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A LONGITUDINAL ANALYSIS OF THE IMPACT OF HEALTH BEHAVIOR CAMPAIGNS ON HIV-RISK BEHAVIORS AND HIV INCIDENCE IN ESWATINI

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Abstract

Between 2010–2015, Eswatini conducted mass media health behavior campaigns (HBCs) designed to avert new HIV infections. Using longitudinal data from the nationally representative Swaziland HIV Incidence Measurement Survey of 2011, we describe the impact of exposure to HBCs on selected HIV risk behaviors and HIV incidence among sexually active, HIV-negative adults (n = 11,232). Exposure to partner reduction HBCs was significantly associated with reporting fewer (i.e., 1 versus 2, or 2 versus ≥3) sexual partners in the prior six months at baseline among women (aOR = 3.02; 95% CI 1.38, 6.62); and at both baseline and at six-months follow-up for men (aOR = 2.26; 95% CI 1.49, 3.44; aOR = 1.95, 95% CI [1.26–3.00], respectively).

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Authors' Contributions

JJ and IM designed this study, IM analyzed the data and IM and JJ interpreted the data, IM drafted the manuscript and all authors reviewed and approved the manuscript for submission

Conflicts of Interest

The authors declare that they have no conflicts of interest

Declarations

Ethics Approval

The study was approved by the Institutional Review Boards (IRBs) at Columbia University, the U.S. Centers for Disease Control and Prevention, and the Swaziland Science and Ethics Committee

Consent to Participate

All participants provided written consent to participate in the study

Consent for Publication

Not applicable

Availability of Data and Material

Information available at: http://shims.wcsitepreview.com and data available upon request

Code Availability

Upon request

Despite these reported partner reductions, there was no association between HBC exposure and prospectively observed HIV seroconversions (n = 121). This analysis strengthens the evidence that HIV prevention at the population level requires integrated strategies.

Keywords

health behavior campaigns; HIV; sexual risk; media

INTRODUCTION

Health behavior campaigns (HBCs) aimed at reducing risky sexual behavior have been a key priority in HIV prevention globally, particularly in regions with generalized epidemics such as sub-Saharan Africa (SSA), but evidence of their effectiveness is mixed. Some targeted individual-level interventions that were community-based and culturally competent have been found to be effective in reducing risky sexual behavior (1). These interventions have included, for example, programs that guide women in power-imbalanced relationships through the steps of condom negotiation with partners (2).

HBCs often do not change behavior directly but their effects may be mediated by more proximal factors such as changing knowledge, awareness, and attitudes, which in turn lead to an intention to change behavior and eventually changes in actionable behavior and positive health outcomes (3). Socio-ecological approaches to health behavior change that cut across all levels of influence have been proposed (4–6). HBCs implemented via mass-media aim to educate community members about individual risk levels while also attempting to change community norms regarding risky sexual behavior; they may therefore be regarded as socio-ecological in their approach. As Figure I illustrates, HBCs can lead to both individual and societal changes regarding HIV risk behaviors which can have a broader impact at the population level.

Multiple studies with diverse designs and mixed methods have assessed the effect of exposure to HIV/AIDS communication campaigns on risky sexual behavior in high burden countries, particularly in SSA (7–16). Results have been mixed, depending on the study design and type of intervention or HBC. Studies with quasi-experimental designs (comparing the impact of an intervention to a control group or a baseline measure) have had stronger associations, although outcome evaluations used to assess the impact of the interventions have generally not adequately controlled for threats to internal validity to rule out alternative explanations for the changes in outcomes (11, 12, 16). A systematic review and meta-analysis of studies from several countries, most in SSA, also showed that social marketing of condoms through promotional campaigns has been effective in increasing condom use (17). However, most of these studies only assessed the effect of a single media intervention using a small, non-representative sample. Although three of these studies used nationally representative data (9, 13, 14), only one focused on a single high burden country (South Africa) (13). A review of campaigns in developing countries found the campaigns to be moderately effective in reducing high-risk sexual behavior, particularly reducing number of sexual partners, and increasing knowledge about HIV transmission, but other results such

as condom use, and self-efficacy were mixed or had no effect (15). A meta-analysis done on 72 interventions around the world with a total sample of 142,196 participants found mass-media-delivered HIV prevention interventions to be effective in increasing condom use when the campaigns were longer (median duration of eight months) and were in nations with a low human development index, as characterizes most countries in SSA (16).

The evidence for the effect of HBCs on HIV incidence is, however, scarce. A community randomized trial in Uganda found that attending a media-based behavior intervention did not result in risk behavior changes but resulted in a decrease in HIV incidence for women but not for men (18). This trial was, however, conducted in a rural area in one district of Uganda; hence there is a need to assess this association at a larger population level using a nationally representative sample.

Eswatini (previously known as Swaziland) has the highest national HIV prevalence and incidence in the world, estimated in 2009 at 26% and 2.66% and in 2016 at 27% and 1.36%, respectively, among adults ages 15–49 (19, 20). In an effort to curtail the epidemic, the Ministry of Health (MOH) in Eswatini, in conjunction with local and international non-governmental organizations (NGOs), conducted a series of media and community-based HBCs between 2009 and 2015 targeting different populations with different HIV risk levels such as youth, men, couples, public transport workers and the general population (Table I). These campaigns used targeted messaging on HIV testing, reducing the number of sexual partners, condom use, and VMMC. They were aimed at averting risky sexual behavior in conjunction with the expansion of HIV prevention services in the midst of a spiraling epidemic.

HBCs, in conjunction with other combination prevention strategies, have the potential to alter the direction of the HIV epidemic in Eswatini and other similar, high-prevalence SSA countries. Because the impact of HBCs in reducing risky sexual behavior has mostly been studied in evaluations of individual programs with small samples (11, 12), it has not been clear whether any observed effects apply to a high-burden national population when multiple intervention programs are implemented together.

Drawing from the Swaziland HIV Incidence Measurement Study (SHIMS), a nationally representative, household-based survey conducted in 2011, this analysis assesses the association between multiple HBC exposures via mass media campaigns and several sexual behavioral outcomes as reported in the survey. The analysis is informed by a theory of change (Figure I, adapted from Stead et. al.) (3) which illustrates the sequence of the factors that may lead to changes in HIV risk behaviors using media such as HBCs. HIV risk behavior changes that are commonly known to lead to a reduction in widespread HIV infection include reducing the number of sexual partners, condom use, voluntary medical male circumcision (VMMC), and widespread HIV testing (21). HBCs also need to address the contextual factors that influence sexual behavior and acquisition of sexually transmitted infections (STIs) (4). These factors include family, relational, peer/community and societal characteristics, such as gender norms and socio-economic inequalities (4). We hypothesized that SHIMS participants who reported exposure to HBCs via mass media would be more likely to report low-risk sexual behaviors or high uptake of prevention-related behaviors than

participants who did not report exposure to these campaigns. We further hypothesized that SHIMS participants who reported exposure to HBCs would have a lower HIV incidence rate than those who did not report HBC exposures.

METHODS

Study Design and Setting

This study was conducted as part of the Swaziland HIV Incidence Measurement Survey (SHIMS), which has been described elsewhere (22, 23). Briefly, SHIMS was a nationally representative, household-based survey that assessed the impact of expanded HIV prevention and treatment services such as HIV testing and counseling, condom use, antiretroviral treatment (ART) and medical male circumcision (MMC) on HIV incidence in Eswatini. The data described in this analysis were collected during a survey conducted prior to the expansion of prevention and treatment services. The survey was administered by interviewers in English or SiSwati to 14,927 households located in all four regions of Eswatini from December 2010 to June 2011. Eligibility criteria, as described previously (22, 23), included residence in the sampled household (or sleeping in the household the night before), reporting an age of or between 18–49 years, and consenting to study procedures. Interviewers collected baseline demographic, clinical, and health behavioral information (Table II), including information about recent (defined as the six months prior to the survey) sexual behavior and recent exposure to HBCs about HIV testing and HIV risk reduction (condom use, partner reduction, and MCC). For those who tested HIV negative, additional demographic, behavioral, and clinical information was collected at the six-month follow-up survey.

All participants provided written consent to participate in the study, and the study was approved by the Institutional Review Boards (IRBs) at Columbia University, the U.S. Centers for Disease Control and Prevention, and the Swaziland Science and Ethics Committee.

Outcomes

The outcomes of interest included the prevalence of specific protective or risk-enhancing behaviors, as reported at baseline and/or at the six-month follow-up visit. These behaviors included: having had an HIV test in the last six months (at baseline only); the number of sexual partners in the last six months, categorized as one, two, or three or more in the analysis; overall frequency of condom use with all sexual partners in the last six months (not always versus always); circumcision status for men and circumcision status of the primary partner for women (uncircumcised, circumcised) [Table III]. These specific outcome variables were also combined and measured on a binary scale created for this analysis, where low-risk behavior was defined as reporting all four of the following characteristics and behaviors in the last six months: having had an HIV test [at baseline visit only]; having one sexual partner; reporting always using condoms; and reporting being circumcised or having a circumcised primary partner. High-risk behavior was defined as reporting fewer than four of the above characteristics and behaviors. “Don’t know” and “Refused to answer” responses were treated as missing for all variables.

Exposures

The independent variable of interest was self-reported exposure to HBCs via different media outlets and community outreach programs in the six months prior to the survey. Participants were asked about exposure to specific prevention messages (yes/no) and, if yes, about the source of information such as billboards, radio, television, and community outreach programs (Table IV) via the following question: “In the past six months, have you heard or seen any messages about the following topics related to HIV?” followed by: “If yes, what is the source of this information? Mark all that apply.” The HBCs assessed contained HIV prevention information about the importance of getting an HIV test; reducing the number of sexual partners; using condoms; and getting circumcised. These individual exposure variables were also combined, such that “total campaign exposure” was denoted as “four” for participants who reported that they were exposed to all four types of risk-reduction campaigns and “three or less” for participants reporting exposure to three or fewer types of HBC messages.

Additional Covariates

Demographic information included: age (collected as a continuous variable but split into seven categories for analysis—according to the different HIV risk levels per age group); employment status; marital status; pregnancy status for women; education level; self-reported HIV status and HIV status as confirmed by laboratory testing in SHIMS. Rapid HIV testing was conducted at baseline and, for HIV-seronegative individuals, it was repeated six months later. Prospectively observed seroconversions were defined as incident infections, as previously described (22, 24).

Statistical Analysis

To test the relationship between exposure to HBCs and reported HIV risk or preventive behavior, a binary logistic regression analysis was conducted for each dichotomous outcome, and an ordinal logistic regression was conducted for the ordered outcomes (number of sexual partners, modeled on fewer sexual partners). A crude association was first assessed for each outcome, then additional variables that were potential confounders and theoretically important to the relationships being investigated (age, employment status, marital status, pregnancy status (for women), and education level) based on previous literature (11, 12) were added to the multivariable regression model. Because of the known differences between men and women in sexual behavior and associated or subsequent HIV risk, the analyses were stratified by sex *a priori*. Significant main effects were tested for interaction by geographic administrative region, and an assessment was made for a difference in effect among younger adults (aged 18–24) and older adults (aged 25–49). The relationship between exposure to HBCs at baseline and incident HIV infections six months later was also assessed. All statistical analyses were conducted using SAS 9.4 software.

RESULTS

Participants

As previously described (24), 18,172 adults from 12,571 participating households agreed to participate and completed HIV testing in the survey. Of these, 12,369 tested HIV-negative and, of these, 11,232 (94%) completed a six-month follow-up visit. For this analysis, we included participants who reported recent sexual activity at both the baseline and six-month follow-up survey visits and also responded to questions about HBC exposures and the specific behavioral outcomes at baseline (7,347) and follow-up (7,247). Sample weights developed to produce nationally representative estimates for the SHIMS study (22) were applied to this analysis, which gave a final sample size of 7,379 for the analysis.

Demographic, Clinical, and Behavioral Characteristics

Among 3,353 men and 4,026 women in the weighted baseline sample, the median age was 28.0 years (interquartile range 23–36). About half the men were fully employed (46.4%), while fewer women (28.5%) were fully employed [Table II]. About a third of both men and women were married and living with their partner, whereas half of the men and 36.5% of women were not married. The proportion of women who reported being pregnant at the time of the survey was 8.2%. About half of both men and women had attained secondary-level education.

Just over half of the men (59.3%) and most of the women (88.1%) had been tested for HIV six months prior to the baseline survey [Table III]. A larger proportion of men than women reported two or more recent sexual partners (26.1% vs. 3.4%). About one-quarter of men and women (28.4% and 20.1%) reported always using condoms in the prior six months. Most men (76.6%) reported being uncircumcised at the time of the survey. Similarly, most women had an uncircumcised primary partner (74.6%). The vast majority of both men and women reported recent exposure to HBC messages (Table IV) promoting HIV testing (99.2% and 99.3%), reducing the number of sexual partners (97.1% and 97.5%), using condoms (99.2% for both), and male circumcision (99.2% and 98.7%). Most participants reported exposure to all media and community-based channels of information about HIV risk behavior, but ≤ 25% reported exposure to risk behavior information from the radio for each type of campaign, and “health care provider” was reported as a source of information by fewer women compared to men.

Associations Between Health Behavior Campaign Exposures and HIV Risk Behavior Outcomes and HIV Incidence

Specific Behavior Outcomes—Among men at baseline, there was no statistically significant relationship between exposure to HIV testing campaigns six months prior to the survey and reporting recent HIV testing (Table V). Among women at baseline, however, those who reported exposure to HIV testing campaigns in the six months prior to the survey were almost four times as likely to report recently having had an HIV test compared to women who did not report HBC exposure, after adjusting for age, employment status, marital status, pregnancy status and education level (adjusted OR [aOR] = 3.84, 95% CI [1.18–12.55]).

In contrast to the HIV testing HBCs, men at baseline who reported exposure to partner reduction HBCs were twice as likely to report fewer (i.e., 1 versus 2, or 2 versus ≥3) recent partners than men who did not report recent exposure to partner reduction HBCs (aOR = 2.26, 95% CI [1.49–3.44]). Similarly, women at baseline who reported recent exposure to partner reduction HBCs were three times as likely to report fewer recent partners compared to women who did not report exposure to partner reduction HBCs (aOR = 3.02, 95% CI [1.38–6.62]). Exposure to HBCs targeting condom use or circumcision was not associated with a greater or reduced likelihood of reporting the corresponding behavior or characteristic by either men or women (Table V).

Associations between specific HBC exposures and the corresponding behaviors were also assessed at the six-month follow-up visit. Men who reported recent exposure to partner reduction HBCs at baseline were more likely to report fewer recent sexual partners at the six-month follow-up visit (aOR = 1.95, 95% CI [1.26–3.00]). No significant associations were found at the six-month follow-up visit between exposure to HBCs about condoms or male circumcision and the corresponding behaviors among men or women (Table V). Exposure to HIV testing HBCs and reported HIV testing was not assessed at the six-month visit since all survey participants were tested for HIV at the baseline visit as part of survey procedures.

Additional Assessments—For both men and women, there was no relationship between exposure to all four (vs. fewer than four) HBCs and the corresponding low-risk behaviors (all four vs. fewer than four) at both the baseline (aOR = 0.72, 95% CI [0.33–1.59] for men and aOR = 1.04, 95% CI [0.45–2.40] for women) and the six-month follow-up visit (aOR = 1.94, 95% CI [0.79–4.74] for men and aOR = 0.704, 95% CI [0.38–1.31] for women). Despite a large number of prospectively observed seroconversions (n = 145, overall HIV incidence 2.4% and n = 120 seroconversions among those reporting sexual activity at both baseline and the six-month follow-up), exposure to all four (vs. fewer than four) HBCs at baseline was not associated with incident HIV infection for either men or women (Wald Chi-Square test statistic = 0.1541, p=0.6946; and Wald Chi-Square test statistic = 0.3614, p=0.5477 respectively). There was no evidence of multiplicative interaction by geographic region and age at both baseline and the six-month visit for any of the assessments (data not shown).

DISCUSSION

This paper examined the short-term impact of several national HBCs on four individual behaviors and characteristics germane to HIV risk in Eswatini in 2011. We found that exposure to HBCs targeting HIV testing was significantly associated with more self-reported HIV testing among women and that exposure to HBCs targeting partner reduction was significantly associated with fewer sexual partners among men and women. HBCs on condom use and circumcision, by contrast, did not appear to have any impact. To our knowledge, this analysis was one of the first nationally representative studies to assess the relationship between exposure to multiple mass-media HBCs and corresponding HIV health behaviors in a single high burden country (with the other study having been done in South Africa (13)) and the only such analysis done in Eswatini. Additionally, no other

study has assessed the effects of circumcision HBCs on circumcision rates using a nationally representative study.

Despite the association between partner reduction and HIV testing HBCs and the corresponding behaviors, exposure to HBCs was not associated with a lower HIV incidence among men and women in Eswatini. This may have been due to the very high proportion of people exposed to HBCs in this study, which may have resulted in insufficient statistical power to detect a change in incidence. In terms of our theory of change (Figure 1), we found evidence of a relationship between HBC exposure and some but not all specific risk behaviors and no evidence of an effect on HIV incidence; this suggests HBCs may not have changed societal norms sufficiently to affect HIV risk behaviors and, in turn, result in a reduction in HIV incidence. This illustrates that more health information does not always result in people making rational changes in their behavior—people in vulnerable situations (such as women in power-imbalanced relationships) may only be able to make partial changes. This finding is contrary to the results of a community randomized trial in Uganda, which found no effect of attending a media-based behavior intervention on risk behavior changes but a decrease in HIV incidence for women (18). However, this trial was conducted in a rural area in one district of Uganda, so the results may differ when considering a nationally representative sample consisting of both rural and urban dwellers.

Our findings confirm the results of two cross-sectional nationally representative studies, one in Ghana and one in South Africa. In Ghana, exposure to a mass media campaign was associated with increased HIV testing for both men and women (14). In South Africa, exposure to HIV mass communication programs was associated with being more likely to report HIV testing in the last 12 months (13). Given that over one-third of HIV-infected adults in Eswatini were unaware of their HIV status in 2011 (23), messages communicating the importance of HIV testing were particularly relevant in Eswatini. The SHIMS survey was repeated in 2016 and documented that five years after the first SHIMS, only 13% of HIV-infected adults were unaware of their HIV status (25).

Our findings on the effect of HBCs on reducing the number of sexual partners are consistent with reports of program-based evaluations (15, 26, 27), but not the mass-media national representative study done in South Africa, which did not find a significant effect (13). In our study, this effect was more pronounced for men than women in the follow-up assessment.

We did not find an effect of HBC exposure on condom use. This finding differs from an Uganda study which found an increase in condom use as reported by women (but not men) after HBC exposure (28). However, this study was conducted in a predominantly rural sample that was not representative of the entire country, and this population might have a different risk profile than an urban or nationally representative population. Additionally, since there is evidence from an international meta-analysis done on 72 interventions that mass-media-delivered HIV prevention interventions tend to be effective in increasing condom use when the campaigns last longer (with a median duration of eight months) in resource-limited settings (16), a six-month follow-up time may not have been sufficient to observe changes in condom use in Eswatini.

HIV risk behaviors are important contributing factors but are not the sole determinants of the most important outcome of HIV prevention interventions, which is HIV incidence. In the primary incidence assessment of the SHIMS study, having a partner with unknown HIV serostatus was an important predictor of HIV incidence for both men and women but neither condom use, number of sexual partners, nor male circumcision status predicted HIV incidence (24). Evidence from other studies about a direct or indirect impact of HBCs on HIV incidence has been scant, perhaps reflecting the challenge of conducting such an assessment.

In this analysis, women reported more protective behaviors, such as having had a recent HIV test and fewer sexual partners, after HBC exposure than their male counterparts. Women, who bear a higher burden of HIV than men in Eswatini (19, 22–24), may be more motivated than men to avoid risky sexual behaviors because they may be more aware of their disadvantaged status. Given that gender inequalities (particularly intergenerational sex, gender-based violence, transactional sex, and multi-concurrent partnerships among men) are known to be major drivers of the HIV epidemic in Eswatini (29, 30), women exposed to such situations may be more likely to seek HIV testing more often than men. HIV testing, together with reducing the number of sexual partners, are behaviors that are largely under the control of the individual (except in instances of coerced sex). However, when it comes to a sexual act that involves negotiating a shared behavior, such as condom use, or refusing a sexual relationship with an uncircumcised partner, women may feel less empowered to take steps that they know would protect them (31). On the other hand, men may have lower perceived risk and may also have fewer encounters than women with the health care system, providing fewer opportunities for them to get tested for HIV or acquire condoms for example. This discrepancy can be mitigated by providing more male-friendly clinics or HIV-testing (and other HIV-related services) at the community level. Interestingly, men consistently reported “health care provider” as a source of HIV prevention information more than women for each type of risk-reduction messaging (Table IV), suggesting that when men do access services, they may acquire or respond to health information better than women.

The type of media campaign may be important to consider when targeting different audiences, particularly different genders. As described above, an analysis of the 2014 Demographic and Health Survey (DHS) data in Ghana showed a greater effect on HIV testing among women when the HBC messaging was delivered via the radio while print media and television were the more effective media channel for men (14). Interestingly, in our study, fewer than one fourth of participants reported having received HIV prevention messaging through the radio channel for all types of messages, while television was reported as a source of information for roughly three quarters or more of the different messages (Table IV). The 2014 Swaziland Multiple Indicator Cluster Survey showed that over a fifth of women and a third of men of reproductive age had regular exposure to mass media, and among youths aged 15–24, almost half of them had access to communication technology such as the internet (30). These high levels of access suggest mass media has good potential to communicate HIV risk reduction messages, particularly to younger populations. However, a meta-analysis done across 72 interventions across the globe did not find an increase in health impact with an increase in channels of communication (16). Given that our study assessed a composite of different types of media exposures, it complements this literature by

showing that expansive and varied exposure can have desirable outcomes on certain health behaviors in the general population. However, since most people were exposed to all forms of media, and the responses were not mutually exclusive, we could not assess the effect of exposure to one form of media campaign versus another on HIV risk behaviors. We thus could not assess the effect that different dosages of HBC exposures may have on HIV risk behaviors.

Our study had several limitations. Firstly, nearly all participants reported exposure to HBCs (more than 96% in all categories), which lowered the power of the study to detect smaller effect sizes. Nonetheless, our analysis revealed some important findings. Secondly, both the exposure and outcome behaviors were self-reported; hence the analysis is prone to reporting bias as participants are more likely to report socially desirable behaviors. Participants were asked about HBC exposure and health (preventive or risky) behaviors over the last six months, a relatively long period of time, and therefore prone to recall bias. The mass HBCs were not built on a known theoretical framework to target a specific audience. Lastly, data from 2011 may not seem to be relevant to the ongoing epidemic; however, the uneven relationships between certain HBCs and behaviors and the absence of impact of HBCs on incidence are unlikely to have changed over time.

This study had several strengths. Since the sampling design and weighting yielded nationally representative data, the results of this analysis are generalizable to the sexually active population of adults in Eswatini in 2011 and may be applicable to other high-HIV-burden countries in SSA. Our study used a rigorous HIV testing algorithm to identify incident HIV cases and also had high participation, high retention and very little missing data.

Mass media HBCs may need to be context-specific and not have a “one-size-fits-all” approach to reducing HIV risk in high burden countries, particularly in SSA. For example, although “Abstinence, Condoms and Faithfulness (ABC)” programs supported by the U.S. *President’s Emergency Plan for AIDS Relief* (PEPFAR) have been successful in averting risky sexual behavior in some countries (32–34), this was not the case universally in all countries; an analysis of DHS data from 22 SSA countries found that these programs had not resulted in reduced high-risk sexual behaviors, comparing PEPFAR countries to non-PEPFAR countries (35).

This study suggested that averting risky sexual behaviors at a population level with mass media based HBCs was possible, but the impact on the epidemic was minimal. A maximum impact on the HIV epidemic in high-burden settings will likely require integrated strategies that include biomedical approaches such as PrEP which are not heavily reliant on behavior change or changes in societal norms. Future studies should assess the impact of these integrated strategies in order to identify the most promising approaches and settings.

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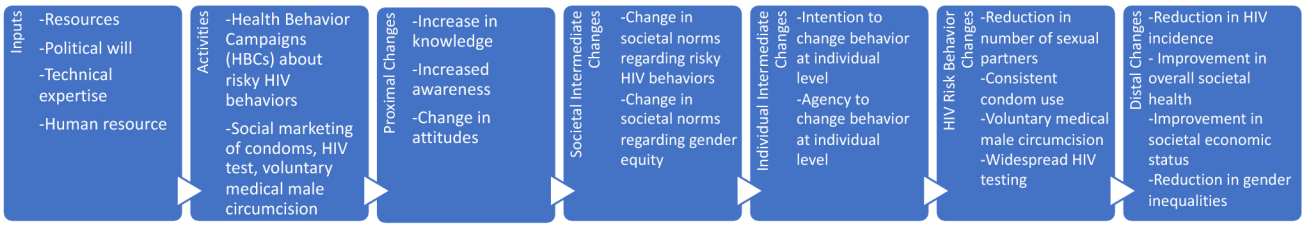

Figure I.

Theory of change of HIV risk behaviors through health behavior campaigns (adapted from Stead et. al., 2019)[3]

Table I.

List of Campaigns in Eswatini Overlapping with SHIMS Study Period or Prior to Study

	Target Population	Target Risk Factor (behaviors)	Year	Mode	Summary
HTC Month	General population	HIV testing	2006-Present	Billboards, TV, radio, newspapers	The month of February is designed as HIV testing month. The themes differ every year depending on the target group, i.e., men, women, couples, youth, children.
Makhwapheni Uyabulala (Secret Lover Kills)	Couples	Multiple, concurrent partnerships (MCP)	2006	Billboards, radio, TV and newspapers	Campaign featured pictures of mobile text messages such as “Let’s have a quickie, my husband is not around” and “come over now, my husband is out.” Under public pressure, the campaign was withdrawn and relaunched as “Hha! i-HIV ibhokile (Hey! HIV kills). Only the makhwapheni (secret lover) was dropped but the main appearance and message were largely unchanged.
Ngoba likusa ngelami (The Future is Mine)	Youth (in- or out of school); young adults; adults	MCP	2006	Radio, TV, newspapers, billboards	Campaign consisted of 9 different posters with “Sex can wait” and “I will not share my partner” as prominent messages.
Abasha Phezulu	Youth	Condom use	2006–2007	Billboards, brochures, TV and radio	Campaign targeted youth with messages promoting condom use
Ngitotfolani	Youth (in- or out of school)	Intergenerational sex, MCP, condom use	2007–2008	Billboards, posters, radio, newspaper	Campaign addressed the risk of transactional sex, especially with older men, by promoting fewer partners, not getting involved with older men and condom use.
I Am a One Woman Man / One Man Woman	Couples	MCP	2008–2010	Radio, TV, newspapers, billboards-used role models from different industries, community dialogs, community mobilization, booklets, radio and TV series	Campaign promoted partner reduction by focusing on drivers of the epidemic such as poverty and other vulnerabilities through interpersonal communication.
Men in Green Circumcision Campaign	Men	Voluntary medical male circumcision (VMMC)	2009	Role modeling, visual demonstration, and community mobilization	This campaign sought to increase the number of men seeking circumcision. Men wore all-green jumpsuits with polo necks (high, close-fitting, turned-over collars) to represent an uncircumcised organ. This campaign was stopped prematurely because it was deemed not culturally inappropriate.
Love Test	Couples	HIV testing	2009-Present	Billboards, TV, radio	This yearly campaign was initially informed by findings of the DHS about the high prevalence of HIV among married couples and cohabiting couples. One of the driving factors was thought to be a lack of disclosure. The campaign therefore encouraged couples to undergo HIV testing together to promote disclosure.
Soka Uncobe (Circumcise and Conquer)	Men	Voluntary medical male circumcision	2009–2010	Radio, TV, newspapers, billboards	The campaign sought to promote VMMC among men and had a one-year target of 100,000 men, representing about a third all adult men between 15–49 years[36].
Clean Fun	Youth(12–35)	HIV testing, condom use, multiple partnerships	2009–2010	Newspapers, radio, TV, overnight event	Youth attended an overnight event where there were educational talks and popular musicians and DJs from Eswatini and the region. Messages on abstinence, condom use

	Target Population	Target Risk Factor (behaviors)	Year	Mode	Summary
					and faithfulness to one partner and testing were disseminated.
Sidlaza Imphilo	Public transport operators	HIV testing	2010–2013	Billboards, TV, radio	Campaign targeted public transport operators, as they are frequently on the road for work, to encourage them to know their HIV status.
A Man Knows	Men	HIV testing	2010–2013	Billboards, TV, radio	This campaign was informed by several studies demonstrating that men were less likely than women to have been HIV tested. Messages emphasized that a real man knows his status. It was by the Minister of Health followed by additional launches to men at a tertiary education institute through a soccer tournament, six workplace communities affiliated with various HIV programs, an album launch by influential artists and promotions at commuter bus ranks (stations)
Choose One	General population	MCP	2011	Billboards, TV, radio	This campaign, based on studies showing that MCPs are a major driver of the HIV epidemic in Eswatini, sought to discourage individuals from having MCPs
Stru Aw'kaphephi (Truly You Are Not Safe)	Young adults	MCP, condom use	2012–2013	Radio, TV, newspapers, billboards, roadshows, bus rides forum theatre	This campaign highlighted the risk of a sexual network that target populations may have not been aware of. It promoted partners reduction and condom use to prevent HIV infection.

Table II.

Demographic and Clinical Characteristics of Sexually Active Adults, Ages 18–49 Years, in Eswatini, 2011

	Men, N= 3,353		Women, N= 4,026	
	Number	%	Number	(%)
Demographic Characteristics:				
Categorized Age (years)				
15–19	165	4.9	332	8.2
20–24	824	24.6	1135	28.2
25–29	822	24.5	763	19.0
30–34	594	17.7	509	12.6
35–39	382	11.4	490	12.2
40–44	307	9.2	432	10.7
45–49	259	7.7	366	9.1
Employment Status				
fully employed	1555	46.4	1148	28.5
partially employed	494	14.7	211	5.2
unemployed	1076	32.0	2462	61.1
other	160	4.8	142	3.5
missing *	67	2.0	64	1.6
Marital Status				
married, living with partner	1136	33.9	1536	38.1
married, not living with partner	433	12.9	964	23.9
not married	1755	52.4	1471	36.5
Missing *	28	0.9	56	1.4
Pregnancy Status				
pregnant	N/A	N/A	330	8.2
not pregnant	N/A	N/A	3571	88.7
missing *			126	3.1
Education Level				
no education	186	5.5	228	5.7
primary	900	26.9	1150	28.6
secondary	1552	46.3	2038	50.6
higher	703	21.0	594	14.8
missing *	12	0.3	17	0.4
Region				
Hhohho	987	29.0	1157	28.7
Manzini	1146	34.2	1369	34.0
Shiselweni	495	14.8	701	17.4
Lubombo	724	21.6	800	20.0

*All “don’t know” and “refused” responses were also coded as missing

Table III

Behavioral Characteristics of Sexually Active Adults in Eswatini, 2011

	Men, N= 3,353		Women, N= 4,026	
	Number	%	Number	(%)
Behavior				
Ever Having Been Tested for HIV				
yes	1989	59.3	3546	88.1
no	1362	40.6	478	11.9
missing *	1	0.0	3	0.0
Number of Recent Sexual Partners				
1	2439	72.8	3874	96.2
2	600	17.9	124	3.1
3 or more	274	8.2	13	0.3
missing *	40	1.2	16	0.4
Frequency of Condom Use				
always	953	28.4	811	20.1
not always	2272	67.8	3094	76.8
missing *	127	3.8	122	3.0
Circumcision Status				
circumcised	646	19.3	N/A	N/A
uncircumcised	2569	76.6	N/A	N/A
missing *	137	4.1		
Primary Partner Circumcision Status				
circumcised	N/A	N/A	720	17.9
uncircumcised	N/A	N/A	3002	74.6
missing *			303	7.5

* All “don’t know” and “refused” responses were also coded as missing

Table IV

Weighted Baseline (T1) Health Behavior Campaign Exposure Among Sexually Active Adults in Eswatini, 2011

	Men, N= 3,353		Women, N= 4,026	
	Number	**%**	**Number**	**(%)**
Exposure to Media Campaigns on Risk Reduction, by Campaign Type:				
HIV Testing				
yes	3325	99.2	3998	99.3
no	21	0.6	15	0.4
missing *	7	0.2	14	0.3
Reducing Number of Sexual Partners				
yes	3256	97.1	3927	97.5
no	92	2.8	90	2.2
missing *	5	0.1	9	0.2
Using Condoms				
yes	3327	99.2	3993	99.2
no	17	0.5	18	0.5
missing *	9	0.3	16	0.4
Benefits of Circumcision				
yes	3326	99.2	3974	98.7
no	21	0.6	48	1.2
missing *	5	0.2	4	0.1
Exposure to Campaigns About HIV Testing:				
Media Source				
Billboard	2864	85.4	3573	88.8
Radio	551	16.4	778	19.3
Television	2459	73.4	3114	77.4
Community group/organization	2803	83.6	3416	84.4
Health care provider	2451	73.1	2279	56.6
Religious leader/organization	3129	93.3	3775	93.8
Friend	2957	88.2	3688	91.6
Family member	3086	92.1	3779	93.9
Other	3160	94.3	3898	96.8
Exposure to Campaigns About Reducing Number of Partners:				
Media Source				
Billboard	2936	87.6	3650	90.7
Radio	755	22.5	1023	25.4
Television	2568	76.6	3190	79.2
Community group/organization	2836	84.6	3435	85.3

	Men, N= 3,353		Women, N= 4,026	
	Number	**%**	**Number**	**(%)**
Health care provider	2506	74.7	2414	60.0
Religious leader/organization	3148	93.9	3793	94.2
Friend	2988	89.1	3729	92.6
Family member	3130	93.4	3813	94.7
Other	3203	95.5	3915	97.2
Exposure to Campaigns About Using Condoms:				
Media Source				
Billboard	2907	86.7	3631	90.2
Radio	647	19.3	968	24.0
Television	2475	73.8	3182	79.0
Community group/organization	2788	83.2	3403	84.5
Health care provider	2378	70.9	2170	53.9
Religious leader/organization	3162	94.3	3802	94.4
Friend	2933	87.5	3704	92.0
Family member	3092	92.2	3803	94.5
Other	3193	95.3	3893	96.7
Exposure to Campaigns About Male Circumcision:				
Media Source				
Billboard	2907	86.7	3676	91.3
Radio	639	19.1	815	20.2
Television	2642	78.8	3296	81.9
Community group/organization	2825	84.3	3436	85.4
Health care provider	2436	72.7	2515	62.5
Religious leader/organization	3174	94.7	3822	94.9
Friend	2974	88.7	3786	94.0
Family member	3150	94.0	3877	96.3
Other	3190	95.1	3906	97.0

*All “don’t know” and “refused” responses were also coded as missing

Table V.

Weighted Crude and Adjusted[#] Logistic Regression Modeling Low-Risk Behaviors[§] for HBC Exposures at Baseline by Risk Behavior Outcomes at Baseline (Cross-Sectional) and 6-Months Follow-Up (Cohort) Among Sexually Active Adults in Eswatini, 2011

	Men				Women			
	Cross-Sectional Analysis (Baseline)		Cohort Analysis (6 Month Follow-Up)		Cross-Sectional Analysis (Baseline)		Cohort Analysis (6 Month Follow-Up)	
Campaign Topic Exposure (yes vs. no):	**cOR (95% CI)**	**aOR (95% CI)**	**cOR (95% CI)**	**aOR (95% CI)**	**cOR (95% CI)**	**aOR (95% CI)**	**cOR (95% CI)**	**aOR (95% CI)**
Reducing No. Sexual Partners [+]	[*]2.75 (1.85–4.11)	[*]2.26 (1.49–3.44)	[*]2.56 (1.70–3.86)	[*]1.95 (1.26–3.00)	[*]4.23 (2.21–8.12)	[*]3.02 (1.38–6.62)	2.08 (0.73–5.90)	1.90 (0.64–5.62)
Using Condoms	0.79 (0.29–2.12)	0.73 (0.26–2.07)	1.09 (0.43–2.75)	1.25 (0.49–3.18)	1.25 (0.39–4.00)	1.48 (0.45–4.88)	0.82 (0.35–1.94)	0.86 (0.36–2.05)
Benefits of Male Circumcision	1.98 (0.83–4.72)	2.36 (0.98–5.69)	1.00 (0.35–2.84)	1.16 (0.40–3.36)	1.27 (0.69–2.34)	1.16 (0.61–2.21)	1.47 (0.79–2.76)	1.51 (0.79–2.88)
HIV Testing	1.28 (0.54–3.00)	1.13 (0.47–2.73)	-	-	[*]3.00 (0.97–9.20)	[*]3.84 (1.18–12.55)	-	-

[#]Adjusted for age, employment status, marital status, pregnancy status (for women only) and education level

[*]Significant association

[+]Ordinal for number of sexual partners, categorized as 1, 2 or > 3 partners

[§]Low-risk behaviors: having ever HIV tested; fewer sexual partners; always using condoms; being circumcised or having a circumcised primary partner

cOR = crude odds ratio of reporting the corresponding low-risk behavior among those exposed to a specific HBC compared to those not exposed

aOR = adjusted odds ratio of reporting the corresponding low-risk behavior among those exposed to a specific HBC compared to those not exposed