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The Impact of MTV Shuga Naija in Nigeria on Health-Related Outcomes

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Executive Summary

This report presents results from an evaluation of the entertainment education (or edutainment) intervention of MTV Shuga Naija on youth behaviors related to sexual health, contraceptive use, and sexual violence in three states of Nigeria. MTV Shuga Naija is a production of the MTV Staying Alive Foundation. Since 2009, MTV Shuga programming has addressed issues of safe sex, sexual violence, and HIV/AIDS prevention and treatment through programming in Nigeria, Kenya, South Africa, and Cote d'Ivoire.

The evaluation of MTV Shuga Naija in Nigeria used a modified stepped-wedge design to assess the combined effects of a television drama, radio drama, peer education, and social media on youth's health-related outcomes. During the first phase of implementation, a 10-episode television drama and a radio drama were presented in Lagos state, but not in Kaduna and Kano states. Shuga Naija also disseminated social media content during the first phase. During the second phase, a modified television magazine, a radio drama, and peer education were presented in Kaduna and Kano, while, in Lagos, there was a second 8-episode installment of the television drama, a more extensive radio drama, and peer education. There was also social media content during the second phase. Content in Kaduna and Kano was restricted almost exclusively to themes related to sexual and reproductive health, while content in Lagos also included content related to sexual violence.

MTV Shuga Naija is ultimately intended to change behaviors related to sexual health, contraceptive use, and gender-based violence and works through the Theory of Planned Behavior (Ajzen 1991) to achieve change in the precursors to the targeted behaviors – attitudes, subjective norms, and perceived behavioral control. The television and radio dramas, for example, address these precursors through the storylines of characters in the series, supplemented by social media and peer education. Attitudinal shifts are promoted by emphasizing positive outcomes of contraception and condom use and illustrating the negative consequences of not using contraception and condoms. Norms are challenged – and incorrect norms are corrected – by knowledgeable, positive characters who insist on using condoms and actively counter contraceptive and sex myths through their own words and actions. Perceptions of behavioral control are augmented by demonstrating how characters can manage their own contraception and

condom use, overcome barriers to this usage, and have related open discussions with partners. These three types of programming content relate to behavioral, normative, and control beliefs, and as a result, a short-to-medium term objective of MTV Shuga is to disseminate content that can change three respective precursors of behavior change: attitudes, subjective norms, and perceived behavioral control.

Data for the evaluation were collected from a panel of youth at three points in time: in March 2018 (baseline), October 2019 (midline), and September 2020 (endline). The period between the baseline and midline surveys corresponds with the first phase of MTV Shuga Naija project implementation; the period between the midline and endline corresponds with the second phase of implementation. The baseline and midline surveys were conducted using face-to-face interviews. Due to the COVID-19 pandemic, the endline was conducted via phone.

Two types of analytical modeling were used to illuminate causal relationships between exposure to MTV Shuga Naija and outcomes targeted by MTV Shuga Naija programming:

(1) Intent-to-Treat (ITT), difference-in-differences modeling making use of the quasi-experimental stepped-wedge design. The ITT models measure whether key outcomes improved more among youth living in the regions where MTV Shuga media activity were being implemented than among youth living in regions where there were no such media activities or activities with more restricted content. As such, ITT models measure the overall effect of MTV Shuga programming on the target population, recognizing that that not all people in the target population were exposed to the MTV Shuga media activities. Multivariate ITT analyses control for differences in the background characteristics of the survey respondents across regions.

(2) Treatment-on-the-Treated (Toth) modeling that controls for non-random, confirmed exposure to Shuga media. The ToT models measure the effect of MTV Shuga programming, comparing people who were exposed with people who were not exposed. Results from ToT analyses show the extent to which seeing or hearing MTV Shuga programming affected individuals' health outcomes and behaviors relative to those who did not see or hear MTV Shuga programming. This information is particularly useful for understanding what could be achieved by increasing the intensity and/or reach of the media activities.

For the intent-to-treat models, we use two types of difference-in-difference regression estimations for panel data: correlated random effects models that address confounding from unobserved heterogeneity in respondents and a doubly-robust, fixed-effects model with inverse probability weighting by the propensity score (PS). Using two different models is intended to test the robustness of the estimates of treatment effects.

For the ToT models, we use propensity score matching, comparing outcomes for exposed and unexposed individuals but with similar likelihoods of exposure. We also use the doubly-robust, fixed-effects model with inverse probability weighting by the propensity score (PS), as well as correlated random effects, and fixed effects models. Again, the intent is to test the robustness of findings across several analytical methods.

Representativeness

The baseline sample was designed to be representative of youth aged 14-24 years living in urban areas of Kaduna, Kano and Lagos states. At baseline, 2,856 youth were interviewed. As with most panel surveys, there was attrition of survey respondents across survey waves. By the midline, participation had dropped to 1,883 respondents, likely due in part to the mobility of this population. Unfortunately, the switch to phone interviews that resulted from the COVID-19 pandemic caused substantial additional attrition (given that not all baseline respondents had a phone or had agreed at baseline to be contacted by phone). As a result, only 899 of the original 2,856 youth participated in the endline survey. One in five respondents, 641 in total (399 females and 242 males), were in all three waves (thus, constituting the panel sample).

To address differences in the endline sample attributable to phone ownership, we reweighted the endline data using an iterative proportional fitting procedure (i.e., survey raking) that was intended to make the sample look more like the baseline sample in terms of gender, state, education, and marital status (Bergmann 2011). Survey raking is a commonly used method for adjusting phone survey samples that have characteristics that differ from the general population (Arcos and del Mar Rueda 2014, Leo, Morello et al. 2015). All estimates presented here reflect the weights estimated by the iterative proportional fitting model. Appendices 1A and 1B compare socioeconomic variables for youth in this sample relative to the sample of urban youth in the same states in the 2018 Nigeria Demographic and Health Survey (National Population

Commission (NPC) [Nigeria] and ICF 2019).

Key findings from the evaluation include the following:

Recall of Shuga Programming

We measured respondents' recall of MTV Shuga Naija's TV and radio dramas in two ways: 1) unconfirmed unaided recall; and 2) confirmed unaided recall. These measures, which are explained in greater detail below, entailed whether respondents self-reported recall of a broadcast soap opera about "entertainment and educational storylines about responsible sexual behaviour, safe sex, contraceptive methods, family planning, and preventing violence in sexual relationships." If respondents simply reported "yes," they were classified as having "unconfirmed unaided recall." If they also subsequently provided identifiable information about the soap opera that confirmed that they were referring to Shuga, they were classified as having "confirmed unaided recall."

Differently, respondents' recall of Shuga Naija's other programming components (e.g., social media, peer education) was measured with aided recall. Aided recall measures followed a later detailed explanation of Shuga Naija and its programming. If respondents self-reported exposure to a specific type of Shuga Naija programming (e.g., social media, peer education), they were classified as having "aided recall." Also, an overall measure, which we call "overall exposure," measured whether respondents had either confirmed unaided recall of TV or radio – or aided recall to any of the other media components.

Key findings from these recall measures are as follows:

- Overall, Shuga achieved high levels of overall exposure in Lagos, reaching one in two males and one in five females. From midline to endline, confirmed unaided recall to the Shuga Naija television drama in Lagos increased from 9.1% to 14.7% among females and from 14.5% to 38.3% among males. Confirmed unaided recall to the radio drama increased from 0.7% to 3.0% among females in Lagos and from 4.5% to 13.4% among males.
- Overall exposure to MTV Shuga Naija activities was lower in the two northern states. Among males, at least one in five in Kaduna and one in seven in Kano were exposed. Among

females, one in fifteen females in Kaduna and one in ten females in Kano were exposed. Confirmed unaided recall to the MTV Shuga Naija television drama among males at endline was 4.9% in Kaduna and 6.0% in Kano. Confirmed unaided recall among females was approximately 4% in both states.

- In all areas, aided recall to Shuga media was higher among males than among females. Aided recall to MTV Shuga Naija social media (e.g., website, Facebook, Instagram, Twitter, YouTube) amongst females was negligible. Among males, 7.3% in Kaduna and 0.9% in Lagos had visited the website. Nearly 10% of males in Lagos had visited the Shuga Facebook page, 3.6% had visited the Instagram site, 2.6% had visited the Twitter feed, and 10.3% had visited the YouTube site. Just under 5% of males in Lagos reported that they had called or texted the SMS number of the HoneyandBanana family planning program that is promoted during the Shuga Naija TV episodes.

Intent-to-Treat (Difference-in-Differences) Models

For robustness, we estimated difference-in-differences ITT models in two ways: (1) panel data, correlated random effects models and (2) doubly robust, inverse probability weighted fixed effects regression models. These two sets of results were fairly consistent with each other in terms of the sign and statistical significance of coefficients.

Nonetheless, the Intent-to-Treat estimates must be considered with caution. The validity of the ITT difference-in-differences models rests on the validity of the parallel trends assumption – that treated and untreated areas would have followed the same trends in indicators absent the intervention (Wooldridge 2020). There is ample reason to be suspicious of this assumption in this instance. Looking at DHS data in the period prior to the Shuga evaluation, there is evidence to show that key indicators in Kaduna and Kano were on very different paths than in Lagos even prior to the start of Shuga. For contraceptive use, indicators were already worsening in the treatment area, Lagos, in the 10 years preceding the Shuga evaluation, while they were steadily improving in the control areas (Mercer, Lu et al. 2019).

In this context, the following ITT, DID results were noted:

- Condom Use: Amongst females, there was no evidence of greater change in condom use in

Lagos relative to either Kaduna or Kano. Positive condom-related attitudes, as measured by agreement with statements such as "condoms ruin the mood" or "condom use means that a person is promiscuous," were estimated to show greater improvement among females in Kaduna and Kano than in Lagos. Nonetheless, relative to both Kaduna and Kano, females in Lagos showed greater improvements in indicators such as motivation to use condoms and confidence to use condoms. The trends for other indicators – condom perceived behavioral control, ease of use of condoms, ease of discussions of condoms with sexual partners, and ease of discussions of condoms with parents – were similar across the three states, and hence the difference-in-differences estimates for each were not statistically significant.

- Amongst males, there were no statistically significant differences in condom use at last sex across the three states although there were upwards trends in condom use in both Kaduna and Lagos. The sample size of sexually active males in Kano was too small to analyze. A scale of positive condom attitudes improved more in Lagos relative to Kano, but less in Lagos relative to Kaduna. As compared to their counterparts in Kano, male respondents in Lagos were less likely to agree with statements such as "condoms ruin the mood," "condoms are embarrassing," and "condoms imply promiscuity." Again, improvements in these indicators, however, were greater in Kaduna than in Lagos. There were no significant differences in changes in indicators related to ease of use of condoms, ease of discussions of condoms, or confidence to use condoms correctly.
- Contraception: Amongst females, changes in contraceptive use were larger in Kaduna and Kano than in Lagos, although the differences were not statistically significant. Many of the other intermediate factors (e.g., knowledge, ease of use, beliefs) showed mixed (inconsistent) results. However, motivation to use contraception increased more among females in Lagos relative to both Kaduna and Kano. Amongst males, there was evidence of increases in contraceptive use in Lagos relative to Kano, due in part to a decrease in Kano but also steady increases over the three waves in Lagos. Changes in contraceptive use were larger in Kaduna than in Lagos but were only statistically significant in the doubly robust DID models. As with females, the upward trend in estimated contraceptive use in Kaduna preceded the initiation of Shuga activities, meaning that it was likely not the exclusive result of Shuga. The index of contraceptive beliefs improved more in Lagos relative to Kano but not relative to Kaduna. For other indicators, the results were more positive in Kaduna and Kano than in

Lagos, with nearly all of the change in Kaduna and Kano occurring after the midline and during the period of Shuga activities in those states. Motivation to use contraception increased more amongst males in Kaduna and Kano relative to Lagos but only the result for Kaduna was statistically significant.

- Sexual Violence: Amongst both sexes, victim-blaming attitudes decreased considerably more in Lagos than in both Kaduna and Kano, as reflected in individual attitudes and an overall index. Self-reported experiences of sexual harassment increased more in Lagos relative to the other states, perhaps reflective of respondents' greater awareness of acts classifiable as harassment and their increased empowerment to acknowledge these problems and take a stand against them. An indicator of discussions about sexual violence with parents showed greater change between baseline and midline in Lagos relative to the two northern states but the situation reversed from midline to endline.

Key findings – Treatment-on-the-Treated Models

These multivariate models examined outcomes for respondents with overall exposure of Shuga relative to those without overall exposure. We present the results from propensity score matching analyses. We also tested three other TOT statistical methods, including fixed effects, correlated random effects, and doubly robust fixed effects. Those results, which are largely consistent with the PSM results, are included as annexes.

- Condom Use: Amongst females, there were no statistically significant effects on any indicators related to condom use, attitudes towards condoms, condom knowledge, ease of use, motivation, and perceived behavioral control. Amongst males, there were no effects on condom use at last sex although there were statistically significant positive effects on ease of use and discussions, condom perceived behavioral control, motivation to use condoms, the index of condom interpersonal communication, and confidence in using condoms correctly.
- Contraception: The ToT propensity score results indicate a positive effect of Shuga on several modern contraceptive indicators, including the perceived behavioral control indicators for ease of use and motivation to use, as well as on actual use. PSM estimated positive effects of Shuga on modern contraceptive use for females (Average Treatment Effect on the Treated, ATT=18.7 pp., t =2.34) but not for males (ATT=0.7, t =0.09). Exposed

individuals were also more likely to report greater motivation to use contraception (females: ATT=17.6 pp., t =2.86; males: ATT=25.2, t =3.35).

- Sexual Violence: The effects in the TOT models largely mirror those in the Intent-to-Treat models. Amongst both sexes, there was more self-reporting of sexual harassment among those exposed to Shuga, perhaps a reflection of both greater willingness to disclose or greater recognition of what constitutes sexual harassment. Victim-blaming attitudes also decreased considerably more amongst the exposed relative to the unexposed. Amongst females, discussions with parents about sexual violence were more frequent amongst the exposed.

Effectiveness of Different Media

In fixed effects modeling, different media were found to be more effective in the principal treatment area, Lagos, than in the lower intensity areas of Kaduna and Kano. Television appeared to be more effective in Lagos than radio, peer education or other media, while radio appeared to be more important in Kano and Kaduna. This could be suggestive of television's supreme power as a vehicle for health education programming (with such content appearing only in Lagos) and radio being the major vehicle for Shuga content in the north (where there were no television drama broadcasts). Simply put, where there were television broadcasts of Shuga Naija, they were the dominant vehicle for attitudinal and behavior change, whereas, where there were no television broadcasts of Shuga Naija, radio broadcasts were the dominant vehicle for attitudinal and behavior change.

In Lagos, statistically significant results were found for those who reported confirmed unaided recall of the television drama, including positive effects on contraceptive beliefs, motivation to use contraception, and ease of contraceptive use. Respondents with confirmed unaided recall of Shuga TV were 13.9 percentage points (pp.) (p=.04) more likely to be motivated to use contraception and 13.0 pp (p=.059) more likely to say that it was easy to use contraception. These respondents were also more confident that they could use a condom correctly. Effects on these indicators were not generally evident for those exposed to Shuga by radio or other media.

Confirmed unaided recall of peer education in Lagos was associated with greater reporting of incidents of sexual harassment. Youth who participated in peer education sessions were 35.8 pp. (69.2% versus 33.4%, p=.057) more likely to report that they had experienced "unwelcome

attempts to draw them into a discussion of sexual matters" and 46.1 pp. (59.1% versus 13.0%, p=.002) more likely to report that "someone implied better treatment if they engaged in sexual behavior with them."

In the northern states, the Shuga radio drama appeared to be an important driver of targeted outcomes, affecting condom use at last sex in both states. Peer education also appeared to be associated with greater modern contraceptive use in Kaduna. In Kano, those exposed to the Shuga radio drama were more likely to be using any contraceptive method generally and oral contraceptives specifically. They were also more likely to say that it would be easy to discuss condoms and to have greater perceived behavioral control over condom use. As in Lagos, respondents who had participated in peer education sessions were also more likely to report having been victims of sexual harassment.

Conclusion

In terms of reach, it is clear that MTV Shuga Naija has the capacity to engage large youth audiences, entertain them, and — in the process — educate them. In particular, rates of overall exposure for MTV Shuga Naija were very high for both males and females —49.1% and 18.7% at endline in Lagos respectively. Overall, these rates constitute a high reach, especially for males, and speak to Entertainment Education's capacity to attract and draw in large audiences with creative storylines and compelling characters. Achieving such levels of reach positions MTV Shuga Naija well for seasons to come in Nigeria where it can expand its storylines, further refine its educational content, and experiment with new health topical areas (as it is doing with gender-based violence).

In terms of outcomes, this evaluation provides evidence of MTV Shuga Naija's effects on TPB precursors and growing evidence of its having the potential capacity to influence behaviors related to contraception and condom use. In terms of TPB preventive perceptions, for females, MTV Shuga Naija had effects on attitudes and perceived behavioral control related to modern contraceptives. For males, MTV Shuga Naija had effects on attitudes and perceived behavioral control related to condom use. These results shed light on the processes by which males and females are differentially progressing toward behavior change—and, importantly, suggest that the behavioral processes of Nigeria youth are active and may lead to increased behavioral change

following the endline survey. It takes time for campaign viewers to progress from campaign exposure to the development of preventive perceptions and, subsequently, from the development of preventive perceptions to the development of behaviors. There is evidence that these processes were ongoing at endline and may lead to increased behavior change thereafter.

Finally, the results provide evidence of the effectiveness of MTV Shuga Naija in Nigeria in the different contexts of sexual health, contraceptive use, and gender-based violence. In future seasons, MTV Shuga Naija is encouraged to intensify its educational content on sexual health and contraceptive use, which may help move Nigeria youth further along to behavioral change, especially in the case of youth who had already developed TPB preventive perceptions at endline. An exciting new type of Shuga Naija content is gender-based violence, which ties in with storylines on rape at the nightclub and at a party. While this was a secondary health content area in the most recent seasons of Shuga Naija, the findings suggest the impact that Entertainment Education, in general, and MTV Shuga Naija, in particular, can achieve in terms of educating and empowering youth to prevent gender-based violence. MTV Shuga is encouraged to continue and expand its content in this area, upgrading it to a primary health topic in its Entertainment Education programming in Nigeria and other countries.

It is important to note that the evaluation faced several challenges. In addition to selective attrition and the switch from face-to-face interviews to phone interviews, there were also issues related to the changing content between north and south, concurrent family planning programs, sample size and statistical power, and the COVID-19 pandemic. First, the original study design articulated the provision of identical content in both the north and the south, which would have allowed us to see in which areas Shuga programming was most effective and with which populations. However, it was determined that some subject matter was inappropriate for northern audiences, and hence storylines and material in Kaduna and Kano were limited to reproductive health. Differing content, therefore, meant that comparisons were not necessarily equivalent. Second, related to attrition, the sample sizes of respondents, particularly of sexually active males, were quite small, meaning that the detectable differences required for statistical significance for indicators dependent on sexual activity tended to be quite large – generally greater than 15 percentage points. Hence, while Shuga may have shifted indicators in the desired direction, those shifts may not have been large enough to be statistically significant (i.e., at a p-value of below

.05). Third, at the same time that MTV Shuga Naija programming was being broadcast in Kaduna and Lagos, the Nigeria Urban Reproductive Health Initiative (NURHI), funded by the Bill & Melinda Gates Foundation, was also using social and behavior change communication to improve contraceptive outcomes in these same two states, making it more difficult to tease out the independent effects of Shuga. Finally, starting in March 2020 – seven months before the endline survey – Lagos was placed under stringent COVID-19 lockdowns that were not implemented in the northern states of Kaduna and Kano. This potentially affected the ability of youth in Lagos to access important reproductive health services, including modern contraception and condoms. Hence, this evaluation's failure to document larger trends in important behaviors in Lagos relative to Kaduna and Kano may not be a failure of Shuga programming but rather of external circumstances.

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Acronyms

ATT	Average Treatment Effect on the Treated
BMGF	Bill and Melinda Gates Foundation
CRERD	Centre for Research, Evaluation, Resources and Development
EA	Enumeration Area
IPV	Intimate partner violence
IRB	Institutional Review Board
ITT	Intent-to-Treat
IUD	Intrauterine Device
LARC	Long-Acting Reversible Contraception
NHREC	National Health Research Ethics Committee
ODK	Open Data Kit
Pp	Percentage point
PMA	Performance Monitoring for Action
STD	Sexually Transmitted Disease
TPB	Theory of Planned Behavior
ToT	Treatment-on-the-Treated

Introduction

Nigeria has had successful initiatives in human development, yet younger generations have not shared equally in those efforts. Continued investment in younger generations provides a window of opportunity for accelerating development and reducing poverty. Controlling fertility and delaying early childbirth are necessary to achieve these aims, yet these goals remain elusive. Modern contraceptive use is low and has changed only marginally over the past 30 years, increasing from 4% of sexually active women in 1990 to 12% in 2018. Consequently, the Total Fertility Rate has remained high at 5.3 births per woman, only slightly lower than the rate of 5.7 in 2003. The modern CPR among sexually active 15-19 year olds was only 22.2% (National Population Commission (NPC) [Nigeria] and ICF 2019).

There is a pressing need to promote contraceptive use and address unmet need among adolescents in Nigeria. The 2018 Nigeria DHS showed that 32.2% of females aged 15-19 and 78.8% of females 20-24 were sexually active[1]; by comparison, only 8.2% of males aged 15-19 and 41.6% of males aged 20-24 reported being sexually active. Despite this early onset of sexual activity among females, only 28.3% of unmarried sexually active women aged 15-19 were using any form of family planning (National Population Commission (NPC) [Nigeria] and ICF 2019). Among unmarried sexually active women aged 20-24, 37.1% were using a form of family planning. However, only 10.9% of married women aged 20-24 did. Among unmarried sexually active females, 65.6% of those aged 15-19 and 51.4% of those aged 20-24 have an unmet need for family planning. This need for family planning is almost exclusively for birth spacing, rather than limiting. Among married females, the unmet need for family planning is notably lower (12.2% for those aged 15-19 and 16.1% for those aged 20-24) (National Population Commission (NPC) [Nigeria] and ICF 2019).

High fertility and low contraceptive use in Nigeria are driven by pro-natalist norms and beliefs, limited female empowerment, high rates of teenage pregnancy (23%), early marriage, and long-held myths surrounding contraception (Izugbara and Ezeh 2010, Sinai, Anyanti et al. 2017). Social norms driving high fertility are tied in part to perceptions of its social advantages, such as signaling greater wealth and status, ensuring the survival of family names, and broadening social

[1] Defined as having had sex within the past 12 calendar months.

networks and influence. Large family size is believed to both represent and engender wealth, influence, respect, and fame (Izugbara and Ezeh 2010).

Gender power imbalances that inhibit contraceptive uptake are fostered by patriarchal social structures in which women have limited autonomy over most decisions, including those affecting marriage, health and fertility (Sinai, Anyanti et al. 2017, Adanikin, McGrath et al. 2019). Men are often the final decision-makers on important household matters, including those related to "household purchases, health of family members, timing of pregnancies, family size, and education of children" (Babalola, John et al. 2015). As the decision-makers on family size, men ultimately determine contraceptive use through their fertility desires and approval or disapproval of contraception (Schwandt 2011, Sinai, Anyanti et al. 2017).

Negative perceptions surrounding contraceptives are also prevalent, such as beliefs that contraceptives are dangerous to a woman's health (Gueye, Speizer et al. 2015, Hutchinson, Meekers et al. 2018), that they can harm a woman's womb (Ankomah, Oladosun et al. 2011, Gueye, Speizer et al. 2015, Measurement Learning and Evaluation Project, National Population Comission (NPC) Nigeria et al. 2015, Measurement Learning and Evaluation Project, National Population Commission (NPC) Nigeria et al. 2015), that they can inhibit subsequent fertility (Gueye, Speizer et al. 2015, Hutchinson, Meekers et al. 2018) or that they can cause cancer (Izugbara and Ezeh 2010).

Ultimately, decisions about contraceptive use are inextricably linked to this complex interaction of high fertility desires, social norms, and contraceptive myths, as well as economic factors such as financial security, income streams, and the costs of health services (Ankomah, Oladosun et al. 2011, Speizer and Lance 2015, Okigbo, Speizer et al. 2017, Babalola and Oyenubi 2018).

Opposition to contraception use and wanting more children are also the predominant reasons women do not plan to use modern contraceptives (World Bank, 2011). A 2003 study of married men in northern Nigeria found that nearly two thirds of men disapproved of the concept of contraception (Kabir, Iliyasu et al. 2003), a finding mirrored by others (Duze and Mohammed 2006). The Nigerian Urban Reproductive Health Initiative (NURHI) further reported that less than 20% of married women had discussed family planning and fertility with their spouses within the past six months(Measurement Learning and Evaluation Project, National Population Commission (NPC) Nigeria et al. 2015).

Youth in Nigeria are also beset by physical and sexual violence. According to the 2018 NDHS, approximately 11.8% of ever-partnered women and girls aged 15 years and older have experienced physical violence by a current or former intimate partner in the previous 12 months, while 4.7% have experienced sexual violence. Again, gender power imbalances play a critical role in the prevalence and acceptance of intimate partner violence, particularly in northern Nigeria (Antai and Antai 2008, Umana, Fawole et al. 2014, Gage and Thomas 2017).

MTV Shuga Naija

MTV Shuga Naija is a television-based drama with an accompanying radio-based drama, peer education, and social media that aims to shift youth norms, attitudes, self-efficacy and behaviors related to contraceptive use, sexual violence, and female empowerment. Shuga, a production of the MTV Staying Alive Foundation, can be broadly conceptualized as a form of "entertainment education," which is the process by which media messages are designed to entertain and educate an audience (Singhal and Rogers 2001). Since 2009, eight seasons of Shuga, based in Kenya, Nigeria, Cote d'Ivoire and South Africa, have aired. Previous seasons have focused on HIV/AIDS prevention and treatment. Seasons 3 and 4 of MTV Shuga Naija, based in Nigeria and airing from 2018 to 2020, re-focused messages to target the drivers of youth contraceptive use. The English-language drama, which aired only in the state of Lagos (but may have additionally had spillover exposure through social media), also focused on issues of sexual violence and girls' education. In lieu of the television drama, a "television magazine," consisting of 30-minute episodes with clips and interviews, was aired in Kaduna and Kano states in the north of the country. This show, in the Hausa language, had more limited content than the television drama and focused solely on sexual and reproductive health.

In all states, other media supported television programming, including radio dramas, peer education, and social media. The radio drama in Lagos provided additional detail and storylines that were not contained in the television drama. In contrast, the radio program in Kaduna and Kano was the principal dramatic narrative shared with audiences.

Peer education sessions were conducted in all three states and involved trained youths presenting Shuga materials and media on relevant topical issues addressed by the MTV Shuga Naija series. The content for Lagos State consisted of the 10 TV episodes from Season 3 with a peer

facilitator guiding discussions around the content. In Kaduna and Kano, content was centered around the Hausa TV magazine show, and 10 audio sessions with the radio drama, with a similar peer facilitator guide.

Social media, available in all states, included SMS text messages linked to the programming, the mtvshuga website, Facebook page, and YouTube.

Social and behavior change campaigns to promote contraceptive use and lower fertility have been effective in a variety of contexts. A recent review of over 130 studies of family planning SBC interventions (Rosen, Bellows et al. 2019) showed that not only were such interventions effective in improving contraceptive prevalence but they were also cost-effective, with mass media representing the lowest cost per person reached. FP SBC yielded cost savings from direct health care costs averted and productivity gains from mortality averted ranging from $2.30 to $6.10 per $1 invested.

According to Hornik (2002), effective family planning mass media campaigns involve two key components: (1) a link between message design and behavior change theory and (2) interventions of sufficient intensity that behavior change can be catalyzed and measured. The MTV Shuga Naija program is intimately tied to the Theory of Planned Behavior (Ajzen 1991) and episodes and content are intended to foster change in youth attitudes, subjective norms, behavioral control, intentions and ultimately contraceptive uptake. A randomized controlled trial (RCT) of previous seasons of Shuga – which focused on HIV/AIDS issues – found that Shuga improved viewers' knowledge and attitudes, increased HIV testing, reduced risky sexual behaviors, and reduced new infections of chlamydia (Banerjee, La Ferrara et al. 2019).

Evaluation Objectives

This study is an evaluation of the effectiveness of the entertainment education interventions of MTV Shuga Naija in shifting youth norms, attitudes, perceived behavioral control, and behaviors related to sexual health, contraceptive use, and sexual violence in Kaduna, Kano, and Lagos states of Nigeria.

The design of this evaluation is intimately tied to the Theory of Planned Behavior employed by MTV Shuga. Data collection also focuses on measures of behavioral attitudes, subjective norms, perceived behavioral control, and ultimately targeted behaviors.

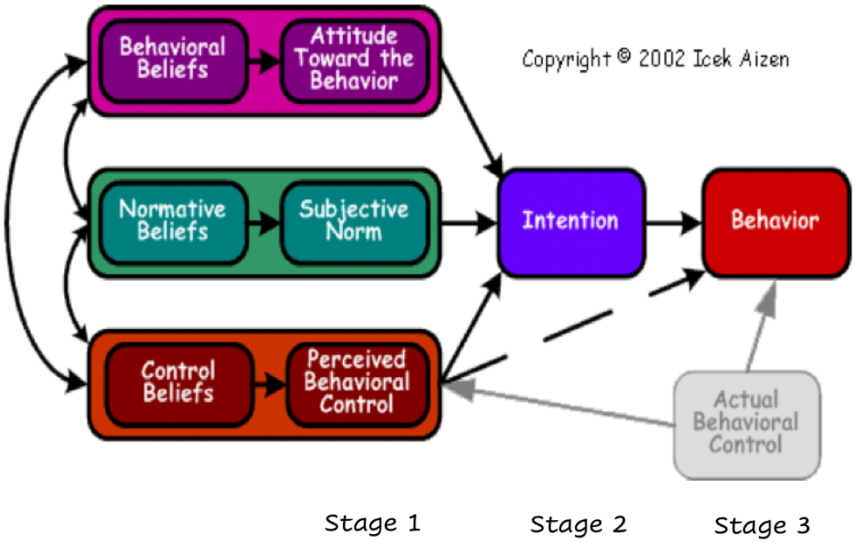
This evaluation used a quasi-experimental design with a non-equivalent control group to demonstrate the extent to which the communication interventions of MTV Shuga (i.e., Shuga television dramas and magazine shows, radio dramas and shows, peer education, and social media) achieve measurable improvements in knowledge, attitudes, subjective norms, control, and practices related to timing of first birth, use of modern contraception, and fertility in treatment individuals relative to control individuals, as well as changes in attitudes toward sexual violence. Further details about the methodology are provided below.

Methods

Conceptual Framework

Both the design of MTV Shuga Naija and the corresponding evaluation were based on the Theory of Planned Behavior (TPB) (Ajzen 1991), which was used as a guide for 1) the development of health educational messaging in Shuga programming and 2) the development of the survey questionnaire for Shuga programming. The TPB posits that messaging should include content specific to behavioral beliefs, normative beliefs, and control beliefs. These three types of beliefs are present in Shuga TV, radio programming, and peer education specific to contraceptive use, family planning, and sexual violence. Messages that address these three belief components, in turn, are expected to influence an audience's development of attitudes toward the behavior, subjective norms about the behavior, and perceived behavioral control about the behavior. The audience's development of these three behavior-specific constructs is, in turn, expected to influence its behavioral intention and subsequently behaviors promoted by MTV Shuga Naija.

Figure 1. Ajzen's Theory of Planned Behavior



When applied to Shuga, media messaging is expected to influence the overall processes of TPB (Fishbein and Cappella 2006). In particular, it is expected that Shuga messaging influences media users' development of the core beliefs (behavioral beliefs, normative beliefs, and control beliefs) that subsequently impact the development of TPB's main three predictive factors: attitudes; perceived behavioral control; and subjective norms. For instance, Shuga health educational messaging can inform people's expectations of what behavioral settings are like and, thus, help them develop beliefs related to the aforementioned three predictive factors (Yzer 2017, Yzer 2017).

While the ultimate goal of Shuga is to engender behavior change, the Theory of Planned Behavior shows that this cannot be achieved without a prior change in the precursors to the targeted behaviors. Hence, change in these behavioral precursors is an important short- to medium-term objective of the MTV Shuga Naija campaign. The television drama addresses these precursors through the storylines of several of the lead characters in the series. Attitudinal and related belief shifts are promoted by countering the contraceptive and sex myths propagated by Diana with correct information disbursed by Yasmin, Hadiza, and clinic nurses. Norms are challenged by having Faa always insist on using condoms or by illustrating the consequences of not using contraception through Leila's pregnancy and spontaneous abortion. Perceptions of

behavioral control are augmented by demonstrating the benefits of open discussions between partners such as Yasmin and Mahmud and Hadiza and Umar.

Further, while the Shuga communication strategy centers on the messages delivered in the television and radio dramas, a basic conception of communication processes (i.e., Two-Step Flow) is that mediated communication (i.e., the Shuga Naija series) spurs interpersonal communication (i.e., discussion), which, in turn, can influence change in outcomes such as attitudes and behaviors. The idea is that the communication strategy can increase people's willingness to discuss difficult topics that previously may have been considered taboo (e.g. intimate partner violence). People who use the media learn things that they can subsequently pass on to others via face-to-face conversations or engagement with other Shuga media (e.g., SMS texts, the mtvshuga website, Facebook page, YouTube). Hence, a key intermediate objective of the campaign is to promote discussion, which shares common ground with the notion of spillover effects among individuals who are not directly exposed to Shuga programming. The fact that indirect exposure to a media campaign can "grow" its audience in this manner is dynamic, powerful, and often predictive of a campaign's end goals (Boulay, Storey et al. 2002).

Intervention Activities and Study Design

MTV Shuga used a stepwise introduction of the intervention activities across the three states, as depicted in Figure 2. Each phase of activities was bookended by surveys that collected data from targeted beneficiaries of MTV Shuga activities.

In the first stage of implementation, 10 22-minute episodes of a television drama and social media posts were disseminated in Lagos, but not in the comparison cities of Kaduna and Kano. Constituting entertainment education, the television and radio programming included engaging entertainment storylines that were infused with health education information and social modeling of positive health behaviors. This programming covered themes related to contraception, power dynamics between men and women, sexual violence, transactional sex, and women's education and empowerment. These storylines interwove the lives of approximately a dozen characters as they encountered real-world challenges at home and at other locations, such as the XL Lounge, the Molade Memorial Secondary School, and Mahmud's home in Kano.

In the second stage, program activities continued in Lagos, including a new 8-episode television drama series, a more extensive radio drama, peer education, and social media. During this second phase, more limited program activities also started in Kaduna and Kano. These included a television magazine, a radio drama, social media, and peer education.

Figure 2. Study Design and MTV Shuga Naija Activities

State	Feb. 2018	Stage 1 March 2018-September 2019	Oct. 2019	Stage 2 October 2019-September 2020	Sep. 2020
Lagos	BASELINE SURVEY	**FULL CONTENT** - Shuga Naija Season 3 10-part television drama on MTV satellite and NTA2 - Shuga Naija Season 3 Radio drama - mtvshuga website - mtvshuga Facebook page - MTV Shuga Instagram - MTV Shuga Twitter - MTV Shuga YouTube - SMS - email info@mtvshuga.com - Marie Stopes International helpline - Peer education Season 3	MIDLINE SURVEY	**FULL CONTENT** - Shuga Naija Season 4 8-part television drama on MTV satellite, MTV Base, Startimes TV, Pop Central, NTA, ONTV, EBONYLIFE TV - mtvshuga website - mtvshuga Facebook page - MTV Shuga Instagram - MTV Shuga Twitter - MTV Shuga YouTube - SMS - email info@mtvshuga.com - Peer education Season 4 - honeyandbanana website - DKT helpline	ENDLINE SURVEY
Kaduna and Kano		NO CONTENT		**LIMITED CONTENT** - Shuga Naija magazine show o Kano: Arewa 24, ARTV, Rahma TV, NTA o Kaduna: Liberty TV, NTA, AIT - Shuga Naija radio broadcast o Kano: Kano Radio II, Express Radio, Rahma Radio o Kaduna: Capital Sound, Kada FM, Karama FM - email info@mtvshuga.com - MSI helpline - Peer education Season 4 - honeyandbanana website - DKT helpline	

This stepwise introduction of the activities enables the use of a quasi-experimental study with a non-equivalent control group to measure the impact of the combined effects of the MTV Shuga television drama, the television magazine show, radio drama programming, peer education and social media on youth outcomes.

Concurrent with the implementation of Shuga, however, was the Nigeria Urban Reproductive Health Initiative (NURHI), which had many of the same objectives as Shuga. The project, which

was funded by the Bill and Melinda Gates Foundation, ran in two phases from 2009 to 2015 and from 2015 to 2020 in Kaduna and from 2015 to 2020 in Lagos. Phase 2 was aimed at reducing "barriers to family planning services while increasing the acceptability of contraceptive use, leading to increased use of modern contraceptives" (NURHI 2 2021). This was achieved through a number of demand-side activities, including a branded mass media "Get it Together" campaign, an entertainment education radio magazine and serial drama, mass media involving short-format television, digital media, and social mobilization, as well as programs focused on improved service delivery. The presence of NURHI in some of the same program areas as Shuga increases the risk that some Shuga program effects may be conflated with those of NURHI.

Study Population

The target population for MTV Shuga Naija were youth in the states of Kaduna, Kano, and Lagos. Because of the stepwise implementation of Shuga Naija, the first stage of implementation targeted youth in Lagos only, while the second phase targeted youth in all three states. To assess the effects of Shuga on these target groups, we conducted surveys among a randomly sampled cohort (Science Panel on Interactive and Health) of urban youth. Use of a panel survey in which the same youth are re-interviewed at several points in time yields stronger evidence of changes in health-related outcomes than use of cross-sectional surveys with different samples of youth. The disadvantages of panel surveys include the added costs of re-locating respondents who participated in the baseline survey, and the fact that panel surveys typically have fairly high dropout rates.

For our study, we interviewed the panel of youth at three points in time: (1) prior to the implementation of any Shuga activities in any of the states (baseline), (2) after implementation of Shuga activities in Lagos but not elsewhere (midline), and (3) after the implementation of Shuga activities in all three states.

At baseline, the target sample size for the study was computed as 2,000 females and 1,000 males between the ages of 14-24 years. With permission from the Bill and Melinda Gates Foundation (BMGF), the Center for Research, Evaluation Resources, and Development (CRERD) used the Performance Monitoring for Accountability 2020 (PMA2020 2017) Nigeria sample frame in Kano, Lagos, and Kaduna states to select urban clusters for the SHUGA survey. In Nigeria,

PMA2020 data were collected from eight states including Kano, Kaduna, and Lagos. Utilization of PMA2020 enumeration areas (EAs), which were randomly selected from each state's census enumeration areas, meant that there was a previously established and recent sampling frame of all households located in PMA2020 EAs.

At baseline, interviews were completed with 1,900 females and 986 males. As with most panel surveys, we experienced attrition of respondents across survey waves. Of the baseline participants, 70% agreed to be re-contacted for subsequent interviews and attempts were made to re-contact all of these individuals for the midline survey. Some respondents, however, had relocated from the clusters or were otherwise not contactable, lowering midline response rates. In total, interviews were completed at midline with 1,185 females and 679 males.

The switch to phone interviewing at endline (which was required to comply with COVID-19 regulations) compounded earlier attrition. At endline, telephone calls were made to all respondents in the baseline and midline database who had consented to callbacks.[2] The endline sample consisted of 899 respondents. Of these, only one in five respondents, 641 in total (399 females and 242 males), participated in all three waves. As expected, the endline sample over-represented people who owned phones, omitting those who had not reported contact phone numbers in prior waves.

Because the endline sample was restricted to respondents who had provided their phone number, its sample had a different socioeconomic profile than the samples for the first two waves. For example, the unweighted endline sample was demonstrably more educated: 27.7% of females and 34.5% of males in the endline had post-secondary education as compared with 12.0% and 12.7% respectively at midline. In regression modeling, being in the endline sample was significantly associated with wealth and age but not education, marital status, and gender. In additional regression modeling, phone ownership was found to be associated with age, post-secondary education, and wealth.

Based on these findings, we reweighted (raked) the endline data using an iterative proportional fitting procedure to make the endline sample comparable to the baseline sample in terms of gender, state, education and marital status (Bergmann 2011). Bivariate estimates presented in the

[2] At baseline, 712 males (72.2%) and 1,306 females (68.7%) consented to be recontacted.

annexes to this report reflect the weights estimated by the iterative proportional fitting model in addition to controls for the multistage survey design.

Table 1. Baseline, Midline and Endline Samples and Re-interview Rates, by State and Sex

	Baseline	Midline	Endline	Baseline to Midline Re-interview Rate	Baseline to Endline Re-interview Rate
TOTAL					
State					
Kaduna	972	699	348	71.9%	35.8%
Kano	877	719	272	73.6%	31.0%
Lagos	937	446	279	47.6%	29.8%
Total	2,886	1,864	899	64.6%	31.2%
MALES					
State					
Kaduna	321	250	131	77.9%	40.8%
Kano	331	260	96	78.5%	29.0%
Lagos	334	169	95	50.6%	28.4%
Total	986	679	322	68.9%	32.7%
FEMALES					
State					
Kaduna	651	449	217	69.0%	33.3%
Kano	646	459	176	71.1%	27.2%
Lagos	603	277	184	45.9%	30.5%
Total	1,900	1,185	577	62.4%	30.4%

Survey Instruments

The Shuga survey instruments consisted of a household questionnaire and individual male and female questionnaires that were designed to capture information on indicators from the Theory of Planned Behavior. Baseline and midline questionnaires were largely identical, although questions on abortion were removed from the midline survey as it had become clear that this would not be a priority area for Shuga programming. The midline survey also included questions on recall of exposure to each of the Shuga Naija media, including measures of unconfirmed unaided recall, confirmed unaided recall, and aided recall (Southwell, Barmada et al. 2002).

We measured respondents' recall of MTV Shuga Naija's TV and radio dramas in two ways: 1) unconfirmed unaided recall; and 2) confirmed unaided recall. For these measures, respondents were first read a statement about a broadcast soap opera about "entertainment and educational storylines about responsible sexual behavior, safe sex, contraceptive methods, family planning, and preventing violence in sexual relationships." They were asked if they recalled seeing or hearing this broadcast programming on TV and then radio. Respondents who answered "yes" were classified as having "unconfirmed unaided recall." Respondents who answered "yes" were then asked (via a recall confirmation prompt) if they could spontaneously report anything about the soap opera, such as the name of the TV soap opera, the hotline number, a character from the show, or an actor on the show. Respondents who provided identifiable information specific to Shuga Naija were classified as having "confirmed unaided recall."

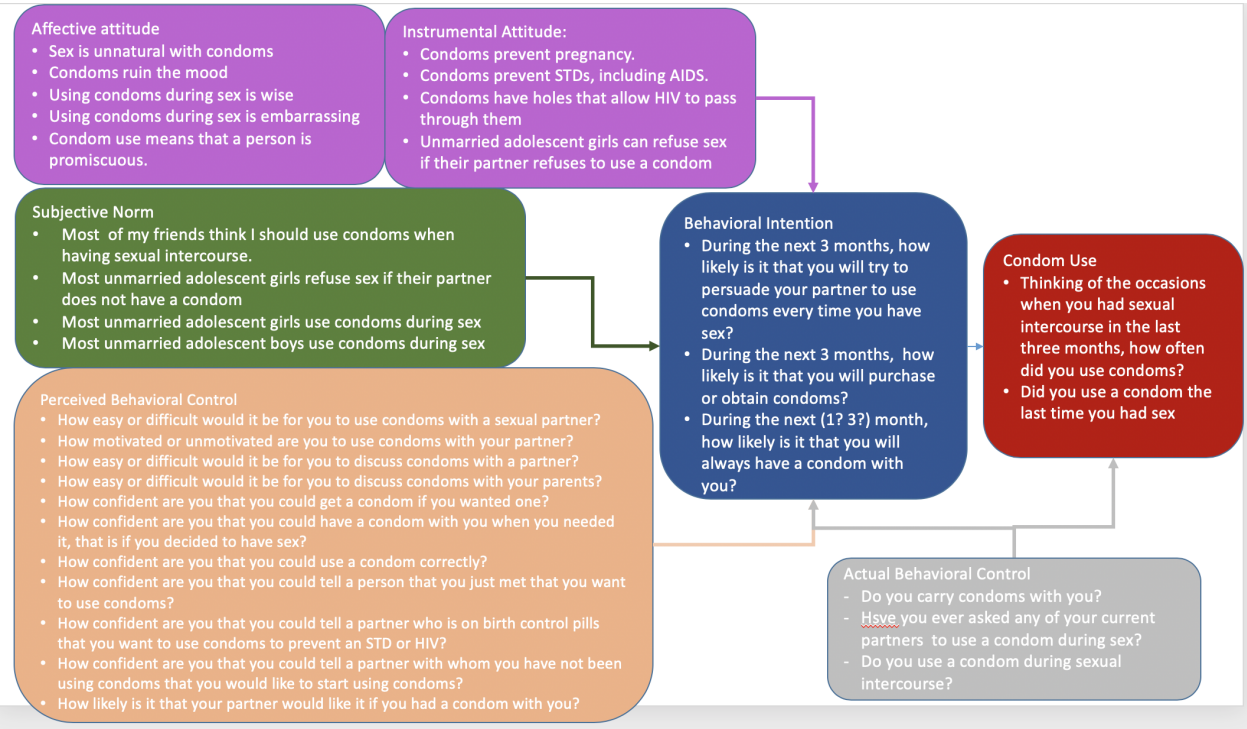
We also measured respondents' recall of Shuga Naija's other programming components (e.g., social media, peer education) using aided recall. Aided recall measures followed the latter detailed explanation of Shuga Naija and its programming. Here is the description for Season 6 (which serves as an "aid" to respondents): "Across 2018 and 2019, MTV Africa broadcast Naija Season 6 of the television soap opera, Shuga, in Nigeria. Shuga Naija Season 6 has entertainment and educational storylines about responsible sexual behavior, safe sex, contraceptive methods, family planning, and preventing violence in sexual relationships. MTV Africa has broadcast the entire Shuga Naija Season 6 two different times in Nigeria." Respondents were then asked a series of aided recall questions. If respondents self-reported exposure to a specific type of Shuga Naija programming (e.g., social media, peer education), they were classified as having "aided recall" for a certain type of programming. For example, respondents were prompted about familiarity and engagement with specific MTV Shuga media, including radio programming, social media, the MTV Shuga website, Facebook, Instagram, Twitter, YouTube, SMS, email, honeyandbanana.com and peer education. An overall measure, which we call "overall exposure," measured whether respondents had either confirmed unaided recall of TV or radio—or aided recall to any of the other media components.

Because the endline survey was conducted by phone, a shorter questionnaire was required to minimize respondent fatigue and drop-off. For this reason, the household questionnaire was omitted, which meant that updated data on assets and household measures of well-being were not

collected. Further, questions focused on a smaller set of indicators from the TPB that were deemed essential to cover the Theory's broad domains and behavioral outcomes (e.g., contraceptive use, HIV testing, experiencing and discussing sexual violence).

The content of the questionnaires was intended to reflect the Theory of Planned Behavior as exemplified by the storylines for each of the MTV Shuga Naija's main characters. For example, surveys asked about: 1) behaviors (e.g., use of a condom at last sex); 2) attitudes towards a behavior (e.g., "sex is unnatural with condoms" or "condoms ruin the mood"); 3) subjective norms (e.g., "Most of my friends think I should use condoms when having sexual intercourse"); 4) perceived behavioral control (e.g., "How easy or difficult would it be for you to use condoms with a sexual partner?" and "How easy or difficult would it be for you to discuss condoms with a sexual partner?"); and 5) behavioral intentions (e.g., "During the next 3 months, how likely is it that you will try to persuade your partner to use condoms every time you have sex?").

Figure 3. Survey questions on condom use corresponding to Theory of Planned Behavior constructs



Measures

Our outcome measures reflect the Theory of Planned Behavior described above. Questions that addressed the same theoretical domain, for example condom attitudes, were aggregated into scales. These were then used as outcome variables in multivariate analysis to test the effects of MTV Shuga on the individual constructs of the TPB.

For questions related to condom use, we constructed scales for attitudes, beliefs, perceived behavioral control, and ease of interpersonal communication. The condom attitudes scale was constructed from responses to the Likert-scale questions: “sex is unnatural with condoms,” “condoms ruin the mood,” and “using condoms during sex is embarrassing.” The beliefs scale was constructed from the Likert-scale questions: “condom use means that a person is promiscuous,” “condoms prevent pregnancy,” and “condoms prevent STDs, including AIDS.” The perceived behavioral control scale was constructed from two questions: “how easy or difficult would it be to use condoms with a sexual partner?” and “how confident are you that you could have a condom with you when you need one?” Finally, ease of communication was constructed from two questions: “how easy or difficult would it be for you to discuss condoms

with a sexual partner?" and "how easy or difficult would it be for you to discuss condoms with your parents?" Scales for the Theory of Planned Behavior's components for contraceptive use and sexual violence were constructed in similar ways. Scales used in the analyses were created from the score of the first principal component using the *polychoricpca* command in Stata (Kolenikov and Angeles 2009).

Exposure to MTV Shuga, our main treatment variable, was measured in two ways. In the Intent-to-Treat analyses (described below), exposure was defined geographically by the state in which a person lived. So even if an individual was not directly exposed, they were located in an area where there was an intention to expose all youth to the program at defined points in time.

In the Treatment-on-the-Treated analyses, we defined exposure based on respondents' self-reports about whether they had seen, heard, or read any of the different sources Shuga media. We constructed a binary composite variable indicating that a person was exposed if they reported either confirmed exposure to TV, radio, or peer education or aided recall of the MTV Shuga website, Facebook page, Instagram feed, Twitter feed, or YouTube channel.

Training and Fieldwork

Training for the baseline survey took place in Abuja from February 13-17, 2018. Trainings included an overview of MTV Shuga and study objectives, ethics of human subjects' research and informed consent, methodology, a review of study instruments, and ODK data collection software. For the baseline survey, data collection took place from February 19 through March 4, 2018.

For the midline survey, training took place October 11-12, 2019. Data collection was completed from October 13-23, 2019 and was conducted primarily by the original baseline field staff. Using the original staff engendered greater familiarity both with the instruments and with local terrain and respondents from the baseline survey. A phone application, Qfield, was introduced to facilitate location of households within selected clusters. This application helped fieldworkers identify respondents' households using offline maps that had been geo-referenced during baseline data collection. Communication among the field staff and the management team was done using WhatsApp groups. This facilitated daily discussions of issues encountered in the

field, as well as the dissemination of daily monitoring reports among interviewers, supervisors, and the management team. Each team of interviewers also met daily with their supervisor.

Endline training of interviewers was conducted virtually consistent with CRERD's COVID-19 guidelines. A two-day virtual refresher training was organized by the CRERD central team in Abuja for all interviewers. Interviewers were selected based on their experience and ability to speak Yoruba or Hausa. Endline data collection occurred from September 1-26, 2020.

Quality Control and Data Quality Checks

To ensure quality control, CRERD selected only experienced field staff, of which 90% had been part of previous survey activities undertaken by the organization. Furthermore, only field workers who participated in the baseline survey participated in the midline survey. They also performed random quality checks on all field staff, which included field inspections, monitoring fieldworkers' use of spatial data and time stamps, and their overall performance utilizing a performance dashboard.

Data quality was also monitored by CRERD in accordance with three core concepts: completeness, clarity, and consistency. This ensured that the data captured all of the interviews, that the data could be easily understood for analysis, and that the data made logical sense (i.e., reviewed outliers and skip patterns). Stata software was used to produce *do-files* to ensure these checks were communicated to the teams.

Human Subjects Research Approval

For the baseline survey, CRERD submitted the research protocol to the National Health Research Committee (NHREC) and obtained approval on January 24, 2018 with NHREC/01/01/2007-24/01/2018. Institutional Review Board (IRB) approval from the Tulane University Biomedical IRB was granted on February 18, 2018. For the midline survey, CRERD obtained IRB approval from the NHREC, which spans August 23, 2019 through August 22, 2020 (NHREC/01/01/2007-23/08/2019B). Approval from the Tulane University Biomedical IRB was granted on September 20, 2019. For the endline survey, CRERD submitted the revised protocol and survey instruments to NHREC and received approval on July 9, 2020. Approval from the Tulane University Biomedical IRB was granted on August 5, 2020.

Analysis

Two main types of multivariate analyses were conducted: (1) intent-to-treat analyses (ITT) involving estimation of difference-in-differences models with changes from baseline to midline to endline compared for respondents in Kaduna and Kano relative to those in Lagos and (2) treatment-on-the-treated (Toth) analyses in which adjusted outcomes for those exposed to Shuga interventions were compared with outcomes for the unexposed.

Intent-to-treat (ITT) analyses

The ITT difference-in-difference models test whether the outcomes improved more in the intervention locations, with more intense programming than in the comparison locations. As noted earlier, between baseline and midline, Lagos received Shuga plus NURHI programming, Kaduna received NURHI programming only, and Kano received neither. Between midline and endline, Lagos received additional Shuga programming and additional NURHI programming, Kaduna received a more limited version of Shuga and the full NURHI programming, and Kano received only the more limited version of Shuga.

These models made use of the panel nature of the data set to estimate correlated random effects linear regression models, as well as doubly robust regression models with inverse probability weighting. Estimation of the Intent-to-Treat (ITT) models involved interacting state dummy variables for Kaduna and Kano with dummy variables for survey wave.

In the correlated random effects models, variables were included that represent the mean values of those variables for an individual across all waves in which the individual appeared. The advantage of such models is that they allow for correlation between the model's error term and other covariates in the model, thereby controlling for unobserved heterogeneity that can lead to biased coefficient estimates, including for the effects of Shuga (Wooldridge 2019, Wooldridge 2020).

To assess consistency across estimation strategies, we also use a method that combines a fixed-effects model with inverse probability weighting by the propensity score (PS) (Joffe, Ten Have et al. 2004). The resulting estimator is known as the doubly robust estimator (Lunceford and Davidian 2004) and can consistently estimate the treatment effect parameters as long as either the regression or the propensity score is correctly specified.

The Intent-to-Treat estimates, however, must be considered with caution. The validity of the ITT difference-in-differences models rests on the validity of the parallel trends assumption – the assumption that any trends in outcomes would occur at the same rate and direction between treatment and control groups in the absence of treatment (Wooldridge 2020). There is ample reason to be suspicious of this assumption in this instance. Looking at DHS data in the period prior to the Shuga evaluation, there is evidence to show that key indicators in Kaduna and Kano were on very different paths than in Lagos prior to Shuga. For contraceptive use, indicators were already worsening in the treatment area, Lagos, in the 10 years preceding the Shuga evaluation, while they were steadily improving in the control areas (Mercer, Lu et al. 2019).

These models were estimated in Stata 17.0 using the *xtreg , re* and *xtreg , fe* commands. Regression coefficients for the state-wave interactions represent the Intent-to-Treat effect of Shuga on an outcome. Separate regression models were estimated for each of the behavioral outcomes and each component of the Theory of Planned Behavior.

Treatment-on-the-treated (Toth) analyses

Previous evaluations of media campaigns involving observational research designs have identified the importance of controlling for both observed and unobserved characteristics of study participants in estimating program effects (Angeles, Guilkey et al. 1998, Guilkey, Hutchinson et al. 2006, Hutchinson, Lance et al. 2006, Guilkey and Hutchinson 2011, Hutchinson and Meekers 2012). To address this, we estimated ToT models using analytical methodologies to test for the effects of exposure to Shuga on each outcome while controlling for non-random (endogenous) exposure. For these models, we use our binary composite variable for confirmed exposure to Shuga TV, radio, or peer education or self-reported exposure to any of the MTV Shuga website, Facebook site, Instagram site, Twitter feed and YouTube site. Other ToT models looked at individual sources of exposure to the television drama, the radio drama, peer education or any other source of exposure. The specific analytical methods used include the following:

1) Propensity score matching, which estimates the likelihood of being exposed to Shuga using baseline characteristics of respondents based on their actual reported exposure at midline and endline and then compares outcomes for exposed and unexposed individuals

with similar propensity score (i.e., similar likelihoods of exposure to Shuga). These models were estimated using the *pscore* and *psmatch2* commands in Stata 17.

2) Correlated random effects models that allow unobserved heterogeneity to be correlated with observed covariates and sample selection for unbalanced panels (Wooldridge 2019). These models were estimated using the *xtreg, re* command in Stata
3) Fixed effects models making use of the panel nature of the data set. This approach controls for confounding of exposure to Shuga from observed characteristics of respondents (e.g., age, education, sex, state) and time invariant unobserved characteristics of respondents. These models were estimated using the *xtreg, fe* command in Stata.
4) Doubly robust fixed effects, which uses inverse weights based on the propensity to be exposed to MTV Shuga, identical to the models estimated for the ITT models but with exposure to Shuga representing the "treatment" (Joffe, Ten Have et al. 2004, Lunceford and Davidian 2004).

An advantage of the ToT models over the ITT models is that they are not dependent upon differences across different geographies, which may be affected by concurrently running programs, such as NURHI in Kaduna and Lagos, and by unmeasured differences in the populations across states. As noted, NURHI also aimed to shift contraceptive attitudes, norms, and behaviors in Kaduna and Lagos. The ToT models help to identify an independent effect of Shuga on contraceptive outcomes that is both less likely to be confounded by other programs and by unobserved heterogeneity in populations.

To ensure that survey respondents were not confusing exposure to Shuga with exposure to other programs, we utilized questions in the survey that confirmed respondent exposure to the MTV Shuga Naija television and radio dramas to the exclusion of other entertainment education programming. Second, we made use of estimation strategies that seek to address our fundamental evaluation question surrounding possible selection bias: do we observe better outcomes in people exposed to Shuga because they were exposed to Shuga or because people exposed to Shuga are different in ways that also affect outcomes? For example, a sexually active person who watches Shuga may be more progressive and more likely to use condoms than a more conservative sexually active person who doesn't watch shows about sex (i.e., Shuga) and does not tend to use condoms. We address this in our estimations by using fixed and random effects

models that relate an individual's changes in outcomes over time with changes in his/her exposure. So if Shuga works, we would expect a greater likelihood of adopting condoms (from time 1 to time 2) in an exposed person relative to an unexposed person.

The ToT analytical methods reduce the influence of confounding from outside influences and selection bias in a number of ways. Fixed and correlated random effects panel data methods remove confounding from time invariant unobservables. Propensity score matching methods reduce bias by comparing outcomes for individuals with equal likelihoods of exposure. Doubly robust fixed effects estimations weight observations based on the likelihood of exposure.

To ease presentation of results, we focus here on the results from the propensity score matching estimates of treatment effects, as has been done elsewhere (Babalola and Vonrasek 2005, Hutchinson and Meekers 2012, Beaudoin, Chen et al. 2016). We opted to present the PSM results, which reduce but do not eliminate all bias from unobserved heterogeneity, because they are perhaps the most intuitive to explain.

Across all regression models, control variables included age category (13-17, 18-21, 22+), education (None, Primary, Secondary, Higher), marital status (yes/no), state (Kaduna, Kano, Lagos), cellphone ownership, TV watching, radio listening, and wave. In fixed effects models, variables that did not vary for an individual across time (e.g., gender) were omitted. This issue was addressed in part by running separate models for males and females. Wealth was not included as a control variable because there was no measure of household assets in the endline data collection. Correlated random effects models included the means of these variables for an individual as covariates in the model. Separate regression models were estimated for males and females.

Results

Demographics

Because this was a panel sample, changes in socio-demographic characteristics largely reflect changes that might be expected among a youth cohort over 30-month period during this particular phase of their life cycles. For example, the average age for females increased from 18.5 years at baseline to 19.4 years at midline and to 20.4 years at endline, while that for males

increased from 18.7 years to 19.7 years and to 21.3 years at endline. At baseline, 41.0% of females were 13-17 years old, 38.0% were 18-21 and 21.0% were 22 years or older, while for males 39.5% were 13-17 years, 37.1% were 18-21 years and 23.4% were 22 years or older. At endline, 20.2% of females were 13-17 years old, 46.5% were 18-21 and 33.2% were 22 years or older, while for males 14.9% were 13-17 years, 40.9% were 18-21 years and 44.1% were 22 years or older.

Similarly, educational status improved as more males and females completed schooling. At baseline, 70.4% of females had a secondary education and 12.8% had post-secondary education. At endline, 71.7% of the female sample had a secondary education and 10.3% had post-secondary education. Among males, the percentage with a secondary education increased from 65.4% to 80.3% and the percentage with post-secondary education increased from 14.0% to 15.3%.

Exposure to Shuga

Because the rollout of program activities started in Lagos, we expected to observe a steady increase in recall of Shuga program activities in the state across the three survey waves. Since program activities in Kaduna and Kano did not start until October 2019, recall of program activities was only expected to be observed in those states in the endline survey, except for minor spillover for people who may have watched the English-language versions of MTV Shuga Naija on the MTV Base channel or on the Shuga website or Facebook page.

Overall exposure: Overall exposure to Shuga was measured as confirmed exposure to television, radio or peer education or aided recall of social media (e.g., website, Facebook, Instagram, Twitter, YouTube). Overall exposure by endline was highest in Lagos – 18.7% of females and 49.1% of females (Table 2). In Kaduna, 6.8% of females and 20.5% of males were exposed to any Shuga media, while in Kano 10.4% of females and 14.1% of males were exposed.

Table 2. Overall Exposure to MTV Shuga Naija

	Kaduna %	Kano %	Lagos %	Total %
Females	6.8	10.4	18.7	12.0
Males	20.5	14.1	49.1	26.9

Shuga Naija television drama: Recall of Shuga programming increased in all three states from midline to endline, with the largest increases being observed in Lagos (Table 3). From midline to endline, unconfirmed unaided recall of the Shuga Naija television drama in Lagos increased from 11.7% to 23.6% among females and from 15.0% to 54.9% among males. Although there was no dissemination of Shuga's TV drama in the North, there were moderate levels of unconfirmed unaided recall among respondents at endline. Among females, 7.3% in Kaduna and 4.2% in Kano reported seeing the television drama. Among males, 10.3% in Kaduna and 12.2% in Kano reported seeing the television drama.

To test for confirmed unaided recall, respondents were asked to identify something from the episodes that would be known only to a viewer or listener, such as the name MTV Shuga Naija, a character, or an actor. Confirmed unaided recall for the television drama was 14.7% among females and 38.3% among males in Lagos at endline. Among females, 4.0% in Kaduna and 4.2% in Kano had confirmed unaided recall to the television drama. Among males, 4.9% in Kaduna and 6.0% in Kano had confirmed unaided recall to the television drama.

Table 3. Exposure to MTV Shuga Television

	Kaduna			Kano			Lagos		
	BL %	ML %	EL %	BL %	ML %	EL %	BL %	ML %	EL %
Females									
Unconfirmed unaided recall	0.0	4.1	7.3	0.0	0.5	4.2	0.0	11.7	23.6
Confirmed unaided recall	0.0	2.2	4.0	0.0	0.2	4.2	0.0	9.1	14.7
Males									
Unconfirmed unaided recall	0.0	0.0	10.3	0.0	4.2	12.2	0.0	15.0	54.9
Confirmed unaided recall	0.0	0.0	4.9	0.0	2.3	6.0	0.0	14.5	38.3

Note: BL=baseline; ML=Midline; EL=Endline survey.

Shuga radio drama: From midline to endline, unconfirmed unaided recall to the radio drama increased from 1.6% to 11.1% among females in Lagos and from 5.0% to 17.0% among males (Table 4). In Kano and Kaduna, the radio drama only started in the second phase. At endline, unconfirmed unaided recall to the radio drama among females in these two states was low (less

than 2%). By contrast, radio exposure among males was much higher: 7.9% in Kaduna and 16.9% in Kano.

In Lagos, confirmed unaided recall for the radio drama was 3.0% among females and 13.4% among males. Confirmed unaided recall for females was 0.6% in Kaduna and 0.8% in Kano, while confirmed unaided recall among males was 3.9% in Kaduna and 2.8% in Kano.

Table 4. Exposure to MTV Shuga Radio

	Kaduna			Kano			Lagos		
	BL %	ML %	EL %	BL %	ML %	EL %	BL %	ML %	EL %
Females									
Unconfirmed unaided recall	0.0	2.7	1.9	0.0	0.2	0.8	0.0	1.6	11.1
Confirmed unaided recall	0.0	0.5	0.6	0.0	0.2	0.8	0.0	0.7	3.0
Males									
Unconfirmed unaided recall	0.0	0.0	7.9	0.0	0.4	16.9	0.0	5.0	17.0
Confirmed unaided recall	0.0	0.0	3.9	0.0	0.4	2.8	0.0	4.5	13.4

Note: BL=baseline; ML=Midline; EL=Endline survey.

Overall, 26.6% of females and 55.9% of males in Lagos reported confirmed unaided recall to either the TV drama or the radio drama. Among females, confirmed unaided recall to either of these two sources was only 6.3% in Kaduna and 4.5% in Kano, while among males it was 12.9% in Kaduna and 22.0% in Kano.

Shuga peer education: At endline, 15.0% of females and 19.5% of males in Lagos had heard of the MTV Shuga peer education sessions (Table 5). Approximately 2.4% of females and 9.8% of males in Lagos had attended a peer education session. Relative to females in Lagos, awareness of the peer education sessions was higher among females in Kaduna and Kano – 19.5% and 21.5% – while it was roughly the same among males – 18.2% in Kaduna and 20.4% in Kano. In Kaduna, 1.3% of females and 5.3% of males had attended a peer education session, while in Kano 4.7% of females and 4.3% of males had.

Table 5. Exposure to MTV Shuga peer education

	Kaduna			Kano			Lagos		
	BL %	ML %	EL %	BL %	ML %	EL %	BL %	ML %	EL %
Females									
Heard of	0.0	2.2	19.5	0.0	0.0	21.5	0.0	5.4	15.0
Confirmed unaided attendance	0.0	0.2	1.3	0.0	0.0	4.7	0.0	0.6	2.4
Males									
Heard of	0.0	1.4	18.2	0.0	0.4	20.4	0.0	4.4	19.5
Confirmed unaided attendance	0.0	0.0	5.3	0.0	0.0	4.3	0.0	0.3	9.8

Note: BL=baseline; ML=Midline; EL=Endline survey.

As explained earlier, respondents' exposure to other Shuga Naija programming was measured in terms of aided recall, which entails aided, self-report, and no confirmation.

Shuga social media: Aided recall of MTV Shuga Naija social media (e.g., website, Facebook, Instagram, Twitter, YouTube) was low among females (Table 6). At endline, approximately 3% of females in Lagos had visited the Facebook page, almost none had visited the website or accessed the Twitter feed, less than 1% had visited the YouTube page, and 1.5% had visited the Instagram site. Among females in Kaduna and Kano, exposure to MTV Shuga Naija through social media was negligible.

By contrast, males had notably higher aided recall of MTV Shuga Naija social media. Nearly 10% of males in Lagos had visited the Shuga Facebook page, while 10.3% had visited the YouTube site, 5.0% had ever visited the website, 3.6% had visited the Instagram site, and 2.6% had seen the Twitter feed. As with females, social media aided recall among males was lower in Kaduna and Kano than in Lagos. In Kaduna, approximately 7.3% in Kaduna had ever visited the website, 6.5% had visited the YouTube site, 4.6% had visited the Facebook page, 3.2% had visited the Instagram site, 2.2% had accessed the Twitter feed. In Kano, 5.2% had visited the

YouTube site, less than 1% had visited the MTV Shuga website, 1.7% had visited the Facebook page, 2.7% had visited the Instagram site, and less than 1% had accessed the Twitter feed.

Table 6. Aided Recall of MTV social media

	Kaduna			Kano			Lagos		
	BL %	ML %	EL %	BL %	ML %	EL %	BL %	ML %	EL %
Females									
Website	0.0	0.3	0.6	0.0	0.0	0.3	0.0	0.9	0.0
Facebook	0.0	0.3	1.7	0.0	0.0	1.0	0.0	2.9	2.7
Instagram	0.0	0.5	0.3	0.0	0.0	0.8	0.0	0.3	1.5
Twitter	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.2	0.0
YouTube	0.0	0.3	0.7	0.0	0.0	0.8	0.0	0.4	0.7
Males									
Website	0.0	0.0	7.3	0.0	0.4	0.9	0.0	1.1	5.0
Facebook	0.0	0.4	4.6	0.0	0.4	1.7	0.0	2.1	9.7
Instagram	0.0	0.0	3.2	0.0	0.9	2.7	0.0	0.0	3.6
Twitter	0.0	0.2	2.2	0.0	0.0	0.5	0.0	0.0	2.6
YouTube	0.0	0.0	6.5	0.0	0.7	5.2	0.0	6.4	10.3

Note: BL=baseline; ML=Midline; EL=Endline survey.

Honey and Banana helpline: The MTV Shuga content also included contact information for the Honey and Banana helpline, which is implemented by DKT Nigeria. Many people were aware of the Honey and Banana helpline phone number and SMS text number. Among females, 12.3% in Lagos, 7.7% in Kaduna, and 2.9% in Kano were aware of the number. Among males, 26.4% in Lagos, 6.0% in Kaduna, and 11.7% in Kano were aware of the number. At endline, only a handful of respondents had called or texted the number. Few respondents had visited the honeyandbanana website.

Difference-in Differences, Intent-to-Treat (ITT) Analyses

To assess program impact, we test how much key indicators improved between the baseline and midline surveys, between the midline and endline surveys, and overall between the baseline and endline in each of the three states.

During phase 1 of the MTV Shuga program, Lagos was the only intervention site. By the time of the midline survey, Lagos had received the full suite of intervention components for approximately one year, while Kaduna and Kano had not been targeted. At the same time,

however, both Lagos and Kaduna were also key target areas of NURHI (www.nurhi.org), which ran from 2015 to 2020 in both states. Hence, during phase 1, Lagos was exposed to both NURHI and Shuga, Kaduna was exposed to NURHI only, and Kano was exposed to neither project.

If phase 1 was effective, we would expect indicators to have improved more in Lagos than in Kaduna, even after controlling for differences in background characteristics of the respondents. This comparison measures the effect of *adding* one year of full MTV Shuga programming in a context in which the service delivery and demand generation activities of NURHI were also operating. We would also expect the outcome indicators to have improved more in Lagos than in Kano, which was absent any social and behavior change interventions. Comparison of the trends in the outcome measures in Lagos with the trends in Kano measures the effect of one year of NURHI programming and one year of full MTV programming relative to an area that had not been exposed to either project. It should be noted, however, that the presence of NURHI in Kaduna from 2009 to 2015 (but not in Lagos) may have put indicators in Kaduna on a different trend line from the latter two states.

During phase 2, Lagos received an additional year of full MTV Shuga programming, while Kaduna and Kano received one year of content focused solely on sexual and reproductive health. NURHI service delivery and demand generation activities also continued in both Lagos and Kaduna. Hence, by the end of phase 2, Lagos had received two years of full MTV Shuga programming in addition to several years of NURHI programming. Kaduna had received a similar level of phase 2 NURHI programming, but only one year of partial MTV Shuga programming, and Kano had received only one year of partial MTV Shuga programming (but no NURHI programming).

Our difference-in-difference models therefore measure how much outcomes improved between baseline, midline, and endline surveys in each of the three locations and test whether there were larger improvements in the intervention areas than in the control areas. If the phase 2 activities were effective, we would expect to find that the outcome measure improved more in Lagos than in Kaduna, assuming that program effects operated in a dose-response manner. This comparison tests the effect of adding a second year of full MTV Shuga programming in a context where the service delivery and demand generation activities by NURHI were already operating. Comparison of the trends in Kano with those in Lagos tests the effect of adding a second year of

both full MTV Shuga programming and NURHI programming relative to having only one year of partial/limited MTV Shuga programming.

Difference-in-difference models of the trend in the outcome indicators over the entire time period (from baseline to endline) further test the cumulative effect of the MTV intervention, including the complete story arc of many of the main characters. Specifically, comparison of the trends from baseline to midline in Lagos and Kaduna show the effect of adding one year of full MTV Shuga programming, compared to having only NURHI programming while comparisons from midline to endline show the effect of higher dose Shuga programming in Lagos relative to lower dose programming in Kaduna, in the context that both received NURHI programming as well. Comparison of the trends in Lagos and Kano shows the effect of having two full years of both MTV Shuga and NURHI programming, compared to only having one year of partial MTV Shuga programming.

As noted earlier, we estimated difference-in-differences ITT models in two ways: (1) correlated random effects models with an interaction term between state and wave, and (2) inverse probability weighted fixed effects regression models with dummy variables combining state and wave. These two sets of results were generally consistent with each other in terms of sign and statistical significance. Full results are depicted in separate MS Excel files.

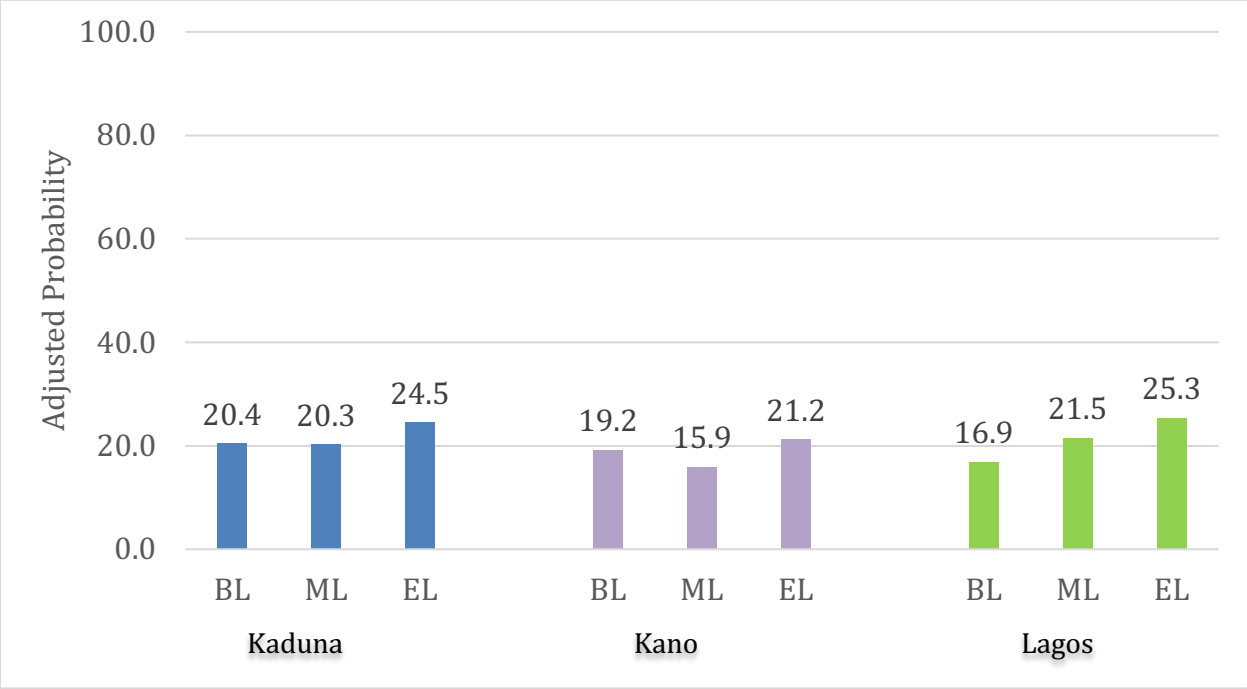
Condom Use

Several storylines of MTV Shuga Naija TV drama emphasized safe sex with condoms and the importance of discussions with partners about condoms. For example, Faa insisted upon condom use with Tobi, while both Leila and Simi became pregnant because of their failure to use condoms. Wasiu, a sexually prolific youth who seldom uses condoms, contracted HIV.

Our principal outcome indicator related to condoms was whether or not a sexually active respondent used a condom the last time that he/she had sex. Amongst females, there was no statistically significant evidence of greater change in condom use at last sex in Lagos relative to either Kaduna or Kano over the period of the project (Figure 4). Increases were larger in Lagos from baseline to midline but smaller from midline to endline. In no cases were the differences statistically significant. For example, in the adjusted models, the baseline-to-midline DID estimate for condom use for Lagos relative to Kaduna was 4.7 percentage points and for Lagos

relative to Kano it was 7.9 percentage points.[3] Overall, the baseline-to-endline DID for Lagos relative to Kaduna was 4.3 percentage points and 6.4 percentage points relative to Kano.[4] In short, increases in condom use were greater in Lagos relative to Kaduna and Kano during the period when Shuga was not present in the latter two states but were not sufficiently large as to be statistically significant with this sample size. Once Shuga activities started in Kaduna and Kano, the effects appeared to be larger than in Lagos even without the full television drama.

Figure 4. Condom Use at Last Sex, Females



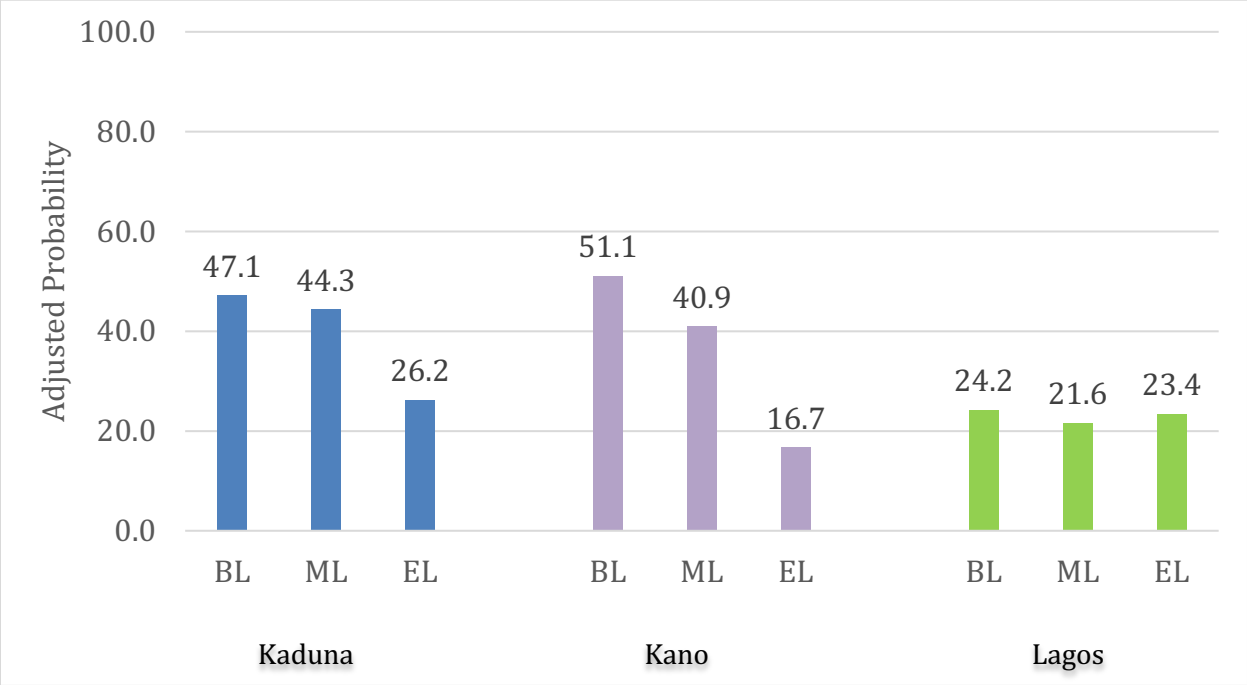
Note: Adjusted probabilities from correlated random effects models

[3] Referring to Figure 4, the baseline-to-midline DID estimate for Lagos relative to Kaduna was (21.5-16.9)-(20.3-20.4) = 4.7 percentage points. The baseline-to-midline DID estimate for Lagos relative to Kano was (21.5-16.9)-(15.9-19.2)=7.9 percentage points.

[4] Referring to Figure 4, the baseline-to-endline DID estimate for Lagos relative to Kaduna was (25.3-16.9) - (24.5-20.4) = 4.3. The baseline-to-endline estimate for Lagos relative to Kano was (25.3-16.9) - (21.2-19.2)=6.4 percentage points.

The DID estimates for several condom-related indicators, such as agreement with the statements "condoms ruin the mood" or "condom use means that a person is promiscuous," showed greater improvement among females in Kaduna and Kano than in Lagos. These effects were largest after the midline when Shuga activities were also operating in Kaduna and Kano. For example, agreement with statement "condom use is embarrassing" was low in Lagos at baseline (24.2%) and remained low (Figure 5). In contrast, at baseline approximately half of females in Kaduna and Kano were estimated to agree with this statement. This percentage declined in both states from baseline to midline but more precipitously after the midline – from 44.3% to 26.2% in Kaduna (DID = -18.1 pp., p<.001) and from 40.9% to 16.7% in Kano (DID = -24.2 pp., p<.001).

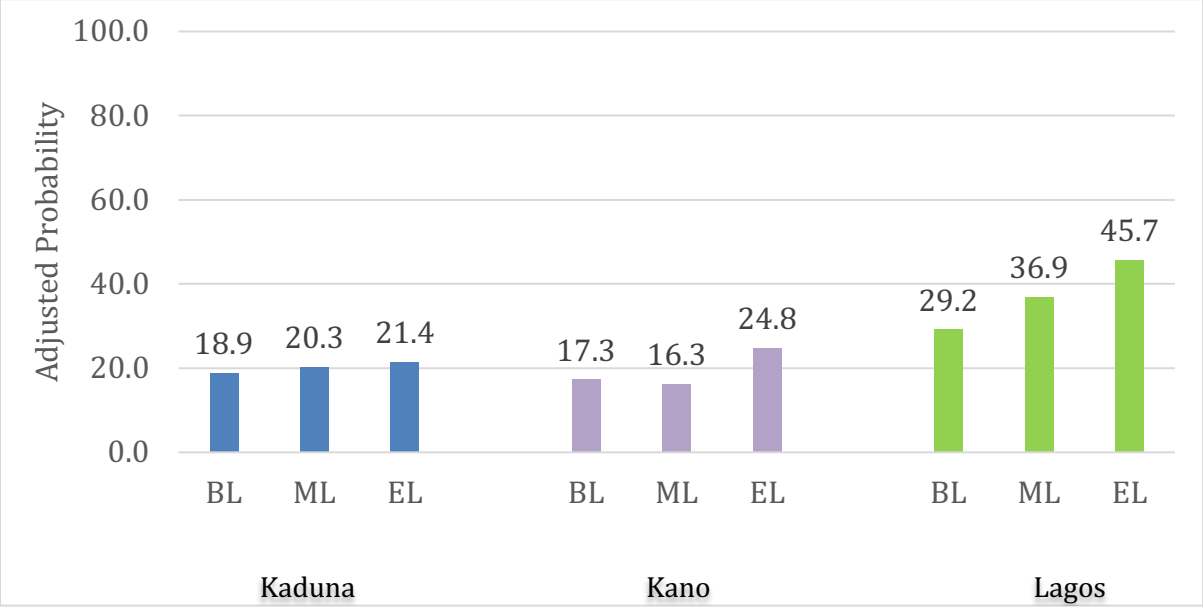
Figure 5. Agreement with statement "condom use is embarrassing," Females



Note: Adjusted probabilities from correlated random effects models

Relative to both Kaduna and Kano, females in Lagos showed greater improvements in the likelihood of being motivated to use condoms (Figure 6) and being confident to use condoms. From baseline to endline, estimated motivation increased by 16.5 pp. in Lagos but only by 2.5 pp. and by 7.5 pp. in Kaduna and Kano respectively. Other indicators – the index of condom attitudes, condom perceived behavioral control, ease of use of condoms, ease of discussions of condoms with sexual partners, and ease of discussions of condoms with parents – all showed similar trends across the three states, and hence the DID estimates were not statistically significant.

Figure 6. Motivation to use condoms, Females



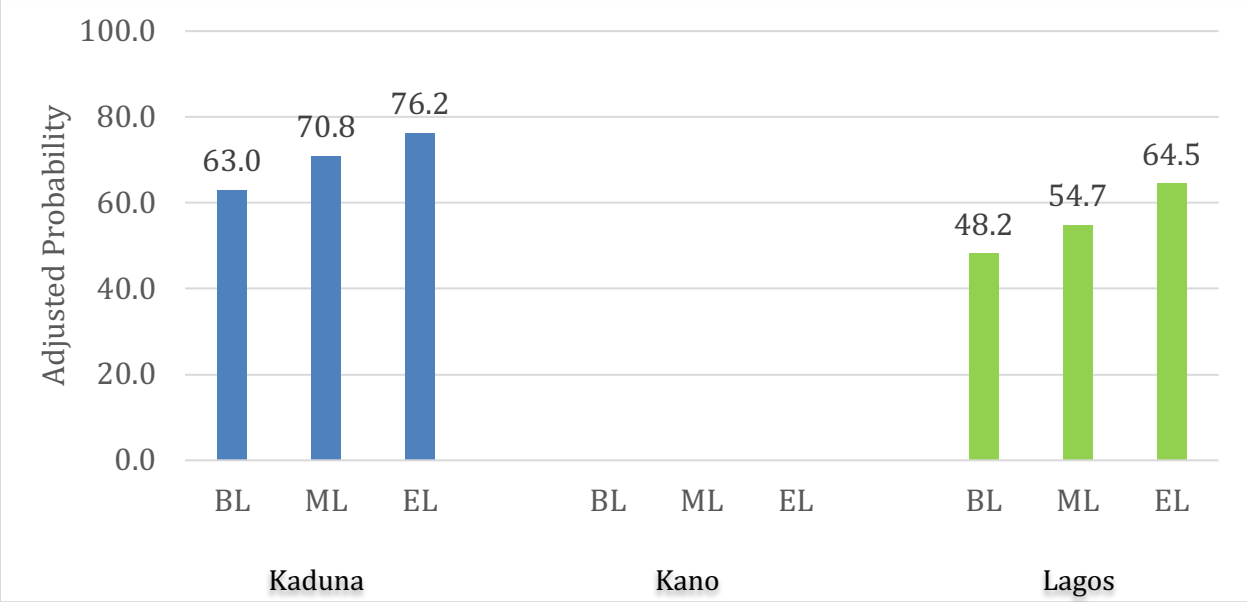
Note: Adjusted probabilities from correlated random effects models

Amongst males, there was evidence in the adjusted models of increasing trends in condom use at last sex in both Kaduna and Lagos (Figure7). The start of the upward trend in Kaduna was already apparent in phase 1, prior to the initiation of Shuga activities, and perhaps a reflection of the ongoing influence of NURHI. The estimated increase from midline to endline, when the most intensive Shuga activities were ongoing, was larger in Lagos than in Kaduna (9.8 pp. versus 5.4 pp.), but this result was not statistically significant.

For Kano, the sample size of sexually active males was small in all years; only 8 of 96 males in

Kano at endline reported being sexually active. As a result, DID estimates for Kano relative to Lagos are not presented here.

Figure 7. Condom Use at Last Sex, Males



Note: Adjusted probabilities from correlated random effects models

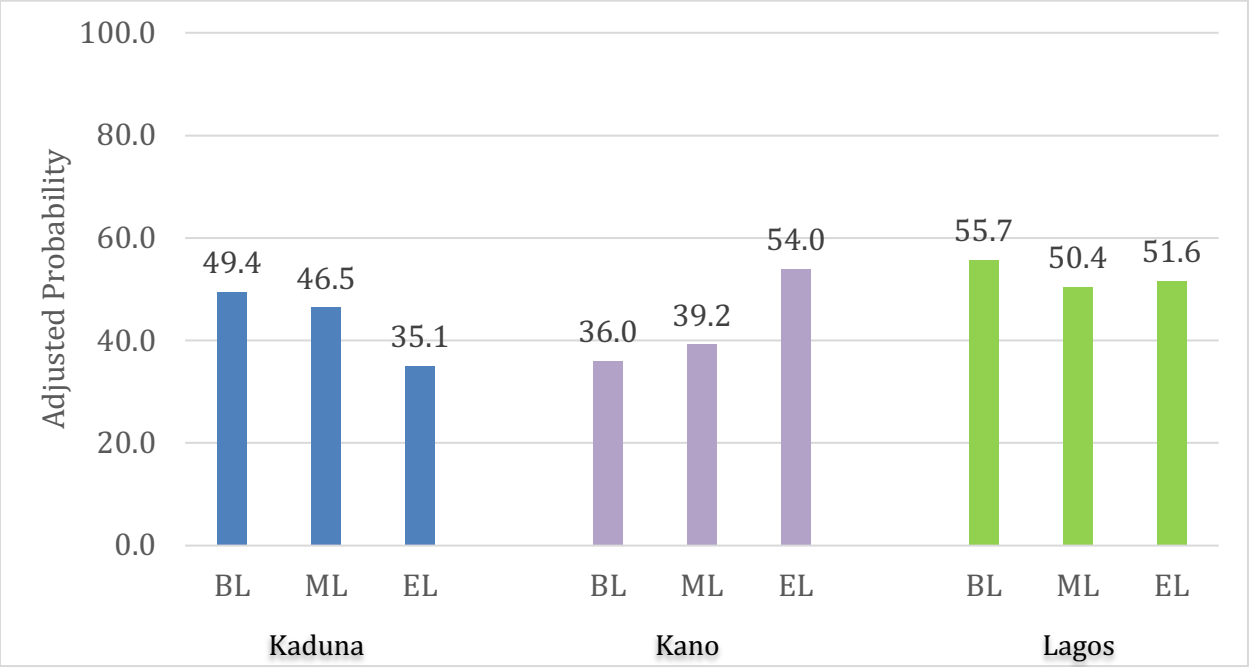
Many of the TPB belief indicators related to condom use were estimated to have improved more in the lower dose states of Kaduna and Kano.[5] Again, the largest changes were after the midline when Shuga activities were occurring in both states. This suggests that some components of Shuga were more effective in the northern states than in Lagos. For example, the percentage of males who agreed with the statement, "condoms prevent pregnancy," increased from baseline to endline by 16.2 pp in Kaduna (from 73.9% to 90.1%) and by 19.8 pp. in Kano (from 67.2% to 87.0%). Nearly all of this improvement was after the midline, when Shuga activities were present in both states. In contrast, agreement with this statement was already high in Lagos at baseline and remained largely unchanged at approximately 86%.

On the other hand, a scale of positive condom attitudes was estimated to improve more in Lagos relative to Kano but the reverse was true for Kaduna. This was due not so much to improvements

[5] Note that TBP questions were asked of all males regardless of sexual activity. Hence the number of respondents answering these questions was larger than the sexually active sample.

in Lagos but rather to a worsening of attitudes in Kano. For example, the percentage of males in Kano who were estimated to agree with the statement, "sex with condoms is unnatural," increased from 36.0% at baseline to 54.0% at endline in Kano, contrary to program goals. In contrast, estimated agreement with this indicator fell by 14.3 pp. in Kaduna and 4.1 pp. in Lagos, again where both NURHI and Shuga were present.

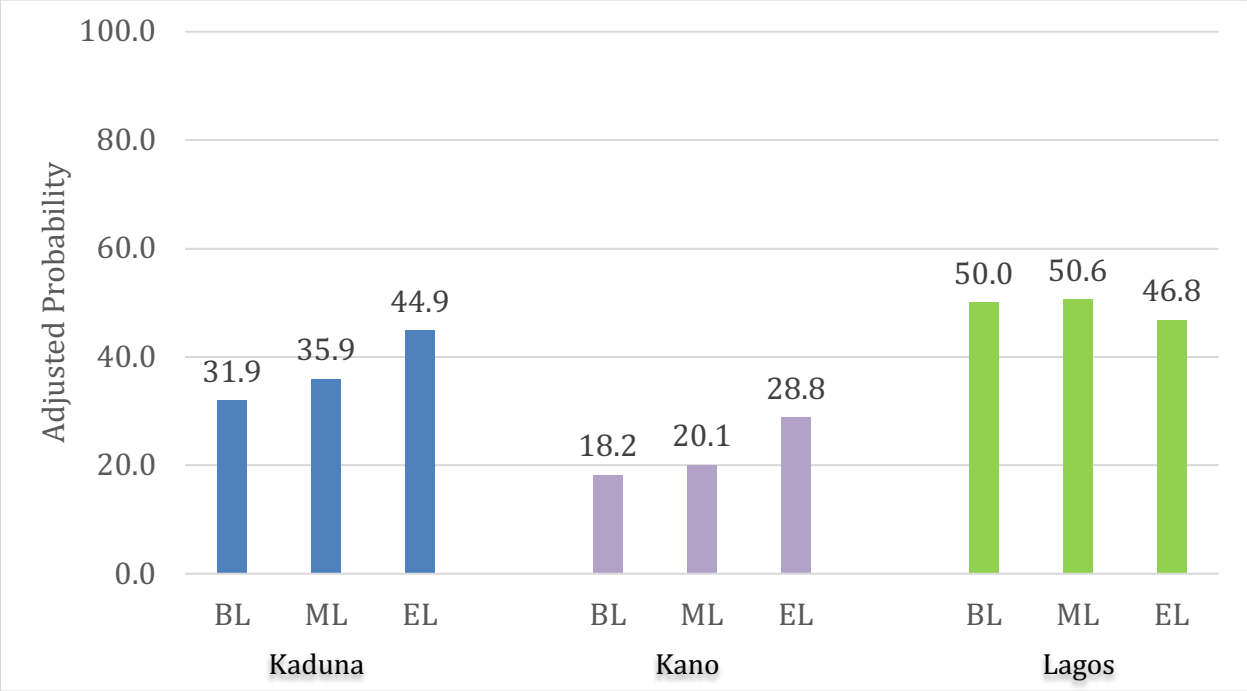
Figure 8. Agreement with "Sex with condoms is unnatural," Males



Note: Adjusted probabilities from correlated random effects models

There were no significant differences in changes in indicators related to ease of use of condoms and ease of discussions of condoms, nor with confidence to use condoms correctly. Amongst males, estimated motivation to use condoms dipped slightly in Lagos but rose in the other two states (Figure 9). Once again, the majority of this improvement in Kaduna and Kano was after the midline, when Shuga activities were ongoing in these states.

Figure 9. Motivation to use condoms, Males



Note: Adjusted probabilities from correlated random effects models

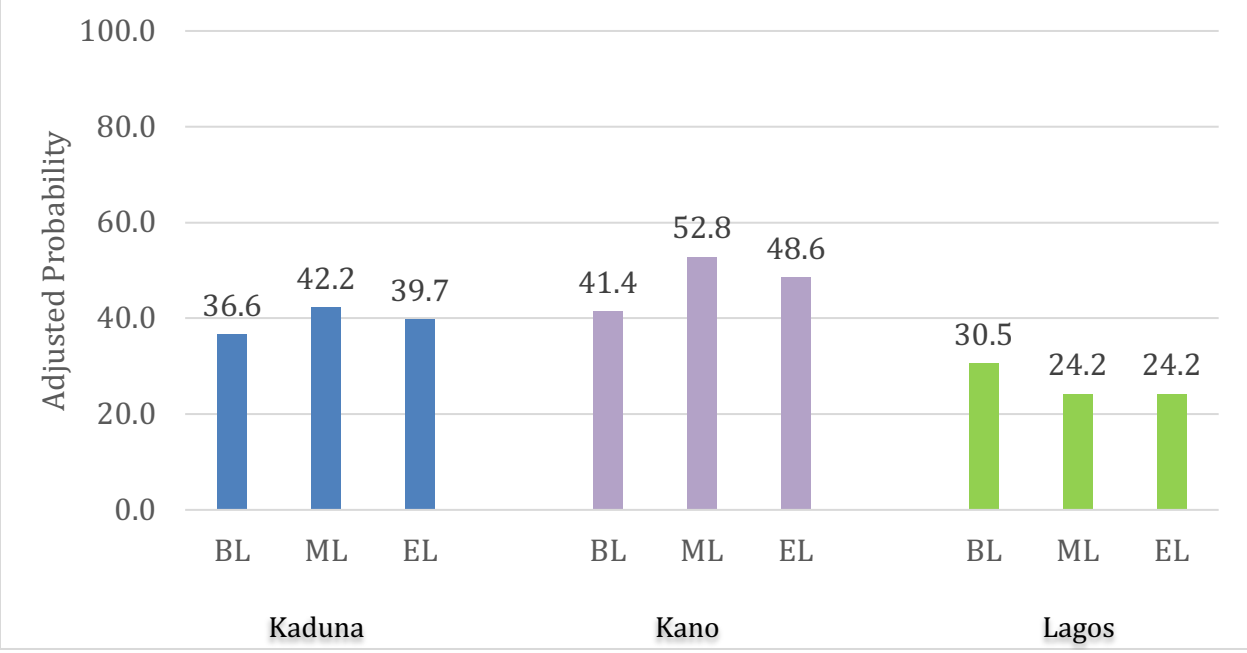
Contraception

The use of modern contraceptive methods is a central theme of MTV Shuga in both Seasons 3 and 4. For example, one of the key characters, Leila, is in an experimental phase in life, which entails increased high-risk behavior, including a relationship with an older male (Tobi), with whom she occasionally engages in unprotected sex. She tries and fails to start regular use of contraception, becomes pregnant, and then faces a dramatic change in her life plans. Yasmin, a Hausa school teacher at Molade Memorial Secondary School, is in a different stage of life than Leila. She is dealing with the pressures of trying to start her teaching career and other pressures that encourage women to bear children soon after they are married (which is the norm in Hausa

societies). She and her husband have agreed to delay child-rearing for several years. Nonetheless, she faces pressure to have children from her in-laws, who do not understand the purpose or the mechanisms of contraceptive use. At the same time, many of the students at Moldade are just beginning to learn about pregnancy and contraception and have many questions for Yasmin. She tries to address students' informational needs about contraception and safe sex but becomes a point of concern at the school from administrators and parents.

In our analyses, the DID estimates of changes in modern contraceptive use amongst females from baseline to endline showed improvements in Kaduna and Kano relative to Lagos, but these estimates were not statistically significant (Figure 10). In the adjusted models, there was an estimated decline in modern contraceptive use in Lagos from 30.5% at baseline to 24.2% at endline, a 6.3 pp decrease. Overall, there was an estimated 3.1 pp, increase in modern contraceptive use in Kaduna and a 7.2 pp increase in Kano. However, these increases occurred prior to the start of Shuga activities and, therefore, must be caused by other factors.

Figure 10. Current Use of Modern Contraception, Females

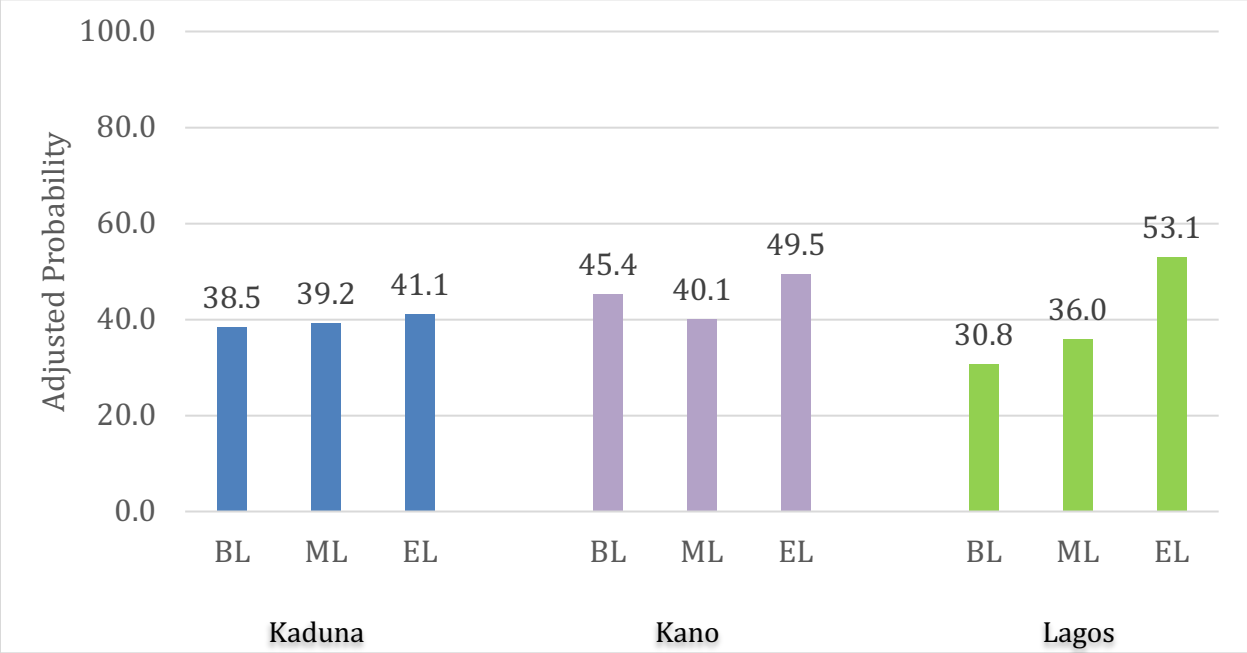


Note: Adjusted probabilities from correlated random effects models

Many of the other intermediate factors – knowledge, ease of use, beliefs – showed mixed

(inconsistent) results. DID estimates found no difference in the trends in contraceptive beliefs in Lagos relative to Kano but greater improvement in Lagos relative to Kaduna after the midline. There were no statistically significant differences in the trends across states for the contraceptive norm, "most of my friends would approve of my using contraception," nor with ease of use nor motivation to discuss contraception with a partner. However, estimated motivation to use contraception increased more from baseline to endline among females in Lagos relative to both Kaduna and Kano (Figure 11). From baseline to endline, motivation increased by 22.3 pp in Lagos relative to a 2.6 pp. increase in Kaduna and a 4.1 pp. increase in Kano. Both results were statistically significant.

Figure 11. Motivation to use contraception, Females

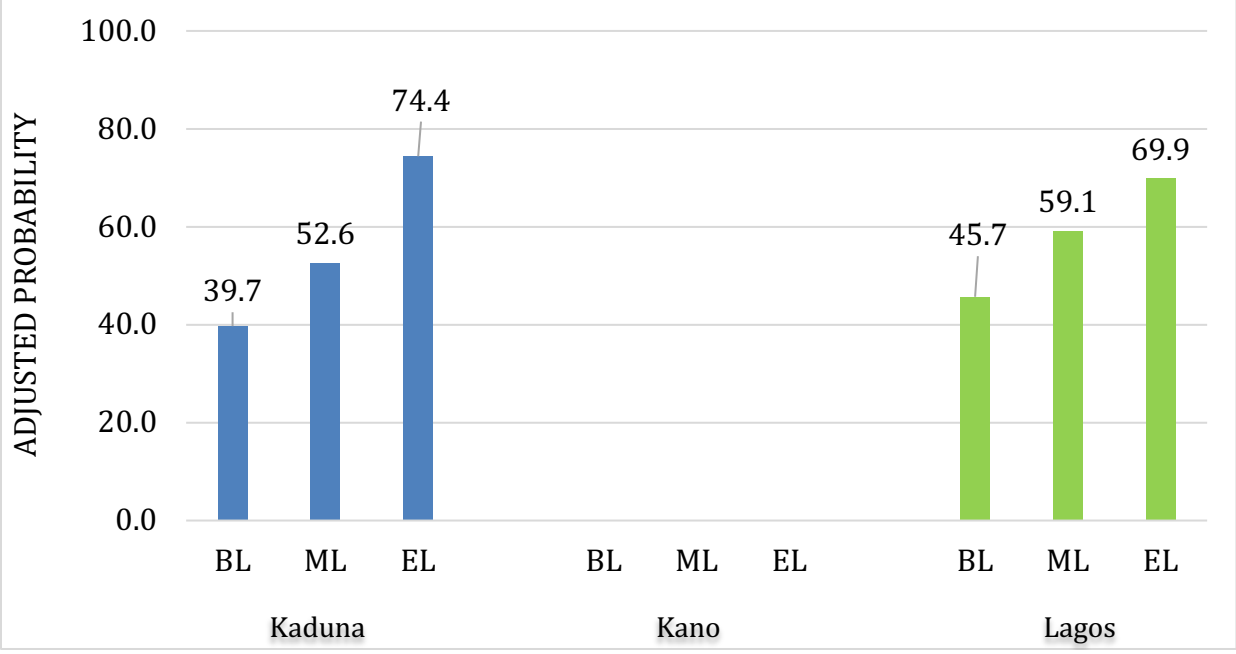


Note: Adjusted probabilities from correlated random effects models

Amongst males, there was evidence of an increase in contraceptive use in Lagos relative to Kano, but this result was not statistically significant. The estimated change in contraceptive use was larger in Kaduna than in Lagos but was only statistically significant in the doubly robust DID models. As with females, the upward trend in estimated contraceptive use in Kaduna preceded the initiation of Shuga activities, meaning that it was likely not due to Shuga. Again, the small sample size of sexually active males in Kano (n=8 for endline) means that estimates of

modern contraceptive use were measured with considerable imprecision.

Figure 12. Modern Contraceptive Use, Males

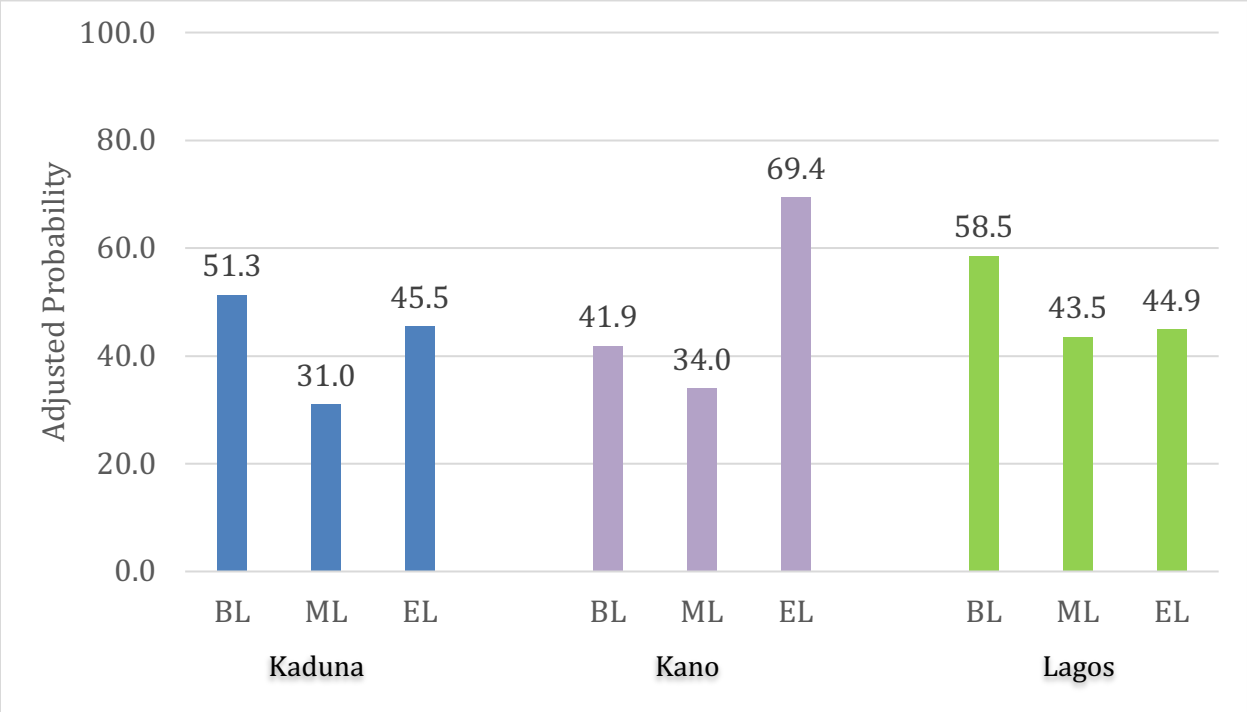


Note: Adjusted probabilities from correlated random effects models

For the TPB precursors to contraceptive use, the story was mixed. The index of contraceptive beliefs[6] improved more in Lagos relative to Kano but not relative to Kaduna. For example, amongst males, agreement with the statement, "contraceptives are dangerous to a women's health," actually was estimated to increase from 41.9% to 69.4% from baseline to endline in Kano but was estimated to decrease in both Kaduna and Lagos (Figure 13). The baseline to endline DID estimate for Kaduna relative to Lagos was -13.4 pp. (p=.005).

[6] The index was constructed from disagreement with the statements, "Use of some contraceptives can make you permanently infertile," "Contraceptives are dangerous to your health," "Women who use contraceptives may become promiscuous," and "The husband should be the one to decide about contraception."

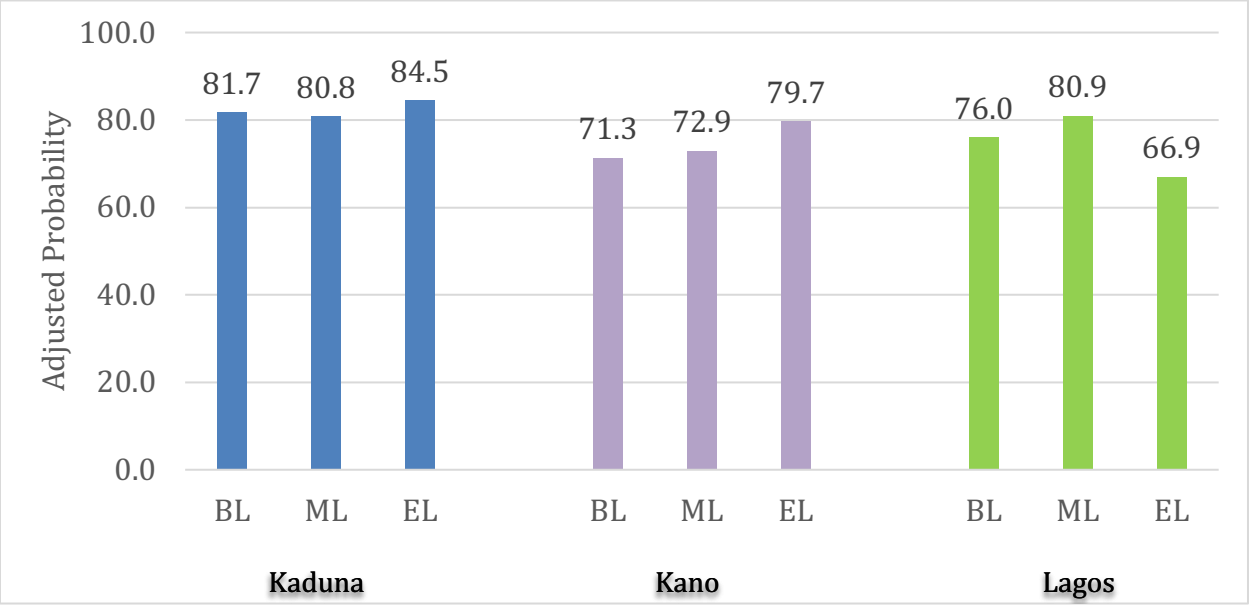
Figure 13. Agreement with "Contraceptives are dangerous to a woman's health," males



Note: Adjusted probabilities from correlated random effects models

For other indicators, the results favored Kaduna and Kano relative to Lagos, with nearly all of the change in Kaduna and Kano occurring after the midline and during the period of Shuga activities in those states. At baseline, for example, estimated agreement with the statement, "it is important that husbands and wives discuss contraception," was highest at 83.2% in Lagos relative to Kaduna (77.1%) and Kano (68.1%) (Figure 14). By endline, however, it was estimated that nearly all males in Kaduna (97.3%) and Kano (96.0%) agreed with this statement, while the percentage had fallen slightly in Lagos (77.0%). Similarly, the percentage of men in Lagos who could identify benefits to a woman from using contraception fell after the midline survey from 80.9% to 66.9% while it increased from 80.8% to 84.5% in Kaduna and from 72.9% to 79.7% in Kano (Figure 14).

Figure 14. Able to identify benefits to the woman from using contraception, males



Note: Adjusted probabilities from correlated random effects models

There was no difference in trends across states for the contraceptive norm, "most of my friends would approve of me using contraception," nor for ease of contraceptive use. Motivation to use contraception increased more amongst males in Kaduna and Kano relative to Lagos but only the result for Kaduna was statistically significant.

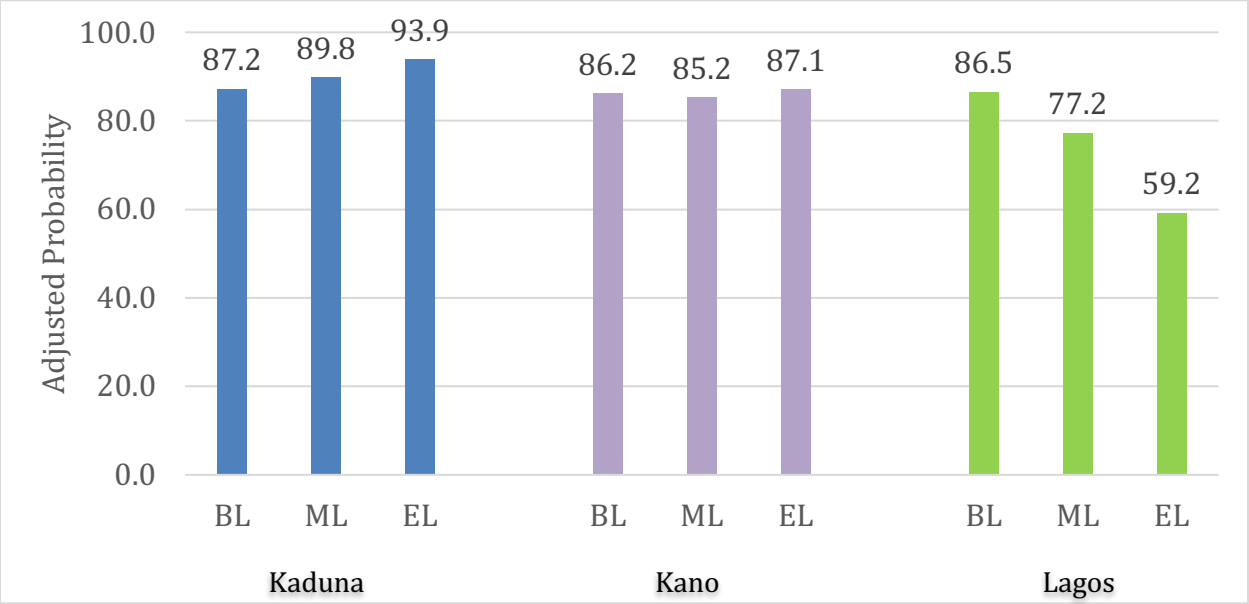
Sexual Violence

Issues of sexual violence were portrayed in two key storylines in Shuga Naija - the rape of Frances at Chike's party and the rape of Faa by Bada at the XL Lounge. Smaller storylines - such as a teacher soliciting sexual favors from Diana to improve her grades or Wasiu suggestively touching female students - depict forms of sexual harassment. These storylines were present in the Shugaa media presented to youth in Lagos but not to youth in Kaduna and Kano.

In these areas, there were apparent shifts in myths, norms, attitudes, and discussions surrounding sexual violence among both females and males. Amongst both sexes, victim-blaming attitudes decreased considerably more in Lagos relative to both Kaduna and Kano, as reflected in individual attitudes and an overall index. For example, for both males and females, there was a precipitous drop in agreement with the statement, "When women wear clothes that expose their

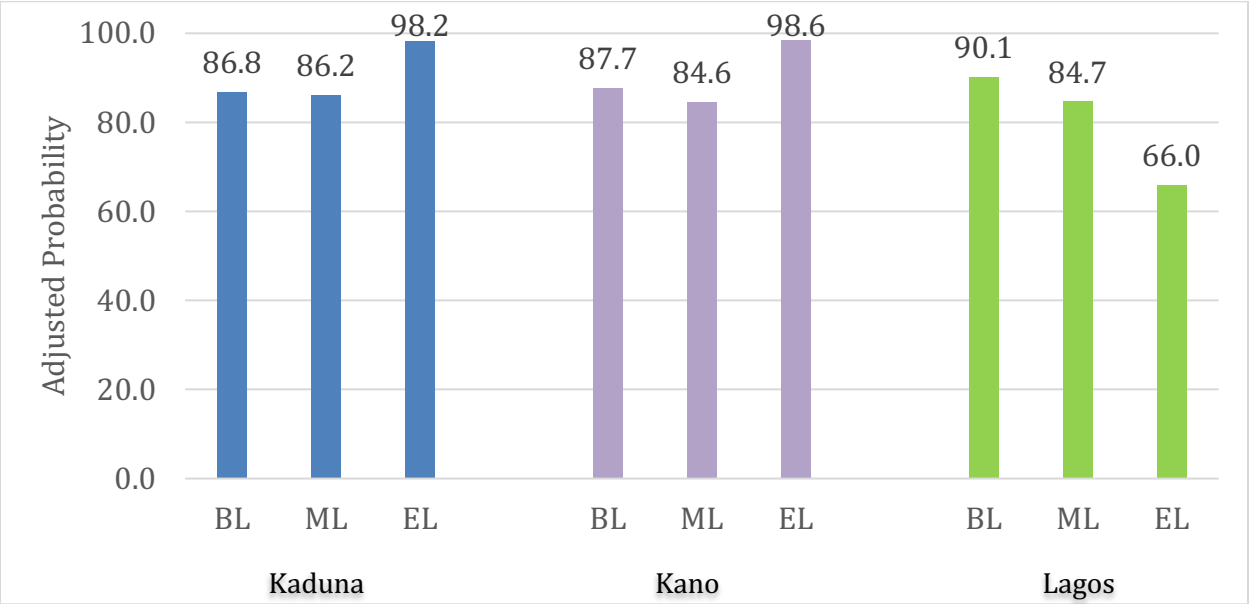
bodies, they are asking to be raped," in Lagos that was not apparent in the other two states where anti-sexual violence messaging was not present. Among females, the baseline to endline DID estimates were -34.0 pp. (p<.001) for Kaduna relative to Lagos and -28.2 pp. (p<.001) for Kano relative to Lagos (Figure 15). Effect sizes were similar for males (Figure 16).

Figure 15. Agreement with statement, "When women wear clothes that expose their bodies, they are asking to be raped," Females



Note: Adjusted probabilities from correlated random effects models

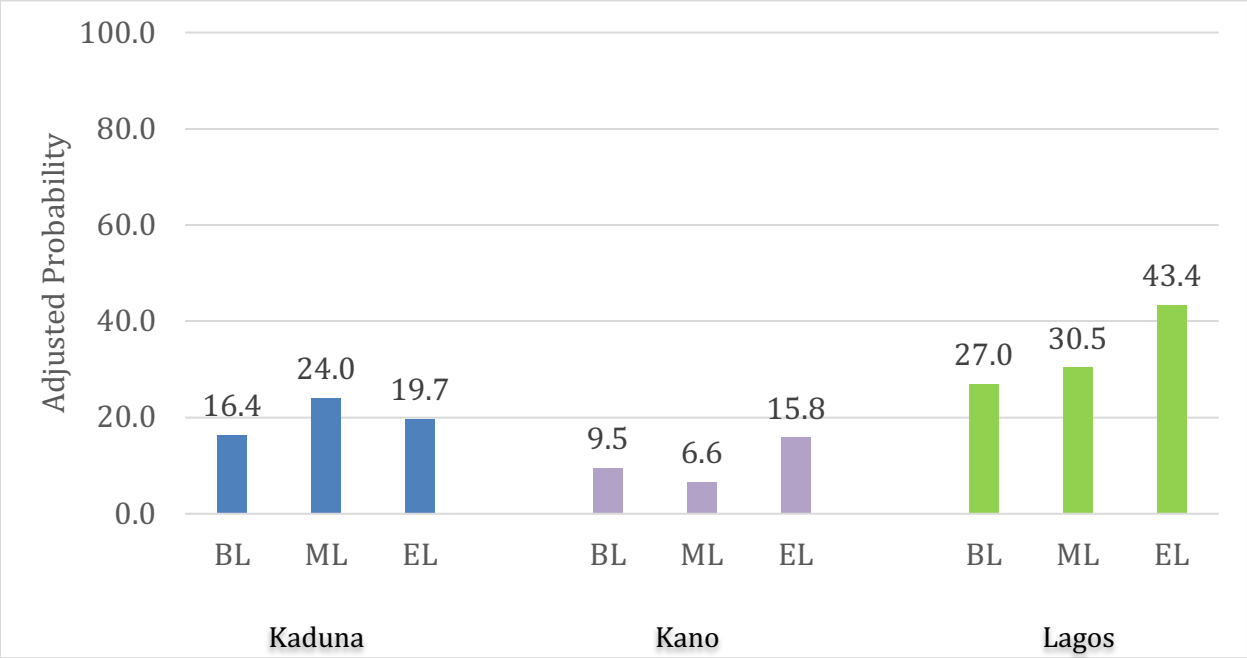
Figure 16. Agreement with statement, "When women wear clothes that expose their bodies, they are asking to be raped," Males



Note: Adjusted probabilities from correlated random effects models

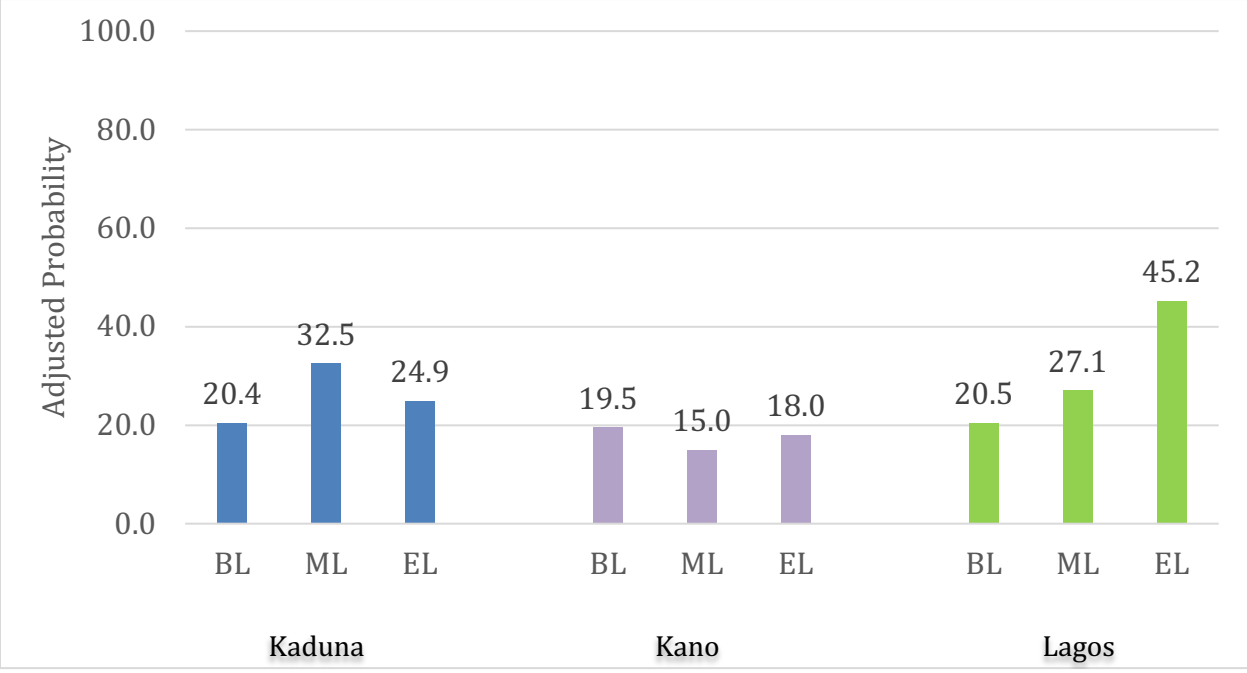
The percentage of women who admitted having experienced sexual harassment increased more rapidly in Lagos, compared to the other states, perhaps reflective of increasing awareness of acts classifiable as harassment or greater willingness to acknowledge actions that were previously considered taboo to mention. In Lagos, reporting of "unwelcome attempts to draw the respondent into a discussion of sexual matters" increased by 16.4 pp. among females (Figure 17) and 25.2 pp. among males (Figure 18), far greater than for the other two states.

Figure 17. Unwelcome attempts to draw you into a discussion of sexual matters, Females



Note: Adjusted probabilities from correlated random effects models

Figure 18. Unwelcome attempts to draw you into a discussion of sexual matters, Males



Note: Adjusted probabilities from correlated random effects models

A key programmatic goal of Shuga was to increase dialogue surrounding gender-based violence, and specifically to encourage discussions between parents and their children. For both males and females in Lagos, there were steady increases across the three waves in the predicted likelihood that a youth had discussed sexual violence with their parents. From baseline to midline, these estimated increases for females were not mirrored in Kaduna and Kano, where the prevalence of such discussions declined. From midline to endline, however, there was a surprising jump in the percentage of females who had had such discussions, to 79.4% of females in Kaduna and to 81.0% of females in Kano. In contrast, only 60.7% of females were estimated to have had such discussions at endline in Lagos.

Treatment-on-the Treated Analyses

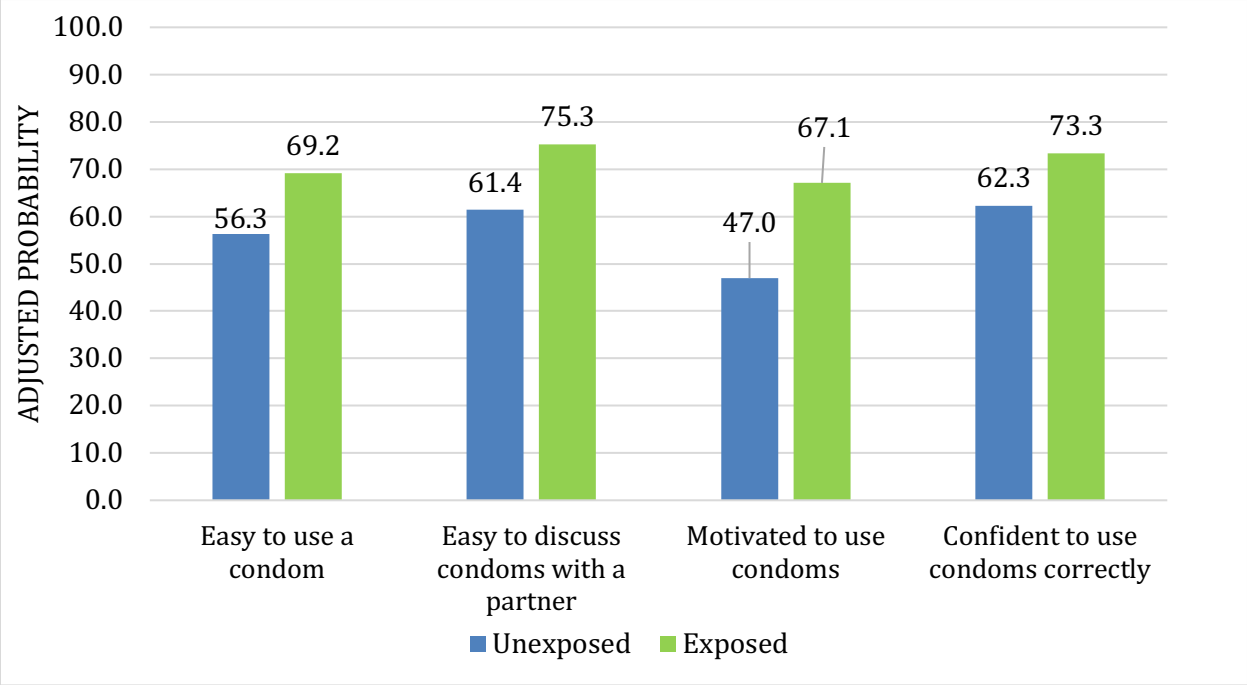
We present here the Treatment-on-the-Treated results as estimated by propensity score matching. Results for the fixed effects, correlated random effects, and doubly robust fixed effects estimates largely parallel these results and are included as annexes. The purpose of the TOT models is test for the effects of Shuga on respondents with confirmed unaided recall of the Shuga TV, radio dramas, or peer education or aided recall of social media (i.e., the exposed group) relative to respondents who do not have any such recall (i.e., the unexposed group). Again, we term the resulting variable "overall exposure," with these models, thus, comparing respondents with overall exposure versus respondents without overall exposure. The propensity score results reduce the bias from unobserved confounders by matching exposed and unexposed individuals based on their propensity to be exposed to Shuga.

Amongst females, the ToT models showed no statistically significant effects on any indicator related to condom use, attitudes towards condoms, condom knowledge, ease of use, motivation, and perceived behavioral control. For males, the PSM results showed positive effects of Shuga on many of the perceived behavioral control indicators related to condom use but not on actual condom use at last sex. Males exposed to Shuga were more likely to say that it is easy to use a condom (Figure 19). The average treatment effect on the treated (ATT) was 12.9 pp. (t-stat=2.55).[7] Males were also more likely to say that it is easy to discuss condoms with a partner

[7] The average treatment effect on the treated is the difference between the value for an exposed individual (69.2%) and an unexposed individual (56.3%).

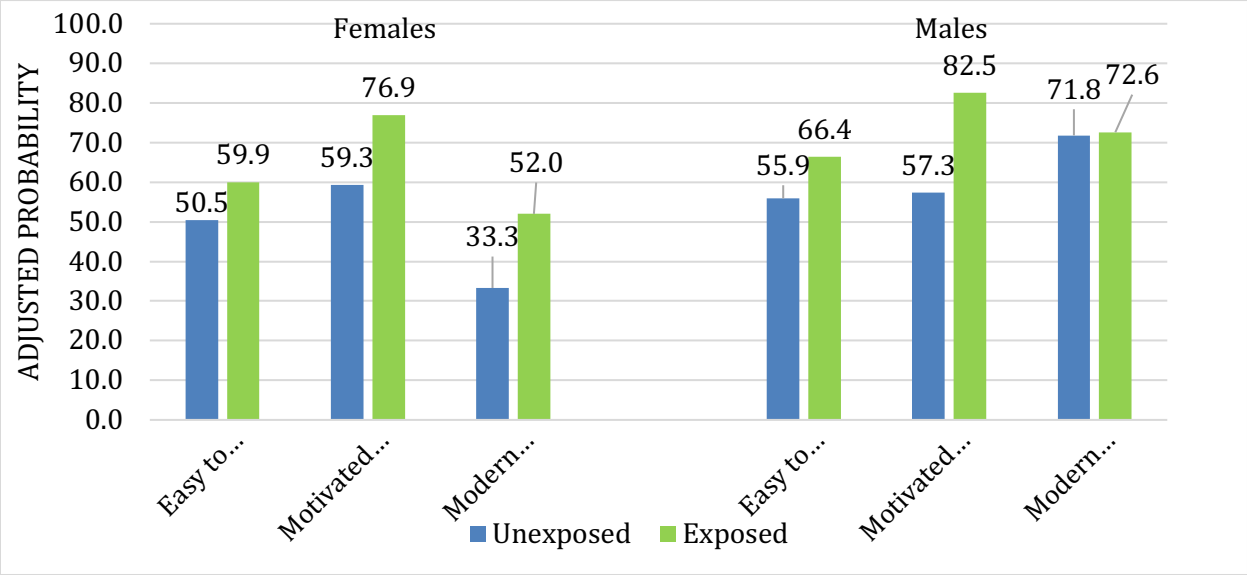
(ATT=13.9 pp., t-stat=2.87), to report being more motivated to use condoms (ATT=20.1 pp., t-stat=4.00), and more likely to be confident in their abilities to use condoms correctly (ATT=11.0 pp., t-stat=2.25). There were no similar effects on females however.

Figure 19. Condom Indicators by Shuga Overall Exposure, Propensity Score Matching, Males



The ToT propensity score results indicate a positive effect of Shuga on several modern contraceptive indicators, including ease of use, motivation to use, and actual use (Figure 20). For example, 59.9% of exposed females said that it was easy to use contraception relative to 50.5% of unexposed females (ATT=9.4 pp., t-stat=2.03) (Figure 20). The effect size was larger for males (ATT=10.5 pp, t-stat=2.07). Exposed individuals were also more likely to report greater motivation to use contraception (females: ATT=17.6 pp., t-stat=2.86; males: ATT=25.2, t-stat=3.35). PSM also estimated positive effects of Shuga on modern contraceptive use for females (ATT=18.7 pp., t stat=2.34) but not for males (ATT=0.7, t stat=0.09).

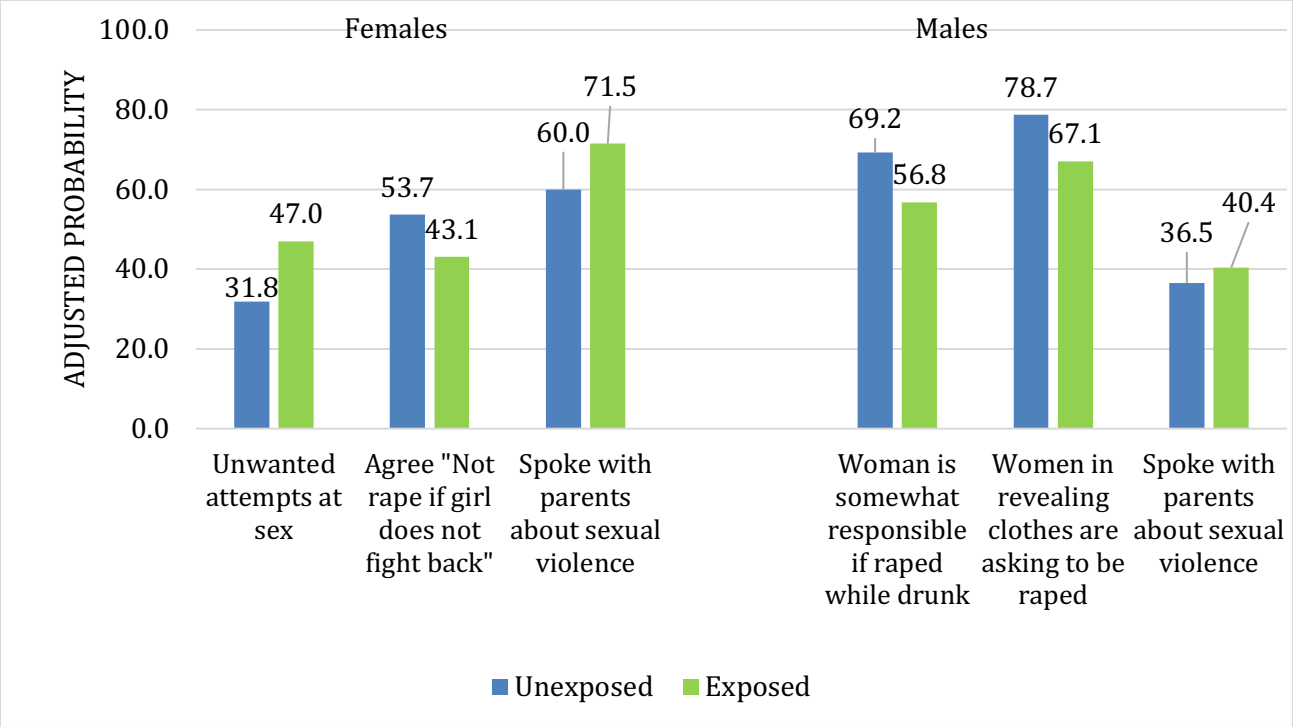
Figure 20. Estimated Likelihood of Contraceptive Outcomes for Respondents with Overall Exposure versus Those with Non-Exposure, Females and Males



Gender-Based Violence

The PSM results corroborate the findings of the effects of Shuga on indicators of gender-based violence, which were evident in the ITT models. Females who were exposed to Shuga were more likely to report incidents of sexual harassment, to be less likely to hold victim-blaming attitudes, and to have spoken with their parents about sexual violence (Figure 21). Similarly, exposed males were also less likely to hold victim-blaming attitudes but were no more likely to speak with their parents about sexual violence.

Figure 21. Gender-based Violence Indicators by Shuga Overall Exposure, Propensity Score Matching, Females and Males



Testing the Effectiveness of Different Media

Fixed effects ToT modeling was used to test for the effects of different media on targeted Shuga outcomes. These models showed distinct patterns of effectiveness by state. Television appeared to be more effective in Lagos than radio, peer education or other media, while radio appeared to be more important in Kano. There was no clear pattern, however, in Kaduna.

In Lagos, statistically significant results were found for those who reported confirmed unaided recall of the television drama, including positive effects on contraceptive beliefs, motivation to use contraception, and ease of contraceptive use. Respondents with confirmed unaided recall of Shuga TV were 13.9 pp (p=.04) more likely to be motivated to use contraception and 13.0 pp (p=.059) more likely to say that it was easy to use contraception. These respondents were also more confident that they could use a condom correctly. Effects on these indicators were not generally evident for those exposed to Shuga by radio or other media.

Aided recall of peer education in Lagos was associated with greater reporting of incidents of sexual harassment. Youth who participated in peer education sessions were 35.8 pp. (69.2% versus 33.4%, p=.057) more likely to say that they had experienced "unwelcome attempts to draw them into a discussion of sexual matters" and 46.1 pp. (59.1% versus 13.0%, p=.002) more likely to say that "someone implied better treatment if they engaged in sexual behavior with them."

In the northern states, the Shuga radio drama appeared to be an important driver of targeted outcomes, affecting condom use at last sex in both states. Peer education also appeared to be associated with greater modern contraceptive use in Kaduna. In Kano, those exposed to the Shuga radio drama were more likely to be using any contraceptive method generally and oral contraceptives specifically. They were also more likely to say that it would be easy to discuss condoms and to have greater perceived behavioral control over condom use. As in Lagos, respondents who had participated in peer education sessions were also more likely to report having been victims of sexual harassment.

Discussion

The use of entertainment education media in the field of family planning has a well-supported evidence base (Mwaikambo, Speizer et al. 2011, Westoff and Koffman 2011, Bongaarts, Cleland et al. 2012). As noted by one set of reviewers, "Communication through mass media (radio, television, or print) is an appealing strategy for the promotion of family planning because of its potential for expansive reach and its ability to address in an entertaining or informative way issues that in many settings are culturally taboo" (Mwaikambo, Speizer et al. 2011). Towards that end, the compelling and dramatic storylines, along with the numerous opportunities for multi-way dialogue presented by MTV Shuga Naija, represent an important tool in influencing contraceptive subjective norms, attitudes, and perceived behavioral control in a high-fertility environment in which women frequently have limited autonomy. The results presented here contribute further to the evidence base surrounding the use of edutainment in improving contraceptive use.

This evaluation is also unique in that it demonstrates a link between multichannel SBC and attitudes towards intimate partner violence. To date, there has been limited evidence of such a link in contexts similar to the areas under study here (Bott, Morrison et al. 2005). The WHO and PAHO have highlighted the important role that mass media entertainment education strategies can have in influencing gender norms, community responses, and individual attitudes towards IPV (World Health Organization and Organization 2012).

The results presented here should be interpreted with caution because of a number of other factors, in addition to the influence of MTV Shuga Naija, that might have contributed to changes in outcomes over the study period, including: 1) the changes in the composition of the sample due to attrition over time; 2) the smaller than expected sample size of sexually active youth, 3) the changes in the sample and the nature of responses from switching from face-to-face to telephone interviews, which may have introduced both selection bias and response bias; 4) the maturation of survey respondents; and 5) the influence of the novel coronavirus pandemic.

Selective Attrition

From baseline to midline, attrition appeared mostly random. To test this, we estimated logistic regression models to ascertain which observable characteristics of respondents affected being in

the midline sample relative to the baseline sample. Overall, we did not find strong evidence that baseline and midline characteristics of respondents differed in statistically significant ways.

From midline to endline, however, attrition was also influenced by ownership of phones and by respondents' prior consent to being re-contacted by phone. Regression modeling indicated that the endline sample tended to be wealthier, more educated, male, and unmarried. Youth from Kano were also less likely to own phones relative to youth in the other two states, and so Kano respondents decreased as a percentage of the endline sample.

Our solution to address this issue was to use iterative proportional fitting, or survey raking, to calibrate our survey weights to known control totals, in this case, to our baseline population. Survey raking is an iterative process by which the algorithm selects weights for each control variable sequentially until it has reached convergence. More specifically, "for a given control variable (e.g., gender), the total sizes of subpopulations are estimated, and the weights in separate categories (males, females) are multiplied by a group-specific factor (ratio of the known population total to the estimated total) so that the new set of weights produces total estimates conforming to the known totals." (Bergmann 2011). Using this method, we conducted post-stratification adjustment by breaking down the population into different cells (e.g., combinations of gender, education, state and marital status) and then we adjusted the weights in each cell so that the weights summed to a known total. This ensured that our endline weighted data had similar socio-economic characteristics as the population that we started out with at baseline, which was representative of this age cohort in Kaduna, Kano and Lagos.

Statistical Power

One serious limitation with the analysis is related to indicators that depend upon a person reporting that he/she is sexually active, such as condom use or contraceptive use. The percentage of the sample, particularly for males, who reported being sexually active was far smaller than originally anticipated. Once these groups were further disaggregated by state, the numbers became quite small. The implication of this is that the detectable differences required for statistical significance for indicators dependent on sexual activity tended to be quite large – generally greater than 15 percentage points.

Switching from Face-to-Face to Phone Interviews

The results presented here are also complicated by the switch in survey modality from face-to-face interviews during the baseline and midline surveys to phone interviews during the endline survey. As noted previously, it was apparent that there were potential issues of selection bias from the switch in interview modality; the endline sample contacted by phone tended to be older, wealthier, and more educated than the baseline and midline samples.

However, we are also concerned with response bias – the tendency for respondents to provide more favorable responses or to be more willing to reveal information considered to be sensitive based on the format of the interview. In the existing literature, there are mixed results regarding this issue. Donovan, Holman et al. (1997) found that, as compared to telephone respondents, face-to-face (i.e., household) respondents were more likely to report problematic levels of risky health behaviors and less likely to report awareness of health messages. This was the case for risky behaviors like current smoking, unsafe drinking, and low consumption of fruits and vegetables. Thus, the responses of face-to-face respondents were less positive (i.e., less favorable) in these regards. This study also considered differences in respondent awareness of health messages, with levels tending to be generally lower for face-to-face respondents. Given how we measured Shuga campaign recall—with confirmation— we would not expect such substantive differences between face-to-face and telephone survey methodologies in how we assess overall exposure. In another study, Holbrook, Green et al. (2003) also found that telephone respondents were more likely to present themselves in socially desirable ways than were face-to-face respondents. The summation of these two articles, thus, suggests potentially lower response bias for face-to-face interviews. Interestingly, this would go against the counter argument that telephone respondents would have lower levels of response bias given that, without direct exposure to an interviewer, they may feel freer to report candidly their beliefs, attitudes, and behaviors.

A more recent study examined the accuracy of reported ownership of insecticide treated nets as measured by face-to-face interviews relative to phone interviews (L'Engle, Sefa et al. 2018). The authors compared ITN use estimates collected through a nationally representative random digit dial phone survey in Ghana with responses provided in the Demographic and Health Survey. They found only a 1.7-percentage point difference, attesting to the validity of phone surveys.

Concurrent FP SBCC programs (NURHI) in Kaduna and Lagos

At the same time that MTV Shuga Naija was being broadcast in Kaduna and Lagos, NURHI was also working in these same two states. NURHI, which ran from 2015 to 2020 in both states and was funded by the Bill and Melinda Gates Foundation, sought to increase modern contraceptive prevalence to contribute to the Nigerian Government's goal of attaining a national contraceptive prevalence rate of 27% by 2020. The project focused on advocacy, demand generation, and service delivery. The demand generation component involved an entertainment education radio magazine program and serial drama, mass media involving short-format television and radio materials, social mobilization, print media for service providers, social mobilizers and clients, and digital media (NURHI 2 2021).

While it is possible and perhaps likely that the NURHI work contributed to shifting contraceptive attitudes, norms, control, and behaviors in Kaduna and Lagos, several arguments, however, still support an independent effect of MTV Shuga on contraceptive outcomes. First, we utilized questions in the survey that confirmed respondent exposure to the MTV Shuga Naija television and radio dramas. In PSM and multivariate modeling, confirmed exposure to MTV Shuga Naija programming was, in turn, linked to improvements in contraceptive use generally and condom use specifically in Kaduna and Lagos. Secondly, exposure to Shuga media was also found to influence contraceptive use in Kano, where NURHI did not have a presence. Hence, it seems plausible that MTV Shuga Naija was responsible for many of the observed changes in this sample over this time period.

COVID-19 Pandemic

Many of the ITT models showed large improvements in Kaduna and Kano relative to Lagos. This might imply that Shuga was more effective in these states relative to Lagos. But starting in March 2020 – seven months before the endline survey – Lagos was placed under stringent lockdowns that were not implemented in the northern states of Kaduna and Kano. This potentially affected the ability of youth in Lagos to access important reproductive health services, including modern contraception and condoms. Hence, this evaluation's failure to document larger trends in important behaviors in Lagos relative to Kaduna and Kano may not be a failure of Shuga programming but rather of external circumstances. It could be argued that

Shuga achieved larger gains in Lagos in areas such as motivation and confidence but not in the behavioral domain where youth faced additional structural barriers.

Conclusions

Here we consider the main takeaways for MTV Shuga Naija at the conclusion of this evaluation as MTV aims to make strategic decisions for future Shuga seasons in Nigeria and in other African countries. In terms of reach, it is clear that MTV Shuga Naija has the capacity to engage large youth audiences, entertain them, and – in the process – educate them. In particular, rates of overall exposure for MTV Shuga Naija were very high for both males and females – 49.1% and 18.7% at endline in Lagos respectively. Overall, these rates constitute a high reach, especially for males, and speak to Entertainment Education's capacity to attract and draw in large audiences with creative storylines and compelling characters. Achieving such levels of reach positions MTV Shuga Naija well for seasons to come in Nigeria where it can expand its storylines, further refine its educational content, and experiment with new health topical areas (as it is doing with gender-based violence).

In terms of outcomes, this evaluation provides evidence of MTV Shuga Naija's effects on TPB precursors and growing evidence of its having the potential capacity to influence behaviors related to contraception and condom use. In terms of TPB preventive perceptions, for females, MTV Shuga Naija had effects on attitudes and perceived behavioral control related to modern contraceptives. For males, MTV Shuga Naija had effects on attitudes and perceived behavioral control related to condom use. These results shed light on the processes by which males and females are differentially progressing toward behavior change—and, importantly, suggest that the behavioral processes of Nigeria youth are active and may lead to increased behavioral change following the endline survey. It takes time for campaign viewers to progress from campaign exposure to the development of preventive perceptions and, subsequently, from the development of preventive perceptions to the development of behaviors. There is evidence that these processes were ongoing at endline and may lead to increased behavior change thereafter.

As explained above, MTV Shuga Naija is conceived to have content specific to TPB's three types of beliefs (i.e., behavioral, normative, and control beliefs)—and, thus, can be evaluated in terms of its effects on the three types of preventive perceptions, behavioral intention, and behavior. An evaluation can also test the staggered effects, such as how the three types of preventive perceptions predict behavior. While there is more to be learned about these processes in terms of MTV Shuga Naija, the current evaluation generally underscores the value of using

TPB as a theoretical basis for the design of entertainment education programming and the later outcome evaluation.

Finally, the results provide evidence of the effectiveness of MTV Shuga Naija in Nigeria in the different contexts of sexual health, contraceptive use, and gender-based violence. In future seasons, MTV Shuga Naija is encouraged to intensify its educational content on sexual health and contraceptive use, which may help move Nigeria youth further along to behavioral change, especially in the case of youth who had already developed TPB preventive perceptions at endline. An exciting new type of Shuga Naija content is gender-based violence, which ties in with storylines on rape at the nightclub and the school. While this was a secondary health content area in the most recent seasons of Shuga Naija, the findings suggest the impact that Entertainment Education, in general, and MTV Shuga Naija, in particular, can achieve in terms of educating and empowering youth to prevent gender-based violence. MTV Shuga is encouraged to continue and expand its content in this area, upgrading it to a primary health topic in its Entertainment Education programming in Nigeria and other countries.

References

Bibliography

Adanikin, A. I., N. McGrath and S. S. Padmadas (2019). "Power relations and negotiations in contraceptive decision-making when husbands oppose family planning: analysis of ethnographic vignette couple data in Southwest Nigeria." Cult Health Sex **21**(12): 1439-1451.

Ajzen, I. (1991). "The theory of planned behavior." Organizational Behavior and Human Decision Processes **50**(2): 179-211.

Angeles, G., D. K. Guilkey and T. A. Mroz (1998). "Purposive Program Placement and the Estimation of Family Planning Program Effects in Tanzania." Journal of the American Statistical Association **93**(443): 884-899.

Ankomah, A., M. Oladosun and J. Anyanti (2011). "Myths, misinformation and communication about family planning and contraceptive use in Nigeria." Open Access Journal of Contraception **2**: 95-105.

Antai, D. E. and J. B. Antai (2008). "Attitudes of women toward intimate partner violence: a study of rural women in Nigeria." Rural Remote Health **8**(3): 996.

Arcos, A. and M. del Mar Rueda, Trujillo, M. et al (2014). "Review of Estimation Methods for Landline and Cell Phopne Surveys." Sociological Methods and Research **44**(3): 458-485.

Babalola, S., N. John, B. Ajao and I. S. Speizer (2015). "Ideation and intention to use contraceptives in Kenya and Nigeria." Demogr Res **33**: 211-238.

Babalola, S. and O. Oyenubi (2018). "Factors explaining the North-South differentials in contraceptive use in Nigeria: A nonlinear decomposition analysis." Demographic Research **38**: 287-308.

Babalola, S. and C. Vonrasek (2005). "Communication, ideation and contraceptive use in Burkina Faso: an application of the propensity score matching method." J Fam Plann Reprod Health Care **31**(3): 207-212.

Banerjee, A., E. La Ferrara and V. H. Orozco-Olvera (2019). The Entertaining Way to Behavioral Change: Fighting HIV with MTV. Policy Research Working Paper. Washington, DC, World Bank.

Beaudoin, C. E., H. Chen and S. Agha (2016). "Estimating Causal Effects With Propensity Score Models: An Evaluation of the Touch Condom Media Campaign in Pakistan." J Health Commun **21**(4): 415-423.

Bergmann, M. (2011). "Ipfweight: Stata module to create adjustment weights for surveys." Retrieved November 18, 2020, from https://econpapers.repec.org/software/bocbocode/s457353.htm. .

Bongaarts, J., J. C. Cleland, J. Townsend, J. T. Bertrand and M. Das Gupta (2012). Family Planning Programs for the 21st Century: Rationale and Design. New York, Population Council.

Bott, S., A. Morrison and World Bank. (2005). Preventing and responding to gender-based violence in middle and low-income countries a global review and analysis. Policy research working paper 3618. Washington, D.C., World Bank,.

Boulay, M., J. D. Storey and S. Sood (2002). "Indirect exposure to a family planning mass media campaign in Nepal." J Health Commun **7**(5): 379-399.

Donovan, R. J., C. D. J. Holman, B. Corti and G. Jalleh (1997). "Face-to-face household interviews versus telephone interviews for health surveys." Australian and New Zealand Journal of Public Health **21**(2): 134-140.

Duze, M. C. and I. Z. Mohammed (2006). "Male knowledge, attitudes, and family planning practices in northern Nigeria." Afr J Reprod Health **10**(3): 53-65.

Fishbein, M. and J. N. Cappella (2006). "The role of theory in developing effective health communications." Journal of Communication **56(Suppl.1)**: S1-S17.

Gage, A. J. and N. J. Thomas (2017). "Women's Work, Gender Roles, and Intimate Partner Violence in Nigeria." Arch Sex Behav **46**(7): 1923-1938.

Gueye, A., I. S. Speizer, M. Corroon and C. C. Okigbo (2015). "Belief in Family Planning Myths at the Individual and Community Levels and Modern Contraceptive Use in Urban Africa." Int Perspect Sex Reprod Health **41**(4): 191-199.

Guilkey, D. K., P. Hutchinson and P. Lance (2006). "Cost-effectiveness analysis for health communication programs." J Health Commun **11 Suppl 2**: 47-67.

Guilkey, D. K. and P. L. Hutchinson (2011). "Overcoming methodological challenges in evaluating health communication campaigns: evidence from rural Bangladesh." Stud Fam Plann **42**(2): 93-106.

Holbrook, A. L., M. C. Green and J. A. Krosnick (2003). "Telephone Versus Face-to-Face Interviewing of National Probability Samples with Long Questionnaires." Public Opinion Quarterly **67**: 79-125.

Hornik, R. C. (2002). Public Health Communication: Evidence for Behavior Change. Hillsdale, NJ, Lawrence Erlbaum.

Hutchinson, P., P. Lance, D. K. Guilkey, M. Shahjahan and S. Haque (2006). "Measuring the cost-effectiveness of a national health communication program in rural Bangladesh." J Health Commun **11 Suppl 2**: 91-121.

Hutchinson, P., D. Meekers, C. Beaudoin, E. Omoluabi, A. Akinyemi, A. Babatunde, M. Do and A. Gage (2018). Evaluation of the MTV Shuga Naija Family Planning / Reproductive Health Television Drama In Nigeria: Baseline Survey Report. New Orleans, Louisiana.

Hutchinson, P. L. and D. Meekers (2012). "Estimating causal effects from family planning health communication campaigns using panel data: the "your health, your wealth" campaign in Egypt." PLoS One **7**(9): e46138.

Izugbara, C. O. and A. C. Ezeh (2010). "Women and high fertility in Islamic northern Nigeria." Stud Fam Plann **41**(3): 193-204.

Joffe, M. M., T. R. Ten Have, H. I. Feldman and S. E. Kimmel (2004). "Model selection, confounder control, and marginal structural models: review and new applications." The American Statistician **58**(4): 272-279.

Kabir, M., Z. Iliyasu, I. S. Abubakar and B. S. Maje (2003). "The Role of Men in Contraceptive Decision-making in Fanshekara Village, Northern Nigeria." Trop J Obstet Gynaecol **20**(1): 24-27.

Kolenikov, S. and G. Angeles (2009). "Socioeconomic status measurement with discrete proxy variables: is principle component analysis a reliable answer?" Review of Income and Wealth **55**(1): 128-165.

L'Engle, K., E. Sefa, E. A. Adimzoya and e. al. (2018). "Survey research with a random digit dial national mobile phone sample in Ghana: Methods and sample quality." PLoS One **13**(1): 1-11.

Leo, B., R. Morello, J. Mellon, T. Peixoto and S. T. Davenport (2015). Do Mobile Phone Surveys Work in Poor Countries? Washington, D.C., Center for Global Development.

Lunceford, J. K. and M. Davidian (2004). "Stratification and weighting via the propensity score in estimation of causal treatment effects: a comparative study." Statistics in medicine **23**(19): 2937-2960.

Lunceford, J. K. and M. Davidian (2004). "Stratification and weighting via the propensity score in estimation of causal treatment effects: a comparative study." Stat Med **23**(19): 2937-2960.

Measurement Learning and Evaluation Project, National Population Comission (NPC) Nigeria and Data Research and Mapping Consult Ltd (2015). Measurement, Learning and Evaluation of the Urban Reproductive Health Intiative Nigeria 2014 Endline Survey. Measurement, Learning and Evaluation Project. Chapel Hill, NC, USA.

Measurement Learning and Evaluation Project, National Population Commission (NPC) Nigeria and Data Research and Mapping Consult Ltd (2015). Measurement, Learning and Evaluation of the Urban Reproductive Health Intiative Nigeria 2014 Endline Survey. Measurement, Learning and Evaluation Project. Chapel Hill, NC, USA.

Mercer, L. D., F. Lu and J. L. Proctor (2019). "Sub-national levels and trends in contraceptive prevalence, unmet need, and demand for family planning in Nigeria with survey uncertainty." BMC Public Health **19**(1): 1752.

Mwaikambo, L., I. S. Speizer, A. Schurmann, G. Morgan and F. Fikree (2011). "What works in family planning interventions: a systematic review." Stud Fam Plann **42**(2): 67-82.

National Population Commission (NPC) [Nigeria] and ICF (2019). Nigeria Demographic and Health Survey 2018. Abuja, Nigeria and Rockville, Maryland, USA.

NURHI 2. (2021). "About Us." Retrieved Accessed April 1, 2021, from https://nurhi.org/en/.

Okigbo, C. C., I. S. Speizer, M. E. Domino and S. L. Curtis (2017). "A Multilevel Logit Estimation of Factors Associated With Modern Contraception in Urban Nigeria." World Med Health Policy **9**(1): 65-88.

PMA2020. (2017). "PMA Nigeria." 2017, from https://www.pmadata.org/countries/nigeria.

Rosen, J. E., N. Bellows, L. Bollinger, W. D. Plosky and M. Weinberger (2019). The Business Case for Investing in Social and Behavior Change for Family Planning. Washington, DC, Breakthrough Research.

Schwandt, H. (2011). Perspectives on Family Planning in Ibadan and Kaduna, Nigeria: A Qualitative Analysis. Baltimore, Maryland, Nigerian Urban Reproductive Health Initiative.

Science Panel on Interactive, C. and Health, Eds. (1999). Wired for health and well-being: The emergence of interactive health communication, U.S. Government Printing Office.

Sinai, I., J. Anyanti, M. Khan, R. Daroda and O. Oguntunde (2017). "Demand for Women's Health Services in Northern Nigeria: A Review of the Literature." Afr J Reprod Health **21**(2): 96-108.

Singhal, A. and E. M. Rogers (2001). The Entertainment-Education Strategy in Campaigns. Public Communication Campaigns. R. E. Rice and C. Atkins. Thousand Oaks, CA, Sage Publications.

Southwell, B. G., C. H. Barmada, R. C. Hornik and D. M. Maklan (2002). "Can we measure encoded exposure? Validation evidence from a national campaign." J Health Commun **7**(5): 445-453.

Speizer, I. S. and P. Lance (2015). "Fertility desires, family planning use and pregnancy experience: longitudinal examination of urban areas in three African countries." BMC Pregnancy Childbirth **15**: 294.

Toth, R. (1996). A perception gap, IPI Report**:** 18-19.

Umana, J. E., O. I. Fawole and I. A. Adeoye (2014). "Prevalence and correlates of intimate partner violence towards female students of the University of Ibadan, Nigeria." BMC Womens Health **14**: 131.

Westoff, C. F. and D. A. Koffman (2011). "The association of television and radio with reproductive behavior." Popul Dev Rev **37**(4): 749-759.

Wooldridge, J. M. (2019). "Correlated random effects models with unbalanced panels." Journal of Econometrics **211**(1): 137-150.

Wooldridge, J. M. (2020). Introductory Econometrics: A Modern Approach. Boston, Cengage.

World Health Organization and P. A. H. Organization (2012). Understanding and addressing violence against women: Intimate partner violence. Geneva.

Yzer, M. C. (2017). Reasoned action as an approach to understanding and predicting health message outcomes. Oxford Research Encyclopedia of Communication. J. F. Nussbaum. Oxford, Oxford University.

Yzer, M. C. (2017). Theory of Reasoned Action and Theory of Planned Behavior. The international encyclopedia of media effects. P. Rossler. Malden, MA, John Wiley & Sons, Inc.

Appendices

Appendix 1A. Comparing Shuga Samples with 2018 DHS (unweighted data, urban females)

	2018 DHS					Shuga baseline			
	Total	Kano	Kaduna	Lagos		Total	Kano	Kaduna	Lagos
Age									
15-19	57.9	57.8	55.4	59.8		64.6	68.7	58.1	67.2
20-24	42.2	42.2	44.6	40.2		35.4	31.3	41.9	32.8
Education									
None	13.7	16.5	24.2	2.9		4.6	5.7	6.6	1.3
Primary	6.9	6.4	11.1	4.2		8.1	9.1	12.4	2.2
Secondary	65.9	61.3	52.7	80.3		75.5	71.7	69.7	85.9
Higher	13.6	15.9	12.1	12.6		11.8	13.5	11.2	10.6
Household has									
Electricity	88.2	83.2	81.1	98.4		93.5	92.9	92.5	95.4
Radio	77.5	72.8	69.3	88.3		72.4	79.6	75.3	61.7
TV	74.7	60.0	66.9	94.2		80.4	71.8	79.3	90.7
Refrigerator	46.2	37.1	42.2	57.3		42.8	41.6	47.9	38.5
Car/truck	21.8	27.8	19.6	18.0		30.4	35.3	33.0	22.4
Married/ living together	27.5	34.1	40.3	11.6		21.1	20.3	29.8	12.6
Sexually experienced	41.5	36.1	50.7	39.4		34.8	23.4	44.5	36.7
Uses modern FP (among all respondents)	4.3	2.6	3.4	6.6		10.6	6.3	11.1	14.6
Uses modern FP (among sexually experienced)	10.1	7.2	6.6	16.0		29.5	27.2	24.6	37.0
Children ever born									
None	75.3	72.5	65.4	85.6		81.8	83.4	73.6	88.9
One	12.8	12.1	16.4	10.5		6.2	4.6	7.8	6.0
Two-three	10.5	13.6	15.8	3.7		8.6	9.0	11.7	4.8
Four+	1.4	1.7	2.4	0.3		3.5	2.9	6.9	0.3
N of Cases	1,025	346	298	381		1,900	646	651	603

Appendix 1B. Comparing Shuga Samples with 2018 DHS (unweighted data, urban males)

	2018 DHS					Shuga baseline			
	Total	Kano	Kaduna	Lagos		Total	Kano	Kaduna	Lagos
Age									
15-19	61.8	64.7	56.6	63.3		63.0	58.3	59.2	71.3
20-24	38.2	35.3	43.4	36.7		37.0	41.7	40.8	28.7
Education									
None	6.3	4.7	11.8	3.1		2.0	3.3	0.9	1.8
Primary	7.0	5.9	11.8	4.1		12.5	25.1	8.4	3.9
Secondary	71.0	76.5	57.9	76.5		73.0	58.9	76.6	83.5
Higher	15.8	12.9	18.4	16.3		12.5	12.7	14.0	10.8
Household has*									
Electricity						97.6	97.0	96.9	98.8
Radio						83.4	93.7	84.4	72.2
TV						84.6	74.9	86.6	92.2
Refrigerator						47.4	39.6	55.8	47.0
Car/truck						34.2	25.1	43.9	33.8
Married/ living together	2.3	2.4	2.6	2.0		2.1	0.6	4.0	1.8
Sexually experienced	18.2	3.5	18.4	30.6		21.0	4.5	24.6	33.8
Uses modern FP (among all respondents)	12.0	1.2	14.5	19.4		8.3	2.4	7.2	15.3
Uses modern FP (among sexually experienced)	(66.0)	(--)	(--)	(63.3)		38.9	(--)	28.7	44.7
Children ever born									
None	98.8	98.8	98.7	99.0		98.4	100.0	96.9	98.2
One	0.8	0.0	1.3	1.0		0.8	0.0	1.6	0.9
Two-three	0.4	1.2	0.0	0.0		0.5	0.0	0.9	0.6
Four+	0.0	0.0	0.0	0.0		0.3	0.0	0.6	0.3
N of Cases	259	85	76	98		986	331	321	334

( ) N of cases <50; (--) N of cases < 25)

* Not available in the male DHS data