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A Qualitative Investigation of the Impact of a Livelihood Intervention on Gendered Power and Sexual Risk Behaviors Among HIV-Positive Adults in Rural Kenya

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Abstract

Despite the recognized links between food insecurity, poverty, and the risk of HIV/AIDS, few randomized trials have evaluated the impact of livelihood interventions on HIV risk behaviors. The current study draws upon data collected from a qualitative process evaluation that was embedded into a pilot randomized controlled trial that tested whether a multisectoral agricultural intervention (*Shamba Maisha*) affected the HIV-related health of HIV-positive adults in rural Kenya. In the current study, we drew upon longitudinal, in-depth interviews with 45 intervention participants and 9 control participants (N = 54) in order to examine the impacts of the intervention on gendered power and sexual risk reduction among both women and men. Female and male participants in the intervention described positive changes in sexual practices and gendered power dynamics as a result of intervention participation. Changes included reduced sexual risk behaviors, improved gender-related power dynamics, and enhanced quality of intimate relationships. These findings illuminate how a multisectoral agricultural intervention may affect inequitable gender relations and secondary transmission risk. Further research is needed to explore how to best leverage

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

agricultural interventions to address the important intersections between poverty and inequitable gender relations that shape HIV risks.

Keywords

HIV/AIDS prevention; food security; structural interventions; poverty; microfinance; gender relations

INTRODUCTION

Globally, HIV is disproportionately concentrated in resource-poor settings and among women. Over 70% of all people living with HIV (PLHIV) are in Sub-Saharan Africa (SSA), where women make up approximately 58% of those infected (UNAIDS, 2014). Given these trends, scholars have emphasized how poverty, gender inequality, and other structural factors influence individual behaviors linked to HIV transmission risk. Understanding the social context of sexual risk taking among both women and men is of particular significance in light of evidence that HIV transmission in SSA occurs primarily through unprotected heterosexual sex and increasingly among HIV-discordant couples in long-term and cohabiting relationships (WHO, UNICEF, & UNAIDS, 2011).

Food insecurity, defined as a lack of access to nutritious and safe food or the inability to procure food in a socially acceptable manner (Weiser et al., 2011, 2015), is increasingly understood to be an important driver of HIV transmission risk and of poor health outcomes among PLHIV (Anema, Vogenthaler, Frongillo, Kadiyala, & Weiser, 2009; Weiser et al., 2015). Studies in both resource-rich and resource-poor settings have documented an association between FI and sexual risk behaviors in a number of contexts. Among women, FI has been shown to be an impetus for engaging in transactional sex (Miller et al., 2011; Weiser et al., 2007), sex work (Fielding-Miller, Mnisi, Adams, Baral, & Kennedy, 2014; Oyefara, 2007) and intergenerational sex (Weiser et al., 2007); to impede leaving abusive or violent relationships (Miller et al., 2011); to undermine the ability to consistently use male condoms (Davidoff-Gore, Luke, & Wawire, 2011; McCoy, Ralph, Njau, Msolla, & Padian, 2014; Miller et al., 2011; Tsai, Hung, & Weiser, 2012; Tsai & Weiser, 2014; Vogenthaler et al., 2013; Weiser et al., 2007); to be a risk factor for multiple sexual partnerships (Eaton et al., 2014; Vogenthaler et al., 2013); and to reduce control in sexual decision-making (Tsai et al., 2011; Weiser et al., 2007). While the causal mechanisms underlying these associations are not fully understood, it is clear that FI compromises women's ability to negotiate safer sex practices when they are dependent on men for food and other resources. FI may also exacerbate gender-based imbalances in relationship power that can increase sexual risk by enhancing male control and decision-making dominance in sexual relationships, including the timing and frequency of sex (Patel et al., 2014; Shannon et al., 2012). Women's low sexual relationship power has also been associated with less condom use (Campbell et al., 2009; Pettifor, Measham, Rees, & Padian, 2004; Pulerwitz, Amaro, De Jong, Gortmaker, & Rudd, 2002) and with physical violence and forced sex (Muldoon, Deering, Feng, Shoveller, & Shannon, 2015; Pulerwitz, Gortmaker, & De Jong, 2000).

While the influence of FI on sexual risk has been more pronounced among women, there have been indications that men's sexual behaviors may also be affected. In South Africa, both men and women who experienced hunger were more likely to report engaging in transactional sex (Kalichman, Watt, Sikkema, Skinner, & Pieterse, 2012). Among PLHIV who inject drugs in Vancouver, severe FI was correlated with unprotected sex among both men and women (Shannon et al., 2011). Similarly, a study among homeless and marginally housed PLHIV in San Francisco found FI to be a risk factor for unprotected sex and multiple sexual partners for both men and women (Vogenthaler et al., 2013). These findings suggest that men, as well as women, may engage in risky sexual practices if they are food insecure, although the circumstances for men merit further investigation. Combined with the high prevalence of FI among PLHIV (Anema et al., 2009; Weiser et al., 2011), the associations of FI with sexual risk signal FI as an important structural factor linked to HIV transmission risk.

Overall, scholars have underscored that progress in HIV/AIDS prevention requires an expansion to innovative structural models that address the underlying factors that determine primary and secondary HIV risk (Auerbach, 2009; Blankenship, Friedman, Dworkin, & Mantell, 2006; Dworkin et al., 2013; Friedman, Kippax, Phaswana-Mafuya, Rossi, & Newman, 2006; Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008). There has been increasing research interest in linking poverty reduction with HIV prevention, and recent studies have highlighted some promise in microenterprise and microfinance as an economic empowerment strategy for women's sexual risk reduction in particular (Dunbar et al., 2014; Odek et al., 2009; Pronyk et al., 2006, 2008; Rosenberg, Seavey, Jules, & Kershaw, 2011; Sherman, German, Cheng, Marks, & Bailey-Kloche, 2006; Sherman et al., 2010; Witte et al., 2015). However, some researchers argue that microfinance may have limited potential as an empowerment and risk reduction strategy due to the fact that women often lack control over increased household income, may have to borrow from several sources in order to pay back loans, and are confined to female-dominated low-income activities (Brett, 2006; Dworkin & Blankenship, 2009; Mayoux 2002; Venkata & Yamini, 2010). Furthermore, poverty has been found to have a complex relationship with HIV and to play a multidimensional role that is shaped by the broader social environment (Kim, Pronyk, Barnett, & Watts, 2008). Thus, researchers have increasingly called for multisectoral intervention packages that go beyond one structural factor to incorporate several that are appropriate to the local context, such as food security and property rights (Dworkin & Blankenship, 2009; Cohen et al., 2015; Dworkin et al., 2013; Kim et al., 2007; Weinhardt et al., 2009, 2014).

Despite the call for structural interventions and the known links between food insecurity and HIV/AIDS risks, few studies have rigorously tested the impact of food security interventions on women's and men's HIV risks, particularly among those already living with HIV. In fact, no randomized trials exist evaluating the effects of a combined agricultural and microfinance intervention on HIV vulnerability and sexual risk. In addition, very few structural interventions target both women and men simultaneously, representing a missed opportunity to understand the ways that structural interventions may help to shift gendered power relations in a more equitable direction to improve health outcomes (Dworkin, 2015; Weiser et al., 2015). Scholars have emphasized that women's sexual negotiations occur within the

context of intimate relationships and changes in gendered power among not just women but men can be an important driver of sexual risk and health outcomes for both men and women (Dworkin, Treves-Kagan, & Lippman, 2013; Pulerwitz, Michaelis, Verma & Weiss, 2010). In the current study, we present findings from a qualitative sub-study that was embedded into a pilot cluster randomized controlled trial (RCT) known as *Shamba Maisha* (SM) (Kiswahili for "farm life"). The intervention sought to test the impact of a multisectoral agricultural and microfinance intervention on HIV health outcomes and transmission risk behaviors among adults living with HIV in rural Kenya. As a sub-analysis of this parent study, which was designed to improve livelihoods, food security, and HIV-related medical outcomes, the current study aimed to better understand whether and how participants experienced changes in sexual risk and gendered power.

METHOD

Participants

The SM pilot cluster RCT was conducted from April 2012 to July 2013 in the Rongo and Migori Districts of Kenya's Nyanza Region. The intervention trial was registered at ClinicalTrials.gov (NCT01548599) and has been fully described elsewhere (Cohen et al., 2015). Two government health facilities that met the requirements of the study were selected and randomly assigned to the intervention or control site. The government health facilities were supported by Family AIDS Care & Education Services (FACES), a collaboration between the Kenya Medical Research Institute (KEMRI) and the University of California at San Francisco (UCSF) (Lewis Kulzer et al., 2012). Ethical approval was obtained for this study from the Committee on Human Research at UCSF (CHR #11-07435) and the Ethical Review Committee at KEMRI (SSC #2178).

Men and women were recruited through announcements at the health facilities, and those who expressed interest were consented and screened for eligibility. Eligibility criteria included being 18–49 years old, being HIV-positive and receiving ART, having access to farm land and surface water, demonstrating moderate to severe food insecurity or malnutrition at baseline or during the previous year, and participating in or willingness to join a patient support group. A total of 140 HIV-positive individuals were enrolled in the RCT and were followed for one year. Voluntary written, informed consent was obtained from each participant prior to enrollment.

We conducted a longitudinal qualitative study among participants in the RCT to examine participant experiences and mechanisms through which intervention effects occurred. We interviewed 45 intervention participants and 9 control participants who were purposively selected to ensure representativeness based on gender and age (key factors driving HIV risk in the setting). While an N of 30 is typically needed in qualitative interview samples to achieve adequate saturation and redundancy across a range of relevant characteristics (Dworkin, 2012; Morse, 1995), we selected a somewhat larger sample size given the complexity of the intervention and the large number of mechanisms being explored in the intervention trial (behavioral, nutritional, and gender-related). While it would have been far more ideal to have a larger number of controls in our qualitative sample, funding was limited in this pilot intervention trial. We sought to include some controls in the sample in order to

ascertain whether the impacts and mechanisms described by intervention participants were related to the intervention or to study participation more broadly. In order to assess changes over time, we interviewed 31 intervention participants both early in the intervention (three to five months after study enrollment) and at the intervention end (at 12-month follow-up), and 14 intervention participants were interviewed once, at either time point. The nine control participants were interviewed at the end of the intervention.

Procedure

Study Context—Kenya has a generalized HIV epidemic with an adult HIV prevalence of 5.6% (aNational AIDS Control Council [NACC], 2014a). The epidemic exhibits a gender disparity, with a prevalence of 7.6% among adult women compared to 5.6% among adult men (NACC, 2014b). Adult women also account for 49% of new HIV infections, and sex between women and men, engaged in either casually or within marriage, is estimated to contribute over 60% of all infections (NACC, 2014a). The Nyanza Region, which borders Tanzania and Lake Victoria in southwestern Kenya, has the highest adult HIV prevalence in the country (15.1%) (National AIDS & STI Control Programme, 2014). Subsistence farming and fishing are the dominant occupations in the Nyanza Region. In previous studies conducted among PLHIV in this region, food insecurity was widespread (Nagata et al., 2012), and up to 34% of men and 25% of women were found to be underweight (Nagata et al., 2013). A number of gendered structural drivers of HIV risk have been observed in Nyanza, including female labor migration and the exchange of fish for sex in the lake ecology (Camlin, Kwena, & Dworkin, 2013; Camlin, Kwena, Dworkin, Cohen, & Bukusi, 2014), women's economic disempowerment and property rights violations (Dworkin et al., 2013; Lu et al., 2013), and gender-based violence (Hatcher et al., 2013; Turan et al., 2011, 2015).

Intervention—As described elsewhere (Cohen et al., 2015), the SM intervention consisted of three components: a microfinance loan, a micro-irrigation pump, and agricultural and financial training. In partnership with *Adok Timo*, a local microfinance institution, each intervention participant received a microfinance loan of around $150 USD after s/he saved 500 Kenyan shillings (~$6 USD) as a deposit. The loans were then used to purchase farming commodities, including a micro-irrigation "Hip Pump," seeds, fertilizer, and pesticides. KickStart, an international non-governmental organization, developed the low-cost MoneyMaker Hip Pump to enable poor farmers who were dependent on seasonal rainfall to irrigate their crops year-round, improving their agricultural output. Intervention participants received eight training modules from partner organizations on financial management and marketing skills, sustainable farming techniques, and how to use the MoneyMaker Hip Pump. Trainings and loan repayments occurred in patient support groups. These support groups met monthly and informally addressed topics of concern to participants. It is important to note that gender and sexuality discussions were not intentionally included in the support groups, though this may have arisen spontaneously during some sessions. Control participants were eligible for the microfinance loan, Hip Pump, farming implements, and trainings at the end of the one-year follow-up period.

Our evidence-based causal framework that was previously developed to understand how food insecurity negatively affects HIV health outcomes informed the design of the intervention. This framework draws from prior research elucidating the nutritional, behavioral, and mental health pathways through which food insecurity and HIV/AIDS are linked (Weiser et al., 2011). Drawing on this causal framework, the SM intervention's three components were hypothesized to improve food security and household wealth, which would then reduce malnutrition (nutritional pathway), reduce stress and depression (mental health pathway), improve ART adherence and retention in care (behavioral pathway), and improve gendered power (empowerment pathway), thereby decreasing HIV transmission risk behaviors and reducing HIV/AIDS morbidity and mortality (Cohen et al., 2015).

In the current study, we evaluated whether SM acted through behavioral and empowerment pathways (as hypothesized in the theoretical model) to reduce sexual risk behaviors, primarily through improved food security and increased household income.

Measures

Interviews were conducted by gender-matched local researchers in the local language (Dholuo or Kiswahili) at participants' homes or other locations chosen by participants, lasting between 45 minutes and 2.5 hours. Participants received 400 Kenyan shillings (~ $4.70 USD) for the interviews, which is consistent with ethical research procedures in Kenya. Researchers received two weeks of qualitative interview training that included the use of mock and pilot interviews, and the research team evaluated early transcripts to provide feedback on interview styles. The interviewers were not previously known to participants, and only the participant and interviewer were present during the interviews.

The interview guide covered a broad range of topics related to the intervention activities and hypothesized pathways, including food insecurity, diet quality, poverty, agricultural practices, mental health, health behavior, engagement in care, HIV-related stigma, and sexual risk. Experiences with the intervention and perceptions of intervention components were also probed among intervention participants. Among controls, the guide evaluated experiences being a control participant and whether any changes in health or health behaviors occurred as a result of study participation. The interview guide was iteratively developed by six researchers (AMH, SK, EW, RB, SLD, SDW).

Data Analysis

Interviews were digitally recorded, and researchers were responsible for transcribing verbatim the interviews they conducted and translating them from local languages into English, maintaining local meaning through the use of *emic* words and phrases. Each transcript was reviewed by at least one study investigator (AMH, SK, SDW) to ensure the accuracy of the translation and was labeled with the location and time-point of the interview, as well as age and gender of the participant. Transcripts were managed using Dedoose software (SocioCultural Research Consultants, LLC, Manhattan Beach, CA, USA). Transcripts were double coded and analyzed using content analysis methods (Miles, Huberman, & Saldaña, 2013). First, a thematic coding framework was developed based on the topics covered in the interview guides by four members of the study team (AMH, SK,

SLD, SDW) in consultation with co-investigators. Next, three investigators (AMH, LLH, MN) coded the transcripts using the thematic coding framework. Lastly, fine codes were developed by three investigators (AMH, LLH, SDW) for sub-themes that emerged inductively to fully capture participant experiences and meanings (these are italicized headers in the results section). The study team established intercoder reliability by double coding a random selection of transcripts. Training phone calls were held among coders and a senior supervising investigator (SDW) to establish consensus.

In the results that follow, we examined interview domains related to sexual risk and gendered power among participants. Exemplar quotes are included that represent both common and divergent perspectives within the cohort. Quotes are identified by the gender and age of the participant and interview time-point; wherever possible we also mention marital status. A longitudinal perspective is explored wherever possible.

RESULTS

Demographic Characteristics

The qualitative sample consisted of 54 HIV-positive participants, 48% of whom were female and 52% were male. Participants ranged in age from 23 to 56 years, with the median age being 38 years (interquartile range [IQR] 33–42 years). Over half of participants were married, with 21% in polygamous unions. Approximately 29% were single due to being widowed, and 12% reported being widows who were “inherited,” meaning male in-laws assumed responsibility for the women’s economic and social support after the husbands’ death. Most participants (96%) had at least two children, with the median being three children (IQR 2–4 children). At the time of the study, 86% of participants had been on ART for at least two years prior to enrollment, and the median years on ART for the sample was four years (IQR 2–6 years). Participants had a median 13 years of farming experience (IQR 5–20 years). (Table 1) Participants had little formal agricultural experience at baseline and predominantly practiced small scale subsistence farming of staple crops (e.g., maize, beans, sorghum). As a result of the intervention, participants reported growing new crops, including black nightshade, butternut squash, onions, kale, and watermelon, and improving their farming skills in ways that maximized yield, such as through transplanting seedlings, erosion control, and fertilizer and pesticide use (agricultural results are reported in Cohen et al., 2015; food security results are reported in Weiser et al., 2015).

Impact of *Shamba Maisha* on Sexual Risk

Changes in sexual and HIV-related risk were reported by many of the intervention participants, consisting of roughly equal numbers of male and female participants. Only some control participants reported behavioral shifts, and changes were more pronounced among intervention participants. As elaborated upon in the following sections, key themes among intervention participants included reduced sexual risk behaviors among both women and men, improved gender-related power dynamics, and enhanced physical and emotional intimacy within sexual relationships.

Reduced Sexual Risk Behaviors

Increased condom use due to a broader prioritization of health—Increased condom use with both casual and marital partners was commonly reported by most female and male intervention participants in our sample and was often described within the context of their improved HIV-related health. Many intervention participants described improvements in their immunologic and virologic outcomes and diet quality after starting the intervention. In the words of a 44 year-old female participant early in the intervention: "I feel that my body is not bad, I feel that I am okay." Condom use was credited with helping participants maintain their improved health (and that of their sexual partners) by preventing HIV re-infection or superinfection as well as secondary transmission. For example, this female participant (married, husband has 2 wives) decided to consistently have protected sex once her health improved in order to avoid re-infection:

> Before I was never using a condom but now, I don't miss using it … Now that my viral load is zero, I want to try and maintain it at zero so I can't accept to go without a condom. It has been tested three times but it is still at zero. (Female participant, intervention end, 32 years old)

This male intervention participant (married, multiple extramarital sexual partners) also emphasized the role condoms played in preventing re-infection that could jeopardize his rising CD4 count:

> Since joining SM, my immunity is now boosted and I have also learnt that when you have unprotected sex there is re-infection and also your CD4 is lowered. SM is making my CD4 count to rise--that is why I have to use condoms so that it is not lowered. (Male participant, early intervention, 36 years old)

Three control participants–one woman (unmarried, has a current sexual partner) and two men (one married, one unmarried)–also reported increased condom use at the end of the study; however, unlike intervention participants, they simply reported increased use and did not describe the importance of condoms within the context of improved health.

A few intervention participants did not report increasing their condom use. A 37 year-old female participant (married) and a 33 year-old male participant (married, polygamous marriage) interviewed early in the intervention noted that they were already using condoms prior to SM; therefore, they did not report a change as a result of the intervention. A 35 year-old female participant (unmarried, has a sexual partner) also stated that her sexual practices remained the same at the end of the intervention.

Fewer extramarital sexual partners among men—Many of the male intervention participants stated that they reduced or, at times, eliminated their extramarital relationships following their participation in SM, which was a change not described by control participants. Some men seemed to re-evaluate the purpose of extramarital relationships in light of the food and income benefits that resulted from the intervention. For example, a 42 year-old male participant claimed that he and his wife were very faithful at the intervention end because they were "only concerned with what puts food on [their] table." For other male participants, participation in SM led them to reflect on the impact of spending money on

extramarital girlfriends on their households and relationships. A 33 year-old man remarked at the end of the intervention that meeting the financial demands of his previous extramarital girlfriends "brought problems," but that after the intervention he would rather "work for [his] children and not for such things." Another male participant early in the intervention indicated that he was now "aware of [his] actions" and beginning to consider the consequences of having sex with women outside of his marriage. By the end of the intervention, he was contemplating an end to his affairs:

> Selling my vegetable is one ways through which I make friends but … I have started thinking seriously about changing my mind such that I also want to do away with my two sexual partners so that I only remain with my wife only … The other girls were just there because of money but now if I have money then my wife has money too so I think I should do away with the others. (Male participant, intervention end, 36 years old)

Another male participant reported early in the intervention that he decided to remain faithful to his wife and maintained this stance at the intervention end due to the trouble infidelity had previously caused in his marriage:

> Before I could take even 2,000 shillings to just go to Rongo or go to Migori just to waste it, and when you come back home there is no money. Since I joined SM … I am no longer involving myself with other women. (Male participant, intervention end, 31 years old)

While the theme of reduced partners was not as marked among women, some similarly acknowledged that their male partners were no longer spending money on extramarital girlfriends. For example, this female intervention participant described changes in her husband's behavior:

> Before he was having so many affairs outside our marriage. If he had money he would go and spend it with other women and would come back once the money was gone. But currently if he gets some money he comes and asks me how we can spend it. He is earning 3,000 shillings per month where he is employed, so after receiving his pay he asks me what we can do with the money. We make the decision together on how to use the money. (Female participant, early intervention, 28 years old)

However, not all participants experienced this change. For example, a 30 year-old female participant at the intervention end acknowledged that she continued to be "stressed" by her husband's "numerous sexual relationships with other women" and noted that the situation was "still the same" after participating in SM.

Improved Gender-Based Power Dynamics Within Sexual Relationships

Joint sexual decision-making—Many participants–particularly men–described a shift away from male-dominated sexual decision-making and towards joint decision-making with their female sexual partners. This was particularly the case when examining domains related to the timing and circumstances of sexual encounters. Intervention participants emphasized that both partners–including the woman-had to agree to engage in sex, which was a change

from previous assumptions that it is normative for men to demand sex and for women to yield to men's wishes. Control participants did not describe similar shifts in how they understood sexual decisions within relationships. One 42 year-old female intervention participant (unmarried, widowed) interviewed early in the intervention noted a change in her relationship with her current sexual partner when she described that "We only have sex when both of us feel like doing so." A 41 year-old married male participant at the intervention end similarly explained a change in sexual decision-making: "That goes back to decision-making [about sex], we both decide." Reflecting on changes in the way he understood sexual norms, a 35 year-old male participant stated at the intervention end that he used to think that men cannot control their sexual urges, but now understood that "sexual urges" are also impacted by perceptions of whether men have the right to access their wife's body at any time. He now felt there was "nothing wrong" with going a "whole week" without sex with his wife because: "Before I used to feel that sex is something that you can have anytime as long as your wife is around, but now I feel that it is something that one can control."

For some, increased communication served as a mechanism through which mutual decision-making about engaging in sexual intercourse occurred. For example, a 38 year-old male participant interviewed early in the intervention reflected, "It is now easier to initiate sex … you just talk about it and decide." Several male participants stated that they used to not talk about sexual initiation and highlighted how open verbal discussions of desire were important in making decisions jointly:

> We just agree, when I am in the mood I just tell her and she also tells me when she is in the mood and if we both agree … Again you cannot ask your spouse once you are in bed, you have to give her signs earlier enough. (Male participant, intervention end, 42 years old)

While not a common theme, a few men from the intervention arm described that they used to have sex with their female partner when they themselves did not want to, and that now they feel better able to say no to sex if they do not want to have it. For example:

> With my wife, the change has been that before when she wanted sex I would also just give in, but in my case she could say she is tired or she is having her menstrual cycle and I might also feel tired or physically unwell. But now once we tell each other our situation we can just sleep. (Male participant, intervention end, 35 years old)

Improved ability to refuse sex—Some female participants perceived that they were better able to refuse sex with male partners after participating in SM. For example, one 42 year-old woman (widowed, has a current male partner) interviewed early in the intervention explained that while her partner was previously not very understanding about her sex refusals, sometimes she now declines her partner's advances when she is tired from working in the garden and that "he is very understanding and does not interrogate [her] when this happens." A 32 year-old female participant (currently married) implied that intervention participation led to less forced sex in her relationship. She described early in the intervention that she decided about when to have sex more so than in the past because her partner "cannot undress [her] forcefully." When asked about changes in her sexual relationship after SM,

another female participant also noted a reduction in forced sexual encounters perpetuated by her husband:

> When I look at before joining SM, we used to disagree a lot when it comes to matters concerning sex. You would find that you are not in the mood yet the partner is forcing you and if you say "no" it becomes a problem. (Female participant, intervention end, 28 years old)

A 46 year-old control participant (marital status not known) reported a change in this domain, explaining that he stopped forcing his female partner to have sex when she didn't want to as a result of participating in the study; however, he said he was "taught" not to force his partner, though it was not clear whether this message was imparted to him as part of the patient support groups that were part of the intervention or from his regular clinic care.

Improved condom negotiations—A few female intervention participants described an improved ability to negotiate condom use with their male partners. They tended to report frequent disagreements with male partners about condoms that subsided after the intervention. For example, a woman described,

> My husband also never liked condoms. He used to say that sex is only enjoyable without a condom and that is a reason why we used to disagree a lot. But now that we are part of SM, things have really changed. He even reminds me to put on the condom for him before we start engaging in sex. (Female participant, intervention end, 28 years old)

Another 32 year-old female participant described the changes that she experienced with her husband by the intervention end: "I am the one who has to decide … I even insist that if we can't use a condom then we should sleep separately." One male participant explained how his participation in the intervention encouraged more joint decision-making within his polygamous marriage, which extended to decisions regarding condom use:

> Since I joined SM, decisions on the relationship are made in each wife's individual house. The way we speak, we all talk on using condoms and they have all accepted. (Male participant, early intervention, 42 years old)

Improved financial power—For a minority of female intervention participants, their improved financial power from participating in SM positively influenced their sexual decision-making. One woman (unmarried) credited her improved livelihood with eliminating the need to engage in transactional sex–she described this as having newfound clout to "not be deceived" into having sex with casual sexual partners who used to regularly offer her resources for sex:

> Right now I cannot indulge in those issues to do with sex because if getting money is what could have driven me into having sex, I have already learnt how I can make my own money. Someone cannot deceive me with such things … (Female participant, early intervention, 29 years old)

Enhanced Relationship Quality and Intimacy

Several intervention participants described improved relationship quality with their primary partners after participating in the intervention. Many reported having more “peace” in their relationships due to fewer verbal conflicts and disagreements about household matters such as money and food, extramarital affairs, and sexual matters (often condom use or timing of sex), while only one male control participant reported this change. For example, one 32 year-old female intervention participant noted early in the intervention that since joining SM, she and her husband “understand each other more and … have peace.” One male participant explained how increased income from the intervention led him to enact less violence against his wife–and stated that he used to erupt into violence over financial arguments that he perceived emerged from poverty:

> I used to be violent … The violence would mostly relate to money issues and this is the root cause in many homes … but right now [his wife] manages the farm and takes it as hers … so she has some few coins in the pockets and if I need some money … I can always ask her. So it has taken care of some form of domestic violence to some a very big extent … because money is definitely the major cause of violence in homes, so if there is money then there is no problem. (Male participant, intervention end, 42 years old)

Another male participant also reflected about the impact of SM on his verbal conflicts with his wives:

> I could quarrel with my wives a lot whenever they cooked me vegetables, but all those have changed and they are also at peace. In fact, they can just cook anything for me because we were encouraged to eat more vegetables. (Male participant, intervention end, 44 years old)

Some women spoke of relationship conflicts over male partners’ infidelities prior to their participation in SM that subsequently subsided after the intervention:

> [B]efore we joined SM, my husband could sleep the whole night without even touching me, he could even push me away as he was involved with other women. He never used to care about my feelings and we used to argue a lot … Since we joined [SM] he has changed and even confesses that he cannot involve himself with other women … (Female participant, intervention end, 28 years old)

For some men, “increased peace” was related to better mutual understanding that extended to sexual relations. For example, in the words of this man who explained that he and one of his wives “now live happily” after SM:

> [I]n the past one year, there is one of my wives whom I was not in good terms with in that I had no sexual desire for her. But since May this year we can sit down and talk as husband and wife, including engaging in sex. There is better understanding between us … [and] there is peace between us. That is a change I have seen. (Male participant, intervention end, 33 years old)

Having access to more and better food also appeared to have an impact on relationship quality for a few participants. This man explained that hunger created tensions in his

relationship due to his wife's low sexual desire that ceased after the intervention brought food into the household:

> Before I had a lot of food, she would lie to me that she is in her monthly periods when the truth is that it was because she was hungry. When I wanted to have sex, she did not. (Male participant, early intervention, 36 years old)

At the 12-month follow up, he described beneficial effects of the intervention on his sexual relationship:

> It used to happen when she is hungry then you will not have sex with her because she has a lot of stress and you know that thing is good only if the two of you enjoy it … At that time a lack of money created problems but now when there is money the problems are no longer in existence. (Male participant, intervention end, 36 years old)

Other participants also attributed increased food security as a result of the intervention to physical well-being which positively impacted male sexual stamina and overall sex drive. For some, increased sexual satisfaction and functioning with their partners was a simple matter of feeling better due to sufficient food, as described by these two men:

> Back then we could go long without engaging into sex … at times because of sickness. Currently this is not happening, as I am physically well as is my wife. Therefore we are very free … It's because of the food we eat. The vegetables that we are eating are giving us energy. (Male participant, intervention end, 42 years old)

> There is some change as we have a much better relationship since we now have enough food … Before] we could jointly decide and have sex but it wasn't pleasurable as it is now because we were not having enough food to eat. Now that we have food we are getting the full package (roars in laughter). (Male participant, intervention end, 34 years old)

DISCUSSION

Given that poverty, food insecurity, and gender relations play a major role in shaping primary and secondary HIV/AIDS transmission, there has been increased recognition of the need for structural, multisectoral interventions. We found that both female and male participants in an agricultural and microfinance intervention that was designed to improve food security and HIV outcomes described a number of behavioral and empowerment pathways that reduced sexual risks. These included reductions in the number of sexual partners and increased condom use; a shift towards joint sexual decision-making and improved ability to negotiate the conditions of sexual encounters; and enhanced emotional and sexual intimacy in relationships.

Unlike many studies focused on income generation and livelihood improvement approaches to HIV/AIDS prevention, our study probed sexual risk changes among both women and men, rather than only among women (Cui, Lee, Thirumurthy, Muessig, & Tucker, 2013; Gibbs, Willan, Misselhorn, & Mangoma, 2012; Kennedy, Fonner, O'Reilly, & Sweat, 2014).

This allowed us to more deeply explore whether and how the intervention affected gendered power relations–an area that is often overlooked when the focus is on women's empowerment alone. Our results showed that men described a shift towards more equitable gender dynamics, including a move away from male-dominated decision-making and towards more joint decision-making particularly around the timing and circumstances of sex and condom use. We also found that some men reported a reduction in perpetuating sexual coercion and/or weaker adherence to normative assumptions that men have a right to sexual access to women's bodies and that women do not have a right to refuse sex. This is an important finding given that such sexual norms have been observed by other scholars in this region of Kenya (Hatcher et al., 2013; Withers et al., 2015).

It is interesting to note that while the parent study demonstrated significant improvements in food security and diet quality among intervention participants (Weiser et al., 2015), and the literature links food insecurity to sexual risk behaviors for women especially, reported shifts in gendered power were especially prevalent among men in our sample. This is noteworthy because the parent study did not have empowerment or gender-related content embedded into this structural intervention, which consisted of a microfinance loan, agricultural and financial training, and a water pump. As such, it may be the case that the intervention's alleviation of poverty and food insecurity–known factors contributing to women's disempowerment and risky sex–could have led to improvements in gendered power relations. Additionally, the intervention content emphasized making decisions that were best for the household in terms of agriculture and finances, and this may have led to more shared decision-making that, in turn, may have spilled over to the relationship and sexual realm. Our findings that women did not articulate as many shifts in gendered power as did men suggests that it may be important to integrate gender-related content (relationship dynamics, women's empowerment, masculine norms) into future structural interventions in order to ensure that gendered power relations shift in the desired direction for both women and men to improve sexual risk and HIV outcomes. This recommendation aligns with findings that economic and/or livelihoods interventions can be more effective at improving women's empowerment and reducing their sexual risk behavior and risk of intimate partner violence when paired with gender training (Kim et al., 2009; Pronyk et al., 2006).

Improvements in food security and income may have also influenced sexual risk for participants in unanticipated ways. Some participants spoke of improved relationship dynamics through reduced tension and fighting over a lack of food and money, and of improved sexual intimacy due to improved wellness from increased food consumption. A recent study evaluating a cash and in-kind food transfer program targeted to women in Ecuador likewise found the lack of food and income to be a trigger of conflict and stress within relationships (Buller, Hidrobo, Peterman, & Heise, 2016). The impact of improved food and financial security on violence and/or conflicts in relationships may be an important consideration in interventions that seek to address HIV transmission risk. IPV, one of the most extreme manifestations of unequal gendered power, is itself directly linked to incident HIV infection in women (Dunkle et al., 2004; Jewkes, Dunkle, Nduna, & Shai, 2010; Li et al., 2014; Machtinger, Wilson, Haberer, & Weiss, 2012) and to worsened treatment outcomes for women living with HIV (Hatcher, Smout, Turan, Christofides, & Stöckl, 2015). This points to the need for our research team and other researchers to add validated

violence measures to structural interventions to further understand the effects of multisectoral interventions on violence, which is a known pathway for HIV prevention, treatment, and care outcomes.

Another unanticipated finding is that both women and men expressed recognition of the importance of condom use in the context of their improved health. This is consistent with our research team's findings that SM significantly improved the food security and health of HIV-positive participants, and that participants felt encouraged to adhere to ART and attend clinic appointments by their improved HIV clinical outcomes (Weiser et al., 2015, 2016). Thus, our qualitative findings of increased condom use, reductions in the number of sexual partners, and improved condom negotiations may be a sign not only of improvements in gendered power but also of a broader prioritization of health among both male and female participants.

The current study has several implications for structural HIV/AIDS prevention interventions. Previous interventions focused on poverty and gender relations have tended to use microfinance as a sexual risk reduction strategy and not broader multisectoral approaches. Few microfinance programs aimed at reducing women's HIV risks have been rigorously evaluated (Dworkin, 2015), and even fewer are focused on men's HIV risks. A small number of published HIV prevention and microfinance studies have reported promising changes among women, including higher levels of HIV-related communication and lower levels of unprotected sex at last intercourse with a nonspousal partner (Pronyk et al., 2008); improvements in empowerment indicators (Kim et al., 2007); reductions in IPV (Pronyk et al., 2006); increased condom use and reduced transactional sex (Dunbar et al., 2014); and reductions in sexual partners, money for sex, and/or unprotected sex among female sex workers (Odek et al., 2009; Sherman et al., 2006, 2010; Witte et al., 2015). However, these studies do not consider livelihood interventions and improved food security as a critical driver of improved HIV risks for both women and men. Additionally, these studies probe sexual risk within the context of HIV acquisition, and limited data exists on the impact that such interventions have on the sexual risk behaviors of PLHIV. Thus, the current study extends an understanding of how an integrated food security and microfinance intervention may positively impact gendered power relations and sexual risks among both women and men, and offers insight into how a multisectoral agricultural intervention could affect secondary HIV transmission risk among adults already living with HIV.

Previous work has also tended to assume that only women and not men would benefit from economic empowerment as this links to HIV risks. Our findings are therefore particularly important in light of concerns that including men in structural interventions will enhance their power over women, and it is this power differential that placed women at a high risk of HIV to begin with (Dworkin, 2015; Dworkin et al., 2011). Rather than finding that the inclusion of men in this livelihood intervention enhanced men's power over women, we found shifts in the direction of more equitable intimate partnerships and recognition of the benefits of shared sexual decision-making. As noted above, this may be because SM emphasized household level benefits in the financial and agricultural realms so that household members made decisions that benefited their income, food security, and HIV-related health outcomes. Simultaneously, however, the current study is not one where both

members of a couple are included and hence future research should continue to explore the relationship between income, food security, gendered power relations, masculinity, and sexual risk reduction for both women and men.

There were several limitations to our study. First, our study was limited to individuals who have access to land and surface water and may not be generalizable to all food insecure PLHIV in Kenya or beyond. To assist the reader in assessing whether the results could be justifiably applied to another setting, we provided a detailed account of the study context, eligibility criteria, and methods. Second, our semi-structured, in-depth interviews relied on participants' perceptions of their experiences with sexual risk reduction and self-reporting of their behaviors. Given the sensitivity of the sexual topics probed in the interviews and within this region of the world, our results are subject to social desirability bias. To minimize the potential that participants may respond favorably due to their study participation, we hired local researchers to administer the interviews who were not involved in the study administration or delivery of the intervention and who were trained in open-ended interview techniques, probing, and neutral questioning. Third, we only interviewed a small number of control participants, some of whom reported some changes in condom use (though not in relationship control or intimacy in their relationships). While some control participants reported changes in sexual risk, we suspect that their involvement in patient support groups and regular home visits from study staff as well as clinic visits may have created unanticipated pathways toward behavior change for them. It is also possible that their reporting was a research effect, since being routinely asked about HIV health behaviors may have unintentionally prompted behavior change. It is not uncommon to find that some control participants change in a similar direction to interventions participants in randomized trials (Blankenship et al., 2006; Djulbegovic, 2001). Nonetheless, a greater proportion of intervention participants evidenced sexual risk changes, underscoring the strength of the intervention. Future studies evaluating mechanisms of change should consider evaluating a larger sample of control participants.

Another limitation in our study was that a lower proportion of women compared to men described changes in themes focused on gendered power and improved sexual intimacy, pointing to the complexities of understanding the gendered mechanisms of change in structural interventions that include both women and men. Finally, it is important to note that our findings differ from other studies which report that men who have access to increased fungible income, particularly in the cash economy through agricultural work in SSA, increase their number of sexual partners (Bingenheimer, 2010). We found that men reduced the number of sexual partners they have, and we think this may be due to the ways in which the intervention helped index participants to consult with and make joint decisions about household finances with their marital partners in order to benefit the financial status of the household. In addition, research has shown that unlike numerous countries in sub-Saharan Africa, household wealth in Kenya is not correlated with men's multiple partnerships and the reason for this finding is not clearly understood in the existing literature (Bingenheimer, 2010). Future research should explore further the intersection of sexual and financial dynamics on HIV-related health.

Despite the limitations found in our study, our findings illuminated the ways that a multisectoral agricultural intervention affected the sexual risk behaviors and gendered power dynamics among farmers living with HIV in western Kenya. These results bolster other findings that the intervention led to increased and diversified crop production and labor savings from using the water pump (Cohen et al., 2015) and significantly improved HIV-related health and nutritional outcomes of participants (Weiser et al., 2015). Together, these findings show the promise of livelihood and economic interventions in reducing food insecurity and improving income and gender dynamics among women and men affected by HIV. Future research is needed to continue to explore what aspects of multisectoral structural programs are linked to changes in gendered power relations, gender norms, and sexual risk reduction among both women and men. Given the lack of structural interventions that include both women and men simultaneously, additional studies are also urgently needed that evaluate how men perceive and respond to intervention components and shifts in gender relations that result from multisectoral HIV prevention, treatment, and care approaches.

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References

Anema A, Vogenthaler N, Frongillo EA, Kadiyala S, Weiser SD. Food insecurity and HIV/AIDS: Current knowledge, gaps, and research priorities. Current HIV/AIDS Reports. 2009; 6:224–231. DOI: 10.1007/s11904-009-0030-z [PubMed: 19849966]

Auerbach J. Transforming social structures and environments to help in HIV prevention. Health Affairs. 2009; 28:1655–1665. DOI: 10.1377/hlthaff.28.6.1655 [PubMed: 19887406]

Bingenheimer JB. Men's multiple sexual partnerships in 15 Sub-Saharan African countries: Sociodemographic patterns and implications. Studies in Family Planning. 2010; 41:1–17. DOI: 10.1111/j.1728-4465.2010.00220.x [PubMed: 21151707]

Blankenship KM, Friedman SR, Dworkin S, Mantell JE. Structural interventions: Concepts, challenges, and opportunities for research. Journal of Urban Health. 2006; 83:59–72. DOI: 10.1007/s11524-005-9007-4 [PubMed: 16736355]

Brett JA. We sacrifice and we eat less: The structural complexities of microfinance participation. Human Organization. 2006; 65:8–19. http://dx.doi.org/10.17730/humo.65.1.6wvq3ea7pbl38mub.

Buller AM, Hidrobo M, Peterman A, Heise L. The way to a man's heart is through his stomach?: A mixed methods study on causal mechanisms through which cash and in- kind food transfers decreased intimate partner violence. BMC Public Health. 2016; doi: 10.1186/s12889-016-3129-3

Camlin CS, Kwena ZA, Dworkin SL. Jaboya vs. jakambi: Status, negotiation, and HIV risks among female migrants in the "sex for fish" economy in Nyanza Province, Kenya. AIDS Education and Prevention. 2013; 25:216–231. DOI: 10.1521/aeap.2013.25.3.216 [PubMed: 23631716]

Camlin CS, Kwena ZA, Dworkin SL, Cohen CR, Bukusi EA. “She mixes her business”: HIV transmission and acquisition risks among female migrants in western Kenya. Social Science & Medicine. 2014; 102:146–156. DOI: 10.1016/j.socscimed.2013 [PubMed: 24565152]

Campbell AN, Tross S, Dworkin SL, Hu MC, Manuel J, Pavlicova M, Nunes EV. Relationship power and sexual risk among women in community-based substance abuse treatment. Journal of Urban Health. 2009; 86:951–964. DOI: 10.1007/s11524-009-9405-0 [PubMed: 19921541]

Cohen CR, Steinfeld RL, Weke E, Bukusi EA, Hatcher AM, Shiboski S, … Weiser SD. Shamba Maisha: Pilot agricultural intervention for food security and HIV health outcomes in Kenya: Design, methods, baseline results and process evaluation of a cluster-randomized controlled trial. SpringerPlus. 2015; 12:122.doi: 10.1186/s40064-015-0886-x

Cui RR, Lee R, Thirumurthy H, Muessig KE, Tucker JD. Microenterprise development interventions for sexual risk reduction: A systematic review. AIDS and Behavior. 2013; 17:2864–2877. DOI: 10.1007/s10461-013-0582-1 [PubMed: 23963497]

Davidoff-Gore A, Luke N, Wawire S. Dimensions of poverty and inconsistent condom use among youth in urban Kenya. AIDS Care. 2011; 23:1282–1290. DOI: 10.1080/09540121.2011.555744 [PubMed: 21562992]

Djulbegovic B. Placebo-controlled trials. Annals of Internal Medicine. 2001; 135:62–64. DOI: 10.7326/0003-4819-135-1-200107030-00022

Dunbar MS, Kang Dufour MS, Lambdin B, Mudekunye-Mahaka I, Nhamo D, Padian NS. The SHAZ! project: Results from a pilot randomized trial of a structural intervention to prevent HIV among adolescent women in Zimbabwe. PLOS One. 2014; 9:e113621.doi: 10.1371/journal.pone.0113621 [PubMed: 25415455]

Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntryre JA, Harlow SD. Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa. Lancet. 2004; 363:1415–1421. http://dx.doi.org/10.1016/S0140-6736(04)16098-4. [PubMed: 15121402]

Dworkin, SL. Men at risk: Masculinity, heterosexuality, and HIV prevention. New York, NY: New York University Press; 2015.

Dworkin SL. Sample size policy for qualitative studies using in-depth interviews [Editorial]. Archives of Sexual Behavior. 2012; 41:1319–1320. DOI: 10.1007/s10508-012-0016-6 [PubMed: 22968493]

Dworkin SL, Blankenship K. Microfinance and HIV/AIDS prevention: Assessing its promise and limitations. AIDS and Behavior. 2009; 13:462–469. DOI: 10.1007/s10461-009-9532-3 [PubMed: 19294500]

Dworkin SL, Dunbar M, Krishnan S, Hatcher A, Sawires S. Uncovering tensions and capitalizing on synergies in violence and HIV programming. American Journal of Public Health. 2011; 101:995–1003. DOI: 10.2105/AJPH.2009.191106 [PubMed: 21164091]

Dworkin SL, Grabe S, Lu T, Hatcher AM, Kwena Z, Bukusi E, Mwaura-Muiru E. Property rights violations as a structural driver of women’s HIV risks: A qualitative study in Nyanza and Western Provinces, Kenya. Archives of Sexual Behavior. 2013; 42:703–713. DOI: 10.1007/s10508-012-0024-6 [PubMed: 23179234]

Dworkin SL, Treves-Kagan S, Lippman SA. Gender-transformative interventions to reduce HIV risks and violence with heterosexually-active men: A review of the global evidence. AIDS and Behavior. 2013; 17:2845–2863. DOI: 10.1007/s10461-013-0565-2 [PubMed: 23934267]

Eaton LA, Cain DN, Pitpitan EV, Carey KB, Carey MP, Mehlomakulu V, … Kalichman SC. Exploring the relationships among food insecurity, alcohol use, and sexual risk taking among men and women living in South African townships. Journal of Primary Prevention. 2014; 35:255–265. DOI: 10.1007/s10935-014-0346-3 [PubMed: 24806889]

Fielding-Miller R, Mnisi Z, Adams D, Baral S, Kennedy C. “There is hunger in my community”: A qualitative study of food security as a cyclical force in sex work in Swaziland. BMC Public Health. 2014; 14:79.doi: 10.1186/1471-2458-14-79 [PubMed: 24460989]

Friedman SR, Kippax SC, Phaswana-Mafuya N, Rossi D, Newman CE. Emerging future issues in HIV/AIDS social research. AIDS. 2006; 20:959–965. DOI: 10.1097/01.aids.0000222066.30125.b9 [PubMed: 16603846]

Gibbs A, Willan S, Misselhorn A, Mangoma J. Combined structural interventions for gender equality and livelihood security: A critical review of the evidence from Southern and Eastern Africa and the implications for young people. Journal of the International AIDS Society. 2012; 15:1–10. DOI: 10.7448/IAS.15.3.17362

Gupta GR, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. Lancet. 2008; 372:764–775. DOI: 10.1016/S0140-6736(08)60887-9 [PubMed: 18687460]

Hatcher AM, Romito P, Odero M, Bukusi EA, Onono M, Turan JM. Social context and drivers of intimate partner violence in rural Kenya: Implications for the health of pregnant women. Culture, Health & Sexuality. 2013; 15:404–419. DOI: 10.1080/13691058.2012.760205

Hatcher AM, Smout EM, Turan JM, Christofides N, Stöckl H. Intimate partner violence and engagement in HIV care and treatment among women: A systematic review and meta-analysis. AIDS. 2015; 29:2183–2194. DOI: 10.1097/QAD.0000000000000842 [PubMed: 26353027]

Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: A cohort study. Lancet. 2010; 376:41–48. DOI: 10.1016/S0140-6736(10)60548-X [PubMed: 20557928]

Joint United Nations Programme on HIV/AIDS (UNAIDS). The GAP report 2014. Geneva: Author; 2014. Retrieved from http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Gap_report_en.pdf

Kalichman SC, Watt M, Sikkema K, Skinner D, Pieterse D. Food insufficiency, substance use, and sexual risks for HIV/AIDS in informal drinking establishments, Cape Town, South Africa. Journal of Urban Health. 2012; 89:939–951. DOI: 10.1007/s11524-012-9686-6 [PubMed: 22669645]

Kennedy CE, Fonner VA, O'Reilly KR, Sweat MD. A systematic review of income generation interventions, including microfinance and vocational skills training, for HIV prevention. AIDS Care. 2014; 26:659–673. DOI: 10.1080/09540121.2013.845287 [PubMed: 24107189]

Kim J, Ferrari G, Abramsky T, Watts C, Hargreaves J, Morison L, … Pronyk P. Assessing the incremental effects of combining economic and health interventions: The IMAGE study in South Africa. Bulletin of the World Health Organization. 2009; 87:824–832. DOI: 10.2471/BLT.08.056580 [PubMed: 20072767]

Kim J, Pronyk P, Barnett T, Watts C. Exploring the role of economic empowerment in HIV prevention. AIDS. 2008; 22:S57–S71. DOI: 10.1097/01.aids.0000341777.78876.40

Kim JC, Watts CH, Hargreaves JR, Ndhlovu LX, Phetla G, Morison LA, … Pronyk P. Understanding the impact of a microfinance-based intervention on women's empowerment and the reduction of intimate partner violence in South Africa. American Journal of Public Health. 2007; 97:1794–1802. DOI: 10.2105/AJPH.2006.095521 [PubMed: 17761566]

Lewis Kulzer J, Penner JA, Marima R, Oyaro P, Oyanga AO, Shade SB, … Cohen CR. Family model of HIV care and treatment: A retrospective study in Kenya. Journal of the International AIDS Society. 2012; 15:8–13. DOI: 10.1186/1758-2652-15-8 [PubMed: 22353553]

Li Y, Marshall CM, Rees HC, Nunez A, Ezeanolue EE, Ehiri JE. Intimate partner violence and HIV infection among women: A systematic review and meta- analysis. Journal of the International AIDS Society. 2014; 17:18845.doi: 10.7448/IAS.17.1.18845 [PubMed: 24560342]

Lu T, Zwicker L, Kwena Z, Bukusi E, Mwaura-Muiru E, Dworkin SL. Assessing barriers and facilitators of implementing an integrated HIV prevention and property rights program in Western Kenya. AIDS Education and Prevention. 2013; 25:151–163. DOI: 10.1521/aeap.2013.25.2.151 [PubMed: 23514082]

Machtinger EL, Wilson TC, Haberer JE, Weiss DS. Psychological trauma and PTSD in HIV positive women: A meta-analysis. AIDS and Behavior. 2012; 16:2091–2100. DOI: 10.1007/s10461-011-0127-4 [PubMed: 22249954]

Mayoux L. Microfinance and women's empowerment: Rethinking 'best practice'. Development Bulletin. 2002; 57:76–81. Retrieved from https://crawford.anu.edu.au/rmap/devnet/devnet/db-57.pdf.

McCoy SI, Ralph LJ, Njau PF, Msolla MM, Padian NS. Food insecurity, socioeconomic status, and HIV-related risk behavior among women in farming households in Tanzania. AIDS and Behavior. 2014; 18:1224–1236. DOI: 10.1007/s10461-013-0629-3 [PubMed: 24097335]

Miller CL, Bangsberg DR, Tuller DM, Senkungu J, Kawuma A, Frongillo EA, Weiser SD. Food insecurity and sexual risk in an HIV endemic community in Uganda. AIDS and Behavior. 2011; 15:1512–1519. DOI: 10.1007/s10461-010-9693-0 [PubMed: 20405316]

Miles, MB., Huberman, AM., Saldaña, J. Qualitative data analysis: A methods sourcebook. Thousand Oaks, CA: Sage Publications; 2013.

Morse JM. The significance of saturation. Qualitative Health Research. 1995; 5:147–149. DOI: 10.1177/104973239500500201

Muldoon KA, Deering KN, Feng CX, Shoveller JA, Shannon K. Sexual relationship power and intimate partner violence among sex workers with noncommercial intimate partners in a Canadian setting. AIDS Care. 2015; 27:512–9. DOI: 10.1080/09540121.2014.978732 [PubMed: 25402720]

Nagata JM, Fiorella KJ, Young SL, Otieno OD, Kapule I, Bukusi EA, Cohen CR. Socio-demographic and health associations with body mass index at the time of enrollment in HIV care in Nyanza Province, Kenya. AIDS Care. 2013; 25:1491–1498. DOI: 10.1080/09540121.2013.775399 [PubMed: 23464799]

Nagata JM, Magerenge RO, Young SL, Oguta JO, Weiser SD, Cohen CR. Social determinants, lived experiences, and consequences of household food insecurity among persons living with HIV/AIDS on the shore of Lake Victoria, Kenya. AIDS Care. 2012; 24:728–736. DOI: 10.1080/09540121.2011.630358 [PubMed: 22150119]

National AIDS Control Council (NACC). Kenya AIDS strategic framework 2014/2015 – 2018/2019. Nairobi: Kenya Ministry of Health; 2014a. Retrieved from http://www.nacc.or.ke/images/documents/KASF_Final.pdf

National AIDS Control Council (NACC). Kenya HIV prevention revolution road map: Countdown to 2030. Nairobi: Kenya Ministry of Health; 2014b. Retrieved from http://www.nacc.or.ke/images/documents/Final.pdf

National AIDS & STI Control Programme. Kenya AIDS indicator survey 2012: Final report. Nairobi: Author; 2014. Retrieved from http://www.nascop.or.ke/index.php

Odek WO, Busza J, Morris CN, Cleland J, Ngugi EN, Ferguson AG. Effects of micro-enterprise services on HIV risk behaviour among female sex workers in Kenya's urban slums. AIDS and Behavior. 2009; 13:449–461. DOI: 10.1007/s10461-008-9485-y [PubMed: 18998204]

Oyefara JL. Food insecurity, HIV/AIDS pandemic and sexual behaviour of female commercial sex workers in Lagos metropolis, Nigeria. Social Aspects of HIV/AIDS Research Alliance. 2007; 4:626–635. DOI: 10.1080/17290376.2007.9724884

Patel SN, Wingood GM, Kosambiya JK, McCarty F, Windle M, Yount K, Hennink M. Individual and interpersonal characteristics that influence male- dominated sexual decision-making and inconsistent condom use among married HIV serodiscordant couples in Gujarat, India: Results from the Positive Jeevan Saathi Study. AIDS and Behavior. 2014; 18:1970–1980. DOI: 10.1007/s10461-014-0792-1 [PubMed: 24893852]

Pettifor AE, Measham DM, Rees HV, Padian NS. Sexual power and HIV risk, South Africa. Emerging Infectious Diseases. 2004; 10:1996–2004. DOI: 10.3201/eid1011.040252 [PubMed: 15550214]

Pronyk PM, Hargreaves JR, Kim JC, Morison LA, Phetla G, Watts C, … Porter JD. Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: A cluster randomised trial. Lancet. 2006; 368:1973–1983. DOI: 10.1016/S0140-6736(06)69744-4 [PubMed: 17141704]

Pronyk PM, Kim JC, Abramsky T, Phetla G, Hargreaves JR, Morison LA, … Porter JD. A combined microfinance and training intervention can reduce HIV risk behaviour in young female participants. AIDS. 2008; 22:1659–1665. DOI: 10.1097/QAD.0b013e328307a040 [PubMed: 18670227]

Pulerwitz J, Amaro H, De Jong W, Gortmaker SL, Rudd R. Relationship power, condom use and HIV risk among women in the USA. AIDS Care. 2002; 14:789–800. DOI: 10.1080/0954012021000031868 [PubMed: 12511212]

Pulerwitz J, Gortmaker SL, De Jong W. Measuring sexual relationship power in HIV/STD research. Sex Roles. 2000; 42:637–660. DOI: 10.1023/A:1007051506972

Pulerwitz J, Michaelis A, Verma R, Weiss E. Addressing gender dynamics and engaging men in HIV programs: Lessons learned from Horizons research. Public Health Reports. 2010; 125:282–292.

Retrieved from http://www.publichealthreports.org/issueopen.cfm?articleID=2386. [PubMed: 20297757]

Rosenberg MS, Seavey BK, Jules R, Kershaw TS. The role of a microfinance program on HIV risk behavior among Haitian women. AIDS and Behavior. 2011; 15:911–918. DOI: 10.1007/s10461-010-9860-3 [PubMed: 21153762]

Shannon K, Kerr T, Milloy MJ, Anema A, Zhang R, Montaner JS, Wood E. Severe food insecurity is associated with elevated unprotected sex among HIV- seropositive injection drug users independent of HAART use. AIDS. 2011; 25:2037–2042. DOI: 10.1097/QAD.0b013e32834b35c9 [PubMed: 21811140]

Shannon K, Leiter K, Phaladze N, Hlanze Z, Tsai AC, Heisler M, … Weiser SD. Gender inequity norms are associated with increased male-perpetrated rape and sexual risks for HIV infection in Botswana and Swaziland. PLOS One. 2012; 7:e28739.doi: 10.1371/journal.pone.0028739 [PubMed: 22247761]

Sherman SG, German Y, Cheng M, Marks M, Bailey-Kloche M. The evaluation of the JEWEL project: An innovative economic enhancement and HIV prevention intervention study targeting drug using women involved in prostitution. AIDS Care. 2006; 18:1–11. DOI: 10.1080/09540120500101625 [PubMed: 16282070]

Sherman SG, Srikrishnan AK, Rivett KA, Liu SH, Solomon S, Celentano DD. Acceptability of a microenterprise intervention among female sex workers in Chennai, India. AIDS and Behavior. 2010; 14:649–657. DOI: 10.1007/s10461-010-9686-z [PubMed: 20352320]

Tsai AC, Hung KJ, Weiser SD. Is food insecurity associated with HIV risk? Cross-sectional evidence from sexually active women in Brazil. PLOS Medicine. 2012; 9:e1001203.doi: 10.1371/journal.pmed.1001203 [PubMed: 22505852]

Tsai AC, Leiter K, Heisler M, Iacopino V, Wolfe W, Shannon K, … Weiser SD. Prevalence and correlates of forced sex perpetration and victimization in Botswana and Swaziland. American Journal of Public Health. 2011; 101:1068–1074. DOI: 10.2105/AJPH.2010.300060 [PubMed: 21493950]

Tsai AC, Weiser SD. Population-based study of food insecurity and HIV transmission risk behaviors and symptoms of sexually transmitted infections among linked couples in Nepal. AIDS and Behavior. 2014; 18:2187–2197. DOI: 10.1007/s10461-014-0794-z [PubMed: 24833522]

Turan JM, Bukusi EA, Onono M, Holzemer WL, Miller S, Cohen CR. HIV/AIDS stigma and refusal of HIV testing among pregnant women in rural Kenya: Results from the MAMAS Study. AIDS and Behavior. 2011; 15:1111–1120. DOI: 10.1007/s10461-010-9798-5 [PubMed: 20827573]

Turan JM, Hatcher AM, Romito P, Mangone E, Durojaiye M, Odero M, Camlin CS. Intimate partner violence and forced migration during pregnancy: Structural constraints to women's agency. Global Public Health. 2015; 21:1–16. DOI: 10.1080/17441692.2015.1030684

Venkata, NA., Yamini, V. Why do microfinance clients take multiple loans? MicroSave India Focus Note 33. Uttar Pradesh: MicroSave; 2010 Feb. Retrieved from http://www.microsave.net/files/pdf/IFN_33_Why_Do_Microfinance_Clients_Take_Multiple_Loans.pdf

Vogenthaler NS, Kushel MB, Hadley C, Frongillo EA Jr, Riley ED, Bangsberg DR, Weiser SD. Food insecurity and risky sexual behaviors among homeless and marginally housed HIV-infected individuals in San Francisco. AIDS and Behavior. 2013; 17:1688–1693. DOI: 10.1007/s10461-012-0355-2 [PubMed: 23086429]

Weinhardt LS, Galvao LW, Mwenyekonde T, Grande KM, Stevens P, Yan AF, … Watkins SC. Methods and protocol of a mixed method quasi-experiment to evaluate the effects of a structural economic and food security intervention on HIV vulnerability in rural Malawi: The SAGE4Health study. SpringerPlus. 2014; 3:296.doi: 10.1186/2193-1801-3-296 [PubMed: 25019044]

Weinhardt LS, Galvão LW, Stevens PE, Masanjala WH, Bryant C, Ng'ombe T. Broadening research on microfinance and related strategies for HIV prevention: Commentary on Dworkin and Blankenship (2009). AIDS and Behavior. 2009; 13:470–473. DOI: 10.1007/s10461-009-9561-y [PubMed: 19363651]

Weiser SD, Bukusi EA, Steinfeld RL, Frongillo EA, Weke E, Dworkin SL, … Cohen CR. Shamba Maisha: Randomized controlled trial of an agricultural and finance intervention to improve HIV health outcomes in Kenya. AIDS. 2015; 29:1889–1894. DOI: 10.1097/QAD.0000000000000781 [PubMed: 26214684]

Weiser, SD., Hatcher, AM., Lemus Hufstedler, L., Weke, E., Dworkin, SL., Bukusi, EA., … Cohen, CR. Changes in health and antiretroviral adherence among HIV-infected adults in Kenya: Qualitative longitudinal findings from a livelihood intervention. 2016. Manuscript submitted for publication

Weiser SD, Leiter K, Bangsberg DR, Butler LM, Percy-de Korte F, Hlanze Z, … Heisler M. Food insufficiency is associated with high-risk sexual behavior among women in Botswana and Swaziland. PLoS Medicine. 2007; 4:1589–1597. DOI: 10.1371/journal.pmed.0040260 [PubMed: 17958460]

Weiser SD, Young SL, Cohen CR, Kushel MB, Tsai AC, Tien PC, … Bangsberg DR. Conceptual framework for understanding the bidirectional links between food insecurity and HIV/AIDS. American Journal of Clinical Nutrition. 2011; 94:1729S–1739S. DOI: 10.3945/ajcn.111.012070 [PubMed: 22089434]

Withers M, Dworkin SL, Zakaras JM, Onono M, Oyier B, Cohen CR, … Newmann SJ. 'Women now wear trousers': Men's perceptions of family planning in the context of changing gender relations in western Kenya. Culture, Health & Sexuality. 2015; 17:1132–1146. DOI: 10.1080/13691058.2015.1043144

Witte SS, Aira T, Tsai LC, Riedel M, Offringa R, Chang M, … Ssewamala F. Efficacy of a savings-led microfinance intervention to reduce sexual risk for HIV among women engaged in sex work: A randomized clinical trial. American Journal of Public Health. 2015; 105:e95–102. DOI: 10.2105/AJPH.2014.302291

World Health Organization (WHO), United Nations Children's Fund (UNICEF), & Joint United Nations Programme on HIV/AIDS (UNAIDS). Progress report 2011: Global HIV/AIDS response. Geneva: World Health Organization; 2011. Retrieved from http://www.who.int/hiv/pub/progress_report2011/en/

Table 1

Demographic characteristics of qualitative study participants from a multisectoral agricultural intervention in western Kenya (n =54)

Characteristics	*n* (%) or Median (IQR)
Participant group[a]	
Intervention (followed)	31 (57.4)
Intervention (once-off)	14 (25.9)
Control	9 (16.7)
Gender	
Female	26 (48.1)
Male	28 (51.9)
Age	38 (33–42)
Years on antiretroviral therapy	4 (2–6)
Marital status	
Married	20 (38.5)
Polygamous	11 (21.2)
Widow (single)	15 (28.8)
Widow (inherited)[b]	6 (11.5)
Children	3 (2–4)
Years farming	13 (5–20)

IQR interquartile range

[a]Followed intervention participants were interviewed early in the intervention (3–5 months after enrollment) and at the intervention end (at 12-month follow-up). The remaining intervention participants were interviewed once, at either time point. Control participants were interviewed at the end of the intervention.

[b]Indicates a woman who became the responsibility of a male in-law after the death of her husband.