

Reproductive Health and Family Planning Behaviors in North West Nigeria: Effects of a Hausa Language Radio Drama

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Abstract

Contraceptive prevalence (CPR) in North West Nigeria is the lowest in the country coinciding with high fertility driven primarily by large family ideation. Research shows that communication about family planning, especially between spouses/partners leads to adoption of a modern method of contraception. To promote spouse and partner communication and to increase family planning use, an entertainment-education radio serial drama was broadcast featuring characters that modeled how to discuss having smaller families, birth spacing, contraceptive use, and maternal and child health. A post-test representative survey of 649 participants found that 71 percent listened to the program weekly. Multivariate analysis found that regular listeners were 2.4 (95% CI 1.4, 4.3) times more likely than non-listeners to say they “currently use something to delay or avoid pregnancy.” On several other behavioral and attitudinal indicators, results showed that regular listeners to the program had more favorable scores than non-listeners to the program.

Introduction

Nigeria is the most populous country in Africa, and this is in part due to its high fertility. In 2007, at the inception of the program intervention described in this paper, Nigeria was one of the eight countries with the world's largest population. Its population of 144 million that year was projected to increase to 282 million by 2050. The average level of fertility among Nigerian women aged 15-49, as measured by total fertility rate (TFR) in 2008 was 5.7 (NPC [Nigeria] and ICF Macro 2009) but this overall figure masks regional variations in fertility. TFR is highest in the North West region (7.3) and lowest in the South West at 4.5 (NPC [Nigeria] and ICF Macro 2009). The role of age at first marriage, and in turn, onset of childbearing as proximate determinants of fertility, is well researched (Bongaarts 1978; NPC and ICF International 2014; Westoff 1992). In 2008, the median age at first marriage for women aged 25-49 was lowest in the North West region, at 15.1. By comparison, the figure was 18.1 in North East region and highest in the South East, at 22.8 (NPC [Nigeria] and ICF Macro 2009). Marrying early, especially when combined with closely based births, has a negative impact on the health of the mother and child.

Similarly, childbearing starts early in the North West. According to the same source, median age at first birth for women currently age 25-549 was 18.3 in the North West and highest in the South East (23.6) parts of the country. Use of contraceptives among married women of reproductive age (15-49) can both lower TFR and help parous women implement healthy birth spacing; however in 2008 the contraceptive prevalence rate (CPR) in the North West was as low as 2.8 percent versus 31.7 in the South West compared with a national average of 9.7 percent (NPC [Nigeria] and ICF Macro 2009). Thus, the reported high levels of negative sexual and reproductive health outcomes among men and women of reproductive age residing in this Nigerian zone (Bankole 1994; Bankole et al. 1996) is not surprising.

Ideation factors related to family planning, reproductive health, and women's empowerment have been identified as driving the observed high TFR and low contraceptive use. One of these ideation factors is ideal family size. The number of children desired is a reflection of fertility norms of a society, the demand for children, and ultimately contraceptive use. In 2008, the mean ideal number of children for Nigerian women aged 15-49 was 6.1 but 8.0 in the North West

region. Feyisetan and Casterline (2000) noted that women in the North West are more inclined to use contraceptives for spacing. This statement is supported by the 2008 Nigeria DHS that finds that the demand for spacing is 18.0 percent nationally but only 3.6 percent (NPC [Nigeria] and ICF Macro 2009). Since spacing has less impact on fertility than limiting, this explains the high fertility in that region of Nigeria. Several other reasons for non-use of family planning in Nigeria includes “perceived lack of need for contraception, fear of side effects and opposition to contraception on personal, spousal or religious grounds” (Sedgh et al. 2006).

Studies have also found that gender norms, asymmetric gender roles, and low levels of women’s empowerment have contributed to the strong forces driving the low use of contraception in the North West region of Nigeria (Kritz et al. 2000) and the rest of the developing world (Agyeman and Casterline 2002; Blanc 2001; Gage 1995; Mason 1997; Mason 1993; Mason and Smith 2000). Cleland and colleagues (2006) highlight the human rights perspective for gender equality and its link to reproductive health by noting “Freeing women from involuntary reproduction was one of the main inspirations for family planning pioneers 100 years ago and remains just as relevant today.....and remains the most important step towards the achievement of gender equality”.

Theoretical Framework: Ideation, Entertainment-Education and Reproductive Behavior

The importance of ideation processes in influencing the adoption of contraception in recent fertility transitions is well documented. The role of ideation theory, as an alternative theory in explaining contemporary fertility in developing countries came into prominence due to the lack of evidence supporting conventional as the main force behind fertility declines globally.

Demographic transition theory has not fully explained the historical fertility decline in Europe (Coale and Watkins 1986; Knodel and van de Walle 1979), the fertility declines from Asia and Latin America, and more recently the incipient declines in sub-Saharan Africa (Caldwell and Caldwell 1992; Cleland 1985; Hirschman 1994; Kirk 1996). This alternative theory, sometimes referred to as diffusion of innovations/diffusion of fertility decline theory, is defined as new ways of thinking (Cleland 1985; Cleland and Wilson 1987; Freedman 1987; Tsui 1985) that spread across individuals, social groups, and regions, or diffuse within a culture by means of social influence or social interaction (Bongaarts and Watkins 1996; Montgomery and Casterline

1996; Rosero-Bixby and Casterline 1993). Thus, close and constant interactions across individuals, groups, and networks provide the catalyst for the diffusion of new ideas (Bongaarts and Watkins 1996; Montgomery and Casterline 1996). The spread of these novel ideas in turn leads women and men to begin to find legitimacy in and internalize them and ultimately aligning their behaviors, preferences, and attitudes with those of the group.

Findings from extensive behavior change entertainment-education (EE) research corroborates the theoretical association between radio dramas using EE and ideational changes in family planning and reproductive health (Babalola et al. 2008; Bankole et al. 1996; Barker 2012; Bertrand and Anhang 2006; Kane et al. 1998; Meekers et al. 2007; Nariman 1993; Piotrow et al. 1997; Rogers 1995; Rogers et al. 1999; Ryerson 2010; Singhal 2004; Smith et al. 2007; Vaughan and Rogers 2000; Westoff and Bankole 1997).

Population Media Center (PMC) is a US-based non-profit organization working in the US and the developing world to promote positive change in family planning, reproductive health, and other social issues. PMC uses a unique type of EE that is based on an integrated contextual multi-disciplinary theoretical framework that uses the long-running serial drama format broadcast via radio, TV, and more recently other social media. A long-running format lends to audience behavior change because it allows time for (1) audience members to identify with characters, (2) characters to change their own attitudes at a believable pace, and (3) audience members to test the attitudinal and behaviour changes themselves (Ryerson 2010). Each aspect of a drama is developed according to PMC's theory of change and an empirical research-based formula in order to reinforce a coherent set of interrelated values that is tied to specific prosocial behaviors. PMC's change theory is informed by Social Cognitive Theory (SCT) and other theories in EE (Barker 2012; Sood 2004) via mediated role models who inspire increased confidence or self-efficacy to perform a specific behavior. Not only can new behaviors be learned from such models, but many cognitive and affective responses to a behavioral situation can be learned as well (Bandura 1986).

The foregoing ideational factors have made family planning initiatives in North Western Nigeria challenging (Brotherton et al. 2007). The Nigerian government subscribes to UNFPA's

objectives of improving family planning, reproductive health, and maternal and child health through the promotion of family planning. A framework to achieve these objectives is found in Nigeria's National Population Policy, one goal of which is to "promote behavioral change communication (BCC) programs to increase reproductive and sexual health knowledge, awareness, and behavioral change among Nigerians" (NPC 2004).

Program Development

To contribute to the Nigerian government's effort to achieve the targets set at the ICPD and MDGs, including UNFPA's objectives in the country, PMC established a Nigeria office and program team that produced and broadcast a 208-episode radio serial drama¹, *Ruwan Dare*² in Hausa, the dominant language of the North West. The drama promoted and modelled ideational change, specifically spousal communication, birth spacing, contraceptive use, and smaller family size. Four states, Kaduna, Kano, Katsina, and Sokoto, residing in the highest fertility North West geopolitical zone³ were identified as the target region for the broadcast.

PMC trained Hausa-speaking writers and radio producers in the use of the PMC's Methodology to create the drama. In line with PMC's research-oriented methodology and to inform the program, a Nigerian research firm conducted formative research, beginning with a review of the literature and the country's policy framework on ideational processes that influence family planning and reproductive attitudes and behaviors, with special emphasis where possible on North West Nigeria. The firm also conducted an infrastructure and media analyses that identified family planning service points in the broadcast area.

The formative research also identified media habits and ideal listening times of potential

¹ Radio is the most widely consumed media in Nigeria because of its accessibility and affordability, and is the optimal channel for family planning messages. In the North West 70 percent of households own a radio and this medium is cited most frequently as a source of family planning messages for both women (19.8 percent) and men (27.1 percent). (NPC and ICF International 2014)

² *Ruwan Dare* can be translated as "Midnight Rain" or "Midnight Dew" in Hausa. Writers created the title as a metaphor for the human interactions and activities that transpire in the late night (Okon 2011). Under this conceptual metaphor, the storyline and related characters presented both positive and negative views related to making key life decisions (See Appendix A) and modeled how to discuss sensitive issues such as birth spacing, contraceptives, family size, and how to seek prenatal care to promote maternal and child health.

³ Nigeria is comprised of 36 states and a Federal Capital Territory (FCT) and is grouped into six geopolitical zones: North Central, North East, North West, South East, South South, and South West. There are 774 local government areas (LGAs) that are constitutionally recognized in the country.

audience members and included a pretest of preliminary versions of the first four episodes of the drama. Audience research in the form of qualitative focus groups and individual in-depth interviews were conducted within the community to identify reproductive health and family planning ideation processes of concern and to assess potential audience members' attitudes towards these issues. Thus, the formative research enabled the creative team to design appropriate, realistic, and credible characters for the drama that featured discussion of reproductive and family planning issues. Local staff established a production advisory committee to assure high quality and appropriate content of the program and listeners' clubs with male and female audience members in the four North West states to provide ongoing feedback to the creative team.

Methods

A regionally representative endline cross-sectional survey was used to evaluate the impact of the drama. Women (15-49) and men (15-59) of reproductive age from urban and rural areas of Kaduna, Kano, Katsina, and Sokoto states in the North West geopolitical zone of Nigeria were interviewed for the study. The endline study was conducted in July of 2009, one week after broadcast of the last episode of the drama.

Sampling

A stratified two-stage cluster sampling method was employed to generate the study sample. The four broadcast states in the North West were considered the universal population to be surveyed. In the first stage, Local Government Areas (LGAs)⁴ in the four states were sorted into eight strata defined by the intersection of state and urban-versus-rural status and five LGAs were sampled from each of the eight strata with equal probability totaling 40 LGAs in the sample. These formed the first stage "clusters" and became the primary sampling unit (PSU) for the study. In the second stage, within each LGA cluster, systematic random sampling was used to select households. In each cluster, enumerators conducted a complete household listing operation in anticipation of achieving a fixed sample take of 20 households per cluster. Once this was

⁴ The rural-urban delineation of LGAs in each state was determined using the following criteria: rural LGAs are comprised of villages and small settlements situated away from the cities; they have few, low-level, none or dilapidated infrastructural facilities in health services, education and transportation. They are also far away from large-scale markets and other amenities that operate daily. Urban LGAs are defined as the opposite of the rural definition.

completed fieldwork commenced with enumerators approaching the single starting household in the cluster and continuing to the next identified household. An inter-household gap of 3 houses in rural areas and 6 houses in urban areas was established to assure randomness and to make the data collection relatively widespread within each urban and rural cluster.

Selection of individuals within households was also conducted systematically with an *a priori* probability of selection skewed 60 percent female and 40 percent male by utilizing 6 female interviewers and 4 male interviewers. Because the North West region is primarily Muslim, men and women customarily do not interact in a situation such as an interview, thus male enumerators interviewed males and female enumerators interviewed females for the study. To select females for an interview, female enumerators approached the selected house and asked for the first wife of the household. If that individual was not available, a request was made to interview the second wife and so on. If an eligible female was not available for the interview at that time, an appointment was made to return to the house for a second attempted interview. To select males for an interview, male enumerators asked for the male head of the household. If that individual was not available, a request was made to interview the oldest eligible male resident. If an eligible male was not available at that time, an appointment was made to return to the house for a second attempted interview. Using this systematic approach, interviews continued (with a maximum of three attempts) and enumerators followed instructions to satisfy the 6 to 4 female-male ratio in the field to achieve the *a priori* quota until 1 participant in each selected household was interviewed for each cluster.

Selection Probability

In each surveyed state, the probability (P) of a Local Government Area (*lg*) being selected was done according to the following formula: $P_{lg} = (a/A)$, where **a** is the total number of LGAs selected and A represents the total number of LGAs in the state. Regarding the selection of participants and based on the 60-40 ratio in favor of females, the final individual probability of the **i-th** respondent selected could be estimated as follows: $P_i = (r_i/R)*0.4$ for a male respondent and $P_i = (r_i/R)*0.6$ for a female, where r is the specific participant and R stands for the total number of participants selected in the LGA.

Survey Implementation

Prior to the fieldwork, training was conducted for enumerators and supervisors on the protocol for implementing the survey. The training included asking questions in English, translating questions into Hausa and back translating into English to ensure accuracy and consistency. Training of male and female enumerators stressed the need to pay attention to courteousness, confidentiality, sensitivities, culture, religion, and values of participants. The Centre for Reproductive Health and Development Research (CEDER) and the Department of Economics, Faculty of Social Management Sciences at Kaduna State University in Nigeria conducted the project evaluation. Data entry and management was done using SPSS Version 12.

Measures

Face to face interviews were conducted with the sampled participants using standardized items from the Nigeria Demographic and Health Surveys (DHS) relevant to the drama as well as an “exposure module” to establish listenership status of *Ruwan Dare*. In line with ideation theory and PMC’s theory of change, our measures of ideation included knowledge, attitudinal, and behavioral measures of family planning and reproductive health, as presented below. Because we used logistic regression in our estimations our dependent and independent measures were dichotomized, with “1” being the estimated outcome and “0” being the reference; similarly control measures were either dichotomized or categorized.

Independent Variable

We established “regular listener” to the drama as the main independent variable for the study. To capture this, participants were asked “Have you ever heard about the radio serial drama *Ruwan Dare*?” Those participants that indicated “Yes” were then asked “Have you ever listened to one or more episodes of the radio serial drama *Ruwan Dare*?” Those saying “Yes” were asked “How often did you listen to the drama *Ruwan Dare* each week?” with three as the maximum number of episodes.⁵ “Regular listeners” were categorized as participants that listened to one or more episodes per week. “Non-listeners” were categorized as either those that never listened to the drama or who did not listen weekly.

⁵ The program aired twice per week from July 2007-October 2008, then 3 times per week thereafter until July 2009.

Dependent Variables

For the study we examined dependent variables that both aligned well with prominent storylines and character role modeling in the drama and that reflect measures of ideation. These included 3 behavioral, 11 attitudinal, and 2 knowledge outcomes relating to family planning and reproductive health for a total of 16 outcome variables. *Behavioral Variables.* To assess behavior change as a result of the program we included the following three variables in the survey: 1. Current use of family planning asked participants “Are you currently using something to delay or avoid pregnancy?”, 2. Discussion of family planning with others asked participants “In the last 3 months, have you discussed the practice of family planning with your family, friends, or neighbors?”, and 3. Frequency of discussion of family planning with spouse/partner asked: “How often have you talked to your husband (or wife)/partner about family planning in the last 3 months?” with response categories “never”, “once or twice”, and “more often”. For this variable we coded the negative response category “never” as 0 and combined the response categories “once”, “twice”, and “more often” for the outcome response and coded it 1.

Attitudinal Variables: Family Planning and Reproductive Health. Seven attitudinal variables were used to assess program outcomes. The first three included attitudinal statements presented to participants: 1. Spacing births: “Couples should space their children at least 2.5 to 3 years apart”, 2. Couples sharing responsibility for family planning: “Couples should share responsibility for making family planning decisions”, and 3. Attitude toward family planning: “People should plan how many children they have”, all with response categories “agree” or “disagree”. 4. Attitude toward close pregnancies asked “Can becoming pregnant every year put the health of the mother at risk?”. 5. For the variable mean ideal number of children (intended to measure ideal desired family size) participants with children were asked “If you could go back to the time when you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?” and participants without children were asked: “If you could choose exactly the number of children to have in your whole life, how many would that be?” Both items had numeric response categories. 6. To assess attitude toward contraception in the context of a highly religious Muslim population in the North West of Nigeria, we asked “Is using contraception against the will of Allah/God?” 7. Lastly, we assessed attitude toward

educating children about the use of condoms to prevent HIV by asking “Should children age 12-14 be taught about using a condom to avoid HIV/AIDS?”

Attitudinal Variables: Women’s Empowerment and Reproductive Health. Four attitudinal statements focusing on women’s empowerment as it relates to reproductive health were also included in the survey: 1. Attitude toward ideal age of marriage asked participants “What do you consider to be the ideal marriage age for a female?” with a numeric category as the response. The next series of items provided statements related to opinions about a wife refusing to have sex with her husband: “Please tell me if you think a wife is justified in refusing to have sex with her husband when”: a. “She knows her husband has a sexually transmitted infection”, b. “She knows her husband has sex with women other than his wives”, and c. “She is tired or not in the mood?” The latter three all used “yes” or “no” as response categories. *Knowledge Variables: Source of Family Planning and AIDS prevention.* The final two indicators assessed 1. Knowledge of a place to get family planning and asked: “Do you know of a place where you can obtain a method of family planning?” and 2. Knowledge of reducing risk of HIV/AIDS by using a condom that asked: “Can people reduce their chances of getting the AIDS virus by using a condom every time?”

Control Variables

People who reside in urban areas and who have higher educational attainment tend to be more oriented toward ideational changes regarding family planning and reproductive health. Marital status, age, sex, and urban/rural location can confound the association between ideation and mass media. Accordingly, our analyses controlled for these five important correlates of family planning ideation (Table 1).

Analysis

We undertook an analysis strategy that aimed to understand the effects of “regular listenership” to the drama on the 16 dependent variables controlling for demographic co-variables. Given the complexity of the study’s data collection design (i.e., two-stage sampling as opposed to simple random sampling), it was necessary to utilize statistical procedures capable of accounting for the stratification of states and clustering in the two sampling stages. The use of a Complex Sampling

procedure was made even more imperative by the fact that all the clusters in the four states were sampled with equal probability. The Complex Samples module in SPSS (Version 22) allows one to incorporate complex design specifications into different types of data analysis (e.g., descriptive analysis and logistic regression), thereby enhancing the accuracy of generated standard errors and validity of results⁶.

Sample Weights

Because our sample was selected with equal probability regardless of LGA size, we applied sample weights to adjust for differences in this selection probability and to make the sample representative of the population of the four states under study in the North West. The individual weight of a participant's case in the sample is derived from the product of the household weight and the inverse of the participant response rate based on his/her individual response rate group. Specifically, the inclusion at each stage is the proportion of the units sampled; the overall inclusion probability is the product of each of the stage-wise inclusion probabilities; and the final sampling weight is the reciprocal of this product as illustrated below:

$$1/P_i = (1/n_i) * (n_j/N_j) * 5/N_K$$

Where P_i is the individual sample weight, n_i is the number of eligible individuals within the i th person's household; n_j is the number of households sampled in the j th LGA; N_j is the total number of households in the j th LGA; and N_K is the number of LGAs within the k th stratum.

Having created sample weights, the data were then processed using Complex Samples

⁶ The dataset that was originally constructed during the program evaluation did not contain sample weights and some of the design variables. In order to ensure the computation of accurate variance estimates under the Complex Samples procedures, we had to create a Complex Sample analysis plan that specified the structure of the sampling, estimation methods for each sampling stage, inclusion probabilities of sampled clusters and sample weights. Based on the sampling design information received from our data collection researchers, we were able to satisfy these requirements in two steps, namely 1) Computation of the inclusion probabilities of the units at different sampling stages and the sampling weights; 2) Creating an analysis plan, which includes three sub-steps. The first step to creating an analysis plan is to compute the sampling stage-wise inclusion probabilities and sampling weights. For this study purposes, we considered calculating inclusion probabilities at two stages: the LGA level and the household level, which in turn allowed us to calculate sample weights. In the second step, we created an analysis plan by first specifying the design variables considered under step 1 and using the four North West states as strata for variance estimation, followed by the selection of an estimation method consistent with the sampling design, and finally specifying the inclusion probabilities calculated in the step 1.

procedures. Statistical comparisons using chi-square and multivariate logistic regression methods were made between regular listeners and non-listeners on the dependent variables to identify any changes among the audience. Statistics for regular listenership were used in conjunction with the 2006 state level census estimates for Nigeria (NPC 2007) for age adjustments to estimate the audience size for the program, cost of listenership, and cost per behavior change.

Table 1. Percentage (and mean values) of participants' background characteristics					
(covariates) by regular listeners and non-listeners, <i>Ruwan Dare</i> 2007, North West Nigeria					
		Non-listeners (%)	Regular listeners (%)	Total (% or mean)	
Independent Variable (Listenership)		28.6 (ref)	71.4	100	
		Sample size			
		193	456	649	
Covariates (Demographic characteristics)					
Mean age		35.6	34.8	35.0	
Age in completed years (%)					
	45-59	16.0	9.4	11.2	
	30-44	46.8	56.8	54.0	
	15-29 (ref)	37.2	33.9	34.3	
Sex					
	Male	45.2	44.7	40.1	
	Female (ref)	54.8	55.3	59.9	
Current marital status					
	Married/cohabiting	76.4	90.1***	86.3	
	Not married or in union (ref)	23.6	9.9	13.7	
Education					
	Higher	33.2	25.6	27.7	
	Secondary	24.1	26.7	26	
	Primary	16.3	23.4	21.4	
	None (ref)	26.5	24.2	24.9	
First language					
	Hausa	66.4	90.4***	82.0	
	Other (ref)	33.6	9.6	18.0	
Region of residence (ns)					
	Urban	54.8	58.9	59.7	
	Rural (ref)	45.2	41.1	41.1	

***Differences significant at $p \leq .001$

Results

Of a possible 793 participants drawn for the sample, 649 completed the survey for a response rate of 82 percent (Table 1). Characteristics of the participants reveal that the majority (54 percent) of the sample is in their prime adult reproductive years (30-44); 34 percent are in their youth or early adulthood (15-29), and 11 percent fall under the later adult or post-reproductive years (45-59). As was planned, 60 percent of participants are female and 40 percent male and 85 percent are either married or cohabiting. Nearly one third (25 percent) have no formal education while more than half (54 percent) are educated at the secondary (26 percent) or higher (28 percent) levels, while 21 percent have a primary school education. Sixty percent reside in urban areas (Table 1).

According to Table 1, more than seven of ten (71 percent) participants in the four broadcast states reported regularly listening to *Ruwan Dare* one or more times per week, with slight gender differences (females - 72 percent, males 71 - percent). The show was popular with regular listeners who were married/cohabitating and whose first language is Hausa. On t-test analysis we found significant differences between regular listeners and non-listeners on both of these demographic variables at the $p < .001$ level (Table 1). This is understandable given that the show was recorded and performed in Hausa and targeted married and sexually active individuals. There were no other significant differences in characteristics between regular listeners and non-listeners in the sample.

On most of our ideation indicators, results found that participants that regularly listened to *Ruwan Dare* had more favorable scores (more so at the descriptive level than multivariate level) than those who did not listen regularly. For current use of family planning, a significantly higher percentage of regular listeners (61 percent) than non-listeners (39 percent) reported currently using some form of contraception to delay or avoid pregnancy, with no differences between females and males. Consistent with the descriptive evidence, multivariate results show that regular listeners were 2.4 (95% CI 1.4, 4.3) times more likely than non-listeners to say they “currently use something to delay or avoid pregnancy.” The impact of the drama on discussion of family planning with others was higher for regular listeners (55 percent) compared to non-listeners (37 percent). Multivariate results indicate that listeners were 1.7 (95% CI 1.0, 2.9) times

Table 2. Percentage of participants' study outcomes (descriptive comparisons) and multivariate comparisons by regular listeners and non-listeners, *Ruwan Dare* 2007-2009, North West Nigeria

		Descriptive Comparisons			Multivariate Comparisons of Listeners and Non-listeners	
		Non-listeners (%)	Regular listeners (%)	Total (%)	Adjusted odds ratio	95% confidence interval
Dependent Variables						
Behaviors						
Current use of family planning	Yes	39.3	60.8**	54.8	2.4**	1.4-4.3
Discuss FP with others	Yes	37.1	54.6**	49.8	1.7*	1.0-2.9
Discuss FP with spouse/partner	Yes	27.6	43.8**	39.2	1.5	0.8-2.7
Attitudes: Reproductive Health and Family Planning						
Couples should space their children 2.5-3.0 years	Agree	66.5	77.6*	74.3	2.6**	1.4-5.0
Couple should share responsibility for family planning	Agree	73.0	79.3	77.4	1.7#	0.9-3.3
Plan family size	Agree	61.1	67.1	65.3	1.4	0.8-2.7
Close pregnancies detrimental to mother's health	Yes	62.3	64.5	63.9	1.7#	0.9-3.2
Ideal family size	Mean	5.4	6.3	6.1		
	5 or Less	67.2	55.4	58.4	0.7	0.3-1.8
Using contraceptives is against Allah' will	No	44.8	47.8	47.0	1.2	0.7-2.1
Teach children about condoms to prevent AIDS	Yes	32.8	35.8	35.0	1.6	0.8-3.0
Attitudes: Reproductive Health (Women's Employment)						
Ideal marriage age	Mean	20.2	19.7	19.9		
	19 yrs or older	65.3	66.8	66.3	1.7*	1.0-2.9
Wife should refuse sex if husband has STDs	Yes	74.0	92.1***	87.5	7.5***	3.4-16.9
Wife should refuse sex if husband is unfaithful	Yes	70.5	89.3***	84.5	5.2***	2.5-11.0
Wife should refuse sex if she is tired/not in the mood	Yes	59.7	59.6	59.6	1.2	0.6-2.1
Knowledge						
Can AIDS risk be reduced by using condoms?	Yes	65.8	70.6	69.2	1.8*	1.0-3.4
Know source of FP (ns)	Yes	62.2	67.2	65.8	1.1	0.6-1.9

p ≤.10; * p ≤.05; **p ≤.01; ***p ≤.001; ns=not significant

more likely than non-listeners to say they had “discussed the practice of family planning with family members, friends, or neighbors in the past 3 months.” While the variable discussion of

family planning with spouse/partner showed a higher percentage of regular listeners (44 percent) than non-listeners (28 percent) multivariate results found no discernible difference between the two groups.

The eight family planning (relating to reproductive health) attitudinal ideation variables show mixed results; furthermore, they were not as strongly impacted relative to the behavioral indicators. More regular listeners (78 percent) than non-listeners (67 percent) agreed with the statement that “couples should space their children between 2.5 and 3 years” and on this indicator listeners were 2.6 (95% CI 1.4, 5.0) times more likely than non-listeners to think that “couples should space children 2.5 to 3 years.” For the variables, “sharing responsibility for family planning” and “having close births”, no significant differences were found between regular listeners (65 percent) and non-listeners (62 percent). However, multivariate results showed an odds ratio of 1.7 in both cases, in favor of regular listeners when comparing the groups, but the strength of the associations are of borderline significance ($p < .10$). The remaining four attitudinal variables were not impacted at all.

Results of the four attitudinal indicators of women’s empowerment as it relates to reproductive health (bottom of Table 2) found mean ideal marriage age was approximately 20 years for the entire sample. To permit comparison of regular listeners with non-listeners on this indicator, we established a cut-off age of 19 years or older. Sixty seven percent of regular listeners and 65 percent of non-listeners considered the ideal marriage age for a woman to be 19 years and older but these differences are not statistically significant. Notwithstanding, the multivariate results on this indicator is statistically significant at the $p < .05$ level, underscoring the importance of controlling for differences in individual characteristics: regular listeners were 1.7 (95% CI 1.0, 2.9) times more likely than non-listeners to regard 19 years and older as the ideal marriage age for women (Table 2).

Two of the three remaining empowerment outcomes were strongly impacted by the program. Ninety two percent of regular listeners compared with 74 percent of non-listeners think that “a wife is justified in refusing to have sex with her husband if he has a sexually transmitted infection.” Further, the multivariate results showed that regular listeners were 7.5 (95% CI 3.4,

16.9) times more likely than non-listeners to think the same. Likewise, more regular listeners (89 percent) than non-listeners (71 percent) think that “a wife is justified in refusing to have sex with her husband if he is unfaithful”, and based on the multivariate estimate, listeners were 5.2 (95% CI 2.5, 11.0) times more likely than non-listeners to think that “a wife is justified in refusing her husband sex if he is unfaithful.”

On our knowledge indicators, the drama impacted only one of the two. Seventy one percent of regular listeners versus 66 percent of non-listeners think that condoms can reduce the risk of HIV/AIDS. Multivariate results found listeners were 1.8 (95% CI 1.0, 3.4) times more likely than non-listeners to know that regular use of condoms can help one reduce the risk of AIDS (Table 2). Yet, findings indicate that listeners to *Ruwan Dare* are no more likely than their counterpart non-listeners to know of a place to obtain family planning methods.

Program Reach and Cost Effectiveness Analysis

To determine the reach of the program, we used the 2007 state level census estimates for Nigeria (NPC 2007) and the 2008 Nigeria Demographic and Health Surveys to adjust our listenership levels according to the North West population age structure and radio listenership. Once these adjustments were made, it was estimated that approximately 12.2 million Nigerians (women: 15-49, men:15-59) residing in the North West listened regularly to *Ruwan Dare*. This calculates to a cost of US .08 (CI .06, .10) cents per listener. The cost per behavior change per new adopter of family planning was \$1.32 (CI .92, 1.72)⁷.

Discussion

The results presented in this paper suggest that *Ruwan Dare*, a Hausa language EE radio serial drama targeting men and women of reproductive age in North West Nigeria, benefited regular listeners of the program by influencing positive knowledge, attitudinal, and behavior changes through ideation processes. Findings confirm the important role of the long-running PMC style drama on family planning and reproductive health ideation. Firstly, the increase in contraceptive use and the amount of discussion about family planning that took place among families, friends,

⁷ Cost per listener=total cost of program divided by number of regular listeners. Cost per behavior change=total cost of program divided by estimated number of regular listeners adopting family planning method.

or neighbors - both behavioral ideation outcomes - are notable. These two findings corroborate the theoretical literature on the positive role of ideation processes in family planning and reproductive health, especially through stimulating interpersonal and social-group discussions and social norms (Bongaarts and Watkins 1996; Papa et al. 2000). Second, the findings are also consistent with research evidence elsewhere (Rogers et al. 1999) and from Nigeria (Bankole et al. 1996). Bankole and his co-authors (1996) concluded that contraceptive use and intention are positively associated with exposure to mass media messages.

Third, the behavioral findings highlight the effectiveness of the PMC Methodology, as is reflected in regular listeners (female and male) identifying strongly with both the female and male characters in the Azumi storyline. In this story, Azumi and Asibi, along with their husband, struggle with difficult decisions about family size, family planning, and other reproductive health issues. Despite many obstacles, these characters were able to successfully model how to discuss sensitive issues such as whether or not to space births, to use contraceptives, and to ensure health of the mother and child. Listeners, in turn, were able to weigh the positive and negative consequences of their actions and eventually adopt some of the positive behaviors and attitudes modeled for them.

Fourth, the evidence indicates that the program had also shifted attitudes toward acceptability of family planning within the context of the Islamic culture in Nigeria's North West. This can be seen in the large and significant likelihood of those exposed to the drama relative to those who were not exposed agreeing with the spacing of births by couples, the need for couples to share the responsibility for family planning, and the recognition of the detrimental link between close pregnancies and maternal health; however, the latter two effects are weak. Fifth, and consistent with existing theoretical and research evidence, our findings also indicate an important promising link between radio serial EE dramas and attitudinal factors surrounding women's empowerment and its link to reproductive health. Across all the study outcomes, the drama effects were strongest with respect to ideational changes regarding the women's empowerment outcomes, with those exposed to the drama being considerably more likely than those not exposed to agree that a wife should refuse having sex with her husband if she knows that he has STDs or is unfaithful.

Conversely, the reverse is observed for the last empowerment indicator: “A wife is justified in refusing to have sex with her husband when she is tired or not in the mood.” This implies that the target audience and by extension the population of the four North West States in Nigeria do not consider a wife’s “tiredness or not being in the mood” as justification for refusing to have sex with her husband. The fact that, unlike the first two of these three empowerment indicators, the program did not impact the last indicator speaks to the difficulty of changing deeply held patriarchal or asymmetric gender views. *Ruwan Dare*’s use of the PMC methodology, with its emphasis on honoring values and encouraging audience input throughout the program, may have contributed to the observed shift in attitudes, especially those related to gender norms.

Furthermore, and conflicting with findings in Nigeria (Feyisetan 2000) and elsewhere in the developing world (Bawah 2002; Flink 2011; Meekers et al. 2007), discussion of family planning between spouses though significant between listeners and non-listeners, showed no impact after comparisons using multivariate analysis. This suggests that a follow-on program is needed in the North West zone of Nigeria to help couples overcome socio-cultural barriers to spousal/partner communication about family planning. Likewise, no drama effects were observed for the remaining family planning attitudinal outcomes: ideal family size, planning how many children to have, using contraceptives is against the will of Allah, and teaching children (age 12-14) about condom use for HIV prevention. Ideally, listeners who had adopted a method of family planning as a result of listening to the broadcast would also report wanting fewer children and demonstrate anticipated effects on these three attitudinal/belief outcomes relating to family planning.

However, this was not the case. One explanation for this is that listeners may have adopted a method of family planning in order to space births rather than to reduce family size; as portrayed in two storylines of *Ruwan Dare*, child spacing was emphasized as an excellent method to protect the health of the mother and child (and future children). The promotion of spacing was the entry point for widening the acceptability of family planning within a highly religious population in which planning how many children to have or teaching children about the use of condoms for HIV prevention are unacceptable based on religious grounds. Another explanation may be that other similar interventions aimed at increasing use of family planning may have influenced these scores. During the project period 2007-2009, both the Government of Nigeria and Rotary International had programs promoting birth spacing and family planning in an effort

to reduce maternal mortality and fistula in the North West states and these programs may have had an influence on results of this study.⁸

Finally, because our findings show an increased level of regular listeners reporting discussing family planning with other groups (families, friends, and neighbors), non-listeners may have benefited from these discussions as well. An argument can be made that regular listeners discussed the program and its issues with non-listeners and, in turn, non-listeners' scores on the indicators were affected. This is in alignment with both the PMC methodology and the ideation/diffusion of innovations theory (Bongaarts and Watkins 1996; Montgomery and Casterline 1996; Montgomery et al. 2001; Rogers 2004; Rosero-Bixby and Casterline 1993; Singhal et al. 2004); although evidence for this possibility was not obtained because of the design of this study.

Limitations

There are several limitations to this study. First, data collected from participants are self-reported, including contraceptive use, sexual behavior, and listenership and this may have introduced bias into the study. Second, for the evaluation of *Ruwan Dare*, it was not feasible to design the study using a randomized controlled trial within the context of a mass media radio broadcast in North West Nigeria. Instead the study used a cross-sectional endline survey representative of the four North West states, with two-stage cluster sampling design as a cost saving measure to select participants. There are several threats to validity with this research design, as described by Cook and Campbell (1979). Often, this type of sampling increases the variance of survey results, producing wider confidence intervals than methods such as simple random sampling (Dean et al. 1995). A second threat to validity is related to the sequencing of

⁸ The Rotary Action Group for Population Growth and Sustainable Development (RFPD) initiated a pilot project from 2005-2010 in the North West states Kano and Kaduna. The program, "Improvement of Maternal Health-Prevention and Treatment of Obstetric Fistula" introduced quality assurance in obstetrics in 10 hospitals. The program, of which PMC was a partner included awareness efforts using multiple media and communication channels including radio, TV, town criers, billboards, public plays, and community dialogues. The Federal Government of Nigeria, in collaboration with the United Nations Population Fund (UNFPA) developed A National Strategic Framework Plan for Vesico Vaginal Fistula (VVF) Eradication that was implemented between 2005-2010. The goal of the plan was to eliminate obstetric and thus improve quality of life of women. A birth spacing media campaign with the slogan "Well-spaced children are every parent's joy" was heard or seen by 11% of women in North West Nigeria during the PMC program.

events leading to the possibility of reverse causation (Greene and Merrick 2005; Schultz 2005) or the difficulty of making causal inference (Moffitt 2003; 2005; Schultz 2005) because such data capture one moment in time and is insufficient to infer causal influence (Thornton 2001).

Another threat to making accurate interpretation concerns selection and endogeneity bias (Axinn and Thornton 1992). As it relates to this research, it is uncertain whether it is listening to the drama that caused participants to adopt a method of family planning, or whether they were interested in and listened to the drama because they approve of or are using family planning, or whether the association is reciprocal (i.e., works in both ways). Nevertheless, comparing listeners and non-listeners as to their exposure experience while “controlling for background differences, provides researchers with an opportunity to measure dose-response effects on the fertility or family planning outcomes of interest” (Mwaikambo et al. 2011). In our efforts to control for influencing variables, we used multivariate regression, and this statistical method is widely believed to increase the validity of cross-sectional studies.

Strengths

From the late 1990’s until the interventions described above (including *Ruwan Dare*), Nigeria along with other countries experienced a neglect of family planning programs and services. Perhaps more importantly, excluding a few studies (Babalola et al. 2008; Bankole 1994; Bankole et al. 1996) there was little if any communication research on the effects of mass media campaigns on family planning and reproductive health ideation in Nigeria. This paper and the results presented fill the gap in the literature for interventions and subsequent communication research on ideation for the period 2007-2009 in North West Nigeria. An EE radio program to promote family planning, gender issues, and encourage safe motherhood, if designed with audience input and listener feedback, can benefit couples who are seeking legitimate information to make decisions about family planning, contraceptive use, and maternal health. The findings also confirm that PMC style dramas not only deliver important social and health information and messages to sizeable audiences, but can also motivate people to modify attitudes and adopt new family planning behaviors through ideation processes.

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References

- Agyeman, Dominic K. and John B. Casterline. 2002. "Social organization and reproductive behavior in Southern Ghana." Policy Research Division Working Paper no.167. New York: Population Council.
- Axinn, William G. and Arland Thornton. 1992. "The relationship between cohabitation and divorce: selectivity or causal influence?" *Demography* 29(3): 357-374.
- Babalola, Stella, Lisa Folda, and Hadiza Babayaro. 2008. "The effects of a communication program on contraceptive ideation and use among young women in Northern Nigeria." *Studies in Family Planning* 39(3): 211-220.
- Bandura, Albert. 1986. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs: Prentice-Hall.
- Bankole, Akinrinola. 1994. "The Role of Mass Media in Family Planning Promotion in Nigeria." Calverton, Maryland: Macro International Inc.
- Bankole, Akinrinola, Germán Rodríguez, and Charles F. Westoff. 1996. "Mass media messages and reproductive behaviour in Nigeria." *Journal of Biosocial Science* 28(2): 227-239.
- Barker, Kriss. 2012. "Sex, Soap and Social Change: An Examination of the Elements Underlying the Successful Application of Entertainment-Education." Capetown: University of Capetown.
- Bawah, Ayaga A. 2002. "Spousal communication and family planning behavior in Navrongo." *Studies in Family Planning* 33(2): 185-194.
- Bertrand, Jane T. and Rebecca Anhang. 2006. "The Effectiveness of Mass Media in Changing HIV/AIDS-related Behaviour Among Young People in Developing Countries." (Preventing HIV/AIDS in Young People: A Systematic Review of the Evidence from Developing Countries). *WHO Technical Report Series*. Geneva: WHO.
- Blanc Ann K. 2001. "The effect of power in sexual relationships on sexual and reproductive health: an examination of the evidence." *Studies in Family Planning* 32(3): 189-213.
- Bongaarts, John. 1978. "A Framework for analyzing the proximate determinants of fertility." *Population and Development Review* 4(1): 105-132.
- Bongaarts, John and Susan C. Watkins. 1996. "Social interactions and contemporary fertility transitions." *Population and Development Review* 22(4): 639-682.
- Brotherton, D., E. Conis and K. Ellison. 2007. "Improving Lives and Slowing Population Growth: Six Years of International Grantmaking in Reproductive Health."

- Caldwell, John C. and Pat Caldwell. 1992. "What does the Matlab fertility experience really show?" *Studies in Family Planning* 23(5): 292-310.
- Cleland, John. 1985. "Marital fertility decline in developing countries: theories and the evidence." In: Cleland, J., Hobcraft, J., Dinesen, B. (Eds.), *Reproductive Change in Developing Countries: Insights from the World Fertility Survey*. New York: Oxford University Press.
- Cleland, John and Christopher Wilson. 1987. "Demand theories of the fertility transition: an iconoclastic view." *Population Studies* (41): 5-30.
- Cleland, John, Stan Bernstein, Alex Ezeh, Anibal Faundes, Anna Glasier, and Jolene Innis. 2006. "Family planning: the unfinished agenda." *Lancet* 368: 1810-1827.
- Coale Ansley J. and Susan C. Watkins, eds. 1986. *The Decline of Fertility in Europe*. Princeton, NJ, USA: Princeton University Press,
- Cook, Thomas D. and Donald T. Campbell. 1979. *Quasi-Experimentation: Design and Analysis for Field Settings*. Chicago: Rand McNally.
- Dean, Andrew G., Jeffrey A. Dean, D. Coulombier, Karl A. Brendel, Donald C. Smith, Anthony H. Burton, Richard C. Dicker, Kevin Sullivan, Robert F. Fagan and Thomas G. Arner. 1995. Epi Info, Version 6: a word processing, database, and statistics program for public health on IBM-compatible microcomputers. Atlanta: Centers for Disease Control and Prevention.
- Feyisetan, Bamikale 2000. "Spousal communication and contraceptive use among the Yoruba of Nigeria." *Population Research and Policy Review* 19(1): 29-45.
- Feyisetan, Bamikale and John B. Casterline 2000 paper "Fertility preferences and contraceptive change in developing countries." *International Family Planning Perspectives*. 26(3): 100-109.
- Flink, Cynthia F. 2011. "Spousal communication and contraceptive use in rural Nepal: an event History analysis." *Studies in Family Planning* 42(2): 82-92.
- Freedman, Ronald. 1987. "The contribution of social science research to population policy and family planning program effectiveness." *Studies in Family Planning* 18(2): 57-82.
- Gage, Anasthasia. 1995. "Women's socioeconomic position and contraceptive behavior in Togo." *Studies in Family Planning* 26: 264-277.
- Greene, Margaret E. and Thomas Merrick. 2005. "Poverty reduction: does reproductive health matter?" Health, nutrition and population discussion paper. Washington DC: The World Bank.

- Hirschman, Charles. 1994. "Why fertility changes." *Annual Review of Sociology* (20): 203-233.
- Kane, Thomas, Mohamadou Gueye, Ilene Speizer, Sara Pacque-Margolis, and Danielle Baron, 1998. "The impact of a family planning multimedia campaign in Bamako, Mali." *Studies in Family Planning*. 29(3): 309-323.
- Kirk, Dudley. 1996. "Demographic transition theory." *Population Studies* (50)361-387.
- Knodel, John and Etienne van de Walle. 1979. "Lessons from the past: policy implications of historical fertility studies." *Population and Development Review* (5): 217-245.
- Kritz, Mary M., Paulina Makinwa-Adebusoye, and Douglas T. Gurak. 2000. "The role of gender context in shaping reproductive behavior in Nigeria." In H.B. Presser and G. Sen (eds.), *Women's Empowerment and Demographic Processes: Moving Beyond Cairo*. Oxford: Oxford University Press.
- Mason, Karen O. 1997. "Explaining fertility transitions." *Demography* 34(4): 443-454.
- Mason, Karen O. 1993. "The impact of women's position on demographic change during the course of development." In N. Federici, K.O. Mason and S. Sogner (eds.) *Women's Position and Demographic Change*. Oxford, London: Clarendon Press.
- Mason, Karen O. and Herbert L. Smith. 2000. "Husbands' versus wives' fertility goals and use of contraception: the influence of gender context in five Asian countries." *Demography* 37(3): 299-311.
- Meekers, Dominique, Ronan Van Rossem, Martha Silva and Andrew. Koleros. 2007. "The Reach and Effect of Radio Communication Campaigns on Condom Use in Malawi." *Studies in Family Planning*. 38(2): 113-120.
- Moffitt, R. 2005. "Causal Analysis Relationships in Population Research." *Demography* 42(1): 91-108.
- Moffitt, R. 2003. "Causal Analysis in Population Research: An Economist's Perspective." *Population and Development Review* 29(3): 448-458.
- Montgomery, Mark R. and John B. Casterline. 1996. "Social networks and the diffusion of Fertility control." Policy Research Division Working Paper no.119. New York: Population Council.
- Mwaikambo, Lisa., Ilene S. Speizer, Anna Schurmann, Gwen Morgan and Fariyal Fikree. 2011. "What works in family planning interventions: a systematic review." *Studies in Family Planning* 42 (2): 67-82.

- National Population Commission (NPC) [Nigeria] and ICF International. 2014. Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.
- National Population Commission (NPC). 2007. "Census of Nigeria " In Ed. *National Population Commission*. Abuja: Government of Nigeria.
- National Population Commission (NPC) [Nigeria] and ICF Macro 2009).
- National Population Commission (NPC) 2004. "National Policy on Population and Sustainable Development " In, Ed. *National Population Commission*. Abuja: Government of Nigeria.
- Papa, Michael J., Arvind Singhal, Sweety Law, Saumya Pant, Suruchi Sood, Everett Rogers and Corinne L. Shefner-Rogers. 2000. "Entertainment-education and social change: an analysis of parasocial interaction, social learning, collective efficacy, and paradoxical communication." *Journal of Communication* 50(4): 31-55.
- Piotrow, Phyllis T., Jose G. Rimon, Kim Winnard, D. Lawrence Kincaid, Dale Huntington and Julie Convisser. 1990. "Mass media family planning promotion in three Nigerian cities." *Studies in Family Planning*. 21(5): 265-274
- Rogers, Everett M. 2004. "A prospective and retrospective look at the diffusion model." *Journal of Health Communication* 9 Suppl 1: 13-19.
- Rogers, Everett M. 1995. *Diffusion of innovations* (4th ed). New York: Free Press.
- Rogers, Everett M., Peter W. Vaughan, Ramadhan M. Swalehe, Nagesh Rao, Peer Svenkerud and Suruchi Sood. 1999. "Effects of an Entertainment-education Radio Soap Opera on Family Planning Behavior in Tanzania." *Studies in Family Planning* 30(3): 193-211.
- Rosero-Bixby, Luis C. and John Casterline. 1993. Modelling diffusion effects in fertility transition. *Population Studies*. 42: 147-167.
- Ryerson, William N. 2010. "The effectiveness of entertainment mass media in changing behavior." In. Shelburne: Population Media Center.
- Schultz, Paul T. 2005. "Effects of fertility decline on family well being: opportunities for evaluating population programs." Unpublished Draft.
- Sedgh, Gilda Akinrinola Bankole, Isaac F. Adewole, Boniface A. Oye-Adeniran, Susheela Singh and Rubina Hussain. 2006. "Unwanted pregnancy and associated factors among Nigerian women." *International Family Planning Perspectives* 32(4): 175-184.
- Singhal, Arvind, Michael J. Cody, Everett M. Rogers and Miguel Sabido. 2004. *Entertainment Education and Social Change*. London: Lawrence Erlbaum Associates Publishers.

- Smith, R.A., E. Downs and Kim Witte. 2007. "Drama theory and entertainment education: exploring the effects of a radio drama on behavioral intentions to limit HIV transmission in Ethiopia." *Communication Monographs* 74(2): 133-153.
- Sood, Suruchi, Tiffany Menard and Kim Witte. 2004. "The theory behind entertainment-education." In *Entertainment Education and Social Change*, Ed. Arvind Singhal, Cody, M.J., Rogers, E.M., Sabido, M. London: Lawrence Erlbaum Associates Publishers.
- Thornton, Arland. 2001. "The developmental paradigm, reading history sideways and family change." *Demography* 38(4): 449-465.
- Tsui, Amy O. 1985. "The rise of modern contraception." In: Cleland, J., Hobcraft, J. (Eds.), *Reproductive Change in Developing Countries: Insights from the World Fertility Survey*. New York: Oxford University Press.
- Vaughan, Peter W. and Everett M. Rogers. 2000. "A staged model of communication effects: evidence from an entertainment-Education Radio Soap Opera in Tanzania." *Journal of Health Communication* 5(3): 203.
- Westoff, Charles F. 1992. "Age at marriage, age at first birth and fertility I Africa." World Bank Technical Paper No. 169. Washington, DC: The World Bank.
- Westoff, Charles F. and Akinrinola Bankole. 1997. "Mass Media and Reproductive Behavior in Africa." Demographic and Health Surveys Analytical Reports no. 2. Maryland, Calverton: Macro International Inc.