

# Willingness of Clinicians to Integrate Microbicides into HIV Prevention Practices in Southern Africa

Cynthia C. Harper · Kelsey Holt · Taazadza Nhemachena · Tsungai Chipato · Gita Ramjee · Laura Stratton · Maya Blum · Charles E. McCulloch · Sibongile Mgweba · Kelly Blanchard

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**Abstract** The first vaginal microbicide was recently proven effective in clinical trials. We assessed the willingness of clinicians to integrate microbicides into HIV prevention practices in Southern Africa, where women face elevated HIV risks. We conducted in-depth interviews ( $n = 60$ ) and nationally representative surveys ( $n = 1,444$ ) in South Africa and Zimbabwe with nurses and physicians. Over half of clinicians (58%) were aware of microbicides, with physicians far more likely than nurses to be familiar. Clinicians, including those in rural areas, were generally

willing to discuss microbicides, a female-initiated method less effective than the condom, particularly when condom use was unlikely (70%). Fewer would include microbicides while counseling adolescents (51%). Most clinicians (85%) thought their patients would use microbicides; greater clinician familiarity with microbicides was significant for support. Training for both nurses and physicians prior to introduction is critical, so they have sufficient knowledge and skills to offer a microbicide upon availability.

**Keywords** Microbicides · HIV prevention for women · Clinicians · Zimbabwe · South Africa

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C. C. Harper (✉) · L. Stratton · M. Blum  
Department of Obstetrics, Gynecology and Reproductive Sciences, Bixby Center for Global Reproductive Health, University of California, UCSF Box 0744, San Francisco, CA 94118, USA  
e-mail: harperc@obgyn.ucsf.edu

K. Holt · K. Blanchard  
Ibis Reproductive Health, Cambridge, MA, USA

K. Holt · K. Blanchard  
Ibis Reproductive Health, Johannesburg, South Africa

T. Nhemachena · T. Chipato  
UZ-UCSF Collaborative Programme on Women's Health, Harare, Zimbabwe

G. Ramjee  
South African Medical Research Council HIV Prevention Research Unit, Durban, South Africa

C. E. McCulloch  
Department of Epidemiology and Biostatistics, University of California, San Francisco, San Francisco, CA, USA

S. Mgweba  
CASE, Johannesburg, South Africa

## Introduction

Women in Southern Africa are at high risk of HIV acquisition: 1 in 3 women are HIV positive in the most at-risk ages (South Africa ages 25–29; Zimbabwe ages 30–34) [1–3]. Condom use remains low, particularly within marriage [4–6]. Female condom use is under 1% of sexually active women [1, 2, 7]. Women need additional options for HIV prevention. A microbicide product in development, antiretroviral tenofovir gel, was recently found effective in decreasing HIV incidence by 39% (54% with high adherence) [8]. Research conducted at an early stage can inform strategies for educating clinicians and women about microbicides. The lack of success of the female condom has been partially attributed to a dearth of research with clinicians prior to female condom roll-out—leading to missed opportunities for appropriate training on female condom counseling [9].

Clinician support for a new HIV prevention method is needed in order for women to receive adequate information about the method and access to it. A review of the nascent

research on clinicians and microbicides, including two qualitative studies in South Africa, found that clinicians expressed enthusiasm for a new product they could offer patients, particularly those who are unwilling or unable to use condoms, but had concerns about safety and wetness, and were uncertain about counseling messages for partially effective methods [10]. Providers viewed microbicides as a tool to empower women since men resist condoms use [11, 12].

Research into providers' attitudes and counseling practices is essential to understand how to introduce microbicides and where to allocate scarce training resources [9]. Clinicians may recognize that microbicides can increase overall protection where condoms are used infrequently [13]. Alternatively, they may hesitate to recommend partially effective microbicides. Research on counseling interventions shows that a risk reduction message with a choice of methods is generally superior to a simple message for changing behavior [14–16]. However, we do not yet know if clinicians would integrate microbicides into their overall HIV prevention efforts, and how this would vary for different patients. We conducted in-depth interviews and nationally representative surveys of clinicians in South Africa and Zimbabwe about their knowledge and views on microbicides. This is the first large, nationally representative survey of nurses and physicians on microbicides. We investigated whether clinicians would include microbicides in their overall HIV prevention practices, and assessed how their perceptions and counseling varied, according to clinician characteristics and patient risks.

## Methods

We conducted a mixed methods study with in-depth interviews, followed by national probability surveys of physicians and nurses. Participants answered a series of questions on microbicides for HIV prevention. The study was part of a larger, multi-country investigation of clinicians' pregnancy and HIV/STI prevention practices in Southern Africa and the United States. The surveys included a core set of questions in all countries, as well as country-specific sections, and were developed using qualitative results and input from community advisory groups.

### In-depth Interviews

The formative research consisted of in-depth interviews with 60 clinicians (30 in each country). Interview participants were purposively sampled to represent a range of clinical and geographic settings. In South Africa, clinicians were recruited from urban and surrounding areas in Durban, Johannesburg and Cape Town. In Zimbabwe,

clinicians were recruited from Harare, Mutare, Epworth and Chitungwiza and surrounding areas. Participants were interviewed in-person by trained interviewers from the Medical Research Council in Durban and the University of Zimbabwe, using a semi-structured open question topic guide. Interviews were conducted in English (with some explanation in local languages), lasted approximately one hour, and were audio-recorded using digital voice recorders. Participants received approximately \$10 in local currency in Zimbabwe and \$14 in South Africa, with the exception of public sector clinicians in South Africa, who received a clinic gift worth about \$20, on the recommendation of local advisors. Most participants were nurses, reflecting the structure of health care (83% in South Africa and 80% in Zimbabwe). Eleven clinicians were screened for eligibility but did not participate due to ineligibility or refusal. The topic guide was reviewed by clinician advisors, local community advisory groups, and piloted with 12 clinicians.

We asked clinicians about their patient population and HIV/STI prevention practices for different types of patients. We also asked whether they would be willing to recommend partially effective prevention methods, including microbicides, to their patients and whether they thought women would use them. We asked about female-controlled methods that were 50 and 33% effective, within the hypothesized range for microbicide efficacy [17, 18]. Interview data were transcribed and coded independently by three researchers using Atlas.ti (Berlin, Germany) software. Deductive topic codes were applied to the interview questions based on concepts from the literature. Additional topics and conceptual codes were generated inductively from the data. The responses were organized thematically. The goal of the analysis was to explore HIV prevention counseling and approaches used for a range of patients.

### Survey

Survey items were generated from the literature and formative qualitative research [19]. The surveys were pilot tested and the final instruments included items on clinicians' demographic and professional practice characteristics, patient population and contraceptive and HIV/STI attitudes and prevention practices.

To select a national probability sample of clinicians, we used a multistage, facility-based approach in which first districts were selected, then facilities from within those districts, and finally clinicians. We relied on government data for South African facilities and constructed a national listing of facilities in Zimbabwe. Districts were randomly selected with probability proportional to size, based on the estimated number of physicians and nurses. In South

Africa, 12 of the country's 52 districts were randomly selected and in Zimbabwe, 15 of 63 districts. Within these districts, a sample of facilities stratified by type (clinic or hospital) was randomly selected proportional to size. Facilities were eligible if they offered family planning or HIV/STI services. The final sample of eligible facilities included 187 clinics (100 from South Africa, 87 from Zimbabwe), and 81 hospitals (30 from South Africa, 51 from Zimbabwe). Participating facilities included 171 clinics (87 or 87% in South Africa and 84 or 97% in Zimbabwe) and 75 hospitals (29 or 97% in South Africa and 46 or 90% in Zimbabwe). Principal reasons for facility non-participation were that the facility could not be contacted or refused. Approvals to recruit clinicians were granted by health officials at the national, provincial or district level, as needed. All clinicians who provided family planning or HIV/STI services were considered eligible and invited to participate. Clinicians were excluded if they were retired, inactive, or resided out of the country. The final sample included 1,972 physicians and nurses (1,019 from South Africa and 953 from Zimbabwe).

Data were collected from 2008–2009 through a self-administered questionnaire that was distributed in-person at participating facilities in Zimbabwe. In South Africa, a much larger country, surveys were primarily administered by telephone (due to prohibitive costs of in-person visits). Cash reimbursements were discouraged by local advisors, so survey respondents in Zimbabwe received a pen in appreciation for their time and respondents in South Africa chose a local charity for a small donation of approximately \$10 (7,000 Rand). The study was approved by the University of KwaZulu-Natal Biomedical Research Ethics Committee, the Medical Research Council of Zimbabwe, the Western Institutional Review Board, and the University of California, San Francisco Committee on Human Research.

### Survey Measures

A series of items on microbicides were introduced with a short description, "Microbicides are products being tested, which women could apply in their vagina, as a foam, cream or gel, to prevent HIV infection." Clinicians were then asked how familiar they were with microbicides (not heard of microbicides, heard of microbicides but not sure of details, familiar with microbicides research). They were also asked how important it is for women to have a HIV/STI prevention method they can use without their male sexual partner knowing; responses on a Likert scale from 1 to 10 were coded for analysis from low (1–2), low-medium (3–4), medium (5–6), medium-high (7–8), high (9–10). Clinicians were asked how frequently they thought their patients would use a microbicide (never, sometimes, usually, always). Finally they were asked whether they would

discuss microbicides, if found to be 33% effective in clinical trials (i.e. HIV transmission reduced by 1/3), with different patients, including women in general, married women, women whose partners don't use condoms, women with uncircumcised partners, women in domestic violence situations, and female teenagers (yes, no, not sure).

### Analysis

We analyzed four clinician outcome variables: (1) Familiarity with microbicides; (2) Support for discreet female HIV prevention methods; (3) Perceptions on patient microbicides use; and (4) Willingness to discuss a 33% effective microbicide with patients. We used multivariable logistic regression analysis to identify differences in the outcome variables by clinician and practice-related characteristics. We used ordinal logistic regression for the ordinal outcomes: familiarity with microbicides, support for female HIV prevention methods, and opinion on patient microbicide use. For willingness to discuss microbicides, we used logistic regression analysis on a dichotomous outcome (yes vs. no/not sure). We adjusted for the facility-based sampling scheme in analyses by accounting for clustering at the facility level. Analyses were also conducted separately by country for comparison. Analyses were conducted using Stata 11.0 (College Station, TX). Significance was defined as  $P \leq 0.05$ .

### Results

A total of 614 clinicians from South Africa and 830 clinicians from Zimbabwe participated in the survey ( $n = 1,444$ ), yielding a clinician response rate of 73.2%. An analysis of non-response shows there was no difference in South Africa between clinics and hospitals (60% vs. 61%), although nurses were more likely to respond than physicians (66% vs. 39%). In Zimbabwe, physicians were more likely to respond than nurses (100% vs. 87%), and those in hospitals more likely to respond than those in clinics (92% vs. 81%). Table 1 shows that the majority of participants were female (86%), nurses (91%), and trained in HIV prevention (80%) and family planning (63%). Respondents worked in rural (52%) and urban (48%) areas. Seventy percent reported that most or all of their patients were at risk of HIV infection. Ninety-nine percent of clinicians reported discussing condoms with female patients, and 84% reported routine discussion (usually or always).

Table 2 shows that more than half of clinicians surveyed had heard of microbicides (58%), and an additional 7% were familiar with research. Nearly 70% of clinicians reported that HIV/STI prevention methods women can use

**Table 1** Clinician, practice, and patient-related characteristics of participants (*n* = 1444)

	South Africa ( <i>n</i> = 614)	Zimbabwe ( <i>n</i> = 830)	Total ( <i>n</i> = 1444)
Gender, <i>n</i> (%)			
Female	547 (89.8)	674 (82.3)	1221 (85.5)
Male	62 (10.2)	145 (17.7)	207 (14.5)
Clinician type, <i>n</i> (%)			
Nurse	528 (86.0)	792 (95.4)	1320 (91.4)
Physician	86 (14.0)	38 (4.6)	124 (8.6)
Age, median years (range)	43 (23–69)	39 (20–74)	41 (20–74)
Training in HIV prevention, <i>n</i> (%)	510 (84.4)	629 (77.1)	1139 (80.2)
Training in family planning, <i>n</i> (%)	399 (66.0)	503 (61.3)	902 (63.3)
Type of facility, <i>n</i> (%)			
Hospital	309 (50.3)	484 (58.6)	793 (55.1)
Clinic	305 (49.7)	342 (41.4)	647 (44.9)
Location, <i>n</i> (%)			
Urban	315 (51.3)	375 (45.4)	690 (47.9)
Rural	299 (48.7)	451 (54.6)	750 (52.1)
Proportion of patients at HIV risk, <i>n</i> (%)			
None/some	46 (7.6)	175 (21.6)	221 (15.6)
Half	92 (15.1)	112 (13.8)	204 (14.4)
Most/all	470 (77.3)	524 (64.6)	994 (70.1)
Routine counseling of condoms with female patients, <i>n</i> (%)	542 (89.9)	652 (80.1)	1,194 (84.3)

without their partner knowing were important (medium to high range). In South Africa, clinicians were far more likely to report that “discreet” HIV/STI prevention methods were highly important than in Zimbabwe (84% vs. 57%).

The need for female-initiated methods was reflected in the qualitative data as well. In in-depth interviews clinicians universally acknowledged that men do not want to use male condoms, due to underlying issues of intimacy, trust and fidelity, and also for sexual pleasure. Clinicians noted that men do not use condoms within marriage. They pointed to women’s economic dependence, which causes hesitation to refuse sex or request condom use. The clinicians spoke frequently about the potential for women’s empowerment, should a female-initiated HIV prevention method become available: “The beauty about the whole thing is that it empowers the woman who is always at the receiving end of this epidemic” (Physician, Zimbabwe, peri-urban).

Harm reduction messages, including less effective methods along with condom counseling, were widely acknowledged to be useful for married women and for women whose partners don’t use condoms: “The more things you actually use to prevent it the better. I mean, not every man is going to use a condom, and you [are] actually stuck because what you got now is absolutely no protection.” (Nurse, South Africa, urban). Clinicians did not voice concerns in this context of low condom use that

women would shift to use of less effective methods over the condom. A physician in rural South Africa said: “We should try anything that we can because the male condom is obviously not really working well, is not having the desired effects if we look at the statistics that rise each year.”

Clinicians were optimistic about patient use of microbicides in the interview and survey data. Thirty-six percent of clinicians surveyed reported that their patients would use a microbicide usually or always, and 49% reported that patients would use it sometimes (see Table 2). Only 15% thought patients would never use microbicides. South African clinicians were more likely to report their patients would usually or always use microbicides (44% compared to 30% in Zimbabwe). In the interviews, clinicians largely thought their patients would use microbicides, but voiced concerns, including a need for information or that the physical properties of a gel (wet, messy) might work for some, but not for others who prefer dry sex.

The majority of clinicians surveyed (64%) reported that they would discuss a 33% effective microbicide with their female patients (Table 2). Clinicians in Zimbabwe were more likely to report they would discuss microbicides than those in South Africa (69% vs. 58% for women in general). In interviews, clinicians were asked about a 50% effective female-controlled method, in addition to a 33% effective method, and all responded they would integrate a 50%

**Table 2** Clinician knowledge and perceptions about microbicides ( $n = 1444$ )

	South Africa ( $n = 614$ )	Zimbabwe ( $n = 830$ )	Total ( $n = 1444$ )
Familiarity with microbicides	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Familiar with microbicide research	57 (9.7)	40 (5.0)	97 (7.0)
Heard of microbicides, not sure of details	349 (59.5)	451 (56.8)	800 (57.9)
Not heard of microbicides	181 (30.8)	303 (38.2)	484 (35.0)
Importance of female discreet HIV/STI method			
High (9–10)	338 (57.3)	226 (28.1)	564 (40.4)
Medium–High (7–8)	80 (13.6)	94 (11.7)	174 (12.5)
Medium (5–6)	78 (13.2)	141 (17.5)	219 (15.7)
Medium–Low (3–4)	38 (6.4)	128 (15.9)	166 (11.9)
Low (1–2)	56 (9.5)	216 (28.6)	272 (19.5)
How frequently patients would use microbicides			
Always	140 (24.4)	138 (17.6)	278 (20.5)
Usually	115 (20.0)	97 (12.4)	212 (15.6)
Sometimes	222 (38.7)	440 (56.2)	662 (48.8)
Never	97 (16.9)	108 (13.8)	205 (15.1)
Willing to discuss 33% microbicide with...			
Women in general			
Yes	340 (58.1)	550 (69.0)	890 (64.4)
No	183 (31.3)	166 (20.8)	349 (25.3)
Not sure	62 (10.6)	81 (10.2)	143 (10.4)
Married women			
Yes	343 (59.3)	553 (70.0)	896 (65.5)
No	177 (30.6)	153 (19.4)	330 (24.1)
Not sure	58 (10.0)	84 (10.6)	142 (10.4)
Women whose partners don't use condoms			
Yes	376 (64.3)	581 (73.9)	957 (69.8)
No	157 (26.8)	129 (16.4)	286 (20.9)
Not sure	52 (8.9)	76 (9.7)	128 (9.3)
Women with uncircumcised partners			
Yes	349 (60.4)	504 (64.4)	853 (62.7)
No	165 (28.5)	154 (19.7)	319 (23.4)
Not sure	64 (11.1)	125 (16.0)	189 (13.9)
Women in domestic violence situations			
Yes	358 (62.2)	542 (69.5)	900 (66.4)
No	160 (27.8)	134 (17.2)	294 (21.7)
Not sure	58 (10.1)	104 (13.3)	162 (12.0)
Female teenagers			
Yes	337 (58.3)	357 (45.8)	694 (51.1)
No	184 (31.8)	286 (36.7)	470 (34.6)
Not sure	57 (9.9)	137 (17.6)	194 (14.3)

method into their patient counseling. For the 33% effective method, there were mixed responses, with concerns about failure and some doubts about overall benefit; however, many reported that they would offer it, and let the patients choose for themselves: “Half a loaf is better than no bread at all” explained several nurses in urban and rural areas in both countries. A rural nurse in Zimbabwe said “I think it’s

better because out of 100 women if 33 are prevented, it’s better than having all of them dying of HIV.”

When asked in the survey about women whose partners don’t use condoms, 70% of clinicians reported they would discuss microbicides. An urban nurse from South Africa stated in an interview: “Women are often desperate to protect against HIV and they are often in a position where

they cannot dictate to their partner about using condoms, so being able to offer them something is better than offering them nothing.” In terms of counseling patients, however, each clinician still stressed condom use, due to high effectiveness and the goal of educating patients over time, particularly younger patients. In the interviews, clinicians were more likely to prefer simple condom counseling messages for teenagers. In the survey, clinicians also showed less willingness to discuss a partially effective microbicide with teenagers (51%) than with other patients, particularly in Zimbabwe.

Table 3 shows the results of multivariable regression models examining differences in outcome variables by clinician characteristics. Physicians were far more likely than nurses to be familiar with microbicides, as were those who had family planning training. Physicians were also significantly more likely than nurses to place importance on the need for an HIV/STI prevention method women can use without their male partners knowing. However, nurses were just as likely as physicians to believe their patients would use microbicides. Overall, clinicians who were

familiar with microbicides research were more likely to think patients would use them.

Table 4 presents results from multivariable logistic regression analysis of the willingness of clinicians to discuss a 33% effective microbicide with different types of patients. Nurses and physicians were equally willing to discuss microbicides with patients. Greater familiarity with microbicides and family planning training were consistently associated with willingness to discuss microbicides. For women in domestic violence situations, as well as for female teens, HIV training was significant.

## Discussion

In our in-depth interviews and survey data, we assessed clinician approaches to HIV prevention with their female patients. Survey results showed that almost two-thirds of clinicians would discuss microbicides that would reduce HIV transmission by one-third with patients. We found that clinicians generally endorsed harm reduction approaches

**Table 3** Clinician knowledge and perceptions about microbicides: multivariable ordered logistic regression

	Familiarity with microbicides OR [95% CI]	Importance of discreet HIV/STI prevention method for women OR [95% CI]	Belief that patients would use a microbicide OR [95% CI]
<i>Clinician</i>			
Country			
Zimbabwe (reference)	–	–	–
South Africa	1.2 [0.91–1.7]	1.23*** [1.0–1.4]	1.4* [1.1–1.9]
Age (years)	1.0 [0.99–1.0]	1.00 [0.99–1.0]	1.00 [0.99–1.0]
Professional training			
Physician (reference)	–	–	–
Nurse	0.20*** [0.13–0.31]	0.47** [0.26–0.83]	1.2 [0.80–1.8]
Trained in HIV prevention	1.1 [0.82–1.5]	0.97 [0.75–1.3]	1.0 [0.78–1.4]
Trained in family planning	1.3* [1.0–1.6]	1.0 [0.81–1.4]	0.94 [0.74–1.2]
Knowledge of microbicides			
None (reference)	–	–	–
General familiarity	–	1.0 [0.81–1.4]	0.92 [0.79–1.2]
Familiar with research	–	1.3 [0.80–2.2]	1.7** [1.1–2.5]
<i>Practice</i>			
Type of facility			
Hospital (reference)	–	–	–
Clinic	1.0 [0.79–1.4]	1.2 [0.94–1.6]	1.1 [0.78–1.5]
Location			
Rural (reference)	–	–	–
Urban	1.3 [0.97–1.7]	1.7*** [1.3–2.2]	0.85 [0.64–1.1]
Most/all patients HIV risk	1.1 [0.89–1.4]	0.95 [0.76–1.2]	0.17 [–0.08–0.42]
<i>n</i>	1,289	1,276	1,250
Model chi-square (df)	$X^2 (8) = 76.4$	$X^2 (10) = 143.9$	$X^2 (10) = 29.4$

\*  $P \leq 0.05$ ; \*\*  $P \leq 0.01$ ;

\*\*\*  $P \leq 0.0$



**Table 4** Clinician willingness to discuss 33% effective microbicides with different patient types: multivariable logistic regression

Clinician would discuss microbicides with female patients						
	Women in general OR [95% CI]	Married women OR [95% CI]	Partners do not use condoms OR [95% CI]	Uncircumcised partners OR [95% CI]	Domestic violence OR [95% CI]	Adolescents OR [95% CI]
<i>Clinician</i>						
<i>Country</i>						
Zimbabwe (reference)	–	–	–	–	–	–
South Africa	0.62*** [0.48–0.80]	0.63*** [0.49–0.82]	0.60*** [0.45–0.82]	0.85 [0.65–1.1]	0.70* [0.52–0.94]	1.6*** [1.3–2.1]
Age (years)	0.99 [0.98–1.0]	0.99 [0.98–1.0]	0.98 [0.97–1.0]	0.99 [0.97–1.0]	0.99 [0.98–1.0]	0.99 [0.97–1.0]
<i>Professional training</i>						
Physician (reference)	–	–	–	–	–	–
Nurse	0.97 [0.61–1.6]	1.1 [0.73–1.7]	0.91 [0.55–1.5]	1.3 [0.88–2.0]	1.0 [0.67–1.6]	1.2 [0.82–1.8]
Trained in HIV prevention	1.2 [0.89–1.6]	1.2 [0.85–1.6]	1.4 [0.99–1.9]	1.1 [0.83–1.5]	1.5** [1.1–2.1]	1.4* [1.0–1.9]
Trained in family planning	1.6*** [1.2–2.0]	1.4** [1.1–1.7]	1.4** [1.1–1.9]	1.5** [1.2–1.9]	0.12 [0.94–0.16]	1.4** [1.1–1.8]
<i>Knowledge of microbicides</i>						
None (reference)	–	–	–	–	–	–
General familiarity	1.2 [0.93–1.7]	1.3 [0.98–1.8]	1.4* [1.1–2.0]	1.4* [1.1–1.9]	1.3* [1.0–1.7]	1.2 [0.91–1.6]
Familiar with research	2.1** [1.2–3.7]	1.9* [1.1–3.3]	2.0* [1.2–3.6]	2.5*** [1.5–4.4]	2.0* [1.2–3.5]	1.7* [1.0–2.9]
<i>Practice</i>						
<i>Type of facility</i>						
Hospital (reference)	–	–	–	–	–	–
Clinic	1.3 [0.96–1.7]	1.4* [1.0–1.9]	1.3 [0.94–1.8]	1.3 [0.92–1.7]	1.1 [0.82–1.5]	1.1 [0.89–1.4]
Urban location	0.75* [0.57–0.99]	0.81 [0.61–1.1]	0.77 [0.56–1.0]	0.78 [0.58–1.1]	0.76 [0.56–1.0]	0.85 [0.66–1.1]
Most patients at HIV risk	0.93 [0.69–1.2]	0.99 [0.74–1.3]	1.3 [0.99–1.9]	0.98 [0.74–1.3]	1.1 [0.85–1.5]	1.2 [0.91–1.6]
<i>n</i>	1,267	1,257	1,259	1,253	1,247	1,251
Model chi-square 10 (df)	43.6	39.9	48.5	36.4	27.9	47.9

\*  $P \leq 0.05$ ; \*\*  $P \leq 0.01$ ; \*\*\*  $P \leq 0.001$ 

that allowed for counseling on partially effective microbicides, in addition to condom counseling. Discreet female-initiated methods for HIV/STI prevention were viewed as important, particularly among physicians in South Africa. In the interviews, clinicians cited women's inability to control condom use and male partners' unwillingness to use condoms. Our results are similar to previous qualitative research in South Africa, which found support from clinicians for microbicides to give women more control over HIV protection [10, 12].

Familiarity with microbicides was the strongest factor associated with willingness to discuss the method with women, which reflects the importance of clinician education. Six Phase 3 microbicides trials have been held in Southern Africa. While a small percentage of clinicians reported familiarity with microbicides research, the fact that the majority reported that they had heard of

microbicides is likely to also have been a byproduct of research in the region. Innovations in healthcare tend to be adapted slowly until they reach a critical mass of clinicians [20, 21]. Providing information to clinicians in urban areas could help to develop a cadre of supportive healthcare workers during initial product roll-out of a new microbicide. However, beyond the initial stages, there is a need for more widespread nurse outreach and training. Despite providing the majority of healthcare in these high HIV-prevalence settings, only 62% of nurses (compared to 89% of physicians) have heard of microbicides. Family planning training was a salient factor in microbicides knowledge and support, suggesting that education on microbicides and female-initiated prevention methods in the context of family planning training is a critical clinician training strategy. The integration of family planning and HIV prevention services can have many benefits in low-resource

settings [22]. Results showed HIV training is also an important venue for vulnerable women, such as those in domestic violence situations and adolescents.

Our results highlighted that microbicide education will need to be tailored to country conditions and social context. In order to reduce HIV transmission risks, it is important for communities and providers to develop appropriate messages for their context [23]. In both countries physicians and nurses thought that women would have a greater likelihood of using a female-controlled method than men currently do with male condoms, particularly in marriages or unions. Clinicians were aware of women's disproportionate HIV risks and were highly supportive of women taking protective measures. South African physicians perceive a much higher need for an HIV prevention method women can use without their male partner knowing than do clinicians in Zimbabwe. This finding is consistent with previous research in Zimbabwe that shows an expectation of male partner participation in women's microbicide use [24]. Other research has shown the relevance of gender norms to microbicide acceptability [25, 26]. Relationship factors will be important considerations in the introduction of any HIV prevention method, including microbicides, and greater male partner involvement may be a more useful strategy in certain contexts, while empowering autonomous female use will be more relevant in others.

Also, as expected, clinician counseling preferences varied for different patient types: clinicians were most supportive of a partially effective microbicide when counseling women whose partners do not use condoms. However, for adolescents, clinicians had more hesitations, although half of survey respondents were still willing to discuss microbicides with them. Lower support for microbicides counseling with teenagers suggests the need for special attention to the elevated risks young women face: in 2008, 40% of new HIV infections worldwide were among 15–24 year olds [3]. Heightened concerns about adolescents were also reported in small qualitative microbicides studies [11, 27]. Attitudes towards adolescent sexuality, decision-making and risks may account for the different approach for adolescents. Patterns of condom use may also be a factor; condom use has increased for youth in the past decade in South Africa [28, 29] and is higher among the unmarried population in Zimbabwe [30].

A surprisingly high proportion of clinicians surveyed thought their patients would use microbicides (85%). This figure likely reflects the commonly expressed feeling that new methods are desperately needed. However, half of clinicians thought that use would be sometimes rather than usually or always, which raises the question of adherence, a significant concern for coital methods. Level of effectiveness is important for acceptability and use, but use patterns also affect effectiveness. Certain microbicide products

under development do not require adherence at every sexual act, or daily adherence, and these types of products show promise for increased effectiveness [31].

This study has limitations. It was conducted before the tenofovir gel trial results were available, and knowledge and support for microbicides may have increased now that there is proof of concept that a microbicide could work. We did not ask about cost, which will also influence available supplies and access to the method. Future microbicides research, particularly among women, should include cost questions. Our survey response rate was high for a national probability clinician survey [32, 33]. However, non-response was higher in South Africa, and within the country, among physicians, so we may have underestimated familiarity with microbicides and importance of discreet methods of HIV prevention, both high measures for South African physicians. Country differences were significant, and may not only reflect differences among clinicians, but also country variations in data collection. Despite the limitations, our nationally representative samples allow us to generalize about clinicians within these two countries, unlike previous provider studies in South Africa with smaller, less representative samples.

## Conclusion

Once an effective microbicide becomes available, clinician support will be essential for successful roll-out and to ensure that women are informed and have access to the products. Clinicians are also important spokespersons and will play a prominent role in introductory strategies. Our results found clinician support for a partially-effective microbicide, within overall HIV prevention efforts, and showed the importance of clinician education, particularly within family planning training, for nurses as well as physicians in Southern Africa.

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