

Utilizing perspectives from HIV-infected women, male partners and healthcare providers
to design family planning mobile health messaging in Kenya: a qualitative study

Karren Lewis

A thesis
submitted in partial fulfillment of the
requirements of for the degree of

Master of Public Health

University of Washington

2017

Committee:

Jennifer Unger

Grace John-Stewart

Gabrielle O'Malley

Program Authorized to Offer Degree:

School of Public Health

©Copyright 2017

Karren Lewis

University of Washington

Abstract

Utilizing perspectives from HIV-infected women, male partners and healthcare providers to design family planning mobile health messaging in Kenya: a qualitative study

Karren Lewis

Chair of Supervisory Committee:

Dr. Jennifer Unger

OBGYN, Global Health

Short messaging systems (SMS) present an opportunity to expand the reach of clinical care and improve reproductive health outcomes. SMS could reduce unmet need for family planning (FP) through education, support and demand generation. However the best approach for using SMS to increase FP has not been demonstrated and content of messaging may be critical. We conducted focus group discussions with HIV-infected women, in-depth interviews with male partners of HIV positive women, and with health care workers (HCWs) at one urban and two rural clinics in Kenya to design SMS message content for a larger trial. Many women and men felt SMS could be used as a tool to discuss FP with their partners, and help decrease misconceptions about FP by repeat exposure to validated information. Women felt that SMS enabled them to be more comfortable discussing sensitive topics and lessened power differentials with partners and HCWs compared to in-clinic discussions of FP. However, many women expressed concerns about FP SMS given covert FP use and potential for partner disapproval. This was often found among women who had not disclosed their HIV status and had similar misgivings about overt HIV messages. Providers felt SMS was an important tool for appointment reminders, tracking patients and clinical triage. However,

SMS was not viewed as able to replace clinical visits, especially around FP counseling and options. Our findings suggest that SMS messaging could be a powerful tool to facilitate communication within partner and potentially facilitate provider discussion around FP.

Introduction

Providing quality family planning (FP) counseling and service delivery remains a major challenge to achieving appropriate levels of FP uptake for many areas in Sub-Saharan Africa. This is critically important among HIV positive women of reproductive age who account for the largest proportion of HIV infected individuals in Kenya ((National AIDS and STI Control Programme (NASCO), 2014). In Kenya, the overall unmet need for FP is 17.5% (Kenya National Bureau of Statistics & ICF Macro, 2015) and higher, 20.2%, among HIV positive women (Macquarrie, 2015; National AIDS and STI Control Programme (NASCO), 2014), demonstrating that improved systems to meet the FP needs of HIV positive women are needed (Macquarrie, 2015). HIV positive women face similar challenges to FP use and access (Imbuki, Todd, Stibich, Shaffer, & Sinei, 2010) as HIV negative women, but also have unique circumstances around prevention of mother to child transmission (PMTCT), issues related to discordant partners, the need for dual contraceptive use (Laher et al., 2009), as well as concerns around drug interactions with antiretroviral therapy (ART) (Laher et al., 2009; Todd et al., 2011). Given these additional barriers it is important to develop counseling and education strategies that integrate FP and HIV concerns.

Previous work has shown that HIV positive women have many of the same concerns around FP as uninfected women with regards to their partner's potential disapproval (Wanyenze et al., 2013), fertility desires (Nattabi, Li, Thompson, Orach, & Earnest, 2009; Nieves et al., 2015) and concerns about side effects. Additionally they have HIV specific concerns that can limit the use of contraception (Imbuki et al., 2010). Male partners also share concerns regarding ways in which HIV intersects with FP and are most likely to choose condoms based on their understanding of risks related to HIV and the need for dual protection (Harrington et al., 2015; Wanyenze et al., 2013). Integration of FP into HIV services has been successful in improving access and uptake

of FP among HIV infected individuals (Lopez, Grey, Chen, Denison, & Stuart, 2016), and offers an opportunity to involve men in the discussion of FP (Harrington et al., 2015; Newmann et al., 2013; Onono et al., 2015; Steinfeld et al., 2013). Despite this improvement, unmet need remains high in this population. Thus, it is necessary to design novel approaches to FP counseling, support and care delivery among HIV positive women. In settings where there are health worker shortages and limited patient clinic time, mobile health (mHealth) solutions have been shown to be effective for supplementing clinical care and improving health outcomes among HIV infected individuals (Lester et al., 2010) and could potentially be used toward improving FP outcomes in this population.

The use of mobile phones worldwide has grown exponentially particularly in low to middle income countries (Communications Authority of Kenya, 2016). Additionally, cell phone coverage is able to reach remote areas, including over 90% penetration in Kenya (Communications Authority of Kenya, 2016). Mobile technology offers the unique potential to expand health services to people living in remote regions with minimal cost or additional burden to current health workers (Mushamiri, Luo, liams-Hauser, & Ben Amor, 2015). While mHealth has been widely accepted as useful for appointment reminders and education among HIV positive populations, (Albino et al., 2014; Cormick et al., 2012; Jennings, Ong'ech, Simiyu, Sirengo, & Kassaye, 2013) few of these projects have incorporated messaging related to FP. In general mHealth studies related to FP are limited and showed insufficient evidence for effect on adherence or use (Smith, Gold, Ngo, Sumpter, & Free, 2015). Most studies have focused on health promotion or education (Ippoliti & Engle, 2017) and demonstrated acceptability and feasibility of using SMS for FP education, but they have not yet shown impact on FP usage (Johnson, Juras, Riley, Chatterji, & Sloane, 2017). The best mHealth approach to facilitate uptake and long-term use of FP has not yet been determined. We hypothesize that incorporating FP messaging into a larger HIV short message system (SMS) strategy

for young women would, improve integration of clinical care, provide efficiencies in messaging and present a more holistic approach to healthcare for this population. Additionally, we wanted to design an mHealth approach that was culturally appropriate and designed by targeted end-user community.

Prior to initiating a randomized controlled trial (RCT) to determine the effect of tailored 1-way SMS versus 2-way SMS dialogue on adherence to antiretroviral therapy (ART) (Option B+) and retention in care, (Drake et al., 2017) we conducted a formative study to understand the perspectives of HIV-positive women, their partners and health care workers (HCW) regarding the use of SMS to support adherence and retention in HIV care as well as support of FP and other maternal and child health (MCH) outcomes. The objectives of this study were to investigate participant perceptions regarding the use of SMS to facilitate uptake of FP, to design FP focused SMS messages for the trial and explore provider opinions for using SMS in this population.

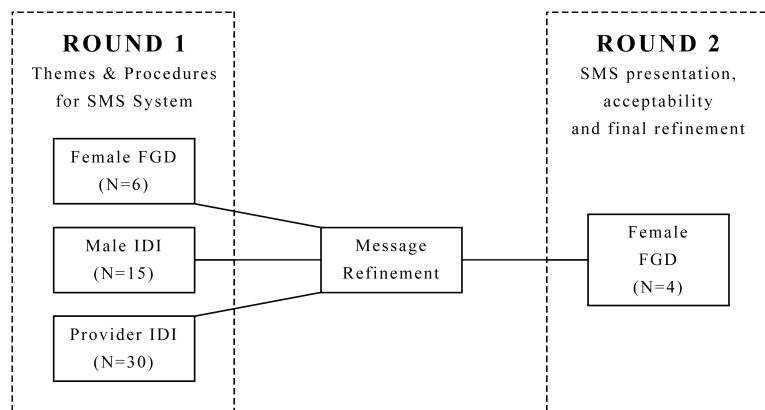
Methods

Study Setting

This study was conducted as the formative phase of the Mobile WACH-X RCT in Kenya (Drake et al., 2017). The aim of the trial is to evaluate the use of SMS to optimize maternal ART adherence and retention in care among pregnant and postpartum women in Kenya. This formative work was designed to inform SMS development and messaging strategies. Participants were recruited from three public sector MCH clinics: Mathare North City Council Clinic, Bondo District Hospital and Ahero sub-District Hospital. These sites have a large volume of MCH clients with 30-40 new antenatal care visits each week and a high HIV burden with a prevalence of 15-19%. This selection of clinics provided a sample from both rural (Ahero and Bondo) and peri-urban (Mathare) settings. Human subject approval for this study was obtained from both the University of

Washington (Institutional Review Board) in Seattle, Washington and Kenyatta National Hospital (Ethics Review Committee) in Nairobi, Kenya.

Figure 1: Schematic of formative phase interviews and message refinement



Participants and Data Collection

Female focus group discussions (FGDs)

Women were recruited from existing mentor mothers’ support groups at each clinic. Female participants were purposively selected to include women based on pregnancy/postpartum status and with varying levels of experience with HIV treatment including for PMTCT only, ART and no HIV medication (Table 1). Each FGD included women from each type of HIV experience.

Table 1. HIV experience among female FGD participants

Site	HIV Experience		
	ART more than PMTCT	ART for PMTCT	Never used ARV
Ahero	14	5	5
Bondo	24	0	1
Mathare	22	14	2
Total	60	19	8

Study staff approached women attending the clinic to participate in the study and it was explained that HIV disclosure within the group was necessary to participate in the

FGD. Women signed written informed consent and completed a short sociodemographic survey prior to FGD. Two rounds of FGDs (N=87 participants) took place in each study location with groups conducted in English, Swahili and Luo (Figure 1). In the first round of the FGDs a trained and experienced qualitative research facilitator used a semi-structured guide to address topics such as challenges in HIV and MCH care utilization, medication adherence, and family planning. She also explored themes for additional messaging, concerns about disclosure and message security and challenges with SMS. The facilitator also distributed drafted SMS to participants to elicit feedback and facilitate discussion of these topics. The drafted message topics included medication adherence, general encouragement, visit reminders, iron therapy, birth preparation, FP and infant health. The information from these FGDs was used to refine the SMS messages and draft new messaging. In round 2, the facilitator presented new sample messages to explore comprehension, acceptability and finalize the SMS content. Each participant received a transport reimbursement.

Male in-depth interviews (IDIs)

Male participants were recruited using two sampling approaches. First, female FGD participants were asked to refer their male partners. Men referred by partners included both HIV infected and uninfected individuals. Second, study staff approached men attending HIV clinics at the three study sites and recruited those who had a current HIV infected partner. Each participant completed written informed consent as well as a baseline sociodemographic survey prior to IDI. Each site recruited 5 men (N=15). Interviews were conducted by the same qualitative facilitator and addressed the comprehension and acceptability of previously described drafted SMS, the involvement of the male's partner in SMS programs primarily targeting women, use of SMS to discuss sensitive topics such as HIV and FP and general concerns about SMS communication.

Provider IDIs

Key members of various provider groups, including nursing officers, MCH nurses, clinical officers, pharmacists, peer counselors and mother-to-mother counselors, were recruited to participate. Each participant provided written informed consent and participated in a standardized survey prior to IDI. Sites recruited 10 providers each (N=30). Topics discussed were the current provider challenges to HIV and MCH care, the use of SMS to increase clinic attendance and retention in care, provide HIV education, and communicate of sensitive topics such as FP.

Data Analysis

The interviews were transcribed from audio recordings and translated into English when necessary. Interview transcripts and survey data were analyzed in Dedoose (Dedoose Version 7.5.17, 2017). Two investigators (KL and EH) coded each set of transcripts (female FGDs, male IDIs, and provider IDIs). After independently reading the original transcripts, they developed an initial list of codes for each transcript set. These preliminary codebooks, along with an open coding process to incorporate emerging thematic codes, were used to code five transcripts in each set; EH and KL then compared codes and developed revised codebooks for each set of transcripts. The final codebooks were reviewed with the senior qualitative expert on the Mobile WACH X team (GO). All transcripts were then coded or re-coded, and EH and KL met to compare code application, check for consistency in how codes were used, and reach consensus.

Textual data was then grouped by code and transcript set to allow for comparing and contrasting themes across FGDs and IDIs. Overarching themes in the data were synthesized into memos, or thematic summaries. Memos were then critically reviewed by members of the Mobile WACH X team to further refine emerging concepts.

Results

Participants

Women who participated in the FGDs were young (median age 26 years (interquartile range [IQR]: 23-31.5 years), and predominantly in monogamous partnerships (n=57, 66%). A majority of female participants received at least some primary education (n=86, 99%) and most of them had experience with ART including PMTCT (n=79, 91%). Men were a median age of 37 years (IQR 33-43 years) and most lived with their current partner (n=14, 93%). A majority of men received at least some primary education (n=11, 73%). Most men were HIV positive (n=12, 80%) with all of those having experience using ART. A variety of health providers were interviewed who had a median of 6 years in clinical practice (IQR: 4-15 years). (Table 2)

Table 2: Participant Characteristics

	Women (n=87)	Men (n=15)	Providers (n=30)
Site= n			
Ahero	24	5	10
Bondo	26	5	10
Mathare	37	5	10
Demographics			
Age median, years, (IQR)	26 (23-32)	37 (33-43)	36 (31-43)
In relationship= n (%)	75 (86)	15 (100)	28 (93)
Married n (%)	70 (80)		27 (90)
Education			
Less than primary	23 (26)	3 (20)	
At least primary	43 (49)	8 (53)	
Secondary or above	20 (23)	4 (27)	
Pregnant	30 (34)		

Perceptions of SMS for FP

Women and men were generally in favor of SMS for increasing knowledge, dispelling myths and empowering women to start FP. *“[If] you send SMS I can know that family planning is good for my health especially now that I know my status I should plan my family” (21yo married woman, Ahero).*

Most women viewed SMS as tool to educate their partners about FP options, although there was some concern among women who had not disclosed their HIV status. The ability of SMS to reach both partners was seen as helping to place responsibility for FP on both women and men equally, and to help dispel many of the common misperceptions for both men and women. *“[If] you want to use family planning then you should educate yourselves with your husband so that none of you get surprised” (39 yo married woman, Ahero).*

Women stated it was important for both men and women to receive women’s health-related SMS messages because they could help to clarify messages from the clinic visit as most of the men do not attend. SMS was a way women could deliver important information to their partner to help improve health decisions.

I think it [SMS] can be sent because it is good even the spouse would understand it [IUCD], it is easy to put, it takes many years, it easy to remove and at any time it is good if he sees that it can be removed easily, I think that it is good (30yo married woman, Bondo).

Women also note that SMS offered a level of anonymity that allowed them to discuss sensitive issues and overcome conventional power dynamics around gender and status to improve the overall quality of patient-provider relationships.

[Sending] messages can be easier to tell my story. [Some] things are difficult to just face someone and tell them, like you can find it hard to tell the

doctor that your husband has refused to use condom... [Obviously] if you meet a male doctor you cannot tell him. [Even] if you have problems with your breast or private parts you will have problems telling the doctor of opposite sex, but through SMS you can tell him... easily and you will get help (23 yo married woman, Mathare).

All groups mentioned the sharing of SMS, referring to either the woman showing the SMS to their partners, or the messages being sent to both partners as an educational opportunity but also a challenge in message design. There was no consensus for the use of names in the messages, however several participants noted that use of names in messaging provided clues about disclosure status. *"[The] one that mentions only Rose, I think it is because she hasn't disclosed to her husband and those that talk about Rose and John it's because they know their status" (30 yo married woman, Mathare).*

Men agreed with the women about potential for SMS to educate and dispel myths. They provided a possible explanation of how messaging could help change men's opinions. A group of men described the need to be reminded frequently about health facts so that eventually they could overcome the cultural misperceptions. They saw SMS as the ideal delivery system for education and change of their opinions.

[My] wife has been encouraging me about family planning...but I have not understood...SMS which encourages family planning should be sent to me also to read because you also know that if you keep on hitting a rock eventually it will break down to become a soil. [So] what I have not been getting, if you keep on repeating it to me and my wife...explains it, I will eventually understand it and agree to it (29 yo HIV positive male, Bondo).

Challenges of SMS for FP

The status of disclosure of HIV to a partner was a major determinant of women's opinions about SMS for FP. Women who had not disclosed HIV status were generally not comfortable receiving SMS with overt messaging about HIV or FP, and tended to express stronger opinions about the content and wording of SMS messages. Partnered women who had not disclosed voiced difficulty in discussing other health issues with their partners and concerns about sensitive SMS leading to inadvertent disclosure, with consequences such as physical abuse, relationship dissolution, and loss of financial support. *"[If] you send me SMS...[and] you disagree with some [partner] instead of solving your problem they will abuse you."* (30yo married woman, Ahero).

Several women described using ART without the knowledge of their male partners; these women often were concerned about FP SMS or concealed use of FP. They discussed the taboo nature of FP and the potential harm they could face if male partners saw a FP-related message on their phones. *"[Most] men have not embraced family planning, in that case if he receives the message and reacts badly then it will mean that he hasn't been told about...family planning, since most men do not like family [planning]... if you use it secretly it might affect you"* (28yo married woman, Mathare). There was a strong feeling that there was need for the women's permission to receive FP messaging to help protect their confidentiality. *"[Some] men have issues with family planning. [They] don't allow their wives to use it, so...you use it in secret...I think that it [FP-related SMS messages] can't be sent to someone who has [not] consented"* (28 yo married woman, Bondo).

Women who had disclosed to their partners were more interested in detailed SMS that could be both educational and supportive to them and their partner. Many described the act of disclosure as a gateway to increased communication about health topics. *"I had not disclosed to my husband, so I was just hiding...[One] day...he saw the drugs. [He] took it and read, so I just told him [and] I started to cry. [But] he understood*

and we went together and got tested” (28 yo married woman, Mathare). The importance of openness and communication within couples was repeatedly mentioned in relation to discussions about FP and the desire for FP messaging. Women who stated they had disclosed their HIV status were more open and able to discuss FP with their partners, and viewed it as an important issue for the couple together.

[If] my husband [knows] my status then he will be the first person to advise me to go for family planning, so it is important that your partner should know your status before you can think of family planning, because then you will be free. (20 yo married woman, Ahero).

Overall, male participants showed strong interest in inclusion of FP-related SMS messaging as part of a clinic-based intervention. However, some brought up concerns that such messages could cause problems for women in the community whose partners had misperceptions about FP, *‘[Family] planning messages are the ones which can bring issues’ (36yo HIV positive male, Bondo).* While most men found FP-related messaging acceptable for themselves, many expressed concern about reactions by other males. They described how many men still do not accept FP and that the message would bring about concerns of promiscuity and infidelity. They felt educating male partners and having woman discuss FP before receiving the SMS messages was very important.

There are some men who don’t want anything to do with family planning, so when you want to send SMS you have to try as hard as possible for them [women] to share ideas about family planning with their husbands so that they get to a point where the husband knows what it is all about (29yo HIV positive male, Bondo).

Limitations of SMS

Participants identified many limitations to SMS for FP but an especially important one for providers was the limitations of SMS to actually provide counseling on complex topics and deliver FP care. Both women and providers discussed that SMS could not replace attending clinic for medical attention and in-depth counseling. Other participants had perceptions that an exam was required to make a decision about FP. *“[If] I may emphasize there are many types of family planning, but you must be examined before using any of them to determine a good one for you” (36yo divorced woman, Bondo).*

[No] we cannot use another SMS to counsel, because she has to be there in person...[The] mother has to come to the hospital [to] check the weight and blood pressure. She cannot just come and it [implant] is inserted, she has to undergo examination before it is inserted (59 yo MCH nurse, Bondo).

Additional key limitations included, language and reading difficulties, lack of cellular access and electricity to keep cellular phones charged, lack of credit and partners control of their actual credit and finally the potential risk of HIV disclosure if other people read their messages.

It will work better if the clients give consent because this semi urban place where economically people are down, so many of the women may not be having phones they usually give their husband's number and others have not disclosed... [To] introduce the SMS what we will do is we have to ask each and every one if they are comfortable getting the SMS they have to give consent so if they give consent it will be easier (32yo Clinical Officer, Mathare).

Many providers did express concern about confidentiality and covert FP use with use of SMS. *“I don’t want you to mention...the kinds of family planning practice because these clients [don’t] want [their] partner to know what it is...[they use] the family planning without even telling the partner,” (45yo mentor mother, Mathare).* They also noted that women should have to consent to receiving messages including those about FP.

Providers perceptions of utilization of SMS

Providers described several ways that SMS could help improve the clinic flow and augment their work. First, they felt it was an important way to remind women about appointments and track those that were missing visits. Second, it was a way to increase communication with their patients and improve relationships. Additionally, SMS could act as a mechanism to triage complaints and avoid unnecessary visits to clinic. Some noted that it could be a way to streamline the visit for clients who did attend clinic.

I think the provider workload will reduce, because some of them come to the clinic specifically because they have some questions... ‘When do I [start] family planning?’...[You] can just SMS and tell the lady, don’t come this time it is not yet... instead of wasting time to come here (24 yo nurse, Bondo).

Discussion

In recent years, SMS programs for pregnant and postpartum women and infants, and for HIV positive individuals, have been expanding rapidly. Although message content in these projects often follow standard MCH or HIV counseling, little has been published about what content women and their families find appropriate to receive by SMS and few programs address the concerns about confidentiality with participants. This study explored the perspectives of key stakeholders regarding the use of SMS as a platform to educate and support HIV positive women in the use of FP. This study identified several

important considerations for the development of SMS programs targeting improved FP among HIV positive woman. The findings highlight the complex opinions about FP and the complex relationships around FP, partner involvement and disclosure.

HIV positive women, male partners and providers were generally in favor of the use of SMS to support FP; SMS could facilitate couple communication and decision-making and educate partners who were not able to attend clinic. However, there were concerns about messages inadvertently disclosing a woman's HIV status or her FP use and creating problems within a couple if the male partner does not support FP. HIV disclosure was critical in determining women's ability to discuss health issues with their partners, particularly FP. These concerns impact the ways in which women participate in SMS programs and need to be considered not only in message development and program design, but also in the presentation of the intervention to women.

HIV disclosure was a major factor in determining women's desire for SMS messages from the clinic and influenced opinions about message design. This was true even if the messages were about FP and not HIV. Previous studies have found that both men and women felt that HIV disclosure led to improved communication about HIV and other health topics (Hartmann, Gilles, Shattuck, Kerner, & Guest, 2012; Onono et al., 2015). HIV disclosure is postulated to have important effects on health care outcomes, and non-disclosure has been associated with worse PMTCT outcomes (Jasseron et al., 2013), likely due to limitations on health care seeking. Our study indicates that even accidental disclosure in some cases leads to improved communication possibly indicating that disclosure itself leads to better communication not just that partners with better communication are more likely to disclose. Many women and men felt that SMS held potential to help with disclosure discussions, as disclosure remains a challenge among couples (Roxby, Matemo, Drake, Ongecha-owuor, & Kiarie, 2013).

Although SMS has demonstrated improvements in HIV care and outcomes (Lester et al., 2010) and uptake of MCH care (Lee et al., 2016), researchers need to recognize the potential for inadvertent disclosure of personal information by sending SMS messages. SMS messaging within MCH and FP systems have different approaches to implementation but often it's a "one size fits all" approach (Johnson et al., 2017). These programs should include options for women to elect the type of messages they want to receive and there needs to be standardized information disclosure of intent and content of planned messages. This study also highlights the importance of understanding societal norms before new SMS systems are initiated in communities, as these findings may not be generalizable. Women highlighted the need for permission to receive FP messages, especially in the context of phone sharing and potential for friends or family to read messages, which is important in Kenya and likely much of Sub-Saharan Africa where there remains high levels of phone sharing (Wesolowski, Eagle, Noor, Snow, & Buckee, 2012).

Unmet family planning needs among HIV positive women in Kenya remains high making innovative strategies to reach these women a high priority (Macquarrie, 2015a; National AIDS and STI Control Programme (NAS COP), 2014). Similar to previous studies, participants reiterated that there are many misconceptions around FP use and that men often lack an understanding or acceptance of FP (Harrington et al., 2015; Imbuki et al., 2010; Steinfeld et al., 2013). SMS was viewed as a potential method to help overcome some of these misconceptions and lead to better education. Previous research has shown that typical FP education at clinics may not be sufficient to change opinions (Withers et al., 2015) and that community based education is a better option. SMS remains a potential community based education program that was overall acceptable. Adding to the complexity was the opinion that women could and should be sharing SMS with their partners. Previous research demonstrates the importance of male inclusion in family planning discussions for successful uptake (Akelo et al., 2013;

Hartmann et al., 2012; Imbuki et al., 2010; Newmann et al., 2013; Tumlinson et al., 2013). The majority of women and all men felt that men should be included in any SMS program. SMS was viewed as an acceptable method to engage men about these topics and potentially allows for specific strategies to address men's specific fears and misunderstandings about FP. However, there remains a concern about how to best include men as our findings suggest this approach would not work for all participants.

SMS has the potential to improve relationships with providers as well as increasing the efficiency of the clinic. Similar to previous studies interviews with healthcare workers demonstrated their interest in using SMS to help improve adherence and appointment tracking (Lund et al., 2012; Mushamiri et al., 2015) as well as triaging complaints and improving communication between providers and patients. SMS may also be able to alleviate the fear women have about talking to their providers either because of previous mistreatment (Turan, Miller, Bukusi, Sande, & Cohen, 2008) or concerns about discussing sensitive topics such as gynecologic complaints at the clinic. SMS also provides a unique type of anonymity, not experienced in any type of in person interaction. To our knowledge this is the first time community members have identified this powerful aspect of SMS to enable patients to feel comfortable discussing sensitive topics and providing a way to seek treatment when they are too embarrassed to go to a clinic. Despite all of the potential of SMS, healthcare providers and women emphasized the importance of clinic-based care and felt that SMS could not replace this care. These opinions have been seen in other formative work (Jennings et al., 2013).

This study demonstrates that it is necessary to understand the social and cultural factors that influence women's decisions about FP and willingness to receive remote FP counseling prior to developing an SMS program. This formative work helped to craft our FP messaging and changed our approach to the introduction of the study to women as well as the consent process. Women in our study have more control over what types of

messages they choose to receive and their HIV disclosure is a major determinant to their messaging track.

Limitations

This study has several limitations. As an exploratory qualitative study focused on HIV positive women, its results cannot be generalized. Experiences and concerns related to FP among women who are HIV positive may differ from those with unknown or HIV negative status. However, our study design advantage is that it illuminates how FP messaging could be optimized depending on HIV disclosure. In addition to their HIV status, because the women interviewed were recruited from existing HIV support groups or health facilities, their views and experiences may not reflect the barriers to FP among people currently not involved in care. The opinions of the men in the study were supportive of FP messaging and not concerned about the stigma of FP, which differed from previous research, likely because men were mainly recruited by a female partner from the FGD which may indicate this sample is from men with more open communication. Another limitation is that our sample of men were not matched with their partner so direct analysis of partnership and communication within a pair were not possible.

Conclusion

This research is an important beginning for understanding the opinions and desires of HIV positive women about FP SMS communication and demonstrates how essential community input is when building mHealth programs. Without this critical information, programs might inadvertently send messaging that places the woman at risk or at least creates problems within relationships. Conversely, SMS messages that restrict themselves to vague, general, supportive language may not maximize the potential of information rich messaging that could help women who had already disclosed HIV status

and/or FP use to their partner. HIV non-disclosure remains the critical barrier to delivery of health information to women and couples.

This study identifies another area of health impacted by non-disclosure, FP choice and open FP use. There are several important future studies that would greatly improve our understanding. It will be important to quantify the impact that non-disclosure has on FP practice and try to understand whether it is a couple's baseline ability to communicate or if the act of disclosure changes how partners are able to communicate about these topics. Further studies will be useful to assess whether and how SMS can improve communication and demonstrate changes in FP behaviors and uptake. In addition, further studies are needed to determine the best balance between SMS counseling and clinic education around FP.

Mobile health solutions continue to be an important area of research and potentially could support the delivery of healthcare worldwide, particularly in resource limited settings. This study demonstrated the acceptability of SMS systems for the delivery of FP education and also demonstrated several important concepts as these systems scale-up. Population context and social acceptability of SMS topics must be identified and appropriate consent obtained if applicable. In many settings designing programs that include men and women and a process to help improve discussion between partners for FP decisions may be useful. SMS appears to be an acceptable bridge to improve communication between patients and providers; however, increased research is needed to ensure that SMS results in improved outcomes.

References

- Akelo, V., Girde, S., Borkowf, C. B., Angira, F., Achola, K., Lando, R., ... Lee Lecher, S. (2013). Attitudes toward Family Planning among HIV-Positive Pregnant Women Enrolled in a Prevention of Mother-To-Child Transmission Study in Kisumu, Kenya. *PLoS ONE*, 8(8). <http://doi.org/10.1371/journal.pone.0066593>
- Albino, S., Tabb, K. M., Requena, D., Egoavil, M., Pineros-Leano, M. F., Zunt, J. R., & García, P. J. (2014). Perceptions and Acceptability of Short Message Services Technology to Improve Treatment Adherence amongst Tuberculosis Patients in Peru: A Focus Group Study. *PLoS ONE*, 9(5), e95770. <http://doi.org/10.1371/journal.pone.0095770>
- Communications Authority of Kenya. (2016). *Quarterly Sector Statistics Report Fourth Quarter for the Financial Year 2015-2016*. Retrieved from <http://www.ca.go.ke/images/downloads/STATISTICS/Q4SectorStatisticsReport2014-2013FINAL.pdf>
- Cormick, G., Kim, N. A., Rodgers, A., Gibbons, L., Buekens, P. M., Belizán, J. M., & Althabe, F. (2012). Interest of pregnant women in the use of SMS (short message service) text messages for the improvement of perinatal and postnatal care. *Reproductive Health*, 9(1), 9. <http://doi.org/10.1186/1742-4755-9-9>
- Dedoose Version 7.5.17. (2017). Web application for managing, analyzing, and presenting qualitative and mixed method research data. Los Angeles, CA: SocioCultural Research Consultants, LLC. Retrieved from (www.dedoose.com)
- Drake, A. L., Unger, J. A., Ronen, K., Perrier, T., Derenzi, B., Richardson, B. A., ... Kinuthia, J. (2017). Evaluation of mHealth strategies to optimize adherence and efficacy of Option B + prevention of mother-to-child HIV transmission: Rationale, design and methods of a 3-armed randomized controlled trial. *Contemporary Clinical Trials*. <http://doi.org/10.1016/j.cct.2017.03.007>
- Harrington, E. K., Dworkin, S., Withers, M., Onono, M., Kwena, Z., & Newmann, S. J. (2015). Gendered power dynamics and women's negotiation of family planning in a high HIV prevalence setting: a qualitative study of couples in western Kenya. *Culture, Health & Sexuality*, 1058(November), 1–17. <http://doi.org/10.1080/13691058.2015.1091507>
- Hartmann, M., Gilles, K., Shattuck, D., Kerner, B., & Guest, G. (2012). Changes in Couples' Communication as a Result of a Male-Involvement Family Planning Intervention. *Journal of Health Communication*, 17(7), 802–819. <http://doi.org/10.1080/10810730.2011.650825>

- Imbuki, K., Todd, C., Stibich, M., Shaffer, D., & Sinei, S. (2010). Factors influencing contraceptive choice and discontinuation among HIV-positive women in Kericho, Kenya. *African Journal of Reproductive Health*, 14(4 Spec no.), 98–109. <http://doi.org/10.2307/41329759>
- Ippoliti, N. B., & Engle, K. L. (2017). Meet us on the phone : mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries. *Reproductive Health*, 14(11), 1–8. <http://doi.org/10.1186/s12978-016-0276-z>
- Jasseron, C., Mandelbrot, L., Dolfus, C., Trocmé, N., Tubiana, R., Teglas, J. P., ... Warszawski, J. (2013). Non-Disclosure of a Pregnant Woman's HIV Status to Her Partner is Associated with Non-Optimal Prevention of Mother-to-Child Transmission. *AIDS and Behavior*, 17, 488–497. <http://doi.org/10.1007/s10461-011-0084-y>
- Jennings, L., Ong'ech, J., Simiyu, R., Sirengo, M., & Kassaye, S. (2013). Exploring the use of mobile phone technology for the enhancement of the prevention of mother-to-child transmission of HIV program in Nyanza, Kenya: a qualitative study. *BMC Public Health*, 13, 1131. <http://doi.org/10.1186/1471-2458-13-1131>
- Johnson, D., Juras, R., Riley, P., Chatterji, M., & Sloane, P. (2017). A randomized controlled trial of the impact of a family planning mHealth service on knowledge and use of contraception. *Contraception*, 95(1), 90–97. <http://doi.org/10.1016/j.contraception.2016.07.009>
- Kenya National Bureau of Statistics, & ICF Macro. (2015). *Kenya Demographic and Health Survey 2014*. Nairobi, Kenya.
- Laher, F., Todd, C. S., Stibich, M. A., Phofa, R., Behane, X., Mohapi, L., & Gray, G. (2009). A qualitative assessment of decisions affecting contraceptive utilization and fertility intentions among HIV-positive women in Soweto, South Africa. *AIDS and Behavior*, 13, 47–54. <http://doi.org/10.1007/s10461-009-9544-z>
- Lee, S. H., Nurmatov, U. B., Nwaru, B. I., Mukherjee, M., Grant, L., & Pagliari, C. (2016). Effectiveness of mHealth interventions for maternal, newborn and child health in low- and middle-income countries: Systematic review and meta-analysis. *Journal of Global Health*, 6(1), 10401. <http://doi.org/10.7189/jogh.06.010401>
- Lester, R. T., Ritvo, P., Mills, E. J., Kariri, A., Karanja, S., Chung, M. H., ... Plummer, F. A. (2010). Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WeTel Kenya1): a randomised trial. *Lancet*, 376(9755), 1838–45. [http://doi.org/10.1016/S0140-6736\(10\)61997-6](http://doi.org/10.1016/S0140-6736(10)61997-6)
- Lopez, L. M., Grey, T. W., Chen, M., Denison, J., & Stuart, G. (2016). Behavioral

interventions for improving contraceptive use among women living with HIV. *The Cochrane Database of Systematic Reviews*, 8(8), CD010243.
<http://doi.org/10.1002/14651858.CD010243.pub3>

Lund, S., Hemed, M., Nielsen, B., Said, A., Said, K., Makungu, M., & Rasch, V. (2012). Mobile phones as a health communication tool to improve skilled attendance at delivery in Zanzibar: a cluster-randomised controlled trial. *BJOG: An International Journal of Obstetrics & Gynaecology*, 119(10), 1256–1264. <http://doi.org/10.1111/j.1471-0528.2012.03413.x>

Macquarrie, K. L. D. (2015a). HIV / AIDS and Unmet Need, (122).

Macquarrie, K. L. D. (2015b). *HIV / AIDS and Unmet Need for Family Planning. DHS Working Papers*. Rockville, Maryland, USA.

Mushamiri, I., Luo, C., Iiams-Hauser, C., & Ben Amor, Y. (2015). Evaluation of the impact of a mobile health system on adherence to antenatal and postnatal care and prevention of mother-to-child transmission of HIV programs in Kenya. *BMC Public Health*, 15(1), 102. <http://doi.org/10.1186/s12889-015-1358-5>

National AIDS and STI Control Programme (NASCO). (2014). Kenya AIDS Indicator Survey 2012: Final Report. *NASCO*, June, 1–530.
<http://doi.org/10.1097/QAI.0000000000000152>

Nattabi, B., Li, J., Thompson, S. C., Orach, C. G., & Earnest, J. (2009). A systematic review of factors influencing fertility desires and intentions among people living with HIV/AIDS: Implications for policy and service delivery. *AIDS and Behavior*, 13(5), 949–968. <http://doi.org/10.1007/s10461-009-9537-y>

Newmann, S. J., Grossman, D., Blat, C., Onono, M., Steinfeld, R., Bukusi, E. A., ... Cohen, C. R. (2013). Does integrating family planning into HIV care and treatment impact intention to use contraception? Patient perspectives from HIV-infected individuals in Nyanza Province, Kenya. *International Journal of Gynecology and Obstetrics*, 123(SUPPL.1), e16–e23. <http://doi.org/10.1016/j.ijgo.2013.08.001>

Nieves, C. I., Kaida, A., Seage, G. R., Kabakyenga, J., Muyindike, W., Boum, Y., ... Matthews, L. T. (2015). The influence of partnership on contraceptive use among HIV-infected women accessing antiretroviral therapy in rural Uganda. *Contraception*, 92(2), 152–159. <http://doi.org/10.1016/j.contraception.2015.04.011>

Obare, F., Birungi, H., Undie, C., Wanjiru, M., Liambila, W., & Askew, I. (2011). *Levels, trends and determinants of contraceptive use among adolescent girls in Kenya. APHIA II OR Project Kenya/Population Council*. Nairobi, Kenya.

- Onono, M., Guzé, M. A., Grossman, D., Steinfeld, R., Bukusi, E. A., Shade, S., ... Newmann, S. J. (2015). Integrating family planning and HIV services in western Kenya: the impact on HIV-infected patients' knowledge of family planning and male attitudes toward family planning. *AIDS Care*, 27(6), 743–52.
<http://doi.org/10.1080/09540121.2014.999744>
- Roxby, A. C., Matemo, D., Drake, A. L., Ongecha-owuor, F., & Kiarie, J. (2013). Pregnant Women and Disclosure to Sexual Partners After Testing HIV-1–Seropositive During Antenatal Care. *AIDS PATIENT CARE and STDs*, 27(1), 33–37.
<http://doi.org/10.1089/apc.2012.0327>
- Smith, C., Gold, J., Ngo, T., Sumpter, C., & Free, C. (2015). Mobile phone-based interventions for improving contraception use. *Cochrane Database of Systematic Reviews (Online)*, (6).
<http://doi.org/10.1002/14651858.CD011159.pub2.www.cochranelibrary.com>
- Steinfeld, R. L., Newmann, S. J., Onono, M., Cohen, C. R., Bukusi, E. A., & Grossman, D. (2013). Overcoming barriers to family planning through integration: perspectives of HIV-positive men in Nyanza province, Kenya. *AIDS Research and Treatment*, 2013.
<http://doi.org/10.1155/2013/861983>
- Todd, C. S., Stibich, M. A., Laher, F., Malta, M. S., Bastos, F. I., Imbuki, K., ... Gray, G. E. (2011). Influence of culture on contraceptive utilization among HIV-positive women in Brazil, Kenya, and South Africa. *AIDS and Behavior*, 15(2), 454–468.
<http://doi.org/10.1007/s10461-010-9848-z>
- Tumlinson, K., Speizer, I. S., Davis, J. T., Fotso, J. C., Kuria, P., Archer, L., ... Carolina, N. (2013). Partner communication, discordant fertility goals, and contraceptive use in urban Kenya. *African Journal of Reproductive Health*, 17(3), 79–90.
- Turan, J. M., Miller, S., Bukusi, E. a, Sande, J., & Cohen, C. R. (2008). HIV/AIDS and maternity care in Kenya: how fears of stigma and discrimination affect uptake and provision of labor and delivery services. *AIDS Care*, 20(8), 938–945.
<http://doi.org/10.1080/09540120701767224>
- Wanyenze, R. K., Wagner, G. J., Tumwesigye, N. M., Nannyonga, M., Wabwire-Mangen, F., & Kanya, M. R. (2013). Fertility and contraceptive decision-making and support for HIV infected individuals: client and provider experiences and perceptions at two HIV clinics in Uganda. *BMC Public Health*, 13(1), 98. <http://doi.org/10.1186/1471-2458-13-98>
- Wesolowski, A., Eagle, N., Noor, A. M., Snow, R. W., & Buckee, C. O. (2012). Heterogeneous Mobile Phone Ownership and Usage Patterns in Kenya. *PLoS ONE*,

7(4), 1–6. <http://doi.org/10.1371/journal.pone.0035319>

Withers, M., Dworkin, S., Onono, M., Oyier, B., Cohen, C., Bukusi, E., & Newmann, S. (2015). Men's perspectives on their role in family planning in Nyanza Province, Kenya. *Studies in Family Planning*, 46(2), 201–215. <http://doi.org/http://dx.doi.org/10.1111/j.1728-4465.2015.00024.x>

World Health Organization. (2015). *State of inequality: reproductive, maternal, newborn and child health*.