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Cost Benefits from the Provision of Specific Methods of Contraception in 2009

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Cost Benefits from the Provision of Specific Methods of Contraception

EXECUTIVE SUMMARY

This report presents the analysis of comparative cost-benefits of contraceptive methods dispensed to female clients under the Family PACT Program in calendar year 2009. This report provides an update to a previous analysis of the cost-benefit of specific contraceptive methods dispensed to female clients in calendar year 2003, and includes additional contraceptive methods that previously had not been made available through the program. These analyses describe the relative contribution of different contraceptive methods to the fertility effect of the Family PACT Program. This information also helps us understand the cost-benefit associated with expenditures on short-term and long-acting methods of contraception. The former have low cost but also provide relatively few months of contraceptive protection. The latter have larger upfront costs, but may avert pregnancies for months or years into the future.

We estimate the number of pregnancies averted through the use of specific contraceptive methods as the difference between the number of pregnancies expected in the absence of Family PACT and the number of pregnancies expected given provision of that contraceptive method through Family PACT. We examine the total cost of providing each method of contraception including the contraceptive supplies and services, pregnancy testing, and sexually transmitted infection (STI) testing and treatment. We compare the cost of providing each method to the savings from reduced public expenditures on unintended pregnancy. Our key findings are as follows:

1. Every method of contraception offered in Family PACT is cost-beneficial, that is, each saves more in public expenditures for unintended pregnancy than it costs to provide.

2. Over half (51%) of the 200,000 pregnancies averted in 2009 as a result of Family PACT are attributable to the most commonly used method, oral contraceptives, one seventh (13%) to use of injectable methods, 12% to intrauterine contraceptives (IUCs), and 9% to barrier methods.
3. IUCs and implants have the highest cost-savings with near or over \$5.00 of savings for every dollar spent for users of these methods, a conservative estimate since we cap the duration of contraceptive effect at 2 years.
4. Among short-term methods, injectable contraceptives have the highest cost-savings at \$4.00 saved per dollar in services.
5. The remaining short-term hormonal methods in order of savings are oral contraceptives (\$3.37), emergency contraception (EC) (\$2.56), vaginal ring (\$2.20) and the patch (\$2.12)
6. Barrier methods and spermicides yield savings of less than \$2 per dollar spent on services.
7. Essure[®] appears to be much less cost-beneficial than surgical tubal ligation. It saves just \$1.59 compared to \$3.59 for surgical tubal ligations.

Since no single method is clinically recommended for every woman, it is medically and fiscally advisable to offer women all contraceptive methods to enable them to choose methods that best meet their needs, increasing the likelihood of compliance with the method chosen and prevention of unintended pregnancies. Family PACT can further increase savings associated with each method by encouraging providers to:

- (for those who work within clinics with the authority to dispense contraceptive methods onsite) dispense more months of contraceptive protection per visit as appropriate, to facilitate contraceptive continuation, particularly for the ring and patch;
- provide information to women about the relative effectiveness and ease of use of different contraceptive methods to help women choose the best method for them; and

- recommend longer-acting methods of contraception, particularly to primary users of barrier methods and EC.

INTRODUCTION

Family PACT (Planning, Access, Care and Treatment) is California's family planning program serving women and men of reproductive age whose incomes do not exceed 200% of the federal poverty guidelines and who have no other public or private reproductive health care coverage. Introduced in 1997 as a state-funded program, Family PACT has operated since 1999 with additional funds from the federal Centers for Medicare and Medicaid Services under a Section 1115 Demonstration Waiver and recently converted to the State's Medical Program via a State Plan Amendment in 2011. Family PACT currently provides contraception and other reproductive health services to more than 1.8 million clients per year.¹ Clients seeking contraception at no cost through Family PACT can choose from FDA-approved contraceptive methods. Methods available since the inception of the program include oral contraception, injectables, intrauterine contraception (IUC), sterilization, and barrier methods. As new and improved methods of contraception have become available, the Family PACT formulary has grown to include Emergency Contraception products (EC), added in 2000, the contraceptive patch (Ortho Evra[®]) and ring (NuvaRing[®]), added in 2002, the contraceptive implant Implanon[®] as well as the permanent contraceptive device, Essure[®], both added in 2008.

The present study is designed to:

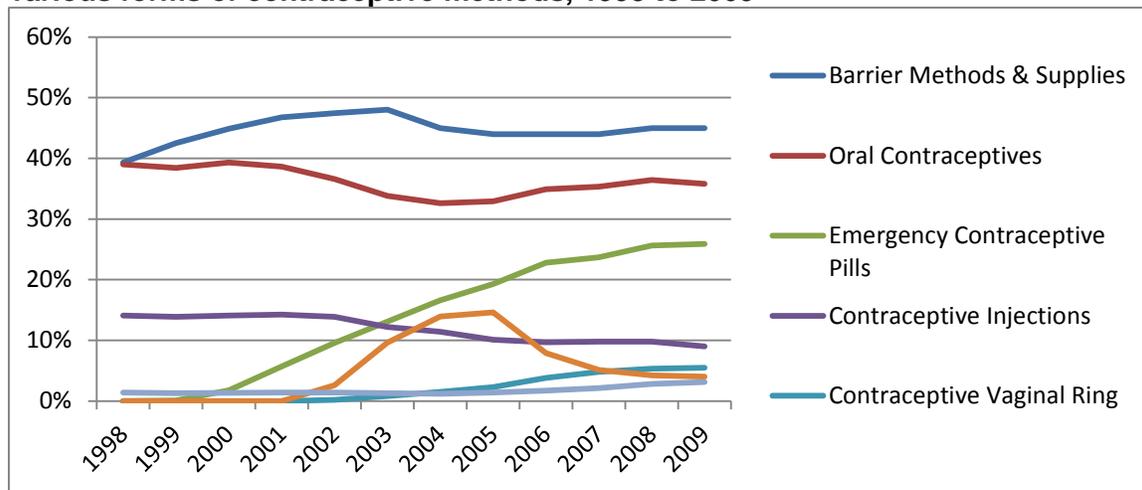
- assess the cost-benefit of specific contraceptive methods in light of the availability of new methods (e.g., Implanon[®], Essure[®]) under Family PACT and the push toward greater adoption of long-acting reversible contraception;
- account for the changing costs of well-established methods under Family PACT; and
- evaluate the relative contribution of each method to the number of unintended pregnancies averted within the Family PACT population.

The cost-benefit of specific methods of contraception is estimated by assessing the cost of providing each of these methods and the savings from pregnancies averted by contraceptive method. We compare the costs of providing contraceptives through the Family PACT Program to the costs of unintended pregnancy borne by federal, state and local governments. Although the Family PACT Program provides contraception to women and men on the basis of medical necessity for family planning services, this study is based on services provided only to women in their prime reproductive ages 15 to 44. There are relatively few women (under 5%) served in Family PACT who are outside this age range; and the fecundity of those women outside of this range is not well known.

As part of the overall evaluation of Family PACT, the pattern of various methods of contraception dispensed has been carefully tracked.² Figure 1 shows the changes in method provision over time. Among female Family PACT clients in 2009, the most popular methods dispensed were barrier methods (45%) and oral contraceptives (36%). Provision of all methods increased or held constant over time with the exception of the contraceptive patch, which accounted for 15% of clients in 2005 and declined to 4% in 2009. The percentage of female clients dispensed a contraceptive injection also declined in popularity from 12% in 2003 to 9% in 2009. Between 2003 and 2009, two contraceptive methods increased significantly in popularity: the ring (from 0.8% to 5.5%) and IUCs (from 1.3% to 3.1%). Dedicated Emergency Contraceptive pill products (EC) have also increased steadily over time; 13% of female clients were provided EC in 2003, 26% received EC products through Family PACT in 2009. Most women received EC with another method; only 1% of clients were provided EC without another method of contraception in 2009. Since the contraceptive implant Implanon[®] was only added as a benefit in 2008, trend data are limited and uptake of this method shows that less than 0.5% of female clients in 2009 underwent placement of Implanon[®] and far fewer underwent the Essure[®] procedure (0.05%) in 2009. However, growth in the number of women using Essure (114 in its first year and

723 in its second) does indicate a small increase in what has otherwise been nearly stable female sterilization rates over the past five years.

Figure 1. Trends in the percentage of Family PACT female clients being dispensed various forms of contraceptive methods, 1998 to 2009



Source: Family PACT claims data.

Note: Sterilization and implants, provided to fewer than 1% of female Family PACT clients, are not shown.

Cost-benefit analyses of the overall Family PACT Program show substantial reductions in private, federal, and state expenditures on unintended pregnancies attributable to pregnancies averted by Family PACT.^{3,4} However, the analysis of the cost benefit of the program as a whole did not disaggregate the different types of contraceptive methods to examine whether some contraceptive methods are more cost-beneficial than others. In a previous study based on data from 2003, we demonstrated the cost-benefit of specific methods of contraception in a public program in which women can discontinue and switch methods.⁵ This analysis, published in 2009,⁶ contributed to the literature which to date had relied on models of hypothetical use for fixed periods of time with no contraceptive discontinuation or switching. The influential Trussell study showed the theoretical cost-effectiveness of the methods, not accounting for the costs of providing other method-related services or the likelihood of method discontinuation and found that all methods are cost-effective in relation to the high cost of an unintended pregnancy.⁷ Trussell and colleagues have continued to update and expand their economic analysis of contraceptive use over the

years to account for cost updates, as well as the availability of new products, such as implants.^{8,9} The models presented by Trussell are based on hypothetical use for fixed periods of time, typically one year and five years. These models do not reflect reality in that many women, such as those in Family PACT, discontinue and switch methods frequently.

An international review across several developed countries of cost benefit studies by specific methods found that sterilization and long-acting reversible methods were most cost beneficial, followed by other hormonal methods, then barrier and behavioral methods.¹⁰ The authors emphasized that more work needs to be done to encourage compliance and improve continuation rates. For example, method continuation can be related to cultural and demographic factors, as substantiated in numerous studies. Kost et al, found that failure rates of contraceptives were generally stable between 1995 and 2002, but risk of failure is greatly affected by socioeconomic characteristics of the users.¹¹ A Cochrane Review of implantable contraceptives found that women in developed country studies were more likely to discontinue these methods compared to women in developing country studies.¹² Lipetz et al, compared the relative cost-effectiveness of Implanon[®] to oral contraception within a reproductive health clinic serving urban and rural women in Wales, UK. Implanon[®] was found to be more cost-effective than oral contraceptives, although it was estimated that cost-effectiveness may be equal at around 3 years of use assuming no method failures.¹³ In at least one U.S. study, the authors claim that a comparison of the contraceptive patch with combination oral contraceptives favors the patch in terms of reduced costs from unintended pregnancy.¹⁴

Although the overall cost savings from contraception is well established, the actual costs and effectiveness to individuals and society depend on correct and consistent use of any given method. Sawhill et al, point out that, "...not all contraceptives are created equal. Some are far more effective in practice than others, once the likelihood of incorrect or inconsistent use is factored into the

equation.”¹⁵ Contraceptives that reduce the burden on the user to remember to use them, as opposed to methods like oral contraception, diminish incorrect and inconsistent use and thus the probability of experiencing an unintended pregnancy. These are especially important for young people who may be more spontaneous about their sexual behavior. Studies documenting declines in pregnancy risk for adolescents have explained the trends in terms of improvements in contraceptive practice, particularly the increased use of condoms and decreased use of withdrawal and “no method”.¹⁶ Addressing the trends in contraceptive use among adolescents, and common issues that prevent clinicians from recommending more effective methods, such as implants and IUCs, Whitaker et al point out that “none of the long-acting highly effective methods are contraindicated in adolescents, and they should be considered for use and offered to young women as contraceptive options”.¹⁷

In the present study, we examine the relative cost-benefit of specific methods when cost data are derived from an established public health benefits program. Family PACT, as do most publicly-funded family planning programs, serves a significant proportion of low-income women who tend to switch and discontinue contraceptive methods, which is taken into account in this analysis of specific contraceptive methods examined individually. In the previous cost study of specific methods (2007)¹⁸, the key outcomes were:

- Each method of contraception in the Family PACT formulary was found to save more in terms of public expenditures for unintended pregnancy than it costs to provide.
- Over half of the 178,000 pregnancies averted as a result of Family PACT were attributable to oral contraceptives, one fifth to injectable methods, and one tenth each to the contraceptive patch and barrier methods.
- The highest savings were found for implantable and intrauterine contraception with more than \$7 of savings for every dollar spent on services and supplies.

- Per \$1.00 spent, injectable contraceptives yielded savings of \$5.60; oral contraceptives, \$4.07; the patch, \$2.99; the vaginal ring, \$2.55; barrier methods, \$1.34; and emergency contraceptives, \$1.43.

As in the earlier study¹⁹, this report presents an analysis of the comparative cost-benefit of contraceptive methods taking into account four factors:

1. the failure rates of the methods,
2. how many months of coverage women get,
3. who uses the method and what other services they use, and
4. the total cost of providing each method and maintaining use, including expenditures for office visits, supplies, pregnancy tests, and testing and treatment for sexually transmitted infections (STIs).

DATA AND METHODS

This study relies on two calendar years of Family PACT claims data, as well as various sources of public cost and other data. We use contraceptive method dispensing data from Family PACT paid claims in 2009. We also examined claims in 2010 to analyze contraceptive continuation including intrauterine contraceptives (IUC) and implant removals.

We employ the same methodology to estimate pregnancies averted that we have used in previous reports and peer reviewed papers.^{20,21,22,23} However, for this study, we analyze the fertility effect of each method of contraception separately, similar to an analysis we conducted with 2003 data.²⁴ We estimate the number of pregnancies averted by means of each specific contraceptive method used to be the difference between the number of pregnancies expected in the absence of Family PACT and the number of pregnancies expected despite provision of that method through Family PACT.

To estimate the probability that Family PACT clients would become pregnant in the absence of contraceptives provided through Family PACT, we used a

program-wide fertility rate estimated from clients' self-reports of contraceptive use prior to enrollment, determined from a review of medical records of new Family PACT female clients in 2009 who were not seeking pregnancy.²⁵ The sample of women who came to Family PACT for the first time included the charts of 644 women. Of those, 7% were missing charts, 19% were missing information on contraceptive methods used, 2% were seeking pregnancy, and 4% were out of the age range for this study, leaving 440 new clients age 15-44 to base our estimates of fertility rates in the absence of Family PACT.

Contraceptive Coverage

We estimated the number of months of contraceptive coverage provided under the Family PACT Program on the basis of paid claims data on the quantity and type of contraceptives dispensed. The coverage for long-acting methods (e.g., tubal ligations, IUCs, and implants) was calculated as the number of months between the provision date and December 2011, unless the claims data suggested that the client discontinued the method earlier. We imposed a two-year cap to avoid predicting pregnancies far into the future. This assumption creates very conservative estimates for the duration of coverage, especially for long-acting reversible methods of contraception and tubal ligations, whose protection ranges from 3 years to a lifetime.

Because clients do not necessarily use all of the contraceptives they receive, the number of months of contraceptive coverage for short-term methods, such as condoms and oral contraceptives, was adjusted to account for method discontinuation. For oral contraceptives, we assumed that a woman who did not return for refills used half of the pills dispensed to her. We assumed that women who received one packet of emergency contraceptive pills (EC) used it; however, if women were given more than one packet (i.e., as advance provision), we assumed that 50% used the second packet. We assumed a month of protection for every 10 condoms dispensed by pharmacies. For condoms and other barrier methods dispensed by clinics, the exact quantity of supplies dispensed was not

available, and we assumed, given findings from the 2007 Family PACT Medical Record Review, that each dispensing provided two months of contraceptive coverage. Each injection of depot medroxyprogesterone acetate was assumed to provide three months of contraceptive coverage. In our sensitivity analysis, we examined the effect of adjusting for method discontinuation on our estimates of method-specific pregnancies averted.

Pregnancies

To estimate the number of pregnancies expected among the Family PACT clients, with and without the Family PACT program, we modeled the month-by-month experience of a woman who is at risk for pregnancy, beginning with the month when the contraceptive was dispensed and ending with the last month of contraceptive coverage. For each month, we calculated the probability that the woman would become pregnant, based on three factors: the published failure rate of the method used (i.e., the proportion of users who experience a pregnancy in a year), and the estimated probability of pregnancy in previous months. Modeling pregnancies averted by month allowed us to use specific contraceptive dispensing data for months of coverage, rather than assume a year of coverage for each client. It also allowed for repeat pregnancies within a year, a common outcome among women who use low-efficacy methods and terminate pregnancies in abortion.²⁶

For this report, we have updated our estimates of contraceptive failure rates and pregnancy outcomes. Failure rates for contraceptives are based on the newest article by Trussell.²⁷ We updated our estimate of the outcomes of unintended pregnancy based on new data from the Guttmacher Institute. Finer et al (2011) estimates that 47% of unintended pregnancies in California end in a birth, 42% end in abortion, and 11% end in fetal loss.²⁸

Costs of Family PACT services

We calculate the costs of providing contraceptive services for each method by assigning each dispensing visit a primary method. Each visit was assigned the most effective method dispensed in the following order: female sterilization, intrauterine contraceptives, implants, injectables, vaginal ring, patch, oral contraceptives, barrier methods, and emergency contraception. In addition to the cost of the contraceptive supplies themselves, all subsequent clinician visits, lab work, and pharmacy claims, including services related to pregnancy testing or sexually transmitted infections, are attributed as costs of providing that method. For clinician visits, lab claims, or pharmacy visits in which no method was dispensed, the primary method of the last clinician visit is assigned. So, if a client received oral contraceptives, all her subsequent clinician visits, lab and pharmacy claims would be attributed to the cost of providing oral contraceptives until she is dispensed or provided another method of contraception. There is an exception to this rule for long term methods like sterilization, implants and IUCs. For these methods, a clinical visit for screening and counseling might be scheduled a few weeks before the method is actually provided. We attribute the cost of visits in which no method was dispensed, but that occurred within 40 days prior to initiation of a long term method of contraception (sterilization, IUCs and implants) to the long term method.

In 2009, Family PACT spent \$443 million in claims to female clients ages 15-44 who had a method dispensed in 2009. This represents 78% of the total program costs for 2009 (\$569 million). The other 22% were spent on other services (i.e., STI testing and treatment, cervical cytology screening, etc.) for women who did not get a method of contraception, women outside the age range, and men. Rebates for prescription drugs dispensed at pharmacies reduced the total cost of the program by 5-8%. Information on the amount of the rebates by drug type is not available and is not included in this analysis, an omission that may cause our numbers to underestimate the cost benefits of oral contraceptives, patch, and ring.

Costs of an unintended pregnancy

The public cost of an unintended pregnancy was estimated for up to two years after a birth as part of the 2007 cost-benefit study for the Family PACT evaluation.²⁹ These cost data were adjusted for inflation using the CPI index for medical costs, and applied in the present study.³⁰ Secondary data sources provided quantitative information on health and social service programs available to pregnant or parenting women at or below 200% of the federal poverty level in California. The costs of participation in each public program were each adjusted to account for the probability that a Family PACT female client would qualify for each program on the basis of the program's income, age, and citizenship status eligibility requirements, as well as the anticipated participation rate among eligible women and children. Finally, an adjustment was made to the total cost-per-pregnancy to account for whether the costs associated with a pregnancy were prevented versus delayed. We assumed that the public saves the entire cost of 50% of pregnancies to adults and 62% of pregnancies to adolescents, which is the sum of the percentage of pregnancies which are unwanted and will never occur later and the percentage which are delayed, but are not expected to incur public costs in the future. In the latter case, some pregnancies are not expected to incur public costs in the future if, by delaying a pregnancy, a woman is likely to be financially self-sufficient by the time she has a birth. For the remaining pregnancies, however, the public saves the difference between paying for services now versus paying at the time when women wish to have their pregnancies. Data for this adjustment came from exit interviews with 1,497 Family PACT clients conducted in 2007. Family PACT clients ages 20-44 on average wished to delay their first or repeat pregnancies by 3.7 years, and adolescents wanted to wait an average of 6.6 years to have their first or another child.³¹

Using this methodology, we estimated for 2007 that each pregnancy averted by Family PACT saved the public sector \$5,110 for adult women and \$10,351 for adolescents in medical, welfare, and other social service costs for a woman and

child from conception up to two years after a pregnancy. Updating those figures to 2009 using the medical care price index yields \$5,469 per pregnancy for adults and \$11,077 for adolescents. The cost for adolescents is higher because they are more likely to carry a pregnancy to term, more likely have pregnancies that are delayed rather than prevented, and more likely to qualify for public programs owing to their income status. To examine the lowest possible savings, we use a figure for the cost of an unintended pregnancy through delivery. Using the methodology described in Biggs et al (2010)³², we estimated that each pregnancy averted by Family PACT saved the public sector an estimated \$1,183 for adult women and \$1,536 for adolescents in medical costs alone for a woman from conception through delivery or termination. Updating these figures to 2009 gives us \$1,266 for adult women and \$1,644 for adolescents through the end of pregnancy.

Sensitivity analyses

Our model of the cost-benefit from preventing unintended pregnancy with specific methods of contraception makes some assumptions which may impact the relative cost-benefit of particular methods. We conducted several sensitivity analyses to investigate how the model's results were dependent on the probability estimates chosen. First, we adjusted the months of protection from short-term reversible methods of contraception to take into account method discontinuation. As a sensitivity analysis, we present our findings without this adjustment. Second, we examine the short-term return of contraceptive provision, examining the medical savings through delivery or termination.

RESULTS

Contraceptive dispensing to women in 2009

The distribution of primary contraceptive methods provided to Family PACT clients in 2009 is presented in Table 1. More than one million women received contraceptive methods through Family PACT in 2009 —214,856 women aged 15–19 and 843,525 women aged 20–44. Claims data included payments for oral contraceptives for about 537,000 clients, condoms and other barrier methods as a primary method for 394,000, and injectable contraceptives for 136,000. There were about 84,000 women who received the vaginal contraceptive ring and 61,000 who received the contraceptive patch. Long-acting methods, such as implants, IUCs, and sterilization, were provided to 57,000 women (just over 5% of women served with a method). Emergency contraception was dispensed without any other method to 71,000 clients.

The claims paid for female clients during 2009 provided each woman with an average of 8.0 months of primary method contraceptive coverage. Long-acting methods, such as tubal ligation, implant, and IUCs provided the greatest number of months of protection to each woman who received the method, even with the cap of the duration at 2 years. Women who received implants received 14.7 months of protection, women who received IUCs got more than 16 months of protection, and women who received a sterilization procedure received the greatest coverage (17.9 months for ligation and 16.6 for Essure[®]).

Among short-term methods of contraception, women who received oral contraceptives received the greatest number of months of protection (8.4 months), followed by the ring (6.4 months), injectable, and the patch (each 6.1 months). With limited data on exact quantities dispensed, we estimate that barrier method users received 2.9 months of contraceptive protection. Women using EC as their primary method received 1.7 months of protection from EC,

although these women may have received other primary methods over the course of the year.

Table 1. Primary contraceptive method provision and average months of protection for Family PACT adolescent and adult female clients in 2009

Contraceptive method	Adolescents (age 15-19)		Adults (age 20-44)		Total		
	Clients	Average months of protection per client	Clients	Average months of protection per client	Clients	Average months of protection per client	Percentage of total months of primary contraceptive protection
Tubal ligation	0	--	3,259	17.9	3,259	17.9	1%
Essure [®]	0	--	705	16.6	705	16.6	0%
Copper IUC (ParaGard [®])	1,399	15.5	19,340	16.4	20,739	16.3	7%
Hormonal IUC (Mirena [®])	2,905	16.1	23,791	16.2	26,696	16.1	9%
Implant	1,361	14.4	4,670	14.6	6,031	14.6	2%
Injectable	29,160	5.5	107,155	6.3	136,315	6.1	8%
Ring	15,913	5.9	68,100	6.5	84,013	6.4	5%
Patch	11,099	4.9	49,551	6.4	60,650	6.1	3%
Oral contraceptives	116,251	8.4	420,278	8.4	536,529	8.4	44%
Diaphragm	27	2.3	454	2.4	481	2.4	0%
Barriers [*]	85,166	2.8	308,616	2.9	393,782	2.9	17%
Spermicide	273	2.1	1,965	2.3	2,238	2.3	0%
Emergency contraceptive pills	22,034	1.7	48,873	1.7	70,907	1.7	2%
Total	214,856	7.7	843,525	8.1	1,058,381	8.0	100%

Columns add to more than the total because some women have visits for more than one primary method over the course of a year.

n.a. not applicable

* Barrier methods may include male and female condoms, and diaphragms and spermicide dispensed on-site.

Pregnancy rate in the absence of Family PACT methods

Before receiving Family PACT contraceptive services, 25% of adolescent and 20% of adult female clients were using no method of contraception and 1% were using behavioral methods, such as periodic abstinence and withdrawal, according to the 2009 Medical Record Review data.³³ Nearly half of women (47%) were using condoms, 3% were not sexually active, and the remaining 28% were using hormonal methods or IUCs. Based on these data, we estimate that, in the absence of the Family PACT Program, women would become pregnant at an annual rate of 43% among women ages 15-19 and 38% among women ages 20-44 (See Table 2).

Table 2: Methods used by adolescents and adults prior to first Family PACT visit

Contraceptive Method	Adolescents (age 15-19) (n=119)	Adults (age 20-44) (n=321)	Total (n=440)
	%	%	%
Male or Female Sterilization	0%	1%	0%
Intrauterine Contraception/ Implants	2%	5%	4%
Injectable Contraception	8%	4%	5%
Ring/Patch/Oral Contraceptives	12%	20%	18%
Male or Female Condoms	48%	47%	47%
Behavioral methods	0%	1%	1%
No method	25%	20%	21%
Not Sexually Active	5%	2%	3%
Total	100%	100%	100%
Estimated Annual Pregnancy Rate	43%	38%	39%

Source: MRR for new clients in 2009

Pregnancies averted by specific methods of contraception, 2009

On the basis of the quantity and type of contraceptive methods dispensed, we estimate that because of method failure and noncompliance that is considered typical among contraceptive users, women participating in Family PACT experienced almost 50,000 pregnancies during the time they were covered by Family PACT contraceptives. If these women had been using the methods

women used prior to enrollment in Family PACT, they would have experienced 250,000 pregnancies. The difference, 200,000 pregnancies, is an estimate of the number of pregnancies averted through the provision of specific contraceptive methods provided in the Family PACT program in 2009 (See Table 3).

Modeling pregnancies averted by method reveals that just over half (51%) of the pregnancies averted (102,000) are attributable to oral contraceptive use, 13% (26,000) are attributable to injectable use, 12% (24,000) are attributable to IUC provision, 9% (17,000) to barrier methods, and 5% (9,000) to the patch. Implants prevent around 3,000 pregnancies (1%) and female sterilization (both bilateral tubal ligation and Essure[®]) prevent 2,100 pregnancies (1%) over two years.

Table 3. Pregnancies averted by age and method by Family PACT services in 2009

Contraceptive method	Adolescents (15-19)			Adults (20-44)			Total		
	Pregnancies in absence of method	Pregnancies with method	Pregnancies Averted	Pregnancies in absence of method	Pregnancies with method	Pregnancies Averted	Pregnancies in absence of method	Pregnancies with method	Pregnancies Averted
Tubal ligation		-	-	1,788	23	1,766	1,788	23	1,766
Essure [®]		-	-	360	5	355	360	5	355
Copper IUC (Paragard [®])	773	13	760	9,699	195	9,504	10,472	208	10,264
Hormonal IUC (Mirena [®])	1,666	7	1,659	11,797	59	11,738	13,463	66	13,396
Implant	705	1	704	2,107	3	2,104	2,812	3	2,808
Injectable	6,644	762	5,882	23,349	3,178	20,171	29,993	3,940	26,053
Ring	3,203	560	2,643	12,974	2,686	10,288	16,177	3,246	12,931
Patch	1,800	314	1,486	9,476	1,958	7,519	11,277	2,272	9,005
Oral contraceptives	30,950	5,629	25,321	97,974	20,722	77,252	128,923	26,350	102,573
Diaphragm	2	0	2	29	8	21	31	8	22
Barriers [*]	7,334	2,612	4,722	22,196	9,421	12,775	29,530	12,033	17,496
Spermicide	18	10	7	125	87	38	143	98	46
Emergency contraceptive pills	1,635	400	1,235	2,953	863	2,090	4,588	1,263	3,325
Total	54,730	10,310	44,420	194,827	39,206	155,621	249,557	49,516	200,041

* Barrier methods may include male and female condoms, and diaphragms and spermicide dispensed on-site.

Cost savings per dollar spent on Family PACT services by primary contraceptive method

Expenditures on all contraceptive methods have a positive return in preventing unintended pregnancy (Figure 2). The cost-savings per dollar spent on Family PACT contraceptive services by type of primary method is shown in Table 4. Expenditures on services for adolescents yield more than twice the savings as services for adults because of the higher public cost of an unintended pregnancy and higher fertility in the absence of Family PACT. However, the pattern of savings by method is similar between adults and adolescents. The contraceptive implant and copper IUC have the highest rate of return (just over \$5 in averted public expenditures per dollar spent on family planning services). The hormonal IUC saves almost \$5 per dollar spent on family planning services (\$4.89). Among short-term methods, injectable contraceptives have the highest savings at \$4.00 saved per dollar in expanded services. The remaining short-term hormonal methods, in order of cost-savings are oral contraceptives (\$3.37), emergency contraception (\$2.56), the ring (\$2.20), and the patch (\$2.12). Diaphragms save \$1.84 per dollar spent on services. Barrier methods and spermicides alone have lower cost-savings at \$1.58 and \$1.22 per dollar spent on services, respectively.

Traditional interval tubal ligation averts an estimated \$3.59 in pregnancy related costs for every dollar spent in prevention services. However, the new outpatient sterilization procedure, Essure, saves only \$1.59 per dollar spent. The cost savings for both sterilization procedures are undercounted here, as we have limited our analysis of pregnancies averted to a two-year period. However, the much lower cost-savings for Essure relative to tubal ligation is accurate, a consequence of a much higher cost per day of the procedure -- Essure costs over twice as much as a tubal ligation.

Figure 2. Cost-savings associated with provision of specific methods of contraception through Family PACT in 2009 in averted public expenditures on mothers and children through age 2

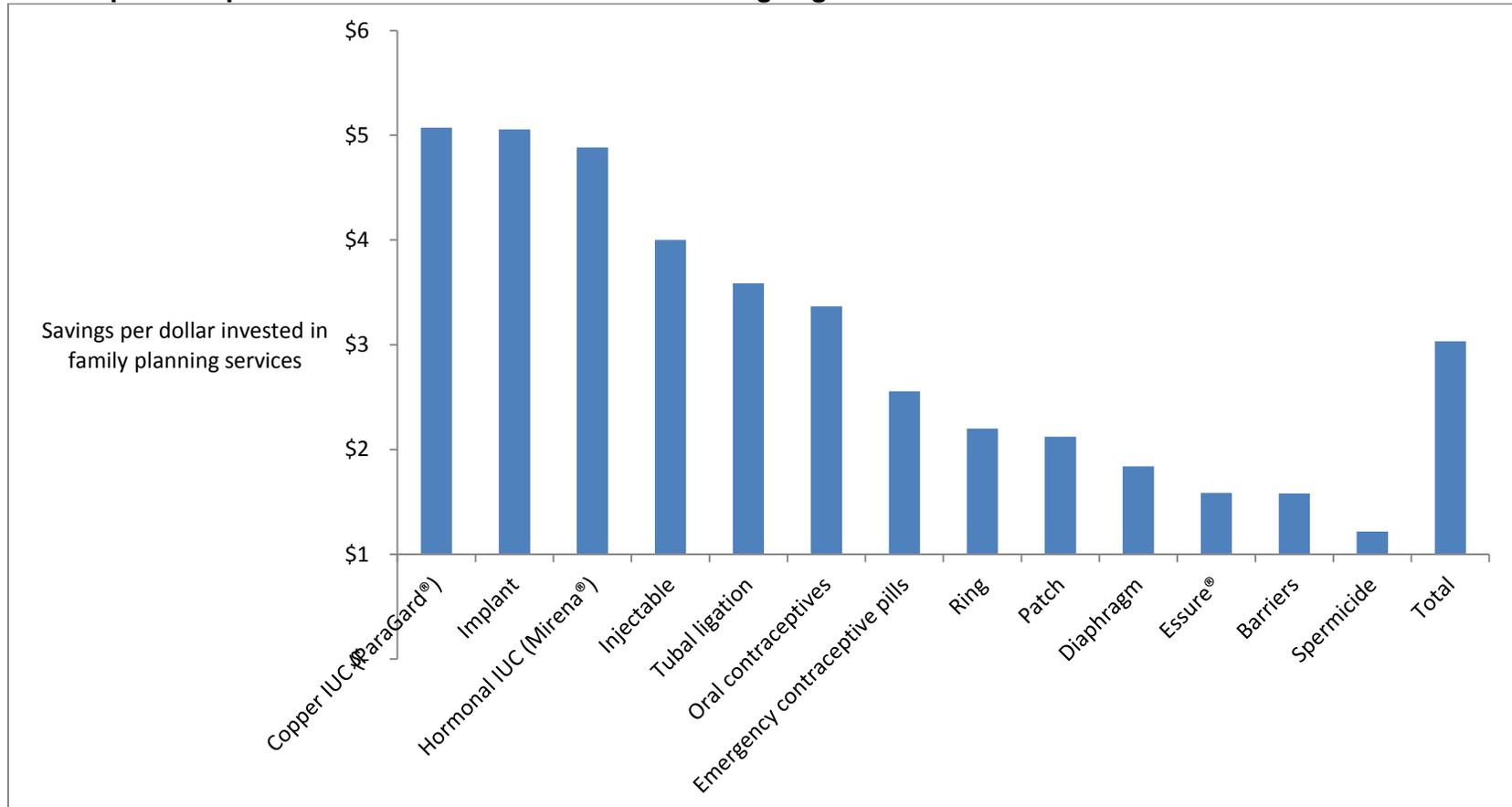


Table 4. Cost savings from averting unintended pregnancy in Family PACT by primary method (conception through age 2) and by client age, 2009

Contraceptive method	Adolescents (age 15-19)			Adults (age 20-44)			Total		
	Pregnancies Averted	2009 expenditures in thousands	Cost savings per dollar expenditure	Pregnancies Averted	2009 expenditures in thousands	Cost savings per dollar expenditure	Pregnancies Averted	2009 expenditures in thousands	Cost savings per dollar expenditure
Tubal ligation	—	—	—	1,766	\$2,692	\$3.59	1,766	\$2,692	\$3.59
Essure [®]	—	—	—	355	\$1,226	\$1.59	355	\$1,226	\$1.59
Copper IUC (ParaGard [®])	760	\$805	\$10.46	9,504	\$11,101	\$4.68	10,264	\$11,905	\$5.07
Hormonal IUC (Mirena [®])	1,659	\$1,868	\$9.84	11,738	\$15,032	\$4.27	13,396	\$16,900	\$4.89
Implant	704	\$859	\$9.08	2,104	\$2,960	\$3.89	2,808	\$ 3,819	\$5.06
Injectable	5,882	\$9,006	\$7.23	20,171	\$34,862	\$3.16	26,053	\$43,869	\$4.00
Ring	2,643	\$6,810	\$4.30	10,288	\$32,062	\$1.75	12,931	\$38,872	\$2.20
Patch	1,486	\$3,990	\$4.13	7,519	\$23,124	\$1.78	9,005	\$27,113	\$2.12
Oral contraceptives	25,321	\$40,856	\$6.87	77,252	\$167,820	\$2.52	102,573	\$208,676	\$3.37
Diaphragm	2	\$3	\$5.47	21	\$68	\$1.68	22	\$71	\$1.84
Barriers [*]	4,722	\$15,567	\$3.36	12,775	\$61,668	\$1.13	17,496	\$77,235	\$1.58
Spermicide	7	\$28	\$3.01	38	\$211	\$0.98	46	\$ 239	\$1.22
Emergency contraceptive pills	1,235	\$2,946	\$4.64	2,090	\$6,882	\$1.66	3,325	\$9,828	\$2.56
Total	44,420	\$82,736	\$5.95	155,621	\$359,707	\$2.37	200,041	\$442,443	\$3.04

* Barrier methods may include male and female condoms, and diaphragms and spermicide dispensed on-site.

Sensitivity of results to methodology and inputs

In our first sensitivity analysis (Table 5), we examined the pregnancies averted without the adjustment for method discontinuation on the ring, patch, oral contraceptives, and barrier methods. This adjustment reduced the months of protection for these methods thereby reducing their savings. The cost benefit of the whole program would be 16% higher (\$3.51) without this adjustment for contraceptive discontinuation. Even without the adjustment, the three most cost beneficial methods are the IUCs (copper and hormonal) and implant. As shown in Table 5, if women used all the oral contraceptives they were dispensed, the savings from oral contraceptive provision would be higher than that of injectables and would take the place as the most cost beneficial short term method of contraception. Without the adjustment for discontinuation, diaphragms approach the cost benefit ratio of the contraceptive patch. However, even assuming that women use all supplies they are dispensed does not increase the level of savings from condoms or spermicides reached by the use of hormonal methods.

Table 5. Sensitivity analysis of method specific savings to preventing unintended pregnancy through Family PACT, 2009

Contraceptive method	BASECASE	Scenario 1: Women use all methods dispensed		Scenario 2: Medical costs through delivery only	
	Cost savings per dollar expenditure	Cost savings per dollar expenditure	Percent change from base case	Cost savings per dollar expenditure	Percent change from base case
Tubal ligation	\$3.59	\$3.59	0%	\$0.83	-77%
Essure®	\$1.59	\$1.59	0%	\$0.37	-77%
Copper IUC (ParaGard®)	\$5.07	\$5.07	0%	\$1.12	-78%
Hormonal IUC (Mirena®)	\$4.89	\$4.89	0%	\$1.04	-79%
Implant	\$5.06	\$5.06	0%	\$1.00	-80%
Injectable	\$4.00	\$4.00	0%	\$0.80	-80%
Ring	\$2.20	\$2.60	18%	\$0.45	-80%
Patch	\$2.12	\$2.51	18%	\$0.44	-79%
Oral contraceptives	\$3.37	\$4.08	21%	\$0.67	-80%
Diaphragm	\$1.84	\$2.49	35%	\$0.41	-78%
Barriers*	\$1.58	\$2.19	39%	\$0.31	-80%
Spermicide	\$1.22	\$1.60	31%	\$0.25	-79%
Emergency contraceptive pills	\$2.56	\$2.56	0%	\$0.48	-81%
Total	\$3.04	\$3.51	16%	\$0.61	-80%

* Barrier methods may include male and female condoms, and diaphragms and spermicide dispensed on-site.

Our second sensitivity analysis examines the short-term return of providing contraceptives. By limiting the cost associated with unintended pregnancy to just those medical expenditures which occur up to delivery or termination, we have a conservative measure of the short-term returns of contraception. One dollar spent on contraceptives provided through the program save an estimated \$0.61 just including medical costs related to pregnancy. For the program as a whole, the IUCs and implant recoup the cost of provision even when limiting the savings to just medical care through the end of pregnancy (See Table 5). Many methods yield positive savings for adolescents within nine months including the implant, IUCs, injectable, and oral contraceptives. For adult women, only the IUCs are associated with positive savings within nine months (See Appendix Table 2).

Differences in the cost-benefit ratio of specific methods between 2003 and 2009

We examined the cost benefit of specific methods in a previous report and publication based on 2003 Family PACT claims data.^{34,35} Methodologically, we have made some changes: we have updated contraceptive failure rates and pregnancy outcomes, simplified our model of the absence of specific methods of contraception, and used more recent data. For this analysis, we examined specific types of IUCs (copper or hormonal) and sterilization procedures (tubal ligation or Essure[®]) individually. The results are similar to our past findings with a couple of key differences.

1. The cost savings from every method and of the program as a whole has dropped from \$3.52 to \$3.04. This is largely due to more current data on what methods women would use in the absence of the program. Whereas we assumed that 43% of women would become pregnant in the absence of the program in 2003, we assume that 39% of women would become pregnant in the absence of the program in 2009. That may reflect real increases in condom use and reductions in the proportions of couples who would use no method of contraception.

2. The provision of Emergency Contraception (EC) is more cost-beneficial than it was documented in the previous analysis. Whereas EC was the least cost-beneficial method in 2003, it is substantially more cost-beneficial than barrier methods, and even more cost-beneficial than the patch and ring in 2009. Since our estimate of the effectiveness of EC has not changed, the difference is likely due to a lower cost of providing women with EC. That lower cost may be due to success in getting women who use EC to switch to a more effective method of contraception. If women who are dispensed EC are given other primary methods, the cost of subsequent visits are attributed in the analysis to the more effective primary method, thereby reducing the cost of visits for EC primary users.
3. Our differentiation between types of female sterilization and types of IUCs indicates that the copper IUC (ParaGard[®]) is slightly more cost-beneficial than the hormonal IUC (Mirena[®]). A substantial price increase for the Mirena in 2010 had not been implemented at the time these services were included in this analysis. The increase in cost will likely exacerbate that difference in subsequent analyses.
4. Essure[®] for female sterilization is notably less cost beneficial than surgical tubal ligation because of the higher cost of the Essure[®] product.

LIMITATIONS

This study makes assumptions which have the effect of reducing the cost-savings associated with very long-acting and very short-term contraceptive methods. The cap of two years on the effect of long-acting methods underestimates the cost-savings from these methods since women may use them for many years in the future. We cannot know how long women will use these methods, when they might decide to become pregnant, cease sexual activity, or become infecund. So, for women still using the IUC at the end of two years, we conservatively limit the time period to two years. These long term methods already achieve a positive cost benefit ratio within two years and are more cost beneficial than short term methods. It is cost beneficial to offer these

“long acting” methods even to women desiring a short interval of protection from pregnancy.

For barrier methods, we may have underestimated the duration of contraceptive coverage. Without knowledge of the actual number of months of protection from the actual provision of barrier methods through clinic dispensing, we cannot know the true coverage provided by this method. For on-site dispensing of barrier methods under an X1500 billing code, we cannot distinguish what type or quantity of barrier methods were dispensed. For this reason, “barrier methods” might include not just male and female condoms, but diaphragms and spermicide that were dispensed on-site (although likely that these latter methods represent a minority of methods dispensed).

This study relies on dispensing data from paid claims to the Family PACT Program. Using this dataset does not allow us to include contraceptives that were dispensed, but not reimbursed (either because the provider did not bill or the claim was denied). This might particularly affect IUCs in 2009 when there may have been higher than normal denial of IUC devices in Family PACT. However, the rate of claims denials for IUCs is not high enough to significantly reduce the cost benefit ratio of IUCs to the level of injectables or oral contraceptives. Also, using claims data we cannot tell whether contraceptive supplies that were dispensed were actually used. We conservatively assume that only half of supplies are used. If actual use is lower, the cost effectiveness of condoms, pills, patches and rings would be inflated relative to injectables and long acting methods.

We have not precisely captured the cost of providing some contraceptives because we do not include rebates from pharmaceutical companies on contraceptives dispensed at pharmacies. The rebates reduce the dispensing costs of oral contraceptives, rings, and patches. We underestimate the cost

effectiveness of these methods because we cannot attribute the drug rebate amounts to specific methods.

Our model of the fertility rate in the absence of Family PACT is based on the contraceptive use among women who were new to Family PACT, specifically, the methods they report using prior to enrollment. We performed a specific medical record abstraction for 644 women who were new to Family PACT in 2009. For one in five medical records the contraceptive method used prior to enrollment was not noted in the chart. To the extent that providers may be less likely to record no method as opposed to a specific method of contraception, we may be overestimating contraceptive use in the absence of Family PACT and therefore underestimating the pregnancies averted by Family PACT services.

CONCLUSIONS

We find all contraceptive methods dispensed through Family PACT to be cost-beneficial. Long-acting methods are very cost-beneficial despite our conservative estimate of the duration of use. Barrier methods and spermicides tend to yield the lowest savings per dollar expenditure due to their relatively low efficacy and short duration of use. Higher costs and fewer months of contraceptive protection from the contraceptive patch and ring result in lower cost savings than for oral contraceptives. Essure female sterilization is less cost beneficial than traditional tubal ligation, primarily due to high product cost. Currently, Essure is less cost beneficial than all but one other contraceptive method (spermicides alone is less cost effective). However, we do underestimate the cost savings from permanent methods of contraception by limiting our duration of program effect to two years. Despite this underestimate of its cost savings, Essure does save more in pregnancy expenditures than it costs to provide. It also seems to be attracting women to sterilization who might not have been interested in a tubal ligation. To the extent that these women might not use other methods of contraception, Essure does represent a cost beneficial choice.

RECOMMENDATIONS

1. Continue to make family planning services readily available in a culturally competent manner to low-income women and adolescents who may have previously experienced barriers to receiving contraceptive care or who may have selected less effective methods and to assess and analyze the cost benefits of available contraceptive methods.
2. Continue to include new FDA-approved methods of contraception as Family PACT benefits. The availability of a broad range of methods through the Family PACT Program makes it more likely that clients will find a method that best suits their needs, especially if their experiences with their initial selections are not satisfactory, contributing to higher contraceptive compliance and continuation and lower failure rates, especially among adolescents.
3. Encourage Family PACT providers who have the authority to dispense methods on site to dispense or prescribe more months of contraceptive protection per visit as appropriate, which reduces the number of clinic visits and costs, while promoting method continuation.
4. Provide information to women about the relative effectiveness of different contraceptive methods so that they can make educated decisions about the method that best suits their needs.
5. Encourage users of less effective methods to use longer-acting methods of contraception.

APPENDICES

APPENDIX: Pregnancies averted under two alternative scenarios (for sensitivity analyses)

**Appendix Table 1.
Pregnancies averted by age and method by Family PACT services in 2009 if Women used all supplies they are dispensed**

Contraceptive method	Adolescents (15-19)			Adults (20-44)			Total		
	Pregnancies in absence of method	Pregnancies with method	Pregnancies Averted	Pregnancies in absence of method	Pregnancies with method	Pregnancies Averted	Pregnancies in absence of method	Pregnancies with method	Pregnancies Averted
Tubal ligation				1,788	23	1,766	1,788	23	1,766
Essure [®]				360	5	355	360	5	355
Copper IUC (Paragard [®])	773	13	760	9,699	195	9,504	10,472	208	10,264
Hormonal IUC (Mirena [®])	1,666	7	1,659	11,797	59	11,738	13,463	66	13,396
Implant	705	1	704	2,107	3	2,104	2,812	3	2,808
Injectable	6,644	762	5,882	23,349	3,178	20,171	29,993	3,940	26,053
Ring	3,801	668	3,134	15,276	3,174	12,101	19,077	3,842	15,235
Patch	2,213	389	1,824	11,014	2,281	8,732	13,226	2,670	10,556
Oral contraceptives	37,841	6,941	30,900	118,100	25,152	92,948	155,941	32,093	123,848
Diaphragm	3	1	2	39	11	28	42	11	30
Barriers [*]	9,945	3,561	6,385	31,447	13,411	18,036	41,393	16,972	24,421
Spermicide	25	14	10	162	113	49	186	127	59
Emergency contraceptive pills	1,635	400	1,235	2,953	862	2,091	4,588	1,263	3,326
Total	65,251	12,757	52,494	225,943	48,439	177,503	291,194	61,197	229,997

* Barrier methods may include male and female condoms, and diaphragms and spermicide dispensed on-site.

Appendix Table 2.**Short term cost savings per dollar expenditure, costs through delivery or pregnancy termination by age among Family PACT clients**

Contraceptive method	Adolescents (age 15-19)	Adults (age 20-44)	Total
Tubal ligation	—	\$0.83	\$0.83
Essure®	—	\$0.37	\$0.37
Copper IUC (ParaGard®)	\$1.55	\$1.08	\$1.12
Hormonal IUC (Mirena®)	\$1.46	\$0.99	\$1.04
Implant	\$1.35	\$0.90	\$1.00
Injectable	\$1.07	\$0.73	\$0.80
Ring	\$0.64	\$0.41	\$0.45
Patch	\$0.61	\$0.41	\$0.44
Oral contraceptives	\$1.02	\$0.58	\$0.67
Diaphragm	\$0.81	\$0.39	\$0.41
Barriers*	\$0.50	\$0.26	\$0.31
Spermicide	\$0.45	\$0.23	\$0.25
Emergency contraceptive pills	\$0.69	\$0.38	\$0.48
Total	\$0.88	\$0.55	\$0.61

* Barrier methods may include male and female condoms, and diaphragms and spermicide dispensed on-site.

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