



**TCM Exposure and HIV-Related Knowledge,
Attitudes, and Practices from the 2003
Makgabaneng Listenership Survey in Botswana**

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Abstract

Background

The Total Community Mobilization (TCM) program is a door-to-door, community-mobilization intervention in Botswana that uses peer educators to deliver HIV prevention and treatment-related information. This report examines the association of exposure to TCM activities with selected indicators of HIV/AIDS-related knowledge, attitudes, and practices (KAP). The report aims to provide information to the Government of Botswana and to TCM itself for program assessment and improvement.

Methods

Data for this report come from the 2003 *Makgabaneng* Listenership Survey, which interviewed 807 reproductive-aged Batswana in seven of Botswana's 22 health districts. The survey focused on the *Makgabaneng* radio serial drama, but also asked questions about exposure to TCM. "Exposure to TCM" was defined as a respondent reporting having ever spoken with someone from TCM or having participated in a TCM-Makgabaneng listening-discussion group. At the time of the survey, TCM was operating in five of these seven health districts. The data were weighted for the number of eligible persons per household, undersampling of Gaborone households, non-response, and oversampling of males. At the individual level, we compared KAP outcomes among those with TCM exposure to those without, using both bivariate and multivariate analyses. In the multivariate analyses, we controlled for gender, age group (15-24 years and 25-49 years), education, marital status, urban-rural residence, radio access, and exposure to *Makgabaneng*. We also conducted analyses at the community level, comparing KAP outcomes in the five health districts with TCM to the two health districts without TCM.

Results

In the five health districts in the survey where TCM had been active, 23% of respondents reported exposure to TCM. In multivariate analyses at the individual level, TCM exposure was positively associated with knowledge of abstinence (adjusted odds ratio (AOR) 1.99, $p < .05$) and of condom use (AOR 2.96, $p < .01$) as HIV prevention methods. TCM exposure was similarly associated with the knowledge that the prevention of mother-to-child transmission (MTCT) is possible (bivariate analysis, $p < .01$) and that AZT is a means of preventing MTCT (AOR 2.24, $p < .01$) but not with the likelihood of spontaneously mentioning the three different modes of transmission (pregnancy, delivery, and breastfeeding). On four of six questions about HIV stigma, individual-level TCM exposure was positively associated with non-stigmatizing responses (AORs from 1.44 to 9.12, $p < .05$ for each). Further, TCM-exposed individuals were roughly twice as likely as the unexposed to have been tested for HIV (AOR 1.96, $p < 0.01$), to have discussed testing with a partner before being tested (AOR 1.89, $p < 0.05$), and to have been tested with a partner (AOR 2.41, $p < .05$). However, TCM-exposed individuals were not any more likely than the unexposed to report practicing abstinence or using condoms with higher-risk partners, nor to report having fewer concurrent sex partners. The results from the district-level analyses generally supported these individual-level findings in the areas of knowledge of HIV transmission (sexual and MTCT) and non-stigmatizing attitudes.

Conclusion

These findings offer some important evidence that TCM has been effective in (1) improving knowledge about how HIV transmission can be prevented, (2) increasing understanding of mother-to-child transmission, (3) reducing stigma, and (4) encouraging testing in the communities where TCM has worked. As has been the case worldwide with many other interventions to reduce HIV risk behaviors, there was no association between TCM exposure and reported sexual behaviors.

The positive effects of TCM's work in communities, as measured in this survey, correspond to key goals of the Botswana National Strategic Framework for HIV/AIDS for 2003-2009.

Introduction

The Total Community Mobilization (TCM) program has been a part of the national response to the HIV epidemic in Botswana since 2001; it was developed by the international non-governmental organization, Humana People-to-People, as a replication of their Total Control of the Epidemic program in Zimbabwe and Mozambique.¹ The TCM program is designed to mobilize local communities to take action against HIV/AIDS within three years.^{2,3}

The TCM program is a door-to-door community mobilization campaign which uses peer educators to deliver HIV prevention and treatment-related information to individuals. In Botswana, it was first implemented in the health districts Kasane, Tutume, and Gaborone.³⁻⁵ By the time of the 2003 *Makgabaneng* Listenership Survey, TCM was functioning in 10 health districts (although only five of these were included in the Listenership Survey's

sample frame). Since its inception, TCM in Botswana has adjusted to local conditions: initially a household-level intervention geared to mobilizing individuals, TCM now includes group- and community-level interventions across a variety of venues to try to influence knowledge, attitudes, and practices. The household is no longer the sole portal to TCM program messages and interventions.

This report aims to provide information both to the Government of Botswana to help assess TCM's impact, as well as to TCM itself for program evaluation and development. The report focuses on the association of TCM program exposure with selected indicators of HIV/AIDS-related knowledge, attitudes, and practices (KAP). It reviews findings from the *Makgabaneng* radio serial drama's 2003 Listenership Survey,⁶ which included several questions about exposure to TCM. This approach is similar to previous TCM evaluation efforts that compared selected knowledge and behavioral indicators with self-reported TCM exposure.⁷⁻⁸ This report differs, however, in that it is an externally conducted review of data collected by an organization other than TCM.

Methods

Conducted between February and May 2003, the *Makgabaneng* Listenership Survey provided the primary data for this study. The methods used in this survey have been described previously⁶ and thus will be described only briefly here.

The primary purpose of the Listenership Survey was to assess the popularity, coverage, and impact of the *Makgabaneng* radio serial drama. However, the survey also included questions about exposure to TCM, which has cooperated with *Makgabaneng* in a number of areas, such as running TCM-Makgabaneng listening-discussion groups. Five of the seven districts participating in the Listenership Survey hosted TCM program activities. The survey measured respondents' demographic characteristics, access to radio and television, exposure to (and listening behaviors associated with) *Makgabaneng*, knowledge of HIV prevention and transmission, psychosocial factors related to behavior, and self-reported sexual and testing behaviors.

The Listenership Survey was conducted among 807 persons across the following seven health districts: Gaborone, Southern, Serowe-Palapye, Francistown, Selebi-Phikwe, Ngamiland East, and Kgatleng. Of these, TCM operated in all but Southern and Kgatleng. In our analyses, TCM program exposure was defined as a respondent answering "yes" to either of the following items in the questionnaire: (1) whether the respondent talked with anyone from TCM in the past 12 months; or (2) whether the respondent reported taking part in a TCM-*Makgabaneng* listening-discussion group in the past 12 months.

The limitation with this measurement for TCM exposure is that it does not capture TCM exposure through group- or community-level interventions, such as drama groups, quiz shows, or condom demonstrations. In those and other cases, respondents may not have actually *spoken* with someone from TCM yet were participants in a TCM-related intervention. Further, this measure does not capture variation in intensity of exposure to TCM. Respondents having participated only once in a listening-discussion group or having spoken to a TCM representative only once are grouped together with those who may have actively and frequently participated in listening-discussion groups or held several discussions with TCM program representatives. Both of these limitations would tend to lead to an underestimation

Data Strengths and Limitations

- Strengths of the Listenership Survey data as a source of evaluation information for TCM are that the sample size was broadly representative and that the data were gathered by persons who were not associated with TCM.
- Though the Listenership Survey attempted to be broadly representative of Botswana, the data are not strictly generalizable to the national level because only seven (albeit of the more populous) of Botswana's 22 health districts were sampled.
- Limited data were collected on other HIV interventions in Botswana, so controlling for other such programs in analyses was very limited, making attribution of outcomes to TCM difficult.
- Because the data are cross-sectional, they cannot be used to make causal inferences.
- The TCM exposure measure represents a minimum estimate of the reach of TCM since it measures only whether in the past year someone has participated in a TCM-*Makgabaneng* listening-discussion group or whether they have spoken with a TCM representative: group-level and community-level interventions are not included in the TCM exposure measure used here. Thus, the estimate of TCM exposure is likely an underestimate.
- Since intensity of TCM exposure was not captured in the exposure measure, it is not possible to examine if intensity of exposure differentially affects KAP outcomes.
- In the district-level analysis, only two of the 11 health districts without TCM were sampled from in the Listenership Survey. (Of the 11 health districts with TCM at the time of the survey, five were sampled from.) Also, in health districts with TCM, TCM coverage was not always district-wide but sometimes confined to only a few villages, which could lead to underestimation of program effects.

of TCM effects. On the other hand, the strength of this measure for TCM exposure is that talking with a TCM field officer covers a variety of TCM interventions, such as house-to-house mobilization, PMTCT interventions, individual risk-reduction planning, and TCM-provided educational lessons. Also, this measure would seem to capture exposure to TCM's core intervention activity: door-to-door peer education.

The data were weighted for the number of eligible persons per household, undersampling of households in Gaborone, non-response, and oversampling of males. Bivariate comparisons of Listenership Survey data were examined using Chi-Square tests of significance to understand differences in knowledge, attitudes, and practices by TCM exposure among individuals.

In order to examine whether TCM exposure was among the predictors for particular KAP outcomes, we conducted both bivariate and multivariate analyses of data at the individual level. Multivariate analyses attempted to control for demographics and for *Makgabaneng* exposure. In the multivariate analyses, variables examined include TCM exposure, gender, age group (15-24 years and 25-49 years), education, marital status, urban-rural residence (defined as "major urban areas" and "outside major urban areas"), radio access, and *Makgabaneng* listening (listen at least once a week or not).

In addition, we conducted bivariate analyses at the community, or health-district, level. That is, we examined respondents' answers to the same questions as in the individual-level analyses, but in these new analyses compared overall responses in districts in which TCM had been operating to those in which TCM had not been operating. This analytic method has been called the "quasi-experimental approach."⁹⁻¹⁵ Limitations in using this approach are that the Listenership Survey sample frame included only two (Kgatleng and Southern) of the 11 health districts without TCM programs and that the number of respondents (212) in these non-TCM districts is less than half the number of those (595) in the five TCM districts.

All analyses were conducted using SUDAAN statistical software, which can account for the increased variance resulting from the cluster-sampling study design. All analyses were weighted, and all of the data reported in the results section was weighted (only sample sizes were reported unweighted). Primary data analysis was conducted by Katina Pappas-DeLuca of CDC Atlanta and Todd Koppenhaver of the BOTUSA Project (a collaboration between the Government of Botswana and the U.S. Centers for Disease Control and Prevention).

Additional analysis and TCM program data integration and primary report authorship was provided by the U.S.-based National Alliance of State and Territorial AIDS Directors (NASTAD).

Results

Approximately equal numbers of men and women (405 and 402, respectively) participated in the Listenership Survey; 40% of respondents were between the ages of 15-24 years (“younger people”), while 60% were between the ages of 25-49 years (“older people”).⁶

Twenty three percent (22.8%) of respondents in the five TCM-active health districts reported exposure to TCM, which we defined as meaning that they reported having either participated in a TCM-*Makgabaneng* listening-discussion group or having spoken with someone from TCM.

In their basic demographics, respondents exposed to TCM appeared to be similar to respondents in the overall sample. Although women made up a slightly greater proportion of the TCM-exposed subgroup (61%) than they did in the sample overall (57%), the age distribution of the TCM-exposed subgroup was almost exactly the same as the larger sample: for TCM, 45% of respondents were 15-24 years old, whereas for the larger sample, 46% were that age. Table 1 below compares the geographic distribution of respondents in the Listenership Survey sample with that of the TCM-exposed respondents (this table contains only the five health districts where TCM functioned).

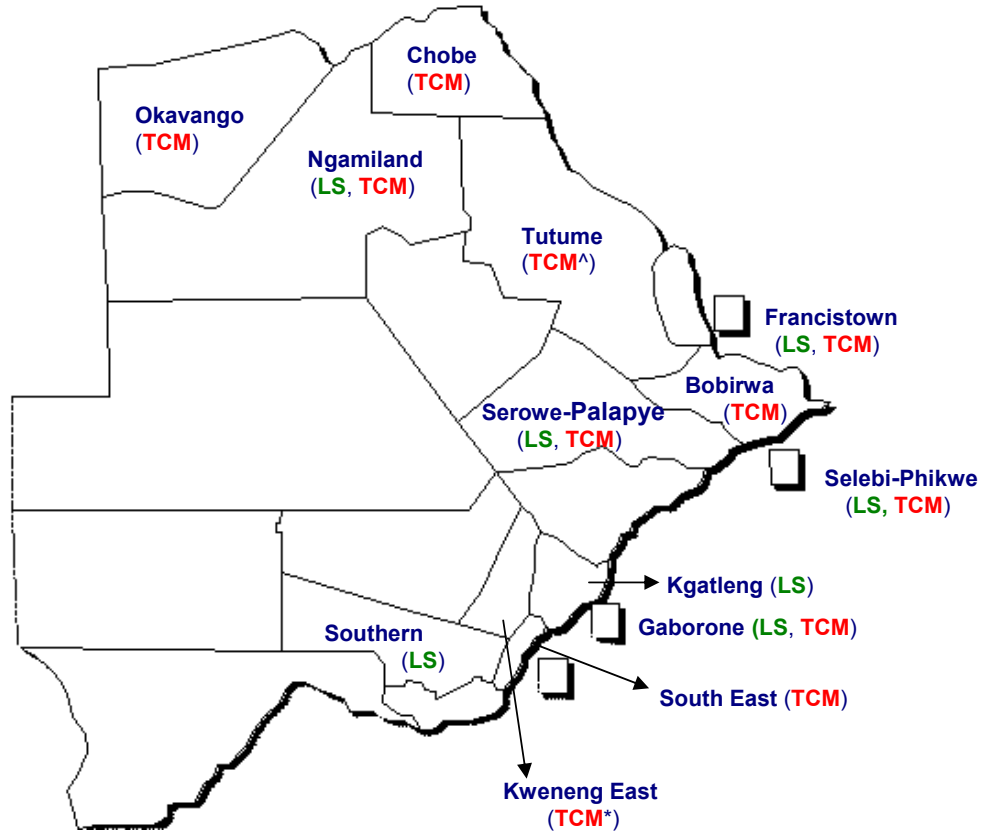
Health District	Listenership Survey Respondents (n = 593)	TCM-Exposed Respondents (n = 129)
Gaborone	40.0%	34.7%
Serowe-Palapye	24.0%	23.7%
Francistown	13.2%	12.8%
Selebi-Phikwe	9.5%	17.3%
Ngamiland East	13.4%	11.5%
TOTAL	100%	100%

*In these results and all others, frequencies are weighted, whereas sample sizes are unweighted.

The geographic distribution of the TCM-exposed respondents is not strikingly different from the overall sample. Residents of Selebi-Phikwe make up a greater proportion of the TCM-exposed respondents (17.3%) compared to the sample overall (9.5%), and residents from Gaborone make up a smaller proportion of the TCM-exposed group (34.7%) relative to their proportion in the overall sample (40.0%).

According to the Listenership Survey respondents in the five TCM-active health districts, 21.2% of men and 23.8% of women spoke with someone from TCM. Exposure by age group was similar, as 22.3% of persons 15-24 years of age and 23.1% of persons 25-49 years of age reported speaking with someone from TCM. Figure 1¹⁶ below shows the distribution of TCM programming and 2003 Listenership-Survey participation by health district.

Figure 1: Distribution of TCM and Listenership-Survey Participation by Health District



LS = Listenership-Survey participation

TCM = TCM programming

^{*} = programming covers only Mogoditshane and Gabane villages

[^] = programming covers all but Tonota village

Association of TCM Exposure with Select KAP Indicators

Several indicators of knowledge, attitudes, and practices were measured by the Listenership Survey. Below, Table 2 (on individual-level exposure) and Table 3 (on district-level exposure) summarize some of the associations between TCM exposure and select KAP indicators. Note, however, that only overall results appear in Tables 2 and 3; subgroup differences are discussed in the accompanying text.

Table 2: Select KAP Outcomes and Individual-Level TCM Exposure		
	Bivariate Results	Multivariate Results
Knowledge of Sexual Transmission		
Spontaneously mentioned abstinence as a way to reduce risk of HIV	79% vs 61%, p<.01	AOR=1.99, p<.05
Spontaneously mentioned being faithful as a way to reduce risk of HIV	40% vs 40%, p≤ .91	AOR=0.89, p≤ .64
Spontaneously mentioned condom use as a way to reduce risk of HIV	92% vs 75%, p<.01	AOR=2.96, p<.01
Rejected mosquitos as means of transmission	70% vs 58%, p<.05	AOR=1.46, p≤ .10
Knowledge of Mother-to-Child Transmission		
Knows pregnant mothers can transmit HIV to their babies	97% vs 88%, p<.01	[AOR=1.99, p≤.12]
Spontaneously mentioned pregnancy as a mode of MTCT	67% vs 59%, p≤ .15	AOR=1.29, p≤ .28
Spontaneously mentioned delivery as a mode of MTCT	46% vs 33%, p<.05	AOR=1.38, p≤ .16
Spontaneously mentioned breastfeeding as a mode of MTCT	53% vs 50%, p≤ .50	AOR=0.85, p≤ .49
Knows risk of MTCT can be reduced	90% vs 70%, p<.01	AOR=2.83, p<.01
Spontaneously mentioned AZT as a way to reduce risk of MTCT	80% vs 57%, p<.01	AOR=2.24, p<.01
Spontaneously mentioned not breastfeeding as a way to reduce risk of MTCT	40% vs 29%, p<.05	AOR=1.38, p≤ .23
Stigmatizing Attitudes		
Would let children play with HIV-positive children of another family	76% vs 62%, p<.01	AOR=1.44, p≤ .05
Would not be afraid to be around someone with HIV	84% vs 77%, p≤ .18	AOR=1.36, p≤ .40
Would buy food from an HIV-positive vendor	63% vs 53%, p≤ .12	AOR=1.35, p≤ .30
Would let children be taught by an HIV-positive teacher	97% vs 88%, p<.01	AOR=2.83, p<.05
Would live with an extended family member with HIV	99% vs 90%, p<.01	AOR=9.12, p<.01
Would care for an extended family member with HIV	97% vs 88%, p<.01	AOR=3.04, p<.05
Testing (among those who had ever had sex)		
Ever tested for HIV	49% vs 31%, p<.01	AOR=1.96, p<.01
Tested for HIV in the past year	34% vs 17%, p<.01	AOR=2.17, p<.05
Discussed testing with partner before being tested	30% vs 17%, p<.01	AOR=1.89, p<.05
Went for counseling and testing with a partner	19% vs 8%, p<.05	AOR=2.41, p<.05
Sexual Behavior		
Never had sex (among 15-24 year olds)	39% vs 44%, p≤ .64	AOR=0.85, p≤ .71
Had concurrent partners in past year (among sexually active)	18% vs 22%, p≤ .59	AOR=0.75, p≤ .53
Used condom in last sex act with non-marital, non-cohabiting partner (among those having sex with such a partner in past year)	76% vs 77%, p≤ .80	AOR=0.67, p≤ .18

*Multivariate analysis results were not available at press time for three indicators, as shown above. In these cases, unadjusted odds ratios (OR) are presented for reference.

“AOR” stands for Adjusted Odds Ratio

Table 3: Select KAP Outcomes and District-Level TCM Exposure*	
	<u>Bivariate Results</u>
Knowledge of Sexual Transmission	
Mentioned abstinence as a way to reduce risk of HIV	68% vs 54%, p<.01
Mentioned being faithful as a way to reduce risk of HIV	39% vs 43%, p≤ .32
Mentioned condom use as a way to reduce risk of HIV	79% vs 76%, p≤ .45
Rejected mosquitos as means of transmission	64% vs 51%, p<.05
Knowledge of Mother-to-Child Transmission	
Knows pregnant mothers can transmit HIV to their babies	91% vs 86%, p≤ .12
Mentioned pregnancy as a mode of MTCT	62% vs 57%, p≤ .51
Mentioned delivery as a mode of MTCT	39% vs.26%, p<.05
Mentioned breastfeeding as a mode of MTCT	54% vs 42%, p<.05
Knows risk of MTCT can be reduced	77% vs 64%, p<.05
Mentioned AZT as a way to reduce risk of MTCT	65% vs 52%, p<.05
Mentioned not breastfeeding as a way to reduce risk of MTCT	36% vs 17%, p<.01
Stigmatizing Attitudes	
Would let children play with HIV-positive children from another family	68% vs 57%, p≤ .06
Would not be afraid to be around someone with HIV	80% vs 73%, p≤ .12
Would buy food from an HIV-positive vendor	58% vs 47%, p≤ .10
Would let children be taught by an HIV-positive teacher	92% vs 84%, p≤ .07
Would live with an extended family member with HIV	93% vs 87%, p<.05
Would care for an extended family member with HIV	92% vs 83%, p<.01
Testing (among those who had ever had sex)	
Ever tested for HIV	35% vs 32%, p≤ .60
Tested for HIV in the past year	22% vs 16%, p≤ .25
Discussed testing with partner before being tested	20% vs 16%, p≤ .36
Went for counseling and testing with a partner	10% vs 10%, p≤ .86
Sexual Behavior	
Never had sex (among 15-24 year olds)	39% vs 52%, p≤ .09
Had concurrent partners in past year (among sexually active)	20% vs 27%, p≤ .28
Used condom in last sex act with non-marital, non-cohabiting partner (among those having sex with such a partner in past year)	79% vs 69%, p≤ .12

*Note: Table 3 compares prevalence of KAP outcomes from five districts with TCM programs to two districts without.

What follows is a description of the overall and subgroup results from both the individual and district-level analyses, for all the indicators of a given outcome area (knowledge, attitude, or practice).

Knowledge of Sexual Transmission and TCM Exposure

Spontaneously mentioned abstinence as a way to reduce the risk of HIV infection

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals were more likely (79%) than the unexposed (61%) to spontaneously mention abstinence as a way to reduce one's chances of being infected with HIV ($p < .01$). This positive association held and was statistically significant among women, older people, and people in rural areas. After controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals overall were nearly twice as likely as the unexposed to mention abstinence (adjusted OR=1.99, $p < .05$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=807), respondents in districts with TCM programs (68%) were significantly more likely than those in districts without TCM (54%) to spontaneously mention abstinence as a way to reduce one's chances of being infected with HIV ($p < .01$). Similar associations were observed among women and older people.

Spontaneously mentioned being faithful as a way to reduce the risk of HIV infection

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals (40%) were *not* more likely than the unexposed (40%) to spontaneously mention being faithful as a way to reduce one's chances of being infected with HIV ($p \leq .91$). Nor were there any significant differences by age group, sex, or residence. After controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals overall were *not* significantly more likely than the unexposed to mention being faithful as an HIV risk-reduction strategy (adjusted OR=0.89, $p \leq .64$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=807), respondents in districts with TCM programs (39%) were *not* more likely than those in districts without TCM (43%) to spontaneously mention being faithful as a way to reduce one's chances of being infected with HIV ($p \leq .32$). However, among older people, those in TCM districts were significantly *less likely* than those in non-TCM districts to mention being faithful.

Spontaneously mentioned condom use as a way to reduce the risk of HIV infection

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals (92%) were considerably more likely than unexposed individuals (75%) to mention condoms as a way to reduce one's chances of being infected with HIV ($p < .01$). This positive association held regardless of age group, sex, and residence. After controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals overall were nearly three times as likely as the unexposed to mention condom use (adjusted OR=2.96, $p < .01$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=807), respondents in districts with TCM programs (79%) were *not* significantly more likely than those in districts without TCM (76%) to mention condoms as a way to reduce one's chances of being infected with HIV ($p \leq .45$). Nor were there any significant differences by age group, sex, or residence.

Correctly rejected mosquitos as a way to be infected with HIV

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals (70%) were significantly more likely than the unexposed (58%)

to correctly reject the misconception that mosquitos can transmit HIV ($p < .05$). This positive association held among men and older people. When controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were *not* significantly more likely than the unexposed to correctly reject this misconception (adjusted OR=1.46, $p \leq .10$).

- **TCM-exposed districts** (see Table 2): In bivariate analyses ($n=807$), respondents in districts with TCM (64%) were significantly more likely than those in districts without TCM (51%) to correctly reject the misconception that mosquitos can transmit HIV ($p < .05$). This positive association held among women and older people.

Knowledge of Mother-to-Child Transmission (MTCT) and TCM Exposure

Said HIV can be transmitted from a mother to her baby

- **TCM-exposed individuals** (see Table 1): In bivariate analyses ($n=807$), TCM-exposed individuals (97%) were significantly more likely than the unexposed (88%) to know that HIV can be transmitted from a mother to her baby ($p < .01$). This TCM-exposure difference held among both sexes, both age groups, and among people in rural areas. On multivariate analysis, the adjusted odds ratio remained elevated at 1.99, but the result did not reach statistical significance (P was ≤ 0.12).
- **TCM-exposed districts** (see Table 2): In bivariate analyses ($n=807$), respondents in districts with TCM (91%) were *not* significantly more likely than those in districts without TCM (86%) to know that HIV can be transmitted from a mother to her baby ($p \leq .12$). Nor were there any significant differences by age group, sex, or residence.

Spontaneously mentioned pregnancy as a mode of MTCT

- **TCM-exposed individuals** (see Table 1): In bivariate analyses ($n=807$), TCM-exposed individuals (67%) were *not* significantly more likely than the unexposed (59%) to spontaneously mention pregnancy as a mode of MTCT ($p \leq .15$). Nor were there any significant differences by age group, sex, or residence. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were *not* significantly more likely than the unexposed to mention pregnancy as a mode of MTCT (adjusted OR=1.29, $p \leq .28$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses ($n=807$), respondents in districts with TCM (62%) were *not* significantly more likely than those in districts without TCM (57%) to spontaneously mention pregnancy as a mode of MTCT ($p < .51$). Nor were there any significant differences by age group, sex, or residence.

Spontaneously mentioned delivery as a mode of MTCT

- **TCM-exposed individuals** (see Table 1): In bivariate analyses ($n=807$), TCM-exposed individuals (46%) were significantly more likely than the unexposed (33%) to spontaneously mention delivery as a mode of MTCT ($p < .05$). This positive association held among women, older people, and people in rural areas. However, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were *not* significantly more likely than the unexposed to spontaneously mention delivery as a mode of MTCT (adjusted OR=1.38, $p \leq .16$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses ($n=807$), respondents in districts with TCM (39%) were significantly more likely than those in districts without TCM (26%) to spontaneously mention delivery as a mode of MTCT ($p < .05$). This positive association held among women.

Spontaneously mentioned breastfeeding as a mode of MTCT

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals (53%) were *not* significantly more likely than the unexposed (50%) to spontaneously mention breastfeeding as a mode of MTCT ($p \leq .50$). However, TCM-exposed individuals in rural areas were significantly more likely than the unexposed in rural areas to spontaneously mention breastfeeding as a mode of MTCT. When controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were *not* significantly more likely than the unexposed to mention breastfeeding as a mode of MTCT (adjusted OR=0.85, $p \leq .49$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=807), respondents in districts with TCM (54%) were significantly more likely than those in districts without TCM (42%) to spontaneously mention breastfeeding as a mode of MTCT ($p < .05$). This positive association held among women and older people.

Said an HIV-positive mother can reduce the risk of infecting her child

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals (90%) were significantly more likely than the unexposed (70%) to know that an HIV-positive mother can reduce the risk of infecting her child ($p < .01$). This positive association held regardless of sex, age group, and residence. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were almost three times more likely than the unexposed to know that an HIV-positive mother can reduce the risk of infecting her child (adjusted OR=2.83, $p < .01$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=807), respondents in districts with TCM (77%) were significantly more likely than those in districts without TCM (64%) to know that an HIV-positive mother can reduce the risk of infecting her child ($p < .05$). This positive association held among men and older people.

Spontaneously mentioned AZT as a way to reduce the risk of MTCT

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals (80%) were significantly more likely than the unexposed (57%) to spontaneously mention AZT as a way to reduce the risk of MTCT ($p < .01$). This positive association held regardless of sex and age group; it was also significant among respondents in rural areas. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were more than twice as likely as the unexposed to mention AZT as a way to reduce the risk of MTCT (adjusted OR=2.24, $p < .01$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=807), respondents in districts with TCM (65%) were significantly more likely than those in districts without TCM (52%) to spontaneously mention AZT as a way to reduce the risk of MTCT ($p < .05$). This positive association held among older people.

Spontaneously mentioned not breastfeeding as a way to reduce the risk of MTCT

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=807), TCM-exposed individuals (40%) were significantly more likely than the unexposed (29%) to spontaneously mention not breastfeeding as a way to reduce the risk of MTCT ($p < .05$). This positive association held among older people. However, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were *not* more likely than the unexposed to mention not breastfeeding as a way to reduce the risk of MTCT (adjusted OR=1.38, $p \leq .23$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=807), respondents in districts with TCM (36%) were significantly more likely than those in districts without

TCM (17%) to spontaneously mention not breastfeeding as a way to reduce the risk of MTCT ($p < .01$). This positive association held regardless of sex and age group.

Stigmatizing Attitudes and TCM Exposure

Would let own children play with HIV-positive children from another family

- **TCM-exposed individuals** (see Table 1): In bivariate analyses ($n=786$), TCM-exposed individuals (76%) were significantly more likely than the unexposed (62%) to say they would let their own children play with HIV-positive children from another family ($p < .01$). This positive association held among men, older people, and people in rural areas. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were significantly more likely than the unexposed to say they would let their children play with HIV-positive children from another family (adjusted OR=1.44, $p \leq .05$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses ($n=786$), respondents in districts with TCM (68%) were *not* significantly more likely than those in districts without TCM (57%) to say they would let their own children play with HIV-positive children from another family ($p \leq .06$). However, older people in TCM districts were significantly more likely than their peers in non-TCM districts to say they would let their kids play with HIV-positive children from another family.

Would not be afraid to be around someone with HIV ($n=787$)

- **TCM-exposed individuals** (see Table 1): In bivariate analyses ($n=787$), TCM-exposed individuals (84%) were *not* significantly more likely than the unexposed (77%) to say they would not be afraid to be around someone with HIV ($p \leq .18$). However, among older people and people in rural areas, TCM exposure was positively associated with respondents' likelihood of saying they would not be afraid to be around someone with HIV. When controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were *not* significantly more likely than the unexposed to say they would not be afraid to be around someone with HIV (adjusted OR=1.36, $p \leq .40$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses ($n=787$), respondents in districts with TCM (80%) were *not* significantly more likely than those in districts without TCM (73%) to say they would not be afraid to be around someone with HIV ($p \leq .12$). However, among older respondents, TCM district-level exposure was positively associated with respondents' likelihood of saying they would not be afraid to be around someone with HIV.

Would buy food from an HIV-positive vendor

- **TCM-exposed individuals** (see Table 1): In bivariate analyses ($n=787$), TCM-exposed individuals (63%) were *not* significantly more likely than the unexposed (53%) to say they would buy food from an HIV-positive vendor ($p \leq .12$). Nor were there any significant differences by sex, age group, or gender. When controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were *not* significantly more likely than the unexposed to say they would be willing to buy food from an HIV-positive vendor (adjusted OR=1.35, $p \leq .30$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses ($n=787$), respondents in districts with TCM (58%) were *not* significantly more likely than those in districts without TCM (47%) to say they would buy food from an HIV-positive vendor ($p \leq .10$). However, among older people in TCM-districts, TCM district-level exposure was positively associated with respondents' increased likelihood of saying they would buy food from an HIV-positive vendor.

Would let own children be taught by an HIV-positive teacher

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=786), TCM-exposed individuals (97%) were significantly more likely than the unexposed (88%) to say they would let their children be taught by an HIV-positive teacher ($p < .01$). This positive association held among men, older people, and among people in rural areas. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were almost three times more likely than the unexposed to say they would let their children be taught by an HIV-positive teacher (adjusted OR=2.83, $p < .05$, although the small number of TCM-exposed respondents unwilling to let their children be taught by an HIV-positive teacher suggests that the precise value of this estimate should be viewed with caution).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=786), respondents in districts with TCM (92%) were *not* significantly more likely than those in districts without TCM (84%) to say they would let their children be taught by an HIV-positive teacher ($p \leq .07$). Nor were there any significant differences by sex, age group, or gender.

Would be willing to live with an extended family member with HIV

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=787), TCM-exposed individuals (99%) were significantly more likely than the unexposed (90%) to say they would be willing to live with an HIV-positive extended family member ($p < .01$). This positive association held regardless of sex, age group, and residence. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were nine times more likely than the unexposed to say they would be willing to live with an HIV-positive extended family member (adjusted OR=9.12, $p < .01$, but the small number of TCM-exposed respondents unwilling to let an HIV-positive extended family member live with them suggests that the precise value of this estimate should be viewed with caution).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=787), respondents in districts with TCM (93%) were significantly more likely than those in districts without TCM (87%) to say they would let an HIV-positive extended family member live with them ($p < .05$). There were no significant differences by sex or age group.

Would be willing to care for an extended family member with HIV

- **TCM-exposed individuals** (see Table 1): In bivariate analyses (n=787), TCM-exposed individuals (97%) were significantly more likely than the unexposed (88%) to say they would care for an HIV-positive extended family member ($p < .01$). This positive association held among men, older people, and people in rural areas. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses, TCM-exposed individuals were three times more likely than the unexposed to say they would care for an HIV-positive extended family member (adjusted OR=3.04, $p < .05$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses (n=787), respondents in districts with TCM (92%) were significantly more likely than those in districts without TCM (83%) to say they would care for an HIV-positive extended family member ($p < .01$). This positive association held among women.

Testing and TCM Exposure***Ever tested for HIV***

- **TCM-exposed individuals** (see Table 1): In bivariate analyses of respondents who had ever had sex (n=643), TCM-exposed individuals (49%) were significantly more likely than the unexposed (31%) to report having ever been tested for HIV ($p < .01$).

This positive association held among both men, women, older people, and people in rural areas. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses of sexually active respondents, TCM-exposed individuals were nearly twice as likely as the unexposed to report having ever been tested for HIV (adjusted OR=1.96, $p<.01$).

- **TCM-exposed districts** (see Table 2): In bivariate analyses of respondents who had ever had sex ($n=644$), respondents in districts with TCM (35%) were *not* significantly more likely than those in districts without TCM (32%) to report having ever been tested for HIV ($p\leq .60$). Nor were there significant differences by sex or age group.

Tested for HIV in past year

- **TCM-exposed individuals** (see Table 1): In bivariate analyses of respondents who had ever had sex ($n=643$), TCM-exposed individuals (34%) were significantly more likely than the unexposed (17%) to report having tested for HIV in the past year ($p<.01$). This positive association held among men, older people, and people in rural areas. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses of respondents who had ever had sex, TCM-exposed individuals were more than twice as likely as the unexposed to report having tested for HIV in the past year (adjusted OR=2.17, $p<.05$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses of respondents who had ever had sex ($n=644$), respondents in districts with TCM (22%) were *not* significantly more likely than those in districts without TCM (16%) to report having tested for HIV in the past year ($p\leq .25$). Nor were there significant differences by sex or age group.

Discussed testing with partner before being tested

- **TCM-exposed individuals** (see Table 1): In bivariate analyses of respondents who had ever had sex ($n=652$), TCM-exposed individuals (30%) were significantly more likely than the unexposed (17%) to report discussing testing with a sex partner before being tested ($p<.01$). This positive association held among men, older people, and people in major urban areas. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses of respondents who had ever had sex, TCM-exposed individuals were almost twice as likely as the unexposed to report having discussed testing with a partner before being tested (adjusted OR=1.89, $p<.05$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses of respondents who had ever had sex ($n=653$), respondents in districts with TCM (20%) were *not* significantly more likely than those in districts without TCM (16%) to report having discussed testing with a partner before being tested ($p\leq .36$). However, among men and older people, TCM district-level exposure was significantly and positively associated with the likelihood of discussing testing with a partner before being tested ($p<.05$).

Went for counseling and testing with partner

- **TCM-exposed individuals** (see Table 1): In bivariate analyses of respondents who had ever had sex ($n=652$), TCM-exposed individuals (19%) were significantly more likely than the unexposed (8%) to report having gone for counseling and testing with a partner ($p<.05$). This positive association held among men, older people, and people in major urban areas. When controlling for demographics and exposure to *Makgabaneng* in multivariate analyses of respondents who had ever had sex, TCM-exposed individuals were more than twice as likely as the unexposed to report having gone for counseling and testing with a partner (adjusted OR=2.41, $p<.05$).

- **TCM-exposed districts** (see Table 2): In bivariate analyses of respondents who had ever had sex (n=653), respondents in districts with TCM (10%) were *not* more likely than those in districts without TCM (10%) to report having gone for counseling and testing with a partner ($p \leq .86$). Nor were there any significant differences by sex or age group.

Sexual Behaviors and TCM Exposure

Never had sex

- **TCM-exposed individuals** (see Table 1): In bivariate analyses of younger people (n=318), TCM-exposed individuals (39%) were *not* more likely than the unexposed (44%) to report having never had sex ($p \leq .64$). However, among men of all ages and people of all ages in rural areas, TCM exposure was *negatively* associated with reporting having never had sex ($p < .05$). When controlling for demographics and exposure to *Makgabaneng* in multivariate analyses of younger people, TCM-exposed youths were more *not* significantly more likely than their unexposed peers to report having never had sex (adjusted OR=0.85, $p \leq .71$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses of younger people (n=318), respondents in districts with TCM (39%) were *not* more likely than those in districts without TCM (52%) to report having never had sex ($p \leq .09$). Among men of all ages, TCM district-level exposure was *negatively* associated with reporting having never had sex.

Used a condom in last sex act with a higher-risk partner

- **TCM-exposed individuals** (see Table 1): In bivariate analyses of respondents having sex with higher-risk partners in the past year (n=378), TCM-exposed individuals (76%) were *not* more likely than the unexposed (77%) to report having used a condom in their last sex act with a higher-risk partner ($p \leq .80$). Nor were there any significant differences by sex, age group, or residence. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses of respondents having sex with higher-risk partners in the past year, TCM-exposed individuals were *not* more likely than the unexposed to report having used a condom in their last sex act with a higher-risk partner (adjusted OR=0.67, $p \leq .18$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses of respondents having sex with higher-risk partners in the past year (n=378), respondents in districts with TCM (79%) were *not* significantly more likely than the unexposed (69%) to report having used a condom in their last sex act with a higher-risk partner ($p \leq .12$). However, among older people, TCM district-level exposure was positively associated with reporting having used a condom during the last sex act with a higher-risk partner.

Had concurrent sex partners in the past year

- **TCM-exposed individuals** (see Table 1): In bivariate analyses of the sexually active (n=544), TCM-exposed individuals (18%) were *not* significantly less likely than the unexposed (22%) to report having concurrent sex partners in the past year ($p \leq .59$). Nor were there significant differences by sex, age group, or residence. Likewise, when controlling for demographics and exposure to *Makgabaneng* in multivariate analyses of the sexually active, TCM-exposed individuals were *not* less likely than the unexposed to report having concurrent sex partners in the past year (adjusted OR=0.75, $p \leq .53$).
- **TCM-exposed districts** (see Table 2): In bivariate analyses of the sexually active (n=544), respondents in districts with TCM (20%) were *not* significantly less likely than those in districts without TCM (27%) to report having concurrent sex partners in the past year ($p \leq .28$). Nor were there significant differences by sex or age group.

Discussion

Overview of Results:

The results from both the individual- and district-level analyses offer support to the hypothesis that TCM is having a positive effect on HIV-related knowledge and attitudes in Botswana. Of the 24 target outcome indicators measured in bivariate, individual-level analyses, 16 showed positive associations with TCM exposure. Of these 16 bivariate associations, 12 remained statistically significant in multivariate analyses. Likewise, in the district-level analyses, nine of the 26 outcome indicators showed positive bivariate associations with TCM exposure. Overall, positive associations were found across all domains—sexual transmission, MTCT, stigma, and testing—except reported sexual behavior.

Regarding respondents' knowledge about sexual transmission of HIV, TCM exposure was associated with two of the four outcomes measured. TCM-exposed respondents were two to three times as likely as the unexposed to mention abstinence and to mention condom use as HIV-prevention methods. Further, TCM-exposed individuals more commonly rejected mosquitos as a means of transmission than did unexposed individuals ($p \leq .10$), although this did not reach the level of statistical significance. However, the lack of association between TCM exposure and mentioning "being faithful" may indicate a need for TCM to focus more on communicating this HIV-prevention method. That the positive associations with these knowledge outcomes were larger among older people is perhaps not surprising, given the higher levels of HIV knowledge among younger people in general.

Regarding knowledge of MTCT, TCM exposure was significantly associated with two of seven measures. TCM-exposed respondents were two to three times as likely as the unexposed to know that the prevention of MTCT is possible and that AZT is one way to prevent MTCT. On other measures of MTCT knowledge, TCM exposure had positive associations, although they did not reach statistical significance. Overall, the results suggest that TCM should consider putting more emphasis on education on the various modes of MTCT, since levels of knowledge were fairly low in general, and TCM effects, while positive, were relatively weak.

Regarding stigmatizing attitudes, TCM exposure was associated with non-stigmatizing responses in four of the six indicators measured. In bivariate sub-analyses of stigmatizing attitudes, the larger associations among men, older people, and people in rural areas are especially important, as Listenership Survey data indicates that these groups were more likely to harbor stigmatizing attitudes.⁶

Regarding HIV testing, there were strong associations with TCM exposure in all four of the measures. TCM-exposed respondents were about twice as likely as the unexposed to report having been tested for HIV in the past year. TCM exposure was also positively associated with other testing behaviors, such as discussing testing with a partner before being tested, and with going for counseling and testing with a partner. That bivariate associations for these testing outcomes were larger among men is particularly important, since men are less likely to report testing in general.⁶

Regarding sexual behavior, TCM was not found to be associated with any of the three outcomes measured. TCM-exposed respondents were no more likely than the unexposed to have never had sex, to have used a condom in their last sex act with a non-marital partner, or to not have concurrent sex partners. Though somewhat discouraging, these results are consistent with those of a wide variety of studies of HIV prevention interventions around the world that have found that sexual behaviors are more difficult to influence than knowledge or

attitudes. Similarly, separate analyses indicated no apparent association between listening to the *Makgabaneng* radio serial drama and reported sexual behaviors.⁶

Community-level analyses supported the results from the individual-level analyses in the areas of knowledge of HIV transmission (sexual and MTCT) and in non-stigmatizing attitudes. As with the results at the individual level, the community-level results showed no positive associations with sexual behaviors.

Considerations in Interpreting the Results:

As described in greater detail previously in the methods section, a number of limitations should be kept in mind in interpreting these results. In particular, a cross-sectional survey such as this one does not enable us to draw direct causal inferences, since participants were not randomized, and those who had been exposed to TCM may have been different from those without TCM exposure in a variety of unmeasured ways. In addition, although multivariate techniques attempted to identify effects of TCM exposure that were independent of demographics and *Makgabaneng* exposure, we did not control for exposure to other HIV prevention interventions. Similarly, at the community level, the five health districts where TCM had been active and the two where TCM had not been active were not chosen randomly, and may have differed in a variety of ways. Finally, sampling only two non-TCM health districts may not have been sufficient to capture enough of the variation to be representative of the 10 non-TCM health districts.

The relatively narrow definition of individual “TCM exposure” means that we may have underestimated exposure to TCM activities in our individual-level analyses. As defined, those with “TCM exposure” included only those who had “ever spoken” with someone from TCM or “participated in a TCM-*Makgabaneng* listening-discussion group.” This definition does not include those respondents who may have been influenced by TCM through group- or community-level interventions, such as drama groups, quiz shows, or condom demonstrations. It seems likely that these group- or community-level interventions may have increased knowledge and improved attitudes among many people, even those who had never spoken with someone from TCM nor participated in a TCM-*Makgabaneng* listening-discussion group. In this way, the diffuse effects of these interventions may have “diluted” the odds ratios we measured when comparing “TCM-exposed” and “TCM-unexposed” populations. Thus, our individual-level analyses likely underestimate TCM’s larger effects on the community as a whole.

In this light, it is especially important that HIV-related knowledge and attitudes were measurably different between communities where TCM had been active and those where TCM had not been active. It might be considered remarkable that the differences in a number of indicators of knowledge and attitudes were so large, given that only 22.8% of individuals reported “TCM exposure” in the communities where TCM had been active. One possible explanation, as already described above, is that the influence of TCM via group- and community-level interventions was much more extensive than was indicated in our “TCM exposure” variable.

Conclusions

These findings offer some important evidence that TCM has been effective in (1) improving knowledge about how HIV transmission can be prevented, (2) increasing understanding of mother-to-child transmission, (3) reducing stigma, and (4) encouraging testing in the communities where TCM has worked.

These positive associations were found both at the individual level and at the community level, and many persisted after controlling for potential confounding factors. However, as with any cross-sectional survey, the results do not allow us to make direct causal inferences about TCM's effects.

Exposure to TCM was not associated with the indicators of sexual behaviors. This has been the case worldwide with many other interventions intended to prevent HIV. Changes in risky sexual behavior are difficult to achieve, and often require a persistent, multifaceted, community-based approach if they are to succeed.¹⁷

The positive effects of TCM's work in communities, as measured in this survey, correspond to key goals of the Botswana National Strategic Framework for HIV/AIDS for 2003-2009.¹⁸ If these improvements in HIV knowledge, reduced levels of stigma, and increases in testing can be sustained into the future, they will form a necessary basis for changes in sexual behavior. Ultimately, changes in sexual behavior will be pivotal in enabling the nation of Botswana to meet the goal of Vision 2016, that "the negative impact of the AIDS epidemic in Botswana will have been halted and reversed."¹⁹

Notes

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