

An Evaluation of Post-campaign Knowledge and Practices of Exclusive Breastfeeding in Uganda

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ABSTRACT

Despite the benefits of exclusive breastfeeding for the health of mothers and children, its practice has markedly declined throughout the developing world. Mass media-communication programmes could play an important role in reversing this trend. This study evaluated the extent to which exposure to behaviour change communication (BCC) messages in the media determined recent improvements in exclusive breastfeeding knowledge and practices in areas targeted by the Delivery of Improved Services for Health (DISH) Project of Uganda. Data were drawn from the 1999 DISH Evaluation Survey. The survey collected information from representative samples of women and men of reproductive age. Multiple logistic regressions were used for assessing the independent influences of BCC exposure on breastfeeding knowledge and practices, controlling for several confounding factors. The results indicated that the exposure to BCC messages was strongly associated with women's knowledge of six months as the ideal duration for exclusive breastfeeding. Positive influences on knowledge of men were also found. Media effects on women's current practice of exclusively breastfeeding their infants up to six months were less conclusive, possibly because of the short interval between the launch of the BCC campaign and survey implementation. While there was some evidence of bias of self-reported exposure, results of exploratory analysis of the indirect effects of communication campaigns suggest that impacts may be compounded as overall awareness is increased at the community level eventually leading to improved knowledge among individuals.

Key words: Breastfeeding; Infant-feeding practices; Infant nutrition; Knowledge, attitudes, practice; Behaviour change communication; Health education; Mass media; Evaluation studies; Uganda

INTRODUCTION

Early childhood breastfeeding practices are important determinants of the nutritional status of children, which, in turn, influence their health status. Evidence reveals that infants who are exclusively breastfed for six months experience less morbidity from gastrointestinal

infections than those who are mixed breastfed up to three or four months (1). Results of a simulation study, covering 42 countries representing 90% of worldwide deaths among children aged less than five years, suggest that universal coverage with breastfeeding may help prevent 13% of all child deaths (2). Health benefits of longer durations of intensive breastfeeding have also been documented from the mother's perspective, linked to longer postpartum amenorrhoea and subsequently longer birth intervals.

Despite the prevalence of child malnutrition and proven benefits of exclusive breastfeeding, the practice of breastfeeding has markedly declined throughout the

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developing world. It has been argued that rapid social and economic changes intensify the difficulties that families face in properly feeding and caring for their children. Expanding urbanization may result in more families, especially women, who depend on employment with few or no maternity benefits, and the erosion of traditional family and community support structures, meaning that accurate information on optimal feeding practices is often lacking (3). Negative effects on breastfeeding intensity of urban residence and mother's work, notably work considered least compatible with childcare, have been documented in certain sub-Saharan African countries, including Uganda (4).

It is generally agreed that to reverse this trend requires programmes aimed at promoting breastfeeding and, in particular, re-educating medical and health personnel and the general public (3,5-6). The World Health Organization advocates that mothers should have access to skilled support to help them initiate and sustain appropriate feeding practices and to prevent difficulties and overcome them when they occur, as part of regular maternal and child health services provided by health workers. Moreover, where fathers are concerned, breastfeeding may be enhanced by the support and companionship they provide as family providers and caregivers (3).

Mass media-communication programmes could play an important role in achieving breastfeeding-promotion objectives. Several empirical studies have highlighted the positive effects of behaviour change communication (BCC) campaigns on breastfeeding knowledge and practices. According to a study in Jordan, knowledge of mothers about early breastfeeding initiation and the benefits of colostrum was positively influenced by exposure to the mass media (7). In Bolivia, media campaigns have been found to effectively increase women's and men's knowledge of early and exclusive breastfeeding and to have an indirect influence through the mediating effects of social networks (8). An evaluation conducted in Brazil indicated significant positive changes in the prevalence and duration of breastfeeding, following the implementation of an intensive media campaign as part of a breastfeeding-promotion programme (9). In Colombia, use of mass media was assessed as being more effective in reaching pregnant women and feeding mothers than through health and educational agents (10).

It has further been suggested that exposure to BCC messages broadcast through various channels is the most effective way to change knowledge, attitudes, and, in turn, behaviour. Use of multiple media types is expected to reach a larger audience and help reinforce messages (11). A dose-response effect between the amount of exposure to family-health messages in the media and improved knowledge and practices has been found in numerous contexts (12-14). For example, an evaluation of the impact of a campaign to promote breastfeeding in Trinidad and Tobago using radio, television, and print media showed positive effects of frequent exposure on maternal breastfeeding knowledge, with radio broadcasting having the most significant effect (12).

In Uganda, the Delivery of Improved Services for Health (DISH) Project, one of the largest family-health programmes in the country, seeks to improve maternal and child health by promoting exclusive breastfeeding for the first six months of an infant's life. The population of Uganda—some 23 million inhabitants—is characterized by a high fertility rate (6.9 lifetime children per woman according to the latest national Demographic and Health Survey), a high infant mortality rate (88 deaths per 1,000 livebirths), and a large proportion of children showing signs of malnutrition (39% stunted and 15% severely stunted) (15). Through a bilateral agreement between the Ministry of Health and the United States Agency for International Development (USAID), the DISH Project conducted a number of activities to improve family-health outcomes, including: training of nurses and midwives for providing integrated reproductive health services and improving standards of care at the public facilities; strengthening support systems for distribution of contraceptives and other commodities; training and support of community reproductive health workers; and conducting BCC activities.

In particular, materials promoting exclusive breastfeeding for the first six months and appropriate complementary feeding practices thereafter were produced as part of a mass media BCC campaign launched in mid-1999. Messages were disseminated through a mixture of media types and in different languages. The target was the women and men of reproductive age residing in the 12 districts where the DISH Project operated, covering about 30% of the total population: Jinja, Kampala, Kamuli, Kasese,

Luwero, Masaka, Masindi, Mbarara, Nakasongola, Ntungamo, Rakai, and Sembabule.

Shortly after launching the BCC campaign, the 1999 DISH Evaluation Survey (DES) was conducted (16). Information was collected from representative samples of women and men living in the DISH target districts on a range of family-health issues, including breastfeeding knowledge and practices. Forty percent of all women and 36% of men reported knowledge of six months as the ideal duration for exclusive breastfeeding, that is, for how many months after birth a mother should give her baby only breastmilk without water or any other foods. The figure for women marked a significant increase from prior to launching the media campaign, based on a comparison against findings of a previous survey conducted in 1997 when 23% gave the same six-month ideal (17). In addition, 65% of women with children aged less than six months were exclusively breastfeeding at the time of the 1999 survey compared to only 38% in 1997.

The objective of this study was to assess the extent to which (if any) exposure to multi-media BCC messages determined improvements in breastfeeding knowledge and practices in the project areas. Analytical approaches for assessing the effectiveness of communication campaigns point to different stages through which an individual progresses as they become increasingly exposed to new ideas (11,18,19). It is argued that there are several intermediate steps that people move through before they change their behaviour, which may be broadly classified as: knowledge, approval, intention, practice, and advocacy (11). In addition, any evaluation of the impacts of programmatic interventions requires consideration of other background characteristics that may at the same time affect media listening habits or traditional breastfeeding practices, such as differences in the socioeconomic status or other environmental support mechanisms.

Our summary framework for assessing the effects of BCC activities on breastfeeding promotion is illustrated in Figure 1. In applying this model, multiple regression analyses of household survey data were used for helping elucidate the relationships between intensity of mass media exposure and breastfeeding knowledge of women and men, and mothers' practices with their infants up to six months. We considered the intensity of exposure in terms of both dose effects of multi-channel interventions and indirect effects of

communication programmes through the degree of penetration of breastfeeding messages in the community.

MATERIALS AND METHODS

Data for this study were drawn from the 1999 DISH Evaluation Survey. The survey was designed to collect information on a number of demographic and health indicators from a representative sample of the population living in the districts targeted by the DISH Project. The survey used a two-stage sampling procedure, based on random sub-samples of households and enumeration clusters in proportion to district population sizes. Personal interviews were conducted with 1,766 women aged 15-49 years and 1,057 men aged 15-54 years from the selected households. Respondents were questioned on their reproductive, maternal, and child health knowledge and behaviour. Additional questions on child health and nutrition were asked to women who had given birth in the three years preceding the survey (16).

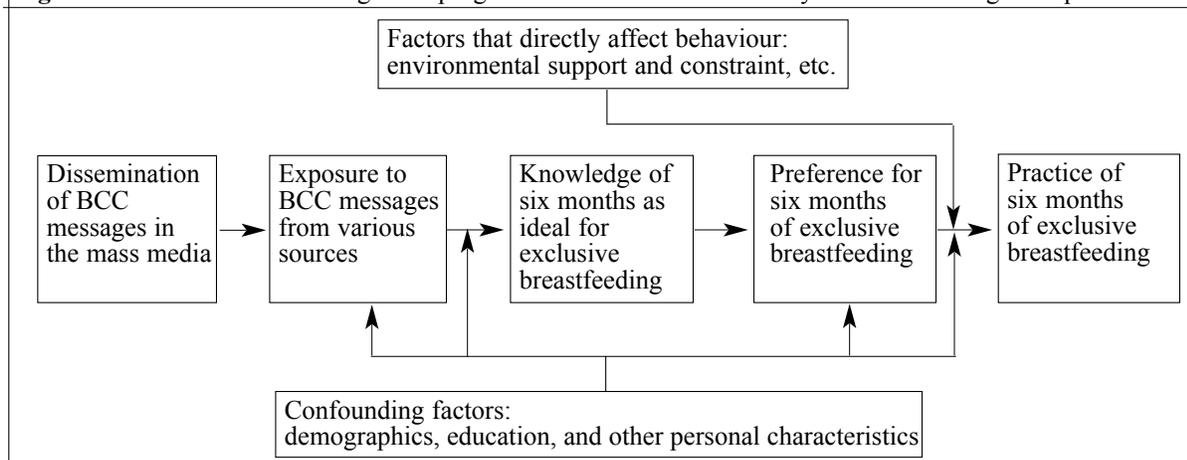
Results of the survey have been used both for monitoring the progress of DISH activities and for evaluating the impacts of specific project interventions (16,20). In the present study, we investigated the independent impact of exposure to BCC campaign messages in the mass media on the likelihood of women's and men's knowledge of six months as the ideal duration for exclusive breastfeeding. In a second step, we examined whether BCC exposure exercised a positive influence on exclusive breastfeeding practices with infants up to six months. Our main hypothesis was that, after controlling for background characteristics, knowledge and practices of individuals pertaining to the promoted breastfeeding ideals would be greater among those with BCC exposure and that the magnitude of the influence would increase with a higher intensity of exposure. It should be noted, however, that the latter model may not yet be evident because the survey fieldwork was conducted only shortly after the BCC campaign was launched (two months earlier).

Multiple logistic regression techniques were used for examining the significance of the relationship between the explanatory variable and the outcomes of interest. Two dependent variables were considered: (i) knowledge of six months as the ideal duration of exclusive breastfeeding among all women and men and (ii) current exclusive breastfeeding status of the youngest living child aged up to six months as reported by the mother. Statistical tests were conducted for

assessing whether observed patterns among those surveyed were significantly discernible, that is, representing real differences in family-health knowledge and behaviours according to BCC exposure, or whether the

models assume that individual observations are independent. However, in two-stage sample surveys, such as DES, individuals from the same cluster or community are likely to exhibit similar demographic

Fig. 1. Framework for evaluating BCC programmatic influences on family-health knowledge and practices



changes were simply reflecting effects of other characteristics or sampling variability.

A variable for intensity of exposure to BCC messages was constructed to capture the number of media through which a woman or a man has been exposed to messages on breastfeeding in the last six months. This included up to four media types: (i) radio, (ii) television or videos, (iii) posters, and (iv) print materials (newspapers, magazines, or leaflets). An individual who recalled having heard messages through at least two different channels was considered to have a high intensity of exposure. (While intensity can be considered in ways other than the number of media types, the survey did not collect other information on amount of exposure.) A number of background variables were also included in the models as potential confounding factors: age of the respondent, marital status (comprising both formal and consensual unions), parity, place of residence, ethni-city, and educational attainment (as a proxy for socio-economic status). The place of delivery was also considered in the analysis of breastfeeding practices.

Moreover, a generalized estimating equation (GEE) was used for taking into account the hierarchically-nested structure of the dataset. Given the differing levels of aggregation of data—individual and cluster—the multi-level nature of the regression's error structure must be taken into account. Standard regression

and behavioural characteristics (because of various unmeasured and unmeasurable factors) compared to those selected from different clusters. GEE allows to control for intra-cluster correlation in population-averaged models (21).

It should be cautioned that even the positive effects of self-reported BCC exposure on the outcomes of interest do not necessarily imply a direct causation, since precise information on the timing of changes in knowledge and practices of individuals with respect to exposure to the mass media was lacking. It is possible that individuals with prior appropriate family-health knowledge, for instance, may be more likely to listen to radio programmes or notice materials about breastfeeding, or to simply remember the messages better when asked in a survey. Ideally, the biases of endogeneity (in which exposure affects behaviour and behaviour affects exposure) could be overcome using an experimental or longitudinal survey approach. In the absence of such sources, we further conducted some exploratory analyses considering BCC exposure through a cluster-level aggregate of the degree of penetration of breastfeeding messages in the community as a means of minimizing the biases of self-reported exposure and examining the indirect effects of communication programmes. All estimation techniques were applied using the Stata statistical software package (22).

RESULTS

Descriptive analysis

The population targeted by the DISH Project was predominantly rural, with about 70% of women and men residing in rural areas (16). Two-thirds (66%) of women and 58% of men were currently married at the time of the 1999 survey; 77% of women had ever given birth. The most common language spoken was Luganda, followed by Runyankole. About one woman in four (22%) and one man in nine (11%) had no formal education.

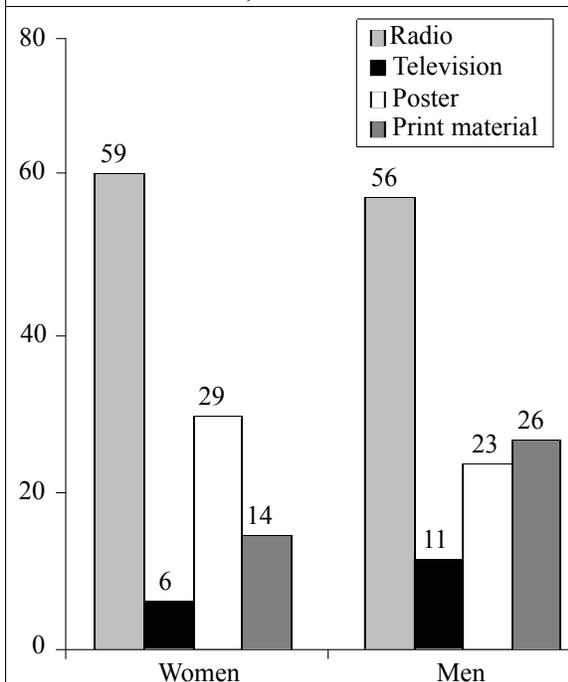
The majority of women (59%) and of men (56%) living in the DISH districts had heard radio messages about breastfeeding in the past six months (Fig. 2). There was also appreciable exposure to BCC messages through posters and print materials (newspapers, magazines, and leaflets) and, to a lesser extent, through television or videos. Exposure to BCC messages via print materials and television was higher among men than among women, likely reflecting a pattern of higher proportions of men with literacy skills or television-viewing habits overall (16).

The preliminary findings of DES revealed that the proportion of women with appropriate knowledge of six months as an ideal exclusive breastfeeding duration was higher among those with exposure to any single breastfeeding BCC message compared to those with no BCC exposure: 42% vs 28% (Fig. 3). Moreover, the proportion was the highest among women exposed to at least two different message types (51%). Similar trends were found for men.

On the other hand, the relationship between media exposure and breastfeeding practices may be more difficult to assess. In 1999, the proportion of women with infants aged up to six months who were currently exclusively breastfeeding was similar among those who had heard multiple message types (65%) as those who were less exposed to BCC messages (65%). Part of the lack of any noticeable difference may be related to the fact that the practices referred to infants born within the six-month period preceding the survey, whereas launching of the relevant BCC campaign in the DISH districts occurred more recently. Some infants might have already been weaned. Moreover, it is reasonable to expect a certain time-lag between acquisition of knowledge and manifestation of behaviours.

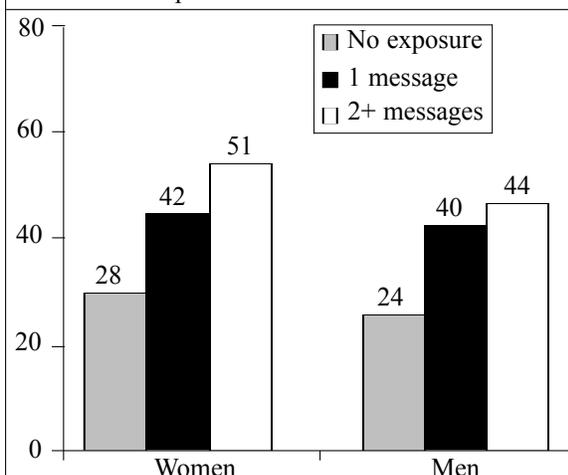
In addition to exposure to the mass media, it would seem likely that maternal and child health knowledge and behaviours are also conditioned by other factors,

Fig. 2. Percentage of women and men reporting exposure to BCC messages on breastfeeding, DISH districts, 1999



Source: DISH Evaluation Survey 1999

Fig. 3. Percentage of women and men with knowledge of six-month exclusive breastfeeding ideal, by BCC exposure



Source: DISH Evaluation Survey 1999

notably sociodemographic characteristics of women and men. For example, according to DES findings, knowledge of the six-month breastfeeding ideal was the highest among women with some secondary education (51%) compared to those with only primary education (39%) and especially those with no formal schooling (32%). Women who are more educated may better appreciate the health advantages of exclusive breastfeeding and longer postpartum amenorrhea. Strong differentials in breastfeeding knowledge by educational attainment were also observed among men (41%, 34%, and 20% respectively).

But such ideals may not necessarily have translated into breastfeeding practices. Women were somewhat less likely to be currently exclusively breastfeeding their infants if they had some secondary education (61%) than if they had lower attainment (66%). These preliminary findings were not entirely surprising: negative associations between education of mothers and duration of breastfeeding have been found throughout the developing world (23).

Multiple regression analysis

Effects on breastfeeding knowledge

Overall, it is probable that knowledge and behaviour of women and men in family-health matters are conditioned by a mix of both background characteristics and ideological differences. Table 1 shows the results of the multiple logistic regression models used for disentangling the effects on breastfeeding knowledge of women and men. To facilitate interpretation, the estimated coefficients 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 knowledge of six months as the ideal duration for exclusive breastfeeding compared to a counterpart in the reference category, other factors remaining the same. A ratio lower than one suggests lower likelihood, and a ratio equal to one suggests similar likelihood.

After controlling for the influences of background characteristics, individual-level exposure to BCC messages in the media was significantly associated with knowledge. Women with no recent BCC exposure were about 40% less likely to know of six months as ideal for exclusive breastfeeding compared to their counterparts exposed to one message type. Some evidence of a dose-response effect was found, with women exposed through multiple media channels being more

likely to have appropriate knowledge; however, the effect was not statistically (at $p < 0.5$) significant.

Among the background characteristics observed to exercise independent influences on breastfeeding knowledge of a woman included her marital status, parity, ethnicity, and educational attainment. All else being equal, women who were currently in union were significantly more likely to know of the six-month ideal compared to their counterparts not in union. Women who had no children were less likely to know of the six-month ideal, likely reflecting their inexperience in breastfeeding compared to women with children. Not surprisingly, education was significantly related to improved knowledge: women with secondary education were over twice as likely to know of the six-month ideal as those with no education.

Among men, self-reported exposure to BCC messages in the media was also positively associated with breastfeeding knowledge (Table 1). Men with no exposure were half as likely to have a six-month exclusive breastfeeding ideal compared to those with exposure to any one message type. As was the case for women, while a dose-response effect was suggested by greater knowledge among men exposed to multiple message types, the effect was not statistically discernible.

Some like sociodemographic influences on breastfeeding knowledge of a man were observed as had been found for women. Ethnicity and education particularly affected breastfeeding knowledge. In particular, men with greater education were more likely to have the six-month ideal for exclusive breastfeeding compared to their counterparts who were less educated.

Effects on breastfeeding practices

At first glance, a strong dose-response effect of mass media exposure on the propensity of women to exclusively breastfeed was suggested. At the time of the survey, women who reported exposure to multiple types of BCC messages about breastfeeding were nearly three times as likely to be currently exclusively breastfeeding their youngest living child up to six months compared to their counterparts with exposure to only one message type (Table 2). However, women with no exposure were also more likely to be exclusively breastfeeding compared to those with exposure to any one message. On the one hand, the greater intensity of exposure may help reinforce messages about positive maternal-child health practices. On the other, women

with no media exposure may be less exposed to the influences of new ideas and modernization in general and more likely to continue traditional practices, such as prolonged breastfeeding. The short interval between the implementation of the BCC campaign in the DISH districts and the survey fieldwork may also be inadequate to expect responsive behavioural change, especially

While the delivery of births at health facilities is favoured to increase survival rates in the case of emergency obstetric complications, women who delivered their children at home in the last six months were more likely to be exclusively breastfeeding compared to those who delivered at a facility, all else being equal. Findings from other countries suggest that certain facility-level

Table 1. Odds ratios from logistic regressions measuring effects of women's and men's self-reported BCC exposure and sociodemographic characteristics on knowledge of six months as ideal duration for exclusive breastfeeding, DISH districts, 1999

Characteristics	Women (n=1,766)		Men (n=1,057)	
	Sample mean	Odds ratio	Sample mean	Odds ratio
Self-reported BCC exposure				
No BCC exposure	.34	0.60***	.37	0.50***
Exposed to one message type (r)	.38	1.00	.32	1.00
Exposed to multiple message types	.28	1.20	.31	1.14
Age group (years)				
15-24 (r)	.45	1.00	.40	1.00
25-34	.32	0.83	.34	1.04
35+	.23	0.86	.26	1.17
Marital status				
Never in union (r)	.21	1.00	.35	1.00
Currently in union	.66	1.56*	.58	1.44
Formerly in union	.13	0.80	.07	0.91
Parity				
0 child	.23	0.61*	.39	0.91
1-3 child(ren)	.43	1.00	.32	1.00
4+ children	.34	0.83	.29	0.90
Ethnicity				
Luganda	.43	1.19	.50	1.17
Runyankole	.23	2.10***	.19	1.86**
Other (r)	.34	1.00	.31	1.00
Residence				
Rural (r)	.70	1.00	.72	1.00
Urban	.30	0.89	.28	0.70*
Education				
No education (r)	.22	1.00	.11	1.00
Some primary schooling	.54	1.39*	.53	2.00**
Some secondary or over	.24	2.52***	.36	2.66***

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

r=reference category

since some infants included in the analysis may have already been weaned before launching the campaign. For the most part, independent influences of socio-demographic characteristics on women's likelihood of current exclusive breastfeeding were not discernible. Only ethnicity exercised significant effects. Some negative impact of women's education was observed, but the trend was not statistically significant. Limiting our observation to women with a living child aged six months or less implies that the sample size here is smaller and, in turn, the confidence interval in the regression model wider.

practices may act to hinder breastfeeding of mothers, such as promotion of formula or other prelacteal liquids, or disruption of contact if the mother and baby are not in the same room. Women who deliver at home may find themselves in a more supportive context for breastfeeding, especially if positively influenced by others, such as their husbands or mothers and mothers-in-law. It is also possible that an increased contact with the medical establishment is likewise associated with socioeconomic status of women, or with perceived poor child health, which may be mitigating factors in early introduction of supplemental feedings.

Potential biases of self-reported BCC exposure

The findings of our analysis suggest a positive association between exposure of an individual to BCC messages in the mass media and appropriate exclusive breastfeeding knowledge and, to a certain extent, practices. Such findings, although encouraging for BCC programming, require a cautionary statement regarding the relationship between self-reported exposure to relevant messages in the media and breastfeeding knowledge and practice relying on cross-sectional survey data.

Table 2. Odds ratios from logistic regressions measuring effects of mothers' self-reported BCC exposure and sociodemographic characteristics on current practice of exclusive breastfeeding for the youngest living child up to six months, DISH districts, 1999

Characteristics	Women (n=212)	
	Sample mean	Odds ratio
Self-reported BCC exposure		
No BCC exposure	.34	2.32*
Exposed to one message type (r)	.38	1.00
Exposed to multiple message types	.28	2.79*
Age group (years)		
15-24 (r)	.45	1.00
25-34	.32	0.66
35+	.23	0.63
Marital status		
Currently in union	.66	1.30
Not in union (r)	.34	1.00
Parity		
1-3 child(ren)	.66	1.00
4+ children	.34	1.24
Ethnicity		
Luganda	.43	1.03
Runyankole	.23	3.10*
Other (r)	.34	1.00
Residence		
Rural (r)	.70	1.00
Urban	.30	0.95
Education		
No education (r)	.22	1.00
Some primary schooling	.54	0.71
Some secondary or over	.24	0.73
Place of delivery		
Health facility (r)	.54	1.00
Home or other non-medical place	.46	2.52*
* p<0.05		
r=reference category		

Some positive effects of self-reported BCC exposure may be related to the modelling problems of endogenous variables.

Respondents who were already well-informed about sound maternal and child health practices may be more likely to notice breastfeeding messages and recall them when asked in a survey, leading to biased findings of significance.

We conducted some exploratory analyses considering BCC exposure through a cluster-level aggregate of the degree of penetration of family-health messages in the community. This alternative approach was designed as a means of minimizing the biases of self-reported exposure, by substituting an 'instrumental variable', or one that is correlated with the explanatory variable but not the regression model's error term (24). The use of cluster aggregates holds both methodological and substantive interest. A cluster can be considered a proxy for neighbourhood or community. Persons in the same community often talk to each other and may share ideas and a common local culture (25). Thus, the cluster aggregate for BCC exposure can be considered as reflective of the penetration of relevant mass media messages in the community.

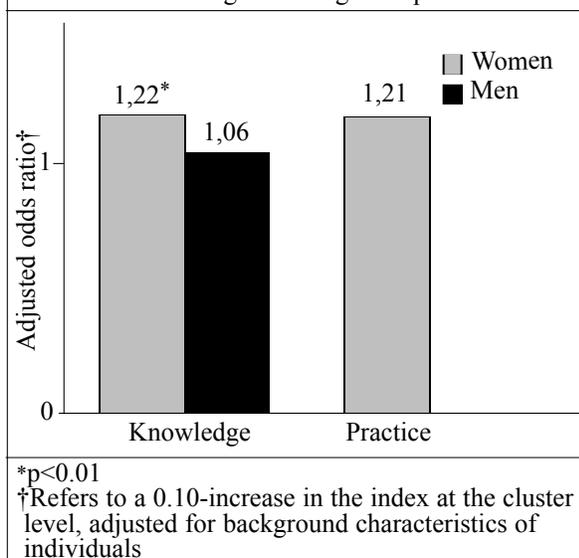
The cluster aggregate for BCC exposure was measured by summing the individual-level responses at the cluster level, i.e. the number of women or men interviewed in the same sampling cluster by exposure to mass media BCC messages. The cumulated measure of media exposure was calculated as an index ranging from 0 to 1, with 0 if no respondents in the cluster reported any breastfeeding BCC exposure and 1 if all respondents reported exposure through all four different media types.

The community BCC index was significantly associated with a woman's likelihood of knowledge of the six-month exclusive breastfeeding ideal (and after controlling for intra-cluster correlation) (Fig. 4). The greater the penetration of BCC mass media messages in a community, the more likely a woman living in that community would have appropriate breastfeeding knowledge.

However, using the same community index, the association between exposure and breastfeeding knowledge dissipated among men. Little conclusive evidence of an independent impact of the penetration of the BCC messages in the community was found on

breastfeeding practices of women. Such results point to a certain degree of uncertainty in relying on self-reported measures alone for evaluating the BCC influences.

Fig. 4. Adjusted odds ratios for effects of community level BCC exposure on six-months exclusive breastfeeding knowledge and practice



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

DISCUSSION

The aim of this study was to assess the influences of exposure to multi-channel media messages promoting exclusive breastfeeding for the first six months of life on breastfeeding knowledge of women and men and on practices of mothers with their infants. Assessing the programmatic influences of breastfeeding promotion efforts is an important model for many types of family-health interventions. Our main analytical tool was multiple logistic regressions drawing on data from a representative household survey conducted in 1999 in the areas targeted by the DISH Project of Uganda.

The results of our study showed that, after controlling for the effects of selected background characteristics, exposure to the BCC messages was strongly associated with women's knowledge of six months as an ideal duration for exclusive breastfeeding. Women who were recently exposed to the BCC messages in the

media were significantly more likely to have appropriate knowledge compared to those with no exposure. This relationship was less important among men but generally held the same pattern.

Examination of the influences of media exposure on breastfeeding practices produced unexpected results. While women with exposure to multiple media messages on breastfeeding were more likely to be currently exclusively breastfeeding their infants aged up to six months compared to those with exposure to only one message type, so were women with no exposure. Conclusive effects of BCC activities promoting breastfeeding in the DISH districts may not yet be evident because the 1999 survey was conducted shortly after launching the campaign.

A number of sociodemographic characteristics were considered to control for differences among the respondents exposed to the mass media that also may help explain their family-health attitudes and practices. As could be expected, women who were married, had children, and were better educated were also more likely to know of six months as the ideal duration for exclusive breastfeeding. The findings were generally quite similar among men, although the effects of parity and marital status were not statistically significant.

Few background characteristics were significant predictors of a woman's likelihood to be currently exclusively breastfeeding. On the other hand, the place of delivery was among the most important determinants. Women who delivered at home were more likely to be exclusively breastfeeding compared to those who delivered at a health facility. Results of a concurrent inventory of health facilities accessible to the surveyed population revealed that 92% of public facilities were, in fact, displaying BCC posters promoting breastfeeding (16). Such findings suggest a need for a better understanding of the role of facilities and medical personnel in promoting or hindering breastfeeding practices. It is also possible that access to the medical establishment is itself a measure of socioeconomic status, beyond educational attainment.

Evaluating the efficacy of public-health campaigns to promote breastfeeding is notably difficult because of inherent weaknesses in relying on cross-sectional survey data to measure campaign exposure. Significant improvements over time were observed in breastfeeding knowledge and practices of women based on

comparisons with findings of an earlier 1997 household survey conducted in the same target areas; however, information on exposure to media messages on breast-feeding had not been compiled in the 1997 round.

The statistical problems of modelling the relationships between BCC exposure and demographic outcomes bear underlining. For example, women with recent experience in infant feeding, either with breastmilk alone or with supplements, may be more likely to notice and recall relevant materials when asked in a survey. While many previous studies evaluating the impacts of media exposure have acknowledged this selectivity bias, few have offered straightforward means to address it in their empirical analyses. Some provide no modelling options other than self-reported exposure. Simultaneous-equations models offer one approach to jointly estimate the self-selection process, but their application involves cumbersome computations and is extremely difficult for evaluating the impacts of BCC activities, in part because of the problems in identifying variables from survey datasets that may affect whether or not a respondent recalls hearing the messages but that are not also associated with the outcome of interest, in this case breastfeeding.

We used a reduced form model instead, using indirect measures of BCC exposure: cluster-level indices of the relative penetration of mass media messages in the community. We would expect this measure to be highly correlated with individual exposure, but not with the modelling error term associated with family-health attitudes and behaviours. Using this instrument offers a simple way to help overcome some (though perhaps not all) of the bias inherent in this type of study.

Overall, the findings from the models with the community exposure index were encouraging, showing strong effects of community exposure on women's knowledge of the six-month breastfeeding ideal. Community-level effects were not found to be determinants of knowledge among men, who may not necessarily have been as directly targeted by the BCC campaign but who could play an important role through creating a supportive environment for promoting breastfeeding among women. Future studies could be enhanced through the availability of data from repeated comparable surveys, which would offer the opportunity for estimating time-trends. Identification and inclusion of adequate exposure variables in future data-collection instruments—such as times of listening to radio or watching television in conjunction with broadcast schedules of BCC

messages—could also allow for more in-depth analyses of the pathways to behaviour change.

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