

# The Impact of Universal Access to Antiretroviral Therapy on HIV Stigma in Botswana

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HIV stigma represents a widespread and significant barrier to HIV prevention, testing, and treatment.<sup>1</sup> Prevalent in North and Latin America,<sup>2–5</sup> Asia,<sup>6</sup> and sub-Saharan Africa,<sup>7</sup> HIV stigma has been associated with delays in testing and treatment in the United States<sup>8</sup> and throughout the developing world.<sup>9–11</sup> Although the gravity and scope of the problem are clear, there is little agreement about the most effective strategies for its elimination. Some researchers have noted associations between HIV knowledge deficits and stigmatizing attitudes in community and clinical samples, arguing that educational interventions should be a high priority.<sup>12,13</sup> Although gains have been reported with educational, skills-building, and counseling interventions,<sup>14</sup> some argue that these behavioral approaches alone are inadequate because they fail to address the structural factors that contribute to HIV stigma and discrimination, such as poverty, gender inequality, marginalization of certain populations, and barriers to health care access.<sup>4,15,16</sup>

According to some observers, a critical determinant of HIV stigma is access to antiretroviral therapy (ART). In its 2003 plan for providing antiretroviral treatment to 3 million people with HIV/AIDS in developing countries by the end of 2005, the World Health Organization (WHO) struck an optimistic tone on the impact of treatment availability:

Universal access to anti-retroviral therapy for everyone who requires it according to medical criteria opens up ways to accelerate prevention in communities in which more people will know their HIV status—and, critically, will *want* to know their status. As HIV/AIDS becomes a disease that can be both prevented and treated, attitudes will change, and denial, stigma and discrimination will rapidly be reduced.<sup>17(p6)</sup>

There is qualitative evidence suggesting a link between treatment access and stigma reduction<sup>4,16,18</sup> and quantitative longitudinal data that documents decreases in certain forms of stigma after the introduction of ART in the

**Objectives.** We sought to examine the impact of treatment access on HIV stigma in Botswana 3 years after the introduction of a national program of universal access to antiretroviral therapy.

**Methods.** We studied the prevalence and correlates of HIV stigma in a population-based study of 1268 adults in Botswana in 2004. We used multivariate logistic regression to assess correlates of stigmatizing attitudes and a new measure, anticipated HIV stigma.

**Results.** Overall, 38% of participants had at least 1 stigmatizing attitude: 23% would not buy food from a shopkeeper with HIV; 5% would not care for a relative with HIV. Seventy percent reported at least 1 measure of anticipated stigma: 54% anticipated ostracism after testing positive for HIV, and 31% anticipated mistreatment at work. Perceived access to antiretroviral therapy was strongly and independently associated with decreased odds of holding stigmatizing attitudes (adjusted odds ratio [AOR]=0.42; 95% confidence interval [CI]=0.24, 0.74) and of anticipated stigma (AOR=0.09; 95% CI=0.03, 0.30).

**Conclusions.** Our findings suggest that antiretroviral therapy access may be a factor in reducing HIV stigma. Nevertheless, the persistence of stigmatizing attitudes and significant anticipated stigma suggest that HIV stigma must be a target for ongoing intervention. (*Am J Public Health.* 2008;98:1865–1871. doi: 10.2105/AJPH.2007.122044)

developed world.<sup>19</sup> However, there have been few assessments—and no large-scale, population-based studies—of the independent association between universal treatment access and HIV stigma in resource-poor settings.

Botswana provides a unique opportunity to study how increasing access to HIV treatment affects the prevalence and nature of HIV stigma in sub-Saharan Africa. With the second highest rate of HIV infection worldwide (estimated at 24% of adults aged 15–49 years in 2006), Botswana instituted a national treatment program in January 2002 to provide universal access to ART on the basis of medical necessity. According to the Botswana government, 60 478 adults in Botswana were enrolled in this program as of February 2006.<sup>20</sup> The number of individuals eligible for treatment in Botswana (defined as CD4 cell count <200 or the presence of an AIDS-defining illness) was estimated to be 110 000 before the launch of the national treatment program. It was projected that this number would rise to 260 000

by 2006, but no official estimates have been provided since that time.

Before the national program was instituted, there was strong evidence that HIV stigma was widespread in Botswana. In 2001, the Botswana AIDS Impact Survey, drawn from 4500 households, identified pervasive stigmatizing attitudes in the community, with 60% of respondents indicating that they “would not buy vegetables from a shopkeeper with HIV/AIDS.”<sup>7</sup> In a study of 109 people living with HIV/AIDS receiving ART in the private sector, respondents reported that HIV stigma had led to delays in HIV testing and limited disclosure of HIV status.<sup>21</sup>

To assess the impact of increased treatment access on HIV stigma in Botswana, we conducted a community survey in November and December 2004, almost 3 years after rollout of the national ART program. We had 3 aims for this study: (1) to determine the prevalence and correlates of stigmatizing attitudes toward people living with HIV/AIDS; (2) to assess the

prevalence and correlates of an alternative stigma measure (“anticipated HIV stigma,” i.e., the respondent’s expectation that he or she would be stigmatized for having HIV), which may be less influenced by social desirability bias than are stigmatizing attitudes toward those with HIV; and (3) to explore whether perceived access to ART (i.e., respondent indicates that ART is available near where he or she lives) is associated with stigmatizing attitudes toward HIV and anticipated HIV stigma.

## METHODS

In November and December 2004, we conducted a cross-sectional study using a structured 234-item survey among a probability sample of 1268 adults aged 18 to 49 years selected from the 5 districts of Botswana with the highest number of HIV-infected individuals. These 5 districts comprise 725 000 individuals, or 43% of Botswana’s population of 1.7 million. We used a stratified 2-stage probability sample design for the selection of households as described elsewhere.<sup>22,23</sup> Within each household, we used random number tables to select 1 adult member who met our inclusion criteria. Up to 2 repeat visits were made to complete face-to-face surveys.

## Procedures

We pilot tested our survey instrument among 20 individuals from Gaborone. Surveys and consent forms were translated into English and then back-translated into Setswana to ensure accuracy. Twenty-five local collaborators with previous research experience underwent a 4-day training course on survey implementation. Interviews were conducted in either English or Setswana in a private setting and lasted 45 to 60 minutes each. We obtained written consent from all study participants (if unable to write, participants were asked to mark an “x” on the consent form in place of their signature). Participants were included in the study if they were adults aged 18 through 49 years living in 1 of the 5 districts in Botswana with the highest number of HIV-infected individuals. We excluded participants if they had cognitive disabilities, if they did not speak either English or Setswana, if they were not a resident of Botswana, or if there was inadequate privacy to conduct the interviews. The Committee on

Human Research at the University of California, San Francisco, and the Botswana Ministry of Health Research and Development Committee approved all study procedures.

## Measures

Domains of inquiry for our survey included demographic characteristics, stigmatizing attitudes about HIV, anticipated HIV stigma, knowledge of HIV prevention, sexual practices (including HIV risk behaviors), history of HIV testing, symptoms of depression, and health care access and utilization. HIV knowledge was measured using a 15-item index adapted from the UNAIDS (the Joint United Nations Programme on HIV and AIDS) General Population Survey and the Department of Health Services AIDS module.<sup>24</sup>

*HIV stigma.* Participants were asked several questions representing potential stigmatizing attitudes that were adapted from the UNAIDS General Population Survey and the Department of Health Services AIDS module. We selected these questions to facilitate comparison with earlier data from a 2001 population-based survey in Botswana that used similar questions.<sup>7</sup> We registered anyone who reported a stigmatizing attitude on any of 7 principal questions as having stigmatizing attitudes (item descriptions are in Table 1). Because participants may not always openly display stigmatizing views toward people living with HIV/AIDS because of social desirability bias, we added a second stigma measure. In this measure, we asked individuals to identify the type of responses they would anticipate from others if they were to test positive for HIV and disclose their status (see item descriptions in Table 1). We converted this information to a 9-item index of “anticipated HIV stigma.” We scored participants as reporting anticipated HIV stigma if they believed that 1 or more of these 9 negative social consequences would result if they had HIV and disclosed their status to others.

*Perceived access to HIV treatment.* We asked participants whether “treatment for AIDS, known as antiretroviral therapy,” was available in or near their village.

## Statistical Analysis

We used descriptive statistics to outline study respondent characteristics, prevalence

and type of respondents’ stigmatizing attitudes, and prevalence and types of stigma they anticipated should respondents contract HIV and reveal their status to others. We used multivariate logistic regression to examine correlates of our 2 primary outcomes of interest: stigmatizing attitudes toward people living with HIV/AIDS and anticipation of being stigmatized because of living with HIV/AIDS.

On the basis of previous literature and theory,<sup>4,7,12,19,21,22</sup> we identified specific variables to include in all multivariable models to adjust for their effects. These were (1) age (continuous); (2) gender (male or female); (3) monthly household income ( $\leq 1000$  pula or  $> 1000$  pula); (4) education ( $\geq$  high school or  $<$  high school); (5) residence type (rural, urban, or urban village); (6) marital status (married, living with partner, or other); (7) knowledge about HIV/AIDS (continuous); (8) depression (dichotomous variable using the 15-item Hopkins Symptom Checklist for Depression,<sup>25</sup> which has been validated in numerous international settings in Africa and elsewhere)<sup>26</sup>; (9) frequency of visits to a medical provider ( $< 1$  per year, 1 or 2 times per year, or  $\geq 3$  times per year); (10) health status (very good or good vs fair or poor); (11) history of unprotected sex over the past year (dichotomous); (12) access to ART (yes, no, or do not know); and (13) gender-based discriminatory attitudes<sup>27</sup> (on the basis of a series of 14 questions about gender discriminatory attitudes, measured as 2 or fewer and 3 or more discriminatory attitudes).

We analyzed all data with Stata statistical software, version 8 (StatCorp LP, College Station, TX). Regression diagnostic procedures yielded no evidence of multicollinearity or overly influential outliers in any of the models. The data were self-weighting by the proportion to population sampling design.

## RESULTS

### Description of Study Population

We randomly selected 1433 individuals, of whom 1268 completed the survey (89% response rate). Among 165 nonrespondents, 46 (28%) were unavailable after 2 repeat visits, 78 (47%) refused to participate or did not meet selection criteria, and 41 (25%) were unable to complete the interview. Demographic and

behavioral characteristics of the study population are shown in Table 2.

**Prevalence and Correlates of Having Stigmatizing Attitudes**

Overall, 484 respondents (38%) reported at least 1 HIV-related stigmatizing attitude. As shown in Table 1, the highest rates of stigmatizing attitudes were for activities related to sharing or buying food. Whereas most respondents agreed with statements that people living with HIV/AIDS should have the same rights as others (96%) and that teachers and students with HIV should be allowed to attend school (98%), the proportion who reported that they would be willing to share food with (73%) or buy food from (77%) HIV-positive individuals was substantially lower. Sixty-three percent of respondents said that the increasing availability of antiretrovirals in Botswana has led to a reduction of discrimination toward people living with HIV/AIDS. Women respondents were significantly more likely than were men to report that they would care for an HIV-positive relative (97% vs 93%;  $P < .01$ ) and that they would share food with an HIV-positive person (77% vs 68%;  $P < .001$ ). There were no other gender differences in responses.

In a separate set of questions, we asked respondents to agree or disagree with 7 statements about stigmatizing attitudes that they would have toward a spouse or partner identified as HIV positive. Ninety percent agreed that they would “always use condoms” if they continued to stay with their spouse or partner, whereas 17% said that they “would not have sex anymore with [their] spouse or partner.” Sixty-two percent would assume that their spouse or partner was having sex with other people. Eight percent agreed that they would kick their spouse or partner out of the home. Five percent agreed that they might try to “hit or hurt” their spouse or partner if they were HIV positive. There were no significant gender differences in these predicted responses, except that significantly more men reported that they would not have sex anymore with their HIV-positive spouse or partner (21% vs 13%;  $P < .001$ ).

The proportion of respondents reporting at least 1 stigmatizing attitude according to demographic and behavioral attributes is shown in Table 3. In both unadjusted and adjusted analyses (Table 3), respondents who reported

**TABLE 1—Prevalence Among Respondents of Stigmatizing Attitudes and Projected Fears About Stigma After the Introduction of a National Program of Universal Access to Antiretroviral Therapy: Botswana, 2004**

	Respondents, No. (%)
<b>Stigmatizing attitudes</b>	
Would not care for a relative with HIV	1256 (4.5)
Teachers with HIV should not be allowed to teach	1259 (3.1)
Would not buy food from a shopkeeper with HIV	1232 (23.0)
Would not be willing to share a meal with a person with HIV	1247 (27.3)
People with HIV/AIDS should not have the same rights as people who do not have the disease	1256 (4.1)
Students with HIV should not be allowed to stay in school	1258 (2.5)
Endorse at least 1 stigmatizing attitude	1268 (38.2)
<b>Anticipated stigma</b>	
Marriage or relationship would break up	1083 (30.2)
Would be physically abused	1190 (12.1)
Would lose job	1188 (12.3)
Would be treated badly at work or school	1153 (30.9)
Would lose friends	1124 (40.0)
Family would disown or neglect you	1245 (5.3)
Health professionals would treat you badly	1168 (11.9)
Community would treat you like an outcast	1090 (53.5)
Family would not care for you	1244 (8.0)
Anticipate at least 1 of these outcomes	1268 (70.1)

Note. There were 372 respondents who had both 1 or more stigmatizing attitudes and fears, whereas there were 517 who had no stigmatizing attitudes but did have at least 1 fear.

that ART was available in or near their village had significantly lower odds of having any stigmatizing attitudes (adjusted odds ratio [AOR]=0.42; 95% confidence interval [CI]=0.24, 0.74) than those who said ART was not available. Other correlates of stigmatizing attitudes in the multivariate analyses (Table 3) included having more than a high school education, living in an urban area, having fewer than 3 outpatient clinic visits in the past 12 months, and inconsistent condom use over the past 12 months.

**Prevalence and Correlates of Anticipated HIV Stigma**

The number of respondents reporting at least 1 concern about anticipated HIV stigma against themselves (889, 70%) was significantly higher than the number reporting at least 1 HIV-related stigmatizing attitude toward others (484, 38%; Table 1). More than one half feared that their community would treat them as an outcast, 40% thought that they would

lose friends, and approximately 30% felt that if they were found to be HIV positive, their marriage or relationship might break up. Twelve percent thought that they might experience physical abuse from their spouse or partner. Whereas 5% feared being disowned or neglected by their families, 8% anticipated that their families would not care for them. A higher percentage of men than women feared losing their jobs if they became HIV positive (15% vs 10%;  $P < .05$ ), being treated badly at work or school (34% vs 28%;  $P < .02$ ), and being treated as an outcast by the community (58% vs 50%;  $P < .01$ ).

In multivariate logistic regression analyses, after adjusting for all respondent characteristics (Table 4), respondents who reported that ART was available in or near their village had much lower odds of reporting at least 1 concern about anticipated HIV stigma than did those who said therapy was not available (AOR=0.09; 95% CI=0.03, 0.30). Other characteristics associated with lower odds of anticipated stigma

**TABLE 2—Respondent Demographic and Behavioral Characteristics: Survey About HIV Stigma (N = 1268), Botswana, 2004**

	Respondents, No.	Met Criteria, No. (%) or Mean $\pm$ SD
Women	1267	654 (51.6)
Marital status	1266	
Married		242 (19.1)
Unmarried, living with sexual partner		340 (26.9)
Unmarried, not living with sexual partner		684 (54.0)
More than high school education	1257	684 (54.4)
Average monthly household income > 1000 pula <sup>a</sup>	1261	693 (55.0)
Residence	1268	
Urban		557 (43.9)
Urban village		375 (29.6)
Rural		336 (26.5)
Presence of depressive symptoms	1268	366 (28.9)
Poor or fair self-report health status	1262	370 (29.3)
Frequency of visits to medical doctor, times per year	1265	
0		278 (22.0)
1 or 2		565 (44.7)
$\geq$ 3		422 (33.3)
HIV treatment available	1263	
No		71 (5.6)
Yes		1108 (87.7)
Don't know		84 (6.7)
Consistent condom use over past 12 mo	1231	473 (38.4)
Two or more gender-discriminatory attitudes	1268	558 (44.0)
Age, y	1259	29 $\pm$ 9.6
Correct statements about HIV (range 0-15)	1268	7.4 $\pm$ 1.0

<sup>a</sup>US \$200.00 to \$250.00.

included being female (AOR=0.74; 95% CI=0.57, 0.97), having 3 or more outpatient clinic visits in the preceding 12 months (AOR=0.68; 95% CI=0.47, 0.99), and reporting a higher number of correct statements about HIV (AOR=0.86; 95% CI=0.74, 0.99). Inconsistent condom use was associated with higher odds of reporting 1 or more concerns about anticipated stigma (AOR=1.78; 95% CI=1.33, 2.38).

## DISCUSSION

A comparison of measures of stigmatizing attitudes from this study with similar measures obtained in 2001 suggests that HIV stigma has decreased in Botswana since the introduction of the policy of universal ART in 2002. The prevalence of reporting at least 1 stigmatizing attitude (nearly 40%) was significantly lower in

our study than in a 2001 population-based study that used a similar stratified 2-stage probability sampling methodology.<sup>7</sup> Ninety-five percent of respondents in this study reported that they would care for a relative with AIDS compared with 88% who expressed that willingness in the previous study. Similarly, 97% stated that a teacher with HIV who is not sick should be allowed to teach, compared with 59% in the previous study.<sup>7</sup> Only 42% of respondents in the previous study said they were willing to buy food from a shopkeeper with HIV; that proportion increased to 77% in this study.

We also found a decreased prevalence of stigmatizing attitudes in a study we conducted with 296 people living with HIV/AIDS in Botswana in 2004. Patterns of disclosure of HIV status in that study suggested an environment of reduced HIV stigma.<sup>27</sup> In that study,

90% of participants had disclosed their status to family members, and 55% had disclosed their status to friends. By contrast, in a study conducted with 109 people living with HIV/AIDS in 2001, before the advent of widespread treatment access, only 31% of respondents had disclosed their HIV status to their family, and only 6% had disclosed their status to friends or community members.<sup>28,29</sup>

In addition to revealing an apparent decrease in prevalence of stigmatizing attitudes toward people living with HIV/AIDS since the introduction of universal ART, this study provides independent evidence of an association between perceived access to treatment and HIV stigma. In a multivariate analysis, after adjusting for other respondent demographic characteristics, knowledge, and attitudes, the factor most strongly associated with decreased odds of holding any stigmatizing attitudes was perceived access to treatment (AOR=0.42; 95% CI=0.24, 0.74).

Even more striking was the association between perceived treatment access and measures of anticipated stigma: respondents who reported they had access to treatment were far less likely than were those who said they lacked access to report at least 1 fear about negative social consequences that would result if they had HIV and disclosed their status to others (AOR=0.09; 95% CI=0.03, 0.30). Consistent with these findings, 63% of all respondents believed that the availability of ART has led to decreased discrimination toward people living with HIV/AIDS in Botswana.

These results support the contention of several investigators<sup>4,16,30</sup> that lack of access to HIV treatment is 1 of the key structural factors contributing to HIV stigma. According to this view, expanded ART access would contribute to a reduction of HIV stigma as well as the adverse consequences of stigma. For example, effective HIV treatment can transform a deadly and often disfiguring disease into a manageable condition that is not visible to others.<sup>16</sup> Accordingly, widespread treatment access changes public perception of the disease, normalizes life with HIV, and empowers people living with HIV/AIDS to take an active role in combating stigma and discrimination.<sup>4</sup>

**TABLE 3—Prevalence Among Respondents and Correlates of Reporting at Least 1 Stigmatizing Attitude After the Introduction of a National Program of Universal Access to Antiretroviral Therapy: Botswana, 2004**

	% Reporting 1 or More Stigmatizing Attitudes	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<b>Gender</b>			
Men (Ref)	40	1.00	1.00
Women	37	0.88 (0.70, 1.10)	0.82 (0.64, 1.05)
<b>Education</b>			
≤ High school (Ref)	45	1.00	1.00
> High school	32	0.59 (0.47, 0.74)	0.67 (0.51, 0.88)
<b>Average monthly income</b>			
< 1000 pula <sup>a</sup> (Ref)	43	1.00	1.00
≥ 1000 pula	34	0.66 (0.52, 0.83)	0.88 (0.67, 1.16)
<b>Place of residence</b>			
Urban (Ref)	44	1.00	1.00
Urban village	32	0.60 (0.46, 0.79)	0.58 (0.43, 0.78)
Rural	35	0.70 (0.53, 0.92)	0.55 (0.40, 0.76)
<b>Health status</b>			
Good/excellent health (Ref)	36	1.00	1.00
Poor health	44	1.43 (1.11, 1.82)	1.23 (0.93, 1.62)
<b>Number of outpatient clinic visits in past 12 mo</b>			
0 (Ref)	46	1.00	1.00
1 or 2	37	0.69 (0.51, 0.92)	0.78 (0.57, 1.07)
≥ 3	36	0.66 (0.48, 0.89)	0.65 (0.46, 0.91)
Increasing knowledge of HIV	...	0.83 (0.74, 0.92)	0.89 (0.79, 1.00)
<b>Condom use</b>			
Always use (Ref)	36	1.00	1.00
Don't always use	42	1.34 (1.06, 1.69)	1.56 (1.20, 2.04)
<b>No. of gender-discriminatory attitudes</b>			
0 or 1 (Ref)	35	1.00	1.00
≥ 2	42	1.37 (1.09, 1.72)	1.11 (0.85, 1.44)
<b>Access to HIV treatment</b>			
No access (Ref)	59	1.00	1.00
Has access	36	0.39 (0.24, 0.63)	0.42 (0.24, 0.74)
Don't know	50	0.69 (0.36, 1.31)	0.65 (0.32, 1.32)

Note. OR = odds ratio; CI = confidence intervals. Adjusted models also included age, marital status, and depressive symptoms; none of these was associated with stigmatizing attitudes in unadjusted or adjusted models.

<sup>a</sup>US \$200.00 to \$250.00.

Along with the national ART program, several other initiatives have been introduced since January 2002 that may have contributed to the observed decreases in stigma measures in Botswana. For example, government programs, nongovernmental organizations, and initiatives led by people living with HIV/AIDS have targeted HIV stigma in Botswana through educational programs, community mobilization, and legal advocacy. Media events have included the annual “Miss HIV-Stigma Free”

competition,<sup>31</sup> the “Mr HIV Positive Living Pageant,”<sup>32</sup> and President Festus Mogae’s public announcement in June 2003 of his personal HIV test results.<sup>33</sup> Finally, the policy of routine “opt-out” testing introduced in early 2004 may have contributed to stigma reduction.<sup>22</sup> Although the effects of individual initiatives have not been quantified, it appears that a multidimensional approach, combining the wide range of initiatives described above with improved access to testing and treatment,

has made gains in reducing stigmatizing attitudes in the general population.

Our findings suggest that HIV stigma in Botswana has decreased since 2001, but this change should not be viewed as grounds for complacency. A considerable proportion of participants in this study reported stigmatizing attitudes (38%), and fully 70% of respondents reported anticipated stigma, a measure that may be less influenced by social desirability bias than may stigmatizing attitudes. Further, although our data support the idea that treatment access is important for stigma reduction, the relation between treatment access and stigma is complex and bidirectional. Treatment may lead to reduced stigma; however, there is evidence that stigma itself impedes access to testing and treatment. We previously reported that respondents with at least 1 stigmatizing attitude toward people living with HIV/AIDS had significantly lower odds of having been tested for HIV, of having undergone routine testing, and if not previously tested, of reporting plans for HIV testing in the future.<sup>22</sup> Other studies in Botswana and elsewhere have found that stigma can serve as a major barrier to accessing health services and to ART adherence.<sup>29,34–36</sup> It is therefore possible that improving access to treatment and decreasing stigma may work together in a positive feedback loop, with improved treatment access leading to a reduction in HIV-related stigma, which in turn will work to further increase treatment uptake.

Finally, it is critical to note that the impact of stigma as a barrier to treatment access in Botswana and elsewhere appears to be strongest among vulnerable segments of the population, including the poor, women, and ethnic minorities,<sup>37,38</sup> who face ongoing, significant barriers to treatment even in the setting of a policy of universal treatment access. For example, in 2 qualitative studies that we conducted in Botswana and Swaziland, we reported that women suffer from significant HIV-related stigma and are often blamed for bringing HIV into families or communities. This stigma has contributed to violence against women and served as a barrier to health care access and treatment for women.<sup>27</sup> Consequently, initiatives to decrease HIV stigma should be linked with measures to reach vulnerable populations as well as with legal

**TABLE 4—Prevalence and Correlates of Reporting at Least 1 Fear of Experiencing HIV-Related Stigma After the Introduction of a National Program of Universal Access to Antiretroviral Therapy: Botswana, 2004**

	% Reporting at Least 1 HIV-Related Fear	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
<b>Gender</b>			
Men (Ref)	73	1.00	1.00
Women	68	0.77 (0.61, 0.99)	0.73 (0.56, 0.95)
<b>Education</b>			
≤ High school (Ref)	70	1.00	1.00
> High school	70	0.99 (0.77, 1.26)	0.94 (0.70, 1.27)
<b>Average monthly income</b>			
<1000 pula <sup>a</sup> (Ref)	71	1.00	1.00
≥1000 pula	69	0.89 (0.70, 1.14)	0.98 (0.73, 1.32)
<b>Place of residence</b>			
Urban (Ref)	72	1.00	1.00
Urban village	70	0.87 (0.66, 1.17)	0.84 (0.62, 1.15)
Rural	67	0.77 (0.58, 1.04)	0.71 (0.51, 0.99)
<b>Health status</b>			
Good/excellent health (Ref)	70	1.00	1.00
Poor health	72	1.11 (0.85, 1.45)	1.01 (0.75, 1.36)
<b>Number of outpatient clinic visits in past 12 months</b>			
0 (Ref)	22	1.00	1.00
1 or 2	45	1.01 (0.73, 1.40)	1.15 (0.82, 1.63)
≥3	33	0.72 (0.52, 0.99)	0.68 (0.47, 0.98)
Increasing knowledge of HIV	...	0.59 (0.41, 0.86)	0.83 (0.71, 0.96)
<b>Condom use</b>			
Always use (Ref)	66	1.00	1.00
Don't always use	75	1.48 (1.15, 1.92)	1.82 (1.37, 2.43)
<b>Number of gender-discriminatory attitudes</b>			
0 or 1 (Ref)	68	1.00	1.00
≥2	73	1.29 (1.01, 1.65)	1.09 (0.83, 1.43)
<b>Access to HIV treatment</b>			
No access (Ref)	96	1.00	1.00
Has access	69	0.10 (0.03, 0.32)	0.09 (0.03, 0.30)
Don't know	60	0.06 (0.02, 0.22)	0.06 (0.02, 0.22)

Note. OR = odds ratio; CI = confidence intervals. Adjusted models also included age, marital status, and depressive symptoms. Marital status was associated with HIV-related fears in unadjusted analyses.

<sup>a</sup>US \$200.00 to \$250.00.

reforms and other interventions to decrease discrimination and violence against women.

### Limitations

There are several important limitations to this study. First, causality cannot be determined from our findings, because this study was cross-sectional; thus, several potentially confounding initiatives introduced during the same period may have accounted for some decrease in HIV stigma. Second, because we did not interview

individuals in the most remote areas of Botswana, our results may not be generalizable to the entire Botswana population. Third, self-report can lead to misclassification and bias. To reduce bias, we did not inform researchers and study participants of key hypotheses and we presented study aims to respondents in general terms. To further maximize validity, we did not ask about HIV status, assured confidentiality and privacy, and presented survey items in a culturally sensitive, nonjudgmental

manner. Fourth, our stigma measures captured only attitudes and beliefs. We were not able to assess actual discriminatory behaviors, which constitute an additional important component of stigma.<sup>39</sup> Finally, our measures, although adapted to the local cultural context, were not specifically validated in this population.

Further, although frequently employed in quantitative research on HIV stigma, measures of stigmatizing attitudes may not be adequate for tracking HIV stigma in the context of an advanced epidemic with a multipronged national response. Against the backdrop of social and educational initiatives deployed since the 2001 national survey, it is likely that social desirability bias leads to a decrease in reporting stigmatizing attitudes over time and thus may confound the interpretation of our findings. A social desirability scale might have helped clarify this concern and would be useful in future research.

### Conclusions

In this population-based study, we found a decrease in stigmatizing attitudes compared with nearly identical measures used before Botswana's national treatment program was introduced in 2002. We found that perceived access to treatment was the strongest protective factor both against holding stigmatizing attitudes toward others and against anticipating HIV stigma toward oneself. These findings suggest that universal access to ART may play a critical role in the reduction of HIV stigma in sub-Saharan Africa.

Nevertheless, the persistence of HIV stigma in Botswana necessitates further direct interventions targeting HIV stigma. These include educational initiatives, community mobilization, and leadership by people living with HIV/AIDS as well as legal and social reforms that address discrimination against women and people living with HIV/AIDS. Thus, for reduction of HIV stigma in sub-Saharan Africa, a multimodal strategy is indicated—a strategy that, to be successful, will likely require universal access to treatment as a part. ■

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This article was accepted February 9, 2008.

### Contributors

W.R. Wolfe and M. Heisler contributed to research design, data analysis and interpretation, and the drafting and editing of the article. S.D. Weiser contributed to conception and design of the research study, acquisition of data, data analysis and interpretation, and the drafting and editing of the article. K. Leiter, F. Percy-de Korte, and V. Iacopino contributed to conception and design of the study, acquisition of data, and editing of the article. W.T. Steward contributed to data analysis and interpretation and the drafting and editing of the article. N. Phaladze contributed to research design, study implementation, and the editing of the article.

### Acknowledgments

This study was funded by Physicians for Human Rights and the Tides Foundation. S. Weiser receives support from the National Institute of Health (grant K23 MH079713-01). M. Heisler is a Veteran Affairs Health Services Research and Development Service Career Development awardee.

### Human Participant Protection

All study procedures were approved by the human subjects committee at the University of California, San Francisco, and the Botswana Ministry of Health Research and Development Committee.

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