

Women's Interest in Vaginal Microbicides

By Jacqueline E. Darroch and Jennifer J. Frost

Context: Each year, an estimated 15 million new cases of sexually transmitted diseases (STDs), including HIV, occur in the United States. Women are not only at a disadvantage because of their biological and social susceptibility, but also because of the methods that are available for prevention.

Methods: A nationally representative sample of 1,000 women aged 18–44 in the continental United States who had had sex with a man in the last 12 months were interviewed by telephone. Analyses identified levels and predictors of women's worry about STDs and interest in vaginal microbicides, as well as their preferences regarding method characteristics. Numbers of potential U.S. microbicide users were estimated.

Results: An estimated 21.3 million U.S. women have some potential current interest in using a microbicide product. Depending upon product specifications and cost, as many as 6.0 million women who are worried about getting an STD would be very interested in current use of a microbicide. These women are most likely to be unmarried and not cohabiting, of low income and less education, and black or Hispanic. They also are more likely to have visited a doctor for STD symptoms or to have reduced their sexual activity because of STDs, to have a partner who had had other partners in the past year, to have no steady partner or to have ever used condoms for STD prevention.

Conclusions: A significant minority of women in the United States are worried about STDs and think they would use vaginal microbicides. The development, testing and marketing of such products should be expedited.

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While some sexually transmitted diseases (STDs) are curable, others, including HIV, are not. The consequences of STDs can include ill health, infertility, compromised infant health, cancer and death. An estimated 15 million new cases of STDs occur yearly in the United States.¹ Globally, annual new cases probably top 400 million.² It is estimated that one-quarter to one-half of all Americans get an STD* in their lifetime.³

Women are physiologically more vulnerable to contracting an STD than men when they have unprotected intercourse with an infected partner. They often experience less obvious symptoms of infection than men, and therefore, may not seek care as quickly as men. As a consequence, they may experience more serious complications.⁴ Additionally, the gender inequities that exist in many cultures and societies may hinder women's ability to negotiate the conditions of their sexual lives and to insist that their partner use a condom.⁵

Furthermore, the technology available for preventing STD transmission leaves women at a disadvantage.⁶ While latex male condoms provide excellent protection

against STDs, they are not always used consistently and correctly and are a male-controlled method. The polyurethane female condom shows promise for STD protection as well as contraception, but its use still depends on male cooperation and acceptance. Because of women's special biological susceptibility to sexually transmitted infection, their often disadvantaged position in gender relations and the limitations of available method options for disease prevention, the development of methods for preventing STDs that can be totally controlled by women is a high priority.⁷

Research is underway to develop safe and effective products, called microbicides, that women can use vaginally to prevent STD transmission.⁸ While it seems clear that current spermicidal contraceptives, which are all based on nonoxynol-9, reduce infection from some STDs, research is ongoing to understand their effects on HIV transmission.⁹ Other work focuses on reformulating nonoxynol-9 or combining it with new compounds and on alternate products that use completely new materials and approaches.¹⁰ However, the realities of clinical trials and of product development and approval mean that proven microbicides will probably enter the market no earlier than 2001.¹¹

Researchers are just beginning to explore women's potential interest in using microbicides and their preferences regarding method characteristics. Such investigations can help indicate whether there will be a receptive market for microbicidal products and can inform development choices regarding method characteristics. A research project of the European Union's HIV/AIDS Programme in Developing Countries found that one-quarter of respondents in urban France and more than 70% in urban areas of Cote d'Ivoire, Kenya and South Africa think a vaginal microbicide would be very useful. In the sub-Saharan countries, more than half of the participants said they were prepared to pay up to five times the price of a condom for such a method.¹² A survey of women in Brazil found that almost half of them were willing to pay up to \$5 per application for a product that would prevent pregnancy and STDs.¹³ Focus groups conducted in New England and Puerto Rico among women involved in drug use (either personally or through their partner) suggested high levels of interest in using vaginal methods that would prevent HIV.¹⁴

Methodology

To find out how many women are interested in and likely to use vaginal microbicides, which groups of women would be most likely to use them and what women's preferences are regarding the characteristics of such products, we surveyed a nationally representative sample of 1,000 women in the continental United States

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*In this article, the term "STDs" includes HIV.

aged 18–44 who had had sex with a man in the last 12 months. In preparation, we conducted in-depth personal interviews to explore many of the issues and questions being considered for inclusion on the national survey. These were conducted with more than 30 women recruited from Planned Parenthood and social service sites in California, New York and Wisconsin. We obtained information on interview length and item comprehension and clarity from a telephone pretest.

Survey Methods Group, Inc., of San Francisco, California, carried out surveying between January and May 1998. Experienced, trained female interviewers conducted the interviews over the telephone using a computer-assisted telephone interview system, which directly coded responses into the computer datafile. Interviews averaged 19 minutes in length. Thirty-seven were conducted in Spanish; all others were in English.

Survey Sampling, Inc., generated a random digit dial sample of 12,797 telephone numbers for this study. The sample was nationally representative of households throughout the continental United States. Of these numbers, 12,298 were dialed up to 12 times each, if necessary, to complete an interview or to take it to final disposition. In all, 8,102 potentially eligible households were identified, of which 5,097 were successfully screened for eligibility.

A total of 1,266 eligible respondents were identified and 1,000 completed the interview, for an overall cooperation rate of 79%. The level of cooperation may have been somewhat reduced because of the sensitive nature of the study, which, for informed consent purposes, was explained early in the screening process.* The majority of the uncompleted interviews were refusals during the introduction (158) or uncompleted callbacks to eligible women (103). Only five women who began the interview did not complete it.

The survey included only women who were living in households with telephones. (Six percent of U.S. households have no telephone service,¹⁵ and they are generally poorer households.) There is no indication, however, that the respondents were biased in characteristics that would affect their interest in using microbicides or their product preferences. The proportions of respondents in age, marital status, and race or ethnicity subgroups were all within three percentage points of the proportions among sexually active women of similar age from the 1995 National Survey of Family Growth (NSFG).

Survey respondents were much more likely than NSFG respondents, however, to

report that they had completed some college (64% vs. 47%, respectively). This may have been because women who live in households with no telephone were excluded from our survey or because respondents may have overstated their educational accomplishments. Alternatively, the difference may result from variations in questionnaire wording or in survey administration between this survey and the NSFG.

Analyses were performed using SPSS (Statistical Package for Social Sciences) for Windows, Version 6.1. The data were not weighted. Tests of significance for cross-tabular comparisons were performed using the Pearson chi-square test of independence. Logistic regression analysis was used to investigate multivariate predictors of interest in microbicides—using as the dependent variable the proportion of all women who reported being very interested in current use and who also were worried about getting an STD. The coefficients for this model were estimated using the maximum-likelihood method. We present the odds ratios and the level of significance for each coefficient based on the Wald statistic.

To estimate the number of potential microbicide users among women in the United States, we applied proportions from this survey to numbers of women in the NSFG who were aged 15–44 and who had had sex in the last 12 months. The NSFG number of women was not adjusted for population change because the estimated number of U.S. women aged 15–44 increased less than 1% between 1995–1998. Since our survey did not include respondents younger than age 18, we applied proportions from our survey for women aged 18–24 to the number of NSFG women aged 15–17 who had had sex in the last 12 months.

Findings

Background Characteristics

Most respondents were married or cohabiting, had some post-high school education and had children (Table 1, page 18). About three-quarters were non-Hispanic white, 12% non-Hispanic black, 9% Hispanic and 4% Asian or other races.

Three-quarters of respondents were contraceptive users or relied on their partner's method. The others were pregnant or trying to become pregnant or were using no method even though they were at risk of unintended pregnancy. Although only 5% of respondents currently used vaginal contraceptives, 40% reported having ever used such a method. Of these, a majority said that they were either very satisfied (23%) or somewhat satisfied (42%) with their past use of these methods (not shown).

STD Experience and Preventive Behaviors

Most women had basic knowledge about STDs. More than 80% knew that some STDs have no immediate symptoms, that some cannot be cured and that there are long-term health effects from some STDs other than HIV. However, 10–11% of women said they did not know these facts. Of greater concern, 8% thought that a woman can always tell if she has an STD, 9% that all STDs other than HIV can be cured with medication and 6% that there are no long-term health effects for women infected with most STDs.

Nearly one in five women reported having had some direct experience with STDs or having been concerned that they might have had an STD. About half of these (10%) said either that a doctor had told them that they had genital herpes or human papillomavirus (HPV) or that a partner had had an STD during the time that they were together. In all, 15% of women said they had gone to a doctor or clinic because they had symptoms they thought might be from an STD other than HIV (Table 1).

Thirteen percent of women reported either that they themselves had had more than one sexual partner in the last year (8%) or that they knew or suspected that their partner had had sex with another woman within the past year (7%). Only 5% of married women said they had had more than one partner or thought their partner had had sex with another woman in the past year, compared with 21% of unmarried cohabiting women and 31% of other unmarried women (not shown). These reported responses about STD experience and risk behaviors should be viewed with caution and considered lower limits of the actual levels, however, since such sensitive behaviors are typically underreported in surveys.[†]

*The personal interview schedule and the telephone questionnaire, as well as the study design and informed consent processes, were approved by The Alan Guttmacher Institute's Institutional Review Board. The survey introduction included the following: "Today we are conducting a national survey about important health issues for women.... In particular, we are investigating ways that women can better protect themselves from getting sexually transmitted diseases.... Some of the questions will ask you about such personal matters as pregnancy, birth control and sexually transmitted diseases...."

†For example, compared with the 21% of unmarried women in this survey who reported that they themselves had more than one sexual partner in the past year, in the personal interview portion of the 1995 NSFG, 28% of unmarried respondents reported having had sex with more than one partner during the last year; and during the private computer-assisted self-interview that ended the survey, 41% said they had done so. (Source: Abma J et al., Fertility, family planning, and women's health: new data from the 1995 National Survey of Family Growth, 1997, *Vital and Health Statistics*, Series 23, No. 19, Table 16, p. 37, and Table 17, p. 38.)

Table 1. Percentage distribution of women aged 18–44, by selected characteristics; percentage distribution of women, by degree of current interest in using vaginal microbicides and current worry about HIV and other STDs, according to selected characteristics; and odds ratios for logistic regression showing the likelihood that women are currently very interested in using microbicides and worried about HIV and other STDs; United States, 1998

Characteristics	%	Total	Very interested and worried	Somewhat or a little interested and worried	Any interest but not worried	Not interested	Odds ratio (N=963)
Total	100.0	100.0	11.3	12.3	16.6	59.8	na
Marital status							
Married	67.8	100.0	3.1	7.7	14.6	74.6***	1.00
Cohabiting	10.3	100.0	12.9	20.8	27.7	38.6	1.22
Not in union	21.9	100.0	35.8	22.5	17.9	23.9	3.86**
Age							
18–24	17.4	100.0	20.3	19.2	24.4	36.0***	0.88
25–34	37.2	100.0	11.9	13.5	15.9	58.8	1.22
35–44	45.4	100.0	7.3	8.7	14.3	69.7	1.00
Income							
<\$20,000	21.7	100.0	28.2	19.9	18.5	33.3***	2.38*
\$20,000–40,000	31.7	100.0	8.5	13.2	17.0	61.2	1.03
≥\$40,000	41.5	100.0	4.4	7.8	16.1	71.7	1.00
Do not know/refused to answer	5.1	100.0	12.2	10.2	10.2	67.3	0.66
Education							
High school/GED	35.8	100.0	16.2	15.3	17.0	51.4***	2.61*
Some college/vocational	37.1	100.0	9.8	11.9	17.9	60.4	1.37
College degree/graduate	27.2	100.0	6.7	8.9	14.1	70.3	1.00
Parity							
0	25.3	100.0	15.9	15.5	20.2	48.4***	1.00
≥1	74.7	100.0	9.7	11.2	15.4	63.6	1.32
Race/ethnicity							
Non-Hispanic white	75.7	100.0	7.1	10.7	14.6	67.6***	1.00
Black	11.8	100.0	32.5	15.8	21.9	29.8	3.63***
Hispanic	8.6	100.0	19.0	23.8	20.2	36.9	2.54*
Asian/other	3.9	100.0	12.8	10.3	30.8	46.2	1.04
Most effective method currently used							
Sterilization	33.0	100.0	6.4	8.8	13.6	71.2***	1.00
Prescription method	24.7	100.0	14.2	17.1	15.4	53.3	1.62
Nonprescription method	16.8	100.0	17.5	13.3	22.3	47.0	1.84
Pregnant/trying to get pregnant	10.0	100.0	9.0	7.0	21.0	63.0	1.56
No method	15.5	100.0	12.0	14.7	16.0	57.3	1.73
Ever used vaginal method							
Yes	40.5	100.0	14.3	10.9	17.8	57.0*	1.46
No	59.5	100.0	9.2	13.3	15.8	61.7	1.00
Ever had herpes/HPV							
Yes	5.3	100.0	21.2	15.4	23.1	40.4*	1.78
No	94.7	100.0	10.8	12.2	16.3	60.8	1.00
Ever had partner with STD							
Yes	5.0	100.0	28.6	16.3	20.4	34.7***	1.62
No	95.0	100.0	10.4	12.1	16.5	61.0	1.00
Ever visited MD for STD symptoms							
Yes	14.8	100.0	29.9	14.3	14.3	41.5***	2.96**
No	85.2	100.0	8.0	12.0	17.0	63.0	1.00
Partner had other partner in past year							
Yes	6.8	100.0	35.8	22.4	20.9	20.9***	3.72***
No	83.8	100.0	5.4	10.0	16.3	68.4	1.00
No steady partner	9.4	100.0	43.0	23.7	17.2	16.1	3.70**
Woman had ≥2 partners in past year							
Yes	8.2	100.0	41.3	25.0	17.5	16.3***	1.42
No	91.8	100.0	8.7	11.1	16.5	63.7	1.00
Use of condoms to prevent HIV/STDs							
Currently using	10.8	100.0	37.7	27.4	23.6	11.3***	8.83***
Used in past	37.6	100.0	16.5	14.9	19.5	49.2	4.74***
Never used	51.6	100.0	2.2	7.3	13.0	77.5	1.00
Ever reduced sexual activity because of HIV/STDs							
Yes	18.2	100.0	32.0	21.3	14.6	32.0***	2.16*
No	81.8	100.0	6.7	10.3	17.2	65.9	1.00

*p≤.05. **p≤.01. ***p≤.001. Notes: In percentage distributions, levels of significance are tested for each characteristic and interest in using microbicides and level of worry about HIV and other STDs using chi-square analysis to test for differences in the percentage distribution among all subgroups. For odds ratios, significance is for difference between each group and the reference group. Total Ns vary between 989 and 1,000, depending on missing values for specific variables. The margin of sampling error is ±1.4–3.1% for the total sample. na=not applicable.

A minority of respondents said they and their partners had taken some actions to lower their risk of sexually transmitted infection. Only 11% said they and their partner currently used condoms for disease protection—3% of married women, compared with 18% of cohabiting women and 33% of women not in a union. All but two of these 107 respondents said they were also using condoms for pregnancy prevention. An additional 38% of women said they had used condoms for protection against STDs in the past, again usually for both disease and pregnancy prevention, and 18% said they had ever stopped having sex for a period of time or had sex less often because they were worried about getting an STD (Table 1).

About three in 10 respondents said they were currently worried about getting an STD—5% were very worried, 10% were somewhat worried and 14% were a little worried (not shown). The majority of women, however, were currently not at all worried about becoming infected.

Women's Interest in Using Microbicides

• *Degree of interest.* Prior to administering questions regarding vaginal microbicides, interviewers described such products to respondents. *Ninety-three percent of all respondents said they would be interested in using a vaginal microbicide if they ever found themselves in a situation where they might be at risk of contracting an STD. † Moreover, 80% of all women said they would have been interested in using such a product at some time in the past, if it had been available. ‡

Overall, 40% of women expressed any current interest in using a microbicidal product—16% were currently very interested, 13% were somewhat interested and 11% were a little interested. § Ninety-two

*Vaginal microbicides were described to respondents as follows: "Currently, scientists are developing substances that can kill or block some of the organisms that cause sexually transmitted diseases. Imagine that these new substances could be added to a cream, or a jelly, or to a suppository or sponge that a woman could insert into her vagina before having intercourse. And imagine that these products would greatly reduce a woman's chances of getting HIV or STDs, even if her partner didn't use a condom."

†Question wording: "Now, imagine that for whatever reason, you found yourself in a situation where you might be at risk of getting a sexually transmitted disease or AIDS, at that time, how interested do you think you would be in using such a product?"

‡Question wording: "Now, thinking about your life in the past, such as when you first became sexually active or during prior sexual relationships, at any earlier time, how interested do you think you would have been in using such a product?"

§Question wording: "If such a product were available, given your current situation, how interested do you think YOU would be in using such a product?"

percent of women currently interested in using a microbicide said that a reason for their interest was that they wanted to be in control of protecting themselves. Other reasons reported by at least one-third of interested women included that they did not trust their partner to be monogamous or that either they or their partner did not like condoms. Most women (88%) who were not currently interested in using a microbicide said this was because they trusted their partner to be monogamous.

There was substantial overlap between being worried about getting an STD and being interested in using a microbicide. Twenty-four percent of women reported that they were both currently interested in using a vaginal microbicide and currently worried about contracting STDs (Table 1). Fifty-five percent said they were neither worried about getting an STD nor currently interested in using a microbicide (not shown).

The remaining women reported somewhat conflicting or mixed perspectives about their risk for getting an STD and their interest in using a microbicide. Five percent of women said they were worried about getting an STD but were not interested in using a microbicide. Conversely, 17% of women reported that they were currently interested in using a microbicide product, even though they were not currently worried about STDs (Table 1).

Logistic regression analyses indicate that in both cases, women with conflicting perspectives were more likely to be married and less likely to report current condom use than were those who were both interested in microbicide use and currently worried about getting an STD. In addition, women who were interested in microbicide use but not worried about STDs were more likely to be cohabiting and to have higher incomes, and were less likely to have ever made a medical visit about STDs or to have ever stopped having sex because of concerns about STDs (not shown).

• *Subgroup differences.* The biggest social or demographic differences in women's interest in using microbicides and their worry about getting an STD are related to marital status: Women who were not in a union were almost three times as likely as cohabiting women and 12 times as likely as married women to say that they were both worried about getting an STD and very interested in using vaginal microbicides (Table 1). Women who were younger, had a low income, were less-educated, were childless and were black or Hispanic also were significantly more likely than other women to report that they were cur-

rently interested in using microbicides and currently worried about contracting STDs.

A significantly higher proportion of women currently using nonpermanent contraceptive methods than women using sterilization reported a high level of interest in and a perceived need for a microbicide. However, women who had ever used a vaginal contraceptive method (jelly, cream, suppositories, film or the sponge) were only slightly more likely to report a high interest in using vaginal microbicides than were women who had never used such methods. Finally, 38% of those currently using condoms for STD prevention were both worried about getting an infection and very interested in microbicide use, compared with only 2% of those who never used condoms for STD prevention.

Women who said that their partners had had other partners in the past year were seven times as likely as the others to be very interested in using microbicides, and women who themselves reported multiple partners in the past year were almost five times as likely as other women to be very interested in microbicides and to be worried about getting STDs. In addition, respondents who said a partner had had an STD and those who had ever been tested for STD symptoms were about three times as likely as other respondents to be currently worried about STDs and to have a very high interest in using microbicides.

Underreporting of women's past experience with STDs and their behaviors related to the risk of contracting STD implies that the observed impact of these variables on their interest in using microbicides also is very likely underestimated.

• *Multivariate analysis.* Logistic regression results (Table 1) indicate that the strongest independent predictor of whether a woman was worried about getting STDs and was very interested in using microbicides was whether she and her partner were already using condoms for STD prevention (odds ratio, 8.8) and whether they had done so in the past (odds ratio, 4.7).

Women who said they knew or suspected that their current partner had had sex with someone else in the past year were significantly more likely than those who said their partner was monogamous to be worried about STDs and to be very interested in using microbicides (odds ratio, 3.7). Women who had no steady partner in the last 12 months were also more likely to be in the category of high potential use of microbicides (odds ratio, 3.7). However, whether a woman reported having had more than one sexual partner herself in the past year was not sig-

nificant when her reports of the man's behavior were in the model.

Women who said that they had gone to a doctor or a clinic in the past with concerns about STD symptoms were significantly more likely than other women to be currently worried about contracting STDs and to be very interested in microbicides (odds ratio, 3.0). Reporting that they had had herpes or HPV or a partner with an STD were not statistically significant predictors, although the odds ratios remained somewhat elevated.

Low-income women and those with the least education were significantly more likely to be worried about STDs and very interested in microbicide use, as were black and Hispanic women. However, age and parity, which were significant in bivariate tabulations, were no longer significant in the multivariate analysis. Women who were not in a union were significantly more likely than married women to be worried about STDs and very interested in microbicide use (odds ratio, 3.9).

When the analysis was rerun including only the social and demographic variables, the odds ratio for women not in a union rose to 14.0, illustrating the fact that apparent effects of union status often reflect unmarried women's higher risk for STDs and their more frequent use of preventive behaviors. Cohabiting women were also significantly more likely than married women to be interested in microbicides in this limited regression analysis (odds ratio, 2.8; not shown).

• *Potential microbicide users' characteristics.* The distribution of women across subgroups of potential use status reflects both a group's level of interest in microbicides and worry about STDs and its size in the population. For instance, married women are least likely to be interested in using microbicides and to be worried about getting STDs, but they are a large proportion of sexually active women aged 18–44. As a result, they comprise 43% of all women with any interest in microbicides and almost one-fifth of those most likely to be potential users (Table 2, page 20). Similarly, while white non-Hispanic women are less likely than black or Hispanic women to be interested in microbicides, they make up 61% of all women with any interest and almost half of those most likely to use microbicides.

The largest proportions of women most likely to be potential users because they are currently worried about STDs and are very interested in using microbicides are those who are not in a union, are aged 25–34, have an annual family income less than \$20,000, have not attended college, have

Table 2. Percentage distribution of women who have any interest in using vaginal microbicides, and of women who are very interested in using vaginal microbicides and are worried about HIV and other STDs, by selected characteristics; United States, 1998

Characteristics	Any interest (N=399)	Very interested and worried (N=112)
Marital status		
Married	42.9	18.8
Cohabiting	15.5	11.6
Not in union	41.6	69.6
Age		
18–24	27.6	31.3
25–34	38.3	39.3
35–44	34.1	29.5
Income		
<\$20,000	36.1	54.5
\$20,000–40,000	30.8	24.1
≥\$40,000	29.1	16.1
Do not know/refused to answer	4.0	5.4
Education		
High school/GED	43.1	51.4
Some college/vocational	36.8	32.4
College degree/graduate	20.2	16.2
Parity		
0	32.6	35.7
≥1	67.4	64.3
Race/ethnicity		
Non-Hispanic white	61.1	47.7
Black	20.2	33.3
Hispanic	13.4	14.4
Asian/other	5.3	4.5
Most effective method currently using		
Sterilization	23.8	18.8
Prescription method	28.8	31.3
Nonprescription method	22.1	25.9
Pregnant/trying to get pregnant	9.3	8.0
No method	16.0	16.1
Ever used vaginal method		
Yes	43.6	51.8
No	56.4	48.2
Ever had herpes/HPV diagnosis		
Yes	7.8	9.8
No	92.2	90.2
Ever had partner with STD		
Yes	8.0	12.5
No	92.0	87.5
Ever visited MD for STD symptoms		
Yes	21.6	39.3
No	78.4	60.7
Partner had other partner in past year		
Yes	13.6	22.2
No	66.5	40.7
No steady partner	19.9	37.0
Woman had ≥2 partners in past year		
Yes	17.0	29.5
No	83.0	70.5
Use of condoms to prevent HIV/STDs		
Currently using	23.7	35.7
Used in past	47.5	54.5
Never used	28.8	9.8
Ever reduced sexual activity because of HIV/STDs		
Yes	30.5	51.4
No	69.5	48.6
Total	100.0	100.0

Notes: For "any interest," Ns vary between 391–399; for "very interested and worried," Ns vary between 108–112. The margin of sampling error is ± 2.1–5.0% for "any interest" in microbicides and ± 4.0–9.4% for women "very interested and worried." Percentages may not add to 100 due to rounding.

one or more children and are non-Hispanic whites. They currently use a nonpermanent prescription method of contraception and are using or have used condoms for STD prevention in the past.

Preferences for Product Characteristics

Respondents who had expressed any interest in a microbicide (99%) were asked their preferences about method characteristics. We note all subgroup differences (significant at $p < .05$ using the chi-square test) at least 10 percentage points in size. In general, though, most preferences did not vary widely across subgroups.

Overall, two-thirds of women said they would prefer a microbicide product that could be applied several hours prior to intercourse (Table 3).^{*} Women aged 35–44 were more likely than those aged 18–24 to prefer a method that could be applied several hours before intercourse (73% vs. 60%); similarly, non-Hispanic white women (72%) were more likely than black or Hispanic women (56–57%) or other women (42%) to say so (not shown). Those with an annual family income of \$40,000 or more also were more likely than women with an annual income of less than \$20,000 to say they had a preference for early application (74% vs. 58%). There were no strong subgroup differences, however, in whether women would use a method that must be reapplied before every act of intercourse.[†]

Most women (71%) would prefer a product that could be purchased

over the counter at a drugstore. One in seven, however, would prefer obtaining a prescription from a medical provider (Table 3).[‡] During the personal interviews, these women said they would have more confidence in the product and in their ability to use it correctly if it was prescribed by a clinic or doctor. Women aged 35–44 were more likely to prefer a product they could get without a prescription (75%) than were those aged 18–24 (61%), as were women with annual incomes of \$40,000 (78%) compared with those with annual incomes below \$20,000 (61%, not shown). White women, as well as Asian or other women, also were more likely to prefer an over-the-counter product (75–79%) than were black and Hispanic women (55–62%).

Women were divided in their preferences for the form the product should take. Younger women were more likely to prefer a cream or jelly (54% of women aged 18–24 vs. 33% of those aged 35–44), while the older women more often preferred a suppository (35% vs. 21%, not shown). Although overall only one-third said that they would prefer a product that could be used without their partner's knowledge (Table 3), even fewer Hispanic women (24%) said they would prefer such a product, compared with 33–35% of black and white women (not shown).

Women's interest in using microbicide products remained strong, even when the product was described as not 100% effective[§] or as effective at preventing HIV but not other STDs.^{**} In each case, almost half of the women would remain very interested in using the product, and almost a third would be somewhat interested (Table

^{*}Question wording: "If you could choose a product that could be applied up to several hours before having sex if necessary or a product that would have to be applied immediately before having sex, which would you be more likely to use?"

[†]Question wording: "If the product needed to be applied before every act of intercourse, how likely would you be to use it in that case?"

[‡]Question wording: "If you could choose between a product that could be bought at a drugstore or a product that you would need to have a prescription for from a doctor or clinic, which would you be more likely to use?"

[§]Question wording: "Some versions of these products may not provide 100% protection against STDs or HIV. Rather, like other products that people use, such as toothpaste to prevent cavities or seat belts to reduce injury during accidents, this product may only reduce the likelihood of getting an STD or HIV. Knowing that such a product was not 100% effective, but provided a 70–80% reduction in risk, how interested would you be in using it?"

^{**}Question wording: "Some versions of these new products may not provide protection against all STDs. If this type of product protected only against HIV, but not other STDs, how interested would you be in using it?"

Table 3. Percentage distribution of women, by their preferred characteristics for a vaginal microbicide product; United States, 1998

Characteristics†	Total (N=982‡)
Application period	
Can apply several hours ahead	67.4
Must apply just before sex	19.8
Either equally	12.8
Likelihood of using, if it must be reapplied for each act	
Very	39.9
Somewhat	31.2
A little	16.1
Not at all	12.8
Source of product	
Drugstore/pharmacy	71.5
Prescription from medical provider	13.7
Either equally	14.8
Form of product	
Cream/jelly	41.2
Suppository	30.1
Sponge	11.6
Film	17.1
Partner awareness of product	
Prefers partner to be unaware	33.6
Prefers partner to be aware	33.1
Either equally	33.2
Interest, if not 100% effective	
Very	45.5
Somewhat	31.5
A little	10.1
Not at all	13.0
Interest, if only protects against HIV	
Very	47.0
Somewhat	29.3
A little	11.4
Not at all	12.4
Interest, if protects from STDs but not HIV	
Very	27.1
Somewhat	37.4
A little	16.6
Not at all	18.9
Interest in use, if cost is about the same as condoms (\$0.50–1.00)	
Very	77.6
Somewhat	15.6
A little	3.5
Not at all	3.3
Interest in use, if cost is twice as much (\$2 per application)	
Very	59.7
Somewhat	24.1
A little	12.8
Not at all	3.3
How it would be used for STDs/HIV prevention	
Instead of condoms	15.8
With condoms	84.2
How it would be used with other contraceptives§	
Instead of other contraceptives	37.4
With other contraceptives	62.6
Expected attitude of current partner††	
Would be happy if she wanted to use it	21.7
Wouldn't care one way or the other	59.7
Would object to using it	18.5
Total	100.0

†See text footnotes for exact wording of product characteristics as described to respondents. ‡Ns vary between 939–979, depending on nonresponse (do not know/refused) for each variable. §If the product had both a contraceptive and microbicide effect. ††Actual N is 869; 92 women with no steady partner were not asked this question. Notes: The margin of sampling error is ± 1.4–3.3%, depending upon the exact number of respondents to each question and the percentage of women in the subgroup. Percentages may not add to 100 due to rounding.

3). However, women's interest in the product was diminished when the potential microbicide was described as protecting against other STDs, but not against HIV.*

Women appeared quite willing to pay an amount equivalent to the cost of condoms (\$0.50–1.00) for a microbicide product.† When faced with a more expensive product (\$2 per application),‡ the percentage remaining very interested in use dropped from 78% to 60%. While 66% of women aged 35–44 said they would be very interested in a microbicide costing \$2 per application, this proportion fell to 53% among women aged 25–34 (not shown). Eighty percent of white and black women said they would be very interested if the product cost one dollar or less per application, but these proportions dropped to 59% and 67%, respectively, if the cost were \$2 per use.

Most women (84%) said that if they used a microbicide, they would likely use it along with condoms to get added protection, rather than substituting it for condoms (Table 3).§ Similarly, when presented with a version that also was effective in preventing pregnancy,** nearly two-thirds (63%) responded that they would continue to use their other contraceptive method for pregnancy prevention, in addition to using microbicides for STD prevention. Women who were not in a union were more likely to say they would use a microbicide with their regular birth control method (68%) than were women who were married or cohabiting (57%; not shown).

Typically, women did not expect their sexual partners to be a hindrance to use of microbicide products. However, almost one woman in five thought that her current partner would object if she wanted to use a microbicide (Table 3). Among the 48 women who said that they might need to use a microbicide with their current partner and that he would object to using this kind of product, 40 said they would use it anyway—19 without telling him and 21 even if he didn't want her to use it (not shown).

Women who were not in a union were more likely than married and cohabiting women to think that their partner would be happy for her to use a microbicide (47% vs. 18%) and less likely to think that he would object to their using a microbicide (6% vs. 21%). Low-income women and those aged 18–24 were more likely than high-income women and those aged 35–44 to think that their partner would be happy and less likely to think he would object. Non-Hispanic white women (18%) were less likely than black women (39%) or Hispanic and Asian or other women (32–33%) to think their partner would be happy with

their using a microbicide product.

Estimated Number of Potential Users

We estimated that as of 1998, 21 million of the nearly 60 million U.S. women aged 15–44¹⁶ would be interested at all in current microbicide use (Table 4, page 22), and that 15.5 million women are currently worried about contracting STDs (not shown). Some 12.6 million women are both currently worried about STDs and interested at all in using a microbicide; 6.0 million of these would be very interested in using such a method (Table 4). Even if the product provides only a 70–80% reduced risk of contracting STDs, 11.5 million of these women would be interested in current microbicide use, and 3.7 million women would be very interested.

Cost makes a difference in women's projected interest. The number of women who think they would be interested in using a microbicide even if it is less than 100% effective drops from 9.5 million if the product costs a dollar or less to 7.7 million if it costs \$2 per application. At the higher price, 3.1 million women would remain very interested in using such a product, even if it is not totally effective.

If the microbicide is less than 100% effective and only protects against HIV, 9.1 million women would be interested in using it at a cost of less than a dollar and 7.3 million would be at a cost of \$2. At this higher cost and with potential product limitations, 2.5 million women would remain very interested in using a microbicide.

Discussion

The effort required to develop, test and bring to market new methods that women can use to prevent the transmission of STDs is great.

*Question wording: "What if the product was effective in protecting against other STDs, but not HIV? In that case, how interested would you be in using it?"

†Question wording: "Now, how much would you be willing to pay for such a product? What if this product cost about as much as condoms, say about \$0.50–1.00, per application. Given that cost, how interested do you think you would be in using such a product?"

‡Question wording: "What if this product cost about \$2 per application. Given that cost, how interested do you think you would be in using such a product?"

§Question wording: "Now, thinking about a situation when you would be interested in using this product, tell me which of these statements best fits for you: I would use this product instead of condoms for STD protection, or I would use this product in addition to condoms to get extra STD protection?"

**Question wording: "Assuming that this product was also effective at preventing pregnancy, which of these two statements best fits for you: I would use this product instead of other birth control methods to prevent both pregnancy and STDs, or I would continue to use my regular birth control method for pregnancy prevention and would use this product for STD prevention only."

Table 4. Estimated numbers of sexually active U.S. women aged 15–44 (in 000s) who are currently interested in using vaginal microbicides and are worried about HIV and other STDs, given different product specifications, according to level of interest in using product, 1998

Characteristics	Interested†	Very interested‡
Currently interested at all in using microbicides	21,289	na
Currently interested in using microbicides and worried about HIV/STDs	12,586	6,044
If microbicide not 100% effective	11,518	3,656
If microbicide not 100% effective and cost is \$0.50–1	9,473	3,562
If microbicide not 100% effective and cost is about \$2	7,697	3,087
If microbicide not 100% effective and only protects from HIV	10,985	2,925
If microbicide not 100% effective, only protects from HIV and cost is \$0.50–1	9,111	2,925
If microbicide not 100% effective, only protects from HIV and cost is about \$2	7,335	2,450

†Includes women who responded that they are very, somewhat or a little interested in current microbicide use, given each product specification. ‡Includes only women who responded that they are very interested in current microbicide use, given each product specification. Note: na=not applicable.

The need for such methods, and their potential beneficial impact, also are great, both in the United States and worldwide. About three in 10 women of reproductive age in the United States are currently worried about getting an STD. However, only about one in 10 is currently using condoms to prevent an infection. Whether the potential for new methods is worth the work and expense they entail will depend on whether women at risk for contracting, or transmitting, these infections will use them.

A survey such as the one reported here should not be taken as an exact prediction of the numbers and characteristics of women who will use a vaginal microbicide when it becomes available, since women are reporting about a hypothetical method and do not have to take any actions toward its use. Further, survey responses cannot determine whether women who intend to try out a new product would be willing to continue using it. Still, such information is useful in determining whether the concept is of interest to women, how interested they are in it and which women are more likely to be potential users. Indeed, the results of this survey of sexually active women in the United States aged 18–44 indicates substantial concern about STDs and interest in the use of vaginal microbicides.

Four in 10 women said that they would be currently interested in using the type of vaginal microbicide presented to them, primarily because they want to be in control of protecting themselves from infection. Our data suggest that some 6.0 million women aged 15–44 are very interested in current use and are currently worried about getting an STD. These women are probably the most likely potential users of such a method. The strongest predictors of being a potential user are women's current use of condoms to prevent infection with STDs, their perception of exposure to risk, their being unmarried and not living with a man, and their being black.

Yet, women in all social and demo-

graphic subgroups showed some interest in vaginal microbicides and also were worried about STDs. Thus, it is likely that another 6.5 million women are worried about getting STDs and are somewhat or a little interested in microbicides.

The characteristics of the method will be especially important in determining how many women will use a microbicide. One in every six women in our survey said that they were currently interested in using a microbicide but were not now worried about getting STDs. A very attractive method and related public education and advertising might cause them to consider microbicide use, as well as to reassess their concern about infection.

The preferences of a majority of women mirror current considerations in method development (i.e., that the method can be applied well in advance of intercourse and that it is readily accessible over the counter rather than by prescription). Contrary to current thinking, only one-third of women said that they would prefer a product that could be used without their partner's knowledge. This is undoubtedly related to the fact that only one in five women thought their current partner would object to their using such a method. However, a method that could be used without the partner's knowledge would meet all women's needs, regardless of whether they would choose to tell their partner about microbicide use.

The ideal microbicide would be 100% effective against HIV and all other STDs and would be inexpensive. Such a method is of course unlikely to be produced any time in the foreseeable future. Women's responses in this survey indicate that the further a product is from this ideal, the less women will be interested in using it. However, women's views also suggest that their expectations are realistic, and are likely to match the types of products that will become available. Of the estimated 12.6 million women aged 15–44 interested in current use and worried about STDs, 11.5

million would still be interested in a method even if it is not 100% effective or 11.0 million would remain interested even if it does not protect against STDs other than HIV. In fact, fewer (but still a majority) would be interested if the method protected only against STDs other than HIV.

Women's predictions of their use of a microbicide were affected by potential price, but interest was still high at \$2 per application. We estimate that more than seven million sexually active women aged 15–44 would be interested in a vaginal microbicide even if the product only protected against HIV, was only 70–80% effective and cost \$2 per application; 2.5 million of them would be very interested in its use.

Since microbicides are unlikely to be 100% effective or to protect against all sexually transmitted infections, the possibility that women and their partners might abandon the use of condoms if such a product became available has raised concern. However, 84% of the women whom we surveyed said they would be likely to use a microbicide together with condoms for added protection, and 63% said that even if the microbicide also prevented pregnancy, they would still continue using another contraceptive method.

In the end, our findings offer two important insights. First, many American women are worried about STDs and think they would use a vaginal microbicide, even if it is not a perfect method. How many will use such methods when they become available remains to be seen, however, and depends on the methods themselves, on how they are presented to potential users and on users' perceptions of their own needs and of their risk for becoming infected.

In addition, even with relatively high levels of interest in microbicides among women at risk for STDs, there remain women who appear to be at risk but who are not interested in using this type of product. Thus, vaginal microbicides may be able to help some women reduce their susceptibility to sexually transmitted diseases, but it is unrealistic to believe that microbicides will be the complete answer. Action will continue to be needed to provide education about STD risks and the potential for infection, to improve women's status and to increase women's ability to act in their own best interests.

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