

## Cost Considerations

### Objective

To demonstrate how ECPs can reduce the public-sector costs associated with unintended pregnancy in a developing-country context.

### Considerations for Decision Makers

- Low-cost provision of ECPs, through nonclinical staff for example, can lead to cost savings in unintended pregnancy costs per woman having unprotected sex.
- Increased cost of ECP provision (such as clinical consultation or examination) reduces these cost savings.
- The larger the price differential between the cost of providing ECPs and the cost of pregnancy outcomes, the more cost-effective the use of ECPs will be.
- Countries with high maternal health care costs are likely to accrue large benefits from making ECPs available.

In advocating for large-scale provision of ECPs, it is important to demonstrate how ECPs can reduce the public-sector costs associated with unintended pregnancies in developing countries. Provided here is a simple model that assesses the cost-effectiveness of providing ECPs through developing-country public-sector services. The results highlight considerations for making decisions about incorporating emergency contraceptive pills into the broader package of family planning options available to women in low-resource settings. These considerations are summarized above.

### Introduction

Every year, nearly 60 million unintended pregnancies occur worldwide. From 1995 to 2000, nearly 700,000 women died as a result of unintended or unwanted pregnancy.<sup>1</sup> Maternal morbidity and mortality associated with unintended pregnancy incur incalculable social costs and personal costs to families. Unintended pregnancy also imposes an economic burden on a country's health care system because of the increased maternal health care costs associated with antenatal care, births, abortions, and postabortion care. Emergency contraception, as the only easily accessible, safe, and effective postcoital contraceptive method, has an important role to play in preventing unintended pregnancy. Consider that if 1,000 women who do not want to become pregnant have unprotected intercourse, an estimated 75 will become pregnant. If all 1,000 women use levonorgstrel-only ECPs, the number of pregnancies can be reduced to 11—an 89 percent reduction in unintended pregnancy.

## Background

Severely limited health budgets require funds be allocated to interventions that not only have an important health impact, but also make the most of scarce resources. Cost-effectiveness analysis can provide helpful information for making decisions about incorporating new health interventions, health technologies, or treatments into existing health systems. Cost-effectiveness analysis compares the costs and outcomes of two or more alternatives, making it possible to see how a new intervention would compare with the status quo. When looking at the implications of widespread access to ECPs, critical costs include those associated with provision of the ECPs; pregnancy, delivery, and related complications; abortion and abortion complications; and maternal morbidity and mortality. Increased access to ECPs will result in fewer pregnancies and abortions, resulting in lower direct medical costs, which can be captured as cost savings. It is more difficult to capture the cost savings to the health sector and society associated with reduced maternal morbidity and mortality.

The published literature to date provides evidence of the cost-effectiveness of ECPs in the United States and Canada.<sup>2,3,4</sup> These studies found that emergency contraception was either cost-effective or resulted in cost savings to the public payer, managed care, or third-party insurer, when used after an act of unprotected intercourse, or when obtained in advance to be used as needed. These studies focused primarily on the direct medical costs associated with induced abortion, birth, spontaneous abortion, and ectopic pregnancies. In Canada and the United States, where the average cost of births and pregnancy-related outcomes is high, especially when compared to the low price of ECPs, use of emergency contraception reduced the expenditures on medical care through the prevention of unintended pregnancies.

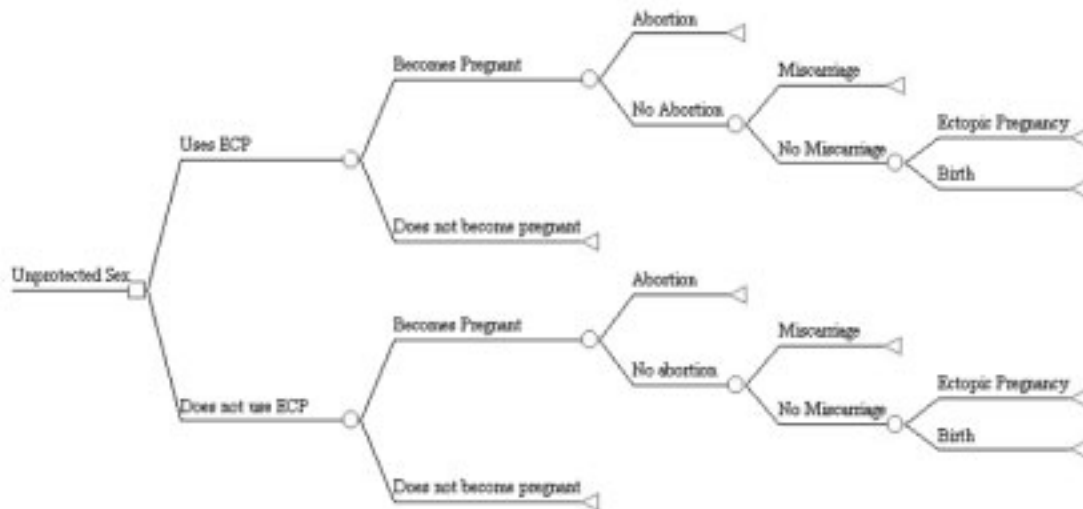
There is very little information on the costs or cost-effectiveness of the use of emergency contraception as part of family planning programs in developing countries. The evidence on the costs and outcomes from developed-country settings is not directly transferable to developing countries for several reasons. First, the health service delivery systems and cost structures in developing countries are more labor-intensive and less technology-intensive than in developed countries, resulting in lower health care costs compared to developed countries. Second, the product cost of the ECPs is relatively inexpensive in high-income countries, such as Canada and the United States. This is not the case in low- and middle-income countries, where the product cost of ECPs may be high relative to per capita health expenditures and the cost of services. Third, abortion services may be illegal in developing countries and not available through the public sector.

## Assessing the Cost-Effectiveness of ECPs in Developing-Country Settings

There are a number of challenges in developing a rigorous and comprehensive cost-effectiveness analysis around the provision of ECPs in a developing-country setting, but even a simple approach can provide useful illustrative information to help guide decision making. This section describes the results of a relatively simple cost-effectiveness analysis that models the costs and outcomes associated with provision of ECPs. The analysis described below examines the costs to a public health system of a set of expected

outcomes related to women's using or not using ECPs after unprotected intercourse. The costs included in this analysis are representative of health services provided by the public-sector clinics. The model uses an existing framework<sup>4</sup> that describes a specific set of possible outcomes occurring as the result of unprotected intercourse. These include: pregnancy, induced abortion, spontaneous abortion, or miscarriage, ectopic pregnancy, and birth (see Figure 1). Using this model, it is possible to apply probabilities of pregnancy and outcomes, drawn from published literature, as well as country-specific data on unintended pregnancy, abortion, and health system costs.

**Figure 1. Decision model for use or nonuse of emergency contraceptive pills**



## Model and Assumptions

The probability that a woman becomes pregnant following an unprotected act of intercourse is estimated at 7.5 percent.<sup>5</sup> The use of a levonorgestrel-only ECP reduces that risk of pregnancy by 85 percent. The risk of pregnancy in women who are using ECPs based on these probabilities is 1.125 percent. The model assumes that if a woman becomes pregnant, there is a 13 percent chance she will experience a spontaneous abortion,\* and a 1.1 percent risk of an ectopic pregnancy.<sup>6</sup> The probability of induced abortion varies by country and is estimated at 48 percent in Cambodia, 59 percent in Peru, 67 percent in Uganda, and 73 percent in Ghana.<sup>1</sup>

The analysis also relies on data from four developing countries: Cambodia, Ghana, Peru, and Uganda. These four countries were selected because they demonstrate both geographic and economic differences. Appendix 1 provides maternal health care cost estimates in the four countries. Socio-demographic and reproductive health indicators for each country are included in Appendix 2. Data on the costs of maternal health care services are scarce, and even more difficult to determine are the costs associated with abortion and postabortion care, especially in countries where abortion is illegal. The four countries also were selected because of the availability of cost data through published literature (Uganda and Ghana), personal communication (Cambodia) and through a rapid MOH survey (Peru). The survey is included in Appendices 3, 4 and 5.

\* Estimated from an unpublished internet source: [http://www.umanitoba.ca/womens\\_health/global-r.htm](http://www.umanitoba.ca/womens_health/global-r.htm).

The model assumes that all women who become pregnant receive maternal health care services in public-sector clinics or hospitals. Cost estimates for birth include antenatal care visits. Abortion costs are difficult to obtain, and where not available these costs are assumed to be 75 percent of birth costs.\*\* ECPs are assumed to be procured by the program at a cost of \$0.25 per unit,† and are provided to clients free of charge.

The cost of an unintended pregnancy represents the “net cost” equal to the total cost of the treatment (i.e., ECPs) minus the total costs that would have been incurred had the woman become pregnant. It is calculated as the weighted average of the costs of abortion, spontaneous abortion, ectopic pregnancy and birth, with the weights equal to the probabilities of each outcome for unintended pregnancies.

To provide a range of cost estimates, the model estimates costs for four scenarios that include clinical consultative services and higher abortion costs.

The model used four scenarios:

### **Scenario 1:**

- ECPs can be obtained from a public health clinic or dispensary without an office visit.
- No costs associated with an office visit.

### **Scenario 2:**

- ECPs can be obtained from a public health clinic or dispensary without an office visit.
- No costs associated with an office visit.
- Abortion costs are 25 percent higher than birth costs.

### **Scenario 3:**

- ECPs are obtained from a public health clinic with a required clinical consultation.
- The cost of a consultative office visit is included.

### **Scenario 4:**

- ECPs are obtained from a public health clinic with a required clinical consultation.
- The cost of a consultative office visit is included.
- Abortion costs are 25 percent higher than birth costs.

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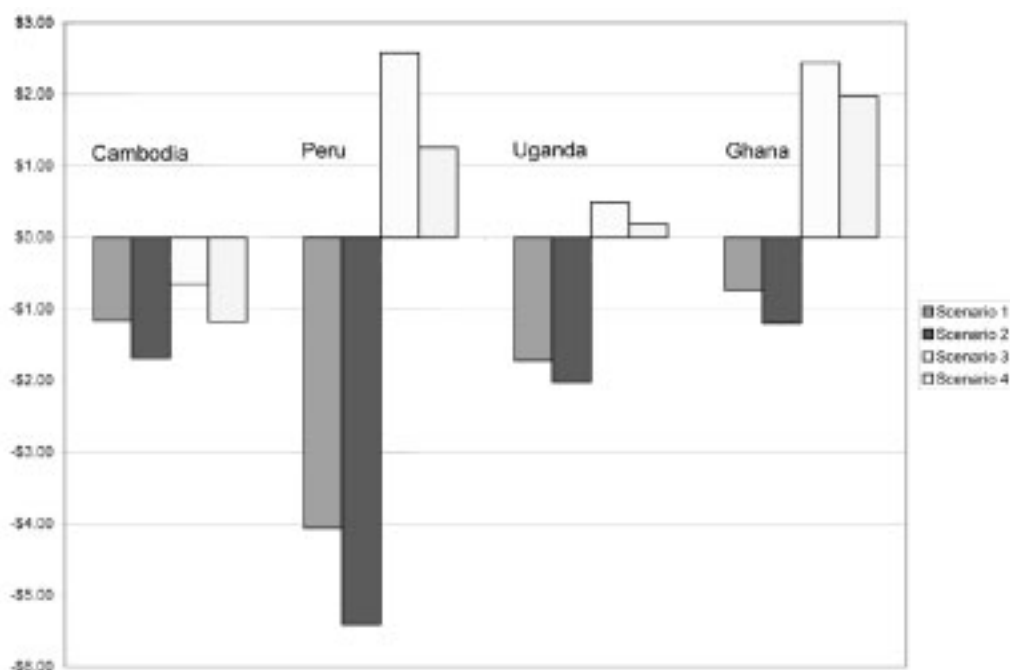
\*\* In Cambodia, where abortion is legal and services are provided by the public sector, the cost estimate is for the provision of abortion services. In Peru, Ghana, and Uganda, where abortions are permitted only under certain conditions (e.g. to save the life of the woman in Uganda), the cost of abortion is the estimated average cost to the public sector for postabortion complication costs. These complication costs have been estimated at \$66.00 per complication for Peru and Ghana and \$35.00 for Uganda (Levin et al. 2000).

† This is the current price for levonorgestrel-only pills procured through UNFPA. (See information in the tools section of Module F on Regulation, Procurement and Distribution of a Progestin-Only ECP on procurement through international procurement services.) The per unit cost is exclusive of shipping costs, which will raise the per unit cost by 40 percent to over 200 percent, depending upon the size of the order.

## Findings

Under the assumptions of Scenario 1, the provision of ECPs is cost-saving in all countries. (See Figure 2 below for an illustration of the cost savings (in \$U.S.) versus the cost increases under the four scenarios.) For example, in Peru, the average cost of an unintended pregnancy was \$5.10 per woman. The use of ECPs reduces that cost by \$4.06—an 80 percent reduction. In Uganda, costs were reduced by 75 percent (\$2.31 reduced by \$1.72); in Cambodia, by 44 percent (\$2.65 reduced by \$1.16); and in Ghana, by 63 percent (\$1.15 reduced by \$0.73). Under Scenario 1, if 500,000 women experienced unintended pregnancy in a single year in Peru and half of these women received ECPs from a public health dispensary, \$1 million would be saved in unintended pregnancy costs within the public sector. This level of cost savings is particularly noteworthy because of the need to treat all women at risk of unintended pregnancy with ECPs, even though only a portion of them would likely become pregnant from a single act of intercourse.

**Figure 2. Savings or costs (in \$U.S.) per woman to public payer to avoid an unintended pregnancy resulting from unprotected sex in Cambodia, Peru, Uganda, and Ghana under four ECP provision scenarios<sup>‡</sup>**



As might be anticipated, even greater cost savings are realized across all countries when the cost of abortion is 25 percent higher than the cost of a birth and when ECPs are accessible without a clinical consultation (Scenario 2). When a required clinical consultation is included (Scenario 3), the cost of providing ECP increases—with the result that in three of the four countries (Cambodia is the exception), the costs incurred in providing ECPs appear to outweigh the cost savings gained from prevention of unintended pregnancy. In Scenario 4, where abortion costs are increased and ECPs are obtainable only with a clinical consultation, ECP provision still appears cost-effective in Cambodia, almost neutral in Uganda, and higher in Peru and Uganda.

<sup>‡</sup> Costs below the line represent savings and costs above the line represent expenditures.

## Discussion

The results of this analysis suggest that emergency contraceptive pills can be cost-saving to the public sector when the cost of providing the ECPs is kept low. The cost can be kept low if ECPs are available at a subsidized price to the government, if women are informed about ECPs, and if they are easily available without a clinical consultation. The safety profile of ECPs has led a number of countries to increase ECP access by making them available over-the-counter or through pharmacies.<sup>§</sup> Public health systems could emulate this easy-access approach.

The results of the analysis also demonstrate that the extent of cost savings or of additional costs incurred will depend upon many factors, including the extent of unintended pregnancy and resulting abortions, costs of pregnancy outcomes, cost of ECPs, and in particular, how ECPs are delivered to women. The higher the costs associated with both abortion and birth relative to the cost of providing ECPs, the greater the cost savings to the public payer. The costs and potential savings will also vary depending on the model assumptions, completeness of the cost data, and data accuracy.

The four scenarios in the model did not include variation in any of the probabilities associated with pregnancy outcomes and only included some variation in costs. Additionally, the model most likely underestimated costs associated with unintended pregnancy because it did not include costs related to pregnancy complications or complete societal costs, such as the indirect costs associated with losses in labor productivity and maternal deaths. Finally the model assumes all costs are borne within the public health care system. This may not be the case if a woman accesses ECPs, maternal health services, or abortion services through other sectors (for example through an NGO or the private sector).

Finally, although the focus of this analysis was cost-effectiveness, direct medical costs are not the only factor policy makers must consider when making decisions about allocating scarce resources. A significant proportion of unintended pregnancies (ranging from 50 percent in Cambodia to 75 percent in Ghana) end in abortion. Unintended pregnancies also lead to maternal deaths. Based on data from the Global Health Council, the following table provides an estimated number of abortions and maternal deaths that could be prevented if 100,000 women at risk of unintended pregnancy in each of the four countries used ECPs.<sup>1</sup>

**Table 1. Unintended pregnancies, abortions, and maternal deaths averted through use of ECPs after unprotected intercourse by 100,000 women in Cambodia, Peru, Uganda, and Ghana<sup>1</sup>**

	Cambodia	Peru	Uganda	Ghana
<b>Unintended pregnancies</b>	6375	6375	6375	6375
<b>Abortions</b>	3060	3761	4271	4718
<b>Maternal deaths</b>	25	9	60	30

<sup>§</sup> The Emergency Contraception Newsletter reports that as of Spring/Summer 2003, ECPs are available direct from a pharmacist in Albania, Belgium, Benin, Cameroon, Congo, Denmark, Finland, France, Gabon, Guinea-Bissau, Israel, Ivory Coast, Lithuania, Madagascar, Mali, Mauritius, Namibia, Portugal, Senegal, South Africa, Sri Lanka, Switzerland, Thailand, Togo, Tunisia, United Kingdom, and parts of United States and Canada. They are available over-the-counter in Norway and Sweden.

The significant number of negative outcomes averted through the use of emergency contraception illustrated in the table above demonstrates an additional critical benefit of the use of emergency contraception in developing-country settings. The costs associated with maternal deaths are not reflected in this analysis, but the issue should certainly be considered when assessing the costs associated with integrating emergency contraception into the public sector.

## Appendix 1. Cost estimates (\$US)

	<i>Country</i>			
	<b>Cambodia</b>	<b>Peru</b>	<b>Uganda</b>	<b>Ghana</b>
<b>ECP</b>	\$0.25	\$0.25	\$0.25	\$0.25
<b>EC office visit</b>	\$0.51	\$6.67	\$2.21	\$3.17
<b>Induced abortion</b>	\$20.00	\$66.00	\$32.25	\$14.84
<b>Spontaneous abortion</b>	\$5.00	\$53.00	\$33.90	\$14.60
<b>Ectopic pregnancy</b>	\$45.00	\$36.00	\$33.90	\$14.60
<b>Birth</b>	\$30.00	\$81.00	\$37.81	\$19.79



## Appendix 2. Selected socio-demographic and reproductive health indicators for the period 1995-2000

	Country			
	Cambodia	Peru	Uganda	Ghana
<b>Total Population (2002)</b>	12,487,190	26,749,000	23,395,170	20,070,910
<b>GDP per capita (2002)</b>	\$325	\$2,404	\$367	\$432
<b>Number of women aged 15-44</b>	2,579,293	6,005,502	4,297,124	4,120,553
<b>MM rate</b>	590	240	1,100	590
<b>Maternal deaths</b>	14,192	9,741	71,515	2,1387
<b>Pregnancies</b>	3,558,236	7,153,365	8,892,312	5,340,873
<b>Births</b>	2,405,472	4,058,911	6,501,377	3,624,982
<b>Unintended pregnancies</b>	1,292,562	3,433,953	1,570,701	1,241,011
<b>Abortions</b>	619,030	2,021,452	1,057,093	914,763
<b>Unintended births</b>	673,532	1,412,501	513,608	326,248

Source: Global Health Council. *Promises to Keep: The Toll of Unintended Pregnancies on Women's Lives in the Developing World*. 2002.

## Appendix 3. Guidelines for collecting information on birth, abortion, and abortion-related costs

Try to meet with individuals who can provide information on public hospitals and health centers and NGO health centers. You may also be interested in private hospital or clinics, since these presumably cover costs and may be more realistic of true resource use. It would be useful to get urban and rural estimates.

Explain to whoever you meet that you are interested in getting estimates of costs for

1. An office visit to obtain ECPs.
2. Antenatal care (average cost per woman).
3. Uncomplicated vaginal delivery.
4. Ectopic pregnancy or complicated delivery (as a proxy).
5. Abortions using MVA and surgical procedures.
6. Costs associated with abortion complications.

It would be easiest to get *average per patient costs*, but these costs should include labor, materials, and indirect costs used in providing any service to women. A source of information may be insurance, hospital, or clinic user-fees manuals or fee schedules.

**If you receive a user-fee manual or fee schedule, ask if these fees cover the full cost of service. If not, ask what percentage of the full cost do the user fees represent.**

Two tables are provided to help collect and organize cost data.

Appendix 4 is a more detailed table that can be used for a single facility.

Appendix 5 is a summary table that can be used to enter average cost estimates that you may be able to collect across different types of facilities.

## Appendix 4. Cost data by facility

Try to fill in the following information. Fill in one of these tables for each facility as needed.

1. Name of facility: \_\_\_\_\_
2. Location: \_\_\_\_\_
3. Type of facility: Public Private NGO (circle one)

	Charges per patient (from user fees)		Cost per patient (other source—full cost of providing service in local currency)	Average number of hours or days in clinic or hospital (hours or days)
	Local currency	% of full cost		
Office visit (20-minute)				
Antenatal care				
Birth				
Vaginal delivery				
Complicated delivery				
Induced abortion				
MVA				
Surgical				
Ectopic pregnancy				
Spontaneous abortion				
Postabortion complications				
Optional				
Daily bed charges				
Ob/gyn consultation				

**Note:** We are interested in the full cost to the provider for each of these services. If not available, we can use patient charges or user fees (that is, what the patient pays) as a proxy and try to estimate how much those costs are subsidized in public health settings.

## Appendix 5. Summary of costs\*

	Hospitals		Health Centers		
	Public Hospital	Private Hospital	Public Health Center	NGO or Mission Health Center	
				Private Clinic	
Office visit to pick up ECPs (20-minute visit)					
Antenatal care					
Birth					
Vaginal delivery					
Induced abortion					
MVA					
Surgical					
Ectopic pregnancy					
Spontaneous abortion					
Postabortion complications					

\* Local currency. Provide exchange rate \$US 1.00 = \_\_\_\_\_

## References

- <sup>1</sup> Global Health Council. *Promises to Keep: The Toll of Unintended Pregnancies on Women's Lives in the Developing World*. New York: Global Health Council (2002).
- <sup>2</sup> Trussell, J., Koenig, J., Ellertson, C., and Stewart, F. Preventing unintended pregnancy: the cost-effectiveness of three methods of emergency contraception. *American Journal of Public Health* 87:932-937 (1997).
- <sup>3</sup> Trussell, J., Wiebe, E., Shochet, T., and Guilbert, E. Cost savings from emergency contraceptive pills in Canada. *Obstetrics and Gynecology* 97:789-793 (2001).
- <sup>4</sup> Marciante, K., Gardner, J., Veenstra, D., and Sullivan, S. Modeling the cost and outcomes of pharmacist-prescribed emergency contraception. *American Journal of Public Health* 91(9):1443-1445 (2001).
- <sup>5</sup> WHO Task Force on Postovulatory Methods of Fertility Regulation. Randomised controlled trial of levonorgestrel versus the Yuzpe regimen of combined oral contraceptives for emergency contraception. *Lancet* 352:428-433 (1998).
- <sup>6</sup> Awojob, O.A. and Ogunsina, S. Ectopic pregnancy in a rural practice. *Niger Journal of Medicine* 10:139-140 (2001).

