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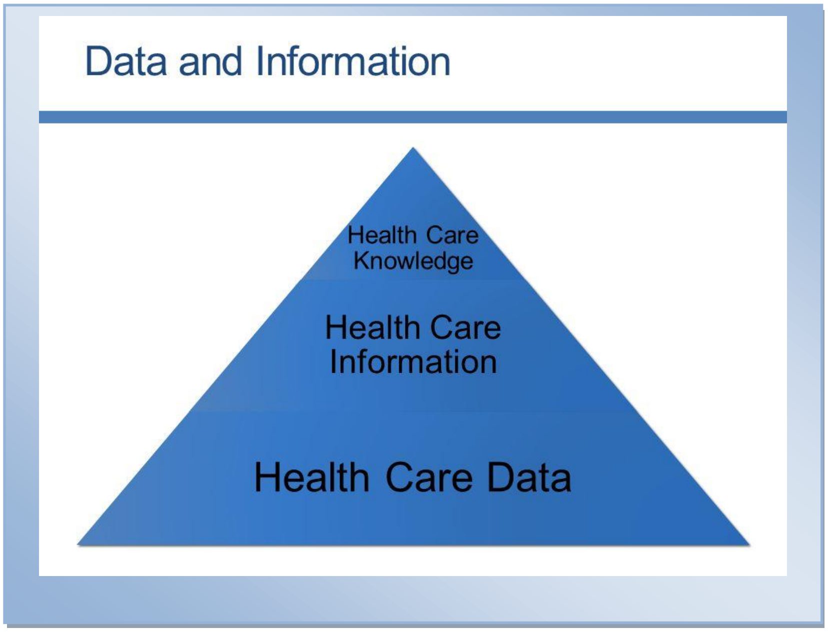
Better Information for Health in Zambia (Better Info) Study

A Toolkit for a Sampling-Based Approach to Understand HIV Treatment Outcomes



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Acknowledgements

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We also thank the BetterInfo Advisory Committee members who shared their experience and guidance to ensure that the study was of the highest quality, and of course to the study participants and Ministry of Health staff at all levels who shared their time, thoughts, and experiences to inform the study findings. Finally, we thank the BetterInfo staff and the wider Centre for Infectious Disease Research in Zambia (CIDRZ) staff for their valuable contributions made to produce this Toolkit.

We hope that this BetterInfo Toolkit clearly demonstrate the activities and tools used in the BetterInfo study to enable other program implementers or researchers to effectively use them to achieve accurate estimates of true patient outcomes in their HIV Care and Treatment programs.

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Abbreviations/Acronyms

ART	Anti-Retroviral Therapy
CIDRZ	Centre for Infectious Disease Research in Zambia
EMRS	Electronic Medical Record System
ERP	Enterprise Resource Planning
GRZ	Government of the Republic of Zambia
HCW	Healthcare Worker
HIV	Human Immunodeficiency Virus infection
IQR	Inter Quartile Range
LTFU	Lost-to-Follow-Up
MoH	Ministry of Health
MRS	Medical Record System
SOP	Standard Operating Procedure

Definitions used in the BetterInfo Study:

Lost To-Follow-Up (LTFU): defined as HIV-infected adults (18 years or older) who made a visit to one of the 30 public, CIDRZ-supported clinics and were late for their last scheduled visit for 90 days or more for those on ART, and late for more than 180 days for those not yet on ART [1].

Official Transfer: refers to patients on ART who were given an official transfer letter from their original health facility to attend another health facility providing ART services [2].

Silent Transfer: refers to patients considered LTFU from their original health facility who were found to be in HIV care at another health facility because they had decided to transfer without informing their original health facility [1].

Treatment supporter/buddy: someone who is chosen by an HIV patient to provide him or her with ongoing support for adherence to care and ART treatment.

Introduction

The global HIV response has grown far beyond early expectations but continues to face formidable and evolving challenges at policy, organisational, individual healthcare worker (HCW), and patient levels [3]. As HIV programs transition to country ownership to ensure sustainability, gaps in capacity and resource commitments emerge. Meanwhile, the volume of individuals seeking chronic HIV care, especially in countries with the highest burdens of disease, has posed a challenge to the health delivery system. In Zambia, for instance, the current HIV prevalence rate is estimated at 12.9% [2017] with about 1.2 million persons living with HIV, many now entering a phase of long-term follow-up. However, losses-to-follow-up from HIV Care and Treatment programs exceed 25-50% in many African settings [4,5], therefore leading to an under-estimation of patient mortality and retention in care. This gap represents a form of selection bias in epidemiologic studies which seek to understand the effects of predictors on patient outcomes. An understanding of the true patient outcomes allows for a better assessment of public health systems and their program efficiencies.

The CIDRZ BetterInfo Study Toolkit was designed for decision-makers and implementers of HIV programs who would like to apply the same sampling-based approach to track patients lost from HIV Care services. Herein, we identify our measurement strategy, provide the basic tools for our sampling-based approach, detail the methods and minimum package to track patients considered lost from care, and discuss our study results.

1.0 BetterInfo Measurement Strategy

A measurement strategy to obtain the right information from the right people at the right time is necessary. A comprehensive patient outcome ascertainment would require tremendous resources at a population level, therefore, a sampling-based approach of representative patients presents a feasible and affordable way to ascertain outcomes of HIV lost-to-follow-up (LTFU) patient.

The true clinical outcomes in a random, but numerically small, sample of patients lost-to-follow-up (LTFU) can be found through patient tracking in the community. These outcomes in a small but representative sample can provide an efficient and unbiased estimate in all patients. Once incorporated into survival analysis through a probability weight [6], this approach can be used to correct estimates of mortality, retention in care, and identify epidemiologically valid determinants of important patient outcomes. Indeed, the measurement of outcomes is the simple biggest barrier to the roll-out of valid epidemiology. Without outcomes, the use of patient and clinic factors is limited to cross-sectional and descriptive estimates.

Drawing from HIV clinics in East Africa where a sampling-based approach was applied, CIDRZ conducted the Bill & Melinda Gates Foundation-funded Better Information for Health in Zambia

(BetterInfo) study from 2015 - 2016 to better understand the outcomes of 5000 patients who were considered LTFU and to identify the drivers for their engagement or disengagement from HIV care in 30 randomly sampled public health facilities across Lusaka, Southern, Eastern and Western Provinces of Zambia. ***See Annex 1: BetterInfo Protocol***.

The BetterInfo study was implemented in public-health facilities where CIDRZ has been implementing its key activities in HIV/AIDS, Tuberculosis, and health systems strengthening. BetterInfo employed a sampling-based survey methodology with all research participants and collected blood specimens from a sub-sample of patients in Lusaka province where the CIDRZ laboratory is located. ***See Annex 2: STATA Code for Sampling and Analysis; and Annex 3: Blood Sample Collection***.

Before participating in the research study, participants were given sufficient information about the BetterInfo study including risks and benefits in the language they understood. Those who voluntarily decided to take part in the study were requested to give consent through a written informed consent process and to sign an Informed Consent Form. ***See Annex 4: Informed Consent Form***. Every effort was made by the BetterInfo study staff to keep research participant information confidential and private.

During implementation of BetterInfo, various barriers and facilitators were encountered, therefore if this sampling-based approach is adopted it would be important to learn the lessons herein and strategies for data management and quality control. ***See Annex 5: Key Implementation Advice; and Annex 6: Data Management and Quality Control***.

2.0 BetterInfo Patient Tracking

To date most estimates of retention in the literature assume that all patients who become lost-to-follow-up (i.e., have unknown outcomes) are not retained in care. This is tantamount to assuming that retention-in-clinic is equivalent to retention in care which is an unwarranted assumption in the setting of HIV Care and Treatment program scale-up and decentralization. Retention in care can only be estimated by tracking patients who are lost-to-follow-up and obtaining updated information about their access to ART [7].

Below we describe the BetterInfo measures and activities that were used for tracking LTFU patients. *See Annex 7: SOP Patient Tracking*.

2.1 Minimum Measurements for Epidemiologic Analyses

The minimum set of measurements that are required to make a clinic-based experience epidemiologically understood are easily accessible in health facilities as shown in ***Table 1***. Patient identifiers, date of ART initiation and dates of all visits are enough to enumerate the cohort, estimate ART access and identify patients lost-to-follow-up. Addition of common measurements such as socio-demographic characteristics (age, sex, baseline WHO stage, etc.), clinic structures (availability of TB diagnostics, distance from home to clinic, etc.) can provide cross-sectional understanding of the clinic population. Most of these factors are time-invariant, and retrievable because they were routinely measured and recorded at the health facilities in the course of clinical care.

Table 1: Minimum Measurements Required for Epidemiologic Analyses

Priority	Measurements	Parameters that Can be Estimated
Tier 1: Enumerates the cohort and estimates elementary descriptive statistics	• Patient Identifier • ART initiation date • Visit dates	• Time zero characteristics of a cohort • Number of patients accessing care • Number of patients starting ART • Number of patients LTFU
Tier 2: Cross-sectional characteristics of patients	• Patient Age • Patient Sex • Patient Height and Weight • Pre-ART CD4-T-cell count *(if applicable)* • Pre-ART WHO stage classification • Enrollment date into HIV Care and Treatment Program • ART initiation date *(if applicable)* • All clinic visits dates	• Description of patient characteristics at time of engagement in care • Factors associated with clinical presentation • Associations between clinical characteristics at time of presentation
Tier 3: Characterise and describe structural level predictors	• Stock out dates • Availability of CD4 or viral load testing	• Description of program characteristics
Tier 4: Sampling-based Outcomes	• Survival & retention in care • ART initiation among those not on ART	• Presence of outcomes obtained through sampling can initiate epidemiologic analyses to identify the causes of mortality and retention in care

2.2 Minimum Team Composition for Right Measurements

An interdisciplinary team consisting of an epidemiologist, a data manager, a number of data entry clerks and patient tracker(s) working closely with a clinical team can make the right measurements be more efficient. Identifying representative clinics, enumerating the clinic-based cohorts, selecting the key predictor variables relevant to local settings, abstracting and entering key information into an Electronic Medical Record System (EMRS) and finally, sampling-based outcomes in the community can be automated, standardized and deployed to make a clinic-based cohort epidemiologically understood. ***See Annex 2: STATA Code for Sampling and Analysis***.

Open source EMRS such as OpenMRS can be downloaded with an internet connection to store data. The clinic staff should then be trained in the use of open source EMRS. If the data collection form is not on a mobile computer tablet, data entry requires 1 data entry clerk per 500 visits per week. Therefore, if a clinic has been open for two years and 3000 patients have made

10,000 visits, one data entry clerk will require 20 weeks, but a team of 10 data clerks will require only two weeks to enter the data.

2.3 Minimum Tracking Activities for Right Measurements

Paper tracking is considered the '*minimal sufficient package', 'lite-touch approach'* or '*basic option'* for tracking LTFU patients in resource-limited settings because it is cost-effective. This option entails establishing a sample of HIV "lost" patients to be tracked, reviewing their file/charts in the health facilities, completing a simple questionnaire to capture vital and HIV in-care status and conclude this process by analysis of the findings.

However, if an organisation or HIV program has sufficient financial and human resources, then the tracking of LTFU patients can progress from Paper to Phone and from Phone to Field Tracking as was implemented in the BetterInfo study.

Paper Tracking is the first step in which files/charts of LTFU patients are reviewed from the registry room of the health facility. The aim is to confirm if the patient should be tracked; to find the patient's identity and contact details; and to document the tracking process as well as information needed for tracking. ***See Annex 7.1: Paper Tracking SOP**.* In BetterInfo the average paper tracking time per patient found was 54 minutes. ***See Annex 7.4: Time Tracking SOP***.

Phone Tracking is the second step which involves contacting the patient or patients' next-of-kin using telephonic communication. BetterInfo used both Airtel and MTN mobile network providers to contact patients. This is because some study sites only had one of the two network providers while other sites had both networks. The aim of phone tracking is to obtain as much information as possible including obtaining any updated patient and/or treatment supporter/buddy contact information (phone numbers, geographic information); determine the patient's outcomes (alive or dead, in-care or out-of-care and reasons for out-of-care or transfer); and to document what has been learnt through the tracking process. *See* ***Annex 7.2: Phone Tracking SOP*****.** In BetterInfo the average paper and phone tracking time per patient found was 60.5 minutes. ***See Annex 7.4: Time Tracking SOP***.

Field Tracking is the third and final step which involves the tracker going into the community (by walking, bicycle, motor bike, and/or public transport) to try to locate the "lost" patient in person. The aim is to obtain any updated patient and/or treatment supporter/buddy contact information (phone numbers, geographic information); determine the patient's outcomes (alive or dead, in-care or out-of-care and reasons for out-of-care or transfer); administer questionnaires; and if applicable, obtain biological specimens. ***See Annex 7.3: Field Tracking SOP**.* In BetterInfo the average paper, phone and field tracking time per patient found was 300.5 minutes. ***See Annex 7.4: Time Tracking SOP**.*

2.4 Minimum Costs for Right Measurements

Cost is a critical component to implementation; thus, a description of the required resources will help decision-makers and implementers determine what type of tracking they can implement. Efficient tracking of patients lost from HIV care requires resources such as, staff, computer tablets, mobile phones and mobile talk time, transportation (public transport, motorbikes, bicycles), tracker supplies (back packs, rain suits/rain coats and umbrellas), and testing supplies (reagents, syringes, gloves, cool boxes etc.) and HIV Viral Load and Resistance test kits. BetterInfo monitored all tracking activities using an Enterprise Resource Planning (ERP) online financial management system to build cost estimates for future implementers. ***See Annex 7.5: Cost Tracking SOP***.

Table 2 highlights the tracking cost drivers per patient outcome found that contributed to measuring the outcomes of LTFU in BetterInfo. ***See Annex 8: SOP Summary of Average Cost Computations*** for details.

Table 2: Cost Drivers to Measure LTFU Patient Outcomes Per Outcome Ascertained

Tracking system	Type of Resource	Cost Description	Per Unit USD
Paper Tracking Only	Training	Cost of a 5-day workshop per staff member (lunch allowance and transport refund)	$228
	Human Resource: Tracker Supervisors	Cost of basic pay effort with pension and tax contributions for Tracker Supervisors	$17
	Human Resource: Trackers	Cost of basic pay effort with pension and tax contributions for Tracker	$44
	Computer Tablet	Cost of computer tablet	$627
		Paper Tracking Only	**$ 916**
Paper and Phone Tracking Only	Training	Cost of a 5-day workshop per staff member (lunch allowance and transport refund)	$228
	Human Resource: Tracker Supervisors	Cost of basic pay effort with pension and tax contributions for Tracker Supervisors	$17
	Human Resource: Trackers	Cost of basic pay effort with pension and tax contributions for Tracker	$44
	Computer Tablet	Cost of computer tablet	$627
	Mobile Phone	Cost of Airtel network mobile phone	$ 20
	Mobile Phone	Cost of MTN network mobile phone	$ 8
	Mobile Phone Talk Time	Cost of mobile phone talk time used to call patients/next of kin	$10
		Paper and Phone Tracking Only	**$954**
	Training	Cost of a 5-day workshop per staff member (lunch allowance and transport refund)	$228
	Human Resource: Tracker Supervisors	Cost of basic pay effort with pension and tax contributions for Tracker Supervisors	$17
	Human Resource:	Cost of basic pay effort with pension and tax	$44

Tracking system	Type of Resource	Cost Description	Per Unit USD
Paper, Phone and Field Tracking	Trackers	contributions for Tracker	
	Computer Tablet	Cost of computer tablet	$627
	Mobile Phone	Cost of Airtel mobile phone	$ 20
	Mobile Phone	Cost of MTN mobile phone	$ 8
	Mobile Phone Talk time	Cost of mobile phone talk time used to call patients/next of kin	$10
	Tracker supplies (Rain boots)	Cost of rain boots for tracker	$11
	Tracker supplies (Rain suit)	Cost of rain suit/rain coat for tracker	$11
	Tracker supplies (Umbrella)	Cost of umbrella for tracker	$11
	Per diem and Lunch allowances for field tracking	Cost of per diem and lunch allowance for field tracking	$15
	Public Transport	Public transport refund for Trackers	$8
	Bicycle	Cost of bicycle	$86
	Bicycle Transport	Cost of bicycle maintenance	$ 0.10
	Motorbike	Cost of motorbike	$ 4021
	Motorbike Transport	Cost of fuel, insurance, road tax and servicing	$174
	Viral Load (VL) Testing	Cost per test	$54
	HIV Drug Resistance Testing	Cost per test	$124
		Paper, Phone and Field Tracking	**$5,469**

3.0 Summary of BetterInfo Study Findings

3.1 Patient Mortality Outcome Estimates

Once revised mortality outcome estimates identified through BetterInfo tracking of LTFU patients were included in the data collected at the health facility, a higher, but more accurate mortality rate estimate was ascertained. Routine HIV Care and Treatment program monitoring underestimated the mortality of ART patients markedly, thereby threatening to undermine assessment of its public health effectiveness. The underestimation of mortality was mainly because ART patient deaths which occurred in the community were not always reported to the health facility. Therefore, the 2% mortality at 2 years is a reflection of only the deaths which were entered in the EMRS and occurred at the health facilities.

3.1.1. NAIVE Mortality Outcome Estimates in New ART Initiator Patients - Figure 1

- Using only data from the EMRS, the patient mortality estimated across all sites was 1% at one year and 2% at two years post ART initiation.

- Median site-level mortality among the "lost" across the 30 BetterInfo sites was 12% (IQR 8% to 17%, range 4% to 27%).

3.1.2 REVISED Mortality Outcome Estimates in New ART Initiator Patients - Figure 1

- Once the revised outcome estimates among the lost were incorporated, overall estimates of mortality in the entire cohort of patients starting ART increased to roughly 5% at 1 year and 8% at 2 years.

- Median site level mortality across the 30 sites was 9% (IQR: 5% to 15%, range 3% to 19%).

3.2 Patient Retention Outcome Estimates

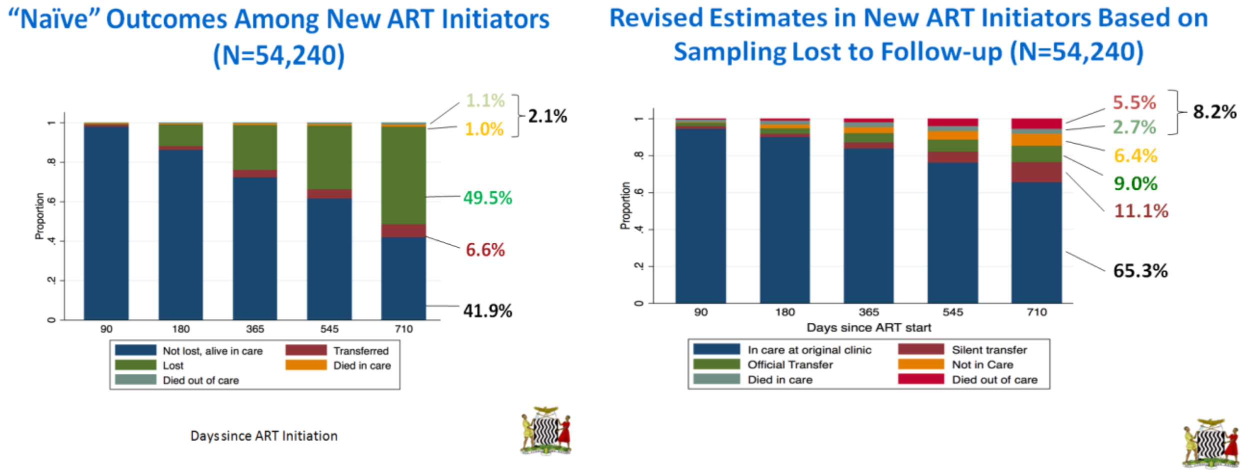
True patient retention in HIV care was found to be higher than what was estimated across a network of clinics in Zambia.

3.2.1 NAIVE Retention Outcome Estimates in New ART Initiator Patients – Figure 1

- Using only data from EMRS, new ART initiator patient retention across all sites was found to be 72% at one year and 42% at two years.

3.2.2 REVISED Retention Outcome Estimates in New ART Initiator Patients – Figure 1

- Patient retention outcomes ascertained through BetterInfo tracking, excluding silent transfers made by patients, and official transfers made by facilities, were 84% at one year and 78% at two years.


“Naïve” Outcomes Among New ART Initiators (N=54,240)

Revised Estimates in New ART Initiators Based on Sampling Lost to Follow-up (N=54,240)

Figure 1: Naive and Revised Outcome Estimates in New ART Initiator Patients

3.3 Key Drivers of Engagement and Dis-engagement from HIV care

When we found patients in-person, we also asked why they silently transferred to a new clinic or stopped attending HIV care altogether. We categorized these reasons into structural, clinical, and psychosocial categories.

3.3.1 Patients' Reasons for Silently Transferring/Switching Clinics

Structural reasons were the main driver of silently transferring to a new facility, followed by clinical and psychosocial reasons as seen in **Figure 2**.

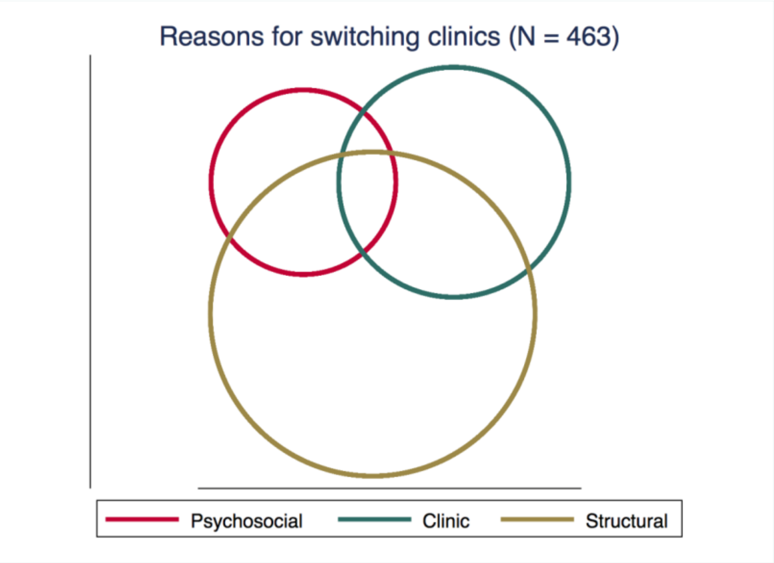


Figure 2: Reasons for Patients Silently Transferring/Switching Clinics

<u>Structural reasons included:</u> long distance from home to the clinic, transportation challenges/costs from home to the clinic, and work and family obligations that made it difficult to go to the original clinic.

<u>Clinical reasons included:</u> patients having to spend too long at the health facility, healthcare workers not providing respectful and quality patient-centered care, and a long and complicated process of ART initiation.

<u>Psychosocial reasons included:</u> risk of HIV status disclosure to someone at the clinic; and family obligations made it difficult for patients to go to the original clinic.

These reasons for switching of clinics suggests that the transfer procedures should be made efficient such that patients are given official transfer letters as and when they desire to be transferred to a different ART clinic. This information should immediately be entered into the EMRS to minimize the mis-categorisation of them as "lost" patients.

3.3.2 Patients' Reasons for Stopping HIV Care

Psychosocial reasons were the main driver for stopping HIV care followed closely by structural reasons and clinical reasons as seen in ***Figure 3***.

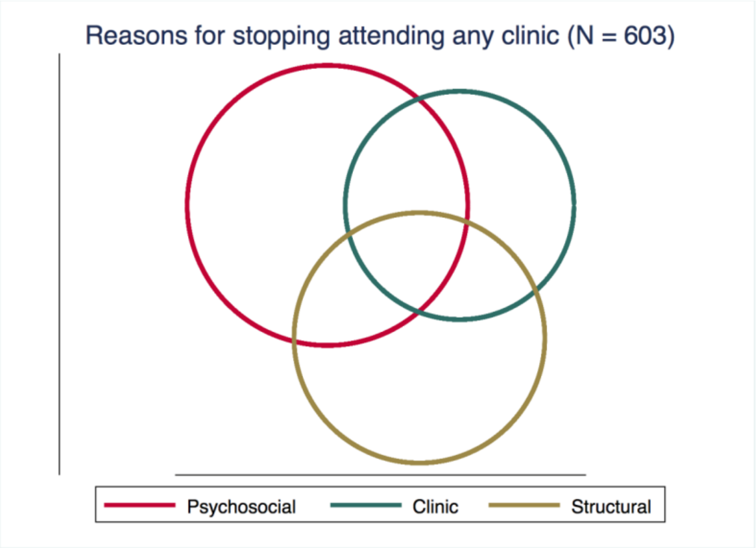


Figure 3: Reasons for Stopping HIV Care

<u>Psychosocial reasons included:</u> risk of HIV status disclosure to someone at the clinic, patient feeling well and thus believing they were no longer in need of care, high CD4 count, and having no reason to attend to clinic.

Structural reasons included: interference of work demands with collecting ART drugs, expensive transportation costs, and ART services not being available in the new location when a patient moved.

Clinical reasons included: having to spend too much time at the clinic, fear of being scolded by clinic staff for missing a scheduled appointment, lost ART Care Card, long process of ART initiation, and healthcare workers not treating patients with respect.

4.0 Conclusion

The measurement strategy employed by the BetterInfo study has the potential to improve evidence-based global delivery of care and treatment for patients with HIV infection. With the more accurate revised information obtained by tracking patients considered lost from the HIV care program, a better estimation of the true mortality and retention rates in this population was obtained. This knowledge can help to guide in-depth assessment to understand care delivery in and across facilities and to identify best practices to improve patient care. Therefore, understanding levels of true disengagement and addressing the facilitators and barriers to HIV care which are unique to clinics is needed to improve ART patient retention.

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Annexures

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