Associations of Mass Media Exposure with Family Planning Attitudes and Practices in Uganda

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This study examines the associations between multimedia behavior change communication (BCC) campaigns and women's and men's use of and intention to use modern contraceptive methods in target areas of Uganda. Data are drawn primarily from the 1997 and 1999 Delivery of Improved Services for Health (DISH) evaluation surveys, which collected information from representative samples of women and men of reproductive age in the districts served by the DISH project. Additional time-trend analyses rely on data from the 1995 Uganda Demographic and Health Survey. Logistic regressions are used to assess the associations between BCC exposure and family planning attitudes and practices, controlling for individuals' background characteristics. To minimize the biases of self-reported exposure, the analyses also explore cluster-level indexes of the penetration of BCC messages in the community. Results indicate that exposure to BCC messages was associated with increased contraceptive use and intention to use. Some evidence of self-reported bias is found, and the pathways to fertility-related behavioral change appear different for women and men. (STUDIES IN FAMILY PLANNING 2003: 34[1]: 19–31)

Evidence from a number of studies suggests that individuals' exposure to mass media messages promoting family planning may affect their contraceptive behavior (Piotrow et al. 1990; Bankole et al. 1996; Westoff and Bankole 1997; Kincaid 2000). For example, in Nigeria, use of modern contraceptives, the intention to use them, and the desire for fewer children were found to be associated with exposure to media messages about family planning (Bankole et al. 1996). A similar study in Tanzania found that women exposed to a combination of such messages were more likely than those who were not to practice contraception (Jato et al. 1999).

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A number of models have emerged from different fields identifying specific pathways to behavioral change and offering insights to aid programs intended to influence and change behavior. Several studies have been useful in explaining the effects of mass media campaigns on fertility-related behavior. Ideation change, defined as a change in a person's way of thinking brought about by the diffusion of new ideas and practices, has been identified as an important determinant of fertility decline (Cleland and Wilson 1987). The ideation model derives from the diffusion-of-innovation theory and includes five stages through which an individual's comportment progresses: knowledge, persuasion, decisionmaking, implementation, and confirmation (Rogers 1995). The input/output persuasion model considers how various aspects of communication affect behavioral outcomes (McGuire 1989). The steps-to-behavior-change theory is an adaptation of the diffusion-of-innovation theory and the input/output persuasion model; it consists of five major stages of change: knowledge, approval, intention, practice, and advocacy (Piotrow et al. 1997). This framework emphasizes several intermediate steps that people move through before they change their behavior, suggesting that different messages and approaches in communication are required to reach people at different stages in the process.

Several empirical studies have confirmed that mass media campaigns are effective at different stages in the process of altering reproductive behavior. According to a study conducted in Nepal, exposure to messages in the mass media had an indirect effect on contraceptive use by increasing interpersonal communication and encouraging positive changes in attitudes and perceived social norms regarding family planning (Storey et al. 1999). Similarly, women exposed to a mass media campaign in Tanzania were found to have developed more positive attitudes toward family planning and were more likely to discuss family planning issues with their spouses than were those who were not exposed (Jato et al. 1999). In Mali, exposure to a campaign was linked to an increase in favorable attitudes toward contraception and a decline in the proportion of men and women who believed that Islam opposes family planning (Kane et al. 1998).

Exposure to messages broadcast through a variety of channels is currently considered the most effective way to change knowledge, attitudes, and behavior. Behavioral change communication (BCC) campaigns often include a combination of radio spots or advertisements; radio dramas; television advertisements; videos; print materials such as newsletters and leaflets; posters; clinic-based counseling; and community activities such as festivals, theater, or group meetings (Kincaid et al. 1992; Piotrow et al. 1997). The use of multiple media is considered the best strategy for extending the reach of a message to a larger audience and for reinforcing its effect (Piotrow et al. 1997). Some studies have shown that a dose-response effect exists between the amount of exposure to family planning messages that a person experiences and the increase in that person's use of contraceptive methods. In Tanzania, Jato et al. (1999) found that the more kinds of media vehicles used to promote family planning, the greater the likelihood of contraceptive use. Likewise, Kane and his colleagues (1998) found that contraceptive knowledge and use and more favorable attitudes toward family planning were positively associated with the number of mass media interventions in Mali.

In Uganda, the Delivery of Improved Services for Health (DISH) project, one of the country's largest reproductive health programs, strove to increase service use and change behavior related to reproductive, maternal, and child health. Focusing on about 30 percent of the total population, DISH operated in 12 of the country's 56 districts: Jinja, Kampala, Kamuli, Kasese, Luwero, Masaka, Masindi, Mbarara, Nakasongola, Ntungamo, Rakai, and Sembabule. Since its inception in 1995, the project's specific activities have included: training of nurses and midwives to provide integrated reproductive health services and to improve standards of care; strengthening support systems for the procurement, distribution, and storage of contraceptives and other commodities; and conducting communications activities to increase knowledge and improve perceptions related to family planning and reproductive health. Between 1995 and 1999, the project implemented several multichannel BCC campaigns in collaboration with its implementing partners[1] to promote the use of modern family planning methods. The campaigns employed short radio and television spots and a weekly radio drama called "Choices" that integrated family health messages. DISH assisted the Ministry of Health in distributing the national "yellow flower" logo and the new "rainbow over the yellow flower" logo to identify health facilities offering family planning and integrated reproductive health services, respectively, and implemented a publicity campaign encouraging couples to visit facilities displaying the logos to obtain information and services. Posters, flip charts for service providers, and a newsletter entitled "Health Matters" were distributed to health-service facilities. Newsletters were also distributed with newspapers and during community events. A range of other community-education activities included drama performances, video shows, and village meetings. All materials were produced in three or four languages. Additional activities were conducted in the DISH districts, including the broadcast of a weekly radio program called "Capitol Doctor" and the social marketing of contraceptives.[2] The Protector™ brand of condom, the Pilplan™ brand of oral contraceptive, and the Injectaplan™ brand of injectable contraceptive were marketed through radio advertisements as well as on billboards and posters at health-service facilities.

Preliminary analysis using data from the 1999 DISH Evaluation Survey (DES) suggested that women and men who were exposed to various family planning radio messages reported higher levels of modern contraceptive use, and, among nonusers, an increased intention to adopt family planning in the near future. For example, 16 percent of women mentioned radio advertisements as among the influences on their decision to practice family planning. Moreover, an examination of time trends drawing on additional data from the 1995 Uganda Demographic and Health Survey (UDHS) and the 1997 DES showed strong overall increases in contraceptive use and intent among the population living in the target districts (Katende et al. 2000).

In addition to mass media exposure, the trends in family planning attitudes and practices observed in the DISH districts were likely being conditioned by other factors as well, notably women's and men's sociodemographic characteristics. A strong and positive relationship between family planning and educational attainment, especially that of women, emerges as one of the most consistent findings from empirical analyses of re-

productive knowledge, attitudes, and behavior in developing countries (see, for example, Rutenberg et al. 1991; Robey et al. 1992; Ainsworth 1994; Ezeh et al. 1996; and Mboup and Saha 1998). Education may be seen as a catalyst in diffusion-of-innovation theories. Also, typically, it is employed as an indicator of socioeconomic development or, among women, as a proxy for gender status. Other sociodemographic factors often cited in the literature as important determinants of changing family planning attitudes and practices include age and parity. Generally speaking, contraceptive use tends to peak in the middle of the reproductive span, likely reflecting a greater desire among couples in the middle age bracket, at higher fecundity, to prevent or space additional pregnancies. Likewise, contraceptive use is often found to vary with the number of children ever born, along with the changing nature of family planning goals. Residence has repeatedly been found to influence reproductive behaviors, with urban–rural distinctions differentiating access to health-care facilities, sociocultural norms, and living situations. Overall, women's and men's behavior in reproductive matters probably is conditioned by a combination of both individuals' characteristics and ideological differences.

The aim of this study is to examine whether observed differences in the levels of modern contraceptive use and intention to use a method among women and men prior to and after the implementation of a BCC campaign signified a positive relationship between exposure to family planning messages and improved perceptions and use. Multivariate regression analyses are employed to help elucidate the relationship between intensity of exposure to BCC messages and family planning attitudes and practices, controlled for the effects of a number of background characteristics including age, parity, education, and residence. The analyses take into consideration intensity of exposure both in terms of the dose effects of multichannel interventions and of the influences of particular combinations of media messages.

Data and Methods

The data sources for this study are three household surveys conducted between 1995 and 1999 in the DISH project districts over the course of the implementation of BCC activities.[3] The 1995 UDHS provided baseline information about the reproductive health status of women and men of reproductive age (Statistics Department and Macro International 1996). Although the survey was national in scope, this analysis uses information obtained from the subsamples of 2,316 women aged 15–49 and 663 men aged 15–54 living in DISH districts. The 1997 DES collected data from 1,697 women and 900 men in the same age groups (Katende et al. 1999), and the 1999 DES gathered information from 1,766 women and 1,057 men in the project districts (Katende et al. 2000).

All surveys used a two-stage sampling procedure, based on random subsamples of households and enumeration clusters in proportion to district population sizes. The use of similar sampling frames and questionnaires ensured general comparability among the three rounds. The data sets were pooled, and multivariate regression models were used to assess the influences of BCC exposure on women's and men's family planning attitudes and practices over time. Two dependent variables were considered: current use of a modern contraceptive method and, among current nonusers, intention to use a modern method in the next 12 months. "Current contraceptive practice" refers to use as reported by the respondent for either herself or himself or for any sexual partner. In order to better gauge the demand for contraceptives, results concerning intention to use a method excluded respondents who said that they or their spouse were infertile as well as those who expressed a desire to have a child "now" or "soon." As a result of differences in questionnaire design, information collected in the 1997 DES about family planning intentions among men were not comparable with findings from the 1995 UDHS and 1999 DES and are not presented here.

Multivariate logistic regression models for binary dependent variables were applied using the Stata statistical software package (StataCorp 2001). Because of the differing levels of aggregation of the data—individual and cluster—a general estimating equation was used to take into account the multilevel nature of the regression's error structure. Standard regression models assume that individual observations are independent. In two-stage sample surveys such as the DHS and DES, however, individuals from the same cluster or community are likely to exhibit similar demographic and behavioral characteristics (because of a variety of unmeasured and unmeasurable factors), compared with those selected from different clusters. The general estimating equation allowed specification of assumed intracluster correlation (Liang and Zeger 1993).

In addition to intensity of exposure to behavior change communications, a number of sociodemographic variables were included as potential confounding factors: respondent's age, marital status (both formal and consensual unions), parity, residence, ethnicity, and educational attainment. The measure for BCC exposure was constructed in two steps. First, a variable was created to capture the number of media through which an individual reported having been exposed to BCC messages in the last six months. The means of exposure included:

(1) having heard a message promoting family planning on the radio; (2) having seen such a message on television; (3) having seen a family planning poster; and (4) having read any materials promoting family planning in a newspaper, magazine, brochure, or leaflet. The total number of media through which the respondent could have been exposed to such messages was summed, to a maximum of four media types.[4] An individual who had received messages through two or more different media was considered to have had a high level of BCC exposure. (Although intensity of exposure can be considered in other ways than the number of different media that convey the message to the individual, the surveys used here did not collect other information with which to gauge amount of exposure.)

Additional multivariate models were run to measure the influences of a number of specific messages disseminated in the target areas using data from the two DES, which contained more detailed information on mass media exposure than had the earlier DHS. To minimize the biases of self-reported exposure, we also conducted exploratory analyses of BCC exposure through an instrumental cluster-level aggregate of the degree of penetration of family planning messages in the community.

The main hypotheses of the study were that exposure to family planning messages in the media would be independently and positively associated with the likelihood of an individual's use of contraceptives or intention to use a method in the near future and that the magnitude of the effect would be greater at a higher intensity of exposure. A secondary hypothesis was that, after controlling for other factors, the levels of contraceptive use and intention to use would be greater following the implementation of the series of project activities compared with the levels found at the beginning of the period of observation in the DISH districts. Statistical tests were conducted to assess whether observed patterns and trends among those surveyed were significantly discernible, that is, whether they represented real differences in family planning attitudes and behaviors to a selected degree of certainty, or whether the changes simply reflected effects of other characteristics or of sampling variability. Even positive effects of BCC exposure do not necessarily imply direct causation, however, because precise information about the timing of changes in individuals' contraceptive use and intentions with respect to their exposure to mass media is lacking. Ideally such information could be collected using a longitudinal survey approach. Interaction terms for the three repeated surveys are used to provide a reasonable proxy to evaluate time trends; these interaction terms specify how the influences on family planning attitudes and practices varied over the course of implementation of the mass media activities.

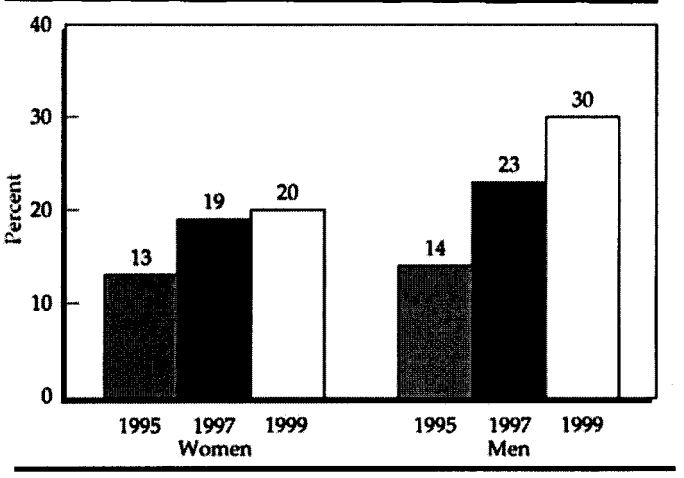
To facilitate interpretation of the results from the logistic models, the estimates are presented here in terms of odds ratios. A ratio greater than one implies that an individual in the given category would have a greater likelihood of using a modern contraceptive (or of intending to use one in the near future) compared with a counterpart in the reference category, other factors remaining the same. A ratio lower than one suggests a lower likelihood, and a ratio equal to one suggests a similar likelihood.

Results

The population targeted by the DISH project is about 70 percent rural. The urban population is heavily concentrated in Kampala; Jinja is the second most urbanized district. Two-thirds of female respondents and 58 percent of men were currently married at the time of the 1999 survey; 77 percent of women had ever given birth. Luganda was the predominant language spoken by respondents, followed by Runyankole-Rukiga. About one woman in four (22 percent) and one man in nine (11 percent) had had no formal education.

Survey data revealed substantial increases over time in the use of modern contraceptive methods among women and men living in the target areas (see Figure 1). In 1999, 20 percent of women and 30 percent of men of reproductive age were currently using a modern contraceptive, a sharp increase from the 1995 prevalence rates of 13 percent and 14 percent, respectively. Increases in contraceptive use were observed also across different sociodemographic groups (not shown). For example, substantial increases were seen when the Kampala district was excluded from the tabulation: Women's use in-

Figure 1 Percentage of women and men currently using modern contraceptives, DISH districts, Uganda, 1995–99



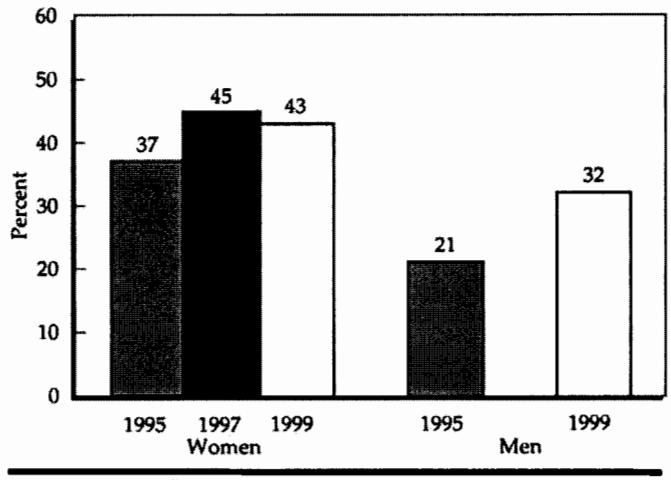
creased from 8 percent to 16 percent over the four-year interval and men's use from 8 percent to 23 percent.

Condoms were, by far, the most popular method choice reported by men, the preference of two-thirds of those who reported using any modern method in 1999. Among women, injectables were the most commonly used method (chosen by one-third of those using any modern method), followed by condoms and the pill. Some respondents may have reported condoms as their current family planning choice even if they were using this barrier method primarily for protection against sexually transmitted infections including HIV (although such reports do not necessarily imply that they were using the method with all sexual partners or even consistently with any one partner). Adoption of long-term contraceptive methods (the IUD, implants, and male or female sterilization) remained low, and the use of other short-term methods (the diaphragm, foam, jelly, or female condoms) was negligible (not shown) (Katende et al. 2000).

Among current nonusers, an overall increase was found in the intention to adopt a family planning method. As seen in Figure 2, between 1995 and 1999 the proportion reporting intention to use a modern contraceptive method within the next 12 months increased from 37 percent to 43 percent among women and from 21 percent to 32 percent among men.

During the same period, reported exposure to family planning messages in the media increased considerably. In 1995, fewer than half (47 percent) of the women surveyed reported that they had heard a family planning message on the radio in the last six months, whereas four years later nearly three-fourths (73 percent) said they had heard one (see Figure 3). Among men, this proportion increased from 61 percent to 79 percent over the same

Figure 2 Percentage of women and men not currently practicing contraception who reported their intention to use a modern method in the next 12 months, DISH districts, Uganda, 1995–99



Note: Among men, findings for intention to use a method from the 1997 DES are not comparable to those of the two other surveys because of differences in questionnaire design and are, therefore, not presented.

period. Exposure by means of television, posters, and print materials, although generally increasing, remained much less frequent. Men tended to be exposed more often than women to family planning messages, reflecting a pattern of higher proportions of men than women who listened to the radio or watched television overall (Katende et al. 2000). Moreover, women and men who had heard BCC messages in the media were more likely to practice family planning or to say they intend to do so in the near future, compared with those who reported little or no campaign recall, as shown in Table 1. Contraceptive prevalence was much higher in 1999 among women who had heard messages on the radio (35 per-

Figure 3 Percentage of women and men who reported exposure to family planning BCC messages in various media, DISH districts, Uganda, 1995–99

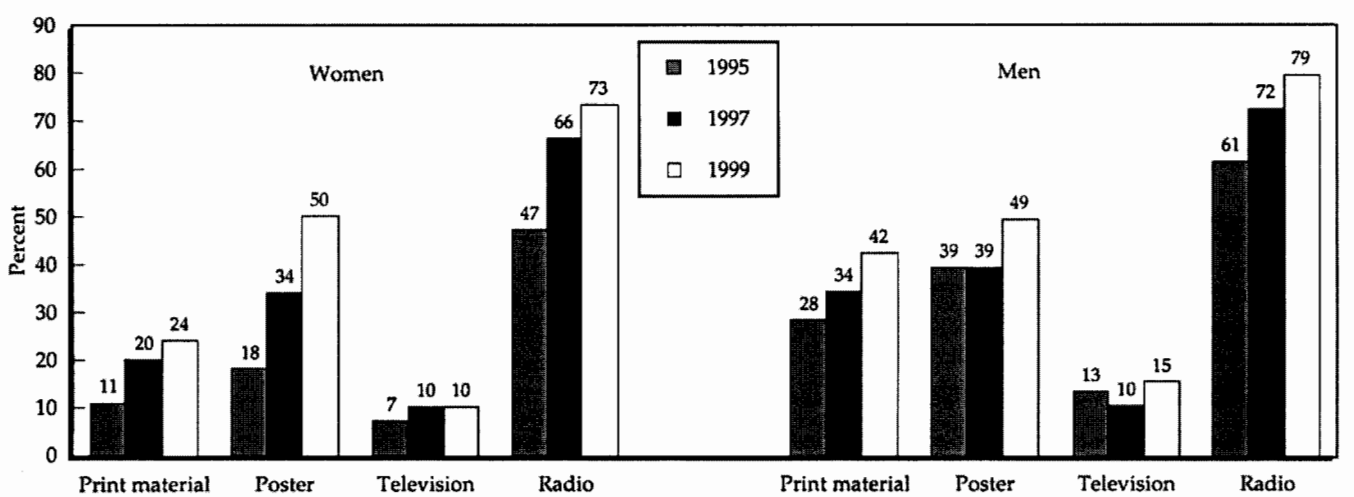


Table 1 Percentage of women and men who reported exposure to family planning BCC messages in various media, by contraceptive use and intention to use, DISH districts, Uganda, 1995–99

	Women						Men					
	Currently uses a modern contraceptive			Intends to use a modern contraceptive in the next 12 months			Currently uses a modern contraceptive			Intends to use a modern contraceptive in the next 12 months		
Medium	1995	1997	1999	1995	1997	1999	1995	1997	1999	1995	1997	1999
Radio	19	23	35	49	50	46	19	27	34	30	na	36
Television	40	43	37	56	36	48	40	40	56	25	na	36
Poster	26	29	28	58	52	49	19	34	42	23	na	42
Print material	27	33	37	51	52	48	27	41	47	35	na	41
No BCC exposure	7	9	6	27	35	30	7	6	14	9	na	19

Sources: 1995 UDHS, 1997 DES, and 1999 DES (figures weighted to reflect sampling procedures). na = Not available because of questionnaire design incompatibility.

cent) or television (37 percent) compared with those who had heard none (6 percent). The most rapid increase in women's contraceptive use between 1995 and 1999 occurred among those who had heard radio messages (from 19 percent to 35 percent); changes associated with exposure to other media channels were less striking. A positive association was also found between exposure to BCC messages and intention to use a modern contraceptive method in the next 12 months among current nonusers. The intention to use was reported in 1999 by about one-half of women who had heard family planning messages in the media, compared with only around one-third of those with no exposure to the campaign.

Similar trends were found among men. In 1999, contraceptive prevalence ranged from 34 percent to 56 percent among those who were exposed to behavior change messages in the various media, compared with only 14 percent among those who were not exposed to the messages. Intention to use a contraceptive was about twice as high for those who had heard the messages compared with those who had not. Rapid increases both in contraceptive use and in intention to use a method were observed over the four-year period among men with all types of BCC exposure, especially among those exposed to the messages via posters.

Factors other than mass media exposure were also expected to influence women's and men's family planning attitudes and practices. For example, according to the 1999 DES, contraceptive prevalence among women ranged from 6 percent for those with no formal education to 36 percent for those with at least some secondary schooling (see Table 2). Likewise, whereas only 35 percent of women with no education reported that they intended to practice family planning in the near future, among those in the highest educational category this figure stood at 47 percent. Similarly strong differentials in contraceptive use and intentions by educational attainment were noted among men.

Multivariate Analysis

Table 3 shows the results of the multivariate regression analyses used to disentangle the relationships between women's and men's sociodemographic characteristics and their exposure to messages in the media, in order to assess the independent influences of BCC exposure on contraceptive use and intentions. Women's exposure to BCC messages was found to be significantly associated with increased contraceptive use, all else being equal. Not only were women with no exposure less likely to be using contraceptives compared with their counterparts who were exposed to any one message type but also their greater likelihood of contraceptive use with exposure through multiple media channels showed evidence of a dose-response effect.

At the same time, contraceptive prevalence was found to have increased significantly over time. Women were about 75 percent more likely to be practicing modern contraception in 1999 than in 1995. Meanwhile, the in-

Table 2 Percentage of women and men surveyed, by educational attainment, according to contraceptive use and intention to use, DISH districts, Uganda, 1995–99

	Women						Men					
	Currently uses a modern contraceptive			Intends to use a modern contraceptive in the next 12 months			Currently uses a modern contraceptive			Intends to use a modern contraceptive in the next 12 months		
Highest level of schooling	1995	1997	1999	1995	1997	1999	1995	1997	1999	1995	1997	1999
None	2	6	6	28	35	35	2	15	13	10	na	18
Some primary	11	16	19	40	50	45	9	15	23	19	na	33
Some secondary or higher	27	38	36	42	44	47	26	39	46	28	na	36

Sources: 1995 UDHS, 1997 DES, and 1999 DES (figures weighted to reflect sampling procedures). na = Not available because of questionnaire design incompatibility.

Table 3 Odds ratios from logistic regression models measuring effects of women's and men's exposure to BCC family planning messages in the mass media and effects of sociodemographic characteristics on contraceptive use and intention to use, DISH districts, Uganda, 1995–99

Characteristic	Currently uses a modern contraceptive		Intends to use a modern contraceptive in the next 12 months	
	Women	Men	Women	Men
BCC exposure: Individual level				
None	0.69**	0.89	0.57***	0.68
Exposed to one message type (r)	1.00	1.00	1.00	1.00
Exposed to multiple message types	1.88***	1.85*	1.49*	1.67
Survey period				
1995 (r)	1.00	1.00	1.00	1.00
1997	1.68**	1.67	1.26	na
1999	1.73**	2.05**	1.17	2.08**
Interaction: BCC exposure survey				
High exposure–1995 (r)	1.00	1.00	1.00	1.00
High exposure–1997	0.82	1.38	0.79	na
High exposure–1999	0.87	1.64	0.72	0.89
Age				
15–19 (r)	1.00	1.00	1.00	1.00
20–29	1.76***	1.42*	0.82	1.17
30–39	1.95***	1.07	0.44***	0.63
40+	1.44	0.71	0.14***	0.35**
Marital status				
Never in union (r)	1.00	1.00	1.00	1.00
Currently in union	0.84	1.12	1.77***	1.16
Formerly in union	0.48***	1.17	0.90	0.47
Parity				
0 (r)	1.00	1.00	1.00	1.00
1–3	2.55***	1.37	1.61**	1.62
4+	4.06***	1.83*	2.55***	2.82*
Ethnicity				
Luganda	1.13	1.37*	1.55***	1.45
Runyankole	0.89	0.80	1.08	2.57***
Other (r)	1.00	1.00	1.00	1.00
Residence				
Rural (r)	1.00	1.00	1.00	1.00
Urban	3.43***	2.41***	1.44**	1.17
Education				
None (r)	1.00	1.00	1.00	1.00
Some primary	2.61***	1.03	1.24*	1.74
Some secondary+	4.54***	1.86**	1.14	2.11*
(N)	(5,778)	(2,617)	(3,766)	(899)

*Significant at $p<0.05$; **$p<0.01$; ***$p<0.001$. (r) = Reference category. na = Not available because of questionnaire design incompatibility.
Sources: 1995 UDHS, 1997 DES, and 1999 DES.

teraction term of survey period on BCC exposure was not statistically significant, suggesting stability in the magnitude of BCC influences between the beginning and the end of the period of campaign implementation. Some of the unexplained increase in women's contraceptive use might be attributable to positive impacts of other project interventions in the target areas, such as training of family planning service providers or improved availability of contraceptive methods, or to other, wider changes occurring in Ugandan society.[5]

As expected, several sociodemographic factors were seen to exercise important independent effects on women's use of modern contraceptives, including age, marital status, parity, residence, and educational attainment. Women in their middle reproductive years (ages 20–29 and 30–39) were nearly two times more likely to report current contraceptive use than were adolescents (ages 15–19). Women in the youngest and oldest age categories may be less likely to practice family planning because they perceive that they have a relatively low risk of pregnancy due to less frequent sexual activity or lower fecundity. The same may hold for formerly married women, who were about half as likely as their married or single counterparts to use contraceptives. Older and unmarried women may also tend to prefer traditional or folk methods for family planning purposes, methods that were not considered in the present analysis.

Contraceptive use was found to increase with parity. Women with one to three children were more than two and a half times more likely to report contraceptive use than were their counterparts with no children, whereas those with four or more children were about four times more likely to do so, underlining their motivation for family-size limitation. Anecdotal evidence points clearly to the high costs of rearing children, especially the expense of education, as a factor driving the preference for smaller family sizes in Uganda.

Not surprisingly, urban and more educated women were significantly more likely than others to use modern contraceptives. Women living in urban areas, who may have better access to family planning information and services, were more than three times more likely to use contraceptives than were those living in rural areas. Likewise, the likelihood that a woman would be practicing contraception was more than two and a half times as high for those with at least some primary schooling and more than four times as high for those with secondary schooling, compared with that of their uneducated counterparts. Women having more education may better appreciate the health and economic advantages of smaller family sizes and be more likely to protect themselves against unplanned pregnancy—and also against sexually transmitted infections including HIV/AIDS—through the use of modern contraceptives.

As with family planning practices, women's self-reported exposure to BCC messages in the media was significantly associated with favorable attitudes toward family planning. Women reporting no exposure to BCC messages in the six months preceding the survey were about half as likely to intend to use a modern contraceptive method in the near future, compared with their counterparts who reported being exposed to one message type, whereas those reporting exposure through multiple

channels were almost 50 percent more likely to express contraceptive intentions than were those who were unexposed. Moreover, these effects were statistically significant after controlling for other sociodemographic variables.

With respect to the influence of background variables, the intention to use a modern contraceptive was found to decline significantly with age. Adolescent women (ages 15–19) were the most likely to report that they intended to use a modern method in the near future, whereas women aged 40 and older were the least likely to report such an intention. Lower contraceptive intentions among older women may reflect a perceived lower risk of becoming pregnant due to their declining fecundity and perhaps a reluctance to adopt new practices. Marital status was found to have independent effects, intention to use being nearly two times higher among women who were currently married than among those who were not married. Married women may perceive greater need for family planning than do those who are not married because they engage more frequently in sexual activity. Contraceptive intentions increased with parity: Women with four or more children were nearly three times more likely to report that they intend to use a method than were women with no children.

In contrast to the patterns observed for current contraceptive use, residence and educational attainment were found to exercise smaller independent influences on family planning intentions. Women living in urban areas were only slightly more likely than their rural counterparts to report their intention to use a method; the effects of higher education were marginal.

Effects on Men's Contraceptive Use and Intentions

As was observed for women, contraceptive prevalence among men was significantly higher in 1999 than in 1995, around the time of the launch of the DISH project. Likewise, men were about two times more likely to intend to use a method at the end of the period than at the beginning. However, self-reported exposure to family planning BCC messages in the media was only slightly associated with use of contraceptives or with intentions to use a method among current nonusers. Although men exposed to multiple messages were more likely than those who were not to be contraceptive users, no discernible difference was found among men who had heard one or no type of message.

Several sociodemographic characteristics were observed to influence men. Age, parity, ethnicity, residence, and educational attainment were all found to affect men's contraceptive use. Like women, men aged 20–29 were significantly more likely to use a modern method than were adolescents. Men with four or more children were also much more likely to use a method than were their childless counterparts, another finding in keeping with that for women. Ethnicity played a role: Lugandan men were more likely than men of other ethnic groups to report use. Men living in urban areas and those with at least some secondary education were about two times more likely than their rural and less educated counterparts to use contraceptives.

Many of the same variables—age, parity, ethnicity, and educational attainment—were found to influence men's and women's contraceptive intentions, albeit in a different manner. Intention to use a modern method in the near future was significantly lower among older men: Men aged 40 years and older were only 35 percent as likely as those in the adolescent group to intend to use a method. Contraceptive intentions were found to increase with parity. Men with four or more children were almost three times more likely to report that they intended to use a method than were men with no children. Influences of ethnicity were found as well: Runyankole men were the most likely among the ethnic groups to say that they intended to use a method. Secondary or higher educational attainment was also associated with increased intention to use a contraceptive.

Interestingly, the influence of marital status, which was statistically significant for women's family planning attitudes and practices, was minimal for men. As mentioned above, the primary contraceptive method that male respondents in the target areas reported using was the condom, a method that they may be more likely to use with nonmarital partners. Moreover, men may be less aware of their partners' (marital or nonmarital) use of contraceptives or more likely to consider contraception their spouse's responsibility.

The Effect of Specific Messages

By far the most common medium through which those surveyed were exposed to BCC family planning messages was the radio. The DISH Evaluation Surveys collected additional information on exposure to specific radio messages broadcast in the project districts (not shown). In 1999, 47 percent of women reported having listened to either the "Choices" or "Capitol Doctor" reproductive health programs; 46 percent recalled having heard advertisements for family planning services; and 35 percent had heard advertisements for at least one socially marketed contraceptive. Among men, these proportions were 57 percent, 42 percent, and 46 percent, respectively. Moreover, the great majority of survey respondents (81 percent of women and 85 percent of men) reported having seen or heard of the "yellow flower"

family planning logo or the "rainbow over the yellow flower" reproductive health logo.

Multivariate models were run for assessing the independent effects of exposure to three specific kinds of messages: radio programs about reproductive health, radio advertisements for family planning services or socially marketed contraceptives, and family planning logos. The results showed that women's exposure to family planning logos was significantly associated with higher contraceptive use and with intention to use a method (see Table 4). After effects of selected sociodemographic characteristics were controlled, the data show that among current nonusers, women who had seen or heard of family planning logos were more than two and a half times more likely to be contraceptive users and almost two times more likely to intend to use a method in the near future than were those who had not been exposed to such logos. Exposure to radio advertisements for family planning services or contraceptives was also found to have positive effects on respondents' intention to use a method. Among men, exposure to the family planning radio programs broadcast in DISH areas was seen to have a strong effect on both contraceptive use and intentions. Men who were exposed to radio advertisements were also more likely to be contraceptive users, all else being equal. Moreover, the magnitude of the effects of exposure to the specific radio messages generally was found to be stable over time (where trend data were available).

Table 4 Adjusted odds ratios from multivariate logistic regression models measuring effects of women's and men's exposure to specific mass media BCC messages on their contraceptive use and intention to use, DISH districts, Uganda, 1997–99

	Currently uses a modern contraceptive		Intends to use a modern contraceptive in the next 12 months	
Characteristic	**Women**	**Men**	**Women**	**Men**
Individual exposure to specific BCC messages				
None (r)	1.00	1.00	1.00	1.00
Radio programs	1.09	1.72***	1.13	1.58*
Radio advertisements	1.16	1.92***	1.35*	1.19
Family planning logos	2.68***	1.35	1.65***	1.01
Survey period				
1997 (r)	1.00	1.00	1.00	na
1999	0.69	0.98	0.85	na
Interaction: BCC exposure survey				
High exposure–1997 (r)	1.00	1.00	1.00	na
High exposure–1999	1.51	1.41	0.96	na

Note: Odds ratios are adjusted for age, marital status, parity, ethnicity, residence, and education.
*Significant at $p<0.05$; ***$p<0.001$. (r) = Reference category. na = Not available because of questionnaire design incompatibility.
Sources: 1997 and 1999 DES.

Potential Biases of Self-reported BCC Exposure

These findings, although encouraging for BCC programming, require a cautious interpretation regarding an association between self-reported exposure to family planning messages and contraceptive intentions and use that relies on cross-sectional survey data. Respondents who practice family planning may exhibit other characteristics that favor increased media awareness, or they may recall the BCC messages more easily than others when they respond to a survey questionnaire. Similarly, individuals who already intend to adopt a family planning method may be more likely to listen to radio programs or to notice materials about family planning. Ignoring endogeneity (in which exposure affects behavior and behavior affects exposure) could lead to biased measures of the effects of BCC campaigns on family planning outcomes.

Multivariate regression techniques can be used to examine the significance of the relationship between the explanatory variable and the outcome of interest, controlling for a certain number of confounding effects. Positive influences of self-reported BCC exposure may be related, however, to the modeling problems of endogenous variables. A number of statistical models designed to address issues of endogeneity are proposed in the literature. Guilkey et al. (1995) used a simultaneous-equations estimation method to assess the impact of a communication program concerning women's fertility desires and family planning practices in Tunisia following an experimental approach. The model jointly estimated the self-selection process for reporting media exposure and its effects on the outcome variables. The application of multiequation models can be problematic for evaluating the impacts of BCC activities, however, in part because of the difficulty of identifying variables from survey data sets such as the DHS and DES that may affect whether a respondent recalls hearing the messages but that are not also associated with outcome behaviors such as contraceptive use. Moreover, Guilkey and his colleagues concluded that, although testing for potential endogeneity of explanatory variables was essential, use of complicated multiequation models is not always warranted.

Another solution to the problem of overcoming the biases resulting from the inclusion of an endogenous variable is to substitute the explanatory variable with an instrument that is correlated with the explanatory variable but not the regression model's error term (see, for example, Briscoe et al. 1990). We adapted this approach, designing a cluster-level exposure index of the relative penetration of media messages in the community. Such an aggregate measure holds both methodological and (perhaps more convincingly) substantive interest. A cluster can be considered a proxy for women's and men's

immediate surroundings, reflecting local culture. Entwisle and her colleagues (1989) argue that people in a community talk with each other and are likely to share messages about family planning and exhibit similar contraceptive behaviors.

In constructing our index of the penetration of BCC messages in the community, we aggregated the individual-level responses at the cluster level, that is, the number of women or men interviewed in the same cluster or community by exposure to mass media BCC messages. The cumulated measure was transformed into an index ranging between zero and one, with zero indicating that no respondents in the cluster reported any BCC exposure and one indicating that all respondents reported exposure by means of all of the four different media types (radio, television, poster, or print material). A community characterized with an index greater than 0.3 was considered to have experienced high penetration of BCC messages.

Using this index (and controlling for intracluster correlation in the regression model), the effects of BCC exposure remained statistically significant for women's contraceptive intentions and for men's contraceptive use, as shown in Table 5. The greater the penetration of BCC messages in communities, the more likely a resident woman would be to report that she intends to use a modern contraceptive method in the near future. The magnitude of this effect was found to be stable over time. The result suggested that BCC campaigns may influence social attitudes toward family planning that lead to a greater intention to use a method, regardless of other individual factors. Likewise, the greater the penetration of BCC mass media messages in a community, the more likely a man living in that community would be to report that he uses a contraceptive method. When BCC exposure was considered from the community perspective, however, influences on women's contraceptive use were not discernible. This finding diverges from the results noted above concerning individual-level exposure, a contrast suggesting some degree of uncertainty in evaluations based on self-reported measures alone.

Additional models were run to measure the effects of specific messages (family planning radio programs, radio advertisements, and logos) using the community-level instrument with data from the latter two DISH surveys (not shown). For example, some respondents might have been exposed to the logos while attending health facilities for family planning services. The survey questions about exposure to logos asked only whether the respondent had seen or heard of them and did not ask about the specific source of exposure. Subsequent analyses would be biased if potential endogeneity were not taken into consideration. The community index of BCC exposure was calculated on a continuous scale from zero to one, with zero indicating that no respondents in the cluster reported exposure to any of the specific messages and one indicating that all respondents reported exposure to all three messages types. The community BCC exposure index remained significantly associated with women's contraceptive use and intentions and with men's contraceptive use ($p<0.05$).

Overall, the patterns with regard to the effects of sociodemographic variables were similar across the models using individual-level and cluster-level measures (not shown), suggesting consistency in the magnitude of their effects.

Table 5 Adjusted odds ratios from multivariate logistic regression models measuring effects of community-level mass media BCC exposure on women's and men's contraceptive use and intention to use, DISH districts, Uganda, 1995–99

Characteristic	Currently uses a modern contraceptive		Intends to use a modern contraceptive in the next 12 months	
	Women	Men	Women	Men
Cluster-level BCC exposure				
Community index	1.01	1.17**	1.19**	1.03
Survey period				
1995 (r)	1.00	1.00	1.00	1.00
1997	1.42	2.32**	1.26	na
1999	1.83**	2.39**	0.92	2.16*
Interaction: BCC exposure survey				
High exposure–1995 (r)	1.00	1.00	1.00	1.00
High exposure–1997	1.21	0.86	0.83	na
High exposure–1999	0.93	1.18	1.04	0.80

Notes: Odds ratios are adjusted for age, marital status, parity, ethnicity, residence, and education. Ratios for the community BCC exposure variable refer to a 0.10 increase in the index at the cluster level.
*Significant at $p<0.05$; **$p<0.01$. *(r) = Reference category. na = Not available* because of questionnaire design incompatibility.
Sources: 1995 UDHS, 1997 DES, and 1999 DES.

Discussion

For this study, our main analytical tool was multivariate logistic regressions based on data drawn from three representative household surveys conducted between 1995 and 1999 in the areas of Uganda targeted by the DISH project. Because all three surveys employed similar sampling designs and data-collection tools, the data sets were pooled and statistical tests were conducted to assess time trends in the effects of BCC exposure on the outcome variables. After controlling for the effects of a number of sociodemographic characteristics, reported exposure to BCC messages in the media was found to be strongly associated with current use of a modern contraceptive method and with the intention to use a method in the near future among nonusers. This relationship gen-

erally held true for both sexes (although the programmatic effects tended to be smaller on men's than on women's intentions).

Such findings echo the results from an earlier evaluation strategy designed for the 1992–94 Uganda Family Planning Promotion Project, which pointed to greater use of contraceptives among respondents who reported higher campaign exposure, after controlling for selected background characteristics (Kiragu et al. 1996).

A dose-response effect between BCC exposure and both of the outcomes of interest was observed among women. As the number of mass media channels through which respondents were exposed to BCC messages increased, especially from one to two or more, so did the likelihood of contraceptive use and of intention to use a method. Some messages showed particularly important associations in the DISH target areas, notably the reproductive health logos advising of service availability and, to a smaller extent, radio advertisements for family planning services and socially marketed contraceptives. Independent associations with exposure to family health radio programs were found for men's contraceptive attitudes and practices. The effects of these radio programs may have been stronger among men because their content increasingly emphasized the use of condoms for protection against HIV/AIDS and other sexually transmitted infections. The condom was the preferred method among the men surveyed. In a separate analysis of 1999 DES data, men's listening to the radio program "Capitol Doctor" was also found to be positively associated with condom use at last sex, an indicator commonly employed in assessing behaviors in studies of STI-prevention strategies (Bessinger et al. 2002).

A number of sociodemographic characteristics were included in the models to control for differences among respondents exposed to the mass media that also may help explain their family planning attitudes and practices. As expected, women who were in the midst of their reproductive years, currently single or married, of higher parity, living in urban areas, and more educated tended to be more likely than others to report that they use modern contraceptives. Similarly, women who were younger, married, and of higher parity were also more likely than others to say they intend to use a modern method in the next 12 months. Positive effects of urban living and better education were also seen, but these influences were less important compared with those found with respect to contraceptive use. Although some differences were found among men, particularly with respect to the magnitude of the associations, the findings were generally similar to those for women. Only marital status was not significantly associated with either men's current use or their intention to use a method. Men are likely motivated not only by the desire to prevent an unwanted pregnancy but also by the desire to prevent transmission of HIV/AIDS and other STIs, especially during intercourse with nonmarital partners.

The availability of data from repeated independent cross-sectional surveys offered a valuable opportunity for estimating time trends. Overall, after the effects of BCC exposure and other background characteristics were considered, contraceptive prevalence among women and men and contraceptive intentions among men were found to be significantly higher in 1999 compared with the same findings for 1995, about the time that the DISH project was launched. Increased contraceptive use and intentions over the course of the project's first phase may also have been attributable in part to broader social changes occurring in Uganda that likely affected family planning attitudes and behaviors or to the effects of other DISH programmatic interventions, such as improved family planning service availability or the quality of health-care provision.

The statistical problems of modeling the relationships between self-reported BCC exposure and demographic outcomes bears emphasizing. Individuals with prior positive attitudes toward and experiences with family planning may be more likely than others to show an interest in mass media messages about family planning and to recall these messages when asked about them in a survey. Although many previous studies have acknowledged this selectivity bias, few have offered straightforward means to address it in their empirical analyses. Some provided no modeling options other than self-reported exposure, and others presented estimates using computationally cumbersome and sometimes problematic structural or multiprocess models.

We experimented with a reduced-form model instead, substituting instrumental measures of BCC exposure: cluster-level indexes of the relative penetration of mass media messages in the community. We expected this measure to be highly correlated with individual exposure, but not with the modeling error term associated with individual family planning practice and intentions. This measure could provide a simple way to help overcome some (though perhaps not all) of the bias inherent in this type of study. On the whole, the findings from the models using the community-exposure index were encouraging, although some evidence was seen of bias inherent in self-reported exposure in results of current contraceptive practice among women and of contraceptive intentions among men. Identification and inclusion of adequate exposure variables in future data-collection instruments (such as times of listening to the radio or watching television in conjunction with broadcast schedules of BCC messages) might allow for more robust analyses.

These findings highlight the need for further investigation regarding the process of social change in family planning attitudes and practices in Uganda. Although exposure to BCC messages among individuals and their communities generally was found to be a significant predictor of contraceptive intentions and use, little is known of the particular pathways through which BCC programming operates. Influences of family, neighbors, and social networks as catalysts for promoting change emerge as areas warranting research attention. Moreover, other aspects of DISH project interventions probably exercise important influences. The effects of availability and quality of family planning services present additional topics for future research.

Notes

1 The DISH project was funded by the United States Agency for International Development (USAID) through a bilateral agreement with the Ugandan Ministry of Health. The prime contractor for the project's first phase (1994–99) was Pathfinder International. Collaborating partners were the Johns Hopkins University Center for Communication Programs (JHUCCP), University of North Carolina Program for International Training in Health (INTRAH), and E. Petrich and Associates. For the DISH project's second phase (1999–2002), JHUCCP was the prime contractor, with INTRAH and Management Sciences for Health as implementing partners.

2 Other BCC activities, including social marketing of condoms, oral contraceptives, and injectables, were conducted under arrangements with the USAID-supported projects Social Marketing for Change (1994–99) and Commercial Market Strategies (1999–2002).

3 Although the district of Kasese was targeted by DISH project activities, it was not covered in the 1997 and 1999 DES because of fieldwork security concerns. In order to maintain comparability, all data presented here refer to the DISH project districts excluding Kasese.

4 The DISH BCC efforts also included community-based activities such as festivals and village meetings; exposure to these activities was not assessed in the surveys, however.

5 Although 1995 modern contraceptive prevalence rates were appreciably higher in the DISH districts compared with those for the country as a whole (13 percent versus 7 percent among women), preliminary evidence from the 2001 DHS suggests that prevalence also has been rising nationally (16 percent among women).

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Acknowledgments

Funding for this research was provided by the United States Agency for International Development. An earlier version of this study was presented at the 2001 annual meeting of the Population Association of America in the session on "Mass Media and Fertility," Washington, DC, 28–31 March.