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The Reach and Impact of Social Marketing and Reproductive Health Communication Campaigns in Zambia

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The Reach and Impact of Social Marketing and Reproductive Health Communication Campaigns in Zambia

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Abstract

Objectives: To address reproductive health problems and the HIV/AIDS epidemic in Zambia, several reproductive and HIV/AIDS prevention programs are being implemented. This paper assesses the reach of selected radio and television programs about family planning and HIV/AIDS and of communications about the socially marketed *Maximum* condoms in Zambia, as well as their impact on discussion of family planning and condom use.

Data and Methods: The analysis was based on data from the 2001–2002 Zambia Demographic and Health Survey, which contained information on a representative sample of women age 15–49 and men age 15–59. To control for self-selection and endogeneity, we use a two-stage regression model to estimate the effect of program exposure on the behavioral outcomes.

Results: Results for both men and women show that those who were exposed to radio and television programs about family planning and HIV/AIDS were more likely to have discussed family planning with their partner (OR = 1.14 for men and 1.06 for women) and to have ever used a condom (OR = 1.12 and 1.04, respectively). Men with high exposure to socially marketed *Maximum* condoms were more likely than those with low exposure to the program to have discussed family planning (OR = 1.30), as well as to have ever used a condom (OR = 1.35) and to have used a condom at their last sexual intercourse (OR = 1.15).

Conclusion: Findings suggest that the reproductive health and social marketing campaigns in Zambia reached a large portion of the population and had a significant impact on family planning discussion and condom use.

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The Reach and Impact of Social Marketing and Reproductive Health Communication Campaigns in Zambia

Introduction

Zambia, like other sub-Saharan African countries, is dealing with important health issues including HIV/AIDS, family planning, and reproductive health. AIDS is omnipresent, contraceptive use is low, and reproductive health needs are not yet fully met (Agha, 1998; Central Statistical Office [Zambia], Central Board of Health [Zambia], and ORC Macro, 2003; Chikamata, Chinganya, Jones, and RamaRao, 2002; Slaymaker and Buckner, 2003; van den Borne, Tweedie, and Morgan, 1996). In recent years, governmental and nongovernmental organizations (NGOs) have designed and implemented social marketing and health communication programs to address these problems (van den Borne et al., 1996; Yoder, Hornik, & Chirwa, 1996; Colorito, 2003; Communication Initiative, 2003; Population Services International [PSI], 2002). Responding to the growing importance of social marketing and health communication programs, the 2001–2002 Zambia Demographic and Health Survey (ZDHS) included a series of questions on exposure to such programs (Central Statistical Office [Zambia] et al., 2003). The purpose of this paper is to assess the reach of selected social marketing and reproductive health communication activities in Zambia and to assess their impact on discussion of family planning and on condom use.

Background

Reproductive Health

While knowledge of modern contraceptives is nearly universal in Zambia, use of modern contraceptives has remained low (Central Statistical Office [Zambia] et al., 2003; Chikamata et al., 2002). The percentage of married women currently using contraceptives increased steadily but slowly from 9% in 1992, to 14% in 1996, to 23% in 2001–2002. Consequently, fertility levels remained among the highest in sub-Saharan Africa. It is estimated that the total fertility rate (TFR) decreased from 7.2 children per woman in 1980, to 6.5 in 1992, to 5.9 in 2001–2002.

As in many countries in sub-Saharan Africa, Zambian youth are particularly vulnerable to reproductive health problems. Sexual activity among adolescents is widespread, and few young people use contraceptives (Central Statistical Office [Zambia] et al., 2003; Ndubani and Hojer,

2001; Vijayan K. Pillai and Kofi Benefo, 1995; Kambou, 1999). The median age at first intercourse was under 17 years for women and about 18 years for men. One in five male and female youth had intercourse before age 15. Among young people, unwanted pregnancy was one of the most common sexual and reproductive health problems. Nearly one-third (32%) of teenage girls were mothers or currently pregnant with their first child. Death rates from abortions and deliveries among young women were high (Feldman, O'Hara, Baboo, Chitalu, and Lu, 1997; van den Borne et al., 1996). An estimated two-thirds of unwanted pregnancies ended in unsafe abortion, usually self-induced (Webb, 2000).

HIV/AIDS

Estimates of the adult prevalence of HIV in Zambia varied, with surveillance-based estimates putting the prevalence close to 20%, which is among the highest in sub-Saharan Africa (Dzekedzeke, 2003; Fylkesnes et al., 1997; van den Borne et al., 1996). HIV testing in the 2001–2002 ZDHS found a somewhat lower prevalence: 18% of women age 15–49 and 13% of men age 15–59 tested HIV+ (Central Statistical Office [Zambia] et al., 2003). HIV prevalence was more than twice as high in urban areas as in rural areas: 26% and 12%, respectively. Due to the relations between female commercial sex workers (CSWs) and long-distance truck drivers, HIV infection rates were extremely high along major national highways and border posts (Family Health International, 2000b; Family Health International, 2000a). Recent estimates put HIV prevalence along major highways, borders, trading centers, and farming and mining towns at about 30%. Among youth aged 15–24, the estimated HIV prevalence rate in 2001–2002 was 13% for men and 18% for women (World Health Organization, 2003).

HIV/AIDS-related knowledge has improved considerably. Currently, approximately 95% of Zambians have heard of AIDS and know it is fatal. Nevertheless, a substantial portion of Zambians continue to engage in risky sexual behavior. The 2001–2002 ZDHS indicated that 17% of men and 3% of women reported having two or more sexual partners in the previous 12 months; 10% of men admitted paying for sex in the previous 12 months (Central Statistical Office [Zambia] et al., 2003).

Knowledge of male condoms was nearly universal, and more than three out of four adults knew a condom source (Gaisie, Cross, and Nsemukila, 1993; Central Statistical Office [Zambia], Ministry of Health [Zambia], and Macro International Inc., 1997; Central Statistical Office

[Zambia] et al., 2003; van den Borne et al., 1996). Compared to 72% of males, only 45% of females felt confident that they could obtain a condom. Despite the high HIV/AIDS awareness, levels of condom use remained low, particularly with regular partners (Agha, 1998; Central Statistical Office [Zambia] et al., 2003; Magnani et al., 2002). Only 8% of women and 10% of men reported using a condom in last intercourse with their spouse or cohabiting partner. By contrast, 33% of women and 44% of men reported using a condom in last intercourse with a non-cohabiting partner. Among men who admitted to paying for sex in the past year, 45% reported using a condom during last paid sex (Central Statistical Office [Zambia] et al., 2003). Similarly, high-risk groups, such as truck drivers and CSWs typically do not use condom consistently (Family Health International, 2000b).

Social Marketing and Reproductive Health Communication Campaigns

Since the mid-1980s, numerous approaches have been used to address these reproductive health problems and to prevent the spread of HIV. At present, numerous reproductive and HIV/AIDS prevention programs are being implemented through the private, public, and voluntary sectors (AIDS Analysis Africa, 1994; USAID Zambia, 2000; Chikamata et al., 2002; Mahler, 1999; Population Council, 2002; Skibiak, 1995). These programs target both the general population and high-risk groups such as women, adolescents, truck drivers, and CSWs. Several programs specifically target adolescents and young adults (Barnett, 2000; Goodrich, 1998-1999; Kambou, 1999; Pillai and Barton, 1999; Shannon, 1998).

Most programs use mass media and/or interpersonal communication campaigns to encourage Zambians to use contraceptives and to prevent the spread of HIV by promoting condom use and safer sexual behavior.

The Zambia Social Marketing Program (ZSMP) was launched in 1992 and is implemented by the Society for Family Health (SFH), an affiliate of Population Services International. SFH distributes subsidized *Maximum* brand condoms and promotes their use through intensive mass media and interpersonal communications. To date, SFH has sold over 65 million condoms. Like several other organizations, SFH makes extensive use of radio and television to promote healthy behavior. For example, SFH's *Club NTG* (New Teen Generation) is a youth-oriented radio program about issues that affect young people, such as teen pregnancy, HIV/AIDS, sexuality, and condom use. Similarly, *An Inside Look* is an interactive television talk

show that addresses health and social issues (Population Services International [PSI], 2002). SFH also produced and broadcast radio and television public service announcements with Dr. Kenneth David Kaumba, the former President of Zambia. These public service announcements aim to discourage HIV-related stigmas, and promote faithfulness, condom use, and voluntary testing and counseling (Communication Initiative, 2003).

Many Zambian health campaigns have made extensive use of print media, song, dance, and drama, but recently radio and television programs have become popular means of educating the public about family planning and HIV/AIDS prevention (van den Borne et al., 1996; Yoder et al., 1996). Television programs are expected to be effective for reaching urban populations, while radio programs are expected to be more effective for reaching rural populations. In 1991, the Ministry of Health and the Zambian National Broadcasting Company produced and broadcast *Nshilakamona (I Have Not Seen It)*, a radio soap opera on HIV/AIDS. The series comprised 39 half-hour episodes that focused on the public denial of the HIV/AIDS epidemic and that were broadcast weekly over a nine-month period. The series aimed to increase risk awareness, discussion of HIV/AIDS, awareness of condom efficacy, and promote monogamy. The popular South African drama series *Soul City* is also broadcast in Zambia. *Soul City* uses both television and radio soap opera series to educate the public about HIV/AIDS (Colorito, 2003). The *Soul City* television drama comprises 13 episodes of 30 minutes each, while some of the radio series consist of either 45 or 60 episodes of 15 minutes each. The series address misinformation about HIV/AIDS and tackles complex topics such as the stigmas associated with HIV infection.

Data and Methods

Data

This study uses data from the 2001–2002 ZDHS, which contains information on a nationally representative sample of 7,658 women age 15–49 and 2,145 men age 15–59. The survey was implemented by the Central Statistical Office and the Central Board of Health of Zambia. The survey instruments collected information on a wide range of topics, including mass media exposure, family planning, fertility, and HIV/AIDS/STI-related knowledge and behavior (Central Statistical Office [Zambia] et al., 2003).

In addition to the standard question modules, the ZDHS included questions on exposure to social marketing and health communication activities about family planning and HIV/AIDS.

Specifically, both female and male respondents were asked if they had listened to any of the following four radio programs in the past six months: *Your Health Matters*, *Lifeline*, *AIDS and the Family*, or *Our Neighborhood*. They were also asked if they had watched any of the following four television programs in the past six months: *Your Health Matters*, *Lifeline*, *Soul City*, or *X-plosion*. In addition, male respondents were asked if they had ever seen or hear any messages about *Maximum* brand condoms, and if so, where they had seen or heard such messages.

The data were collected using a three-stage sampling design. First, 320 clusters were selected from the 2000 Population Census. Next, a representative sample of approximately 8,000 households was selected from those clusters. All women age 15–49 in the selected households were eligible for interviewing. In a sub-sample of one-third of households, all men age 15–59 were eligible for interviewing (Central Statistical Office [Zambia] et al., 2003). For the analyses, the non-weighted samples were used. Only sexually experienced respondents are included in the analyses.

Measures

The outcome measures for our analyses are dichotomous variables that capture the respondents' reproductive health behaviors and indicate whether the respondent had ever discussed family planning matters with his/her partner, had ever used a condom, and had used a condom during the last sexual encounter. These outcome variables were calculated only for the sexually active respondents.

Our indicators of exposure to communication programs about family planning and HIV/AIDS include a count from 0 through 4 of the number of radio programs that the respondent heard in the previous six months (including *Your Health Matters*, *Lifeline*, *AIDS and the Family*, and *Our Neighborhood*) and a count from 0 through 4 of the number of television programs the respondent saw (including *Your Health Matters*, *Lifeline*, *Soul City*, *X-plosion*), as well as a count from 0 to 8 of the total number of programs the respondent had seen or heard. For men, we also include an indicator of the number of sources of information about *Maximum* brand condoms.

As control variables, we included the respondents' age (in years), place of residence (Lusaka, other urban, or rural), religion (Protestant, Catholic, or Other), highest level of education achieved (none, primary, secondary, or higher), number of sexual partners in the past 12 months, and perceived personal risk for HIV/AIDS (none, low, moderate, or high). For the analyses, we combined those who reported being HIV+ and those with high risk. Ownership of radio and television was measured by a set of dichotomous variables.

We also included dummy variables indicating whether the respondents desired a child within the following two years, knew where to obtain a condom, thought they could obtain a condom, and whether their last partners were casual partners.

Statistical Methods

As most of the variables were categorical χ^2 tests, they were used to compare their distributions for the female and male samples. For the few parametric variables, independent sample *t* tests were performed to compare female and male samples.

When examining the effect of program exposure on reproductive health behaviors, it is possible that the same unobserved exogenous factors that affect reproductive health behavior also affect program exposure, as well as that people who display certain reproductive health behaviors may seek out these programs. For instance, someone who intends to use condoms to avoid HIV infection may actively seek out sources of information about condom use and where to obtain them. Standard single-stage regression techniques always assume that all predictor variables are exogenous to the model. When program exposure, however, is endogenous and the error terms of program exposure and reproductive health behavior variables are correlated, the estimate for the effect of program exposure on reproductive health behavior may be biased. Researchers avoid this pitfall by using two-stage regression models in those instances when program exposure shows substantial endogeneity (Bollen, Guilkey, and Mroz, 1995; Chen and Guilkey, 2003; Maddala, 1983).

The proposed two-stage model first required estimating program exposure using a set of exogenous variables. As the program exposure indicators used here are count variables, Poisson regression was used for this first step. In the second step, the estimated values for program exposure were used in the model for reproductive health behaviors rather than the observed

program exposure. As the reproductive health behavior outcome measures are dichotomous, logistic regression was used for this second step. Where no substantial endogeneity in program exposure was observed, the standard one-stage model was used.

To estimate a two-step model, one needs to assure that the model is identified. In a strict sense this condition was fulfilled because the sets of exogenous variables in the two structural equations are not identical. That is, the exogenous predictors of program exposure and of reproductive health behaviors are not all the same. Ideally, however, one would also like that the variables excluded from the structural model for reproductive health behaviors are unrelated to these outcome variables. To test the identification of the model, we used a test proposed by Bollen et al. (1995), based on the comparison of the goodness-of-fit of the unrestricted reduced models and the structural models for reproductive health behaviors in which the predicted program exposure was substituted for observed exposure. This test indicated that there were no identification problems for the male sample. For the female sample, identification problems occurred only with respect to discussion of family planning with partners. However, after a Bonferroni correction, these identification problems became insignificant.

To estimate program exposure, the following variables were included in the model: age, residence, education, number of partners, perceived AIDS risk, and the media exposure indicators. In the model for reproductive health behaviors, the following variables were included: program exposure, age, religion, residence, education, number of partners, perceived AIDS risk, and the proximate determinants of reproductive health behaviors. The results are presented in the form of odds ratios. In the case of parametric variables, such as the number of reproductive health programs respondents were exposed to, we also discussed the interdecile odds ratio (OR_D). The interdecile odds ratio ranks respondents in terms of level of exposure and then estimates the likelihood that the outcome was experienced by those 10% of respondents who had the highest levels of exposure, relative to the likelihood that it was experienced by the 10% of the respondents with the lowest levels of exposure.

Sample Description

Table 1 shows the sample characteristics. The female and male samples are significantly different on most socio-demographic characteristics, although many of the differences are small. Over two-thirds of respondents lived in rural areas, while 18% lived in a town, 6% in a small city

and 9% in the capital Lusaka. The male sample was on average 2.5 years older than the female one because of the different eligibility criteria for the two samples. Women were more likely than men to have had no formal education (14% and 5%, respectively) and less likely than men to have had secondary or higher education (26% and 42%, respectively). Ownership of radio and television was also significantly higher among men than among women. While 50% of men reported owning a radio and 22% owned a television, among women only 43% and 18% reported owning one, respectively.

Men report higher levels of risky sexual behavior than females. Where only 2% of the women reported more than one sex partner in the past year, 20% of men did. Similarly, 11% of men but only 1% of women report that their last sexual partner was a casual partner. Nevertheless, men were more likely than women to consider themselves at no or at low risk of HIV/AIDS; 46% of females and 57% of males considered themselves at no or low risk of getting AIDS.

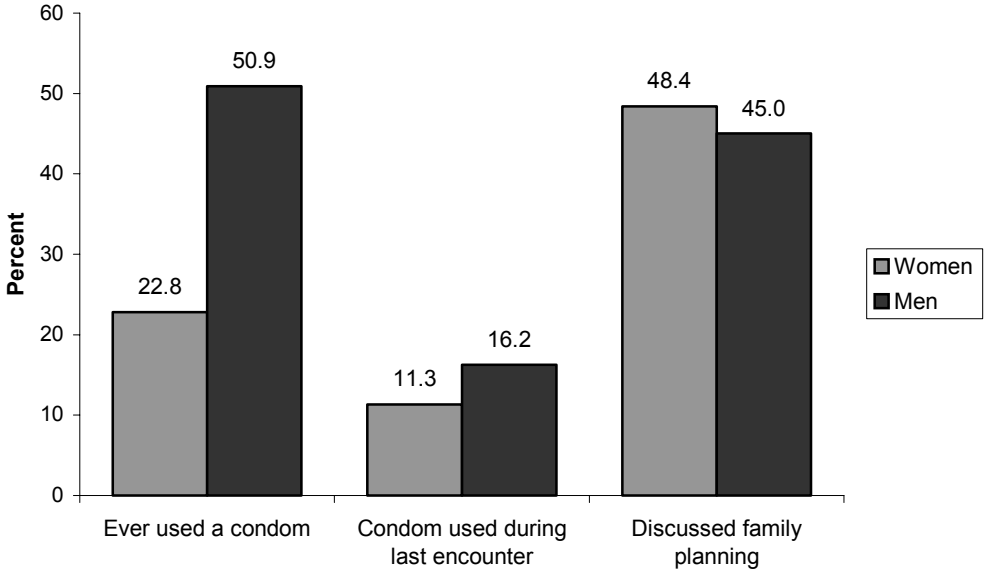
Knowledge of a condom source varies little by gender (86% for males and 79% for females). However, men were much more likely than women to be convinced that they could obtain a condom (76% and 48%, respectively). A significantly higher percentage of men than women desired a child within the following two years (30% and 18%, respectively).

Women reported significantly less condom use than men (Figure 1). Only 23% of the sexually active women reported ever having used a condom compared to 51% of men. Similarly, 11% of women and 16% of men report condom use during last intercourse. However, 48% of sexually active women and 45% of sexually active men felt that they could discuss family planning with their partners.

Table 1. Descriptive Statistics (Unweighted Samples)

	Women	Men	p
Age			
15–19	15.4%	15.4%	
20–24	23.1%	16.6%	
25–29	19.7%	18.0%	
30–34	14.2%	14.2%	0.000
35–39	11.5%	12.6%	
40–44	8.9%	8.8%	
45–49	7.2%	5.8%	
50–54		4.9%	
55–59		3.8%	
De facto place of residence			
Lusaka	9.4%	8.9%	0.333
Other urban	22.7%	24.2%	
Rural	67.9%	67.0%	
Religion			
Catholic	22.4%	23.9%	0.000
Protestant	75.3%	72.0%	
Other	2.4%	4.1%	
Highest educational level			
No education	14.0%	5.4%	0.000
Primary	60.1%	52.7%	
Secondary and higher	25.9%	41.8%	
Perceived risk of HIV/AIDS			
No risk at all	28.8%	37.2%	
Low	17.1%	19.4%	0.000
Moderate	26.9%	17.7%	
High or has AIDS	27.2%	25.8%	
Number of partners in the previous 12 months (including husband)	0.87	1.24	0.000
Owned radio			
No	57.1%	50.4%	0.000
Yes	42.9%	49.6%	
Owned TV			
No	81.9%	78.1%	0.000
Yes	18.1%	21.9%	
Desired child in following 2 years			
No	82.2%	69.9%	0.000
Yes	17.8%	30.1%	
Knew where to obtain a condom			
No	20.6%	14.3%	0.000
Yes	79.4%	85.7%	
Last partner was casual partner			
No	98.9%	89.1%	0.000
Yes	1.1%	10.9%	
Could obtain condom			
No	51.9%	24.0%	0.000
Yes	48.1%	76.0%	
Number of cases	6,782	1,928	

Figure 1. Reproductive Health Behaviors by Gender of Respondent



Note: Percentages for "Ever used a condom" and "Condom used during last encounter" refer to sexually active respondents only.

Results

Levels of Program Exposure

Figure 2 shows the percentage of females and males who reported recalling exposure to any of the four radio reproductive health programs, as well as exposure to each of the four television programs on reproductive health. For males, we also show the percentage who recalled messages about the social marketed *Maximum* condoms.

The radio program associated with the highest levels of recall was *Your Health Matters*, followed by *Our Neighborhood* and *AIDS and the Family*. Figure 1 shows that 58% of males and 36% of females recalled hearing *Your Health Matters* in the previous six months. The television program *Your Health Matters* also triggered the highest recall (30% of men and 23% of women), followed by *X-plosion*. For all programs, women reported lower exposure than men. On average, women reported having seen or heard 1.8 of the eight programs listed, while men had seen or heard 2.7 of these programs (not shown). Three quarters of the male respondents (75%) reported having been exposed to messages for the socially marketed *Maximum* condoms.

Figure 2. Percentage That Recalled Exposure to Reproductive Health Radio and Television Programs in the Previous Six Months and Recall of *Maximum* Condom Advertisements

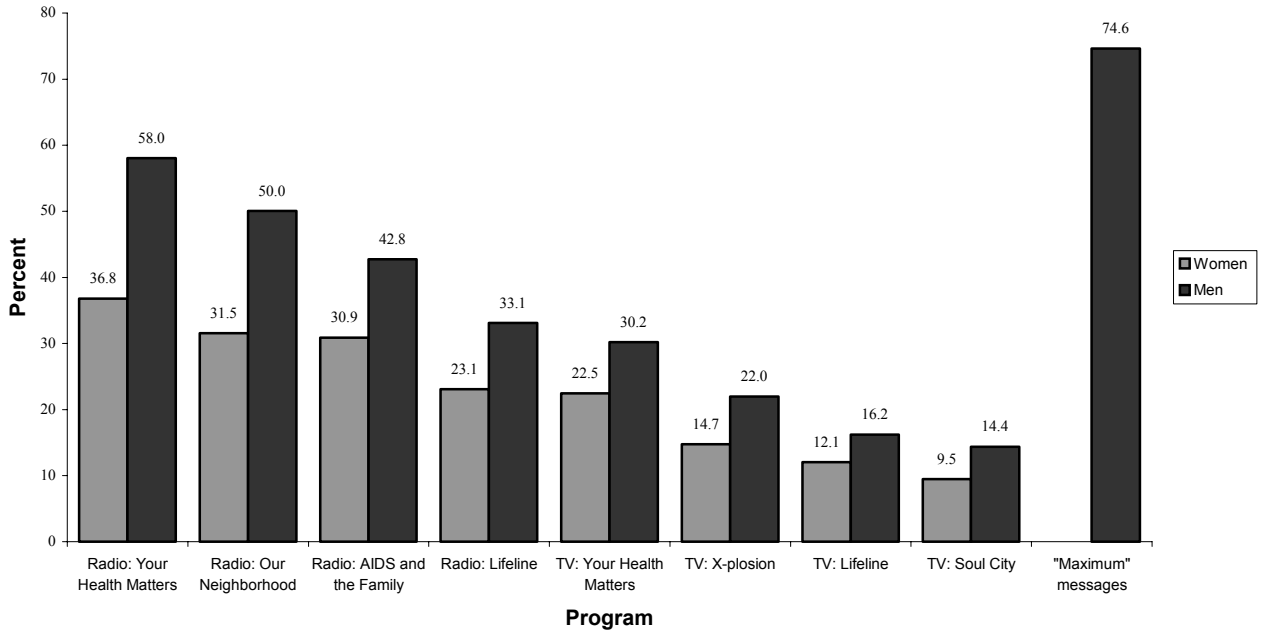


Table 2 presents the results of Poisson regression analyses on the program exposure variables. The purpose of these analyses was twofold: to identify determinants of program exposure and to generate both the instrumental variable and the residual variable required for the endogeneity test in the first stage of two-stage regression. The included socio-demographic factors affected almost all the program exposure indicators, but the effects varied substantially. For instance, for both men and women, age had a significant positive effect on the total number of programs exposed to and on the number of radio programs exposed to. However, age seemed to have a small negative effect on the number of television programs exposed to, as well as on exposure to information about *Maximum* condoms.

In general, urban respondents were likely to have been exposed to a greater number of reproductive health programs than rural respondents. However, the effect of urbanization on program exposure is substantially greater for exposure to television programs than for radio programs. The effect of urbanization was also greater among women than among men. Exposure to these reproductive health programs also increased with the education level of the respondents; again, the effects were greater among women than among men.

Table 2. Poisson Regression Results for Program Exposure Indicators by Gender

	Females			Males			
	Total	Radio programs	TV programs	Total	Radio programs	TV programs	"Maximum" sources
Age	0.002*	0.006***	-0.005**	0.005***	0.008***	-0.004	-0.008***
Residence (ref: Rural)							
Capital	0.881***	0.593***	1.736***	0.510***	0.212***	1.242***	0.377***
Other urban	0.637***	0.457***	1.364***	0.346***	0.130**	0.987***	0.129*
Education (ref: No formal education)							
Primary	0.835***	0.812***	0.982***	0.578***	0.570***	0.735**	0.465***
Secondary and higher	1.329***	1.224***	1.666***	0.980***	0.863***	1.459***	0.807***
Number of partners in previous 12 months	0.018	0.030	-0.008	0.019	0.019	0.029	0.031*
Perceived AIDS risk (ref: None)							
Low	-0.038	-0.070*	0.019	0.033	-0.026	0.174*	0.078
Moderate	-0.071**	-0.094**	-0.020	-0.108*	-0.090	-0.155	-0.005
High or has AIDS	0.174***	0.207***	0.100*	0.094**	0.118**	0.031	0.034
Owns Radio	0.481***	0.650***	-0.009	0.387***	0.473***	0.145*	0.160***
Owns TV	0.449***	0.103**	1.225***	0.278***	-0.007	0.829***	0.181**
Constant	-1.254***	-1.504***	-3.143***	-0.416***	-0.666***	-2.249***	-0.328*
Pseudo-R2	26.6%***	15.7%***	40.9%***	16.7%***	7.4%***	31.4%***	6.2%***
Number of Respondents	**6,782**			**1,928**			

* p<0.05
** p<0.01
*** p<0.001

The indicators of risk behavior had little impact on program exposure. For example, the reported number of partners in the past 12 months only affects exposure to the *Maximum* campaign. Perceived AIDS risk also had only a small effect on program exposure. Among women, only those who considered themselves to be at high risk for AIDS or who reported having AIDS had a significantly higher level of program exposure, while those who reported a moderate risk tended to have lower program exposure. Among men these effects were substantially smaller, and often not significant.

As anticipated, program exposure was affected by the respondents' ownership of radio and television. Women who owned a radio tended to have a higher total program exposure and exposure to radio programs than women who did not own a radio. Radio ownership among women, however, did not affect exposure to television programs. Among men, radio ownership had a positive effect on all program exposure indicators, but the effects were substantially greater for total exposure and exposure to radio programs than for exposure to television programs and exposure to *Maximum* sources. Television ownership among women had a significant positive

effect on all program exposure variables, but again the effect was substantially greater for exposure to television programs than for the other variables. Similar effects were observed for men, except that the effect of exposure to radio programs was not significant.

Effect of Campaign Exposure on Reproductive Health Behavior

Because the possibility exists that the observed associations between program exposure and reproductive health behaviors are affected by the endogeneity of program exposure, we first tested for the presence of endogeneity (Bollen et al., 1995). The results of these analyses (not shown) indicate that endogeneity is a problem only for the models that estimate whether women discussed family planning with their partners. Hence, for this indicator the use of a two-stage model was advisable. For all other reproductive health behavior variables, no endogeneity problem was identified, so a one-stage model was used. Nevertheless, we estimated both one-stage and two-stage logistic regressions for all variables.

Effect on Discussion of Family Planning

Table 3 shows the effect of program exposure and other predictors on the likelihood that sexually active females discussed family planning with their partner in the previous year. Because a significant endogeneity problem was identified, the use of the results from the two-stage models was advisable (even-numbered columns). It is noteworthy, however, that the overall performance of the one-stage and two-stage models was fairly similar.

Column 2 shows that exposure to radio and television programs on family planning and HIV/AIDS is associated with an increased likelihood that women have discussed family planning with their partners. Exposure to a single additional program about reproductive health increased the odds of discussion of family planning by 15% (OR = 1.148).

To better illustrate the magnitude of the effect of exposure to these programs, we also calculated the interdecile odds ratio (OR_D). The OR_D for exposure to radio or television programs about reproductive health is 2.29. In other words, women with the highest levels of program exposure were 2.29 times as likely as women with the lowest exposure to have discussed family planning with their partner. Column 4 shows that female respondents who had the highest levels of exposure to radio programs were 3.49 times as likely as those with low exposure to have discussed family planning with their partner in the past year ($OR_D = 3.49$). By

Table 3. Estimates of the Impact of Program Exposure on the Odds of Females Discussing Family Planning with Their Partners

	Program exposure indicator use					
OR	Total exposure		Radio programs		TV programs	
(95% CI)	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Exposure (Total)						
Observed	1.062***					
Predicted		1.148***				
Exposure (Radio programs)						
Observed			1.101***			
Predicted				1.367***		
Exposure (TV programs)						
Observed					1.037	
Predicted						1.154**
Age	1.022***	1.021***	1.022***	1.020***	1.022***	1.022***
Religion (ref: Protestant)						
Catholic	1.063	1.070	1.063	1.072	1.068	1.068
Other	0.812	0.796	0.816	0.793	0.803	0.798
Residence (ref: Rural)						
Capital	0.805*	0.656**	0.851	0.676***	0.866	0.752*
Other urban	0.883	0.769**	0.903	0.752**	0.947	0.861
Education (ref: No formal education)						
Primary	1.213*	1.154	1.197*	1.067	1.247**	1.237**
Secondary & higher	1.062	0.887	1.063	0.781*	1.168	1.069
Number of partners previous 12 months	5.784***	5.741***	5.775***	5.660***	5.778***	5.788***
Perceived AIDS risk (ref: None)						
Low	1.076	1.074	1.081	1.085	1.073	1.070
Moderate	1.156*	1.158*	1.161*	1.175*	1.150*	1.147
High or has AIDS	1.101	1.070	1.093	1.025	1.121	1.114
Wanted child in following 2 years	0.591***	0.596***	0.588***	0.596***	0.595***	0.596***
Knew where to obtain condoms	1.465***	1.479***	1.462***	1.473***	1.487***	1.488***
Last partner was casual	0.015***	0.016***	0.016***	0.016***	0.015***	0.015***
Could obtain condoms	1.486***	1.508***	1.479***	1.510***	1.504***	1.505***
Constant	0.055***	0.055***	0.055***	0.056***	0.054***	0.054***
OR_D	1.43	2.07	1.47	2.82	1.12	1.46
Pseudo-R2	10.3%***	10.3%***	10.4%***	10.5%***	10.1%***	10.2%***
Number of respondents	**6,782**					

* p<0.05
** p<0.01
*** p<0.001
Note: The odd-numbered columns contain the results for the one-stage models, and the even-numbered columns contain those for the two-stage models.

contrast, women with the highest levels of exposure to television programs on family planning and HIV/AIDS only were 1.54 times as likely as those with the lowest levels of exposure to have discussed family planning with their partner (OR_D = 1.54, see column 6).

Table 3 also shows that older women were more likely to discuss family planning with their partners than younger ones were. Surprisingly, religion, education, and perceived HIV risk did not have any significant effects, and urban respondents were less likely than rural ones were to discuss family planning with their partners. Discussion of family planning increases with the

respondents' number of sexual partners. Women who wanted a child in the following two years were significantly less likely to discuss family planning with their partner. Women who reported that their last partner was a casual one (1% of the sample) were very unlikely to have discussed family planning with their partners. Knowledge of a condom source had a strong significant effect on the likelihood of discussing family planning, as did the belief that one could actually obtain condoms.

The results for males are shown in Table 4. Unlike the case for females, no evidence of endogeneity occurred for the male models, and therefore we used the one-stage models (shown in columns 1, 3, 5, and 7). The results show that exposure to radio and television programs about reproductive health had a positive effect on discussion of family planning (OR = 1.14). Distinguishing between the radio and television programs about family planning and HIV/AIDS shows that exposure to radio programs had a significant effect (OR = 1.24), but exposure to television programs did not.[1] Column 7 also shows that exposure to messages about *Maximum* brand condoms had a significant positive effect on the likelihood that males discussed family planning with their partners (OR = 1.30).

Once again using the estimated OR_Ds to illustrate the magnitude of the effect of program exposure, we observed that males with the highest levels of exposure to reproductive health radio and television dramas were 2.15 times as likely as those with the lowest levels of exposure to have discussed family planning with their partner. As was the case with women, males with the highest levels of radio exposure are more than twice as likely as those with the lowest levels of exposure to have discussed family planning (OR_D = 2.34). Since odds ratio for television exposure is not significant, the OR_D is not meaningful. Exposure to different *Maximum* message sources also has a significant effect, with an OR_D of 2.18.

The likelihood that men discussed family planning with their partner increased significantly with age and is greater for males who know a condom source or who feel they could obtain a condom if they wanted to. Men whose last partner was a casual partner were unlikely to have discussed family planning.

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[1] The effects of program exposure become non-significant in the two-stage models. That is not unexpected, as controlling for endogeneity when there is none, as is the case here, tends to increase the standard errors (Bollen et al., 1995).

Table 4. Estimates of the Impact of Program Exposure on the Odds of Males Discussing Family Planning with Their Partners

	Program exposure indicators							
OR	Total exposure		Radio programs		TV programs		"Maximum" sources	
(95% CI)	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Exposure (Total)								
Observed	1.136***							
Predicted		1.028						
Exposure (Radio programs)								
Observed			1.237***					
Predicted				1.140				
Exposure (TV programs)								
Observed					1.068			
Predicted						0.965		
Exposure ("Maximum" sources)								
Observed							1.296***	
Predicted								0.648
Age	1.077***	1.077***	1.075***	1.075***	1.078***	1.078***	1.081***	1.073***
Religion (ref: Protestant)								
Catholic	1.016	1.039	1.007	1.043	1.034	1.043	1.023	1.046
Other	0.839	0.817	0.847	0.822	0.817	0.817	0.833	0.814
Residence (ref: Rural)								
Capital	0.567**	0.709	0.672*	0.702	0.674	0.801	0.613*	1.067
Other urban	0.685	0.824	0.774	0.811	0.787	0.904	0.779	1.010
Education (ref: No formal education)								
Primary	0.818	0.875	0.785	0.815	0.890	0.897	0.825	1.062
Secondary & higher	0.931	1.124	0.929	0.993	1.135	1.230	0.972	1.814
Number of partners previous 12 months	1.126*	1.125*	1.120*	1.119*	1.129*	1.125*	1.120*	1.150**
Perceived AIDS risk (ref: None)								
Low	1.002	1.010	1.031	1.016	1.009	1.024	1.001	1.078
Moderate	0.833	0.818	0.847	0.826	0.819	0.816	0.822	0.828
High or has AIDS	0.837	0.854	0.835	0.832	0.864	0.866	0.873	0.889
Wanted child in following 2 years	1.194	1.148	1.174	1.149	1.162	1.142	1.161	1.127
Knew where to obtain condoms	2.688***	2.789***	2.560***	2.755***	2.850***	2.793***	2.640***	2.811***
Last partner was casual	0.106***	0.105***	0.107***	0.105***	0.105***	0.104***	0.106***	0.103***
Could obtain condoms	1.525*	1.617**	1.526*	1.624**	1.581*	1.613**	1.499*	1.602**
Constant	0.022***	0.023***	0.023***	0.023***	0.022***	0.023***	0.019***	0.033***
OR_D	2.15	1.81	2.34	2.36	1.22	1.11	2.18	1.21
Pseudo-R2	18.0%***	17.0%***	18.4%***	17.0%***	17.1%***	17.0%***	17.9%***	17.1%***
Number of respondents	**1,933**							

* p<0.05
** p<0.01
*** p<0.001
Note: The odd-numbered columns contain the results for the one-stage models, and the even-numbered columns contain those for the two-stage models.

Effect on Ever Use of Condoms

The estimates of the effect of exposure to social marketing and health communication programs on the likelihood that women ever used condoms are shown in Table 5. The results show that exposure to radio and television programs about family planning and HIV/AIDS had a

significant but small positive effect on the likelihood that women have tried condoms (OR = 1.04).

Among women the OR_Ds of total exposure, radio program exposure, and television program exposure are 1.25, 1.19, and1.21, respectively, indicating that those with the highest levels of exposure are roughly 20% more likely than those with the lowest levels of exposure to have tried condoms.

Older respondents are less likely than younger ones and Catholic respondents less likely than Protestants to have ever used condoms. The likelihood of ever having used condoms increases with the level of urbanization and education. The likelihood that a woman has tried condoms is also significantly higher for women who reported knowing where to obtain condoms, felt confident they could obtain condoms if they wanted to, and with a high number of sexual partners. Women who reported wanting to have a child in the following two years were less likely than other women to have ever used a condom.

Table 6 shows the results of similar analyses for men. The results show that exposure to radio and television programs about family planning and HIV/AIDS had a positive effect on the likelihood that males had ever used condoms (OR = 1.12). Exposure to *Maximum* messages had a very strong positive effect on male respondents' ever use of condoms (OR = 1.35).

The OR_Ds for radio and television dramas show that men with the highest levels of exposure are 2.0 and 1.5 times more likely, respectively, than those with the lowest levels of exposure to have ever used a condom. Males with the highest levels of exposure to messages about *Maximum* brand condoms are 2.5 times more likely than those with the lowest levels to have tried condoms (OR_D = 2.48).

The likelihood that males have ever used condoms decreased with age and was less for males who are not Protestants. The likelihood increased with level of urbanization, education, number of sexual partners, and condom use self-efficacy. Contrary to women, ever use of condoms is higher among males who wish to have a child in the following two years. Perceived AIDS risk, knowledge of a condom source, and type of last sexual partner did not have an effect on male ever use of condoms.

Table 5. Estimates of the Impact of Program Exposure on the Odds of Females Ever Having Used a Condom

	Program exposure indicators					
OR	**Total exposure**		**Radio programs**		**TV programs**	
(95% CI)	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Exposure (Total)						
Observed	1.038*					
Predicted		1.014				
Exposure (Radio programs)						
Observed			1.044*			
Predicted				1.035		
Exposure (TV programs)						
Observed					1.065*	
Predicted						1.015
Age	0.966***	0.967***	0.966***	0.966***	0.967***	0.967***
Religion (ref: Protestant)						
Catholic	0.844*	0.847*	0.845*	0.847*	0.844*	0.847*
Other	0.597	0.593	0.598	0.593	0.594	0.594
Residence (ref: Rural)						
Capital	1.658***	1.762***	1.752***	1.764***	1.653***	1.786***
Other urban	1.271**	1.327**	1.312**	1.321**	1.281**	1.342**
Education (ref: No formal education)						
Primary	1.871***	1.897***	1.871***	1.880***	1.903***	1.910***
Secondary & higher	3.838***	4.021***	3.925***	3.958***	3.946***	4.097***
Number of partners previous 12 months	2.066***	2.058***	2.061***	2.055***	2.067***	2.060***
Perceived AIDS risk (ref: None)						
Small	1.136	1.134	1.138	1.136	1.132	1.134
Moderate	1.129	1.126	1.130	1.128	1.125	1.124
High or has AIDS	0.993	0.998	0.993	0.992	1.001	1.003
Wanted child in following 2 years	0.723***	0.727***	0.723***	0.727***	0.726***	0.726***
Knew where to obtain condoms	1.579***	1.600***	1.584***	1.600***	1.591***	1.601***
Last partner was casual	0.739	0.733	0.739	0.733	0.735	0.733
Could obtain condoms	2.319***	2.337***	2.318***	2.337***	2.333***	2.336***
Constant	0.066***	0.065***	0.066***	0.065***	0.066***	0.065***
OR_D	1.25	13.3%***	1.19	1.07	1.21	0.94
Pseudo-R2	13.4%***	13.3%***	13.4%***	13.3%***	13.4%***	13.3%***
Number of respondents	**6,782**					

* p<0.05
** p<0.01
*** p<0.001
Note: The odd-numbered columns contain the results for the one-stage models, and the even-numbered columns contain those for the two-stage models.

Table 6. Estimates of the Impact of Program Exposure on the Odds of Males Ever Having Used a Condom

OR (95% CI)	Program exposure indicators							
	Total exposure		**Radio programs**		**TV programs**		**"Maximum" sources**	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Exposure (Total)								
Observed	1.124***							
Predicted		1.152*						
Exposure (Radio programs)								
Observed			1.185***					
Predicted				1.244				
Exposure (TV programs)								
Observed					1.115*			
Predicted						1.106		
Exposure ("Maximum" sources)								
Observed							1.353***	
Predicted								1.768
Age	0.977***	0.978***	0.975***	0.976***	0.979***	0.980***	0.981***	0.985*
Religion (ref: Protestant)								
Catholic	0.750*	0.766*	0.745*	0.774*	0.766*	0.767*	0.755*	0.766*
Other	0.510*	0.524*	0.506*	0.525*	0.516*	0.517*	0.517*	0.523*
Residence (ref: Rural)								
Capital	2.085**	1.917*	2.448***	2.325***	2.207***	2.211**	2.105**	1.672
Other urban	1.401*	1.332	1.578**	1.533**	1.487**	1.502*	1.530**	1.388
Education (ref: No formal education)								
Primary	1.619	1.547	1.596	1.496	1.710*	1.709*	1.589	1.377
Secondary & higher	2.671***	2.406**	2.759***	2.436**	3.032***	3.031***	2.632***	1.907
Number of partners previous 12 months	2.218***	2.186***	2.218***	2.178***	2.208***	2.198***	2.212***	2.158***
Perceived AIDS risk (ref: None)								
Low	1.083	1.076	1.114	1.110	1.068	1.085	1.058	1.025
Moderate	0.996	0.993	0.999	0.996	0.975	0.978	0.975	0.959
High or has AIDS	0.849	0.839	0.851	0.834	0.863	0.872	0.873	0.850
Wanted child in following 2 years	1.314*	1.284*	1.287*	1.275*	1.297*	1.274*	1.304*	1.287*
Knew where to obtain condoms	1.658	1.709	1.620	1.693	1.730	1.733	1.591	1.697
Last partner was casual	1.447	1.395	1.446	1.380	1.399	1.399	1.417	1.412
Could obtain condoms	5.483***	5.703***	5.511***	5.702***	5.571***	5.638***	5.446***	5.708***
Constant	0.046***	0.044***	0.046***	0.044***	0.046***	0.045***	0.038***	0.028***
OR_D	2.02	2.08	1.97	2.22	1.39	1.39	2.48	4.81
Pseudo-R2	22.4%***	21.8%***	22.5%***	21.7%***	21.8%***	21.7%***	22.7%***	21.8%***
Number of respondents	**1,933**							

* p<0.05
** p<0.01
*** p<0.001
Note: The odd-numbered columns contain the results for the one-stage models, and the even-numbered columns contain those for the two-stage models.

Effect on Condom Use in Last Intercourse

Table 8 shows that exposure to radio or television programs about family planning and HIV/AIDS had no significant impact on the likelihood that women used a condom in last intercourse.

Again, older women are less likely to have used a condom during their last intercourse than younger women. Religion and residence had no discernable effect on the likelihood of having used a condom in last intercourse. Female level of education and number of sexual partners increased the likelihood that they used a condom in last intercourse, while perceived HIV/AIDS risk and the desire to have a child in the following two years decreased this likelihood. Women who knew a condom source and who felt confident that they could obtain a condom if they wanted were more likely than other women to have used a condom in last intercourse.

Table 8 shows the effect of exposure to social marketing and health communication programs on the likelihood that males used a condom in last intercourse. Unlike the case for females, the results show that exposure to such programs had a significant positive effect on condom use in last intercourse (OR = 1.07). Exposure to radio programs on family planning and HIV/AIDS had a significant positive effect (OR = 1.12), but exposure to television programs on such topics had no significant effect. Exposure to messages for the socially marketed *Maximum* brand condoms also increased the likelihood of condom use in last intercourse (OR = 1.15).

In the male sample the OR_Ds are slightly higher with values of 1.51 for total program exposure, 1.56 for exposure to radio programs, 1.20 for exposure to television programs, and 1.53 for exposure to *Maximum* messages. In other words, men with the highest levels of exposure are 20% to 56% more likely than those with the lowest levels of exposure to have used a condom in last intercourse.

For men, the likelihood of having used a condom in last intercourse decreased slightly with age and with the desire to have a child in the near future. The likelihood is greater for males who had more sexual partners, whose last partners were casual partners, and who felt confident that they could obtain a condom if they wanted.

Table 7. Estimates of the Impact of Program Exposure on the Odds of Female Condom Use During Last Intercourse

OR (95% CI)	Program exposure indicators					
	Total exposure		**Radio programs**		**TV programs**	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Exposure (Total)						
Observed	0.990					
Predicted		0.966				
Exposure (Radio programs)						
Observed			0.978			
Predicted				0.996		
Exposure (TV programs)						
Observed					1.004	
Predicted						0.927
Age	0.965***	0.966***	0.965***	0.965***	0.965***	0.965***
Religion (ref: Protestant)						
Catholic	0.898	0.897	0.899	0.898	0.898	0.898
Other	0.729	0.731	0.728	0.730	0.730	0.732
Residence (ref: Rural)						
Capital	1.309	1.398*	1.303*	1.279	1.265	1.448*
Other urban	0.942	0.985	0.942	0.928	0.921	0.997
Education (ref: No formal education)						
Primary	1.099	1.115	1.105	1.095	1.093	1.099
Secondary & higher	2.040***	2.146***	2.056***	2.008***	1.991***	2.117***
Number of partners previous12 months	4.905***	4.892***	4.904***	4.912***	4.913***	4.876***
Perceived AIDS risk (ref: None)						
Low	0.874	0.875	0.873	0.874	0.874	0.879
Moderate	0.592***	0.592***	0.592***	0.593***	0.593***	0.595***
High or has AIDS	0.485***	0.491***	0.486***	0.484***	0.484***	0.487***
Wants child in following 2 years	0.541***	0.540***	0.542***	0.540***	0.540***	0.540***
Knew where to obtain condoms	1.637**	1.633**	1.641**	1.632**	1.632**	1.631**
Last partner was casual	1.237	1.240	1.235	1.240	1.240	1.240
Could obtain condoms	1.700***	1.696***	1.704***	1.696***	1.696***	1.696***
Constant	0.043***	0.043***	0.043***	0.043***	0.044***	0.043***
OR_D	0.94	1.02	0.91	1.40	1.01	0.86
Pseudo-R2	10.9%***	10.9%***	10.9%***	10.9%***	10.9%***	10.9%***
Number of respondents	**6,782**					

* p<0.05
** p<0.01
*** p<0.001
Note: The odd-numbered columns contain the results for the one-stage models, and the even-numbered columns contain those for the two-stage models.

Table 8. Estimates of the Impact of Program Exposure on the Odds of Male Condom Use During Last Intercourse

	Program exposure indicators							
OR	**Total exposure**		**Radio programs**		**TV programs**		**"Maximum" sources**	
(95% CI)	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Exposure (Total)								
Observed	1.071*							
Predicted		1.096						
Exposure (Radio programs)								
Observed			1.117*					
Predicted				1.434*				
Exposure (TV programs)								
Observed					1.063			
Predicted						0.881		
Exposure ("Maximum" sources)								
Observed							1.153*	
Predicted								1.292
Age	0.948***	0.949***	0.947***	0.944***	0.950***	0.950***	0.950***	0.953***
Religion (ref: Protestant)								
Catholic	1.150	1.153	1.151	1.164	1.157	1.189	1.154	1.157
Other	0.761	0.781	0.760	0.798	0.766	0.760	0.769	0.778
Residence (ref: Rural)								
Capital	1.492	1.429	1.652*	1.451	1.563	2.150**	1.558*	1.412
Other urban	1.228	1.195	1.316	1.178	1.277	1.644*	1.316	1.274
Education (ref: No formal education)								
Primary	1.066	1.045	1.052	0.893	1.107	1.135	1.068	1.010
Secondary & higher	1.441	1.354	1.465	1.027	1.568	1.853	1.476	1.284
Number of partners previous 12 months	1.142*	1.144*	1.141*	1.135*	1.145*	1.138*	1.143*	1.133*
Perceived AIDS risk (ref: None)								
Low	1.195	1.187	1.211	1.215	1.192	1.236	1.182	1.165
Moderate	1.118	1.111	1.118	1.140	1.105	1.086	1.095	1.087
High or has AIDS	0.866	0.837	0.861	0.783	0.876	0.886	0.880	0.853
Wanted child in following 2 years	0.640**	0.630**	0.635**	0.632**	0.632**	0.614**	0.632**	0.628**
Knew where to obtain condoms	0.847	0.859	0.833	0.834	0.871	0.879	0.844	0.857
Last partner was casual	3.051***	2.979***	3.073***	2.977***	2.988***	2.925***	3.007***	2.988***
Could obtain condoms	12.285***	12.716***	12.282***	13.031***	12.406***	12.382***	12.129***	12.704***
Constant	0.051***	0.049***	0.051***	0.046***	0.050***	0.051***	0.047***	0.041***
OR_D	1.51	1.53	1.56	2.29	1.20	0.90	1.53	2.08
Pseudo-R2	16.9%***	16.8%***	17.0%***	17.0%***	16.7%***	16.8%***	16.9%***	16.8%***
Number of respondents	**1,933**							

* p<0.05
** p<0.01
*** p<0.001
Note: The odd-numbered columns contain the results for the one-stage models, and the even-numbered columns contain those for the two-stage models.

Conclusion

The purpose of this paper was to assess the reach of selected social marketing and reproductive health communication activities in Zambia and to assess their impact on discussion of family planning and on condom use. Specifically, we examined the reach and impact of several radio and television programs on family planning and HIV prevention, as well as the reach of communication for the socially marketed *Maximum* brand condoms.

Exposure to the reproductive health-related radio and television programs examined was very high. The most popular radio program was *Your Health Matters*, which produced 58% recall among males and 36% among females. Recall was also high for the radio programs *Our Neighborhood* and *AIDS and the Family*, which were heard by over one-third of respondents. The televised version of *Your Health Matters* also had high recall (30% among men and 23% among women), as did *X-plosion*. On average, women reported recalling 1.8 of the eight programs studied, while men recalled 2.7 programs. The large majority of male respondents (75%) recalled exposure to messages about the socially marketed *Maximum* condoms.

Estimates of the impact of campaign exposure show that exposure to the radio and television programs increased the likelihood of discussion of family planning, for both men and women. Females with the highest levels of exposure to radio programs (those in the top decile) were 2.8 times as likely as those with the lowest levels of exposure to have discussed family planning with their partners. The effect of television exposure on the likelihood that women discussed family planning was somewhat smaller. Among males, exposure to radio programs also had a strong effect on discussion of family planning, but television exposure did not. Males with the highest levels of exposure to messages for the socially marketed *Maximum* condoms were twice as likely as those with low exposure to have discussed family planning.

Exposure to these health communication campaigns also had a significant effect on the likelihood that females and males ever used condoms, although the effect was fairly insignificant among women. Males with the highest levels of exposure to reproductive health-related radio programs and to *Maximum* messages were more than twice as likely as those with low levels of exposure to have ever used condoms. The effect of campaign exposure on condom use in last intercourse varied by gender. Exposure to these programs had no effect on the likelihood that

women used a condom in last intercourse, but significantly increased the likelihood that men had. Men with the highest levels of exposure were roughly 50% more likely than those with the lowest levels of exposure to have used a condom in last intercourse. Differentiating between the types of campaigns shows that exposure to radio programs and *Maximum* condom messages had significant effects, while exposure to television programs did not.

In conclusion, the evidence shows that social marketing condom advertisements and radio and television programs on family planning and HIV/AIDS have succeeded in reaching a large portion of the Zambian population. The results further show that exposure to these campaigns had a strong effect on reproductive health behavior, even after controlling for other factors. However, radio programs and *Maximum* condom advertisements proved more effective than television programs. The data also show that the effect of these campaigns on condom use was considerably stronger for males than females. These findings suggest that future reproductive health communication campaigns that invest in radio programming are likely to be more effective than those investing in television programming. The findings also suggest that future social marketing and reproductive health communication campaigns should seek to increase their impact upon women, perhaps by focusing on specific constraints that prevent females from using condoms.

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