Using Intervention Mapping methodology to design an HIV linkage intervention in a refugee settlement in rural Uganda

Miranda Ravicz[a], **Bernadette Muhongayire**[b], **Stella Kamagaju**[b], **Robin E. Klabbers**[c], **Zikama Faustin**[b], **Andrew Kambugu**[d], **Ingrid Bassett**[e], **Kelli O'Laughlin**[f]

[a]Departments of Internal Medicine and Pediatrics, Massachusetts General Hospital, Boston, MA, USA;

[b]Bugema University, Kampala, Uganda;

[c]Faculty of Health, Medicine and Life Sciences, Maastricht University, Maastricht, the Netherlands;

[d]Infectious Diseases Institute, Makerere University College of Health Sciences, Kampala, Uganda;

[e]Department of Medicine, Massachusetts General Hospital, Boston, MA, USA;

[f]Departments of Emergency Medicine and Global Health, University of Washington, Seattle, WA, USA

Abstract

Nearly 80 million people have been forcibly displaced by persecution, violence, and disaster. Displaced populations, including refugees, face health challenges such as resource shortages, food and housing insecurity, violence, and disrupted social support. People living with HIV in refugee settings have decreased engagement with HIV services compared to non-refugee populations, and interventions are needed to enhance linkage to care. However, designing health interventions in humanitarian settings is challenging. We used Intervention Mapping (IM), a six-step method for developing theory- and evidence-based health interventions, to design a program to increase linkage to HIV care for refugees and Ugandan nationals in Nakivale Refugee Settlement in Uganda. We engaged a diverse group of stakeholders ($N = 14$) in Nakivale, including community members and humanitarian actors, in an interactive workshop focusing on IM steps 1–4. We developed a chronic care program that would integrate HIV care with services for hypertension and diabetes at accessible community sites, thereby decreasing stigma around HIV treatment and improving access to care. IM provided an inclusive, efficient method for integrating community members and program implementers in the intervention planning process, and can be used as a method-driven approach to intervention design in humanitarian settings.

CONTACT Miranda Ravicz, mravicz@mgh.harvard.edu, Departments of Internal Medicine and Pediatrics, Massachusetts General Hospital, 55 Fruit Street, Boston, MA, USA.

Keywords

Refugee; HIV; linkage; Intervention Mapping; Uganda

Introduction

Uganda is home to 1.4 million refugees, the third largest refugee population in the world (UNHCR, 2020). Displaced populations, including refugees, face particular health challenges: prior and ongoing trauma including sexual and gender-based violence, impoverishment and food insecurity, unstable and unsafe housing, destruction of infrastructure, the presence of military forces and armed groups, eroded social support, and disrupted behavioral norms (IASC Task Force on HIV/AIDS in Emergency Settings, 2003; UN Food and Agriculture Organization, 2010; UNHCR, 2017). In this challenging context, there is rapid spread of infectious diseases, including sexually transmitted infections such as HIV, and inadequate management of chronic health issues (IASC Task Force on HIV/AIDS in Emergency Settings, 2003).

Designing health interventions in humanitarian settings is difficult and complex, and empiric evidence from non-emergency settings may not be generalizable. Both the performance of health systems and the health behaviors of individual people are altered by the challenges of the humanitarian context. Furthermore, the experience of displaced people varies by country of origin, and it evolves over time and space – from the acute emergency, to transit through unsafe territories, to residence in camps, to assimilation into a host population or longer-term refugee settlement (Wirtz et al., 2013).

The data on designing optimal health interventions for humanitarian settings are relatively sparse; data collection is difficult, and research has often been deprioritized in favor of quick implementation of life-saving interventions (UNHCR, 2002). However, with growing recognition that program efficacy is critically important to the populations affected by crises, and that well-intentioned aid programs can have adverse consequences, there has been increased emphasis on monitoring and evaluation of health interventions (UNHCR, 2002).

Lessons have emerged. Organizations must coordinate their efforts in order to address gaps and avoid duplication in services, and at-risk groups including women, children, and mobile populations may need specific programming (IASC Task Force on HIV/AIDS in Emergency Settings, 2003). Additionally, the target populations, local and national governments, and supporting organizations should be involved in resource allocation and program design to ensure that interventions are culturally appropriate and acceptable to the target populations, without perpetuating discrimination and stereotypes (IASC Task Force on HIV/AIDS in Emergency Settings, 2003; UN Food and Agriculture Organization, 2010).

Designing interventions to improve HIV care cascade outcomes for displaced populations is crucial for achieving UNAIDS treatment targets (UNAIDS Programme Coordinating Board, 2020). The steps in the HIV care cascade are HIV testing, linkage to care, initiation of antiretroviral therapy (ART), suppression of viral load, and retention in care (Gardner et al., 2011). In Nakivale Refugee Settlement in Uganda, 6850 people (70% of whom were

refugees) were voluntarily tested for HIV from March 2013 to October 2014. The HIV prevalence among refugees was 2% and the prevalence among Ugandans was 9%, compared to a Ugandan national prevalence of 6.0% in 2016 (Uganda AIDS Commission, 2017). Of the people who tested positive for HIV, only 54% linked to care within 90 days after diagnosis (O'Laughlin et al., 2017), compared to 74% in another Ugandan cohort (Billioux et al., 2017) and 61% overall for sub-Saharan Africa (Sharma et al., 2015). This suggests that there may be particular barriers to engaging with HIV care in the refugee settlement. None of the following demographic variables were significantly associated with linkage to care: gender, age, refugee status, country of origin, residence in Nakivale, distance from clinic, years living in Nakivale, relationship status, education level, knowledge about HIV, or prior negative HIV test (O'Laughlin et al., 2016). This suggests that engagement with HIV care may be associated with more complex factors, such as mental health and substance use, HIV stigma and social support, or migration patterns and resettlement policies.

Intervention Mapping (IM) is a method for developing health promotion programs (Bartholomew et al., 1998; Bartholomew Eldredge et al., 2016) that builds on previous health intervention models (Green et al., 2005; Kirby, 2001) to bridge across theory, empiric evidence, and practical implementation. Its iterative step-by-step approach facilitates stakeholder participation throughout the intervention planning process (Bartholomew Eldredge et al., 2016). IM has been used in diverse settings to design interventions for reducing sexually transmitted infections and improving adherence to treatment (Côté et al., 2008; Mkumbo et al., 2009). Few studies have attempted to quantify the effect of IM on the efficacy of health interventions, but one systematic review concluded that programs designed using the IM approach had better uptake compared to control programs (Garba & Gadanya, 2017).

Based on the adaptability, efficacy, and emphasis on participation of diverse stakeholders, we selected IM as a method for designing a program to enhance linkage to HIV care for individuals newly diagnosed with HIV in Nakivale Refugee Settlement.

Methods

Overview of IM steps

A working group of stakeholders is selected to participate in the six-step intervention planning process (Table 1). In Step 1, a needs assessment is performed to characterize the health problem that will be addressed by the intervention. The health problem is described according to the PRECEDE model, which is an established framework for assessing health needs and applying theories to health interventions (Figure 1) (Green et al., 2005). In Step 2, the goals of the intervention are established. In Step 3, theory-based change methods and practical applications are selected. In Step 4, program materials are designed and piloted. In Step 5, a plan is developed for adoption, implementation, and maintenance of the intervention. In Step 6, indicators and measures are selected to assess the intervention (Bartholomew Eldredge et al., 2016).

Application of IM in Nakivale Refugee Settlement

Study setting—Nakivale Refugee Settlement in Uganda hosts over 100,000 refugees from the Democratic Republic of the Congo, Somalia, Burundi, Rwanda, and other countries (UNHCR, 2019). There are four health centers in the settlement, which are attended by refugees and Ugandan nationals living in and around Nakivale. As part of an ongoing prospective research study, a research team collaborates with Medical Teams International (the implementing partner for health care delivery in Nakivale) to offer free HIV testing, counseling, and treatment. Clients who are diagnosed with HIV are referred to the weekly HIV clinic.

IM workshop—In this study, IM was used to design a program to address the health problem of untreated HIV in Nakivale. For the needs assessment (Step 1), we conducted a literature review on the factors that affect linkage to care in Uganda and in sub-Saharan Africa (Jain et al., 2021; Pell et al., 2019; Rentsch et al., 2018; Sabapathy et al., 2018; Sanga et al., 2018; Seeley et al., 2018), and reviewed findings from an ongoing prospective research study of routine clinic-based HIV testing in Nakivale (O'Laughlin et al., 2017, 2013, 2014, 2016, 2018).

Next, a diverse working group of stakeholders was purposively selected to participate in a one-day IM workshop in January 2019, led and facilitated by our research team. There were 14 participants, including representatives from Medical Teams International, the United Nations High Commissioner for Refugees (UNHCR), the American Refugee Committee (ARC), and Tutapona (a local non-governmental organization). Participants also included church leaders, community members, and researchers. Several participants were refugees (from Rwanda, Ethiopia, and the Democratic Republic of the Congo), and at least one was living with HIV. During the stakeholder workshop, we focused on IM steps 1 through 4 (Table 1), as has been described in previous literature (Corbie-Smith et al., 2010; Wolfers et al., 2007). We used small-group breakout sessions and large-group discussions to generate and refine ideas for each IM step. After the workshop, we presented the findings to additional stakeholders for feedback and revisions.

Results

Step 1: logic model of the problem

Based on published literature, data from ongoing research in Nakivale, and participants' experiences, the working group described in detail the *health problem* of untreated HIV in Nakivale. Participants produced a logic model of the problem of untreated HIV (Figure 1), using the PRECEDE framework for assessing health needs (Bartholomew Eldredge et al., 2016; Green et al., 2005).

The working group enumerated the ways that HIV causes secondary *health problems* and reduces people's *quality of life* (Figure 1, Phases 1 and 2). They identified the primary *behavioral and environmental factors* that prevent people living with HIV (PLHIV) from engaging with medical care (Figure 1, Phase 3). Some factors identified were specific to the refugee setting: for example, in Nakivale, food distribution and HIV clinic sometimes occur

on the same day, which prevents clients from attending clinic. Additionally, some religious leaders in Nakivale counsel that HIV can be cured through prayer or alternative healing methods, which discourages participation in care. Resettlement policies and migration patterns make continuity of care difficult for the refugees living in Nakivale.

Finally, the working group examined *behavioral and environmental determinants*, or, the factors causing individual and environmental actors to engage in behaviors that prevent linkage to HIV care (Figure 1, Phase 4). In terms of *behavioral determinants*, the working group emphasized that lack of knowledge about HIV and attitudes about living with HIV – including denial of the diagnosis and fear of anticipated stigma – are major reasons for avoiding health care.

Environmental determinants identified by the working group included a shortage of resources and training for clinic staff, which may contribute to inadequate skills and self-efficacy to provide high-quality, empathic care for PLHIV. On the community and society levels, deeply ingrained stigma and inaccurate beliefs about HIV transmission cause people to discriminate against their family members and neighbors with HIV.

Step 2: program outcomes and objectives

Program outcomes—Behavioral and environmental outcomes are health-promoting behaviors and conditions that would facilitate PLHIV in engaging with HIV care. The working group selected one primary behavioral outcome: individuals who are newly diagnosed with HIV will attend HIV clinic. They selected three primary environmental outcomes:

- HIV clinics are accessible to clients in their communities.

- Clinic staff provide high-quality, empathic care to clients with HIV.

- Clients can access supportive social networks.

Performance objectives, determinants, and change objectives—For each of the behavioral and environmental outcomes, the working group developed performance objectives, determinants, and change objectives. *Performance objectives* are specific actions that must take place in order for the behavioral or environmental outcome to happen. *Determinants* are the reasons why individuals and environmental actors would complete the performance objectives. *Change objectives* describe what must change relative to each determinant in order to accomplish the performance objectives (Table 2).

The working group emphasized that the problem of insufficient resources, including stock-outs of medications and diagnostic tests, inadequate clinic space for confidential counseling, and overburdened clinic staff – was a major barrier to achieving performance objectives. The group agreed that this problem was highly important, but difficult to solve with a single intervention. Therefore, they brainstormed strategies for using existing resources more effectively. For example, to address the problem of overburdened clinic staff, the working group suggested supporting the staff with social events and workshops to prevent burnout and foster empathy for clients.

Step 3: program design

In Step 3, the working group developed the basic features of the intervention. They used an existing taxonomy (Bartholomew Eldredge et al., 2016) to select *change methods* and *practical applications* for each change objective (Table 3). They found that some change objectives could be accomplished using overlapping methods and applications, and grouped those together in Table 3. For example, the change objectives concerning the attitudes and values of clinic staff (C.1 to C.4) could all be addressed by improving staff support and training workshops, so these objectives were grouped together in Table 3.

To guide the working group discussion, the research team provided background information on interventions that have been successful in improving HIV care in other settings, including integrated HIV/NCD programs (Garrib et al., 2018; Haldane et al., 2018; Watt et al., 2017) and adherence clubs (Bateman, 2013; Wilkinson, 2013). HIV/NCD programs integrate HIV care with management of non-communicable diseases (NCDs) including diabetes and hypertension. These programs aim to reduce the stigma associated with HIV by treating HIV alongside other chronic diseases (Garrib et al., 2018). Another type of intervention, adherence clubs, are groups of clients with HIV who meet every 1–4 months in community- or clinic-based sites, facilitated by lay health workers who perform clinical assessments, counsel about treatment and adherence, and distribute ART. This intervention aims to improve social support (Mukumbang et al., 2019) and retention in HIV care (Bock et al., 2019; Grimsrud et al., 2016; Hanrahan et al., 2019; Luque-Fernandez et al., 2013; Sharp et al., 2019; Tsondai et al., 2017).

With this evidence base in mind, the working group brainstormed several practical applications that would be feasible in Nakivale. An HIV clinic could be combined with other services (e.g., diabetes and hypertension management) in order to increase the perceived benefits of HIV care and reduce HIV stigma. Groups of PLHIV could meet for education sessions and social support. Staff training could be supplemented by educational methods such as role-play and empathy training, as well as burnout prevention strategies. Additionally, some strategies that are already used in Nakivale, such as posttest HIV counseling and involvement of lay health workers and expert clients, could be optimized to accomplish additional change objectives.

Step 4: program production

In Step 4, the working group refined the practical applications from Step 3 into cohesive program components. The intervention described was community-based chronic care teams, or "C-3 teams", in which clients would receive counseling and medications for HIV, diabetes, and hypertension at accessible, confidential community sites, such as schools or churches. Clients would be enrolled in the program immediately after diagnosis in order to facilitate linkage to care. They would receive services for diabetes and hypertension in addition to HIV, in order to increase the perceived benefit of the clinic (O'Laughlin et al., 2013). Additionally, the integration of HIV care with that of other chronic diseases would reduce HIV-related stigma (Garrib et al., 2018).

In addition to the primary intervention, there would be two additional program components. First, the staff members for C-3 teams would undergo extensive training including role-plays and guided practice of posttest counseling. They would learn principles of motivational interviewing and participate in empathy training. They would also demonstrate knowledge about HIV management, and practice delivering this information in a client-centered style. Second, there would be a workshop for community leaders to use their leadership role to increase knowledge about HIV and foster empathy for PLHIV in their communities.

Discussion

Despite the unprecedented number of refugees and other forcibly displaced people in the world today (UNHCR, 2020), there is a scarcity of published literature on the best practices for designing health interventions in refugee contexts (Abuhaloob et al., 2018; Palic & Elklit, 2011; Purgato et al., 2018; Thompson et al., 2018; Williams & Thompson, 2011). In a humanitarian setting in which resources are scarce and the sociopolitical situation is complex, it is essential to carefully consider the feasibility, impact, and acceptability of a proposed intervention before implementing it. A broad network of stakeholders, especially the future program participants, must be included in the planning process to ensure it is tailored to the context. IM provides a structured approach for including numerous stakeholders in designing a rigorous, evidence-based health intervention.

We used IM to design a program aimed at enhancing linkage to HIV care in Nakivale Refugee Settlement, Uganda. In an intensive workshop, a cross-disciplinary working group designed a program of "C-3 teams" to provide community-based, integrated health care to people with HIV, hypertension, and diabetes. This program would enhance engagement in HIV care by improving access, reducing stigma, and enhancing social support for participants.

We identified several lessons in applying IM methodology to the refugee context. First, it is crucial to incorporate the firsthand experience of numerous stakeholders in developing an intervention for this setting because the published evidence about refugee populations is relatively sparse. Second, given that there are numerous partner organizations and multiple levels of permissions involved in health care implementation in refugee settlements (in Nakivale, Medical Teams International, UNHCR, the Ministry of Health, and others), it is critical to actively seek participation and buy-in from these organizations in order to successfully implement an intervention. Third, in the refugee setting there can be rapid turnover in staff and leadership, which introduces challenges when planning and implementing long-term projects with local partners.

Another challenge of planning an intervention for HIV care in a refugee setting is the frequent change in guidelines and policies. For example, when data collection on HIV testing in Nakivale began in 2013 (O'Laughlin et al., 2014), the standard of care for HIV management was to base ART eligibility on physical exam findings and CD4 count. In 2016, the guidelines changed to a test-and-treat strategy, initiating all people with HIV on ART regardless of CD4 count. It is not known whether this change in treatment guidelines affected linkage to HIV care in Nakivale (O'Laughlin et al., 2017).

Though the IM method fosters participation from diverse stakeholders, specific efforts may be needed to promote inclusivity. In our workshop, participants had different cultural backgrounds, ages, occupations, and fluency in English (which was the working group's common language). To create a collaborative environment, we explicitly discussed the perspective and strengths of each participant. For example, one participant was a Congolese pastor who had limited English fluency compared to other participants, but was empowered to participate because the group recognized his valuable contributions as a religious provider and community leader.

Our study is limited by the absence of two notable perspectives from the working group: Ugandan nationals living in Nakivale, and Somali refugees. In Nakivale, as in other humanitarian settings, there is a complex landscape of power and vulnerability (Bjørkhaug, 2020). The Ugandan participants in the IM workshop worked for humanitarian and government organizations; they were in positions of relative power in the settlement. Conversely, the Ugandans who live in Nakivale are vulnerable to eviction from their land, yet also benefit from the health and education services provided for refugees, thus facing complex challenges and motivations. Additionally, Somali refugees tend to be more economically prosperous than other groups and conflicts can arise between those communities (Bjørkhaug, 2020). Prior to implementation of the proposed intervention, feedback from these groups should be obtained.

Of note, there are many refugees living in Kampala, Uganda's capital. The refugee population living in urban settings is distinct from those in the settlements: though they may have access to more employment opportunities, they do not have access to the services offered for refugees, and if they do not return periodically to the settlements for "verification" of their refugee status and residence in Uganda, they may lose their benefits altogether. Additionally, rates of transactional sex are high for refugees living in Kampala (Logie et al., 2020). It is not known whether refugees living in urban areas face the same barriers in linkage to HIV care as those living in the refugee settlements.

Intervention Mapping is an inclusive, efficient approach to intervention design that can be applied in the time- and resource-limited conditions of the humanitarian setting. In Nakivale Refugee Settlement, this method allowed stakeholders and community members to design a feasible intervention to promote linkage to HIV care based on a detailed discussion of the causes and consequences of untreated HIV.

Acknowledgements

Abbreviations:

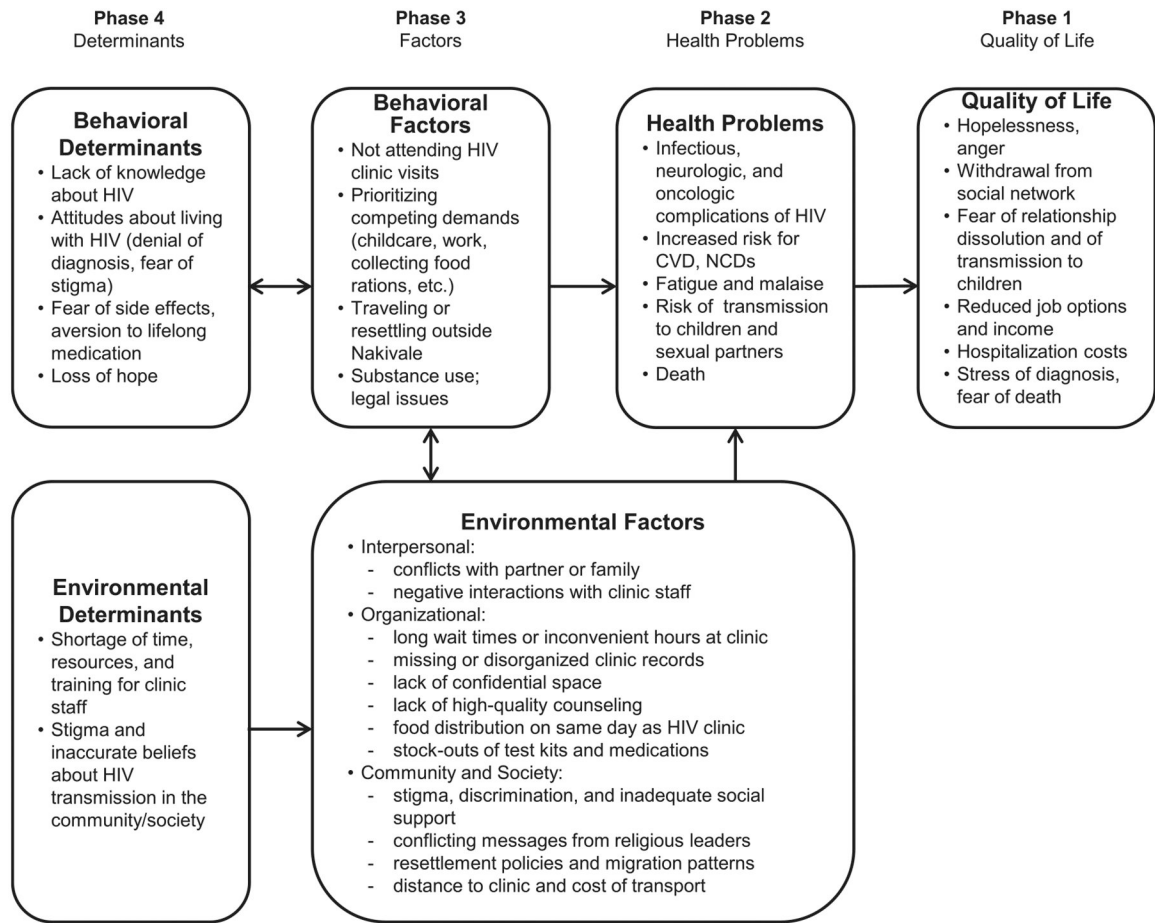|	
ARC	American Refugee Committee
ART	antiretroviral therapy
HIV	human immunodeficiency virus
IM	Intervention Mapping
NCD	non-communicable disease
PLHIV	people living with HIV
UNHCR	United Nations High Commissioner for Refugees

References

Abuhaloob L, Carson S, Richards D, & Freeman R (2018). Community-based nutrition intervention to promote oral health and restore healthy body weight in refugee children: A scoping review. Community Dental Health, 35(2), 81–88. 10.1922/CDH_4188Abuhaloob08 [PubMed: 29381273]

Bartholomew Eldredge LK, Markham CM, Ruiter RA, Fernandez ME, Kok G, & Parcel GS (2016). Planning health promotion programs: An Intervention Mapping approach (4th ed.). Jossey-Bass & Pfeiffer Imprints, Wiley.

Bartholomew LK, Parcel GS, & Kok G (1998). Intervention Mapping: A process for developing theory and evidence-based health education programs. Health Education & Behavior, 25(5), 545–563. 10.1177/109019819802500502 [PubMed: 9768376]

Bateman C (2013). MSF again paves the way with ART. South African Medical Journal, 103(2), 71. 10.7196/SAMJ.6666 [PubMed: 23374312]

Billioux VG, Chang LW, Reynolds SJ, Nakigozi G, Ssekasanvu J, Grabowski MK, Ssekubugu R, Nalugoda F, Kigozi G, Kagaayi J, Serwadda D, Gray RH, Wawer MJ, & the Rakai Health Sciences Program (2017). Human immunodeficiency virus care cascade among sub-populations in Rakai, Uganda: An observational study. Journal of the International AIDS Society, 20(1), 21590. 10.7448/ IAS.20.1.21590 [PubMed: 28605171]

Bjørkhaug I (2020). Revisiting the refugee–host relationship in Nakivale Refugee Settlement: A dialogue with the Oxford Refugee Studies Centre. Journal on Migration and Human Security, 8(3), 266–281. 10.1177/2331502420948465

Bock P, Gunst C, Maschilla L, Holtman R, Grobbelaar N, Wademan D, Dunbar R, Fatti G, Kruger J, Ford N, Hoddinott G, & Meehan S (2019). Retention in care and factors critical for effectively implementing antiretroviral adherence clubs in a rural district in South Africa. Journal of the International AIDS Society, 22(10). 10.1002/jia2.25396

Corbie-Smith G, Akers A, Blumenthal C, Council B, Wynn M, Muhammad M, & Stith D (2010). Intervention Mapping as a participatory approach to developing an HIV prevention intervention in rural African American communities. AIDS Education and Prevention, 22(3), 184–202. 10.1521/ aeap.2010.22.3.184 [PubMed: 20528128]

Côté J, Godin G, Garcia PR, Gagnon M, & Rouleau G (2008). Program development for enhancing adherence to antiretroviral therapy among persons living with HIV. AIDS Patient Care and STDs, 22(12), 965–975. 10.1089/apc.2008.0124 [PubMed: 19072103]

Garba RM, & Gadanya MA (2017). The role of Intervention Mapping in designing disease prevention interventions: A systematic review of the literature. PLOS ONE, 12(3), e0174438. 10.1371/ journal.pone.0174438 [PubMed: 28358821]

Gardner EM, McLees MP, Steiner JF, del Rio C, & Burman WJ (2011). The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. Clinical Infectious Diseases, 52(6), 793–800. 10.1093/cid/ciq243 [PubMed: 21367734]

Garrib A, Birungi J, Lesikari S, Namakoola I, Njim T, Cuevas L, Niessen L, Mugisha K, Mutungi G, Mghamba J, Ramaiya K, Jaffar S, Mfinanga S, & Nyirenda M (2018). Integrated care for human immunodeficiency virus, diabetes and hypertension in Africa. Transactions of The Royal Society of Tropical Medicine and Hygiene. 10.1093/trstmh/try098

Green LW, Kreuter MW, & Green LW (2005). Health program planning: An educational and ecological approach (4th ed.). McGraw-Hill.

Grimsrud A, Lesosky M, Kalombo C, Bekker L-G, & Myer L (2016). Implementation and operational research: Community-based adherence clubs for the management of stable antiretroviral therapy patients in Cape Town, South Africa. Journal of Acquired Immune Deficiency Syndromes, 71(1), e16–e23. 10.1097/QAI.0000000000000863 [PubMed: 26473798]

Haldane V, Legido-Quigley H, Chuah FLH, Sigfrid L, Murphy G, Ong SE, Cervero-Liceras F, Watt N, Balabanova D, Hogarth S, Maimaris W, Buse K, McKee M, Piot P, & Perel P (2018). Integrating cardiovascular diseases, hypertension, and diabetes with HIV services: A systematic review. AIDS Care, 30(1), 103–115. 10.1080/09540121.2017.1344350 [PubMed: 28679283]

Hanrahan CF, Schwartz SR, Mudavanhu M, West NS, Mutunga L, Keyser V, Bassett J, & Van Rie A (2019). The impact of community-versus clinic-based adherence clubs on loss from care and viral suppression for antiretroviral therapy patients: Findings from a pragmatic randomized controlled trial in South Africa. PLOS Medicine, 16(5), e1002808. 10.1371/journal.pmed.1002808 [PubMed: 31112543]

IASC Task Force on HIV/AIDS in Emergency Settings. (2003). Guidelines for HIV/AIDS interventions in emergency settings. Inter-Agency Standing Committee. https://www.refworld.org/docid/3d94756a2.html

Jain K, Mshweshwe-Pakela NT, Charalambous S, Mabuto T, & Hoffmann CJ (2021). Enhancing value and lowering costs of care: A qualitative exploration of a randomized linkage to care intervention in South Africa. AIDS Care, 31(4), 481–488. 10.1080/09540121.2018.1503636

Kirby D (2001). Emerging answers: Research findings on programs to reduce teen pregnancy. ERIC Clearinghouse.

Logie CH, Okumu M, Mwima S, Hakiza R, Abela H, & Kyambadde P (2020). Gender, transactional sex, and HIV prevention cascade engagement among urban refugee and displaced adolescents and youth in Kampala, Uganda. AIDS Care, 1–7. 10.1080/09540121.2020.1861181

Luque-Fernandez MA, Van Cutsem G, Goemaere E, Hilderbrand K, Schomaker M, Mantangana N, Mathee S, Dubula V, Ford N, Hernán MA, & Boulle A (2013). Effectiveness of patient adherence groups as a model of care for stable patients on antiretroviral therapy in Khayelitsha, Cape Town, South Africa. PLoS ONE, 8(2), e56088. 10.1371/journal.pone.0056088 [PubMed: 23418518]

Mkumbo K, Schaalma H, Kaaya S, Leerlooijer J, Mbwambo J, & Kilonzo G (2009). The application of Intervention Mapping in developing and implementing school-based sexuality and HIV/AIDS education in a developing country context: The case of Tanzania. Scandinavian Journal of Public Health, 37(2_suppl), 28–36. 10.1177/1403494808091345

Mukumbang FC, van Wyk B, Van Belle S, & Marchal B (2019). "At this [adherence] club, we are a family now": A realist theory-testing case study of the antiretroviral treatment adherence club, South Africa. Southern African Journal of HIV Medicine, 20(1). 10.4102/sajhivmed.v20i1.922

O'Laughlin K, Kasozi J, Rabideau D, Parker R, Mulogo E, Faustin Z, Greenwald K, Doraiswamy S, Walensky R, & Bassett I (2017). The cascade of HIV care among refugees and nationals in Nakivale Refugee Settlement in Uganda. HIV Medicine, 18(7), 513–518. 10.1111/hiv.12476 [PubMed: 28070923]

O'Laughlin KN, Kasozi J, Walensky RP, Parker RA, Faustin ZM, Doraiswamy S, Owino CO, & Bassett IV (2014). Clinic-based routine voluntary HIV testing in a refugee settlement in Uganda. Journal of Acquired Immune Deficiency Syndromes, 67(4), 409–413. 10.1097/QAI.0000000000000317 [PubMed: 25162817]

O'Laughlin KN, Rabideau DJ, Kasozi J, Parker RA, Bustamante ND, Faustin ZM, Greenwald KE, Walensky RP, & Bassett IV (2016). Predictors of HIV infection: A prospective HIV screening study in a Ugandan refugee settlement. BMC Infectious Diseases, 16 (1). 10.1186/s12879-016-2021-1

O'Laughlin KN, Rouhani SA, Faustin ZM, & Ware NC (2013). Testing experiences of HIV positive refugees in Nakivale Refugee Settlement in Uganda: Informing interventions to encourage priority shifting. Conflict and Health, 7(1), 2. 10.1186/1752-1505-7-2 [PubMed: 23409807]

O'Laughlin KN, Rouhani SA, Kasozi J, Greenwald KE, Perkons NR, Faustin ZM, Bassett IV, & Ware NC (2018). A qualitative approach to understand antiretroviral therapy (ART) adherence for refugees living in Nakivale Refugee Settlement in Uganda. Conflict and Health, 12(1). 10.1186/s13031-018-0145-1

Palic S, & Elklit A (2011). Psychosocial treatment of post-traumatic stress disorder in adult refugees: A systematic review of prospective treatment outcome studies and a critique. Journal of Affective Disorders, 131(1–3), 8–23. 10.1016/j.jad.2010.07.005 [PubMed: 20708804]

Pell C, Reis R, Dlamini N, Moyer E, & Vernooij E (2019). "Then her neighbour will not know her status": How health providers advocate antiretroviral therapy under universal test and treat. International Health, 11(1), 36–41. 10.1093/inthealth/ihy058 [PubMed: 30137387]

Purgato M, Gross AL, Betancourt T, Bolton P, Bonetto C, Gastaldon C, Gordon J, O'Callaghan P, Papola D, Peltonen K, Punamaki R-L, Richards J, Staples JK, Unterhitzenberger J, van Ommeren M, de Jong J, Jordans MJD, Tol WA, & Barbui C (2018). Focused psychosocial interventions for children in low-resource humanitarian settings: A systematic review and individual participant data meta-analysis. The Lancet Global Health, 6(4), e390–e400. 10.1016/S2214-109X(18)30046-9 [PubMed: 29530422]

Rentsch CT, Wringe A, Machemba R, Michael D, Urassa M, Todd J, Reniers G, & Zaba B (2018). Linkage to care and antiretroviral therapy initiation by testing modality among individuals newly diagnosed with HIV in Tanzania, 2014–2017. Tropical Medicine & International Health, 23(12), 1384–1393. 10.1111/tmi.13153 [PubMed: 30282113]

Sabapathy K, Hensen B, Varsaneux O, Floyd S, Fidler S, & Hayes R (2018). The cascade of care following community-based detection of HIV in sub-Saharan Africa: A systematic review with 90-90-90 targets in sight. PLOS ONE, 13(7), e0200737. 10.1371/journal.pone.0200737 [PubMed: 30052637]

Sanga ES, Mukumbang FC, Mushi AK, Olomi W, Lerebo W, & Zarowsky C (2018). Processes and dynamics of linkage to care from mobile/outreach and facility-based HIV testing models in hard-to-reach settings in rural Tanzania. Qualitative findings of a mixed methods study. AIDS Research and Therapy, 15(1). 10.1186/s12981-018-0209-8

Seeley J, Bond V, Yang B, Floyd S, MacLeod D, Viljoen L, Phiri M, Simuyaba M, Hoddinott G, Shanaube K, Bwalya C, de Villiers L, Jennings K, Mwanza M, Schaap A, Dunbar R, Sabapathy K, Ayles H, Bock P, … Fidler S (2018). Understanding the time needed to link to care and start ART in seven HPTN 071 (PopART) study communities in Zambia and South Africa. AIDS and Behavior. 10.1007/s10461-018-2335-7

Sharma M, Ying R, Tarr G, & Barnabas R (2015). Systematic review and meta-analysis of community and facility-based HIV testing to address linkage to care gaps in sub-Saharan Africa. Nature, 528(7580), S77–S85. 10.1038/nature16044 [PubMed: 26633769]

Sharp J, Wilkinson L, Cox V, Cragg C, van Cutsem G, & Grimsrud A (2019). Outcomes of patients enrolled in an antiretroviral adherence club with recent viral suppression after experiencing elevated viral loads. Southern African Journal of HIV Medicine, 20(1). 10.4102/sajhivmed.v20i1.905

Thompson CT, Vidgen A, & Roberts NP (2018). Psychological interventions for post-traumatic stress disorder in refugees and asylum seekers: A systematic review and meta-analysis. Clinical Psychology Review, 63, 66–79. 10.1016/j.cpr.2018.06.006 [PubMed: 29936342]

Tsondai PR, Wilkinson LS, Grimsrud A, Mdlalo PT, Ullauri A, & Boulle A (2017). High rates of retention and viral suppression in the scale-up of antiretroviral therapy adherence clubs in Cape Town, South Africa. Journal of the International AIDS Society, 20, 21649. 10.7448/IAS.20.5.21649 [PubMed: 28770595]

Uganda AIDS Commission. (2017). Uganda HIV/AIDS country progress report July 2016 to June 2017. http://www.unaids.org/sites/default/files/country/documents/UGA_2018_countryreport.pdf

UN Food and Agriculture Organization. (2010). Gender-based violence and livelihood interventions: Focus on populations of humanitarian concern in the context of HIV. https://www.refworld.org/docid/58bd54964.html

UNAIDS Programme Coordinating Board. (2020). Annotated Outline of the Global AIDS Strategy 2021–2026. UNAIDS https://www.unaids.org/sites/default/files/PCB47__Annotated_Outline_Strategy_EN.pdf

UNHCR. (2002). Evaluation of humanitarian assistance in emergency situations. https://www.refworld.org/docid/4ff54d962.html

UNHCR. (2017). UNHCR Global Report. http://reporting.unhcr.org/sites/default/files/gr2017/pdf/GR2017_English_Full_lowres.pdf

UNHCR. (2019, May). Uganda refugee response monitoring: Settlement fact sheet Nakivale. UNHCR operational portal refugee situations https://data2.unhcr.org/en/documents/download/63282

UNHCR. (2020, June). UNHCR figures at a glance. https://www.unhcr.org/en-us/figures-at-a-glance.html

Watt N, Sigfrid L, Legido-Quigley H, Hogarth S, Maimaris W, Otero-García L, Perel P, Buse K, McKee M, Piot P, & Balabanova D (2017). Health systems facilitators and barriers to the integration of HIV and chronic disease services: A systematic review. Health Policy and Planning, 32(suppl_4), iv13–iv26. 10.1093/heapol/czw149 [PubMed: 28666336]

Wilkinson LS (2013). ART adherence clubs: A long-term retention strategy for clinically stable patients receiving antiretroviral therapy. Southern African Journal of HIV Medicine, 14(2), 48–50. 10.4102/sajhivmed.v14i2.77

Williams ME, & Thompson SC (2011). The use of community-based interventions in reducing morbidity from the psychological impact of conflict-related trauma among refugee populations: A systematic review of the literature. Journal of Immigrant and Minority Health, 13(4), 780–794. 10.1007/s10903-010-9417-6 [PubMed: 21103930]

Wirtz AL, Glass N, Pham K, Aberra A, Rubenstein LS, Singh S, & Vu A (2013). Development of a screening tool to identify female survivors of gender-based violence in a humanitarian setting: Qualitative evidence from research among refugees in Ethiopia. Conflict and Health, 7(1), 13. 10.1186/1752-1505-7-13 [PubMed: 23758886]

Wolfers ME, van den Hoek C, Brug J, & de Zwart O (2007). Using Intervention Mapping to develop a programme to prevent sexually transmittable infections, including HIV, among heterosexual migrant men. BMC Public Health, 7(1). 10.1186/1471-2458-7-141

Phase 4 Determinants	Phase 3 Factors	Phase 2 Health Problems	Phase 1 Quality of Life

Behavioral Determinants
- Lack of knowledge about HIV
- Attitudes about living with HIV (denial of diagnosis, fear of stigma)
- Fear of side effects, aversion to lifelong medication
- Loss of hope

Behavioral Factors
- Not attending HIV clinic visits
- Prioritizing competing demands (childcare, work, collecting food rations, etc.)
- Traveling or resettling outside Nakivale
- Substance use; legal issues

Health Problems
- Infectious, neurologic, and oncologic complications of HIV
- Increased risk for CVD, NCDs
- Fatigue and malaise
- Risk of transmission to children and sexual partners
- Death

Quality of Life
- Hopelessness, anger
- Withdrawal from social network
- Fear of relationship dissolution and of transmission to children
- Reduced job options and income
- Hospitalization costs
- Stress of diagnosis, fear of death

Environmental Determinants
- Shortage of time, resources, and training for clinic staff
- Stigma and inaccurate beliefs about HIV transmission in the community/society

Environmental Factors
- Interpersonal:
  - conflicts with partner or family
  - negative interactions with clinic staff
- Organizational:
  - long wait times or inconvenient hours at clinic
  - missing or disorganized clinic records
  - lack of confidential space
  - lack of high-quality counseling
  - food distribution on same day as HIV clinic
  - stock-outs of test kits and medications
- Community and Society:
  - stigma, discrimination, and inadequate social support
  - conflicting messages from religious leaders
  - resettlement policies and migration patterns
  - distance to clinic and cost of transport

Figure 1.
Logic model of the problem of untreated HIV (Step 1). The logic model of the problem of untreated HIV, as described by the Intervention Mapping working group in Nakivale Refugee Settlement. From right to left, the ways in which untreated HIV affects quality of life and health (Phases 1 and 2); the behavioral and environmental factors which contribute (Phase 3); and the behavioral and environmental determinants of those factors (Phase 4).

Table 1.

Six steps of Intervention Mapping (adapted from Bartholomew et al., 2016).

Step 1: Logic Model of the Problem	What is the problem?
	Establish and work with a planning group
	Conduct a needs assessment to create a logic model of the problem
	Describe the context (population, setting, community)
	State program goals
Step 2: Program Outcomes and Objectives – Logic Model of Change	Why is the problem happening? How could it change?
	State expected outcomes for behavior and environment
	Specify performance objectives for behavioral and environmental outcomes
	Select determinants for behavioral and environmental outcomes
	Construct matrices of change objectives
	Create a logic model of change
Step 3: Program Design	How will the intervention achieve the desired change?
	Generate program themes, components, scope, and sequence
	Choose theory- and evidence-based change methods
	Select or design practical applications to deliver change methods
Step 4: Program Production	What are the materials and messages for the intervention?
	Refine program structure and organization
	Prepare plans for program materials
	Draft messages, materials, and protocols
	Pretest, refine, and produce materials
Step 5: Program Implementation Plan	How will the intervention be disseminated, adopted, implemented, and maintained?
	Identify potential program users (implementers, adopters, maintainers)
	State outcomes and performance objectives for program use
	Design implementation interventions
Step 6: Evaluation Plan	How will we know if the intervention is effective?
	Write effect and process evaluation questions
	Develop indicators and measures for assessment
	Specify the evaluation design
	Complete the evaluation plan

Table 2.

Matrices of Change Objectives (Step 2).

A. Behavioral Outcome #1: Newly diagnosed individuals attend HIV clinic.

Personal Determinants: Why would a person take these actions?

Performance Objectives: What actions need to happen?

	Attitudes & Values	Skills & Self-Efficacy	Knowledge	Social Influence
A.1. Accept HIV+ diagnosis.	a. Maintain hope about the future. b. Recognize that accepting HIV diagnosis will allow them to continue to care for loved ones.	a. Work with HIV counselor to brainstorm strategies for attending clinic, disclosing status, coping with stigma. b. Practice sharing emotions with HIV counselor.	a. Recognize that they can live a healthy life if HIV is properly treated. b. Recognize that they have HIV even if they feel healthy.	Trust accuracy of diagnostic tests (despite rumors of false results).
A.2. Prioritize HIV clinic days.	Decide that the benefits of attending HIV clinic outweigh the barriers to seeking care.	a. Demonstrate how to arrange clinic transport. b. Arrange plan to overcome competing demands (childcare, food distribution). c. Demonstrate ability to track clinic dates.	a. State the benefits of attending HIV clinic, and the consequences of *not* attending HIV clinic. b. List community resources available to assist with transport, competing needs, etc.	a. Strategize how to cope with negative reactions toward HIV care from partner, family, neighbors, etc. b. Request assistance from individuals for transport and competing demands.
A.3. Take ownership of HIV diagnosis.	a. Describe their role in maintaining their own health. b. Express reasons for health maintenance (family, religion, etc.).	Express confidence in ability to cope with HIV care.	Actively seek information about HIV care from HIV counselors and others.	Consider disclosing status to trusted individuals.

B. Environmental Outcome #1: HIV clinics are accessible to clients in their communities.

Personal Determinants: Why would a person take these actions?

Performance Objectives: What actions need to happen?

	Attitudes & Values	Skills & Self-Efficacy	Outcome Expectations	Knowledge
B.1. Program implementers identify and involve community leaders.	Program implementers recognize the importance of involving community leaders.	Program implementers are able to persuade community leaders to participate in the program.	Program implementers expect that HIV outcomes will improve if community leaders participate.	Program implementers have the expertise to identify community leaders.
B.2. Community leaders encourage clients to engage with HIV care.	Community leaders believe that PLHIV deserve accessible HIV care.	a. Community leaders recognize their role in	Community leaders expect that HIV outcomes will improve if people can access care in their community.	Community leaders demonstrate accurate, appropriate knowledge of

	Attitudes & Values	Knowledge	Outcome Expectations	Behavioral Capability
		ensuring accessible HIV care for their communities. **b.** Community leaders are able to influence clients to engage in HIV care.		HIV diagnosis, transmission, and management.
	Program implementers and community leaders are able to negotiate for use of community spaces.		Program implementers and community leaders expect clients will engage in care if treatment is offered in an accessible, safe, confidential location.	Program implementers and community leaders know which locations are accessible, safe, and confidential for community members.
B.3. Program implementers and community leaders work together to identify HIV care venues that are safe and convenient.	Program implementers and community leaders recognize the importance of an accessible, safe, confidential HIV treatment space.			

C. Environmental Outcome #2: Clinic staff provide high-quality, empathic care to clients with HIV.

Personal Determinants: Why would a person take these actions?

Performance Objectives: What actions need to happen?

	Attitudes & Values	Knowledge	Outcome Expectations	Behavioral Capability
C.1. Clinic staff provide clients with accurate, accessible information about HIV care, in the clients' own languages.	Clinic staff express personal responsibility for improving their HIV expertise and counseling skills.	**a.** Clinic staff are knowledgeable about HIV. **b.** Clinic staff know how to access and use interpreter services.	Clinic staff expect that clients will have better health outcomes and quality of life if information is accurate and accessible.	Clinic staff are well trained in providing clients with accurate, accessible information.
C.2. Clinic staff protect the confidentiality of clients.	Clinic staff express personal responsibility for maintaining patient confidentiality.	**a.** Clinic staff can explain why it is important to protect confidentiality. **b.** Clinic staff can list ways confidentiality might be compromised.	Clinic staff expect that clients will be more likely to engage with care if confidentiality is preserved.	Clinic staff are well trained in protecting patient confidentiality.
C.3. Clinic has adequate supplies of HIV test kits and ART.	Clinic leaders take responsibility for obtaining adequate supplies.	Clinic leaders know what HIV supplies are needed and how to obtain them.	Clinic leaders expect that HIV outcomes will improve if clinics have adequate supplies.	Clinic leaders demonstrate a system for tracking and restocking HIV supplies.
C.4. Clinic has organized records and reliable hours.	Clinic staff are willing to make a personal effort to maintain a consistent clinic schedule and keep records organized.	Clinic staff recognize that a disorganized, unreliable HIV clinic is a barrier to care.	Clinic staff expect that clients will receive better care if records are organized and the schedule is reliable.	Clinic staff demonstrate a system for maintaining organized records and reliable hours.

D. Environmental Outcome #3: Clients can access supportive social networks.

Personal Determinants: Why would a person take these actions?

Performance Objectives: What actions need to happen?

	Attitudes & Values	Knowledge	Perceived Norms	Social influence
D.1. Partners and family members accept HIV positive diagnosis	Partners and family members express compassion to the client.	**a.** Partners and family members know that risk for	Partners and family members perceive that families should be compassion-ate and supportive.	Partners and family members are prepared to cope with the stigma of

compassionately and assist with HIV care.		transmission is low if on ART. b. Partners and family know that social support is important.		having a partner or family member living with HIV.
D.2. Neighbors and community members provide social support.	Community members express compassion for neighbors living with HIV and wish to support them in their illness.	Community members know that HIV is not transmitted through casual contact.	Community members perceive they should treat neighbors living with HIV with compassion rather than stigma.	Community members treat neighbors living with HIV with compassion even if they see others discriminating against them.
D.3. Health providers replace blame and stereotyping with empathy.	Health providers express compassion for the client.	Health providers know that social support is a key factor in linkage and maintenance of HIV care.	Health providers feel responsible for providing social support to clients with HIV.	Health providers deliver compassionate care to PLHIV even if others do not.
D.4. Community leaders influence people in the community to reduce stigma against PLHIV.	Community leaders believe that PLHIV deserve compassion and support.	Community leaders are knowledgeable about their community members' beliefs about HIV.	Community leaders perceive they should influence people toward compassionate treatment of PLHIV.	Community leaders are willing to publicly support PLHIV even if other community leaders disagree.
D.5. Clients receive social support from other PLHIV.	Clients are open to sharing experiences with other PLHIV.	Clients know social support is a critical component of HIV care.	Clients perceive that PLHIV often support each other.	Clients are comfortable publicly associating with other PLHIV.

Change Methods and Practical Applications (Step 3).

Determinant: Attitudes & Values

Change Objectives	*Change Method(s)*	*Practical Applications*
A.1 Maintain hope about the future. Recognize that accepting HIV diagnosis will allow them to continue to care for loved ones.	Individualization Modeling Provide opportunities for social comparison Stereotype-inconsistent information	Posttest counseling Expert client support
A.2 Decide that the benefits of attending HIV clinic outweigh the barriers to seeking care.	Persuasive communication Motivational interviewing Personalize risk Self-reevaluation Environmental reevaluation Anticipated regret	Posttest counseling Combine HIV clinic with other services to increase the benefits
A.3 Describe their role in maintaining their own health. Express reasons for health maintenance (family, religion, etc.).	Belief selection Individualization Framing Anticipated regret Shifting focus Tailoring Modeling Motivational interviewing	Posttest counseling
C.1 Clinic staff express personal responsibility for improving their HIV expertise and counseling skills.	Participation Persuasive communication Tailoring Modeling Consciousness raising Self-reevaluation Environmental reevaluation Enhancing network linkages Empathy training	Support for clinic staff – to express appreciation and prevent burnout (e.g., social events) Staff workshop to build empathy and foster sense of personal responsibility for work
C.2 Clinic staff express personal responsibility for maintaining patient confidentiality.		
C.3 Clinic leaders take responsibility for obtaining adequate supplies.		
C.4 Clinic staff are willing to make a personal effort to maintain a consistent clinic schedule and keep records organized.		
D.2 Community members express compassion for neighbors living with HIV and wish to support them in their illness.	Belief selection Tailoring Consciousness raising Self-reevaluation Environmental reevaluation Stereotype-inconsistent information Interpersonal contact Empathy training Entertainment education	Use community leaders to influence community
D.3 Health providers express compassion for the client.	*Same as C.1 to C.4 above*	*Same as C. 1 to C.4 above*
D.4 Community leaders believe that PLHIV deserve compassion and support.	Belief selection Persuasive communication Tailoring Consciousness raising Self-reevaluation Environmental reevaluation Stereotype-inconsistent information Interpersonal contact Empathy training	Community leader workshops
D.5 Clients are open to sharing experiences with other PLHIV.	Modeling Facilitation Interpersonal contact Empathy training Developing new social network linkages	Confidential space Facilitated patient group

Determinant: Skills & Self-Efficacy

Change Objective	*Change Method(s)*	*Practical Applications*
A.1 Work with HIV counselor to brainstorm strategies for attending clinic, disclosing status, coping with stigma. Practice sharing emotions with HIV counselor.	Individualization Scenario-based risk information Resistance to social pressure Guided practice Planning coping responses Enhancing network linkages	Posttest counseling Confidential space
A.2 Demonstrate how to arrange clinic transport. Arrange plan to overcome competing demands (childcare, food distribution). Demonstrate ability to track clinic dates.	Individualization Feedback Guided practice Goal setting Self-monitoring of behaviors	Posttest counseling Group education sessions with clients
A.3 Express confidence in ability to cope with HIV care.	Tailoring Modeling Verbal persuasion Goal setting	Posttest counseling Facilitated patient group

Change Objective	Change Method(s)	Practical Applications
B.2 Community leaders recognize their own role in ensuring accessible HIV care for their communities. Community leaders are able to influence clients to engage in HIV care.	Modeling Self-reevaluation Environmental reevaluation Verbal persuasion Participation Cultural similarity Guided practice	Community leader workshops Evaluation and feedback

Determinant: Knowledge

Change Objective	*Change Method(s)*	*Practical Applications*
A.1 Recognize that they can live a healthy life if HIV is properly treated. Recognize that they have HIV even if they feel healthy.	Belief selection Modeling Elaboration Personalize risk	Posttest counseling Group education sessions with clients
A.2 State the benefits of attending HIV clinic, and the consequences of *not* attending HIV clinic. List community resources available to assist with transport, competing needs, etc.	Belief selection Discussion Personalize risk Guided practice	Posttest counseling Group education sessions with clients
B.1 Program implementers have the expertise to identify community leaders.	Participatory problem solving Cultural similarity Use of lay health workers	Community leader workshops Feedback from community members and lay health workers
B.2 Community leaders demonstrate accurate, appropriate knowledge of HIV diagnosis, transmission, and management.	Belief selection Feedback Guided practice	Community leader workshops Evaluation and feedback
B.3 Program implementers and community leaders know which locations are accessible, safe, and confidential for community members.	*Same as B.1 above*	*Same as B.1 above*
C.1 Clinic staff are knowledgeable about HIV. Clinic staff know how to access and use interpreter services. C.2 Clinic staff can explain why it is important to protect confidentiality. Clinic staff can list ways in which confidentiality might be compromised. C.4 Clinic staff recognize that a disorganized, unreliable HIV clinic is a barrier to care.	Providing cues Guided practice Goal setting Feedback Consciousness raising	Staff training (with staff members helping to plan the training) Training involves guided practice, roleplaying, motivational interviewing
D.1 Partners and family members know that risk for transmission is low if on ART. Partners and family know that social support is important.	Elaboration Verbal persuasion Mobilizing social networks Use of lay health workers	Use community leaders to influence community Reinforcement from lay health workers
D.2 Community members know that HIV is not transmitted through casual contact.	Discussion Mass media role modeling Entertainment education Verbal persuasion	Disseminate educational materials in places where community members socialize Drama performance by clients who choose to disclose status Use community leaders to influence community
D.3 Health providers know that social support is a key factor in linkage and maintenance of HIV care.	Discussion Verbal persuasion	Staff training
D.5 Clients know that social support is a critical component of HIV care.	Modeling Discussion Mobilizing social networks Enhancing network linkages Developing new social network linkages	Posttest counseling Facilitated patient group Expert client support

Determinant: Social Influence

Change Objective	*Change Method(s)*	*Practical Applications*
A.2 Strategize how to cope with negative reactions toward HIV care from partner, family, neighbors, etc. Request assistance from trusted individuals for transport and competing demands.	Individualization Providing cues Resistance to social pressure Shifting focus	Posttest counseling Group education sessions and workshops with clients Expert client support
A.3 Consider disclosing status to trusted individuals.	Mobilizing social support Opportunities for social comparison Planning coping responses	Assisted Partner Notification
D.2 Community members treat neighbors living with HIV with compassion even if they see others discriminating against them.	Tailoring Self reevaluation Environmental reevaluation Resistance to social pressure Shifting focus Mobilizing social support Planning coping responses	Disseminate educational materials in places where community members socialize Drama performance by clients who choose to disclose status Use community leaders to influence community

Change Objective	Change Method(s)	Practical Applications
D.4 Community leaders are willing to publicly support PLHIV even if other community leaders disagree.	Participation Tailoring Modeling Environmental reevaluation Resistance to social pressure Shifting focus Planning coping responses	Community leader workshops

Determinant: Outcome Expectations

Change Objective	*Change Method(s)*	*Practical Applications*
C.2 Clinic staff expect that clients will be more likely to engage with care if confidentiality is preserved.	Persuasive communication Environmental reevaluation	Staff training

Determinant: Behavioral Capability

Change Objective	*Change Method(s)*	*Practical Applications*
C.1 Clinic staff are well trained in providing clients with accurate, accessible information.	Feedback Guided practice	Staff training
C.2 Clinic staff are well trained in protecting patient confidentiality.	Feedback Guided practice	Staff training
C.3 Clinic leaders demonstrate a system for tracking and restocking HIV supplies.	Participatory problem solving Facilitation Nudging Organizational diagnosis and feedback Structural redesign	Feedback to leadership Participation from clinic staff
C.4 Clinic staff demonstrate a system for maintaining organized records and reliable hours.	Feedback Facilitation Participatory problem solving Organizational diagnosis and feedback Structural redesign	Feedback to leadership Staff training

Determinant: Perceived Norms

Change Objective	*Change Method(s)*	*Practical Applications*
D.2 Community members perceive they should treat neighbors living with HIV with compassion rather than stigma.	Belief selection Tailoring Modeling Environmental reevaluation Entertainment education	Use community leaders to influence community Disseminate educational materials in places where community members socialize Drama performance by clients who choose to disclose status
D.3 Health providers feel responsible for providing social support to clients with HIV.	Persuasive communication Environmental reevaluation	Staff training
D.4 Community leaders perceive they should influence people toward compassionate treatment of PLHIV.	Modeling Environmental reevaluation	Community leader workshops