



HHS Public Access

Author manuscript

J Assoc Nurses AIDS Care. Author manuscript; available in PMC 2018 August 17.

Published in final edited form as:

J Assoc Nurses AIDS Care. 2016 ; 27(1): 44–56. doi:10.1016/j.jana.2015.10.001.

ART Adherence as a Key Component of Prevention With Persons Living With HIV in Mozambique

Carol Dawson-Rose, PhD, RN, FAAN*,

Professor, Center for AIDS Prevention Studies, School of Nursing, University of California San Francisco (UCSF), San Francisco, California, USA

Sarah A. Gutin, MPH,

HIV Prevention Coordinator, Center for AIDS Prevention Studies, School of Nursing, UCSF, San Francisco, California, USA

Beverly Cummings, MPH,

Behavioral Scientist, Global AIDS Program, Centers for Disease Control and Prevention, Mozambique

Prafula Jaantilal, MSS,

Program Specialist, Global AIDS Program, Centers for Disease Control and Prevention, Mozambique

Kelly Johnson, MPH, and

Research Analyst, Prevention and Public Health Group, Global Health Sciences, UCSF, San Francisco, California, USA

Francisco Mbofana, MD, MIH

Scientific Director, Ministry of Health, National Institute of Health, Mozambique

Abstract

Medication adherence is an effective approach to prevent HIV transmission. In Mozambique, a country with a generalized epidemic, the government has adopted Positive Prevention (PP) training for clinicians as part of its national strategy. Our study, conducted after trainings in five clinics, examined the understanding of trained health care staff and their patients about the importance of adherence to antiretroviral therapy (ART), a key element of PP. Interviews with trained clinicians (n = 31) and patients (n = 57) were conducted and analyzed. Clinicians and patients demonstrated an understanding that ART adherence could decrease HIV transmission. However, participants also highlighted the difficulties of adherence when patients had limited access to food. At the same time that treatment as prevention awareness was increasing, poverty and widespread food insecurity were barriers to taking medications. In Mozambique, the full benefits of treatment as prevention may not be realized without adequate access to food.

*Correspondence to: Carol. Dawson-Rose@ucsf.edu).

Disclosures

The authors report no real or perceived vested interests that relate to this article that could be construed as a conflict of interest.

Keywords

adherence; clinical training; food insecurity; HIV prevention with PLWH; Mozambique

Global and U.S. domestic HIV prevention efforts have historically focused on uninfected communities and individuals. A newer strategy, beginning to show a positive impact on reducing HIV transmissions, is HIV prevention with persons living with HIV (PLWH), which is known as Positive Health, Dignity, and Prevention or Prevention with Persons with HIV, or Positive Prevention (PP; Bunnell, Mermin, & De Cock, 2006; Global Network of People Living with HIV & Joint United Nations Programme on HIV/AIDS, 2011). Positive Prevention has become a cornerstone of U.S. HIV prevention efforts (Centers for Disease Control and Prevention, 2014), and has been prioritized as a U.S. global strategy through the President's Emergency Plan for AIDS Relief (PEPFAR) Prevention Guidance. This "multi-component strategy" includes: (a) antiretroviral treatment (ART), (b) treatment adherence counseling and support, (c) sexually transmitted infection screening and treatment, (d) partner testing and disclosure, (e) risk reduction counseling including condom distribution, (f) prevention of mother-to-child vertical transmission (PMTCT), and (g) assessment and referral for family planning services. The goal of PP is to improve the quality of life and care for PLWH. The goal of our PP project was to enhance health care staff members' skills and comfort in addressing the prevention and care needs of PLWH. As part of the standard of care for HIV, PP services are optimally integrated into existing HIV care, treatment, and support services. Limited work in Southern Africa has demonstrated the acceptability and feasibility of PP in health-based settings (Cornman et al., 2008).

In 2010 and 2011, HIV prevention science received a boost when a series of studies showed that being on ART could reduce the transmission of HIV to seronegative partners by as much as 96% (Cohen et al., 2011). Other studies have shown that HIV treatment can be used to reduce the risk of primary HIV infection, with a microbicide trial showing that tenofovir gel reduced HIV acquisition by 39% overall, and by 54% in women with high adherence (Abdool Karim et al., 2010). Similarly, the iPrex study showed a 44% reduction in the incidence of HIV in men who have sex with men who were using ART for chemoprophylaxis (Grant et al., 2010). Despite these exciting developments in the use of treatment as prevention, when patients try to take medication and adhere to treatment in their day-to-day lives, they face a variety of barriers, such as drug abuse and alcohol consumption, stigma, HIV status disclosure concerns, limited availability and accessibility of ART, poverty, housing instability, and the unavailability of food needed to take with medications (Lyimo et al., 2012; Reda & Biadgilign, 2012).

In Mozambique, where the national prevalence of HIV is 11.5% (Instituto Nacional de Saúde, Instituto Nacional de Estatística, & ICF Macro, 2010), the government has made great strides in its HIV treatment efforts, first offering ART in 2003 and expanding access further in 2007 (Mozambique Ministry of Health, 2013). However, with only 38% of those eligible for ART actually taking medications, the benefits of ART as a wide-scale prevention approach cannot yet be fully realized (Instituto Nacional de Saúde et al., 2010). The approach is further undermined because most Mozambicans test late for HIV, when they are

already very ill and are likely to die before they see improvements from ART (Lahuerta et al., 2012). In order to address these issues, the Mozambique Ministry of Health (MOH) adopted PP as part of its national HIV prevention strategy, and PP was included as a priority in Mozambique's 2010-2014 National Strategic Plan for HIV/AIDS (Conselho Nacional de Combate à SIDA, 2009). Further, Mozambique plans to extend ART coverage to reach 80% of eligible patients by increasing the number of ART clinics from 316 in 2012 to 707 health centers around the country by 2015 (Mozambique Ministry of Health, 2013).

As part of this rapid scale-up of government-supported ART programs, the Mozambique MOH partnered with the University of California, San Francisco (UCSF) to adapt and pilot a 3-day PP training intervention. The theoretical basis of the training was the AIDS risk reduction model, which stipulates that risk behaviors can be changed incrementally with the goal of eliminating them over time. As part of the training, health care staff were encouraged to approach the topic of risk reduction with patients in a variety of ways, including discussing risk assessment, tailoring messages, and focusing on specific behaviors and assessing what a patient could do to decrease the risk of transmission to others. Key technical PP components included an overview of the PP model, risk reduction counseling, and prevention messages, and discussions about disclosure, partner testing, sexually transmitted infection treatment, family planning, PMTCT, ART adherence, community support, problematic alcohol and drug use, and living positively, which was defined as taking action related to one's health and well-being. Adherence to ART was presented as treatment but also as a method of decreasing the likelihood of transmission of HIV, especially in situations where other behavioral methods such as consistent condom use might not be possible. Teaching methods included experiential learning, didactic presentations, interactive skills-building activities, case-based discussions that highlighted opportunities for risk reduction, role plays, and simulated patient interactions.

Based on the HIV Intervention for Providers approach (Rose et al., 2010), health care staff who offered services to PLWH were trained: (a) to focus on building their own skills to assess behavioral and contextual risk in their patients, and (b) to provide a risk reduction-based prevention intervention focused on incremental change tailored to the patient's transmission risk behavior and prevention needs. The program consisted of a 3-day consecutive PP training that was delivered over a 2-year period at five sites in three provinces (Maputo, Sofala, and Zambézia). A qualitative evaluation found that the trainings were effective in transferring skills to health care providers (Gutin et al., 2014).

The study presented here was conducted as part of a secondary analysis of the larger qualitative evaluation. Our analysis explored the treatment adherence component of PP in order to better understand health care staff and patient perspectives related to treatment as prevention, what helps adherence, and the challenges that patients face to adherence, with the aim of identifying gaps and areas for improvement.

Methods

For the overall program evaluation, we conducted in-depth interviews in Mozambique with 44% of the health care staff who had attended PP training ($n = 31$) and with HIV-infected

patients ($n = 57$). Interviews with all health care staff and with PLWH were included in our analysis. The UCSF Committee on Human Research and the Mozambican MOH Bioethics Committee granted ethical approval for the study.

Study inclusion criteria for health care staff were: 18 years of age or older, fluency in Portuguese, participation in the PP training, and regular provision of care to HIV-infected patients. Criteria for patient eligibility were: a diagnosed HIV infection, ages 18 to 65 years, and receiving HIV care at a site where staff had participated in PP trainings. ART initiation was not an eligibility criterion for the overall study, but the analysis reported here was restricted to patients who were on ART (81%, $n = 57$). Interviews took place at MOH clinic sites in five rural areas of Mozambique that also received U.S. funding through PEPFAR for ART. The sites included the Namaacha Health Center and the Esperanca-Beluluane Counseling and Testing Center in Maputo Province, the Mafambisse Health Center in Sofala Province, and the Namacurra Health Center and the Inhassunge Hospital in Zambézia Province.

Study staff used PP training attendance lists to select eligible health care staff. Every other (i.e., every second) health care staff member on the list was selected for inclusion, with the goal of recruiting at least five health care staff participants at each site in Maputo and Zambézia Provinces. In Sofala Province, where trained staff came from health centers, nongovernmental organizations, and the government health department, health care staff were selected based on training attendance lists. The sample size was chosen based on prior qualitative research activities conducted in Mozambique and the project budget. Although achieving saturation was not a criterion used to establish the sample size, saturation was observed during analysis through the consistency and redundancy of information during the interviews (Pope, Ziebland, & Mays, 2000). Triage staff at the study sites recruited PLWH patients when they arrived for services. All providers and PLWH patients who were interested in participating in the study gave written informed consent prior to being interviewed. This analysis includes all 31 providers from the overall program evaluation, and the 57 PLWH who were on ART.

Health care staff who were trained and who participated in the interviews included several different cadres (medical technicians, nurses, counselors, social workers, peer counselors, and educators) who were employed in the health center, health sector, or voluntary counseling and testing centers. Although their education backgrounds and job functions differed, these cadres were chosen to receive PP training and to be included in the evaluation because they represented the various types of health care staff that had contact with the patient population. For example, counselors, social workers, and peer counselors/educators generally provided counseling and referred for clinical services. In contrast, medical technicians and nurses provided clinical care. While several physicians had received PP training, we were unable to recruit any for this study.

Data collection took place from January through June 2010 and involved one round of interviews at each study site. Two sites were evaluated 2 years after receiving the 3-day Positive Prevention training (Namaacha Health Center and Esperanca-Beluluane Counseling and Testing Center in Maputo Province); one site was evaluated 6 months post-training

(Mafambisse Health Center in Sofala Province); and two sites (Namacurra Health Center and Inhassunge Hospital in Zambézia Province) were evaluated 2 months post training. All interviews were conducted one-on-one by trained interviewers in private rooms at the sites or in other convenient, private spaces on the site grounds.

Health care staff interviews were conducted in Portuguese using a structured interview guide with questions focused on what they remembered from PP training and how they had used this information when they returned to their primary work sites. Interview questions were also designed to determine whether incorporating PP into clinic work was feasible and which topics were most useful when speaking to patients, e.g., *what skills or knowledge were you able to use when you returned to your work with HIV-infected individuals?* The same interview guide and questions were used for all health care staff who participated in the study. Based on our field observations, all cadres of staff in the health facilities were involved in many different aspects of care, for example, we observed three different types of staff: nurses, medical technicians, and counselors, advising and distributing HIV medications to patients.

Patient interviews focused on experiences and understanding of PP as it was addressed during the health care services they received. As part of the patient interview, we also collected demographic data (e.g., gender, age, primary occupation, marital status, number of living children, year of HIV diagnosis, ART status, and length of time on ART) and provided a short introduction to the definition of PP and its seven components. Patient interviews were conducted in Portuguese or in the local languages of the region (Changana, Sena, Ndaou, or Chuabo), depending on patient preferences. Interview questions focused on participant experiences in the health facilities and, specifically, whether and how staff addressed ways to decrease transmission to others. Participants were not asked about specific barriers to taking ART or treatment adherence in the interview, as the focus was on prevention methods that had been discussed by health care staff. Interviews ranged from 3 to 60 minutes.

All interviews were digitally recorded. Interviews that were conducted in Portuguese were transcribed verbatim. Those that were conducted in other languages were translated into Portuguese and transcribed. All of the transcripts were then translated into English, and back-translation was used to verify the accuracy of the translation on 25% of the transcriptions.

Qualitative content analysis was used to interpret interview data (Charmaz, 2004), and the AIDS Risk Reduction Model (Catania, Kegeles, & Coates, 1990) was used to frame the analysis theoretically. The analysis described here focused on patient and health care staff experiences with PP in the clinic setting, specifically with one of the PP components, adherence to ART.

The analytic team systematically worked through each transcript assigning a priori codes, which included (a) health care staff experiences in the training, (b) what they thought they had learned from the training, (c) how they applied the training after returning to their worksites, (d) their experiences using skills they had learned during the training, and (e) the

challenges of integrating HIV prevention into care. This method has been utilized by other studies that examined components of the PP approach (Liau et al., 2013).

The analysis reflects (a) health care staff perspectives on ART adherence in their PP work at clinics; (b) patient views on how they incorporated adherence outside of the clinic; and (c) PLWH challenges with adherence, which were mentioned frequently and by a majority of the respondents, despite no questions asked in the interviews about challenges. These stories exemplified the experiences, understanding, and some of the challenges of PP in these settings and offered insight into ART adherence in particular.

Results

Tables 1 and 2 present demographic characteristics of the 31 health care staff and 57 PLWH who participated in the study. The majority of the health care staff were female (55%), 30-39 years of age (52%), and counselors or social workers (61%). The majority of PLWH were women (72%), Portuguese speakers (59%), younger than 40 years of age (54%), married (44%), and had two or more children (61%). The average time since HIV diagnosis was 5 years. All patients were using ART and had been on treatment for an average of 2.5 years. A number of themes emerged from the data and, although the time from training to evaluation follow-up varied, we did not observe any marked variation in data collected at different follow-up times.

Health Care Staff Understanding of Treatment as Prevention

In interviews, it was clear that the concept of using ART to prevent HIV transmissions was familiar to most health care staff based on the PP training, previous education, and experience in PMTCT programs. Staff discussed their knowledge and skills for incorporating the role of ART as prevention and described a range of topics they discussed with HIV-infected patients: treatment as part of prevention (reduction of viral load), adherence to ART, and the need for pregnant women to stay on ART to prevent transmission. Staff showed they could develop their own scripts to communicate PP messages to patients and that they were able to promote strategies for concrete actions to make the theoretical concept of risk reduction meaningful.

Adhering to treatment prevents mother-to-child transmission of HIV—As one nurse described her understanding of the issue:

Positive Prevention is practically a part of everyday life ... I learned [in PP training] that, while condom use is a form of prevention, treatment was also part of prevention, because there are young HIV-positive people who want to have children, but when they are not being treated it is difficult for them to have children that are not HIV-positive. So I learned that the treatment reduces the viral load and they can have children who meet all PTV [prevention of vertical transmission] standards; they can have HIV-negative children. So it is important to encourage treatment, prevention, condom use, a change of behavior, and also fidelity to one's partner. (Nurse, Maputo Province)

A counselor explained that she learned about the risk of mother-to-child transmission of HIV during the PP training. With this new knowledge, she counseled PLWH about the importance of ART adherence:

The most important themes were regarding the transmission from a pregnant mother to her child ... some pregnant mothers when I see it, 6, 7 months pregnant and they have not been to the hospital to inquire about their health. I advise that person, “You have to go to the hospital, get prenatal care, so you know your status, you know. This is taking care of your child ... to not pass it if you have an illness or something ...” This theme was very important to me because I didn’t know it was a risk ... Just follow the medications properly, the treatments, the ... antiretroviral. Take it properly. Follow the schedule every day. To take this is prevention. (Counselor, Sofala Province)

Adhering to treatment helps patients feel healthier—Many health care workers said that feeling healthier was a motivating factor for patients to continue treatment.

You have to show the advantages and disadvantages of treatment. Then, we show the benefit of treatment for people to adhere. The person who is positive has to know there is no other alternative if you have HIV ... So here the work of the counselor is to demonstrate what the risks are that the positive person is running. Being positive does not mean that you cannot live. (Nurse, Zambezia Province)

One of the counselors talked about giving people their HIV test results and to stress that even with a positive result, life can go on, and the best way to achieve this is through medication.

I learned that someone who is positive we need to encourage their life, and in the sense that it doesn’t stop there. When they get the results, for example, we need to encourage them to continue with their life in a normal way and to do the treatments, this is one of the best ways we can encourage life by following the medication, and, being positive ... (Counselor, Maputo Province)

Adhering to treatment is effective even when patients are not adhering to other prevention methods—The PP training used a risk reduction approach. Remaining adherent to treatment was one option that health care staff could suggest to patients who were unable to institute other risk reduction techniques, such as abstaining from sex, using condoms, or asking partners to be tested. Health care staff members used conceptual thinking to integrate different components of PP into a patient’s specific life context. Although PP messages were concrete (e.g., disclose your serostatus to your partners and encourage them to be tested for HIV), the context of sexual partnerships can make it difficult or even impossible for individuals to change risk behaviors.

What I learned about Positive Prevention: Have safe sex with condoms, decrease the vices, smoking, alcohol, and adhere to the treatment medication and follow up. For Positive Prevention in one case I stress just follow the medications properly, the treatments, the anti-retroviral. Take it properly, follow the schedule every day and for the woman to speak to her husband is difficult and if she does but he refuses to

get tested ... I tell her keep following the medications, this is one way. I tell them to follow the treatments and that the disease cannot pass. (Medical Technician, Maputo Province)

PLWH Understanding of Treatment as Prevention

Interviews with PLWH paralleled those with the health care staff in many ways. Most PLWH confirmed receiving messages about PP and hearing from health care staff that adhering to medication was one of the most important actions they could engage for their own and for others' health.

Adhering to treatment prevents mother-to-child transmission of HIV—Several PLWH demonstrated an understanding that adhering to ART was one of the methods for decreasing the risk of HIV transmission to others, including unborn children.

From 4 months to 9 months, including the delivery that I had here at the hospital in August and they gave me medicine for me and my child to take home. When I got home, I complied with taking the medicine. Indeed I feel better and the baby has survived. Analyses were done in the third month and they told me that he's fine. After more tests for the child, they told me that he does not have HIV. I continue to take the medication now. (Female patient, Zambézia Province)

The treatment is going well ... I'm even gaining weight, the only problem is food, since a person with no money has difficulties ... If I did not comply, I would not have my one daughter ... who looks like me ... She is fine and does not have the virus. (Female patient, Maputo Province)

Adhering to treatment helps patients feel healthier—Some participants discussed how improvement in health following ART initiation lead to continued treatment adherence.

... After I took the test and after being told I was positive, there was a moment where I gave up, I did not come for the checkups, I had a relapse with this disease and got diarrhea. That is how I proved that it actually is a risk. And when I ... returned, the medical workers ... started counseling me. From there is when I really started to prove that when I stop, I suffer ... I must ... take this medication forever. (Patient, Sofala Province)

Adhering to treatment extends lives—A critical element for promoting ART adherence has been helping patients understand that the medications can make a substantial difference in extending their lives.

I have been given advice about prevention. I was told to reduce my vices, to not drink, to only have one woman, to use condoms, and to take the medicines on time. Yes, at the clinic they discussed Positive Prevention with me. I understand a positive person has to know that this is not the end of their life. Adhere to your treatment ... You have to prevent against HIV transmission [to others]. (Patient, Maputo Province)

My sister has given me much strength and courage. I also do not flinch because I saw that treatment is the best route to save my life. Right now I'm feeling much better than back then, and I continue to take my medication. (Patient, Maputo Province)

Health Care Staff Citing Food Insecurity as a Factor in Treatment Nonadherence

Although PLWH participants mentioned factors such as improved health, reduced HIV transmission, and family support as facilitating medication adherence, continuing to take medications was not always easy. Part of the story of living with HIV in Mozambique has been the general hardship that PLWH face living in poverty. Food and the lack of food were cited 134 times in the interviews. More than 60% of health care staff and PLWH talked about it as a challenge. Antiretrovirals are powerful medications and taking them on an empty stomach can cause patients to feel ill. Thus, nutrition and the availability of food are important for a patient's ability to adhere to treatment.

Lack of food and living in poverty are barriers—Health care staff made a direct link between lack of access to food and ART adherence:

What hinders Positive Prevention for our patients, from what I can see, they complain most about poverty, not having food or anything, and then when they agree to comply with treatment and the treatment is heavy and they have nothing. I have nothing else to offer them. In this case it is hard to have nothing to offer them for their poverty and only treatments. It is difficult to say this to the patient. (Nurse, Maputo Province)

Many health care staff members discussed limitations of health support systems to respond adequately to social factors exacerbating the HIV epidemic, such as poverty and food insecurity, and noted the lack of infrastructure to provide and distribute food.

I first try to find out what means the person is living with ... to see if the person has proper nutrition, or not. If not, I ... tell the person to go ... to a help center if they do not have the means, and say that they don't have the means and do not have proper nutrition, because you need to eat. Of the people that I have attended to, many do not have the means ... Last month I attended to a patient who said, "Okay I'm HIV positive," ... someone who isn't eating well ... "I do not have the means and what I do?" So I had nothing to give, only 2 meticaïs [currency] that I gave him. It's a way to help, then I said it's not like that money is going to help you for the rest of your life, but wherever you go, you need to say that you do not have the means. Because there are people who give food, they do not give everything, but at least they give a few things. (Counselor, Sofala Province)

Some people are willing to take medications, but they may die of hunger—Health care staff emphasized that a willingness to adhere to ART was insufficient to maintain health when patients were starving.

In Positive Prevention the first thing we had to talk about was being HIV-positive. What an HIV-positive person should do and what not to do and what that person's

behavior should be ... A little thing, not much, but some people have the desire to take the pills but the people who die, it's due to not having anything to eat.
(Counselor, Maputo Province)

PLWH Citing Food Insecurity as a Factor in Treatment Nonadherence

PLWH cited the lack of food as the major barrier to medication adherence.

People sometimes stop taking their medications when they lack access to food—Patients said they often must decide whether to continue taking medications when they have no food, and whether the lack of food makes treatment too difficult to continue.

A lot of people are giving up their treatment because of hunger. A lot of people are losing their lives because of hunger. This year, it is going to be worse, we don't have anything because the sun burnt everything. And a lot of people are giving up because of hunger, because to take this medicine you need to have something in your stomach. But there is nothing, so instead of getting better, the disease is getting worse. (Patient, Maputo Province)

Having more food gives PLWH the strength to undergo treatment—Patients spoke specifically about needing sufficient food to make taking strong ART medications possible. "The drugs that we are receiving and taking should be accompanied with a distribution of food to have the strength to endure taking the medicine" (Patient, Sofala Province).

Yeah, I take the medicine but what saddens me most is hunger, because there is nothing on the farm, everything is dry from the lack of rain, and the medication is strong. The person must eat right, so that your body can function. Hunger is the only problem for now. I still cannot stop taking the medication because without it I don't feel well. I won't live. (Patient, Maputo Province)

To date we have not had anything to eat, but even so we have not given up taking the medicine because we want to stay alive. When there is food we eat, when there isn't, we're patient. We have a tough life due to the lack of food. Sometimes I take the medicine and I feel dizzy and I know that it is due to a lack of adequate food, but I cannot do anything, I still take it. You also cannot do heavy work. Because to eat better I need to do contract work and go to my farm. It would be too much and I can't handle it. (Patient, Zambezia Province)

Discussion

In this analysis of ART adherence as a PP message in Mozambique, health care staff who had participated in the PP training demonstrated an understanding of the importance of ART not only as treatment for HIV, but also as a mechanism for preventing transmission to sexual partners and unborn children. In addition, health care workers were able to develop their own scripts to deliver this message to patients. Similarly, PLWH interviewees from sites with PP-trained health care staff reported receiving this message and demonstrated an understanding of the role that ART played in preventing the transmission of HIV to others as

part of a risk-reduction strategy. These findings reinforced other research that indicated the critical role health care staff can play in promoting ART adherence as one aspect of managing HIV infection (Altice, Maru, Bruce, Springer, & Friedland, 2007).

From the PLWH perspective, ART adherence has played a central role in decreasing morbidity and extending life, thus providing patients with an incentive to continue treatment. These data also demonstrate PLWH understanding that ART can help decrease transmission of HIV to others, and interviews confirmed that health care staff had provided this information. There have been limited published data on patient understanding of treatment as prevention and, as such, our data add to the knowledge base on patient understanding of this concept in sub-Saharan Africa (Boateng, Kwabong, & Agyei-Baffour, 2013).

Although both patients and health care staff understood and accepted treatment adherence as an important mechanism for improved health and reduced HIV transmission, both groups repeatedly mentioned food insecurity as arguably the greatest barrier to adherence for PLWH. Food insecurity has been defined as “having uncertain or limited availability of nutritionally adequate or safe food or the inability to procure food in socially acceptable ways” (Weiser et al., 2009, p. 16). The United Nations Development Program has estimated that the majority of individuals in Mozambique live in poverty (World Bank Group, 2012). The percentage of the population estimated to be food insecure has been reported to be more than 60%, and as high as 75% in the southern region of the country (World Bank, 2013).

Food insecurity has been strongly associated with poor ART adherence (Lamb, El-Sadr, Geng, & Nash, 2012; Ware et al., 2009; Weiser et al., 2009; Young, Wheeler, McCoy, & Weiser, 2014), lower viral load suppression (Wang et al., 2011), and earlier death from HIV (Weiser et al., 2009). A small study from Zambia (Cantrell et al., 2008) demonstrated better adherence in PLWH who received food supplementation compared to patients who did not, and other research in sub-Saharan Africa has supported this approach (Musumari et al., 2014). Several studies have also found a relationship between food insecurity and higher rates of HIV transmission risk behaviors, such as increased sexual risk-taking and increased sexual vulnerability in women (Miller et al., 2011; Weiser et al., 2007). Findings from our study add to this literature and suggest that, as our understanding of treatment as a key approach to prevention grows (Cohen et al., 2011) and as HIV treatment initiatives play a greater part of global strategies to decrease HIV, the effectiveness of these interventions may be challenged by a failure among global and local HIV prevention policy experts to address the basic needs of individuals and the relationships these have with the ability to take medications and change behaviors. As treatment access increases in Mozambique with government efforts to increase the number of clinical sites, barriers to adherence may become more pronounced. Interventions that address barriers to adherence should accompany efforts to scale up treatment so that maximum gains in treatment coverage and adherence can be achieved.

Our data highlight the need for a more systematic effort to understand the role of food insecurity (Aberman, Rawat, Drimie, Claros, & Kadiyala, 2014; Young et al., 2014) as a barrier to adherence in this population and the need to examine approaches to address this issue. Various other countries that have documented food insecurity in PLWH have

implemented small interventions that focus on integrating food or agricultural programs with HIV activities. These have been promoted by international organizations including the World Health Organization, the Joint United Nations Programmes on HIV/AIDS, and the World Food Program (World Food Programme, 2003). Recent studies also have shown that microfinance programs can have a positive impact on HIV prevention by reducing risky behaviors and providing opportunities for women's empowerment (Pronyk et al., 2008). A pilot project in Kenya showed that a microfinance-based agricultural support program integrated with HIV care led to increased food for consumption in the home, improvements in agricultural output and income, and particular benefits for women living in poverty (Pandit et al., 2010). There is agreement that food insecurity is related to both risk of HIV acquisition and HIV outcomes, and that improving food security could improve HIV outcomes, including adherence (Aberman et al., 2014; Young et al., 2014). However, future research, including longitudinal studies that can clearly link these small interventions (e.g., microfinance programs) to improved HIV-related outcomes, is needed.

Limitations

Our study had several limitations. Based on experiences working with PLWH activist partners and patients (Rose et al., 2010) in prior intervention development, we anticipated a more collaborative relationship with HIV-infected Mozambicans. While our initial efforts to adapt this intervention involved PLWH on an individual level, greater involvement with PLWH civil society groups was challenging. Civil society in Mozambique is beginning to grow (Francisco, Mucavele, Monjane, & Seuane, 2007), and the fear of unwanted family or public attention that can come with HIV activism may have impacted our collaborative efforts. A second limitation of our study was that the health care staff and patients represented here were drawn from health facilities in three of Mozambique's 11 provinces. Because some of these were sites where the program had been in place for some time, these staff may have overrepresented those likely to integrate components of PP into their work. Although physicians were included in those who received PP training, interviews took place during normal clinic hours and no physicians were available during those times. This challenge was a reflection of the scarcity of physicians in clinical settings and the patient burden. With very few clinical staff available, trainings must account for the fact that individuals being trained to deliver PP messages have differing job functions, differing education backgrounds, and, thus, differing abilities to learn and communicate PP messages to patients. Also, the goal was to recruit at least five health care staff participants at each site for a total of 10 per province. This sample size was devised in order to capture the different experiences of participants in the PP training and the patients they saw. Researchers also did not employ some of the methods routinely utilized in qualitative studies, such as reaching saturation in the data (Charmaz, 2004).

Health care staff members were not all interviewed at the same length of time after receiving training, and staff trained 2 years prior to this evaluation had received ongoing small-group follow-up and technical assistance sessions during that time. It is possible that the varying lengths of time from training to interview may have affected recall and the degree to which health care staff were using PP interventions in their work. We did not, however, observe any noticeable variation in data based on the time from training to evaluation follow-up.

The results presented here do not represent all of the experiences of study participants but are, instead, a focused analysis of interview transcripts chosen because participants spoke specifically about ART in the context of prevention. As such, the quotes presented do not represent all of the messages that health care staff provided or that the patients reported receiving. In addition, interview responses about adherence as a prevention strategy were focused on content provided in the PP trainings and did not address the overall treatment and adherence approaches in Mozambican clinics. Perhaps because of this, treatment side effects as a barrier to PP, as noted in other literature (Barnighausen et al., 2011), did not emerge in patient or health care staff interviews. Further, interviewers did not prompt participants to speak specifically about HIV treatment with medication or adherence; rather, they asked about methods that would result in decreased transmission of HIV. The questions and analyses were framed using the AIDS Risk Reduction Model (Catania et al., 1990), as was the training, to focus on different methods to decrease transmission and, as such, adherence to medication was not the focus of the parent study or this analysis.

Finally, the use of multiple interviewers and different languages in some settings was a limitation. Steps were taken to reduce bias by standardizing interviewer guidelines and providing training and supervision of all interviewers. Despite these limitations, the results document how PP was implemented in specific settings in Mozambique and what some of the barriers to adherence were.

Conclusions

Findings from our study indicated that treatment adherence was an acceptable prevention approach taught by health care staff and incorporated by PLWH to prevent onward transmission of HIV in Mozambique. Health care staff who attended the PP training reported using the message of ART adherence as a PP strategy in their practices, and PLWH who were interviewed named ART adherence as one of the ways to prevent HIV transmission. Not all participants in the study discussed all seven components of PP, but this analysis found that both health care staff and PLWH understood ART adherence as one PP component. Presentation of the topic by health care staff and comprehension by patients were found to be feasible and effective.

While the issues of food insecurity and poverty emerged strongly in the data, neither treatment nor prevention approaches have historically promoted food supplementation as an important component for adherence success in Mozambique. The results of our study suggest that this country's initiatives to scale up ART and encourage adherence promise to provide important and effective HIV prevention efforts, but may be compromised if food insecurity is not addressed.

Acknowledgments

This research has been supported by the President's Emergency Plan for AIDS Relief (PEPFAR) through the Centers for Disease Control Mozambique under the terms of Grant Number H-F3-MOZ-07-PTR-PWPS. We gratefully acknowledge the patients and clinical staff in Mozambique who participated in the Positive Prevention Project.

References

- Abdool Karim Q, Abdool Karim SS, Frohlich JA, Grobler AC, Baxter C, Mansoor LE, Taylor D. Effectiveness and safety of tenofovir gel, an antiretroviral microbicide, for the prevention of HIV infection in women. *Science*. 2010; 329(5996):1168–1174. [PubMed: 20643915]
- Aberman NL, Rawat R, Drimie S, Claros JM, Kadiyala S. Food security and nutrition interventions in response to the AIDS epidemic: Assessing global action and evidence. *AIDS and Behavior*. 2014; 18(Suppl 5):S554–S565. [PubMed: 24943352]
- Altice FL, Maru DS, Bruce RD, Springer SA, Friedland GH. Superiority of directly administered antiretroviral therapy over self-administered therapy among HIV-infected drug users: A prospective, randomized, controlled trial. *Clinical Infectious Diseases*. 2007; 45(6):770–778. [PubMed: 17712763]
- Barnighausen T, Chaiyachati K, Chimbindi N, Peoples A, Haberer J, Newell ML. Interventions to increase antiretroviral adherence in sub-Saharan Africa: A systematic review of evaluation studies. *Lancet Infectious Diseases*. 2011; 11(12):942–951. [PubMed: 22030332]
- Boateng D, Kwapong GD, Agyei-Baffour P. Knowledge, perception about antiretroviral therapy (ART) and prevention of mother-to-child-transmission (PMTCT) and adherence to ART among HIV positive women in the Ashanti Region, Ghana: A cross-sectional study. *BMC Women's Health*. 2013; 13:2. [PubMed: 23336813]
- Bunnell R, Mermin J, De Cock KM. HIV prevention for a threatened continent: Implementing positive prevention in Africa. *Journal of the American Medical Association*. 2006; 296(7):855–858. [PubMed: 16905790]
- Cantrell RA, Sinkala M, Megazinni K, Lawson-Marriott S, Washington S, Chi BH, Stringer JS. A pilot study of food supplementation to improve adherence to antiretroviral therapy among food-insecure adults in Lusaka, Zambia. *Journal of Acquired Immune Deficiency Syndromes*. 2008; 49(2):190–195. [PubMed: 18769349]
- Catania JA, Kegeles SM, Coates TJ. Towards an understanding of risk behavior: An AIDS risk reduction model (ARRM). *Health Education Quarterly*. 1990; 17(1):53–72. [PubMed: 2318652]
- Centers for Disease Control and Prevention. Recommendations for HIV prevention with adults and adolescents with HIV in the United States. 2014. Retrieved from <http://stacks.cdc.gov/view/cdc/26062>
- Charmaz K. Premises, principles, and practices in qualitative research: Revisiting the foundations. *Qualitative Health Research*. 2004; 14(7):976–993. [PubMed: 15296667]
- Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, Fleming TR. Prevention of HIV-1 infection with early antiretroviral therapy. *New England Journal of Medicine*. 2011; 365(6):493–505. [PubMed: 21767103]
- Conselho Nacional de Combate à SIDA. National Strategic Plan for HIV and AIDS 2010-2014. Maputo, Mozambique: Government of Mozambique; 2009. Retrieved from http://www.aidstar-one.com/sites/default/files/prevention/resources/national_strategic_plans/Mozambique_05-09.pdf
- Cornman DH, Kiene SM, Christie S, Fisher WA, Shuper PA, Pillay S, Fisher JD. Clinic-based intervention reduces unprotected sexual behavior among HIV-infected patients in KwaZulu-Natal, South Africa: Results of a pilot study. *Journal of Acquired Immune Deficiency Syndromes*. 2008; 48(5):553–560. [PubMed: 18645518]
- Francisco A, Mucavele A, Monjane P, Seuane S. Mozambican Civil Society Within: Evaluation, Challenges, Opportunities and Action. Mozambique: Civil Society Index-Mozambique; 2007.
- Global Network of People Living with HIV & Joint United Nations Programme on HIV/AIDS. Positive health, dignity and prevention: A policy framework. 2011. Retrieved from http://www.unaids.org/sites/default/files/media_asset/20110701_PHDP_0.pdf
- Grant RM, Lama JR, Anderson PL, McMahan V, Liu AY, Vargas L, Glidden DV. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *New England Journal of Medicine*. 2010; 363(27):2587–2599. [PubMed: 21091279]
- Gutin SA, Cummings B, Jaiantilal P, Johnson K, Mbofana F, Rose CD. Qualitative evaluation of a Positive Prevention training for health care providers in Mozambique. *Evaluation and Program Planning*. 2014; 43:38–47. [PubMed: 24291214]

- Instituto Nacional de Saúde, Instituto Nacional de Estatística & ICF Macro. Inquérito Nacional de Prevalência, Riscos Comportamentais e Informação sobre o HIV e SIDA em Moçambique 2009 [National Institute of Health, National Institute of Statistics Prevalence of National Survey, Behavioral Risks and Information about HIV and AIDS]. Calverton, Mozambique: INS, INE e ICF Macro; 2010.
- Lahuerta M, Lima J, Nuwagaba-Biribonwoha H, Okamura M, Alvim MF, Fernandes R, Nash D. Factors associated with late antiretroviral therapy initiation among adults in Mozambique. *PLoS One*. 2012; 7(5):e37125. [PubMed: 22615917]
- Lamb MR, El-Sadr WM, Geng E, Nash D. Association of adherence support and outreach services with total attrition, loss to follow-up, and death among ART patients in sub-Saharan Africa. *PLoS One*. 2012; 7(6):e38443. [PubMed: 22685569]
- Liau A, Crepaz N, Lyles CM, Higa DH, Mullins MM, DeLuca J, Marks G. Interventions to promote linkage to and utilization of HIV medical care among HIV-diagnosed persons: A qualitative systematic review, 1996-2011. *AIDS and Behavior*. 2013; 17(6):1941–1962. [PubMed: 23456593]
- Lyimo RA, de Bruin M, van den Boogaard J, Hospers HJ, van der Ven A, Mushi D. Determinants of antiretroviral therapy adherence in northern Tanzania: A comprehensive picture from the patient perspective. *BMC Public Health*. 2012; 12:716. [PubMed: 22935331]
- 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(7):1512–1519. [PubMed: 20405316]
- Mozambique Ministry of Health. Plano de Aceleração da Resposta ao HIV e SIDA em Moçambique 2013-2015 [National HIV/AIDS Acceleration Plan]. Maputo: Government of Mozambique; 2013. Retrieved from <http://www.pepfar.gov/documents/organization/222174.pdf>
- Musumari PM, Wouters E, Kayembe PK, Kiumbu Nzita M, Mbikayi SM, Suguimoto SP, Kihara M. Food insecurity is associated with increased risk of non-adherence to antiretroviral therapy among HIV-infected adults in the Democratic Republic of Congo: A cross-sectional study. *PLoS One*. 2014; 9(1):e85327. [PubMed: 24454841]
- Pandit JA, Sirotnin N, Tittle R, Onjolo E, Bukusi EA, Cohen CR. Shamba Maisha: A pilot study assessing impacts of a micro-irrigation intervention on the health and economic wellbeing of HIV patients. *BMC Public Health*. 2010; 10:245. [PubMed: 20459841]
- Pope C, Ziebland S, Mays N. Analysing qualitative data. *British Medical Journal*. 2000; 320(7227): 114–116. [PubMed: 10625273]
- 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(13):1659–1665. [PubMed: 18670227]
- Reda AA, Biadgilign S. Determinants of adherence to antiretroviral therapy among HIV-infected patients in Africa. *AIDS Research and Treatment*. 2012; 2012:574656. [PubMed: 22461980]
- Rose CD, Courtenay-Quirk C, Knight K, Shade SB, Vittinghoff E, Gomez C, Colfax G. HIV intervention for providers study: A randomized controlled trial of a clinician-delivered HIV risk-reduction intervention for HIV-positive people. *Journal of Acquired Immune Deficiency Syndromes*. 2010; 55(5):572–581. [PubMed: 20827218]
- Wang EA, McGinnis KA, Fiellin DA, Goulet JL, Bryant K, Gibert CL, Justice AC. Food insecurity is associated with poor virologic response among HIV-infected patients receiving antiretroviral medications. *Journal of General Internal Medicine*. 2011; 26(9):1012–1018. [PubMed: 21573882]
- Ware NC, Idoko J, Kaaya S, Biraro IA, Wyatt MA, Agbaji O, Bangsberg DR. Explaining adherence success in sub-Saharan Africa: An ethnographic study. *PLoS Medicine*. 2009; 6(1):e11. [PubMed: 19175285]
- Weiser SD, Fernandes KA, Brandson EK, Lima VD, Anema A, Bangsberg DR, Hogg RS. The association between food insecurity and mortality among HIV-infected individuals on HAART. *Journal of Acquired Immune Deficiency Syndromes*. 2009; 52(3):342–349. [PubMed: 19675463]
- 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(10):1589–1597. discussion 1598. [PubMed: 17958460]

- World Bank. World Bank supports Mozambique's safety net for the poor and capacity building for natural gas, mining industries. 2013. Retrieved from <http://www.worldbank.org/en/news/press-release/2013/03/28/world-bank-supports-mozambique-safety-net-poor-capacity-building-natural-gas-mining-industries>
- World Bank Group. World development indicators 2012. Washington, D.C: World Bank Publications; 2012. Retrieved from <http://data.worldbank.org/sites/default/files/wdi-2012-ebook.pdf>
- World Food Programme. Programming in the era of AIDS: WFP's response to HIV/AIDS. 2003. Retrieved from <https://www.wfp.org/sites/default/files/Programming%20in%20the%20Era%20of%20AIDS%20WFP%27s%20Response%20to%20HIV%3AAIDS.pdf>
- Young S, Wheeler AC, McCoy SI, Weiser SD. A review of the role of food insecurity in adherence to care and treatment among adult and pediatric populations living with HIV and AIDS. *AIDS and Behavior*. 2014; 18(Suppl 5):S505–S515. [PubMed: 23842717]

Key Considerations

- Clinicians and people living with HIV (PLWH) in a low-income country understand the role of antiretroviral therapy (ART) in preventing HIV transmission.
- ART is an effective HIV prevention strategy for PLWH who may not be able to disclose their status or consistently use condoms.
- Lack of food may hinder the ability of PLWH to stay adherent to ART.
- Treatment as prevention and large-scale rollout of HIV treatment may be limited in their scope without addressing poverty and lack of food.

Table 1Health Care Staff Demographics ($N = 31$)

Characteristic	Total Number of Health Care Staff $N = 31$ (%)
Gender	
Female	17 (55)
Male	14 (45)
Language	
Portuguese	31 (100)
Age, years	
<30	8 (26)
30–39	16 (52)
40	7 (22)
Interview provinces	
Maputo (2 sites)	9 (29)
Sofala (1 site)	10 (32)
Zambézia (2 sites)	12 (39)
Occupation	
Counselor/social worker	19 (61)
Medical technician	2 (6)
Nurse	3 (10)
Peer counselor/educator	4 (13)
Program manager	1 (3)
Pharmacist/lab technician	2 (6)

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2Patient Demographics ($N = 57$)

Characteristic	Total number of patients $N = 57$ (%)
Gender	
Female	41 (71.9)
Male	16 (28.1)
Language	
Changana	15 (26.3)
Sena/Ndau	3 (5.3)
Portuguese	33 (57.9)
Chuabo	6 (10.5)
Age, years	
<30	17 (29.8)
30–39	14 (24.6)
40	25 (43.9)
Unknown	1 (1.8)
Interview provinces	
Maputo	24 (42.1)
Sofala	18 (31.6)
Zambézia	15 (26.3)
Occupation	
Farmer/“machamba”	16 (28.1)
Sells in market	3 (5.3)
Domestic worker	8 (14.0)
Teacher or student	3 (5.3)
Unemployed	10 (17.5)
Other/unknown	17 (15.8)
Marital status	
Married	25 (43.9)
Single or separated	15 (26.3)
Widowed	7 (12.3)
Divorced	1 (1.8)
Unknown	9 (8.8)
Number of children	
0	5 (8.8)
1	12 (21.0)
2	7 (12.3)
3	10 (17.5)
4	18 (31.6)
Unknown	5 (8.8)
Year of HIV diagnosis	
Pre–2000	2 (3.5)

Characteristic	Total number of patients <i>N</i> = 57 (%)
2000–2005	8 (14.0)
2006–2010	24 (42.1)
Not reported	23 (40.4)
Year of ART initiation	
2004–2005	5 (8.8)
2006–2007	18 (31.6)
2008–2010	21 (36.8)
Unknown	13 (22.8)
Mean number of months on ART (SD)	29.7 (22.7)

Note. ART = Antiretroviral therapy.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript