# Cost-effectiveness analysis of contraceptive options in Central Women's Hospital

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The aim of this study is to determine the most cost-effective method of contraception in Central Women's Hospital. Based on the cost data obtained from clients attending Central Women's Hospital during the study period, costs for 1000 hypothetical clients for each method for a period of 3 years were estimated. After reviewing literatures, using estimated failure rates from literature (Trussell *et al.*, 1995), number of unintended pregnancy avoided for one year were calculated. It was found that IUCD was the most cost-effective. It was followed by the injection depoprovera and sterilization. Combined oral contraceptives were the least cost-effective method. This study explores the most cost-effective method in currently used contraceptives and it may be useful in implementing family planning services cost-effectively.

## INTRODUCTION

Contraceptive technology is a medical success story. For women who should not become pregnant because of medical problems, contraception saves lives and prevents morbidity. For the majority of users, contraception enhances quality of life, allowing couples to choose when they wish to have children [1].

The two irreversible methods, female surgical sterilization and male surgical sterilizatio (vasectomy), provide the greatest protection from unintended pregnancy. Reversible methods of contraception are oral contraceptives, the injectable contraceptives, subdermal implant, intrauterine devices, barrier methods, fertility awareness methods, lactational amenorrhoea method and coitus interruptus [2]. Cost-effective ness analysis is a form of economic evaluation. It is one facet of information in choosing an appropriate method of contraception [3].

## MATERIALS AND METHODS

This study was a methodological study, where a method for evaluating cost-effectiveness of contraceptive options is developed using prospective approach. It was conducted in family planning clinic, Central Women's Hospital from March 2002 to May 2003. During the study period, 30 clients for each method of contraception i.e., combined oral contraceptives, injectable depo-provera, copper-T IUD and female sterilization were interviewed.

### Costs of different methods

Costs incurred by the users only were considered. During the period of study, individual clients were asked, using the proforma, about the costs incurred for drugs and travel costs. For oral contraceptives and injectables, costs incurred during the period of 9 months were recorded. Costs that would be incurred for one year period were then estimated. For the remaining two methods, cost incurred at the time of investigation was taken as one time cost for the particular year as the method of (IUCD) is used for long term (3-5 years), and sterilization has permanent effect.

Costs were calculated for 1000 hypothetical clients using each method for 3 consecutive years.

Costs of each method include two parts, cost for those using the method throughout the year and costs for those using only to the point where failure takes place.

Users at the beginning $= U$
Drop out rate = Users at the beginning x failure
$= U \times f$
Users at the end of the year $= U-Uf$
$= U(1-f)$
Costs for those using the method throughout the year (total users) will then be,
$= U(1-f) \times C$
$= UC(1-f) \ [4]$

*Costs for those partially using the method*

Costs for those who fail to use the method throughout the year include costs up to the time they fail to use the method only.

For those using pills or injectables, assumption was made that all of them drop out at mid point of the year. They use the method for six months only.

Number of partial users = Initial users x failure rate
$= U \times f$
Cost for partial users $= Uf \times \frac{1}{2}C [4]$
Total costs $=$ Cost for total users + costs for partial users
$= UC(1-f) + \frac{1}{2}UCf$
$= C(U - \frac{1}{2}Uf) - (1) \ [4]$

For calculating costs for subsequent years the equation (1) can be extended as follows:

Cost for the second year $= C(U-Uf_1)(1-\frac{1}{2}f_1)$

Cost for the third year $= C[(U-Uf_1)(1-\frac{1}{2}f_2)(1-\frac{1}{2}f_3)]$

For IUCD method, assumption was made that drop out took place at the end of the year and costs for removal of IUCD were included in calculating total costs of using IUCD for one year.

If the cost for removal is $C_r$ and the number of drop out is Uf as previously calculated.

Removal costs $= Uf \times C_r$ and,
Total costs $=$ Costs for total users + costs for removal
$= UC + UfC_r$
$= U(C+fC_r) - (2) \ [4]$

Annual failure rate for the method available in one literature reviewed [4] were applied in this study.

As the period under consideration was three years, costs were discounted for annual rate of change in price of drugs and appliances, which was assumed to be 10%. Sensitivity analysis was done and changing annual discount rate did not affect the conclusion.

*Effectiveness of each method of contraception*

Effectiveness of each method is determined as the number of unintended pregnancy avoided [4].
$$U_{Pav} = N(C_0 - f_1)$$

$U_{Pav}$ = Unintended pregnancy avoided
$C_0$ = Contraception rate without any method
$f_1$ = failure rate of particular method
N = Number of user

*Cost-effectiveness of each method*

Cost-effectiveness of each method is expressed as cost per unintended pregnancy avoided [4].

### RESULTS

Table 1. Costs undiscounted for annual rate of change in price for each contraceptive method used by 1000 hypothetical clients in 3 years

| Method | Costs (Kyats) | | |
|---|---|---|---|
| | Year (1) | Year (2) | Year (3) |
| COC | 2993120 | 2903326 | 2816226 |
| Injectable depo-provera | 2290789 | 2283916 | 2755248 |
| Copper-T IUD | 1131330 | 262.66 | 787.98 |
| Female sterilization | 8282000 | - | - |

Table 2. Costs discounted for annual rate of change in price for each contraceptive method used by 1000 hypothetical clients in 3 years

| Method | Cost (Kyats) | | | Total discounted cost in 3 years (Kyats) |
|---|---|---|---|---|
| | Year (1) | Year (2) | Year (3) | |
| COC | 2993120 | 3193659 | 3407633.5 | 9594412. 1 |
| Injectables | 2290789 | 2512308 | 2755248.7 | 7558345.3 |
| Copper-T IUD | 1131330 | 288.93 | 593.5 | 1133623.1 |
| Female sterilization | 8282000 | - | - | 8282000 |

Table 3. Pregnancy avoided

| Method | Year | User | Pregnancy expected in one client | | Pregnancy avoided |
|---|---|---|---|---|---|
| | | | Without | With | |
| COC | 1 | 1000 | 0.85 | 0.03 | 1000 × 0.82= 820 |
| | 2 | 970 | 0.85 | 0.03 | 970 × 0.82= 796 |
| | 3 | 940 | 0.85 | 0.03 | 940 × 0.82= 772 |
| | Total | - | - | - | 2388 |
| Injec-tables | 1 | 1000 | 0.85 | 0.003 | 1000 × 0.847= 847 |
| | 2 | 997 | 0.85 | 0.003 | 997 × 0.847= 845 |
| | 3 | 994 | 0.85 | 0.003 | 994 × 0.847= 842 |
| | Total | - | - | - | 2534 |
| IUCD | 1 | 1000 | 0.85 | 0.008 | 1000 × 0.842 = 842 |
| | 2 | 992 | 0.85 | 0.002 | 992 × 0.848= 842 |
| | 3 | 990 | 0.85 | 0.006 | 990 × 0.844= 836 |
| | Total | - | - | - | 2520 |
| Sterili-zation | 1 | 1000 | 0.85 | 0.004 | 1000 × 0.846= 846 |
| | 2 | 996 | 0.85 | 0.0013 | 996 × 0.8487= 845 |
| | 3 | 994 | 0.85 | 0.0013 | 994 × 0.8487= 842 |
| | Total | - | | - | 2537 |

Table 4. Cost-effectiveness of different methods

| Method | Total costs (Kyats) | Total pregnancy avoided | Cost/preg-nancy avoided |
|---|---|---|---|
| COC | 9594412.06 | 2388 | 4017.76 |
| Injectables | 7558345.25 | 2532 | 2982.77 |
| IUCD | 1133623.03 | 2520 | 449. 85 |
| Sterilization | 8282000 | 2537 | 3264.4 |

The methods under study can be listed on the basis of cost-effectiveness as follows:

(1) Copper-T IUD
(2) Injectable depo-provera
(3) Female sterilization
(4) Combined oral contraceptives

## DISCUSSION

This study showed that copper-T IUCD was the most cost-effective, costing 449.85 Kyats for each unintended pregnancy avoided. Injectable depo-provera was the second most cost- effective, costing 2982.77 Kyats. Female sterilization was the third most effective, 3264.4 Kyats. Oral contra-ceptives were the least cost-effective as they cost 4017.76 Kyats for each pregnancy avoided.

Trussell *et al*., (1995) had been reported that copper-T IUD was the most cost-effective method.

In this study, the result was the same because copper-T IUD is cheap, easily available, has less side effect and lower failure rate.

Trussell *et al*.(1995) showed that Injection depo-provera was the fourth most cost-effective method next to copper-T IUCD, vasectomy and implant.

In this study Injection depo-provera was the second most cost-effective method behind copper-T IUCD , because most of the clients use this method, and also due to other reasons. It is suitable for breastfeeding mothers, clients with difficulty in remembering to take a pill and painful periods. It has less side effect and low failure rate. It is also easily available in our country.

Mathematica Policy Research (1992) showed that tubal ligation was the second most cost-effective method behind vasectomy. Trussell *et. al.,* (1995) found that tubal ligation was the seventh most cost-effective method behind copper-T IUD, vasectomy, implant, injectable, oral contraceptives and progesterone - T IUD.

In this study, tubal ligation was the third most cost-effective method following copper-T IUD and injection depo-provera. Although failure rate for tubal ligation was the lowest, the highest costs incurred, so the method was found to be less cost-effective than IUCD and injectables.

Trussell et al., (1995) had reported that oral contraceptives were the fifth most cost-effective method following copper-T IUD, implant and injectable contraceptive.

In this study, oral contraceptives were the least cost-effective method following copper-T IUD, injectables and sterilization. Contraceptive pills were not free from costs

and the costs were more or less comparable to those injectable but because of high failure rate it was found to be least cost-effective.

Mathematica Policy Research (1992) showed that vasectomy was the most cost-effective method. Trussell *et.al.,* (1995) found that vasectomy was second most cost-effective method next to copper-T IUD. In our country, vasectomy is not legally available.

Mathematica Policy Research (1992) showed that Norplant was the third most cost-effective method. Trussell *et al., (*1995) also found that Norplant was the third most cost-effective method. In our country, Norplant is not available now.

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