



Evaluation of the Effects of Smart Couple Digital Health Tool in Kaduna, Nigeria



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Cover photo: Researchers using mobile data collection devices in Kaduna, Nigeria. © 2017, Caitlin Loehr, all rights reserved.

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ACRONYMS

CCP	Johns Hopkins Center for Communication Programs
FP	Family Planning
HC3	Health Communication Capacity Collaborative
IVR	Interactive Voice Response
LGA	Local Government Area
MAMA	Mobile Alliance for Maternal Action
MARS	Market Audits and Research Services
MLE	Measurement Learning and Evaluation
MNO	Mobile Network Operator
M4RH	Mobile for Reproductive Health
SBCC	Social and Behavior Change Communication
SIM	Subscriber Identity Module
SMS	Short Message Service
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

This report presents findings from a quasi-experimental pre-post design trial designed to assess the effects of a digital health tool among couples of reproductive age in Kaduna City, Nigeria. Study participants included 670 women and 652 men who listened to an entertainment-education series on their mobile phones and then participated in the post-study survey. Their responses to survey questions revealed very positive opinions about the Smart Couple tool and bivariate and fixed effects analyses of the data indicate that the tool positively influenced study participants.

Nearly all the ideational and behavioral indicators assessed increased significantly with higher exposure to the tool. Specifically, the multivariable regression results indicate that compared to lower exposure level, higher exposure increased the odds of discussing family planning (FP) with one's spouse 10-fold for women and more than 12-fold for men. Similarly, higher exposure was associated with more than a nine-fold increase for women and almost 12-fold increase for men in the odds of discussing contraceptive methods with a spouse.

In addition, a higher level of exposure to the tool was associated with an eight-fold increase for women and a four-fold increase for men in the odds of discussing the need to visit a FP provider with one's spouse. Exposure to the tool was also associated with increased discussion of desired family size with one's spouse. Compared to lower level of exposure, higher exposure level increased the odds of discussing family size by 170% for women and by 161% for men. Furthermore, higher exposure to the digital health tool increased support for women who used contraceptives by 94% for women and by 188% for men.

Unlike what was observed for all the other ideational variables, exposure to the tool did not significantly change the extent to which the respondents think about their desired family size.

The results were equally generally positive regarding contraceptive use and intention. For women, higher exposure increased the odds of using any method almost three-fold and the odds of using a modern method more than two-fold.

INTRODUCTION

Contraceptive prevalence remains particularly low in many parts of Nigeria, especially in the northern states. Many factors are responsible for this situation, including demand- and supply-related factors. In addition to fear of side effects and misconceptions about contraceptives, many women in need of contraceptives are not accessing family planning (FP) services because they lack the agency and spousal support to do so. When a couple eventually decides to plan their family, the man and the woman often go through a process of deliberation and decision-making as they choose whether or not to adopt modern contraception, what specific method to use, where to obtain it and whether to continue using it. During this process, a woman or man may consider her or his own fertility desires, seek out information on FP, talk with her or his partner, and discuss experiences with family and friends. At some point in this process, a woman is likely to visit with a provider – which is one short, but important, point in time in this decision process.

Communication is a core skill running throughout this process – communicating with one’s partner, communicating with family and friends, and communicating with a health care provider. In addition, communication between partners and joint decision-making has been linked to an increased likelihood that FP methods will be used effectively and over the long term. However, women and men are often not equipped with the skills they need to communicate effectively about personal and sensitive subjects – such as sex, fertility desires and using FP methods – that may go against cultural taboos. Furthermore, where FP is frequently regarded as a woman’s issue, men may not want to be involved or may think they should not be involved throughout the process of adopting or continuing to use FP, including initiating discussion with their partner, seeking information, attendance at counseling, choosing a method and supporting their partner in using their chosen method.

Many demand generation programs, programs that increase awareness of and demand for health products or services among an intended audience, address the information needs of female clients prior to visiting a provider and encourage them to seek out FP counseling. But those programs usually fall short in preparing the client to be active and engaged communicators during the counseling itself, nor do the programs encourage men to be active and engaged. Furthermore, in many parts of Nigeria, efforts have been made to improve providers’ communication skills and provide client-centered counseling, which has led to some improvement in client engagement, but the client is dependent on the provider to lead this process. This is troublesome given that social and gender norms often do not support engaged and empowered clients, especially female clients. As a result, female clients are often passive participants in FP counseling, resulting in discussion and decision-making led by the provider. In other cases, such as Northern Nigeria where gender and social norms around decision-making limit women’s mobility outside of the home and control of money, men may ultimately make the decision about the use of FP methods or women may defer to men to make a decision.

Against this background, the Health Communication Capacity Collaborative (HC3), a five-year project funded by the United States Agency for International Development (USAID) and managed by the Johns Hopkins Center for Communication Programs (CCP), is interested in providing tools for implementing

partners to use to increase the number of FP clients who are informed, empowered and confident – in other words “smart clients” – who are able to engage with providers and talk about their FP needs. HC3 envisions that “smart clients” will be part of a “smart couple” where both partners are informed, supportive and equally involved in making decisions and taking actions related to the use of FP services and methods.

Given the global proliferation of mobile technologies and the success of their use for increasing women’s knowledge about their health (for example, Mobile Alliance for Maternal Action [MAMA] in Bangladesh and South Africa, MOTECH in Ghana and Mobile for Reproductive Health [M4RH] in Kenya and Tanzania), this project leverages this technology to develop a digital health tool to prepare women and men to become “smart clients” and “smart couples” and encourage them to talk with their provider and partner about contraceptive methods.

This intervention builds on the *Beta Life* Smart Client tool, a digital health tool to inform, empower and build confidence among Nigerian women to visit a FP provider, actively participate during the counseling visit, adopt a method and continue using their method of choice (see report under separate cover). Whereas the Smart Client tool targets potential FP female clients, the target for the Smart Couple version is the couple.

While drama is a common approach used in behavior change communication, it is usually delivered via television, radio or community theatre. The *Beta Life* digital health tool delivers drama using mobile phones and interactive voice response (IVR). The approach provides key information and decision triggers via a series of short dramatic episodes about a fictional couple making choices regarding FP. The tool also delivers additional tips, discussion prompts and information related to the core messages. Quizzes reinforce key messages and engage users. Research on communication has shown that exposure to media messaging fosters discussions between couples which leads to uptake of healthy behaviors. For these reasons, CCP decided to expand the *Beta Life* digital health tool to reach the couple as a unit.

The document reports on the evaluation of the digital health tool named *Beta Life* consisting of 17 pre-recorded IVR calls: an initial welcome call, 13 regular calls and three calls with short quizzes. The digital health tool was recorded in Hausa and evaluated among a sample of men and women in Kaduna State using a quasi-experimental design from June to August 2017.

THE INTERVENTION

The digital health tool, named *Beta Life* in Nigeria, was designed to inform, empower and promote “smart clients” and “smart couples” by reaching them directly through mobile phones. It consists of pre-recorded interactive voice response (IVR) calls that include a variety of segments – an introduction, a serial drama, a friend-to-friend chat, a personal story and a sample dialogue. The three short quiz calls ask users a few brief questions to reinforce key messages, evaluate user understanding of content and encourage user engagement. In addition, after each “regular” call, users receive a short message service (SMS) “challenge” which consists of a discussion prompt based on call content. The digital health tool audio recordings and SMS were provided in Hausa for this study.

The tool is based upon Social Learning Theory, which posits that people learn from each other through observation, imitation and modeling. The Smart Couple tool therefore uses fictional role models, who demonstrate the desired behaviors and behavior change process in a drama format, as well as personal stories and examples of “smart client” and “smart couple” dialogues. This allows the intended audience to observe an action, understand its consequences and become motivated to repeat and adopt it. While drama is a common approach used in behavior change communication, it is usually delivered via television, radio or community theatre. This digital health tool explores how drama can be adapted to mobile phones via IVR, using shorter and simpler storylines and episodes while maintaining the fictional drama style.

The *Beta Life* digital health tool is delivered via mobile phone and includes 17 pre-recorded IVR calls. The calls include one welcome call, 13 regular program calls and three quiz calls. The call starts with an introduction by the hosts, followed by the drama segment, after which participants are expected to use the numeric keypad on their mobile phone to select the other components they desire to listen to during each call and to answer call-related quizzes. The content of the calls is described in Table 1.

Table 1: Description of *Beta Life* Program and Other Calls

Call 1:	This is the Welcome call . The participants are called by the <i>Beta Life</i> program, listen to an introduction about the tool explaining how it works and what to expect from the content.
Calls 2, 3, 4, 5, 6, 7:	Regular Calls. These are part of the “13 regular calls.” Participants are called by the <i>Beta Life</i> program, listen to the hosts and drama segment, listen to sample dialogue, personal story and/or male segment, listen to the host at the end of the call and answer one or two question(s) using their numeric keypad.
Call 8:	Short quiz call. Participants are called by the <i>Beta Life</i> program, listen to the host ask four questions and answer using their numeric keypad.
Calls 9, 10, 11:	Regular Calls. These are part of the “13 regular calls.” Participants are called by the <i>Beta Life</i> program, listen to the hosts and drama segment, listen to sample dialogue, personal story and/or male segment, listen to the host at the end of the call and answer one question using their numeric keypad.
Call 12:	Short quiz call. Participants are called by the <i>Beta Life</i> program, listen to the host ask up to five questions and answer using their numeric keypad.

Calls 13, 14, 15, 16:	Regular Calls. These are part of the “13 regular calls.” Participants are called by the <i>Beta Life</i> program, listen to the hosts and drama segment, listen to sample dialogue, personal story and/or male segment, listen to the host at the end of the call and answer one question using their numeric keypad.
Call 17:	Short quiz call. Participants are called by the <i>Beta Life</i> program, listen to the host ask seven questions and answer using their numeric keypad.

Call Format

Each call includes five types of segments that callers will be able to choose how many segments they would like to hear:

1. **Brief welcome and introduction** to the story by friendly host characters, a female and male.
2. **Short drama**, which follows a cast of characters over each episode. The characters include a couple, Laila and Musa, along with their family and friends, who all face different situations and decisions related to using FP methods.
3. **“Friend-to-friend” chats**, in which the host “friends” deliver follow-up messages and tips related to the core message and the drama, and ask the user a quiz question. Some messages in this segment are tailored for male and female users, based on their user preferences set on enrollment, or tailored to the user response to the question.
4. **Personal story.** This is an optional segment, requiring users to “press 1” to hear the content. Personal stories, told by females and males, express diverse experiences with FP that correspond to the key message of the episode.
5. **Sample dialogue**, is also an optional segment, requiring users to “press 2” to hear the content. Sample dialogues feature a friendly provider and a client or a couple, modeling what to expect during a visit to a FP clinic and how to discuss needs, preferences and concerns.
6. **Male personal story or dialogue.** This is an optional segment in the Smart Couple tool, requiring users to “press 3” to hear the content. Male personal stories may be complementary to the female personal stories, just told from the perspective of the male partner, or they may be unique stories expressing diverse experiences with FP. A few calls do not offer personal stories but sample dialogues, between a husband and wife or between a man and provider, are offered instead.

Three calls are a quiz only – asking users a few brief questions to reinforce key messages, evaluate user understanding of content and encourage user engagement.

In addition, an SMS "challenge" was sent to each user on the day following each “regular” call. Through a discussion prompt, the challenges encouraged the user to practice skills modeled in the drama with their spouse/partner. For example, in episode #1 Musa, the husband, complimented his wife on her

cooking. The SMS challenge said "Just like Musa did, give your partner a compliment on something you like about them." In the following call, participants were asked if they completed the previous SMS Challenge.

Participants were instructed not to pick up the call if the timing was not convenient. The system was automated to call the participants back eight times within a span of 24 hours. Participants who did not pick the call were called back as scheduled. Participants could also "flash" the *Beta Life* phone number and receive a call back with the previous call, allowing them to listen from the start, pick up where they left off, or listen to the call again.

METHODOLOGY

STUDY AIMS AND OBJECTIVES

The purpose of the study was to assess how the intended audience engaged with the tool, their perceptions about the tool and its impact on contraceptive-related ideation, intention and behaviors.

The specific objectives of the study were to:

1. Assess if the tool led to an increase in couple communication about FP;
2. Evaluate if there was an increase in couple communication about modern contraceptive methods;
3. Determine if the tool leads to an increase in male partners encouraging their female partners to go to a clinic for a modern contraceptive method; and
4. Assess if the tool led to increased intention to use contraceptives.

STUDY DESIGN AND PROCEDURE

The study utilized a quasi-experimental pre-post design with assessment of relevant outcomes among a cohort of men and women before and after the intervention. The study targets women aged 18 to 35 years and men aged 18 to 45 years in Kaduna City, Nigeria (see "Inclusion Criteria" in Participants section). The research team primarily collected data at two points in time: before and after the intervention; however, data about listening habits was collected automatically by the platform throughout the study. Study participants were married women who were not pregnant nor trying to get pregnant in the next six months, and who were non-users of male or female sterilization or married men whose wife was not pregnant or trying to get pregnant in the next six months, and who were non-users of male or female sterilization. Participants were recruited with the help of trained field agents. Consented men and women were registered to receive the *Beta Life* calls, enabling them to use the digital health tool on their own mobile phones and respond to questions using their numeric keypad. This study did not include a control group; all the participants received the intervention.

SETTING

The setting for this study was North and South Kaduna local government areas (LGAs) of Kaduna State, Nigeria. The two LGAs are urban and make up the Kaduna metropolis. Residents include a mixture of Muslims and Christians although the residents of Kaduna North are predominantly Muslim while Kaduna South is predominantly Christian. Kaduna metropolis includes an estimated total of 1.3 million inhabitants in 2017 and is a melting pot for various Nigerian ethnic groups. While the predominant ethnic group in the city is Hausa, the metropolis also includes a large proportion of Yoruba, Igbo, Fulani, Gbaju and other Nigerian ethnic groups (secondary analysis performed by the lead author of survey data reported in Measurement Learning and Evaluation [MLE], 2016).

The population of the city is relatively well educated by Nigerian standards. Data from a 2015 survey revealed that the majority (78.6%) of the women in the city had post-primary education while one fifth had tertiary education (MLE, 2016). In the same survey, 21.0% of women of reproductive age reported using a modern contraceptive method while 6.5% reported a traditional method.

SAMPLE SIZE AND JUSTIFICATION

The HC3 research team calculated the required sample size based on the proportion of couples who have discussed contraceptive use in the last 12 months. Since this indicator for the study population was not available, the research team assumed it to be 50% since this level provided the maximum variability. The team also assumed that this indicator would increase by 15 percentage points among the couples exposed to the intervention group. Based on these assumptions, the required sample size was 240 respondents for each sex. The recently concluded *Beta Life Smart Client* study in Kaduna city (Babalola et al., 2017) revealed a much higher loss to follow-up than the research team had anticipated. Indeed, of the 401 women recruited into the intervention group only 92 completed the post-study survey, a loss to follow-up of about 77%. For the present study therefore, the team assumed a loss to follow-up rate of 77% and planned to recruit 1,000 married or cohabiting men and 1,000 married or cohabiting women. This number would provide 90% power to detect a difference of 15 percentage points between the pre-study and post-study results in the proportion of couples having discussed FP.

PARTICIPANTS

The participants in the study were **married or cohabiting women** between the ages of 18 and 35 years, who were not pregnant or trying to get pregnant in the next six months, and who were non-users of male or female sterilization; and **married or cohabiting men** between the ages of 18 and 45 years whose wife was not pregnant or trying to get pregnant in the next 6 months, and who were non-users of male or female sterilization.

The specific inclusion criteria for the participants included the following:

- Married or cohabiting
- Aged between 18 and 35 years for women and between 18 and 45 years for men
- Not pregnant (wife not pregnant) or trying to get pregnant in the next six months

- Ownership of a mobile phone
- Residence in Kaduna City
- Fluency and literacy in Hausa

Exclusion criteria for participation include the following:

- Current use of a permanent method such as male or female sterilization
- Inability to use the numeric pad on their cell phone to answer questions
- Inability to respond intelligibly to study questions

PARTICIPANTS' RECRUITMENT

To recruit eligible participants into the study, the team selected three wards from each of the two study LGAs that were not previously involved in the *Beta Life* Smart Client study, for a total of six wards (see Table 2). Note that Kaduna North comprises 12 wards while Kaduna South comprises 13 wards. From each study ward, a total of 84 men and 84 women were recruited.

Table 2: Wards and LGAs for Recruitment of Smart Couple Study Participants

Kaduna North LGA			Kaduna South LGA		
Selected Wards	Selected Localities	Clusters	Selected Wards	Selected Localities	Clusters
Kabala Doki	Kabala Doki	Kabala doki, Costain quarters, sweeping pool road, Kasupda quarters, Police barracks	Tudun Nupawa	Tudun Nupawa	Bakin Dogo, Panteka, Fire brigade, Real church road,
Ungwan Dosa	Ungwan Dosa	Legislative quarters, SMC quarters, Ungwan Kaje, by market	Ungwan Sanusi	Ungwan Sanusi	Police station, Kwanar PRP, Bakin Ruwa
Badarawa	Badarawa	Shagari, Layin Sarki, Ungwan kuriga, by Market area	Makera	Makera	Airforce, General pump, by Secretariat, Dandali, St. Mathew Catholic church area, Makera, Bible society area

HC3 hired male and female field agents that were residents in either Kaduna South or Kaduna North. The male field agents recruited only male participants, while the female field agents recruited both female and male participants. The field agents were fluent in Hausa and were trained to sample one in five of households in the study wards, identify eligible men and women and explain the purpose and method of the study to them. At the point of recruitment, field agents obtained informed consent for

participation in the study. Once consent was obtained, the field agent administered the pre-study survey.

The pre-study survey included questions on respondent's socio-demographic characteristics, contraceptive use behaviors, use of FP services and spousal communication regarding FP and family size desires. After the respondent had received program call 17, he/she was contacted by an interviewer who then returned to administer the post-study survey. The post-study survey included questions on contraceptive use behaviors, use of FP services, spousal communication regarding FP and family size desires, and perceptions about the content of the *Beta Life* program.

Both the pre-study and post-study survey data were collected electronically using a hand-held device. In addition to the survey data, user analytics were collected from the *Beta Life* platform to document user interactions with the platform, including the calls received and when, the duration of each call and responses to quiz questions.

DATA ANALYSIS

Multiple analytic methods are used in this report, bivariate and multivariable analyses. The research team compared relevant outcomes between the groups defined by level of exposure to the tool using differences of proportions or means. For the assessment of the effects of the tool on relevant outcomes, the research team used random effects and fixed effects analyses. Both random and fixed effects regression methods are particularly suited for panel data such as what was collected for this study. For the fixed and random effects regression models, the research team pooled data from the pre-study and post-study and used each participant as their own control to estimate program effects. Fixed effects method assumes that time-invariant unobserved heterogeneity is correlated with the independent variables in the estimated model. Unobserved heterogeneity refers to those variables that do not vary over time, that are correlated with both the dependent and independent variables, and that are excluded from the model. In this sense, unobserved heterogeneity is a form of endogeneity bias, specifically omitted variables bias. Fixed effects model provides a way to control for possible endogeneity of program participation and estimate consistent and possibly efficient parameters in the presence of correlation between the independent variable and unobserved heterogeneity. On the other hand, random effects modeling makes the assumption that time-invariant unobserved heterogeneity is not correlated with the independent variables in the estimated model. If this assumption holds, random effects model produces consistent and efficient estimates. The choice between fixed and random effects model therefore depends on whether or not the assumption of correlation between unobserved heterogeneity and the independent variables in the estimated model. The research team initially estimated both fixed and random effects models for each outcome variable. The research team ran the Hausman test for each model to help decide which was the better model. The Hausman test compares the coefficients in the fixed and the random effects models and assesses the significance of the difference between them. A significant result indicates that the two coefficients are different due to the correlation between unobserved heterogeneity and the independent variable; in this case, fixed effects model should be selected. In contrast, an insignificant Hausman test indicates that the assumption of

correlation between unobserved heterogeneity and the independent variable does not hold; in this case, a random effects mode is the better choice.

ETHICAL CONSIDERATIONS

This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and by the National Health Research Ethics Committee of Nigeria. Every individual gave informed consent prior to their participation in any study related activity. Every participant was made to understand that participation was entirely voluntary and that they could choose not to participate at any time.

After recruitment, each participant was given a gift of detergent worth 400 Naira and airtime worth 100 Naira to provide airtime to flash back after missed calls, equivalent to \$1.16. All participants who listened to any part of the final call were contacted for the post-study survey and given an incentive of detergent and a tablet of laundry or toilet soap worth 1,000 Naira, equivalent to \$2.32, for their participation in the study.

RESULTS

The study took place from June 25, 2017 to August 7, 2017. Once recruited, participants received the call on one day followed by the SMS on the next day. This process repeated until they had received all 17 calls. As such, participants received calls and SMS messages on alternate days.

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

A total of 1,042 women and 1,012 men were recruited and agreed to participate in the pre-study survey. Of these, 670 women and 652 men completed the intervention and participated in the post-study survey, an attrition rate of 35.8% and 36.4% for women and men, respectively. Table 3 compares the socio-demographic characteristics of men and women who participated in the post-study survey and their peers who were lost to follow up. The data showed that the female respondents were, on average, younger, less likely to have tertiary education and had more children than their male counterparts. Overall, both men and women were predominantly Muslim and currently married. It should be noted that the proportion of Muslims in this sample is higher than expected. For example, a large-scale survey conducted in four Nigerian states in 2015, found that 64.0% of the respondents from Kaduna city were Muslims (MLE, 2016). It appears that our study sample is biased towards Muslim residents in Kaduna City rather than the entire population of reproductive age in the city.

Table 3: Socio-demographic characteristics of study participants, by whether or not they participated in the post-study survey, Kaduna 2017

Socio-demographic indicator	Participated in post-study survey	Lost to follow-up: did not participate in post-study survey	All pre-study participants	z (or t)/p for difference between groups
Women				
Mean age in years	28.9	28.5	28.7	0.851/0.395
Percent currently married	99.7	100.0	99.8	1.057/0.290
Percent with tertiary education*	21.5	15.8	19.5	2.230/0.026
Percent Muslim	92.5	94.1	93.1	0.961/0.336
Mean parity	3.21	3.33	3.25	0.894/0.372
Percent resident in Kaduna South	51.4	51.7	51.5	0.100/0.920
Number of Obs.	670	374	1,044	---
Men				
Mean age in years	33.1	32.6	32.9	1.450/0.147
Percent currently married	99.4	98.4	99.1	1.561/0.118
Percent with tertiary education	31.7	29.1	30.7	0.863/0.388
Percent Muslim	97.0	97.3	97.1	0.214/0.831
Mean parity*	2.64	2.35	2.54	2.044/0.041
Percent resident in Kaduna South*	46.6	53.0	48.9	1.961/0.0499
Number of Obs.	652	373	1,025	---

Notes: * $p < 0.05$

Among women, the participants lost to follow up were similar to those that participated in the post-study survey in terms of age, marital status, religion, parity and LGA of residence. In contrast, the women that participated in the post-study survey (21.5%) were more likely to have tertiary education compared to their peers that were lost to follow-up (15.8%). For men, the only difference between those who participated in the post-study survey and their counterparts that were lost to follow up was in terms of parity and LGA of residence. Specifically, male participants in the post-study survey had a larger family size, on average, and were less likely to reside in Kaduna South than their peers that were lost to follow up.

EXPOSURE TO THE DIGITAL HEALTH TOOL

DRAMA

Table 4 summarizes the level of exposure to the various drama episodes for men and women. The data showed that, for both sexes, the majority was exposed to at least one drama episode, either partially or completely. For women the proportion that listened to specific drama episodes partially varied between 48.9% and 77.6%. In contrast, the proportion that listened to specific episodes completely ranged between 37.2% and 50.7%. Proportionally, more women listened to the first four episodes compared to the last few episodes. Exposure was lowest for episode 8, delivered during Call 10. On average, the women listened to 7.7 episodes partially and to 5.9 episodes completely.

Table 4: Exposure to drama segments of *Beta Life* episodes, Kaduna 2017

Episode	Women		Men	
	Listened to any portion	Listened to complete episode	Listened to any portion	Listened to complete episode
Episode 1, Call 2	77.6	49.0	79.1	54.5
Episode 2, Call 3	64.1	50.7	65.1	49.8
Episode 3, Call 4	64.6	50.4	64.8	49.9
Episode 4, Call 5	64.9	49.5	62.9	48.6
Episode 5, Call 6	58.4	46.7	58.4	44.7
Episode 6, Call 7	59.9	48.7	58.2	43.9
Episode 7, Call 9	62.6	46.5	68.2	45.0
Episode 8, Call 10	45.9	37.2	44.8	32.9
Episode 9, Call 11	53.8	44.6	55.6	43.6
Episode 10, Call 13	66.9	46.9	66.9	44.0
Episode 11, Call 14	53.8	43.4	50.3	38.5
Episode 12, Call 15	48.9	41.9	46.6	38.4
Episode 13, Call 15	50.8	38.6	50.0	36.6
% Heard at least one episode	89.6	85.4	92.5	87.7
Mean Number Heard (range 0-13)	7.7	5.9	7.7	5.7

The listening patterns were similar for men. Between 44.8% and 79.1% listened to any portion of specific episodes, while between 32.9% and 54.4% completely listened to specific episodes. As observed for women, earlier episodes attracted a higher rate of listenership compared to the latter ones. Again, episode 8 was the least likely for the men to have listened to. On average, the men listened to any portion of 7.7 episodes while average number of episodes they listened to completely was 5.7.

SMS CHALLENGES

Table 5 provides an overview of the exposure to the SMS challenges, which were sent to all participants following each “regular” call. The data were obtained directly from the *Beta Life* platform. The SMS

challenges provided a prompt for the recipient to use in starting up a conversation with their partner. The number of participants reached with the SMS challenges ranged from 68% to 72%. There were multiple reasons for the slight variation in the sample reached by the SMS challenges, including issues both with the network operators and with the platform throughout the study. One particular issue that was discovered during the study was related to a “do not disturb” list which at least 330 participants were subscribed to with their mobile network operator (MNO). The platform and study team were not able to remove participant’s number from this list during the course of the study.

Table 5: Exposure to SMS challenges (Data from the *Beta Life* Platform)

Call	Total targeted through SMS by platform	Number of SMS that failed	Number of SMS that reached	% that received the SMS message reached
2	2,073	616	1,457	70.3%
3	2,073	616	1,457	70.3%
4	2,073	616	1,457	70.3%
5	2,072	635	1,437	69.4%
6	2,069	628	1,441	69.6%
7	2,067	642	1,425	68.9%
9	2,060	638	1,422	69.0%
10	2,060	644	1,416	68.7%
11	2,059	650	1,409	68.4%
13	2,059	650	1,409	68.4%
14	2,060	653	1,407	68.3%
15	2,060	635	1,425	69.2%
16	2,060	604	1,456	70.7%
17	2,007	558	1,449	72.2%

The majority of the women and men reported that they performed at least one of the SMS challenges sent out by the platform (Table 6). Nonetheless, less than half of the participants reported performing any specific challenge. The average number of challenges performed was 4.7 for women and 4.5 for men.

PERSONAL STORIES AND SAMPLE DIALOGUES

In addition to the drama episodes, many study participants also listened to other components of the tool, including personal stories and sample dialogues, and they also received the SMS challenges. Information on exposure to these components is presented in Table 6. More than two-thirds of women and a little over three-fifths of men listened to at least one personal story. However, less than one third of the men and women listened to any specific personal story. The personal stories in the first four calls were the ones the men and women were most likely to have listened to, while proportionally fewer men and women listened to the personal stories in Call 10 and the last four calls. On average, women and men listened to an average of 2.7 and 2.5 personal stories, respectively.

Table 6: Exposure to personal story and sample dialogue segments of *Beta Life digital health tool*, Kaduna 2017

Episode	Women			Men		
	SMS Challenge	Personal Story	Sample Dialogue	SMS Challenge	Personal Story	Sample Dialogue
Call 2	---	29.3	18.6	---	24.3	13.9
Call 3	31.9	28.7	7.2	35.2	23.5	6.8
Call 4	39.2	22.6	17.0	41.8	16.9	18.1
Call 5	41.9	31.7	18.0	39.7	21.8	15.5
Call 6	32.9	17.8	20.8	32.1	16.0	14.5
Call 7	37.6	18.2	17.8	37.0	10.8	11.0
Call 8	34.4	---	---	31.0	---	---
Call 9	---	19.6	10.0	---	17.7	6.1
Call 10	33.8	12.3	0.5	31.9	9.5	0.8
Call 11	40.0	19.7	13.7	38.1	12.5	8.9
Call 12	37.4	---	--	31.7	---	---
Call 13	---	16.8	18.7	---	14.0	10.3
Call 14	36.7	20.5	9.2	32.5	13.9	5.2
Call 15	33.7	19.7	16.0	31.4	12.7	12.4
Call 16	34.3	15.2	13.7	33.0	11.7	13.7
Call 17	35.9	---	--	36.0	---	--
Completed at least one element	76.6	69.0	62.9	80.0	62.4	52.3
Mean Number Heard /Done	4.70	2.7	1.8	4.5	2.5	1.4

Proportionally more women (62.9%) than men (52.3%) were exposed to at least one of the sample dialogues. Less than one quarter of the women and less than one fifth of the women listened to any specific sample dialogue. As observed for the personal stories, for both women and men, exposure was lowest for the sample dialogue included in Call 10. The average number of sample dialogues to which the study participants were exposed was 1.8 for women and 1.4 for men.

AVERAGE DURATION ON CALLS

Another way of gauging participants' level of engagement with the *Beta Life* tool is to examine the amount of time spent on each call. The information is summarized on Table 7 for men and women. A sizable number of women (between 14.7% and 27.4%) and men (between 9.4% and 20.8%) did not listen to specific calls. Note that the time spent listening to the calls depends on the programmed duration of the call and how much of the call content the study participants actually listened to. It is therefore not surprising that the average listening varied significantly by call. For women, the average listening time varied between 2.11 minutes for Call 8 (quiz call) and 8.80 minutes for Call 3 (regular call). For men, the average listening time varied between 1.81 minutes for Call 12 (quiz call) and 7.48 minutes for Call 3 (regular call). The overall mean listening time was 5.42 for women and 4.48 minutes for men.

Table 7: Average duration (in minutes) of listening to specific program calls, women and men, Kaduna 2017

Call	Women		Men	
	N	Average listening time in minutes	N	Average listening time in minutes
Call 1	879	3.55	929	3.73
Call 2	890	7.25	910	6.17
Call 3	881	8.80	917	7.48
Call 4	851	5.81	897	5.04
Call 5	855	5.46	884	4.57
Call 6	843	6.59	875	5.48
Call 7	831	6.94	854	5.19
Call 8	815	2.11	857	1.89
Call 9	781	6.00	836	4.96
Call 10	798	4.45	848	3.83
Call 11	790	5.41	839	4.25
Call 12	800	2.13	855	1.81
Call 13	796	5.43	848	4.27
Call 14	776	5.79	816	4.26
Call 15	780	5.19	820	4.04
Call 16	758	6.18	812	5.17
Call 17	766	5.12	838	3.98
Mean duration per call	5.42		4.48	

OVERALL EXPOSURE

To assess the intensity of exposure to the digital health tool, the research team computed an exposure index by combining the measures of exposure to the various components of the tool: drama series, personal story, sample dialogue, and SMS challenge. The resulting index varied between zero and 49 for men with a mean of 14.1; and for women, the index varied between zero and 48 with a mean of 15.2. One-tenth of men and 13.0% of women had a score of zero on this measure, indicating that these participants did not complete any of the drama episodes, personal stories, sample dialogues or SMS challenges. The index was significantly higher for men than women ($t=2.190$; $p<0.05$).

Table 8 presents the results of a multivariable linear regression estimated to assess the correlates of intensity of exposure for men and women, separately. For women, the variables that significantly predicted exposure are follow-up status, pre-study contraceptive use and, to a limited extent, the ward of residence. Specifically, the women who participated in the post-study survey scored an average of 7.16 points more than their peers that were lost to follow up. Similarly, pre-study use of modern contraceptive methods was associated with increased exposure. The differences among wards were only marginally significant. For men, the significant predictors were education, ward of residence and follow-up status. Men with higher education had a higher level of exposure than their peers with lower education. Furthermore, the men that participated in the post-study survey were better exposed than those that were lost to follow up. The differences across wards were such that compared to the men residing in Badarawa, the residents of all the other wards had a lower level of exposure, on average. The reason for this is not clear.

Table 8: Results of the regression of intensity of exposure on selected participants' characteristics; women, men; Kaduna 2017

Socio-demographic Characteristics	Women (n=1,044)	Men (n=1,025)
Education Level		
Secondary or Lower (RC)	0.00	0.00
Tertiary	0.496 (0.876)	1.653* (0.742)
Age in single years	-0.057 (0.081)	-0.055 (0.067)
Ward of Residence		
Badarawa (RC)	0.00	0.00
Kabala Doki	0.465 (1.164)	-3.397** (1.136)
Makera	-1.859‡ (1.127)	-2.758* (1.148)
Tudun Nupawa	-0.318 (1.161)	-3.494** (1.151)
Ungwan Dosa	-0.777 (1.173)	-0.581 (1.116)
Ungwan Sanusi	-0.605 (1.161)	-6.003*** (1.117)
Follow-up Status		
Lost to follow-up (RC)	0.00	0.00
Interviewed at Post-study	7.160*** (0.697)	4.700*** (0.689)
Pre-study use of modern contraceptive method		
Not using (RC)	0.00	0.00
Using	1.869** (0.705)	-0.604 (0.738)
Explained Variance	10.4%	8.74%

Notes: ‡ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Standard errors in parentheses.

The majority of the women (91.2%) and men (96.7%) who accessed the digital health tool reportedly discussed the content of the tool with their spouse. Furthermore, almost all the study participants (97.0% of women and 97.1% of men) found navigating the digital health tool very easy. In the same vein, four-fifths of women (79.4%) and men (80.1%) agreed that the content of the tool was both entertaining and educational.

EFFECTS OF THE DIGITAL HEALTH TOOL ON RELEVANT OUTCOMES

The research team assessed the effects of the tool on selected ideational and behavioral outcomes. The outcome examined include the following:

1. Giving consideration to desired family size
2. Discussion of FP with spouse in last six months
3. Discussion of FP methods with spouse in last six months
4. Discussion of visiting a FP provider with spouse in last six months
5. Discussion of family size with spouse in last six months
6. Support for contraceptive use
7. Intention to use a contraceptive method in next 12 months
8. Currently using any contraceptive method
9. Currently using a modern contraceptive method

Two types of analyses are reported in this section: bivariate analyses (unadjusted proportions and their variations over time) and fixed effects analyses. All analyses focus only on men and women that were interviewed at post-study. Table 9 compares the prevalence of the various outcomes at pre-study and post-study for men and women.

Results of the bivariate analyses (Table 9) showed that almost all the indicators had improved significantly between the pre-study and the post-study. The only exception to this general trend was giving thought to desired family size for women. The score for ideation (an index derived from the six ideational variables assessed in this report) increased significantly for women from 2.7 points at pre-study to 4.1 at post-study, and for men from 2.6 to 4.2.

Table 9: Percent of men and women reporting specific ideational and behavioral outcomes, pre-study and post-study; participants interviewed at post-study survey.

Outcome Indicator	Women		Men	
	Pre-study	Post-study	Pre-study	Post-study
Percent that already thought of family size	31.9	29.0 ^{ns}	32.8	39.6*
Percent that discussed FP with spouse in last six months	58.2	91.6***	55.4	91.9***
Percent that discussed FP methods with spouse in last six months	50.6	89.4***	46.9	86.5***
Percent that discussed visiting a FP provider with spouse in last six months	50.1	78.1***	45.9	82.1***
Percent that discussed family size with spouse in last six months	45.4	64.3***	44.5	69.8***
Percent that support contraceptive use	37.5	53.0***	36.5	50.5***
Score for ideation (range: 0 – 6)	2.7	4.1***	2.6	4.2***
Percent (of current non-users) that intend to use a contraceptive method in next 12 months	33.4	60.6***	46.4	63.1***
Percent currently using any contraceptive method	39.4	55.2***	37.0	51.2***
Percent currently using a modern contraceptive method	35.8	50.0***	35.3	41.3*

*Significance of difference between pre-study and post-study: *** p<0.001, * p<0.05, ns not significant*

The multivariable regression results are presented in Table 10. Depending on the result of the Hausman test, the report presents either the fixed effects or the random effects. The research team also reported the marginal effects associated with the fixed or random effects. Note that the marginal effects depict what the change in outcome would have been if everyone in the sample had a higher exposure. The results confirmed what the bivariate analyses suggested. Overall, exposure to the tool was associated with a significant increase in the score for ideation. Indeed, the marginal effects of a higher level of exposure to the tool were 1.22 points for women and 1.49 points for men.

Table 10: Results of random/fixed effects analysis of the relationship between exposure to the *Beta Life* digital health tool on selected ideational and behavioral outcomes.

Outcome Indicator	Random/Fixed Effects OR/Regression Coef.	Marginal Effects OR
Women		
Thought of family size ^{a, c}	0.794 (0.129)	-0.037 (0.006)
Discussed FP with spouse in last six months ^{b, c}	10.000*** (2.909)	0.474*** (0.048)
Discussed FP methods with spouse in last six months ^{b, c}	9.118*** (2.329)	0.457*** (0.042)
Discussed visiting a FP provider with spouse in last six months ^{b, c}	4.031*** (0.796)	0.314*** (0.037)
Discussed family size with spouse in last six months ^{b, c}	2.609*** (0.452)	0.157*** (0.025)
Expressed support for contraceptive use ^{a, c}	2.879*** (0.520)	1.034*** (0.007)
Score for ideation ^{b, d}	1.216*** (0.115)	1.216*** (0.115)
Intention to use a contraceptive method in next 12 months among current non-users ^{a, c}	2.444*** (0.631)	0.137*** (0.037)
Current use of any contraceptive method ^{a, c}	2.814*** (0.517)	0.151*** (0.025)
Current use of modern contraceptive methods ^{a, c}	2.446*** (0.423)	0.135*** (0.025)
Men		
Thought of family size ^{a, c}	1.101 (0.145)	0.021 (0.029)
Discussed FP with spouse in last six months ^{b, c}	12.727*** (3.985)	0.511*** (0.506)
Discussed FP methods with spouse in last six months ^{b, c}	11.923*** (3.443)	0.499*** (0.046)
Discussed visiting a FP provider with spouse in last six months ^{b, c}	8.000*** (2.000)	0.436*** (0.042)
Discussed family size with spouse in last six months ^{b, c}	2.702*** (0.461)	0.233*** (0.036)
Expressed support for contraceptive use ^{a, c}	1.944*** (0.279)	0.137*** (0.028)
Score for ideation ^{b, d}	1.489*** (0.127)	1.489*** (0.127)
Intention to use a contraceptive method in next 12 months among current non-users ^{a, c}	1.437* (0.240)	0.088* (0.040)
Current use of any contraceptive method ^{a, c}	1.935*** (0.280)	0.135*** (0.028)
Current use of modern contraceptive methods ^{a, c}	1.357* (0.196)	0.060* (0.028)

Notes: ^a Results from random effects model; ^b Results from fixed effects model; ^c Binary dependent variable estimated using xtlogit in Stata; ^d Discrete dependent variable estimated using xtreg in Stata; Significance of difference between pre-study and post-study: *** $p < 0.001$, * $p < 0.05$; OR – Odds Ratio; Standard Error in parentheses

The results for each outcome are described in the following paragraphs.

1. Giving consideration to desired family size

Unlike what was observed for all the other ideational variables, exposure to the tool did not significantly change the extent to which the respondents thought about their desired family size. At post-study, the percent that had thought about family size decreased an insignificant amount for women (31.9% at pre-study, to 29.0% at post-study), and increased only slightly, from 32.8% to 39.6%, among men. The multivariate regression results indicate similar effects, with there being very little difference in the odds of giving consideration to desired family size with lower or higher exposure to the tool.

2. Discussion of FP with spouse in last six months

At post-study, 91.6% of women and 91.9% of men reported that they had discussed FP with their spouse in the last six months, increasing from 58.2% and 55.4% at pre-study, respectively. The multivariable regression results indicate that, compared to lower exposure level, higher exposure increased the odds of discussing FP with one's spouse ten-fold for women and more than 12-fold for men. If everyone in the sample had a higher exposure level, the probability of discussing FP with one's husband would have increased by 47.4 percentage points for women and 51.1 percentage points for men.

3. Discussion of FP methods with spouse in last six months

Similarly, the vast majority of the men and women (86.5% and 89.4%, respectively) reported discussing FP methods with their spouse at post-study. Higher exposure was associated with more than a nine-fold increase for women and almost 12-fold increase for men in the odds of discussing contraceptive methods with a spouse. The average marginal effects were 45.7 and 49.9 percentage points for women and men, respectively.

4. Discussion of visiting a FP provider with spouse in last six months

At pre-study, half of women and slightly less than half of men reported discussing visiting a FP provider with their spouse; however, by post-study those numbers had increased to 78.1% of women and 82.1% of men. A higher level of exposure to the tool was associated with an eight-fold increase for women and a four-fold increase for men in the odds of discussing the need to visit a FP provider with one's spouse. The average marginal effects were 43.6 percentage points for women and 31.4 percentage points for men.

5. Discussion of family size with spouse in last six months

While there were insignificant changes in the proportion of participants who had given thought to family size, the number that discussed family size with their spouse was slightly higher and did increase significantly from pre-study to post-study – from 45.4% to 64.3% among women and from 44.5% to 69.8% among men. Exposure to the tool was also associated with increased discussion of desired family size with one's spouse. Compared to lower level of exposure, a higher exposure level increased the odds of discussing family size by 170% for women and by

161% for men. The associated marginal effects were 23.3 percentage points for women and 22.6 percentage points for men.

6. Support for contraceptive use

Whereas the proportion reporting supporting contraceptive use has increased significantly since pre-study, only about half of the men and women reported this attitude at post-study – 50.5% and 53.0%, respectively. Furthermore, higher exposure to the digital health tool increased support for women who used contraceptives, by 94% for women and by 188% for men. These numbers translate to marginal effects of 13.8 percentage points for women and 15.7 percentage points for men.

7. Intention to use a contraceptive method in next 12 months

The percent of current non-users who reported intending to use a contraceptive method in the next 12 months nearly doubled for women (from 33.4% to 60.6%) and increased significantly for men (from 46.4% to 63.1%). Among current non-users, a higher level of exposure increased the odds of intention to use by 144% (marginal effects of 13.7 percentage points) for women and by 43.7% (marginal effects of 8.8 percentage points) for men.

8. Currently using any contraceptive method

Following the study, over half of all participants (both men and women) reported currently using any contraceptive method, which was a significant increase from the pre-study survey. For women, higher exposure increased the odds of using any method almost three-fold; the associated marginal effect was 15.1 percentage points. For men, a higher level of exposure increased the odds of using any method by 93.5% (marginal effects: 13.6 percentage points).

9. Currently using a modern contraceptive method

The proportion of all participants who reported currently using a modern contraceptive method increased significantly from pre-study to post-study – from 35.8% to 50.0% for women, and from 35.3% to 41.3% for men. For women, higher exposure increased the odds of using a modern method more than two-fold; the associated marginal effect was 13.5 percentage points. For men, a higher level of exposure increased the odds of using a modern method by 35.7% (marginal effects: 6.0 percentage points).

CONCLUSIONS AND LESSONS LEARNED

CONCLUSIONS

The *Beta Life* Smart Couple digital health tool is a potentially effective device for promoting positive contraceptive attitudes and supportive partnerships, as well as for encouraging women and men to adopt a contraceptive method. The tool has the potential to contribute to increasing contraceptive prevalence and reducing unmet need for contraceptives in Nigeria. However, in its current format and in the approach of implementation, the tool needs to be modified to achieve its objectives. The limitations

are connected with the number and length of program calls and its requirement for literacy and numeracy skills in low literate settings.

LESSONS LEARNED

The lessons learned from this study fall into two categories: **tool development and implementation;** and **evaluation of effects.**

Tool development and implementation lessons learned:

- During the pretesting of the tool participants expressed their interest in more content; however, analysis of listening patterns during this study indicate that most participants did not listen to additional segments of the calls. This gap between expressed interest and actual listening patterns has important implications for the design of the calls. Program implementers of future adaptations of the tool could consider trimming down the content, eliminating segments or splitting up the segments into separate calls, so that the calls are not so long.
- There were some unanticipated problems with IVR platform, particularly the delivery of SMS messages to all participants due to a “do not disturb” list from the MNO. As a result, 330 participants did not receive any of the SMS Challenges. One member of the local research team attempted to remove his phone number from the list, but these attempts were unsuccessful, so it was accepted that some participants would not have been exposed to the couple communication prompts. More intensive testing of all the features of the IVR platform may have revealed the problem earlier; however, there was still not a workable resolution for the issue.
- There were noticeable differences in the listening patterns of men and women, with men being more likely to skip to the conclusion segment rather than listening to the optional segments, and women being more likely to listen to the optional segments without completing the call. These differences may point to the need for differently structured tools for men and women. For example, the male content could be programmed to play immediately after the drama without being an optional segment.

Lessons learned regarding the evaluation of the effects of the tool:

- Conducting the pre-study and post-study surveys through face-to-face interviews resulted in a much higher response rate than what HC3 had in the Smart Client study, in which the surveys were done through the IVR platform.

RECOMMENDATIONS

In view of the findings of this study, the following recommendations are relevant:

- The positive results about the effects of the tool on relevant outcomes indicate that the tool may be made widely available to women and men of reproductive age in Nigeria. However, it should be noted that the tool requires numeracy skills and an appreciable level of comfort using

the telephone keypad. The tool can be challenging for people with little or no education or those who are visually impaired. Unfortunately, the number of women and men in those categories is not negligible in some parts of Nigeria. These women and men are often the most in need of contraceptive information and services, and most of them have personal mobile phones. Therefore, efforts to make the tool accessible to them are relevant. By eliminating the need for listeners' input during the calls, the tool may be made more accessible to these women and men.

- In addition to the numeracy skills, the SMS challenge requires literacy skills, which can likewise be challenging for people with little or no education or those who are visually impaired. While users still receive the key messages without the SMS challenge messages, the SMS challenges do reinforce the messages through a “small doable action,” helping users put into practice what they are learning. It may be possible to deliver this content as an audio message where literacy levels of the audience are a major issue.
- A sizable number of women (between 14.7% and 27.4%) and men (between 9.4% and 20.8%) did not listen to specific calls, and the calls with the greatest number of listeners were at the beginning of the series. Efforts to scale-up the tool should consider ways of minimizing attrition. For example, ways of considerably reducing the number of program calls should be explored. Based on the averages of segments listening to content, future users may want to reduce to five drama episodes, two personal stories and one sample dialogue, with a maximum of four minutes per call.
- Of those participants who did listen to the calls, women listened for an average of 5.42 minutes and men for an average of 4.48 minutes, indicating that they did not listen to much of the content in the calls. For this reason, implementers of future adaptations of the tool could consider ways to reduce the length of each call, such as by featuring only one category (e.g. drama, personal story, sample dialogue or male content) instead of all four, or offering all four categories and allowing participants to select which category they will listen to for all calls.
- The optimal frequency of the calls should be further tested to minimize attrition due to time demands of using the tool. While testing the Smart Client tool, users indicated their preference for receiving the calls two to three times per week and the “twice per week” option was the most popular frequency selected by participants in the Smart Client user study. In addition, users/participants previously indicated their preference for receiving the calls on the weekends since that is when they have more free time.

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