

# **Reproductive Health Costs Literature Review**

by

Elizabeth A. Mumford  
Varuni Dayaratna  
William Winfrey  
Jeffrey Sine  
William P. McGreevey

Working Paper Series  
No. 3

July 1998

# **Reproductive Health Costs Literature Review**

by

Elizabeth A. Mumford  
Varuni Dayaratna  
William Winfrey  
Jeffrey Sine  
William P. McGreevey

July 1998





## *Contents*

<b>Preface</b> .....	<b>v</b>
<b>Acknowledgments</b> .....	<b>vi</b>
<b>Abstract</b> .....	<b>vii</b>
<b>I. Introduction</b> .....	<b>1</b>
<b>II. Costing Methods</b> .....	<b>3</b>
<b>III. Comparing Interventions</b> .....	<b>7</b>
<b>IV. Results</b> .....	<b>9</b>
FAMILY PLANNING .....	10
SAFE MOTHERHOOD PACKAGES .....	12
MATERNAL/INFANT NUTRITION AND IMMUNIZATIONS .....	14
OBSTETRIC CARE .....	17
POSTABORTION CARE AND MENSTRUAL REGULATION.....	19
STI/HIV/AIDS .....	21
REPRODUCTIVE CANCERS .....	26
MISCELLANEOUS GYNECOLOGICAL PROBLEMS .....	29
<b>V. Costs of Reproductive Health Services: The Gaps</b> .....	<b>31</b>
<b>VI. Discussion</b> .....	<b>35</b>
<b>Appendices</b> .....	<b>37</b>
APPENDIX 1: ICPD DEFINITION OF REPRODUCTIVE HEALTH .....	38
APPENDIX 2: SEARCH METHODS AND LIMITATIONS.....	39
APPENDIX 3: EXCHANGE RATES USED FOR CURRENCY CONVERSIONS .....	40
APPENDIX 4: INVENTORY OF INTERVENTIONS WITH COST INFORMATION BY COUNTRY .....	41
APPENDIX 5: DETAILED LIST OF FAMILY PLANNING SERVICES WITH COST AND/OR COST- EFFECTIVENESS DATA .....	43
APPENDIX 6: SUMMARY AND DETAILED LISTS OF REPRODUCTIVE HEALTH INTERVENTIONS WITH COST AND/OR COST-EFFECTIVENESS DATA .....	60
<b>Bibliography</b> .....	<b>70</b>

## *List of Tables and Figures*

Table 1	Costing Techniques.....	3
Table 2	Guides to Costing.....	6
Table 3	Availability of Cost Data for Elements of Reproductive Health, Developing Countries (1979-1997) .....	10
Table 4	Cost Estimates for Interventions Related to Safe Motherhood Programs.....	13
Table 5	Cost Estimates for Interventions Related to Maternal Nutrition and Immunizations .....	14
Table 6	Cost Estimates for Interventions Related to Obstetric Care.....	18
Table 7	Cost Estimates for Interventions Related to Abortion and Postabortion Services.....	20
Table 8	Types of Interventions Costed per Disease Identified.....	22
Table 9	Cost Estimates for Interventions Related to STIs and HIV .....	23
Table 10	Cost Estimates for Interventions Related to Reproductive Cancers .....	27
Table 11	Cost Estimates for Interventions Related to Gynecology.....	29
Table 12	List of Reproductive Health Interventions Searched and Cost Data Found .....	32
Figure 1	Relationship Between Health Services and Outcome .....	7

## *Preface*

The goal of the POLICY Project is to create supportive policy environments for family planning and reproductive health programs through the promotion of a participatory policy process and population policies that respond to client needs. Issues of reproductive health finance are central to policy and operational decisions regarding the provision of reproductive health services to clients. POLICY undertook this review to inform policymakers and program planners interested in reproductive health cost information about the availability of information for different services, in various settings, and in different countries. This review is not an evaluation of the quality of the cost methodologies used and does not attempt to provide guidelines for future costing studies.

As a collection of cost studies to determine what information is available, this review is by definition an ongoing effort. Since 1997, there have been several additions to the body of reproductive health costing work, which are not included in this review. POLICY continues to gather information on reproductive health cost studies.

## *Acknowledgments*

The authors gratefully acknowledge the guidance and review of several POLICY Project colleagues. Volkan Cakir of the Reproductive Health Finance Working Group invested a great deal of time in considering the issues inherent in a review of costing studies. Kokila Agarwal, Karen Hardee, Nancy McGirr, and John Stover provided valuable comments regarding the nature of reproductive health, the relative coverage of this paper, and the expected outcomes. Tania Dmytraczenko, now with Abt Associates, initiated the activity while working with the POLICY Project and generously continued to provide her guidance, insight, and comments after her departure.

Thanks go to those colleagues outside the project who responded to our request for papers and leads. We also appreciate the ongoing support of Harry Cross, the POLICY Project Director, and of Barbara Crane and Elizabeth Schoenecker, POLICY Project CTOs at USAID/W. We hope that readers of this paper will inform the authors of additional studies that should be included.

## *Abstract*

The International Conference on Population and Development (ICPD) held in Cairo in 1994 expanded the population agenda far beyond family planning. Reproductive health, and the preventive and curative services that could assure it in developing countries, became a key objective accepted by the more than 180 signatory governments. Left unclear was the cost of this expansion and the source of funds to finance it.

To fill that cost-estimation gap, the authors reviewed 160 publications issued between 1970 and June 1997, most of them about the time of the Cairo conference. The studies highlighted in this paper offer some quantitative data on the costs of reproductive health services identified as part of the Cairo agenda. In this review, cost data are reported for eight categories of reproductive health interventions: family planning, safe motherhood programs, maternal/infant nutrition and immunizations, obstetric care, abortion/postabortion care, STIs/HIV/AIDS, reproductive cancers, and miscellaneous gynecology. The review of family planning cost data is treated differently from other reproductive health interventions. For the seven non-family-planning reproductive health elements, there were about 75 examples (29 studies) of unit cost data. We found only 17 instances of cost-effectiveness estimates (i.e., quantitative relations established between costs and health outcomes) in 15 studies. Furthermore, there were only six studies that referred to inter-disease measures of health outcomes, such as disability-adjusted life-years (DALYs), producing 16 cost-effectiveness estimates.

This literature review identifies the gaps in cost information regarding potential reproductive health interventions within the individual reproductive health elements; within geographic regions; and by costing methods. First, about one-half of the expected reproductive health (mostly clinical) services have been costed in at least one setting. Second, only four countries—Bolivia, Ecuador, Mexico, and Zimbabwe—have cost information for more than two services. Third, there is considerable variability in the costing methods applied. Some of the reviewed studies do not clearly report the method used and the assumptions made in calculating the cost results, nor do they provide all the necessary data such that recalculation of the results is possible. Even given valid and replicable measurement, the cost-estimates as presented are generally not comparable because of the lack of a common denominator.

This review recommends that “filling the gaps” should be based on local information needs, and that issues of quality, access, and integrated service delivery require closer attention. In addition, the ongoing debate about existing measures of health outcomes suggests that alternative methods for comparing health interventions merit attention. Finally, collecting the cost information available in developing countries (i.e., not in the international literature) would be useful both to local decision makers and others involved in setting priorities and allocating resources for health services.



## ***I. Introduction***

---

Ensuring reproductive health, as defined by the ICPD *Programme of Action*, requires that countries provide a range of health interventions (the ICPD definition of reproductive health appears in Appendix 1). Since ICPD, policymakers, family planning advocates, health providers, and international donors have struggled with the challenge of grasping the ideal of reproductive health and applying it to specific programs of action. Growing demand for family planning and reproductive health services and constrained resources, in addition to the expanding list of services required to meet the ICPD mandate, have stimulated efforts to determine which services should be provided. The cost-effectiveness of services is an important criterion for setting priorities.

This literature review seeks to document the known costs of reproductive health services. Because the ICPD definition of reproductive health leaves room for interpretation, it is difficult to match a firm cost estimate to a program of expanded family planning/reproductive health services. A commonly noted global estimate of annual costs for reproductive health is \$17 billion per year, increasing to \$22 billion by the year 2015 [30]. However, such global estimates are less useful for financial planning at the country level. This review seeks to identify gaps in information regarding

- Costs of interventions within a complete reproductive health package;
- Cost information by geographic location; and
- Costing methods.

Nearly 160 references representing work carried out between 1970 and 1997, with an emphasis on research conducted in the 1990s, were reviewed. (Appendix 2 describes the methods used to guide the review.) For the purpose of this review, the data are presented according to seven elements of reproductive health interventions, as follows:

- Safe motherhood programs
- Maternal/infant nutrition and immunizations
- Obstetric care
- Abortion/postabortion care
- Sexually transmitted infections (STIs)/HIV/AIDS
- Reproductive cancers
- Miscellaneous gynecology

These are referred to as the non-family planning/reproductive health elements. Of the studies reviewed, 39 contain cost data for these elements. Although *family planning* is an integral component of reproductive health, the search did not specify literature on the cost of family planning services. Many existing sources document the costs of family planning service delivery in great detail; hence, the focus of this literature review is on the remaining reproductive health elements. However, some primary source information regarding family planning costs turned up during the search; this information (from 20 studies) is included in Appendix 5. The state of knowledge about family planning costs is presented at the beginning of Section IV.

***Focus on Developing Countries.*** This literature review excludes cost studies from developed countries because of the limited applicability of these studies in developing country settings. Interventions that have received considerable attention in wealthier countries are often not

feasible in low-income countries, because of the relative magnitude of the health problems as well as the costs and benefits associated with the corresponding intervention. An example is breast cancer, which does not have as much prominence in developing countries since it is a relatively less significant cause of excess mortality and morbidity. In addition, treatment strategies that are considered standard in developed countries are expensive and may be out of reach in developing countries. Developing countries faced with the need to set priorities are likely to focus on their most prevalent health problems, providing those services that produce the biggest improvement in the health status of the population.

Although the scale of costs and disease patterns in wealthier countries is largely irrelevant to developing countries at present, some developed-country cost studies may eventually prove useful to developing countries. For example, treatments that are currently too costly in poor countries may become more affordable in the future. Shifts in causes of mortality and morbidity in developing countries may redirect attention toward reproductive health problems that are currently high priorities only in affluent countries. In such cases, comparable cost-effectiveness data from the developed world could prove useful. Perhaps most importantly, program planners and researchers could slightly modify and use the costing methods employed in developed countries in developing country settings. For these reasons, studies found in the literature search that reference costs of services or treatments in developed countries remain in the bibliography.

***Organization of the Literature Review.*** Section II provides an overview of the costing methods used in the reviewed studies. Section III discusses issues regarding methods for comparing costs among reproductive health interventions. Section IV presents the results of cost studies (which vary by country, drug regimen, facility level) for different interventions. Section V synthesizes the gaps found in the literature pertaining to which interventions have been costed, which countries and regions have cost data, and which costing methods have been applied. Section VI discusses the research and policy implications of these gaps in knowledge. Studies are referenced in the text and tables by numbers in brackets.

## II. Costing Methods

---

The authors of the reviewed studies rely on a number of different techniques to produce cost estimates. Variations in technique may form the basis for different estimates for the same intervention. Without assessing the validity of a given technique in a given context, an estimate that varies from the norm is not necessarily incorrect.

Mitchell et al. [107] describe five costing techniques that informed the review of methods in this study. These techniques are summarized in Table 1.

**Table 1. Costing Techniques**

<b>Economist model</b>	Allocation of total expenditures across components of a program.
<b>Direct observation</b>	Time-motion studies relating service providers to clients.
<b>Use of standards</b>	Assignment of costs to ideal standards of service.
<b>Institutional cost accounting</b>	Organizational accounts of services and locations.
<b>Cost estimation</b>	Combination of direct observation, standards, accounting, and assumptions.

Source: Mitchell et al. [107].

The economist and the institutional cost accounting models have been interpreted as top-down methods, in contrast to the bottom-up approach of direct observation. Use of standards is an estimation method. There is no consensus in the field of costing reproductive health services, however, whether top-down or bottom-up approaches are more appropriate in a given context; decisions about methodology may be based primarily on what data and resources are available.

The utility and comparability of cost estimates are partially dependent on what inputs are included in the estimate. In general, bottom-up costing methods yield more detailed and accurate estimates of the cost of service delivery, based on direct observation and patient-flow analyses. However, the cost of a reproductive health service is more than the sum of inputs specific to service delivery. Implementing a program of reproductive health services includes start-up, training, IEC, and administrative overhead, which are often overlooked in cost estimates but may constitute a large portion of the actual costs of delivering a service. Programs may also entail significant research and evaluation costs. These other program costs associated with service delivery are more difficult to pinpoint using bottom-up methods.

Top-down methods are more useful if the goal is to include all aspects of program costs, from training to communications to policy activities. Top-down methods also allow for estimation of service delivery costs, although estimates are not as accurate as cost estimates derived from direct observation.

The distinction between top-down and bottom-up costing is parallel to the distinction between costing programs and costing service delivery; however, the relationship is not exact. It is possible to cost service delivery within a program, thus estimating total program service delivery costs, without including the additional program costs mentioned above.

There are important methodological issues regarding the treatment of fixed, recurrent, marginal, incremental, joint, and opportunity costs in studies of reproductive health service costs. These measures represent different components and perspectives of the same cost information. Most of the studies in this review report average costs for service delivery (estimated through a combination of methods).

Average costs include both fixed and recurrent costs, such as a building already in use that does not incur new costs, and staff salaries that must be paid on a regular basis. The literature is divided between the costing of a single service delivery option in a given setting and the examination of the relative costs of alternative treatments or services for a single health condition. This raises issues of the inclusion of fixed costs versus a focus on recurrent costs. If the research question examines whether treatment A or B is the less expensive or more cost-effective in a single hospital setting, the researchers may well decide to focus on those costs that distinguish the cost of treatment A from treatment B. For example, hospital overhead could be considered equal for the two treatments and therefore excluded from the cost estimates, whereas the duration of hospital stay, the level of caregiver required for service delivery, the drugs and supplies associated with each treatment, and so forth are the distinguishing cost inputs in the analysis.

The marginal costs represent provision of one more unit of service in a service delivery setting. For example, if a clinic is already providing antenatal services to a population of 5,000, the marginal cost is that which is incurred by adding one additional client. Assuming that a health care delivery system (the facilities, staff, supplies, etc.) is in place but not operating at full capacity, adding a single client will not increase the fixed costs of service delivery and the marginal cost may be negligible.<sup>1</sup>

Adding new services to an existing list of services or opening a new health facility incurs incremental costs. For example, if a clinic is already providing family planning services, the addition of screening for STIs or providing pap smears is an incremental cost. However, if clinic staff are underworked, filling their workdays with additional service responsibilities will not add to the incremental cost of labor. Thus, it is useful to know the extent to which staff are productive relative to the hours for which they are employed. In costing studies, some economists hold that incremental and marginal costs capture the same concept [36].

Joint costs are shared costs for different services. A waiting room that is used both by pregnant women seeking antenatal care and clients waiting to be tested for reproductive tract infections is a joint cost within the health facility. One way to capture joint costs is to attribute a portion of the cost of providing and maintaining that waiting room to each service for which clients are waiting. From this perspective, if joint costs are not apportioned across relevant services, the cost for each service will be overestimated. If joint costs are appropriately apportioned, the incremental costs of each service are less.<sup>2</sup>

Opportunity costs represent the value of what could have been purchased with those resources had they been spent in an alternative manner. In this literature review, potential opportunity costs include costs for clients/patients and voluntary caregivers, for the time of other

---

<sup>1</sup> The “unit of service” need not be an additional client. For example, it could represent the addition of a fourth antenatal visit to a regimen of three visits.

<sup>2</sup> There is no standard prescription for treatment of joint costs in a cost analysis. Apportioning joint costs proportionately based on services is only one method.

providers whose skills could be better utilized in the provision of alternative services, and for equipment or building space that could serve other purposes.<sup>3</sup> These costs are rarely examined in the studies reviewed in this paper. Inclusion of opportunity costs is a technical issue outside the scope of this paper, but is noted for its relevance to the underestimation or noncomparability of cost estimates depending on whether opportunity costs have been included or excluded in the analysis.

Discussion of cost components and terminology is not meant to advocate for a particular method in reproductive health costing or criticize the methods used in the literature. Rather, the point is to aim for transparency in results so that readers of a costing study can understand which costs are included, what the resulting estimates represent, and how to recalculate estimates in order to standardize results across studies.

The number of instruments designed to guide costing efforts illustrates the lack of consensus regarding preferred methods. The bottom-up approach has been clearly laid out in the field of family planning by Janowitz and Bratt [71]. IPAS (International Projects Assistance Services, a nongovernmental organization based in the United States) has also developed a guide for costing abortion-related services [67]. This literature review is not intended to identify the best or most appropriate costing method for all research in the area of reproductive health costs. Table 2 is a list of available guides, spreadsheets, and models for costing reproductive health services in developing countries or elsewhere.<sup>4</sup> Some of the instruments listed in Table 2 are recent additions to the field and are not represented by published accounts of applications.<sup>5</sup> Thus, we include this list for reference only, without making any statements as to the reliability or validity of any instrument.

---

<sup>3</sup> From a broader perspective, any cost may be defined as an opportunity cost because the expenditure of resources for one good precludes allocation to another good. For example, resources spent on supplies are no longer available for salaries. Opportunity costs in this review are taken to mean the implicit costs of goods foregone.

<sup>4</sup> Because we did not specifically search for tools and methodological guidelines, some useful instruments may not be listed here.

<sup>5</sup> One exception included in this literature review is the study by Brambila and Garcia [16], which uses the IPAS guide [67]. There are several examples in the family planning literature (not reviewed here) that follow the Janowitz and Bratt costing manual [71].

**Table 2. Guides to Costing**

<b>Instrument</b>	<b>Reference</b>
CORE model	Management Sciences for Health [180]
Rational Pharmaceutical Management spreadsheet	Rational Pharmaceutical Management Project [181]
Mother-Baby Package spreadsheet	WHO [178]
Methods for Costing Family Planning Services	Janowitz and Bratt [71]
Estimating Costs for Cost Effective Analysis: Guidelines for Managers of Diarrhoeal Diseases Control Programmes	Program for Control Of Diarrheal Diseases (WHO) [132]
Modeling the Costs of HIV Prevention	WHO [177]
Guide to Evaluate the Use of Resources for Treatment of Incomplete Abortions	IPAS [67]

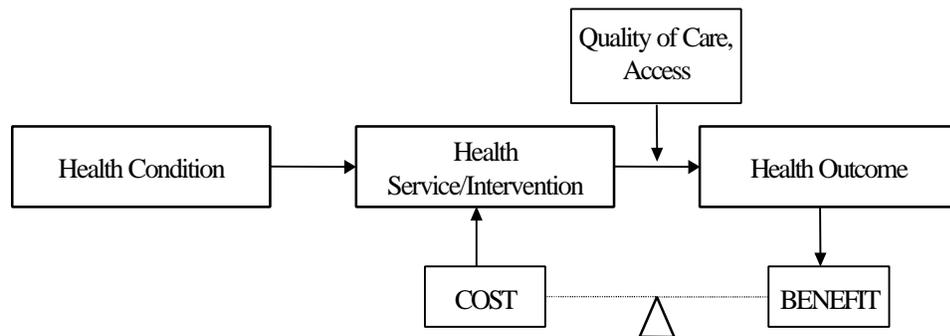
### III. Comparing Interventions

---

Given the breadth of the ICPD agenda and the limited resources available for implementation, program planners need to set priorities both for isolated services and integrated programs. Priorities are set based on a comparison of the relative costs and benefits of interventions.

Different health services incur distinct costs and lead to a range of health outcomes. Different health outcomes have distinct benefits associated with them (see Figure 1). The launch of new services or programs is likely to be preceded by at least some examination—intuitive, or potentially explicit—of the associated costs and benefits. Costs, usually monetary, are easily compared.<sup>6</sup> However, the comparability of health outcomes and their benefits is not as clear. For example, treatment of obstructed labor with a cesarean section ideally results in complete health. But management of HIV infection with a cocktail of protease inhibitors may only delay the advance of a fatal disease. How do we compare the disparate health outcomes and benefits derived from these two treatments? The ability of program planners to weigh the quantitative balance of costs and benefits and assess the relative cost-effectiveness of different services requires the assessment of both costs and benefits in comparable terms.

**Figure 1. Relationship Between Health Services and Outcomes**



Health economists have tried to address the issue of comparability by developing standardized indicators that measure the benefits of health outcomes across different health conditions. Such indicators include disability-adjusted life years (DALYs), quality-adjusted life years (QALYs), handicap-adjusted life years (HALYs), life years gained (LYG), and years of potential life lived (YPLL). Although experts continue to debate the validity of these measures, such inter-disease measures allow program planners to compare the relative benefits of health outcomes, the first step in setting priorities among a range of interventions.

Only five studies reviewed information on benefits in units comparable across different interventions (for example, DALYs). The bulk of information found in the literature pertains to the

---

<sup>6</sup> This statement assumes comparability of the inputs included in cost estimates.

unit costs of reproductive health interventions. As a result, it remains difficult to ascertain the balance between costs and benefits.

Finally, it should be noted that achieving a desired health outcome is not only a function of the provision of the service, but also of the quality of the service and individuals' access to it [58]. Thus, the health benefit is partly determined by the quality of and access to the service. Moreover, quality and access have their own cost dimensions that should be incorporated in the overall cost of the health service/intervention. For example, if existing services are improved by in-service training for care providers or the purchase of more advanced technology that reduces error in diagnosis, costs will be incurred for the sake of improved quality. Likewise, if additional facilities are constructed in a remote area, or mobile services are added to an existing program, costs associated with access are incurred.

## **IV. Results<sup>7</sup>**

---

This section presents cost information for the different categories of reproductive health interventions. In most cases, the range in cost for a particular intervention in a given country is explained by the study context. For example, studies might include, *inter alia*, different drug regimens (e.g. ampicillin-prophylaxis versus penicillin treatment for postoperative infections); locales (e.g., two regions in Bangladesh, 11 hospitals in Mexico); levels of service delivery (e.g., large versus small hospitals); and technological sophistication of the intervention used (e.g., removal of ovaries through laparoscopy versus open surgery). Contextual information is shown for each unit of cost information presented. In addition, although the reported costs have been standardized in 1996 dollars, the vagaries of local inflation may be hidden within the calculated exchanges and standardization procedures.<sup>8</sup> (Appendix 3 reports the exchange rates used to convert costs that were not originally reported in U.S. dollars.)

Furthermore, costs incurred in the public sector will not necessarily be the same as those incurred in the private sector and vice versa. This distinction is relevant to program planners who seek to build on existing services to form an integrated reproductive health package. This review does not highlight whether the costs incurred in providing a service are public or private sector costs, although there are examples of both.

In using and comparing the cost information presented in this section, it is essential to keep in mind that different studies use different methods and inputs in costing similar interventions, and many important reproductive health interventions lack cost information and, hence, do not even appear in the tables. Because of its distinct nature, the treatment of family planning in this section differs from the seven other reproductive health elements. Results for the non-family-planning elements in this section consist of detailed information from a range of individual cost studies. However, given the relatively advanced state of knowledge and the many existing sources on family planning costs, the results presented for the family planning element are less comprehensive and are based primarily on previous literature reviews.

Table 3 shows the availability of information across reproductive health elements and geographic areas. There are more studies available pertaining to costing of STIs/HIV/AIDS interventions than for other elements of reproductive health. With the exception of family planning, costs of reproductive health services have been most frequently studied in Africa and Latin America. Certain elements have received more attention in certain regions; for example, STIs/HIV/AIDS costing efforts have been more heavily concentrated in Africa than elsewhere.

---

<sup>7</sup> Using the cost estimates presented in this section requires careful attention to the contextual information; for more detail, please refer to the original studies.

<sup>8</sup> For studies in which the original year of the value of the reported currency is unclear, the date of the study's publication is noted in parentheses in the tables.

**Table 3. Availability of Cost Data for Elements of Reproductive Health, Developing Countries (1979-1997)**

Elements of Reproductive Health	Number of Studies <sup>9</sup>	Countries Referenced			
		Africa	Asia	Latin America	Other
Family Planning	20	Zimbabwe	Bangladesh Indonesia Pakistan Thailand	Columbia Dom. Rep. Guatemala Honduras Mexico	
Safe Motherhood Programs	3	The Gambia Nigeria			
Maternal Nutrition and Immunizations	6	Malawi Zimbabwe	Indonesia	Ecuador Guatemala Mexico	
Obstetric Care	8	South Africa Tunisia Uganda Zimbabwe	Bangladesh	Bolivia Ecuador Mexico	
Abortion/Postabortion Care	6	Kenya, Nigeria, Tanzania	Bangladesh	Bolivia Mexico	
STI/HIV/AIDS	14	Kenya Tanzania Zambia Zimbabwe Sub-Saharan Africa	Burma	Mexico	“developing countries” “various sites” Lebanon
Reproductive Cancers	8	Uganda Zimbabwe	Thailand	Bolivia Brazil Ecuador Honduras Mexico	
Miscellaneous Gynecology	5	Zimbabwe		Bolivia Ecuador Honduras Mexico	

### ***Family Planning***

The literature pertaining to family planning costs is rich relative to the availability of cost data for other reproductive health services. Furthermore, several existing sources, which are discussed below, provide an overview of the costs of family planning service delivery. Hence, this literature does not present an exhaustive list of studies that report cost estimates for family planning. However, the search for literature regarding other reproductive health costs yielded 20 studies on family planning costs, which are included in Appendix 5.

<sup>9</sup> Some studies provided data for more than one element.

Cost information is available for the following specific contraceptive methods: female and male sterilization, condoms and other barrier methods, pills, IUDs, and injectables, hormonal implants, and foam. Several of the studies cost entire family planning programs, of which the contraceptive methods included are not always specified. Cost data are also available for a range of service delivery mechanisms, including public and private clinic-based services, government hospitals, community-based distribution, social marketing programs, and mobile service units. The 20 studies cover 10 countries.

**Previous Literature Reviews.** Surveys of the family planning cost literature date back to 1983 when Gillespie et al. [50] reviewed 73 studies published between 1966 and 1981. Their review presents data for more than 30 countries pertaining to the cost-effectiveness of family planning. Gillespie et al. report on the type of cost-effectiveness ratio used in each study (cost per couple-year of protection (CYP),<sup>10</sup> cost per acceptor, and/or cost per new acceptor) without presenting quantitative cost information. Neither the costing methods applied nor the quality or reliability of the data in each study was assessed.

More recent surveys of the family planning cost literature include Jensen [77] and Janowitz and Bratt [70]. Jensen reviews cost and cost-effectiveness results (cost per CYP, cost per averted birth, cost per user) from family planning operations research projects in nine countries. Results pertain to community-based distribution (CBD) programs, clinics/health posts, school and factory-based programs, home visits, integrated services, and government hospitals. Janowitz and Bratt compile a summary of costs per CYP for pills, condoms, IUDs, and sterilization in 13 countries based on 15 cost studies. Service delivery mechanisms addressed in these studies include clinic-based services, CBD, and social marketing. Six of these studies [19, 92, 104, 124, 152, 168] are included in Appendix 5. However, the raw data reported in Appendix 5 are taken from the source articles and are, therefore, not comparable to the results in the Janowitz and Bratt review, which standardized the cost information for purposes of comparability.

The results from the 15 studies summarized by Janowitz and Bratt demonstrate the widely varying costs of providing family planning services. The authors provide a comprehensive analysis of the reasons such cost variations exist even within similar combinations of methods and delivery systems, which include the variability of costing methodologies and inputs included, variability of program outputs, and variability in program settings (i.e., differences in level of demand and program capacity, population density, medical infrastructure, price of inputs, and level of technology).

Two articles, Huber and Harvey [65] and Barberis and Harvey [8], provide multicountry assessments of the cost-effectiveness of various family planning service delivery modes. Huber and Harvey use project-level expenditure data from 63 projects in 10 countries (three each in Africa and Asia, and four in Latin America) to estimate cost per CYP for both urban and rural settings for full and mini-clinics, sterilization clinics, CBD, social marketing, and CBD combined with full and mini-clinics. These data, presented by project and country, are not disaggregated by contraceptive method. Barberis and Harvey seem to replicate the methodology of the 1989 study using more recent (early 1990s) project-level expenditure data in 14 countries (five in Africa, four in Asia, three in Latin America, and two in the Middle East). Finally, Labbok et al. [89] review four studies on

---

<sup>10</sup> A CYP corresponds to the family planning services needed to protect a couple from an unwanted pregnancy for an entire year.

the cost-effectiveness (cost per CYP) of natural family planning and breastfeeding programs in Colombia, Kenya, Liberia, and Zambia.

For the purposes of comparative economic analysis, family planning is a special case among reproductive health interventions. The most common effectiveness measure for family planning is the CYP, which is a measure of contraceptive coverage rather than direct health improvement or benefit as would be defined in a cost-benefit analysis. For this reason, the effectiveness or benefits derived from other reproductive health interventions examined in this review cannot be meaningfully assessed in terms of CYPs. Similarly, an accounting of family planning in terms of health improvement (e.g., DALYs, QALYs, etc.) would leave important benefits of family planning unaccounted for. It is essential to overcome this conceptual difficulty in order to effectively set priorities for reproductive health interventions.

### ***Safe Motherhood Packages***

While the concept of safe motherhood [160] includes many interventions detailed in other elements (including obstetric care, maternal nutrition and immunizations, safe abortion management, and family planning), in the literature reviewed here it is treated as a program rather than isolated interventions. However, the package of services constituting safe motherhood is not clear—none of the studies provides detailed information about the components of a maternal health service program—and thus cost estimates are not comparable.

A World Bank document proposing strategies for safe motherhood in the late 1980s [160] includes prenatal screening and care, supervised delivery, emergency treatment for obstetric complications, hysterectomy as required for sepsis, and family planning. A second study [47] describes a package that is limited to mobile clinic services: surveillance of pregnant women for early enrollment in antenatal care, treatment (including emergency) of antenatal care problems, and referral as required. The costs of regularly available services at two fixed sites that support the mobile clinic are also included although not defined in this source. The study examining quality service on the Bamako Initiative [117] builds on assumptions of standards of care, such as the minimum number of service providers or vehicles that should be available within the program, rather than on individual health services.

### **Results**

The information collected by these broad studies and presented in Table 4 is similar in that the costs refer to a program of maternal health services. Beyond that, results are not comparable because the types of services included, the level of service delivery, and the distinction between marginal and total costs vary. Knowing the unit costs that contributed to these aggregate figures would put this information on the same level as the data reported for other elements in this review.

**Table 4. Cost Estimates for Interventions Related to Safe Motherhood Programs**

<b>Intervention</b>	<b>Location/ Date<sup>11</sup></b>	<b>Cost (1996 constant \$)<sup>12</sup></b>	<b>Study Reference and Notes</b>
Illustrative safe motherhood programs	Not specified <sup>13</sup>	\$0.51, \$1.60 per capita \$5,128, \$6,677 per maternal death averted \$2,564, \$3,339 per death averted	[160] Comparison of limited and moderate effort programs.
Quality improvement of maternal care	Nigeria 1994	\$425,966 - 478,583 (total incremental costs for local government areas(LGUs))	[117] LGUs represent 12 facilities in each of two regions.
Mobile maternal health care	The Gambia 1991	\$14.42, \$38.05 per visit \$517.48, \$2,405.86 per death averted \$14.77, \$78.13 per life year gained \$48.48 - 360.77, \$232.24 - 1,277.34 per LYG	[47] Average costs in two sites. Cost-effectiveness measures reflect marginal costs for expansion under best and worst case scenarios. Cost per discounted LYG reflect discount rates of 3%, 6%, and 10% for both scenarios.

### **Methods**

Costing quality improvements under the Bamako Initiative [117] includes only costs to the public sector and to the initiative's program resources. The incremental costs of implementing minimum quality improvements at the facility level are aggregated to estimate total incremental costs. Costs are estimated in terms of variable (pertaining to service utilization) and fixed (personnel, equipment, and vehicles) costs. In The Gambia [47], the cost estimates are a sum of capital and recurrent costs, referrals, and direct and indirect costs to the patients. The estimates of program costs through the World Bank strategies [160] rely on the application of Asian and African experience in providing services to hypothetical populations and environments. Annual operating costs of the program [160] include training, supervision, health education, and other costs not usually included in estimates of single intervention service delivery. In all three of these studies, the absence of information regarding the population size covered within a geographic area makes recalculation of the program costs in other settings difficult.<sup>14</sup>

### **Interpretation**

The authors of studies pertaining to the costs of safe motherhood programs have attempted to provide cost information for a large body of services. Because these services are not a constant package, comparing the resulting cost estimates is difficult. This is particularly true for the study that examines the cost of "quality improvement of maternal care" [117], which focuses on

<sup>11</sup> Not all studies report the date of the study. For these studies, the appropriate value of the currency in this review is estimated based on the date of the relevant sources' publication; these dates are shown in parentheses in subsequent tables.

<sup>12</sup> Appendix 6 details whether the costs found are unit costs or measures of cost-effectiveness—for simplicity of presentation, these two types of information are presented together in the tables.

<sup>13</sup> Study 160 is based on estimation for developing countries in 1993. Still, the reported estimates have been inflated for 1996 prices.

<sup>14</sup> Study 47 provides service utilization data, but the underlying population size is not presented.

structure and quality of design. Although this study does refer to a process of identifying the necessary components of safe motherhood care, personnel requirements, and the critical and noncritical supplies and equipment, it is unclear whether costs represent additional units of service.

As noted, presumably the aggregate costs for a package of services are built on data pertaining more specifically to individual interventions; however, the aggregate figures may be useful even without the detailed service delivery costs. Program planners may approach provision of reproductive health services from two perspectives. One, an existing program of services can be enhanced with the addition of new services or heightened provision of ongoing services. In this setting, knowledge of the cost of adding one or two particular services will be useful (although likely to be an overestimate if synergies within the ongoing program serve to bring costs down). Two, given an initial void in services, a package of new services can be created as an integrated program. Costing a package of integrated services such as safe motherhood is useful to program planners in the second scenario.

Although no cost data were provided, an article by Diop and Leighton [38] provides a useful framework of a costing methodology for safe motherhood services. This article outlines three strategies identical at the administrative level but different at the service-delivery level (community-based IEC, trained birth attendants, and community-based detection of risk factors). However, the study itself has not been implemented.

### ***Maternal/Infant Nutrition and Immunizations***

Immunizations and nutritional supplementation for pregnant women are specific antenatal components of safe motherhood. Two studies examine dietary supplementation [107, 127] and four studies [12, 60, 144, 151] present information about maternal immunizations.<sup>15</sup> Breastfeeding is also included in this element for its impact on infant nutrition and immuno-suppressive effects.

One group of studies focuses on the health of infants [12, 64, 144]. One study, which approaches reproductive health as a package [107], examines costs for adolescents and aging women beyond their reproductive years. Two studies [60, 107] provide information particular to pregnant women's health, and the final study in this category [127] costs an intervention intended to improve the health of "high-risk persons," defined as women of reproductive age and children under age six.

#### **Results**

The unit cost for each of the interventions in the element, shown in Table 5, is under \$5 per visit (for those services that are visit-oriented, rather than commodity delivery). The exceptions are the Zimbabwe and Mexico estimates, which include an exam and necessary counseling. Comparison of cost-effectiveness is difficult because there is no common

**Table 5. Cost Estimates for Interventions Related to Maternal Nutrition and Immunizations**

<b>Intervention</b>	<b>Location/ Date</b>	<b>Cost (1996 constant \$)</b>	<b>Study Reference and Notes</b>
---------------------	---------------------------	--------------------------------	----------------------------------

<sup>15</sup> Study 151 (which appears in Appendix 6) has not been included in Table 5 because the emphasis of the study is on child vaccination with some information on maternal tetanus immunizations included.

<b>Immunizations</b>			
Maternal tetanus immunization	Indonesia 1985	\$0.80-3.39 per completed immunization \$38.14-317.80 per neonatal death averted	[12] Range reflects coverage levels, crash vs. routine program, and different counties. Assumes one neonatal death averted for every 48 women receiving full immunization.
<b>Prophylaxis</b>			
Antenatal chloroquine chemoprophylaxis	Malawi 1988	\$14.01 per infection prevented	[60] Pregnant women.
Anti-malarial drug regimen	Malawi 1992	\$10.96-123.90 per case of low birth weight prevented	[144] Range reflects three different drug regimens.
<b>Maternal nutrition supplements</b>			
Vitamin A supplementation	Guatemala 1991	\$1.10- 4.69 per high-risk person year of adequacy achieved \$0.73-4.09 per high-risk person reached	[127] Range reflects three strategies: fortification of sugar, capsules, nutrition education.
Iron and folic acid supplementation tablets	Mexico 1994	\$1.25 per visit	[107]
Iron and folic acid supplementation tablets	Zimbabwe 1994	\$1.25 per visit	[107]
Exam and iron supplements	Mexico 1994	\$4.17 for adolescents	[107] Exam not defined in source.
Exam and iron supplements	Zimbabwe 1994	\$5.10 for adolescents	[107] Exam not defined in source.
Exam and calcium supplements	Mexico 1994	\$7.70 for aging women	[107] Exam, aging women not defined in source.
Exam and calcium supplements	Zimbabwe 1994	\$6.08 for aging women	[107] Exam, aging women not defined in source.
Breastfeeding promotion, education counseling	Brazil 1993	\$2.15 per birth; \$3.82 per diarrheal case averted; \$586.54 per diarrheal death averted; \$12.58 per DALY gained	[64]
Breastfeeding promotion, education counseling	Honduras 1993	\$3.00 per birth; \$7.20 per diarrheal case averted; \$862.18 per diarrheal death averted; \$20.52 per DALY gained	[64]
Breastfeeding promotion, education counseling	Mexico 1993	\$0.30 per birth; \$1.17 per diarrheal case averted; \$202.99 per diarrheal death averted; \$4.01 per DALY gained	[64]

denominator; however, one study [12] shows that routine immunization programs are more cost effective than targeted one-shot campaigns.

### Methods

One study includes capital costs in its estimation [127], whereas the others focus on recurrent costs [12, 60, 144]. The article that examines supplementation most comprehensively

[107] is limited to daily service delivery costs—primarily labor and drugs—and thus excludes overhead and indirect costs. In the study of a maternal tetanus immunization program [151], the time of the volunteers who conducted the mass campaign is valued on the scale of entry level Ministry of Health salaries; otherwise, opportunity costs are not examined in this selection of studies.

Startup costs are excluded from the estimate of the breastfeeding promotion program [64], which includes maintenance costs only. Unit costs are calculated from expenditure information, market prices, and replacement costs, taking depreciation into account. The variation in costs among countries may be partly attributed to the baseline level of formula used in each hospital.

As in any study of treatment, effectiveness is a function not only of the treatment efficacy but also of the patient's compliance; therefore, comparing the effectiveness of comparable interventions must include this component in the analysis. The comparison [144] of a two-dose regimen of sulfadoxine-pyrimethamine (SP)—found to be more cost-effective alone than SP in combination with chloroquine (CQ) or CQ alone—includes compliance as a variable.

### **Interpretation**

A comprehensive package of reproductive health services could include micronutrients, vitamins, and other nutritional supplements and programs to ensure sufficient caloric intake, according to ICPD recommendations. The literature pertaining to maternal and infant outcome due to nutritional deficiencies provides some information about supplementation but does not examine the issue of sufficient caloric availability or intake. This may partly be a function of the method of our search (which focused on health and population), as nutritional deficiencies may be more closely examined in relation to poverty.

Immunizations (notably the Expanded Program on Immunization (EPI)) are generally a component of child health rather than reproductive health. Where immunizations pertain to maternal health, they may be included in a program of safe motherhood rather than as isolated interventions.

For both immunizations and supplementation, the focus of attention here is child health rather than maternal or women's health. This gap in the literature perhaps reflects the reality of health needs and international attention.

## ***Obstetric Care***

Nine studies present information on obstetric care. Within this category, costs are assessed for the following interventions: antibiotic treatment for ectopic pregnancy, hernia, and cesarean-section (c-section) deliveries; normal and c-section delivery; pregnancy testing; ultrasound exams; antenatal visits; and postpartum care.

Four of the articles present cost comparisons. Two articles [13, 137] compare the costs of two different drug regimens to treat postoperative infection associated with gynecological surgery. A third article [49] compares the costs of routine versus selective use of ultrasonography among pregnant women; and a fourth study [143] compares the cost of c-section versus normal delivery. The remaining articles [28, 43, 93, 107, 156] present absolute costs for pregnancy tests, antenatal visits, postpartum care, and ultrasounds. Only one study [93] presents cost-effectiveness data.

### **Results**

Given the widely varying nature and purposes of the obstetric interventions presented in Table 6, there is little opportunity for making cost comparisons across interventions. However, preventive interventions, such as antenatal and postpartum care, are less costly per unit of services delivered than curative/surgical procedures, such as antibiotic treatments for complications related to pregnancy.<sup>16</sup> As with all service delivery costs, this result may not hold true when the service is provided as part of an integrated package. Additionally, without an effectiveness measure, there is insufficient information to determine which interventions are more cost-effective.

Results from two articles [13, 137] indicate that it is less costly and more effective in terms of patient outcome to use a prophylactic drug regimen to prevent postoperative infections resulting from gynecological surgery. For example, Reggiori et al. [137] finds that single-dose ampicillin prophylaxis with or without metronidazole, although rarely used in developing countries, is less costly and more effective than a standard penicillin treatment for postoperative infections associated with ectopic pregnancies, hernias, and c-sections.

---

<sup>16</sup> There may not be a direct relationship between preventive and curative services, which could render a comparison of costs irrelevant.

**Table 6. Cost Estimates for Interventions Related to Obstetric Care**

<b>Intervention</b>	<b>Location/ Date</b>	<b>Cost (1996 constant \$)</b>	<b>Study Reference and Notes</b>
Admission and antibiotic treatment for postoperative infection: ectopic pregnancy	Uganda 1992	\$30.04 per patient \$23.57 per patient	[137] Higher cost represents postoperative treatment with procaine penicillin; low cost represents ampicillin-prophylaxis.
Admission and antibiotic treatment for postoperative infection: hernia	Uganda 1992	\$26.75 per patient \$20.94 per patient	[137] Higher cost represents postoperative treatment with procaine penicillin; low cost represents ampicillin-prophylaxis.
Antibiotic treatment for postoperative infection: c-sections	Uganda 1992	\$43.09 per patient \$27.52 per patient	[137] Higher cost represents postoperative treatment with penicillin; low cost represents ampicillin-prophylaxis.
Antibiotic treatment for c-sections	Tunisia 1991	\$878 per patient \$87.92 per patient	[13] Higher cost represents treatment with curative antibiotics in the absence of antibiotic prophylaxis.
Normal delivery	Bolivia 1991	\$27.91 per delivery	[143]
Cesarean delivery	Bolivia 1991	\$103.84 per delivery \$55.83 per delivery	[143] Higher cost reflects a cesarean delivery with complications. Lower cost represents without complications.
Pregnancy test	Zimbabwe 1995	\$1.57-2.29 per visit	[28] Range reflects five clinics.
Ultrasound	South Africa 1992	\$21.15, \$31.14 per neonatal visit	[49] Higher cost represents routine, as opposed to selective ultrasonography.
Ultrasound	Mexico 1994	\$39.94 per visit	[107]
Antenatal care	Mexico 1994	\$7.19 per visit	[107]
Antenatal care	Mexico 1994	\$4.56 per procedure	[156]
Antenatal care	Ecuador 1996	\$3.35 per visit	[43]
Antenatal care	Bangladesh 1996	\$17.15-89.23 per QALY gained \$28.89-75.32 per QALY gained	[93] Range reflects comparison vs. intervention in two districts each. (The first range is for different frequencies of satellite clinics with addition of EPI services. The second range is for increased staffing and time open at health and family welfare centers in districts with satellite clinic intervention.
Postpartum care	Mexico 1994	\$5.22 per visit	[107]

## Methods

Of the nine articles presenting cost data on obstetric care, four [28, 43, 93, 107] estimate costs of the various inputs associated with provision of the intervention, primarily labor and drugs/supplies. The four studies use an estimation model, combining a mix of available accounting data, direct observation [43, 93], and standard costs (usually of drugs) to arrive at aggregate cost figures. FHI [43] uses in-depth patient flow analysis to allocate joint costs to different types of visits, includes clinic infrastructure costs, and uses annualized economic costs of capital to calculate cost of capital. This is the only study of the six that examines the opportunity cost and depreciation cost of capital. Levin et al. [93] use randomized intermittent observation to apportion personnel time, overhead costs, other recurrent costs (supplies, building maintenance, and drugs) and client travel costs (but not opportunity costs) to various interventions. Collins et al. [28] use a bottom-up method, which identifies standard types and input amounts needed to provide the service, then assigns costs (standard drug costs, salaries, etc.) to these inputs. Rent, telephone, and electricity costs are allocated to each service in the same proportions as client-related staff time per service. Indirect costs, such as provincial and headquarters supervisory and overhead costs, are also included. Mitchell et al. [107] do not take into account overhead and capital costs.

Rosenthal and Percy [143] allocate costs of supplies/materials, drugs, and fixed costs to different cost centers (surgical theatre/delivery room, general ward, septic ward, neonatal unit, etc.), estimating the costs of different reproductive health interventions by determining the number of days a patient would spend in each cost center for a given intervention. Personnel costs are not included.

Reggiori et al. [137] employ a less sophisticated estimation method, using international drug costs and hospital operating costs for a single admission day to calculate cost per patient. Suarez and Brambila [156] use organizational accounting information to estimate costs. Cost calculations based on “local tariffs (scale of benefits)” [49] are less transparent.

### **Interpretation**

If a comprehensive package of obstetric care is taken to be antenatal care, clean and safe delivery procedures, and postpartum care [178], these data do not provide a comprehensive picture for any one country. The feasibility for adjusting data from one country for use in another is not clear. If this is possible, perhaps a combination of the data for Bolivia and Mexico would give a complete picture of the costs of obstetric care in a Latin American country. Notably missing from the literature, however, is the cost of emergency obstetrical care, often a flashpoint in discussions of the ICPD *Programme of Action*.

## ***Postabortion Care and Menstrual Regulation***

Six papers presented cost results related to postabortion care or menstrual regulation. Three major issues were addressed in these papers:

- The costs of abortion or postabortion care by manual vacuum aspiration (MVA) and/or standard surgical methods [16, 80, 83, 96].
- Comparisons of the costs of postabortion care by manual vacuum aspiration and standard surgical methods [80, 96].

- The medical costs of complications arising from abortions [88, 143].

## Results

The reported costs of MVA and surgical methods for abortion and postabortion care vary widely.

Table 7 summarizes some of the results. MVA is invariably reported to be less expensive than surgical methods for postabortion services, mainly because of the reduced need for hospitalization. Moreover, there are small savings even for the services directly related to the procedure (e.g., drugs and supplies).

Distinct from the comparison study, one study [88] reports on the costs of complications from illegal abortions in Nigeria. The average cost per patient was \$298 with considerable variation depending on the prognosis. Treatment costs for incomplete abortions in Bolivia [143] also vary considerably depending on complications, as may be expected.

**Table 7. Cost Estimates for Interventions Related to Abortion and Postabortion Services**

Intervention	Location/ Date	Cost (1996 constant \$)	Study Reference and Notes
MVA	Mexico 1991	\$74.10 per case	[80]
MVA	Bangladesh 1986	\$3.17-7.80 per case	[83] Range reflects total average cost for service alone, service + client leaving with FP method, service + client returns for follow-up visit; including/excluding client opportunity costs.
MVA	Kenya 1991	\$3.31-5.91 per case	[80] Range reflects different hospitals.
MVA	Tanzania 1992	\$1.91 per case	[96]
Surgical (dilation and curettage)	Mexico 1991	\$89.32-265.95 per case	[80] Without the high outlier, the upper limit is approximately \$150.
Surgical (unspecified)	Mexico 1996	\$192.22 per case	[16] Includes counseling on family planning.
Surgical (dilation and curettage)	Kenya 1991	\$4.50-17.19 per case	[80] Range reflects different hospitals.
Surgical (evacuation by curettage)	Tanzania 1992	\$4.75 per case	[96]
Treatment for septic complications arising from illegal abortions	Nigeria 1987	\$297.88 per case	[88]
Treatment of incomplete abortion	Bolivia 1991	\$26.13, \$93.12 per case	[143] Higher cost represents incomplete abortion with complications; lower cost is without.

## Methods

The four studies presenting the costs of abortion and postabortion care were careful investigations of the costs of personnel time, supplies, equipment, and often building rental and maintenance. The study on the complications of septic abortions [88] used the cost of medicines, blood, and procedure prices based on “hospital costing policy.”

Only one study [143] examines the opportunity costs involved, possibly representing a considerable underestimation of costs. For example, it has been documented elsewhere [73, 74] that family planning workers in Bangladesh have considerable slack in their schedules, meaning that additional work could be added to their load without actually incurring additional personnel costs. Also, training costs were not included.

### **Interpretation**

For the most part, the costs presented in these studies were for procedures or incidents rather than costs per birth averted or cost per DALY or QALY gained.<sup>17</sup> Therefore, none of these estimates would be immediately useful for use in assigning priorities to interventions.

Cost per birth averted is not a good measure for abortion-related services. General consensus holds that contraceptive methods (hormonal, barrier, voluntary sterilization, etc.) are preferred to abortion on medical grounds as a means for averting births. The availability of abortion and postabortion medical services, however, avert complications from illegal or nonclinical abortions. Potentially, cost data presented here could be combined with estimates of the improved DALYs resulting from safe versus unsafe abortions [69] to produce estimates on a common effectiveness scale.

### ***STI/HIV/AIDS***

Twelve articles presented cost information in the field of STIs/HIV/AIDS. This information specified diagnoses under the general rubric of sexually transmitted infections: chancroid, gonorrhea, chlamydia, syphilis, trachoma, gonococcal ophthalmia, and HIV, as well as the generic category of “STDs” (sexually transmitted diseases). Furthermore, costs are assessed for several levels of intervention: surveillance, prevention, screening, detection, and treatment. Table 8 summarizes the categories for which cost information is available. Often, the cost information represents a package of services; most frequently, this package includes detection and treatment. The target population studied most often in developing countries is pregnant women; costs pertaining to services for partner populations, neonates, and commercial sex workers are also examined.

---

<sup>17</sup> The exception is the Bangladesh study [83] that presented some estimates of cost per birth averted.

**Table 8. Types of Interventions Costed per Disease Identified**

Condition	Surveillance	Prevention	Screening	Detection	Management/ Treatment
Chancroid		x			
Chlamydia		x		x	x
Gonorrhea		x			
Syphilis		x	x	x	x
Trachoma		x			
Gonococcal ophthalmia					x
HIV	x	x		x	x
“STDs”				x	x

## Results

Many of the studies in this element demonstrate the extreme sensitivity of the cost-effectiveness of interventions to prevalence rates, target populations (core versus noncore groups), and rate of partner change among members of the target population. These factors, together with site of service delivery, the geographic (local and national) location, and the inputs to the cost estimate, help explain the variability in cost and cost-effectiveness estimates reported for any given intervention.

Three studies [111, 121, 122] suggest that measures such as condom distribution and STD management/secondary prevention are more cost-effective when targeted to core or high-risk groups with high rates of partner change, such as commercial sex workers, and high levels of prevalence and transmission efficiency. One study [122] indicates that blood screening, while not cost-effective at low prevalence rates, is one of the most cost-effective interventions for slowing the spread of AIDS in areas where prevalence is greater than 5 percent.

Most of the estimates regarding preventive efforts come from a single study [121] that presents cost-effectiveness in terms of DALYs. Whereas it is not valid to directly compare these estimates with unit costs for treatment, the results suggest that prevention measures are not necessarily less costly than treatment.

**Table 9. Cost Estimates for Interventions Related to STIs and HIV**

<b>Intervention</b>	<b>Location/ Date</b>	<b>Cost (1996 constant \$)</b>	<b>Study Reference and Notes</b>
<b>Chancroid</b>			
Prevention	Developing countries 1990 <sup>18</sup>	\$47.96, \$651.82 per DALY saved	[121] Core, noncore target groups. Core reflects \$450 per person year of protection, \$45 in noncore.
<b>Chlamydia</b>			
Prevention	Developing countries 1990	\$3.40, \$12.56 per DALY saved	[121] Core, noncore target groups. Core reflects \$450 per person year of protection, \$45 in noncore.
Detection	“Various sites” (1992)	\$4.38 per case	[145] Pregnant women.
Treatment	“Various sites” (1992)	\$3.82 per case	[145] Pregnant women.
Detection & Treatment	“Various sites” (1992)	\$84.92-307.88 per adverse outcome averted	[145] Pregnant women. Range reflects prevalence of 5, 10, 20%.
<b>Gonorrhea</b>			
Prevention	Developing countries 1990	\$1.92, \$10.14 per DALY saved	[121] Core, noncore target groups. Core reflects \$450 per person year of protection, \$45 in noncore.
<b>Syphilis</b>			
Prevention	Developing countries 1990	\$1.37, \$5.44 per DALY saved	[121] Core, noncore target groups. Core reflects \$450 per person year of protection, \$45 in noncore.
Screening	Lebanon (1994)	\$1.65 per screening	[1] Antenatal.
Screening	“Various sites” 1987	\$12.42-93.46 per adverse outcome in infant averted	[10] Antenatal. Range reflects prevalence of 1-15%.
Screening	Tanzania 1990	\$0.67 per woman screened	[86]
Screening & Treatment	Kenya 1993	\$27.78 per case treated \$51.28 per case averted	[76] Antenatal.
Detection, Treatment, & Education	Zambia (1990)	\$0.70 per pregnant woman \$14.07 per adverse outcome averted	[61] Seroreactivity = 10%.
<b>Trachoma</b>			
Prevention	Burma (1996)	\$54 per visual impairment prevented \$4 per HALY averted	[42]

**Table 9 (cont.)**

<b>Gonococcal ophthalmia</b>			
------------------------------	--	--	--

<sup>18</sup> Authors [121, 122] based cost inputs for this decision-tree analysis on total program costs of several different programs, in 1988 and 1990 U.S. dollars. This review assumes 1990 U.S. dollars for purpose of standardizing in constant 1996 dollars.

Treatment	Kenya (1989)	\$1.72-26.99 per adverse outcome averted	[90] Range reflects 3 treatment options & 2 prevalence levels (1,10%).
Treatment	Developing countries 1990	<\$6.24,>\$130.13 per DALY saved	[122] DALY costs reflect silver nitrate in favorable (prev>1%), unfavorable (prev<.1%) situation. Unit cost lower for tetracycline, higher for silver nitrate.
<b>HIV</b>			
Surveillance	Tanzania 1990	\$1.99 per screening	[86]
Prevention	Developing countries 1990	\$9.32, \$26.51 per DALY saved (without ulcers) \$2.45, \$3.38 per DALY saved (with ulcers)	[121] Core, noncore target groups. Core reflects \$450 per person year of protection, \$45 in noncore.
Prevention	Developing countries 1990	\$0.18, \$286.05 per DALY saved	[122] Screening of blood. Higher DALY costs reflect expensive test, noncore target group, prevalence<.1%. Lower DALY cost reflects inexpensive test, core target group, prevalence>5%.
Prevention, Detection, & Treatment	Kenya (1991)	\$9.02, \$13.53 per case prevented	[111] Commercial sex workers: prevalence=80%. Transmission efficiency=1%. Higher cost/DALY represents 50% condom use; lower cost, 80% condom use. Takes into account secondary infection.
Prevention, Detection, & Treatment	Sub-Saharan Africa 1994	\$3,916.40 per infant infection prevented	[97] Zidovudine for pregnant women. Prevalence=12.5 and 25% perinatal transmission.
Management	Developing countries 1990	\$87.92, \$1,406.80 per DALY saved	[122] Lower DALY reflects clinic costs, \$2/hour, paliative & homecare only, 1 DALY gained. Higher DALY reflects clinic costs of \$10/hour, antivirals, 2 DALYs gained.
<b>“STDs”</b>			
Detection	Mexico 1994	\$30.30	[107] Estimated as part of RH package.
Detection	Zimbabwe 1994	\$19.46	[107] Estimated as part of RH package.
Detection & Treatment	Senegal 1990	\$5.64-19.59	[166] Range reflects male/female, with/out contacts.
Treatment	Developing countries 1990	<\$0.66,>\$58.62 per DALY saved	[122] Lower DALY reflects hourly clinic cost of \$2, target core group, HIV epidemic, prevalence>5%. Higher DALY reflects hourly clinic cost of \$10, noncore group, no HIV epidemic, prevalence<1%.

## Methods

Most of the studies use a cost estimation method that relies on a combination of accounting data and estimated unit costs. Some authors take a top-down approach using total program expenditures or accounts to derive costs for defined interventions [42, 76, 107, 111] while others estimate the costs of inputs and aggregate these cost components to calculate an intervention cost [1, 10, 61]. The third method of cost estimation uses decision-tree models. In these studies, the varying costs are a product of different prevalence levels of the medical condition and different hypothetical treatment regimens [90, 97, 121, 122, 145]. One study looks exclusively at the charges made to clients (i.e., the prices paid for service), which are not costs by definition [166].

Partner referral and treatment is an important component of the costs of STIs, because a single infection can spread exponentially. Over and Piot [121] explain the importance of including in a calculation of costs and benefits the “reproduction rate” of a communicable disease. However, partner referral and/or treatment are included as costs in only two instances [61, 166]. More studies [including 111, 121, 122] take into account the number of secondary cases of HIV/AIDS and/or STIs prevented when calculating the benefits associated with an intervention.

Three sources examine indirect and/or overhead costs [76, 107, 111] and one source includes opportunity costs to the client [97]. Training for caregivers is included in one study [76]. Two sources include counseling and/or education costs [61, 97].

### **Interpretation**

Not all common STIs show up in this collection of information; for example, herpes simplex which may be in remission in a large proportion of the adult population,<sup>19</sup> receives no mention in this collection of studies. Hence, there is no information about the costs of some common STIs in developing countries from this literature.

Not all types of services have been costed; for example, only one source looks at the cost of a surveillance program [86], and screening costs for only one disease are assessed [1]. This raises concern that an important preventive measure is receiving insufficient attention, which constrains efforts to cost a holistic package of services for the element.

Furthermore, the relationship between incidence of classic<sup>20</sup> STIs and HIV infection has not been explored thoroughly. In examining the costs of HIV prevention, only one study [111] explicitly includes the cost of lab tests for syphilis and gonorrhea as relevant to HIV prevention.

The bibliography references developed country studies with cost data related to STIs/HIV. Experiences in developed countries may foreshadow costs in developing countries, thus this body of literature may become relevant to developing countries. In addition, the developed-country literature includes information about the costs associated with sequelae of STIs and HIV/AIDS. With advances in the availability of treatment accompanied by longer survival periods among HIV-inflicted individuals, the costs of associated illnesses will become relevant and create further challenges for tight public health budgets.

---

<sup>19</sup> It may be argued that treatment is unnecessary if the condition is generally in remission. Individuals who become infected may be expected to be in remission at the same rate as the original carriers.

<sup>20</sup> “Classic” is the term used in Jamison et al. [69].

Also included in the bibliography are two articles that do not cost treatment for HIV/AIDS, but lay the groundwork for cost-effectiveness analyses. One uses a scaled index of patient opinion of quality of life and marginal increase in survival times to estimate QALYs for different antiretroviral treatment regimes [125]. The second estimates cost-effectiveness at the program level and lays out a model for conducting a true cost study of 11 policy options for treatment of HIV and AIDS individuals (differentiated as children and adults) [131]. Both of these studies pertain to Thailand.

### ***Reproductive Cancers***

Nine articles present cost information related to three types of cancers: ovarian cancer, breast cancer, and cervical cancer. The studies focus on three issues:

- Absolute costs of managing/treating reproductive cancers [3, 20, 28, 43, 156];
- Relative costs of alternative procedures to treat a cancer—laparoscopic vs. standard surgery for removal of ovaries [161]; hysterectomy vs. less invasive treatment for cervical cancer [107]; and
- Relative costs of two antibiotic regimens for treatment of postoperative infection resulting from hysterectomies [137].

**Table 10. Cost Estimates for Interventions Related to Reproductive Cancers**

<b>Intervention</b>	<b>Location/ Date</b>	<b>Cost (1996 constant \$)</b>	<b>Study Reference and Notes</b>
Adnexectomy for ovarian cancer	Thailand (1995)	\$234.25 per case \$472.27 per case	[161] Higher value represents cost for laparoscopic surgery; lower cost is for an open adnexectomy.
Management of breast cancer	Brazil (1995)	\$1,677.88 per case	[3]
Treatment of cervical cancer	Mexico 1994	\$52.51 per visit (a) \$75.89 (b) \$453.42 (c)	[107] Range reflects three different approaches to treating cervical cancer. Procedure (c) includes hysterectomy, while (a) and (b) include less invasive treatments.
Treatment of cervical cancer	Zimbabwe 1994	\$12.35 per visit (a) \$20.46 (b) \$95.82 (c)	[107] Range reflects three approaches to treating cervical cancer. Procedure (c) includes hysterectomy, whereas (a) and (b) are less invasive treatments.
Detection of cervical cancer	Ecuador 1996	\$2.95 per visit \$3.51 per visit	[43] Lower cost, pap smear; higher cost, lab work.
Detection of cervical cancer	Honduras 1991	\$5.60 per visit \$12.89 per visit	[20] Higher cost represents large clinics.
Detection of cervical cancer	Zimbabwe 1995	\$2.99-9.84, \$3.89 per visit	[28] Pap smear. Range reflects 7 clinics; single figure is a mobile service unit.
Detection of cancer (unspecified)	Mexico (1994)	\$9.67 per procedure	[156]
Antibiotic treatment for hysterectomy	Uganda 1992	\$27.19 \$31.91	[137] Higher cost represents postoperative treatment with procaine; low cost represents ampicillin-prophylaxis.
Surgical removal of tumors	Bolivia 1990	\$166.63, \$96.30 per case	[143] Higher cost reflects removal of a malignant tumor. Lower cost, removal of a benign tumor.

## Results

Different approaches and procedures that address the same reproductive health problem, in the same clinic or hospital, can vary widely in cost [161]. Use of new technologies such as laparoscopic adnexectomy with lower probability of complication and shorter postoperative hospital stays and recovery periods, require the use of expensive disposable supplies and, hence, are significantly more costly to provide. Technically sophisticated procedures cannot be easily integrated into the existing health care delivery system in developing countries.

Detection of cervical cancer costs less in the settings reviewed than treatment of cervical cancer. The relative costs of varying approaches to treat cervical cancer are addressed in one study [107], in which the results show that less invasive procedures, such as cryosurgery or loop excision, are far less costly than hysterectomies.

## Methods

Of the nine articles presenting cost data on reproductive cancers, four [20, 28, 43, 107] distinguish the costs of various inputs associated with provision of the intervention. While inputs costed vary by study, all four studies cost labor, drugs, and supplies. The four studies use an estimation model, combining a mix of available accounting data, direct observation [20, 43], and standard costs (of drugs) to arrive at aggregate cost figures. Two of the studies [20, 43] use in-depth patient flow analysis to allocate joint costs to cost centers; they also include costs of clinic infrastructure, capital, institutional overhead, as well as the opportunity cost and depreciation cost of capital. One study [107] does not take into account overhead and capital costs. Another study [28] uses a bottom-up method that identifies standard types and amounts of inputs needed to provide the service and then assigns costs (standard drug costs, salaries, etc.) to these inputs. Rent, telephone, and electricity costs are allocated to each service in the same proportions as client-related staff time per service. Indirect costs, such as provincial and headquarters supervisory and overhead costs, are also included.

Another of the nine studies [137] uses an estimation method, albeit a less sophisticated one, in which international drug prices and hospital operating costs for a single admission day are used to calculate cost per patient. And another study [156] uses organizational accounting information to estimate costs.

One study [143] allocates costs of supplies/materials, drugs, and fixed costs to different cost centers (*inter alia*, surgical theater, delivery room, general ward, septic ward, neonatal unit) and estimates the costs of different reproductive health interventions by determining the number of days a patient would spend in each cost center for a given intervention. Personnel costs are not included.

The final two studies [3, 161] of the nine also assign costs to the different components that make up the interventions under consideration. One of the studies [161] uses hospital charges from patients' hospital bills to assign costs to inputs and arrive at an aggregate cost estimate; by definition, the prices paid by patients are not costs and can only serve as a proxy. Because this study compares alternate approaches to a health problem, the authors focus on variable costs that represent differences to the institution and, by definition, assume that fixed costs are the same for the two approaches.

### **Interpretation**

The cost information available reflects both detection and treatment of reproductive cancers. Although detection efforts of studies focus on cervical cancers, this may be a function of the search design used for the literature review; educational activities such as promoting self-examination for breast cancer are less likely to appear in the medical literature than clinical exams, for example.

New and sophisticated procedures for detection and treatment of reproductive cancers reduce complications and the duration of hospital stays. In high-income settings, in which hospital daily rates and labor costs are high, these characteristics of their cost structure make such innovative treatment procedures attractive. In developing countries, such innovations are less attractive because labor and hospital costs are lower and, often, economies of scale are not associated with the use of high technology in health care provision. As a result, technologically sophisticated procedures add a significant cost burden to the health care system when used in developing countries. Understanding these characteristics of service costs can help in the process of setting priorities within health systems in developing countries.

## *Miscellaneous Gynecological Problems*

Several interventions that are included in the ICPD definition of reproductive health do not all fall neatly into the elements presented thus far. Six studies present cost information on the following interventions:

- Diagnosis of menstrual problems
- Gynecological examinations
- Infertility management
- Treatment of reproductive tract infections

Overlaps between this element and reproductive cancers occur when a package of gynecological services is costed that includes one or more preventive measures for reproductive cancers (for example, the cost of a basic work-up for menstrual problems which includes the cost of a pap smear).

**Table 11. Cost Estimates for Interventions Related to Gynecology**

<b>Intervention</b>	<b>Location/ Date</b>	<b>Cost (1996 constant \$)</b>	<b>Study Reference and Notes</b>
Basic work-up for menstrual problems	Zimbabwe 1994	\$3.83 per visit	[107] Basic workup includes IUD check, RTI screening, pap smear.
Basic work-up for menstrual problems	Mexico 1994	\$5.45 per visit	[107] Basic workup includes IUD check, RTI screening, pap smear.
Gynecological exam	Ecuador 1996	\$3.08 per visit	[43]
Gynecological exam	Honduras 1991	\$3.52 \$7.42	[20] Higher cost represents large clinic.
Gynecological exam	Mexico (1994)	\$4.68 per procedure	[156]
Gynecological exam	Zimbabwe 1995	\$2.72-6.56, \$3.63 per visit	[28] Range reflects three clinics. Single figure represents mobile service unit.
Treatment of diseases of the female genito-urinary tract	Bolivia	\$44.08 per diagnosis	[143]
Basic work-up for infertility	Zimbabwe 1994	\$3.60 per visit	[107]
Genito-urinary tract infections care	Zimbabwe 1995	\$4.99, \$7.92 per visit	[28] Two clinics.
Basic work-up for infertility	Mexico 1994	\$5.22 per visit	[107]
Infertility management	Ecuador 1996	\$3.36 per visit	[43]
Subfertility	Zimbabwe 1995	\$4.10-9.24, \$5.47 per visit	[28] Range reflects four clinics; single figure is a mobile service unit.

## **Results**

One study [107] examines the cost savings to be derived by providing integrated gynecological services in a manner that takes advantage of economies of scale. The study demonstrates that integrated care in which more than one service is provided during a single visit is less costly than separate visits for each intervention, because many of the services share the same basic cost elements (registration, history/counseling, examination-labor, pelvic examination supplies, etc.) that do not have to be duplicated for each type of intervention. Hence, while a basic work-up for menstrual problems, which includes an IUD checkup, RTI screening, and pap smear, would cost \$3.83 in a clinic in Zimbabwe, the costs of each intervention provided in three separate visits would add up to \$6.13. (The costs of separate visits would be, respectively, \$1.15 for an IUD check, \$2.37 for a pap smear, and \$2.61 for an RTI screening.) The savings of providing integrated services in this setting is equivalent to 40 percent of the cost associated with providing the three services separately.

### **Methods**

Four studies [20, 28, 43, 107] distinguish the separate costs of the inputs essential to the provision of the intervention. The costs of labor and drugs/supplies are considered in all four cases. The four studies use an estimation model, combining a mix of available accounting data, direct observation [20, 43], and standard costs (usually of drugs) to arrive at aggregate cost figures. Two studies [20, 43] use in-depth patient flow analysis to allocate joint costs to different types of visits, include clinic infrastructure costs, and use annualized economic costs of capital to calculate cost of capital. These studies also examine the opportunity cost and depreciation cost of capital. Another study [28] uses a bottom-up method that identifies standard types and amounts of inputs needed to provide the service and then assigns costs (standard drug costs, salaries, etc.) to these inputs. Rent, telephone, and electricity costs are allocated to each service in the same proportions as client-related staff time per service. Indirect costs, such as provincial and headquarters supervisory and overhead costs, are also included. Another study [107] does not take into account overhead and capital costs.

In addition, one study [156] uses organizational accounting information to calculate costs, and another [143] allocates costs of supplies/materials, drugs, and fixed costs to different cost centers (surgical theater/delivery room, general ward, septic ward, neonatal unit), estimating the costs of different reproductive health interventions by determining the number of days a patient would need to spend in each cost center for a given intervention. Personnel costs are not included. Unfortunately, the study does not clearly define the intervention being costed.

### **Interpretation**

None of the articles reviewed present cost information on menopause management, which may be considered component of gynecological interventions.

Although the Bolivia study [143] presents cost information on the treatment of “diseases of the female genito-urinary organ,” there is no definition of the specific “diseases” being addressed. Hence, there are no cost data on specific inflammations and/or infections of the reproductive and urinary tract that may or may not be sequelae of STIs: for example, vaginitis, vulvitis, urethritis, cystitis.

## V. *Costs of Reproductive Health Services: The Gaps*

---

A primary objective of this review is to identify gaps in the costing literature for reproductive health. In doing so, three questions must be asked. One, what is the complete set of interventions that comprises comprehensive reproductive health services? Two, what defines sufficient geographic coverage of regions or countries presenting cost data on a reproductive health package or for a given reproductive health intervention to determine whether a cost estimate is valid for general use? Three, what are the acceptable methods of costing based on available costing studies?

***Reproductive Health Services: The Comprehensive Picture.*** This paper has presented the cost data for those interventions for which data were available but has not definitively identified which specific elements of reproductive health merit further research. While the ICPD *Programme of Action* presents categories of services, there is no exhaustive list detailing appropriate programs or services down to the clinical protocols. Stakeholders in the provision of reproductive health services have attempted to specify what this list may be, but the lack of an official document or consensus undermines both donor and country efforts to define reproductive health packages.<sup>21</sup>

Table 12 presents a list of interventions searched for in this literature review that is clearly oriented toward health (often clinical) services. Literature searches in fields other than population and medicine may reveal additional information about other reproductive health linkages, such as girls' education. Cost information was obtained for about one-half the specific reproductive health problems or interventions in Table 12. Still, information on reproductive health costs is far from comprehensive. With few exceptions, the cost data found for an item are not sufficient to conclude that the costs of that item are known and generalizable to other countries. Even for the element for which the most cost information was found—STIs/HIV/AIDS—there are some services (e.g., treatments for herpes, gonorrhea) that do not appear to have been costed in developing countries. Sufficient caloric intake is a component of safe pregnancy that is not addressed in the literature reviewed here.

Because the individual interventions do not carry equal weight, it is difficult to draw conclusions about the urgency of filling in missing data. The relative importance of costing an intervention, just like the relative importance of providing a service, depends on the country context and the availability of resources.

---

<sup>21</sup> A universal definition does not preclude that every country or situation is a special case and requires its own definition derived from local epidemiological conditions and the broad guidelines of ICPD.

**Table 12. List of Reproductive Health Interventions Searched and Cost Data Found**

RH Element	Specific problem or intervention	Cost Data
<b>Family Planning</b>		
	Contraceptive methods <i>Not directly searched.</i>	✓
<b>Safe Motherhood Programs</b>		
	Safe motherhood	✓
<b>Maternal/Infant Nutrition and Immunizations</b>		
	Maternal nutrition (caloric intake)	
	Maternal nutrition: folic acid	✓
	Maternal nutrition: iron	✓
	Maternal nutrition: vitamin A	✓
	Vaccination: tetanus	✓
	Vaccination: BCG/BGC, DPT, rubella	
	Prophylaxis: malaria	✓
	Low birth weight	
	Oral rehydration salts	
	Breastfeeding	✓
<b>Obstetric Care</b>		
	Pregnancy detection, testing, kit	
	Antenatal care	✓
	Ultrasound	✓
	Ectopic pregnancy	✓
	Pregnancy: pyelonephritis, placenta previa, intrauterine growth retardation, breech presentation, twin	
	Blood pressure monitoring: eclampsia, pre-eclampsia, gestosis, toxemia, pre-toxemia	
	Normal delivery care	✓
	Assisted delivery care	
	Emergency delivery care, obstetric complications: obstructed labor, ruptured uterus, forceps, blood replacement products	
	Cesarean section	✓
	Postpartum care	✓
	Postpartum hemorrhage, infection, sepsis	
	Puerperal sepsis	
	Fistula	
	Obstetric referral	

RH Element	Specific problem or intervention	Cost Data
<b>Abortion/Postabortion Care</b>		
	Abortion prevention	
	Incomplete abortion	✓
	Postabortion care	✓
	(Manual) vacuum aspiration	✓
	Dilation (dilatation) & curettage	✓
<b>STI/HIV/AIDS (prevention, detection, treatment)</b>		
	Gonorrhea (GC)	✓
	Herpes	
	Chlamydia (trachomatis)	✓
	Tridionomiasis	
	Chancroid	✓
	Trachoma	✓
	Ophthalmia neonatorum	✓
	HIV/AIDS	✓
	Microbicides	
	HPV	
<b>Reproductive Cancers</b>		
	Ovarian cancer	✓
	Cervical cancer	✓
	Uterine cancer: hysterectomy	✓
	Breast cancer	✓
	Postpartum endometritis	
<b>Miscellaneous Gynecology</b>		
	Pelvic inflammatory disease (PID)	
	Reproductive tract infection(s)	✓
	Gynecology	✓
	Osteoporosis	
	Infertility	✓
<b>Other</b>		
	Partner referral	
	Male, female circumcision, female genital mutilation, clitoridectomy, infibulation	

An additional perspective on Table 12 is the integration of individual interventions within and between reproductive health elements. For example, the provision of family planning services along with postabortion care is a natural link, given the potential health concerns of the client. However, none of the studies reviewed assess the cost of providing these two services in an integrated setting. Similarly, while providing STD services in concert with family planning may be cost-effective [95], in addition to potentially increasing access to services for the broader population, this review did not find specific attention to cost estimation of integration in the literature.

***Geographic (Regional and Country) Coverage.*** None of the countries studied in the literature have comprehensive cost data for a full range of reproductive health services. Only four countries— Bolivia, Ecuador, Mexico, and Zimbabwe—have cost information for more than two reproductive health element intervention categories (see Appendix 4). Hence, there is not enough information on reproductive health costs to use the data as a criterion in assigning priorities (within a range of different interventions) in any one country. Although it may be possible to piece together standardized cost information from various country settings to calculate the costs of different reproductive health services, it would be important to match countries with comparable programs and economic conditions (such as resource costs, medical infrastructure, population size and density, program maturity and coverage, scale of intervention/program, acceptance of intervention, quality of care, and level of technological capability, etc.).

The relative emphasis on different types of reproductive health problems and interventions varies by region, reflecting to a certain extent passage through the health transition: reproductive cancer costs have been examined relatively more frequently in Latin America than in Africa or Asia, and STIs are more prominent in cost studies for African countries. Because there are relatively fewer cost studies referring to Asian nations in this review, there is no identifiable pattern according to a particular element of reproductive health. While there may be considerably more costing work completed or ongoing in Asian nations, it is not appearing in the same body of literature as for the other regions.

***Methodological Issues.*** The costing methods applied and results obtained in this literature review give rise to several questions of reliability, validity, and transparency. First, not all of the studies clearly report the methods used to calculate the costs, and/or do not provide all the necessary data inputs such that recalculation of the results is possible. Often missing from these studies are a complete list of inputs costed; detailed information on how staff time and overhead are allocated and whether inputs and outcomes are adjusted for depreciation; the base year relevant to the value of the chosen currency or the appropriate exchange rate; information about what constitutes a “visit,” a “treatment,” or another unit measure; and background information on the program setting (the client or population base for which costs were estimated, demand for services, program maturity, etc.). Omissions of this type make it difficult for researchers and program planners to assess the reliability of the cost studies and data, thereby limiting their use in similar program settings.

Second, methods that are clearly documented vary widely, rendering different studies, even within the same country and program setting, largely incomparable. Methodological approaches range from bottom-up, patient-flow analyses [43], to top-down use of institutional accounting reports [156], to calculations based solely on client payments for services [166].

Furthermore, the treatment of joint and capital costs varies among studies. Adding to this lack of comparability is that costing studies do not include a constant or exhaustive list of inputs. Some researchers are thorough in their inclusion of capital, administrative, overhead, depreciation, and opportunity costs. In other cases, such as the comparison of open versus laparoscopic adnexectomy [161], researchers only focused on the variable costs that represent the cost difference to the institution.<sup>22</sup> With few exceptions [38, 42, 47, 76, 111, 121], human capital formation (capacity building through personnel training and education) and supervision are largely excluded from the studies reviewed here.

The variability in methodologies used and inputs costed seems to be driven by two factors. The first is the lack of a standard method to guide researchers costing reproductive health services and programs. By comparison, in the family planning literature, Janowitz and Bratt [71] have developed a bottom-up costing method that outlines step-by-step costing procedures, including standards for apportioning joint costs. The second factor is the widely varying purposes that underlie costing exercises; for example, decision makers may require cost information to select the least costly way to address a given reproductive health problem; develop pricing strategies that recover costs; or set priorities among a wide range of reproductive health needs and interventions, given budget constraints.

Finally, even with consistent and replicable measurement, the results as presented are generally not comparable because of the lack of a common denominator. In the family planning literature, CYP, despite its weakness as a measure of cost-effectiveness [150], has facilitated the comparison of different contraceptive methods delivered through various mechanisms in many different settings and countries. Much of the cost information available in other areas of reproductive health are unit cost data and thus not comparable in terms of benefits. Only six of the 39 studies with cost data present cost-effectiveness results based on a global inter-disease denominator: QALYs, DALYs, HALYs, and LYGs. Other effectiveness measures range from deaths averted and maternal deaths averted to adverse outcome averted and infection prevented. Hence, there has been no systematic effort to reformulate outcomes of reproductive health interventions in light of patient demand or other benefits derived by the service user.

---

<sup>22</sup> These and other methodological issues underpinning the comparability of cost information from different sites are carefully laid out in a review of the family planning cost literature [70] and numerous methodological guides to costing [40, 138].

## ***VI. Discussion***

---

Many donors and countries are striving to respond to the ICPD mandate for an expanded array of reproductive health services; however, the resources available for providing these services are scarce. Hence, decision makers must choose among competing reproductive health needs. Cost information—both measures of unit cost and cost-effectiveness—serves as a critical input into the processes of setting priorities and allocating resources efficiently. This review shows that certain practices are more cost-effective than others in addressing specific reproductive health needs: for example, MVA is repeatedly shown to be less expensive than dilation and curettage in postabortion care; ampicillin prophylaxis is less expensive than postoperative treatment of infections following c-sections and ectopic pregnancies.

Unfortunately, collecting cost information is expensive, in terms of both human and financial resources, and collecting it in a manner that will be useful beyond a local setting is challenging. Ideally, planners would have access to cost-effectiveness information comparable across the range of health interventions, and for which the inputs are clearly specified such that adjustments can be made for different economic and program settings. A global standard costing methodology remains the ideal; however, using a global standard is not necessarily feasible, and the widely varying costing methods used in the studies reviewed here support this point.<sup>23</sup> First, costing studies are, as they should be, driven by local information needs and circumstances, and thus may not be designed to measure the same information. Second, sufficient resources may not be available to meet universal standards, especially if a less comprehensive analysis or a different method satisfies the locally defined information needs.

Third, there is no universally accepted common denominator for comparing cost-effectiveness across health interventions. CYPs, commonly used to evaluate effectiveness across contraceptive methods in population research, are not suitable to measure the diverse outcomes of reproductive health interventions. Researchers continue to debate the utility and merits of DALYs [9, 123], a measure of effectiveness introduced to the health field by the World Bank, and other measures and valuations of health outcomes, such as QALYs, client willingness-to-pay, and health status indices [62, 119], all of which have their own practical limitations and questions of validity. Although this literature review does not focus on cost-benefit analyses, some of the collected resources [1, 97, 161] do consider issues of savings in terms of medical costs or productivity losses averted, to individuals or society. The value of a monetary denominator perhaps requires further examination.

Health researchers continue to collect information on the health impacts of reproductive health interventions. This research is most often done in isolation from the costing research. A useful follow-on to this review would be a synthesis of existing reproductive health costing research combined with the state-of-the-art reproductive health outcomes research. The result of this synthesis would be more detailed preliminary estimates of the cost-effectiveness of reproductive health interventions.

In addition, quality and access—important program components with associated costs and effects on health outcomes—deserve greater attention. Certainly, these characteristics are relevant

---

<sup>23</sup> Moreover, as pointed out in section II on costing methods, there is not yet and may never be consensus among economists regarding a single “best” method for cost estimation.

to resource allocation decisions. Although health outcomes among clients may represent a program's quality and accessibility, there are not clear methods for measuring these program characteristics. For example, while DALYs were designed to enhance the equity of services for the most disadvantaged people [63, 113], the measure does not clearly serve this purpose [123]. The costs associated with such efforts are examined in only two studies [76, 117]. Greater attention to these issues within a cost-effectiveness framework is needed.

Another topic that merits greater attention is the cost of providing reproductive health services in integrated settings. The integrated delivery of reproductive health services, together with other health services, often enhances the efficiency of service delivery by taking advantage of joint costs. For example, some reproductive health services such as testing for STDs and postabortion care can be provided alongside family planning in primary health posts, while complicated deliveries may be attended to more efficiently in tertiary facilities equipped with the staff and infrastructure necessary for surgical procedures. While a few of the reviewed studies do cost interventions in integrated settings (safe motherhood programs, services at family planning and reproductive health clinics in Latin America, and provision of STI screening and treatment in antenatal clinics), other interventions that might be more cost-effectively provided within an integrated program, especially alongside non-reproductive health interventions, should be examined for economies associated with programs offering a broader range of services.

Finally, while gaps in the literature remain, the estimates reported in this review show the extent of cost information available in international sources. Even more encouraging, there is likely a great deal more cost information not appearing in this body of literature that would expand planners' understanding in specific localities, be they countries or programs. A collection of the existing cost information—specific to local health and economic conditions and health system capabilities—would inform local decision makers interested in making best use of constrained resources. In turn, donors' responsibilities are clearer when local decision makers understand the inevitable resource allocation choices to be made. Reporting on the cost information available from developing-country sources—with attention to issues of integration, quality, and access—would yield case studies useful both locally and internationally.

## *Appendices*

---

## ***Appendix 1***

### ***ICPD Definition of Reproductive Health***

*Programme of Action*, paragraph 7.2:

Reproductive health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes. Reproductive health therefore implies that people have the capability to reproduce and the freedom to decide if, when and how often to do so. Implicit in this last condition are the rights of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law, and the right of access to appropriate health-care services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant. In line with the above definition of reproductive health, reproductive health is defined as the constellation of methods, techniques and services that contribute to reproductive health and well-being through preventing and solving reproductive health problems. It also includes sexual health, the purpose of which is the enhancement of life and personal relations, and not merely counseling and care related to reproduction and sexually transmitted diseases.

## *Appendix 2*

### *Search Methods and Limitations*

The investigators initiated this literature review with a comprehensive search of Medline and Popline databases, using a list of keywords developed in discussions with the POLICY Project's reproductive health working group. (A list of search words are available upon request.) Because many interventions in reproductive health have traditionally been covered in the field of general health, and it is only since ICPD that these interventions have been linked to the field of population, Medline yielded many more useful references than Popline. Second, appropriate resources referenced in primary articles were collected. Third, the web pages of major donors in the field were scanned for pertinent documents, yielding few references. Finally, the search drew on a number of professionals in the fields of costing and family planning and reproductive health, both to identify appropriate contact persons and to pinpoint unpublished but relevant reproductive health costing studies or methodologies.

In terms of topic area, selected studies addressed interventions contributing to improved reproductive health as broadly defined by the ICPD *Programme of Action* and delineated by the POLICY Project for this paper. Some articles were gathered in the search process, but were excluded from the review for the following reasons:

- No costing information; the study was not a costing study and did not make reference to costs.
- The reference to cost or cost-effectiveness was qualitative rather than quantitative.
- The information provided in the study was represented in a follow-up piece; inclusion of both works would have been redundant.

As noted in the introduction, studies that focused on developed countries were also omitted from the review.

***Additional Limitations.*** The methods employed in collecting review literature created unintended gaps: studies appeared primarily in published journals or were products of USAID-funded projects and for the most part in English. This leaves out the local (in-country) literature that has not been published or disseminated to the international community, but may be no less valid in its results. It is possible that there exists a wealth of unpublished literature related to reproductive health cost information in various countries. Although cost, cost-effectiveness, and cost-benefit studies were searched, the review focused on the first two categories in looking for comparability in terms of health outcomes rather than in terms of monetary benefits. This review does not focus on the distinction of public and private sector costs in different settings, despite the reality that costs of the same services may not be equal when delivered from these two sectors. Infant and child health interventions are not highlighted in this review, although the ICPD *Programme of Action* includes some neonatal and child health services in its agenda; likewise, innumerable linkages with reproductive health, such as female education, are not included.

### *Appendix 3*

#### *Exchange Rates and Deflators Used for Currency Conversions*

Eighteen of the studies reviewed present cost information in local currencies. These currencies are converted into U.S. dollars in the tables in the study, using the average exchange rate for the relevant year. In some cases, the exchange rate is reported in the study. In Appendices 5 and 6, the cost in the original currency is recorded. Note that the cost figures in the text tables are presented in 1996 constant prices. The source for exchange rates that were not reported in the studies and for GDP deflators is the International Monetary Fund, International Financial Statistics Yearbook, 1997.

**Table 1. Exchange Rates for Currency Conversions**

Country	ID number	Exchange rate, per US\$	Year	Notes
South Africa	[49]	2.85201 South African rand	1992	period average
Tunisia	[13]	5.6421 French francs	1991	period average
Bolivia	[143]	3.5806 bolivianos	1991	period average
Malawi	[60]	1.8 kwacha		exchange rate reported in study
Indonesia	[124]	1,643.8 rupiahs	~1987	period average
Thailand	[92]	25.517 bhat	1991	period average
Guatemala	[170]	5.2 quetzales	~1994	exchange rate reported in study
Guatemala	[104]	1 quetzales -	1979	pegged to the dollar
Dominican Republic	[17]	8.525 pesos	1990	period average
Bangladesh	[73,74]	41.794 taka	1996	period average
Pakistan	[98]	25.083 rupees	1992	period average
Columbia	[173]		1986	exchange rate reported in study
Honduras	[20]	5.3167 lempiras	1991	period average
Ecuador	[43]	3189.5 sucres	1996	period average
Honduras	[39]	8.4088 lempiras	1994	period average
Bangladesh	[93]	40 taka		exchange rate reported in study
Zimbabwe	[93]	8.658 Zimbabwe dollars	1995	period average

**Table 2. Deflators for Standardizing as 1996 U.S. Dollars**

Year	Deflators (1996)	<i>continued...</i>	Year	Deflators (1996)
1980	53.4		1989	81.5
1981	58.7	1990	85.3	
1982	62.5	1991	88.7	
1983	65.2	1992	91.2	
1984	68.2	1993	93.6	
1985	70.8	1994	95.7	
1986	72.8	1995	98.1	
1987	74.9	<b>1996</b>	<b>100</b>	
1988	77.6			

**Appendix 4**  
**Inventory of Interventions with Cost Information by Country**

Country	Intervention		Study ID Numbers
<b>Africa</b>			
The Gambia	Safe motherhood program	<ul style="list-style-type: none"> <li>• Mobile maternal health care</li> </ul>	[47]
Kenya	Postabortion care	<ul style="list-style-type: none"> <li>• MVA</li> <li>• Surgical</li> </ul>	[80] [80]
	STI/HIV/AIDS	<ul style="list-style-type: none"> <li>• Syphilis screening &amp; treatment</li> <li>• Gonococcal ophthalmia treatment</li> <li>• HIV prevention, detection, &amp; treatment</li> </ul>	[76] [90] [111]
	Family planning		[89]
Liberia	Family planning		[89]
Malawi	Immunization	<ul style="list-style-type: none"> <li>• Antenatal chloroquin chemoprophylaxis</li> <li>• Antimalarial drug regimen</li> </ul>	[144] [60]
Nigeria	Postabortion care	<ul style="list-style-type: none"> <li>• Treatment of abortion (illegal) complications</li> </ul>	[88]
	Safe motherhood program	<ul style="list-style-type: none"> <li>• Quality improvement of maternal care</li> </ul>	[117]
Senegal	STI/HIV/AIDS	<ul style="list-style-type: none"> <li>• Detection &amp; treatment of STDs</li> </ul>	[166]
South Africa	Obstetric care	<ul style="list-style-type: none"> <li>• Ultrasound</li> </ul>	[49]
	STI/HIV/AIDS	<ul style="list-style-type: none"> <li>• HIV prevention, detection, &amp; treatment</li> </ul>	[97]
Tanzania	Postabortion care	<ul style="list-style-type: none"> <li>• MVA</li> <li>• Surgical</li> </ul>	[96] [96]
	STI/HIV/AIDS	<ul style="list-style-type: none"> <li>• Syphilis screening</li> <li>• HIV surveillance</li> </ul>	[86] [86]
Tunisia	Obstetric care	<ul style="list-style-type: none"> <li>• Antibiotic treatment for c-section</li> </ul>	[13]
Uganda	Obstetric care	<ul style="list-style-type: none"> <li>• Antibiotic treatment for post operative infections: hernia, ectopic pregnancy, &amp; c-section</li> </ul>	[137]
	Reproductive cancers	<ul style="list-style-type: none"> <li>• Antibiotic treatment for hysterectomy</li> </ul>	[137]
Zambia	STI/HIV/AIDS	<ul style="list-style-type: none"> <li>• Syphilis screening, treatment, education</li> </ul>	[61]
	Family planning		[89]
Zimbabwe	Maternal/infant nutrition	<ul style="list-style-type: none"> <li>• Iron and folic acid; calcium</li> </ul>	[107]
	Obstetric care	<ul style="list-style-type: none"> <li>• Pregnancy test</li> </ul>	[28]
	STI/HIV/AIDS	<ul style="list-style-type: none"> <li>• Detection of STDs</li> </ul>	[107]
	Reproductive cancers	<ul style="list-style-type: none"> <li>• Detection of cervical cancer</li> </ul>	[28]
		<ul style="list-style-type: none"> <li>• Treatment of cervical cancer</li> </ul>	[107]
	Gynecological problems	<ul style="list-style-type: none"> <li>• Basic workup for menstrual problems</li> </ul>	[107]
<ul style="list-style-type: none"> <li>• Basic workup for infertility</li> </ul>		[107]	
<ul style="list-style-type: none"> <li>• GTI care</li> </ul>		[28]	
<ul style="list-style-type: none"> <li>• Physical exam</li> </ul>		[28]	
Family planning	<ul style="list-style-type: none"> <li>• Subfertility</li> </ul>	[28]	
			[28, 107]

**Appendix 4 (cont.)**

Country	Intervention		Study ID Numbers
<b>Latin America</b>			
Bolivia	Obstetric care	• Normal and c-section delivery	[143]
	Postabortion care	• Treatment of incomplete abortion	[143]
	Reproductive cancers	• Surgical removal of tumors	[143]
	Gynecological problems	• Treatment of genitourinary tract diseases	[143]
Brazil	Reproductive cancers	• Management of breast cancer	[3]
	Maternal/infant nutrition	• Breastfeeding promotion	[64]
Colombia	Family planning		[168, 169, 173]
Dominican Republic	Family planning		[17]
Ecuador	Obstetric care	• Antenatal care	[43]
	Immunization	• Maternal tetanus immunization	[151]
	Reproductive cancers	• Detection of cervical cancer	[43]
	Gynecological problems	• Gynecological exam • Infertility management	[43] [43]
Guatemala	Maternal/infant nutrition	• Vitamin A supplementation	[127]
	Family planning		[104, 170]
Honduras	Reproductive cancers	• Detection of cervical cancer	[20]
	Gynecological problems	• Gynecological exam	[20]
	Maternal/infant nutrition	• Breastfeeding promotion	[64]
	Family planning		[20, 39]
Mexico	Maternal/infant nutrition	• Iron & folic acid; calcium	[107]
		• Breastfeeding promotion	[64]
	Obstetric care	• Ultrasound	[107]
		• Antenatal care	[107, 156]
		• Postpartum care	[107]
	Postabortion care	• MVA • Surgical	[80] [16, 80]
	STI/HIV/AIDS	• Detection of STDs	[107]
	Reproductive cancers	• Treatment of cervical cancer	[107]
• Detection of cancer		[156]	
Gynecological problems	• Basic workup for menstrual problems	[107]	
	• Gynecological exam • Basic workup for infertility	[156] [107]	
Family planning		[107, 115, 156]	
<b>Asia</b>			
Bangladesh	Obstetric care	• Antenatal care	[93]
	Postabortion care	• MVA	[83]
	Family planning		[5, 73, 74, 93]
Burma	STI/HIV/AIDS	• Trachoma prevention	[42]
Indonesia	Immunization	• Maternal tetanus immunization	[12]
	Family planning		[124]
Pakistan	Family planning		[98]
Thailand	Reproductive cancers	• Laparoscopic & open adnexectomy for ovarian cancer	[161]
	Family planning		[92, 93]
<b>Other</b>			
Lebanon	STI/HIV/AIDS	• Syphilis screening	[1]



## Bibliography

---

1. Abyad, A. 1995. "Cost-Effectiveness of Antenatal Screening for Syphilis." Beirut: American University of Beirut.
2. Aral, A.O. and L. Fransen. 1995. "STD/HIV Prevention in Turkey: Planning a Sequence of Interventions." *AIDS Education and Prevention* 7(6): 544-553.
3. Arredondo, A., L.Y. Lockett and E. de Icaza. 1995. "Cost of Diseases in Brazil: Breast Cancer, Enteritis, Cardiac Valve Disease and Bronchopneumonia." *Revista de Saude Publica* 29(5): 349-354.
4. Arroyave, G., J.R. Aguilar, M. Flores and M.A. Guzman. "Evaluation of Sugar Fortification with Vitamin A at the National Level." *Scientific Publication 384*. Washington, DC: Pan American Health Organization.
5. Attanayake, N., V. Fauveau and J. Chakraborty. 1993. "Cost-Effectiveness of the Matlab MCH-FP Project in Bangladesh." *Health Policy and Planning* 8(4): 327-338.
6. Australian College of Midwives Incorporated. 1994. "Costing Caesarean Sections: A Pilot Study." *Journal of the Australian College of Midwives, Inc.* 7(2): 6-10.
7. Balk, D., K.K. Faiz, U. Rob, G. Simmons. 1988. An Analysis of Costs and Cost-Effectiveness of the Family Planning-Health Services Project in Matlab, Bangladesh. Bangladesh: International Center for Diarrhoeal Disease Research.
8. Barberis, M. and P.D. Harvey. 1997. "Costs of Family Planning Programmes in Fourteen Developing Countries by Methods of Service Delivery." *Journal of Biosocial Sciences* 29: 219-233.
9. Barker, C. and A. Green. 1996. "Opening the Debate on DALYs." *Health Policy and Planning* 11(2): 179-183.
10. Begley, C.E., L. McGill and P.B. Smith. 1989. "The Incremental Cost of Screening, Diagnosis, and Treatment of Gonorrhoea and Chlamydia in a Family Planning Clinic." *Sexually Transmitted Diseases* 16(2): 63-67.
11. Behets, F., S. Bertozzi, M. Kasali, M. Kashamuka, L. Atikala, C. Brown, R.W. Ryder, and T.C. Quinn. 1990. "Successful Use of Pooled Sera to Determine HIV-1 Seroprevalence in Zaire with Development of Cost-Efficiency Models." *AIDS* 4: 737-741.
12. Berman, P., J. Quinley, B. Yusuf, S. Anwar, U. Mustaini, A. Azof and Iskandar. 1991. "Maternal Tetanus Immunization in ACEH Province, Sumatra: The Cost-Effectiveness of Alternative Strategies." *Social Science and Medicine* 33(2): 185-192.
13. Bibi, M., H. Megdiche, H. Ghanem, I. Sfaxi, M. Nouira, H. Essaidi, A. Chaieb, A. Slama and H. Khairi. 1994. "L'antibioprophylaxie dans les Césariennes a Priori Sans 'haute infectieux'" [Antibiotic infection in a priori caesarean sections without a high risk] *Journal Gynecologie? Obstetrique Biologie Reproductive?* 23: 451-455.
14. Bitran, R. Health Financing in Developing Countries: Synthesis of Applied Field Research, 1989-1995. Bethesda, MD: Abt Associates.
15. Bobadilla, J-L., P. Cowley, P. Musgrove, and H. Saxenian. 1994. "Design, Content, and Financing of an Essential Package of Health Services." *Bulletin of the World Health Organization* 72(4): 653-682.
16. Brambila, C. and C. Garcia. 1996. "Estimating Costs of Post-Abortion Services. General Hospital Valdivieso, Oaxaca, Mexico." Final Technical Report. New York: INOPAL III, The Population Council.
17. Bratt, J.H. and B. Janowitz. 1992. Costs of Family Planning Services Delivered Through PROFAMILIA Programs: Final Report. Research Triangle Park, NC: Family Health International.
18. Bratt, J.H., B. Janowitz, and D.B. Fried. 1991. "The Impacts of a Price Increase in Eight Ecuadorean Family Planning Clinics." Research Triangle Park, NC: Family Health International.
19. Bratt, J.H., J.R. Foreit, T. de Vargas and E. Pinto. 1995. An Assessment of Client "Ability to Pay" for Reproductive Health Services Provided by an Ecuadoran Family Planning Agency. Final Report. Research Triangle Park, NC: Family Health International.
20. Bratt, J.H., M. Suazo and H. Santos. 1993. Costs of Family Planning Services Delivered Through ASHONPLAFA Programs: Final Report. Research Triangle Park, NC: Family Health International.
21. Brenzel, L. *The Cost of EPI: A Review of Cost and Cost-Effectiveness Studies*. Arlington, VA: REACH Project, John Snow, Inc.
22. Brenzel, L. 1993. *Selecting an Essential Package of Health Services Using Cost-Effectiveness Analysis: A Manual for Professionals in Developing Countries*. The World Bank and DDM, Harvard School of Public Health.
23. Buga, G.A.B., D.H.A. Amoko, and D.J. Ncayiyana. 1996. "Adolescent Sexual Behavior, Knowledge and Attitudes to Sexuality Among School Girls in Transkei, South Africa." *East African Medical Journal*, February: 95-100.

24. Buzzard, S. 1987. Development Assistance and Health Programs: Issues of Sustainability. USAID Program Evaluation Discussion Paper No. 23
25. Carrin, G. and K. Evlo. 1995. A Methodology for the Calculation of Health Care Costs and Their Recovery. Macroeconomics, Health and Development Series, No. 2. Geneva: World Health Organization.
26. Chang Y-S., J-K. Jun, Y-M. Choi and S-Y. Moon. 1994. "The Present Status of Assisted Reproductive Technology in Asia-Oceania." *Asia-Oceania Journal of Obstetric Gynaecology* 20(4): 331-344.
27. Chao, D.N.W. and K.B. Allen. 1984. "A Cost-Benefit Analysis of Thailand's Family Planning Program." *International Family Planning Perspectives* 10(3): 75-81.
28. Collins, D., J. Littlefield and D. Ndebele. 1995. "Cost Effectiveness of Family Planning Service Delivery Mechanisms in Zimbabwe: A Study for the Zimbabwe National Family Planning Council." Boston: Management Sciences for Health.
29. Comried, L.A. 1996. "Cost Analysis: Initiation of HBMC and First CareMap." *Nursing Economic\$* 14(1): 34-40.
30. Conly, S. 1997. "Missing Billions." *People & the Planet* 6 (1): 12-13.
31. Cowley, P., and J-L. Bobadilla. 1995. Estimating the Costs of the Mother-Baby Package of Health Interventions. (Not a formal publication.) Washington, DC: World Health Organization and The World Bank.
32. Creese, A.L., S.B. Halstead and J.A. Walsh, Eds. 1987. "Financing Issues." In *Why Things Work: Case Histories in Development*. New York: Rockefeller Foundation.
33. Creese, A.L., N. Sriyabbaya, G. Casabal and G. Wiseso. 1982. "Cost-effectiveness Appraisal of Immunization Programmes." *Bulletin of the World Health Organization* 60(4): 621-632.
34. Daga, S.R. and A.S. Daga. 1985. "Impact of Breast Milk on the Cost-Effectiveness of the Special Care Unit for the Newborn." *Journal of Tropical Pediatrics* 31: 121-123.
35. de Ferranti, D. 1985. *Paying for Health Services in Developing Countries: An Overview*. World Bank Staff Working Papers No. 721. Washington, DC: The World Bank.
36. Detsky, A.S. and I.G. Naglie. 1990. "A Clinician's Guide to Cost-Effectiveness Analysis." *Journals of Internal Medicine* 113:147-154.
37. Dey, P., K.K. Dhar, R. Nijhawan, T. Karmakar and A. Khajuria. 1994. "Fine Needle Aspiration Biopsy in Gynecologic Malignancies: Recurrent and Metastatic Lesions." *Acta Cytologica* 38(5): 698-701.
38. Diop, F. and C. Leighton. 1995. Cost-Effectiveness Analysis of Safe Motherhood Services in South Kalimantan, Indonesia. Bethesda, MD: Health Financing and Sustainability Project, Abt Associates, Inc.
39. Dmytraczenko, T. 1996. Trade-Off Between Rural Expansion and Financial Self-Sufficiency: The Case of Honduras. Draft manuscript. The POLICY Project. The Futures Group International, Washington, DC.
40. Eisenberg, J.M. 1989. "Clinical Economics: A Guide to the Economic Analysis of Clinical Practices." *Clinical Economics* 262(20):2879-2886.
41. Enge, K. and C. Brambila. 1996. "Cost Analysis of Reproductive Health Services in Guatemala." An in-house technical assistance proposal of INOPAL III (Unpublished). New York: The Population Council
42. Evans, T.G., M.K. Ranson, Tun Aung Kyaw, and Chit Ko Ko. 1996. "Cost Effectiveness and Cost Utility of Preventing Trachomatous Visual Impairment: Lessons from 30 Years of Trachoma Control in Burma." *British Journal of Ophthalmology*.
43. Family Health International. 1996. Manuscript on the methodology and cost analysis for APROFE, the Ecuadorean IPPF affiliate. North Carolina: Family Health International.
44. Favin, M., B. Bradford and D. Cebula. 1984. *Improving Maternal Health in Developing Countries*. Geneva: UNICEF, World Federation of Public Health Associations.
45. Figa-Talamanca, I., T.A. Sinnathuray, K. Yusof, C.K. Fong, V.T. Palan, N. Adeeb, P. Nylander, A. Onifade, A. Akin, M. Bertan, S. Gaslonde, K. Edstrom, O. Ayeni and M.A. Belsey. "Illegal Abortion: An Attempt to Assess its Cost to the Health Services and its Incidence in the Community." *International Journal of Health Services* 16(3):375-389.
46. Fortney, J.A. 1981. "The Use of Hospital Resources to Treat Incomplete Abortion: Examples from Latin America." *Public Health Reports* 96(6): 574-579.
47. Fox-Rushby, J.A. 1995. "The Gambia: Cost and Effectiveness of a Mobile Maternal Health Care Service, West Kiang." *World Health Statistics Quarterly* 48(1): 23-27.
48. Fox-Rushby, J.A. and F. Foord. 1996. "Cost, Effects and Cost-Effectiveness Analysis of a Mobile Maternal Health Care Service in West Kiang, The Gambia." *Health Policy* 35(2): 123-143.
49. Geerts, L.T.G.M., S.J. Brand and G.B. Theron. 1996. "Routine Obstetric Ultrasound Examinations in South Africa: Cost and Effect on Perinatal Outcomes -- A Prospective Randomized Controlled Trial." *British Journal of Obstetrics and Gynaecology* 103: 501-507.

50. Gillespie, D.G., M.E. Mamlook and K-H.M. Chen. 1983. "Cost-Effectiveness of Family Planning: Overview of the Literature." Pp. 103-140 in *Evaluating Population Programs*, eds. Sirageldin, I., D. Salkever, and R. Osborn. New York: St. Martin's Press.
51. Ginsberg, G., H. Blau, E. Kerem, C. Springer, B-S. Kerem, E. Akstein, A. Greenberg, A. Kolumbos, D. Abeliovich, E. Gazit and J. Yahav. 1994. "Cost-benefit Analysis of a National Screening Programme for Cystic Fibrosis in an Israeli Population." *Health Economics* 3: 5-23.
52. Goldenberg, M., E. Sivan, D. Bider, S. Mashaich, S.S. Seidman. 1996. "Endometrial Resection vs. Abdominal Hysterectomy for Menorrhagia: Correlated Sample Analysis." *The Journal of Reproductive Medicine* 41(5): 333-336.
53. Gomo, E., J. Ndamba, S., Murahwa, C., Nhandara and N.Z. Nyazema. 1995. "In Vitro Activity of Several Antimicrobial Agents Against Neisseria Gonorrhoeae and Comparison of Cost of Treatment." *Central African Journal of Medicine* 41(3): 83-86.
54. Guerin, N. and D. Levy-Bruhl. 1996. "Actualisation des Connaissances sur le BCG Indications en Europe at dans les Pays in Developpement." Update on the BGC Vaccine. *Indications for Use Medecine Tropicale* 56(2): 173-176.
55. Haaga, J.G. and A.O. Tsui, eds. 1995. *Resource Allocation for Family Planning in Developing Countries: Report of a Meeting*. Washington, DC: National Academy Press.
56. Ham, C. 1997. "Priority Setting in Health Care: Learning from International Experience." *Health Policy* 42:49-66.
57. Handsfield, H.H., L.L. Jasman, P.L. Roberts, V.W. Hanson, R.L. Kothenbeutel and W.E. Stamm. 1986. "Criteria for Selective Screening for Chlamydia trachomatis Infection in Women Attending Family Planning Clinics." *JAMA* 255(13): 1730-1734.
58. Hardee, K. and K. Yount. 1995. *From Rhetoric to Reality: Delivering Reproductive Health Promises Through Integrated Services*. Research Triangle Park, NC: Family Health International.
59. Herz, B. and A.R. Measham. 1987. *The Safe Motherhood Initiative: Proposals for Action*. Discussion Papers No. 9. Washington, DC: The World Bank.
60. Heymann, D.L., R.W. Steketee, J.J. Wirima, D.A. McFarland, C.O. Khoromana and C.C. Campbell. 1990. "Antenatal Chloroquine Chemoprophylaxis in Malawi: Chloroquine Resistance, Compliance, Protective Efficacy and Cost." *Transactions of the Royal Society of Tropical Medicine and Hygiene* 84: 496-498.
61. Hira, S.K., G.J. Bhat, D.M. Chikamata, B. Nkowane, G. Tembo, P.L. Perine and A. Meheus. 1990. "Syphilis Intervention in Pregnancy: Zambian Demonstration Project." *Genitourinary Medicine* 66: 159-164.
62. Hodgson, T.A. and M.R. Meiners. 1982. "Cost of Illness Methodology: A Guide to Current Practices and Procedures." *Health & Society* 60(3):429-462.
63. Homedes, N. 1996. "The Disability-Adjusted Life Year (DALY): Definition, Measurement and Potential Use." *Human Capital Development Working Papers*. Washington, DC: World Bank.
64. Horton, S., T. Samghvi, M. Phillips, J. Fiedler, R. Perez-Excamilla, C. Lutter, A. Rivera and A.M. Segall-Correa. 1996. "Breastfeeding Promotion and Priority Setting in Health." *Health Policy and Planning* 11(2): 156-168.
65. Huber, S.C. and P.D. Harvey. 1989. "Family Planning Programmes in Ten Developing Countries: Cost Effectiveness by Mode of Service Delivery." *Journal of Biosocial Science* 21(3): 267-277.
66. Hurley, S.F., J.M. Kaldor, J.B. Carlin, S. Gardiner, D.B. Evans, P. Chondros, J. Hoy, D. Spelman, W.J. Spicer, H. Wraight and P. Meese. 1995. "The Usage and Costs of Health Services for HIV Infection in Australia." *AIDS* 9: 777-785.
67. International Projects Assistance Services. 1993. *Guide to Evaluate the Use of Resources for Treatment of Incomplete Abortions*. IPAS.
68. Islam, M.A., D. Mahalanbis and N. Majid. 1994. "Use of a Rice-Based ORS in a Large Diarrhoea Treatment Centre in Bangladesh: In-House Production, Use and Relative Cost." *Journal of Tropical Medicine and Hygiene* 97: 341-346.
69. Jamison, D.T. et al. (eds.) 1993. *Disease Control Priorities in Developing Countries*. Washington, DC: The World Bank, Oxford University Press.
70. Janowitz, B. and J.H. Bratt. 1992. "Costs of Family Planning Services: A Critique of the Literature." *International Family Planning Perspectives* 18(4): 137-144.
71. Janowitz, B. and J.H. Bratt. 1994. *Methods for Costing Family Planning Services*. UNFPA and FHI.
72. Janowitz, B., J.H. Bratt, and D.B. Fried. 1990. *Investing in the Future: A Report on the Cost of Family Planning in the Year 2000*. Research Triangle Park, NC: Family Health International.
73. Janowitz, B., K. Jamil, J. Chowdhury, B. Rahman, and M. Holtman. 1996. *Productivity and Costs for Family Planning Service Delivery in Bangladesh: The NGO Program*. North Carolina: Family Health International.
74. Janowitz, B., K. Jamil, J. Chowdhury, B. Rahman, and D. Hubacher. 1996. *Productivity and Costs for Family Planning Service Delivery in Bangladesh: The Government Program*. North Carolina: Family Health International.

75. Janowitz, B., K. Kanchanisith, N. Aumkul, P. Amornwichet, K. Soonthordhada and R. Hanenberg. 1994. "Introducing the Contraceptive Implant in Thailand: Impact on Method Use and Costs." *International Family Planning Perspectives* 20:131-136.
76. Jenniskens, F., E. Bwaka, S. Kirisuah, S. Moses, F. Mohamedali Yusufali, J.O. Ndinya Achola, L. Fransen, M. Laga, and M. Temmerman. 1995. "Syphilis Control in Pregnancy: Decentralization of Screening Facilities to Primary Care Level, A Demonstration Project in Nairobi, Kenya." *International Journal of Gynecology and Obstetrics* 48 (suppl): s121-128.
77. Jensen, E.R. 1991. "Cost-Effectiveness and Financial Sustainability in Family Planning Operations Research." Pp. 297-313 in *Operations Research: Helping Family Planning Programs Work Better*, eds. M. Seidman and M.C. Horn. New York: Wiley-Liss.
78. Jillson-Boostrom, I. 1987. *Acquired Immunodeficiency Syndrome (AIDS) in Jamaica: Present Realities and Future Possibilities*. Clarksville, MD: Policy Research Incorporated. USAID/Kingston Contract No. 532-9108-0-00-7064-00.
79. Johannesson, M. 1995. "The Relationship Between Cost-Effectiveness Analysis and Cost-Benefit Analysis." *Social Science and Medicine* 41(4): 483-489.
80. Johnson, B.R., J. Benson, J. Bradley and A.R. Ordonez. 1993. "Costs and Resource Utilization for the Treatment of Incomplete Abortion in Kenya and Mexico." *Social Science and Medicine* 36(11): 1443-1453.
81. Kay, B.J. 1981. "Evaluating the Quality of Ambulatory Abortion Services: A Cost-Effectiveness Approach." Pp. 351-358 in *Systems Science in Health Care*, ed. C. Tilquin. Toronto: Pergamon Press.
82. Kay, B.J. and S.M. Kabir. 1988. "A Study of the Costs and Behavioral Outcomes of Menstrual Regulation Services in Bangladesh." *Social Science and Medicine* 26(6): 597-604.
83. Kay, B.J., A. Germain and M. Bangser. 1991. "The Bangladesh Women's Health Coalition." Quality/Calidad/Qualite No. 3. New York: The Population Council.
84. Kenney, G. and M.A. Lewis. 1990. "Costing in Operation Research Projects." Paper prepared for The International Operations Research Conference and Workshop on Using OR to Help FP Programs Work Better.
85. Kenney, G. and M.A. Lewis. 1991. "Cost Analysis in Family Planning: Operations Research Projects and Beyond." Pp. 411-429 in *Operations Research: Helping Family Planning Programs Work Better*, eds. M. Seidman and M.C. Horn. New York: Wiley-Liss, Inc.
86. Kigadye, R-M., A. Klokke, A. Nicoll, K.M. Nyamuryekung'e, M. Borgdorff, L. Barongo, U. Laukamm-Josten, F. Lisekie, H. Grosskurth and F. Kigadye. 1993. "Sentinel Surveillance for HIV-1 Among Pregnant Women in A Developing Country: Three Years' Experience and Comparison with A Population Serosurvey." *AIDS* 7(6): 849-855.
87. Knowles, J., I. Koek, and B. Seligman. 1993. *What Does a Population Dollar Buy? Patterns, Determinants and Impact of Donor Support for Population Programs*. Paper presented at the Annual Meeting of the Population Association of America.
88. Konje, J.C., K.A. Obisesan, and O.A. Ladipo. 1992. "Health and Economic Consequences of Septic Induced Abortion." *International Journal of Gynecology and Obstetrics* 37: 193-197.
89. Labbok, M.H., K. Krasovec and K. Jaros. 1988. "Cost-Effectiveness Analysis: Natural Family Planning and Breastfeeding Programs." Institute Report No. 2, presented at The Institute for International Studies in Natural Family Planning (IISNFP) workshop at the University of Pittsburgh.
90. Laga, M., A. Meheus and P. Piot. 1989. "Epidemiology and Control of Gonococcal Ophthalmia Neonatorum." *Bulletin of the World Health Organization* 67(5): 471-478.
91. La Ruche, G., F. Lorougnon and N. Digbeu. 1995. "Therapeutic Algorithms for the Management of STDs at the Peripheral Level in Cote d'Ivoire: Assessment of the Efficacy and Cost." *Bulletin of the World Health Organization* 73(3): 305-313.
92. Leoprapai, B., C. Susangkran, K. Soonthordhada, A. Hutaserani, V. Thongthai, K. Harnchanpannich, O. Pituckmahaket and A. Panfueng. 1991. *Cost of Public Family Planning Services and Scope of Private Sector Provisions*. Thailand: Mahidol University and Thailand Development Research Institute.
93. Levin, A., A. Amin, R. Saifi, A. Rahman, Barkat-e-Khuda and K. Mozumder. 1997. "Cost-Effectiveness of Family Planning and Maternal and Child Health Alternative Service Delivery Strategies in Rural Bangladesh." Unpublished article. Bangladesh: MCH-FP Extension Project (Rural), Health and Population Extension Division, ICDDR,B.
94. Loevinsohn, B.P., R.W. Sutter and M.O. Costales. 1997. "Using Cost-Effectiveness Analysis to Evaluate Targeting Strategies: The Case of Vitamin A Supplementation." *Health Policy and Planning* 12(1): 29-37.
95. Lute, E., R. Sturgis, and S. Ladha. 1998. "Advantages and Disadvantages of Integrating STD/HIV Services into Existing MCH/FP Programs in Sub-Saharan Africa." Paper presented at annual meeting of the Population Association of America, April 2-4, Chicago.
96. Magotti, R.F., P.G.M. Munjinja, R.S.M. Lema and E.K.W. Ngwalle. 1995. "Cost-Effectiveness of Managing Abortions: Manual Vacuum Aspiration (MVA) Compared to Evacuation by Curettage in Tanzania." *East African Medical Journal*, April: 248-251.

97. Mansergh, G., A.C. Haddix, R.W. Steketee, P.I. Nieburg, D.J. Hu, R.J. Simonds and M. Rogers. 1996. "Cost-Effectiveness of Short-Course Zidovine to Prevent Perinatal HIV Type 1 Infection in a Sub-Saharan African Developing Country Setting." *JAMA* 276(2): 139-145.
98. Manzoor, K. 1994. "Cost-Effectiveness of the Family Planning Programme in Pakistan." *The Pakistan Development Review* 33(4): 711-726.
99. Marrazzo, J.M., C.L. Celum, C.D. Hillis, D. Fine, S. Delisle and H.H. Handsfield. 1997. "Performance and Cost-Effectiveness of Selective Screening Criteria for Chlamydia Trachomatis Infection in Women." *Sexually Transmitted Diseases* 24(3): 131-141.
100. Mauldin, W.P. and V.C. Miller. 1994. "Contraceptive Use and Commodity Costs in Developing Countries, 1994-2005." Technical Report No. 18. New York: UNFPA.
101. Mauldin, W.P. and J.A. Ross. 1992. "Contraceptive Use and Commodity Costs in Developing Countries, 1990-2000." *International Family Planning Perspectives* 18: 4-9.
102. Mayaud, P., H. Grosskurth, J. Changalucha, J. Todd, B. West, R. Gabone, K. Senkoro, M. Rusizoka, M. Laga, R. Hayes and D. Mabey. 1995. "Risk Assessment and Other Screening Options for Gonorrhoea and Chlamydial Infections in Women Attending Rural Tanzanian Antenatal Clinics." *Bulletin of the World Health Organization* 5: 621-630.
103. Mayhew, S. 1996. "Integrating MCH/FP and STD/HIV Services: Current Debates and Future Directions." *Health Policy and Planning* 11(4): 339-353.
104. McBride, M.E., J.T. Bertrand, R. Santiso and V.H. Fernandez. 1987. "Cost Effectiveness of the APROFAM Program for Voluntary Surgical Contraception in Guatemala." *Evaluation Review* 11(3): 300-326.
105. McGinn, T., D. Maine, J. McCarthy and A. Rosenfield. 1996. *Setting Priorities in International Reproductive Health Programs: A Practical Framework*. New York: Columbia School of Public Health.
106. Mekbib, T. A. 1994. "Induction of Abortion by Condom-Foley Catheter Method in Proegnant Women with Intra-Uterine Foetal Death." *Ethiopian Medical Journal* 32: 107-113.
107. Mitchell, M.D., J. Littlefield and S. Gutter. 1997. *Reproductive Health: From Policy to Practice*. Draft manuscript. Boston: Management Sciences for Health.
108. Mitra, I. 1995. "Early Detection of Breast Cancer in Industrially Developing Countries." *Japanese Journal of Cancer and Chemotherapy* (Gan to Kagaku no Ryoho) 22: Supplement III, 230-235.
109. Mock, N.B., D.M. Mercer, J.C., Setzer, R.J. Magnami, K. Tankari and L. Brown. 1994. "Prevalence and Differentials of Low Birth Weight in Niamey, Niger." *Journal of Tropical Pediatrics* 40: 72-77.
110. Molina, A., A. Leon, C. Garcia, M.A. Flores, C. Brambila and J. Benson. "Cost of Postabortion D&C in Mexico." Population Council Latin American Operations Research Abstracts, Postabortion Abstract 3.
111. Moses, S., F.A. Plummer, E.N. Ngugi, N.J.D. Nagelkerke, A.O. Anzala, and J.O. Ndinya-Achola. 1991. "Controlling HIV in Africa: Effectiveness and Cost of an Intervention in a High-Frequency STD Transmitter Core Group." *AIDS* 5: 407-411.
112. Mundigo, A. 1994. "Reproductive Health: Definitions, Data and Challenges." *Revista Peruana de Poblacion* 4: 105-121.
113. Murray, C. 1993. "Quantifying the Burden of Disease: The Technical Basis for Disability Adjusted Life Years." *Health Transition Working Paper Series* No. 93.03. Later published in the *Bulletin of the World Health Organization* 72(3), 1994.
114. National Research Council, Committee on Population, Panel on Reproductive Health. 1996. *Reproductive Health Interventions: Report of a Meeting*. Washington, DC: National Academy Press.
115. Nortman, D.L., J. Halvas and A. Rabago. 1986. "A Cost-Benefit Analysis of the Mexican Social Security Administration's Family Planning Program." *Studies in Family Planning* 17(1):1-6.
116. Nowak, R. 1995. "New Push to Reduce Maternal Mortality in Poor Countries." *Science* 269: 780-782.
117. Ogunbekun, I., O. Adeyi, A. Wouters and R.H. Morrow. 1996. "Costs and Financing of Improvements in the Quality of Maternal Health Services Through the Bamako Initiative in Nigeria." *Health Policy and Planning* 11(4): 369-384.
118. Okonofua, F.E. 1996. "The Case Against New Reproductive Technologies in Developing Countries." *British Journal of Obstetrics and Gynaecology* 103: 957-962.
119. Olsen, J.A. and C. Donaldson. 1998. "Helicopters, Hearts, and Hips: Using Willingness to Pay to Set Priorities for Public Sector Health Care Programmes." *Social Science and Medicine* 46(1):1-12.
120. Over, M., S. Bertozzi, J. Chin, B. N'Galy and K. Nyamuryekung'e. 1988. "The Direct and Indirect Cost of HIV Infection in Developing Countries: The Cases of Zaire and Tanzania." Pp. 123-135 in *The Global Impact of AIDS*, eds. A.F. Fleming, M. Carballo, D.W. FitzSimons, M.R. Bailey and J. Mann. New York: Alan R. Liss, Inc.
121. Over, M. and P. Piot. 1993. "HIV Infection and Sexually Transmitted Diseases." Pp. 455-527 in *Disease Control Priorities in Developing Countries* eds. Jamison, D.T. et al. Washington, DC: The World Bank, Oxford University Press.

122. Over, M. and P. Piot. 1996. "Human Immunodeficiency Virus Infection and Other STDs in Developing Countries: Public Health Importance and Priorities for Resource Allocation." *The Journal of Infectious Diseases* 174 (Suppl 2): s162-175.
123. Paalman, M., H. Bekedam, L. Hawken, and D. Nyheim. 1998. "A Critical Review of Priority Setting in the Health Sector: The Methodology of the 1993 World Development Report." *Health Policy and Planning* 13(1):13-31.
124. Perkumpulan Kontrasepsi Mantap Indonesia (PKMI -- Indonesian Association for Secure Contraception). 1988. Assessment of Reimbursement Mechanism and Cost Analysis of Voluntary Surgical Contraception. Jakarta: PKMI, University Research Corporation, USAID.
125. Perriens, J., N. Prescott, K. Hill and C. Kunanusont.. "Quality-Adjusted Life Years Gained with Antiretroviral Therapy." Background assessment paper prepared on behalf of the Royal Thai Government.
126. Philippine Information Agency. 1994. Balik Sarap...Libreng Sangkap: The Philippine Experience in Massive Micronutrient Intervention Year 2. Philippine Information Agency.
127. Phillips, M., T. Sanghvi, R. Suarez, J. McKigney and J. Fiedler. 1996. "The Costs and Effectiveness of Three Vitamin A Interventions in Guatemala." *Social Science Medicine* 42(12): 1661-1668.
128. Population Information Program. 1986. "Operations Reports: Lessons for Family Planning Programs." Population Reports, Family Planning Programs Series J, No. 31.
129. Population Information Program. 1991. "Paying for Family Planning." Population Reports, Family Planning Programs Series J, No. 39.
130. Population Information Program. 1991. Population Reports Series J, No. 39, Family Planning Programs. Baltimore: Johns Hopkins University.
131. Prescott, N. "Economic Analysis of Antiretroviral Policy Options in Thailand." Paper presented at Third International Conference on AIDS in Asia and the Pacific, September 21.
132. Program for Control of Diarrhoeal Diseases. 1988. Estimating Costs for Cost-Effectiveness Analysis: Guidelines for Managers of Diarrhoeal Disease Control Programmes. Geneva: World Health Organization.
133. Raab, S.S. 1996. "Cytopathology in the Socialist Republic of Vietnam." *The International Academy of Cytology, Acta Cytologica* 40(3): 541-545.
134. Randolph, A.G., A.E. Washington, and C.G. Prober. 1993. "Caesarean Delivery for Women Presenting with Genital Herpes Lesions." *Journal of the American Medical Association* 270(1): 77-82.
135. Rao, N.D., S.B. Bavdekar, K.J. Raghunandana, S.Y. Joshi and G.S. Hathi. 1994. "Calcium Supplementation for Preterm and Low Birth-Weight Neonates." *Indian Pediatrics* 31(6): 657-660.
136. Rebentisch, D.P., H.D. Rebentisch, K. Thomas, S. Karat and A.J. Jadhav. 1995. "A Proven and Highly Cost-Effective Method of Early Detection of Breast Cancer for Developing Countries." *Radiotherapy and Oncology* 37: 246-248.
137. Reggiori, A., M. Ravera, E. Coccozza, M. Andreato and F. Mukasa. 1996. "Randomized Study of Antibiotic Prophylaxis for General and Gynaecological Surgery for a Single Rural Centre in Africa." *British Journal of Surgery*.
138. Reynolds, J. and K.C. Gaspari. 1985. *Operations Research Methods: Cost-Effectiveness Analysis*. PRICOR (Primary Health Care Operations Research) Monograph Series. Chevy Chase, MD: Center for Human Services.
139. Robinson, W. 1970. "Cost-Effectiveness." Pp. 167-180 in *Taiwan Family Planning Reader*, eds. G.P. Cernada. Taichung: The Chinese Center for International Training in Family Planning.
140. Robinson, W.C. 1979. "The Cost Per Unit of Family Planning Services." *Journal of Biosocial Science* 11: 93-103.
141. Rohde, J.E. 1982. "Mother Milk and the Indonesia Economy: A Major National Resource." *Journal of Tropical Pediatrics* 28: 166-174.
142. Rosen, D.M.B. and M.J. Peek. 1994. "Do Women With Placenta Praevia Without Antepartum Haemorrhage Require Hospitalization?" *Australian and New Zealand Journal of Obstetrics and Gynaecology* 34(2): 130-134.
143. Rosenthal, G. and A. Percy. 1991. *Maternity Services in Cochabamba, Bolivia: Costs, Cost-Recovery, and Changing Markets*. Arlington, VA: MotherCare, John Snow, Inc.
144. Schultz, L.J., R.W. Steketee, L. Chitsulo, and J.J. Wirima. 1995. "Antimalarials During Pregnancy: A Cost-Effectiveness Analysis." *WHO Bulletin OMS* 73: 207-214.
145. Schulz, K.F., J.M. Schulte and S.M. Berman. 1992. "Maternal Health and Child Survival: Opportunities to Protect Both Women and Children from the Adverse Consequences of Reproductive Tract Infections." Pp. 145-182 in *Reproductive Tract Infections: Global Impact and Priorities for Women's Reproductive Health*, eds. A. Germain, K.K. Homes, P. Piot and J.N. Wasserheit. New York: Plenum Press.
146. Scitovsky, A.A. and M Over. 1988. "AIDS: Costs of Care in the Developed and the Developing World." *AIDS* 2(suppl 1): S71-S81.

147. Scott, M. and J. Kocher. 1992. "A Cost-Benefit Analysis of the Family Planning Programme in Jamaica, 1970-2000." Research Triangle Park, NC: RAPID III Project, Research Triangle Institute.
148. Seidman, M. and M.C. Horn, Eds. 1991. *Operations Research: Helping Family Planning Programs Work Better*. New York: Wiley-Liss.
149. Shaw, R.P. 1995. Costs, Benefits, and Financing of Quality Improvements in Reproductive Health Services: Challenges Facing Asia. Draft paper presented to The World Bank/UNFPA/ICOMP Seminar for Key Policymakers in South Asia, Iran, and Malaysia.
150. Shelton, J.D. 1991. "What's Wrong with CYP?" *Studies in Family Planning* 22(5): 332-335.
151. Shepard, D.S., R.L. Robertson, C.S.M. Cameron III, P. Saturno, M. Pollack, J. Manceau, P. Martinez, P. Meissner and MORE 1989. "Cost-Effectiveness of Routine and Campaign Vaccination Strategies in Ecuador." *Bulletin of the World Health Organization* 67(6): 649-662.
152. Simmons, G.B., D. Balk and K.K. Faiz. 1991. "Cost-Effectiveness Analysis of Family Planning Programs in Rural Bangladesh: Evidence from Matlab." *Studies in Family Planning* 22(2): 83-101.
153. Sirageldin, I., D. Salkever, and R. Osborn, Eds. 1983. *Evaluating Population Programs*. New York: St. Martin's Press.
154. Sloan, N.L., L.W.L. Camacho, E.P. Roja, C. Stern and Maternidad Isidro Ayora Study Team. 1994. "Kangaroo Mother Method: Randomized Controlled Trial of an Alternative Method of Care for Stabilised Low-Birthweight Infants." *The Lancet* 344: 782-785.
155. Stray-Pedersen, B. 1983. "Economic Evaluation of Maternal Screening to Prevent Congenital Syphilis." *Sexually Transmitted Diseases* 10(4): 167-172.
156. Suarez, H. and C. Brambila. 1994. Cost Analysis of Family Planning Services in Private Family Planning Programs, FEMAP, Mexico. New York: INOPAL II, The Population Council.
157. The Prevention of Maternal Mortality Network. 1995. "Situation Analysis of Emergency Obstetric Care: Examples From Eleven Operations Research Projects in West Africa." *Social Science Medicine* 40(5): 657-667.
158. The Robert H. Ebert Program on Critical Issues in Reproductive Health and Population. 1994. *Reproductive Health Approach to Family Planning*. New York: The Population Council.
159. The Robert H. Ebert Program. 1997. *Critical Issues in Reproductive Health (a bibliography)*. New York: The Population Council.
160. Tinker, A. and M.A. Koblinsky. 1993. *Making Motherhood Safe*. World Bank Discussion Papers No. 202. Washington, DC: The World Bank.
161. Tintara, H. and R. Leetanaporn. 1995. "Cost-Benefit Analysis of Laparoscopic Adnexectomy." *International Journal of Gynecology and Obstetrics* 50: 21-25.
162. Trachtenberg, A.I., A.E. Washington and S. Halldorson. 1988. "A Cost-Based Decision Analysis for Chlamydia Screening in California Family Planning Clinics." *Journal of Obstetrics and Gynecology* 71: 101-108.
163. Tsu, V.D. 1994. "Antenatal Screening: Its Use in Assessing Obstetric Risk Factors in Zimbabwe." *Journal of Epidemiology and Community Health* 48: 297-305.
164. United Nations. 1994. Report on Family Planning Programme Sustainability, UNFPA Technical Report No. 26. United Nations Fund for Population Consultation on Family Planning Programme Sustainability.
165. United Nations Population Fund. 1994 Global Population Assistance Report 1994. New York: UNFPA.
166. Van der Veen, F.H., I. Ndoye, S. Guindo, I. Deschampheleire and L. Fransen. 1994. "Management of STDs and Cost of Treatment in Primary Health Care Centres in Pikine, Senegal." *International Journal of STDs and AIDS* 5: 262-267.
167. Van Esterik, P. and T. Greiner. 1981. "Breastfeeding and Women's Work: Constraints and Opportunities." *Studies in Family Planning* 12(4):184-197.
168. Vernon, R., G. Ojeda and M.C. Townsend. 1988. "Contraceptive Social Marketing and Community-Based Distribution Systems in Colombia." *Studies in Family Planning* 19(6): 354-360.
169. Vernon, R., K. Rocuts and J.E. Medina. 1987. "The Provision of Natural Family Planning Services at Public Health Centers in Colombia." *International Family Planning Perspectives* 13(4):121-127.
170. Vernon, R., A. Staunton, M. Garcia, J.J. Arroyo and R. Rosenberg. 1994. "A Test of Alternative Supervision Strategies for Family Planning Services in Guatemala." *Studies in Family Planning* 25(4): 232-238.
171. Von Allmen, S.D., W. Cates Jr., K.F. Schulz, D.A. Grimes and C.W. Tyler Jr. 1977. "Costs of Treating Abortion-Related Complications." *Family Planning Perspectives* 9(6): 273-276.
172. Washington, A.E., P.S. Arno, and M.A. Brooks. 1986. "The Economic Cost of Pelvic Inflammatory Disease." *JAMA* 255(13): 1735-1738.

173. Williams, T., G. Ojeda and M. Trias. 1990. "An Evaluation of PROFAMILIA's Female Sterilization Program in Colombia." *Studies in Family Planning* 21(5): 251-264.
174. Wolf, M. and J. Benson. 1994. "Meeting Women's Needs for Post-Abortion Family Planning: Report of a Bellagio Technical Working Group." *International Journal of Gynecology and Obstetrics* 45(Supplement): s3-23
175. World Bank. 1993. *Investing in Health: World Development Report*. Washington, DC: The World Bank.
176. World Health Organization. 1993. Evaluation of Recent Changes in the Financing of Health Services. WHO Technical Report Series 829. Geneva: World Health Organization.
177. World Health Organization. 1994. *Modelling the Costs of HIV Prevention: A Resource Requirement Model for Developing Countries*. Geneva: WHO Global Programme on AIDS.
178. World Health Organization. 1994. *Mother-Baby Package: Implementing Safe Motherhood in Countries*. Geneva: World Health Organization.
179. Yinger, N., R. Osburn, D. Salkever, and I. Sirageldin. 1983. "Third World Family Planning Programs: Measuring the Costs." *Population Bulletin* 38(1).

### *Addendum*

180. Management Sciences for Health. 1998. *CORE: A Tool for Cost and Revenue Analysis*. Boston: Management Sciences for Health.
181. Rational Pharmaceutical Management Project. 1998. *Cost Estimate Strategy Spreadsheet Model (Draft)*. Arlington, VA: Management Sciences for Health.