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Characterizing Loss to Follow-up (LTFU) and Mortality Among HIV Infected Patients in Vietnam

AN GIANG PROVINCIAL AIDS CENTER

HAI PHONG PROVINCIAL AIDS CENTER

HANOI PROVINCIAL AIDS CENTER

NGHE AN PROVINCIAL AIDS CENTER

QUAN NINH PROVINCIAL AIDS CENTER

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Report Overview

This report provides important data to the Vietnam Administration of HIV/AIDS Control (VAAC) and Provincial AIDS Committee/Centers of An Giang, Hai Phong, Hanoi, Nghe An, and Quang Ninh provinces. The National Strategy on HIV/AIDS Prevention and Control till 2020 with a vision to 2030 (Issued with Decision 608/QD-TTg dated May 25, 2012 of the Prime Minister) supports targeted operational research and program evaluation activities that contribute to the continuous development of evidenced-based programmatic initiatives, policies, and guidelines to prevent new infections and maintain the quality and accessibility of care for those infected with HIV (PLHIV). Retention in care and sustained HIV viral suppression among PLHIV on ART is not only essential for the health of individual patients but also for reducing transmission to others in the community. These objectives are also highlighted in the UNAIDS policy goal of "90-90-90: An Ambitious Treatment Target to Help End the AIDS Epidemic" issued in a 2014 policy statement that has also been formally adopted by the Vietnam Ministry of Health. This policy has three critical targets for HIV programs worldwide [1]:

1. By 2020, 90% of all people living with HIV will know their HIV status
2. By 2020, 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy
3. By 2020, 90% of all people receiving antiretroviral therapy will have viral suppression.

The main objective of the Characterizing Loss to Follow-up (LTFU) and Mortality among HIV Infected Patients in Vietnam study was to assess data reporting quality determining the rate of misclassification of reported LTFU and transfer-out (transfer) patents and estimate the "true" rates of LTFU, transfers, and death reported by sites after attempting contact tracing to determine the patients' status. With this information, factors potentially associated with LTFU and mortality from HIV can be more clearly identified for future programmatic interventions to support retention in care and reduce death. These measures are critical to reaching the second target of the UNAIDS 90-90-90 goal by better understanding populations at risk for LTFU or premature death from HIV.

This document represents the primary data analysis of Characterizing Loss to Follow-up (LTFU) and Mortality among HIV Infected Patients in Vietnam across five provinces and eleven HIV outpatient clinics in Vietnam.

Ho Chi Minh City, March 2015

Reed Ramlow

Country Director (FHI 360 Vietnam)

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Abbreviations / Acronyms

AG	An Giang province
AIDS	Acquired immunodeficiency syndrome
Anti-HCV	Hepatitis C antibody
ART	Antiretroviral treatment
ARV	Antiretroviral drug
BMI	Body Mass Index
CD4	CD4 helper lymphocytes
HBsAg	Hepatitis B surface Antigen
HBV	Hepatitis B virus
HCV	Hepatitis C
HIV	Human Immunodeficiency Virus
HN	Hanoi Province
HP	Hai Phong
IDU	Injection Drug Use
LTFU	Loss to Follow-Up
MMT	Methadone Maintenance Treatment
NgA	Nghe An province
OPC	Outpatient Clinic
PAC	Provincial AIDS Center or Provincial AIDS Committee
PLHIV	Persons Living with HIV
PWID	Persons with Injection Drug use history
QN	Quang Ninh Province
SMART TA	Sustainable Management of HIV/AIDS Response and Transition to Technical Assistance
TB	Tuberculosis
Transfer	Patients transferred-out of current HIV outpatient clinic to another facility
USAID	United States Agency for International Development
VAAC	Vietnam AIDS Administration and Control
WHO	World Health Organization

Contents

Characterizing Loss to Follow-up (LTFU) and Mortality Among HIV Infected Patients in Vietnam

1. Introduction

Retention in HIV care is essential for the health of individual patients. It typically requires regular clinic visits to provide prevention counseling, clinical monitoring, assessments of ART eligibility (for those previously not eligible for ART), and support for long-term treatment adherence for those on ART to achieve and maintain viral suppression and prevent further immune system destruction.

Key program metrics for measuring quality of HIV care are absolute numbers and rates of lost to follow-up (LTFU) and death. Unfortunately, varying definitions of LTFU and misclassification of patients makes interpretation of data across treatment settings difficult [2]. Definitions on timing and number of missed appointments for pre-ART and ART clients that meet LTFU criteria vary across settings [3, 4]. This study found that a significant proportion of patients are misclassified as LTFU. Many of those classified as LTFU are patients that have died or continue to receive care from another source. In particular, underestimation of mortality among LTFU patients is a critical quality of care issue, particularly among ART eligible patients who have not yet started ART or patients recently initiated on ART who are LTFU [3-5]. Moreover, many LTFU patients may not have died but self-initiated a transfer to another public or private source of care for personal reasons [6-8].

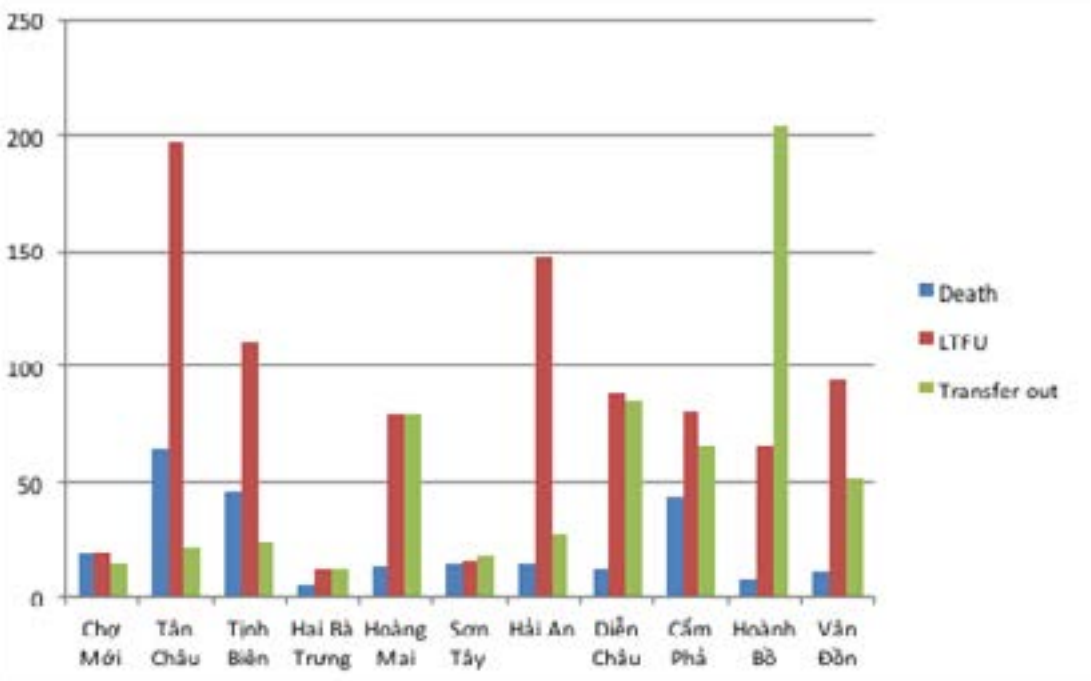
A meta-analysis that included 6,420 patients across sub-Saharan Africa attempted to verify the status of patients classified as LTFU through contact by phone, home visits, and social networks and generated findings highlighting important issues. Status of 64% of patients classified, as LTFU across the included studies was determined. Forty percent were identified as dead with 62% of the deaths due to an AIDS defining illness. A high portion of these cases died within a few months after ART initiation. Of those remaining contacted LTFU patients who were still alive, reasons most cited for LTFU included self-initiated transfers or desire to seek alternative source of HIV care, financial costs associated with transportation, and changes in health status [4].

A subsequent study in two large urban clinics in Malawi found significant levels of misclassification of LTFU ART patients. The study successful traced 47% of LTFU patients and found that 30% of traced LTFU patients were dead and 25% were actually receiving ART from another source. Of those patients who were "truly" LTFU, travelling away from the clinic site for any reason including migrant work and lack of reliable transport were common reasons for not reengaging in care [6].

In Vietnam, the Vietnam Ministry of Health defines LTFU as missing appointments for six months or more for patients enrolled in care but not on ART (pre-ART) and STOPPED treatment (herein referred to as LTFU) as three months or three consecutively missed monthly visits for those patients on ART. Tran et al. assessed LTFU among a nationally-representative sample in Vietnam, with a 15% LTFU rate detected among ART patients between 2005 and 2009 [9]. Similarly, a national retrospective cohort study based on chart review found that rates of LTFU among ART patients increased with duration of treatment from 16% at 12 months to 25% at 36 months [10]. Misclassification of cases in these studies is likely common as neither study attempted tracing to identify the "true" status of patients LTFU, many of who may have reengaged in care at another OPC or died.

The high rate of misclassification is also supported based on review of monitoring and evaluation reports from outpatient clinics (OPCs) within the same region and with similar patient demographics. These OPCs report significant variation in numbers and rates of LTFU, transfers, and deaths among previously enrolled patients (see Figure 1 and Figure 2). It is unclear to what degree differences in classification between sites can be explained due to data misclassification versus differences in service quality and non-service related barriers to retention in care and prevention of premature deaths [5, 9, 11-14].

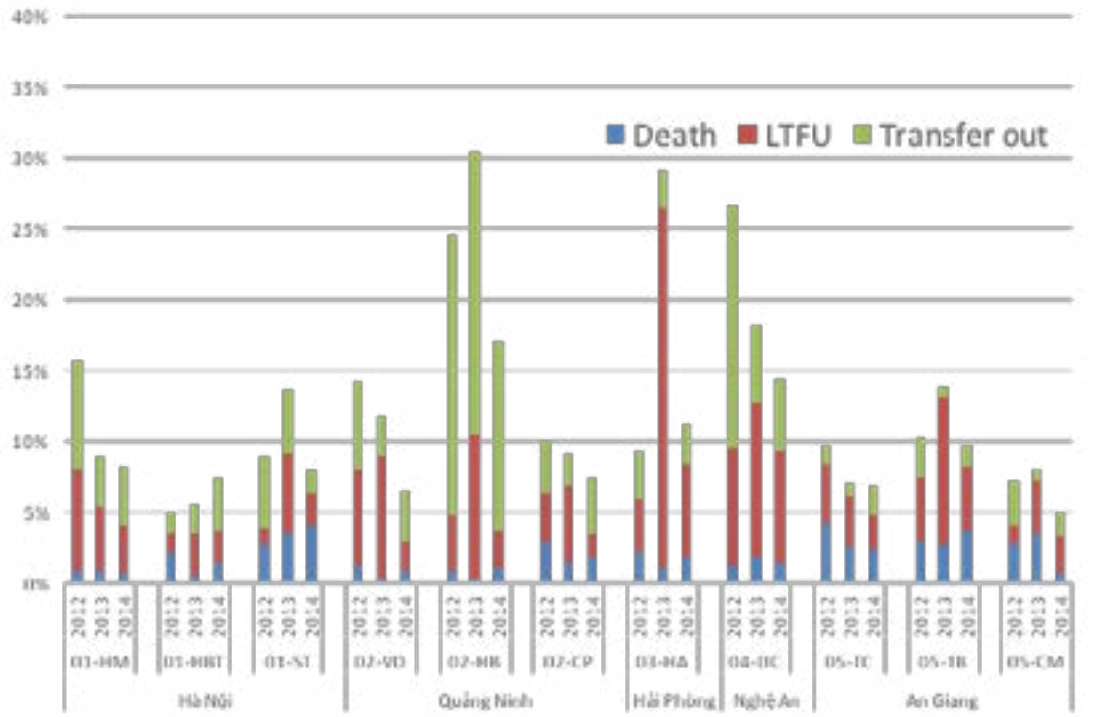
Figure 1: Number of LTFU, death, transfer out rates at selected HIV OPCs in Vietnam January 1, 2012 to May 31, 2014



Source: Ha Noi, Quang Ninh, Hai Phong, Nghe An and An Giang Provincial AIDS Committees' Care and Treatment Quarterly report from 1 January 2012 to 30 June 2014.

Note: ART patients classified as STOPPED treatment are considered LTFU in the graph above.

Figure 2: Percentage of LTFU, transferred out and death patients by year (2012, 2013 and 2014)



Source: Ha Noi, Quang Ninh, Hai Phong, Nghe An and An Giang Provincial AIDS Committees' Care and Treatment Quarterly report from 1 January 2012 to 30 June 2014.

Note: Numerator = number of LTFU, Transferred out and death patients; Denominator = number of current patients in beginning of the year + number of new enrolled + number of new transferred in. ART patients classified as STOPPED treatment are considered LTFU in the graph above.

This study seeks to support data quality improvement by assessing current misclassification rates of LTFU and transfers and to determine adjusted rates of LTFU, transfers, and deaths at selected OPCS. The study also sought to identify factors potentially associated with LTFU and mortality from HIV in Vietnam. Its design is novel in that it also seeks to conduct tracing of not only patients reported as LTFU but also patients reported as transferred-out (transfer) to other public clinics in a concentrated HIV epidemic. The results of this study will likely lead to improved data quality and understanding of risk associated with LTFU, unsuccessful transfers, and premature deaths among PLHIV in Vietnam. With this information, HIV programs across Vietnam will not only be able to improve data quality on LTFU, transfer, and death outcomes for monitoring program performance but also be able to design and target limited resources to the development of more-effective treatment, referral, and retention support interventions.

2. Study Objectives

The primary purpose of the study was to determine the misclassification rates of LTFU and transfers and estimate adjusted LTFU, transfer, and death rates after follow-up tracing among patients previously enrolled at selected USAID/SMART TA supported HIV OPCs. Secondary objectives include better characterizing LTFU, transfer, and dead patients, as well as describe the timing and causes of death among pre-ART and ART patient populations.

3. Brief Overview of Study Setting

HIV care in Vietnam is provided free to PLHIV through a network of more than 300 public clinics throughout the country. All services at the clinics, including drugs, examinations, and routine blood testing, are provided free. These services are primarily delivered at provincial and district levels and are supported through ongoing funding from PEPFAR, the GFATM, and the National HIV/AIDS Treatment Program.

The study was conducted in 11 (eleven) district level HIV outpatient clinics (OPCs) across five provinces in Vietnam. The provinces were chosen to represent diversity in geography and reported rates of LTFU, transfers, and deaths. Within each province, specific OPCs were chosen in consultation with the Provincial AIDS Center (PAC), which is the local government body that coordinates HIV treatment in conjunction with the national public program. Priority was given to OPCs that are supported by the USAID/SMART TA project.

The following OPCs were selected for inclusion in the study: Cam Pha, Hoang Bo and Van Don in Quang Ninh (QN); Tanh Chau, Tinh Bien, and Cho Moi in An Giang (AG); Hai An in Hai Phong (HP), Hoang Mai, Hai Ba Trung, and Son Tay in Hanoi; Dien Chau in Nghe An (NgA).

An Giang (AG) province is located in the Mekong Delta region of Vietnam and covers an area of 3,536.76 square kilometers with a population of 2,144,772. AG shares an international border of 104 km with Cambodia, and borders the Vietnamese provinces of Kien Giang, Dong Thap, and Can Tho. There are many different ethnic minority groups living in AG, namely the Kinh (94.8%), followed by the Khmer (4.0%), the Cham (0.6%), and the Hoa (0.5%). As of Sep 2014, in An Giang, the number of current managed HIV patients was 5,180, cumulative reported number of death cases was 4,429, and 3,342 patients were on ART.

Quang Ninh (QN) province is a northeastern province with a population of 1,144,328. It has a unique terrain, comprising both mountainous and coastal regions. As of Sep 2014, in Quang Ninh, number of current managed HIV patients is 5,080, cumulative reported number of death cases was 4,949, and 4,219 patients were on ART.

Hai Phong (HP) city, located in northern Vietnam, in 2013 had a population of 1.9 million living in an area of 1,519.2 square kilometers. HP borders QN province to the north, Hai Duong province to the west, and Thai Binh province to the south. It is one of the most important ports in Vietnam and is located along major road, railway and maritime transport routes. As of Sep 2014, in Hai Phong, the number of current managed HIV patients was 7,229, cumulative reported number of death cases was 3,245, and 4,255 patients were on ART.

Ha Noi is the capital of Vietnam, and therefore, the political, economic and socio-cultural center of the country. It covers an area of 3,324 square kilometers, and it is administratively divided into thirty counties/districts with 584 communes/wards/towns. Ha Noi is an important hub for both domestic and international trade, with several industrial parks and export processing zones. In addition, it is home to many universities, colleges, vocational schools, and job training centers. The mode of HIV transmission in Ha Noi is primarily through needles and syringes sharing (61.1%) and sexual activity (36.5%) (PAC, 2014). Key populations (KP) are female sex workers (FSW) - categorized as street-based sex workers (SSW) and venue-based sex workers (VSW), men who have sex with men (MSM) and people who inject drugs (PWID). In 2013, it was estimated that there were from 20,435 to 24,277 PWID, 3,525 to 3,691 FSW and 2,148 to 8,880 MSM in Ha Noi (based on consensus with PAC). It was reported that HIV prevalence among PWID was 25.9%, followed by VSWs at 13.9%, SSWs at 10.4%, and MSM at 4% (Source: IBBS 2013). As of Sep 2014, in Ha Noi, number of current managed HIV patients was 21,153, cumulative reported number of death cases was 3,923, and 9,481 patients were on ART.

Nghe An (NgA) Province lies on the north east of Truong Son Mountain Range. Total area of 1,648,729 ha Population: 2.915.055 inhabitants, Ethnic groups: Viet (Kinh), Kho Mu, Tho, Thai, H'Mong, O Du, Dan Lai. The topography is complicated and separated by the mountains and hills, rivers and streams with the descending slope from the north - west to the southeast. The highest peak is Pulaileng (2,711m high) in Ky Son District, the lower is the plains of Quynh Luu, Dien Chau, Yen Thanh districts. At these places, Quynh Thanh Commune in Quynh Luu District is only 0.2m high above the sea level. The mountains and hills occupy 83% area of the natural land of the province. The system of rivers is dense. The total length of the running rivers and streams are 9,828km, with the average density is 0.7km/sqkm. The biggest river is Ca (Lam) originates from Muong Pec District in Xieng Khoang (Laos) with 532km long. The coastline is 82km with six watercourse- mouths, which are convenient for sea transportation, and developing seaport: Cua Lo Sea Port. As of Sep 2014, in Nghe An, number of current managed HIV patients was 6,454, cumulative reported number of death cases was 2,035 and 5,373 patients were on ART.

4. Methods

Study Design

The assessment is a chart review with cross sectional assessment of status and patient characteristics though follow-up tracing. The study did not involve sampling as all adult patients who were reported were LTFU, transferred, or died during the period of January 1, 2012 to May 31, 2014 and had their medical charts retrieved with an address or phone number available for follow-up tracing were eligible to participate.

Data collection

Data collection was based on a research staff administered structured questionnaire that was completed based on information medical records and responses from consented participants. Prior to study visits, OPC staff were asked to collect all LTFU (Pre-ART LTFU and ART STOPPED treatment patients), transferred-out (transfer), and death charts during the period of January 1, 2012 to May 31, 2014. The number of designated charts collected was compared to the number of LTFU, transfers, and deaths reported as part of routine monitoring. If discrepancies were noted, OPC and study staff attempted to find missing charts in active and inactive chart filing locations. Collected charts were reviewed and those charts corresponding to Age>18 years old at the time of last visit with either a phone or address were set aside for data collection. Table 1 summarizes the final percentage and number of charts included for data collection. Reported cases were based on provincial AIDS center routine reporting between January 1, 2012 and May 31, 2014. In one case, the number of charts identified exceeded those reported due to delays in reporting of LTFU, transfers, and death through the health system due to late routine reporting of cases during the study period.

Table 1a: Summary of reported and identified charts for LTFU, transfers, and death

Province	OPC Name	Reported Cases January 1, 2012 through May 31, 2014				Charts identified with available contact information			
		LTFU	Transfer (out)	Dead	Total	LTFU N (%)	Transfer N (%)	Dead N (%	Total N (%)
An Giang *(rural, south)*	Cho Moi	15	10	24	49	12	9	28	49
	Tan Chau	67	14	82	163	55	29	92	176
	Tinh Bien	59	13	70	142	54	10	73	137
Nghe An *(central)*	Dien Chau	108	65	18	191	109	62	18	189
Ha Noi *(urban, north)*	Hai Bai Trung	18	19	6	43	16	20	6	42
	Hoang Mai	45	67	18	130	45	61	19	125
	Son Tay	6	20	17	43	6	20	17	43
Hai Phong (semi-urban, north)	Hai An	66	38	25	129	71	30	27	128
Quang Ninh *(coastal, north)*	Cam Pha	63	65	51	179	61	64	53	178
	Hoanh Bo	85	211	16	312	84	208	17	309
	Van Don	22	46	13	81	20	46	13	79
Totals		**554**	**568**	**340**	**1462**	**533**	**559**	**363**	**1455**

Study staff then proceeded to collect data on the identified charts. Information on patient demographics, behavioral risk, clinical history, and biological markers included in the structured questionnaire were extracted from LTFU, transfer, and death charts.

Follow-up through telephone tracing was then attempted to confirm status of all LTFU and transfer charts. If a chart had an address but no phone number or discovered not to have a working phone number, study staff requested OPC staff to attempt contacting the patient through alternative means to retrieve a working phone number. In many cases, an alternative number for a caregiver listed in the chart was provided. Study staff was also provided patient and caregiver phone scripts for contacting reported LTFU clients. If patients were reached directly and were not enrolled in care, they were asked if they wished assistance in reengaging in care.

Based on the ability to contact patients or caregivers, and in selective cases indirectly through OPC staff, charts were reclassified as:

1) Alive and pre-ART, not receiving care (LTFU)

2) Alive and pre-ART, registered at new OPC (transfer)

3) Alive, on ART at new OPC (transfer)

4) Alive, ART-eligible not on ART but registered at another OPC (transfer)

5) Alive, pre-ART and in prison/detention without OPC organized care (LTFU)

6) Alive, ART-eligible, and not receiving care/not on ART (LTFU)

7) Alive, in prison/detention and ART eligible without OPC organized care (LTFU)

8) Alive and on ART without care at OPC (LTFU)

9) Dead (Dead)

10) Alive, care status unknown (LTFU)

11) Reengaged in care at same OPC (Transfer)

Identified LTFU patients who were contacted were asked reasons why they did not return to care including health, stigma, disclosure, perceived service quality, or other reasons. If the patient's family or caregiver was contacted, they were asked an open-ended question on "why they thought the patient was not receiving care?" Likewise, if identified transfer patient who were contacted were also asked reasons for transfer of care including stigma, disclosure, service quality, or other reasons for transfer. If the patient's family or caregiver was contacted rather than the patient, they were asked an open-ended question on "why they thought the patient transferred site of care?" If follow-up tracing was unsuccessful for transfer patients, the study team reviewed reasons for transfer in the individual patient charts originally classified as transfers.

Based on the reclassifications above, three final "true" LTFU, Transfers, and Death groups were constructed.

1) Final LTFU group: LTFU patients not contacted plus reclassified charts as LTFU including charts reclassified as LTFU (non-transfer) who have fallen out of public HIV system even if receiving care from private or other source, LTFU (unconfirmed transfer), unsuccessful OPC-initiated transfer of care to another OPC, currently detained not transferred by OPCs for rehabilitation, and incarcerated prisoners without continuation in HIV care.

2) Final transfer group: Transfer patients not traced plus reclassified charts as transfer included successful OPC-initiated transfer of care to another OPC, self-initiated transfer of care after LTFU to another or same OPC, patient was found to be reengaged at the same OPC after LTFU or an OPC initiated transfer, patients transferred to detention by OPC for rehabilitation without disruption in HIV care.

3) Final death group: patients originally classified as dead or original LTFU or transfer patients who were reported dead after contacting tracing.

In the event that a chart originally classified transfer or LTFU patient was found to be dead through information provided by a caregiver, study staff followed a script to identify the timing and cause of death. Similarly, for charts originally classified as dead, study staff reviewed medical records to verify the timing and cause of death. If documentation in the chart was not available, study staff attempted to contact caregivers to ascertain and record the timing and cause of death. All death cases with a TB diagnosis within six months and AIDS wasting syndrome were categorized as death due to tuberculosis.

The study was reviewed and approved by the Research Ethical Committee of the Ha Noi School of Public Health and FHI 360 Office of International Research Ethics, Protection of Human Subjects Committee.

5. Data Analysis

Descriptive Analysis

Once final groups were determined, descriptive analysis was used to meet the study objectives to document misclassification rates for LTFU and transfer patients and to determine follow-up tracing adjusted rates of LTFU, transfers, and deaths after contact tracing. Misclassification rates were calculated for each final group based on percent difference between absolute original and final group numbers for charts successfully contact traced with confirmation of current patient status.

The analyses also include descriptive information collected through survey questionnaires including information from charts, patients, caregivers, and OPC staff. Descriptive statistics (e.g., frequencies for categorical variables and mean, median, IQR for continuous variables) are provided for all variables across the final LTFU, Transfer, and Death groups. Separate tables were be developed to further describe reasons for LTFU and transfers as well as and describe timing and causes of death.

Bivariate Analysis

Bivariate analysis was conducted across the three final groups (LTFU, Transfers, Deaths) and collected data and new variables. For testing the association with other categorical variables, we will use Chi-square tests. For comparing continuous variables between the final groups, we will use t-tests or ANOVA tests.

6. Results

At total of 1,455 charts original classified by OPC as LTFU, Transfers, and Deaths were reviewed. Among the original 549 LTFU and 564 transfer charts reviewed, 16.4% and 23.8% of cases were successfully contacted for tracing, respectively. In the majority of contacts, the patient's family was the primary source of information to identify status. Among those originally reported LTFU patients contacted, misclassification occurred 34.4% of reported cases. However, misclassification rates of transfer patients occurred less often at 16.4%.

Half of traced LTFU patients were alive and not in care or had unknown care status. Eighteen percent of LTFU patients self-initiated a transfer to another or returned to same OPC. Seventeen percent of LTFU patients traced were found to be dead. Sixteen percent of traced LTFU patients were in detention or prison without continuation of HIV care. Eighty-one percent of original transfer patients successfully arrived at the new treatment site while 3% reengaged at the same original OPC. Six percent of transfer patient were in prison or detention. Five percent of transfer patients were identified as dead.

Table 1b. Identified Status and Misclassification Rates after Tracing Originally Classified LTFU and Transfer PatientsTable 1b. Identified Status and Misclassification Rates after Tracing

Original Classification of LTFU and Transfer Patients with Successful Tracing	LTFU (N= 549) n (%)	Transferred (N= 564) n (%)
Able to confirm status of LTFU and transfer patients (a)	90 (16.4%)	134 (23.8%)
Identified Status (Original Classification):		
1) Alive and pre-ART, not receiving care (LTFU)	16 (17.8%)	4 (3.0%)
2) Alive and pre-ART, registered at new OPC (transfer)	0 (0%)	2 (1.5%)
3) Alive, on ART at new OPC (transfer)	12 (13.3%)	107 (79.9%)
4) Alive, ART-eligible but not on ART but registered at another OPC (transfer)	2 (2.2%)	0 (0%)
5) Alive, pre-ART and in prison/detention without OPC organized care (LTFU)	5 (5.6%)	1 (0.7%)
6) Alive, ART-eligible, and not receiving care/not on ART (LTFU)	13 (14.4%)	1 (0.7%)
7) Alive, in prison/detention and ART eligible without OPC organized care (LTFU)(b)	9 (10.0%)	7 (5.2%)
8) Alive and on ART without care at OPC (LTFU)	3 (3.3%)	1 (0.7%)
9) Dead (Dead)	15 (16.7%)	6 (4.5%)
10) Alive, care status unknown (LTFU)	13 (14.4%)	2 (1.5%)
11) Reengaged in care at same OPC (Transfer)	2 (2.2%)	3 (2.2%)
Source of information:		
Patient	22 (24.4%)	47 (35.1%)
Patient's family	46 (51.1%)	74 (55.2%)
Friend, caregiver, or community supporter	4 (4.4%)	2 (1.5%)
OPC staff follow-up	18 (20.0%)	11 (8.2%)

Original Classification of LTFU and Transfer Patients with Successful Tracing	LTFU (N= 549) n (%)	Transferred (N= 564) n (%)
Identified Status (Reclassification):		
1) Alive and pre-ART, not receiving care (LTFU)	20 (22.2)	0 (0%)
2) Alive and pre-ART, registered at new OPC (transfer)	0 (0%)	2 (1.5%)
3) Alive, on ART at new OPC (transfer)	0 (0%)	119 (88.8%)
4) Alive, ART-eligible but not on ART but registered at another OPC (transfer)	0 (0%)	2 (1.5%)
5) Alive, pre-ART and in prison/detention without OPC organized care (LTFU)	6 (6.7%)	0 (0%)
6) Alive, ART-eligible, and not receiving care/not on ART (LTFU)	14 (15.6%)	0 (0%)
7) Alive, in prison/detention and ART eligible without OPC organized care(LTFU)(b)	16 (17.8%)	0 (0%)
8) Alive and on ART without care at OPC (LTFU)	4 (4.4%)	0 (0%)
9) Dead (Dead) (c)	15 (16.7%)	6 (4.5%)
10) Alive, care status unknown (LTFU)	15 (16.7%)	0 (0%)
11) Reengaged in care at same OPC (Transfer)	0 (0%)	5 (3.7%)
Final Classification for Contact-traced Patients	75	128
Misclassification rate based on original classification of contact traced LTFU and transfer patients	31/90 (34.4%)	22/134 (16.4%)

a. Attempted number of charts with working phone number.

b. Contacts asked about ART availability in prison or detention. If ARVs continued in prisons, these patients are considered transferred patients to new OPC for final classification. Those patients officially transferred from OPCs to detention for rehabilitation organized by OPC are considered transfers to new OPC and not LTFU. Those patients transferred to other OPCs but held in detention are considered LTFU.

c. These cases were identified as dead through follow-up contact and reclassified as death cases for final classification.

Table 2a: Demographic and Injection Drug Use History by Final Classification

Analysis Population

	LTFU (N=534) n (%)	Transferred (n=558) n (%)	Death (n=363) n (%)	Total (n=1455) n (%)	p-Value
Sex					
Male	398 (74.5%)	439 (78.7%)	280 (77.1%)	1117 (76.8%)	0.26
Female	136 (25.5%)	119 (21.3%)	83 (22.9%)	338 (23.2%)	
Age at last visit (years) (a)					
Mean (SD)	32.5 (7.0)	34.7 (6.0)	35.6 (8.1)	34.1 (7.1)	<0.01
Median (IQR)	32 (28 – 36)	35 (30 – 38)	35 (30 – 39)	34 (29 – 38)	
Province of OPC					
Hanoi	67 (12.6%)	101 (18.1%)	42 (11.6%)	210 (14.4%)	<0.01
Quang Ninh	166 (31.1%)	317 (56.8%)	83 (22.9%)	566 (38.9%)	
Hai Phong	71 (13.3%)	30 (5.4%)	27 (7.4%)	128 (8.8%)	
Nghe An	109 (20.4%)	62 (11.1%)	18 (12.0%)	189 (13.0%)	
An Giang	121 (22.7%)	48 (8.6%)	193 (53.2%)	362 (24.9%)	
OPC					
Hai Ba Trung	16 (3.0%)	20 (3.6%)	6 (1.7%)	42 (2.9%)	<0.01
Hoang Mai	45 (8.4%)	61 (10.9%)	19 (5.2%)	125 (8.6%)	
Son Tay	6 (1.1%)	20 (3.6%)	17 (4.7%)	43 (3.0%)	
Cam Pha	61 (11.4%)	64 (11.5%)	53 (3.6%)	178 (12.2%)	
Hoang Bo	84 (15.7%)	208 (37.3%)	17 (7.4%)	309 (21.2%)	
Van Don	21 (3.9%)	45 (8.1%)	13 (5.0%)	79 (5.4%)	
	71 (13.3%)	30 (5.4%)	27 (7.4%)	128 (8.8%)	
Hai An	109 (20.4%)	62 (11.1%)	18 (5.0%)	189 (13.0%)	
	12 (2.3%)	9 (1.6%)	28 (7.7%)	49 (3.4%)	
Dien Chau	54 (10.1%)	10 (1.8%)	73 (20.1%)	137 (9.4%)	
Cho Moi	55 (10.3%)	29 (5.2%)	92 (25.3%)	176 (12.1%)	
Tinh Bien	501 (93.8%)	504 (90.3%)	345 (95.0%)	1350 (92.8%)	0.01
Tan Chau	33 (6.2%)	54 (9.7%)	18 (5.0%)	105 (7.2%)	

	LTFU (N=534) n (%)	Transferred (n=558) n (%)	Death (n=363) n (%)	Total (n=1455) n (%)	p-Value
Province of Residence					
Same as OPC					
Other	9 (1.7%)	10 (1.8%)	15 (4.1%)	34 (2.3%)	<0.01
	113 (21.2%)	84 (15.1%)	94 (25.9%)	291 (20.0%)	
Distance to travel from home from OPC	82 (15.4%)	50 (9.0%)	73 (20.1%)	205 (14.1%)	
	330 (61.8%)	414 (74.2%)	181 (49.9%)	925 (63.6%)	
<1 km					
1 – 5 km					
6 – 10 km	270 (50.6%)	353 (63.3%)	121 (33.3%)	744 (51.1%)	<0.01
>10 km	264 (49.4%)	205 (36.7%)	242 (66.7%)	711 (48.9%)	
History of IDU (PWID)					
Yes					
No	8 (3.0%)	6 (1.7%)	4 (3.3%)	18 (2.4%)	0.79
	44 (16.3%)	27 (7.7%)	36 (29.8%)	107 (14.4%)	
PWID (n=744) with history MMT	218 (80.7%)	320 (90.7%)	81 (66.9%)	619 (83.2%)	
Yes					
No					
No response/record in chart					

Age at last visit based on year of last visit and year of birth; N=1452.

Both LTFU and death were significantly more common in the first six months of registration. 30% and 37% of LTFU and deaths occurred within the first six months of registration. Lower mean BMI at first visit and last visit occurred in patients was associated with death. CD4 results were significantly different between LTFU and death groups. Median CD4 count at registration and last visit was 351 cells/mm3 and 389 cells/mm3 for LTFU charts but only 50 cells/mm3 and 75 mm3 for death charts. Hepatitis C and history of injection drug use were highly correlated and had similar characteristics for LTFU, transfers, death. Patients diagnosed with TB in past six months were more likely to be dead. IPT was initiated more often in transfer patients, most of whom had been enrolled for more than 2 years at the same OPC.

Table 2b. Clinical Care History by Final Classification

Analysis Population

	LTFU (n=534) n (%)	Transferred (n=558) n (%)	Death (n=363) n (%)	Total (n=1455) n (%)	p-value
Time in care at OPC					
Less than 6 months	163 (30.5%)	46 (8.2%)	134 (36.9%)	343 (23.6%)	<0.01
6 months to 2 years	116 (21.7%)	81 (14.5%)	68 (18.7%)	265 (18.2%)	
2 years or more	154 (57.7%)	431 (77.2%)	161 (44.4%)	847 (58.2%)	
BMI at first visit	(n=522)	(n=538)	(n=349)	(n=1409)	
Mean (SD)	19.4 (2.4)	19.7 (2.1)	18.0 (2.7)	19.2 (2.4)	<0.01
Median (IQR)	19.1 (17.9 – 20.8)	19.7 (18.4 – 21.0)	17.9 (16.3 – 19.5)	19.1 (17.7 – 20.6)	
BMI at last visit	(n=379)	(n=484)	(n=284)	(n=1147)	<0.01
Mean (SD)	19.5 (2.2)	19.8 (2.0)	17.8 (2.8)	19.2 (2.4)	
Median (IQR)	19.3 (18.0 – 20.9)	19.8 (18.4 – 21.0)	17.5 (16.0 – 19.5)	19.2 (17.7 – 20.8)	
CD4 Count at first visit	(n=463)	(n=543)	(n=314)	(n=1320)	<0.01
Mean (SD)	385.6 (286.9)	293.8 (232.2)	148.7 (198.0)	291.5 (261.2)	
Median (IQR)	351 (146 – 574)	255 (113 – 410)	50 (14 – 214)	242.5 (60.5 – 436.5)	
CD4 Count at last visit	(n=458)	(n=542)	(n=310)	(n=1310)	<0.01
Mean (SD)	408.8 (276.3)	387.7 (262.8)	178.6 (226.6)	345.6 (275.8)	
Median (IQR)	388.5 (208 – 561)	353 (212 – 514)	74.5 (16 – 302)	314.5 (123 – 503)	
Hepatitis B Ag Status	(n=477)	(n=521)	(n=304)	(n=1302)	0.34
Positive	66 (13.8%)	61 (11.7%)	46 (15.1%)	173 (13.3%)	
Negative	411 (86.2%)	460 (88.3%)	258 (84.9%)	1129 (86.7%)	

	LTFU (n=534) n (%)	Transferred (n=558) n (%)	Death (n=363) n (%)	Total (n=1455) n (%)	p-value
Hepatitis Anti-HCV Status	(n=351)	(n=293)	(n=232)	(n=876)	<0.01
Positive	119 (33.9%)	116 (39.6%)	57 (24.6%)	292 (33.3%)	
Negative	232 (66.1%)	177 (60.4%)	175 (75.4%)	584 (66.7%)	
Known TB diagnosis in past 6 months	(n=503)	(n=527)	(n=338)	(n=1368)	<0.01
Yes	38 (7.6%)	21 (4.0%)	114 (33.7%)	173 (12.6%)	
No	465 (92.4%)	506 (96.0%)	224 (65.3%)	1195 (87.4%)	
Received IPT					0.04
Yes	22 (4.1%)	43 (7.7%)	20 (5.5%)	85 (5.8%)	
No	512 (95.9%)	515 (92.3%)	343 (94.5%)	1370 (94.2%)	

Fifty-five percent of LTFU patients were not on ART, 39% of whom were Pre-ART patients and not eligible for ART. Fifty-eight percent of ART-eligible LTFU patients did not return to clinic to start ART. ART patients who were eligible but not yet on ART were also more likely to die, as were patients with WHO Class III or IV clinical stage at registration. However, delayed initiation of ART more than 30 days was not more common among patients who died. Thirty-five percent of all dead cases were started on ART within 30 days but 65% of dead cases that did not start ART were due to premature death. ARV regimen or adherence did not differ significantly across groups. However, ART interruptions of three or more days were more common in the LTFU group.

Table 2c. ART History by Final Classification

Analysis Population

	LTFU (N=534) n (%)	Transferred (N=558) n (%)	Death (N=363) n (%)	Total (N=1455) N	p-Value
ARV Status					
Pre-ART (not ART eligible)	209 (39.1%)	31 (5.6%)	19 (5.2%)	259 (17.8%)	<0.01
ART eligible (not on ART)	86 (16.1%)	28 (5.0%)	69 (19.0%)	183 (12.6%)	
On ART	239 (44.8%)	499 (89.4%)	275 (75.8%)	1013 (69.6%)	
Clinical stage at ART eligibility	(n=312)	(n=509)	(n=335)	(n=1156)	
Stage 1/2	78 (31.4%)	207 (40.7%)	75 (22.4%)	380 (32.9%)	<0.01
Stage 3/4	204 (68.6%)	302 (59.3%)	260 (77.6%)	776 (67.1%)	
Time to ART after determined eligible					
ART within 30 days	96 (18.0%)	141 (25.3%)	126 (34.7%)	363 (24.9%)	<0.01
ART after 30 days	143 (26.8%)	358 (64.2%)	149 (41.0%)	650 (44.7%)	
Did not start ART	295 (55.2%)	59 (10.6%)	88 (24.2%)	442 (30.4%)	
ART Regimen at OPC	(n=203)	(n=470)	(n=264)	(n=937)	
2nd line (≥ 6 months)	1 (0.5%)	1 (0.2%)	2 (0.8%)	4 (0.4%)	0.62
2nd line (<than 6 months)	5 (2.5%)	7 (1.5%)	7 (2.7%)	19 (2.0%)	
1st line	197 (97.0%)	462 (98.3%)	255 (96.5%)	914 (97.5%)	
Reported adherence on ART	(n=134)	(n=196)	(n=152)	(n=482)	
Excellent or Good (=>90%)	123 (91.8%)	173 (88.3%)	132 (86.8%)	428 (88.8%)	0.40
Fair or Poor (<90%)	11 (8.2%)	23 (11.7%)	20 (13.2%)	54 (1.2%)	
ART interruption in past year	(n=239)	(n=499)	(n=275)	(n=1013)	
Yes	111 (46.4%)	90 (18.0%)	59 (21.5%)	260 (25.7%)	<0.01
No	128 (53.6%)	409 (82.0%)	216 (78.5%)	753 (74.3%)	

LTFU and transfer patients who were contacted and not in care were asked why they did not return to the OPC for care. Pre-ART patients report "feeling healthy" 44% of the time as the primary reason for not returning to the OPC for follow-up care.

Table 3a. Reported Reasons for Not Returning to Care

Reported Reasons for Not Attending Care Among (a)	Pre-ART (N=29) n (%)	On ART (N=9) n (%)	Total (N=38)
"Feel healthy, no need for care"	13 (44.8%)	2 (22.2%)	15 (39.5%)
"Afraid of stigma if seen attending OPC"	0 (0%)	0 (0%)	0 (0%)
"Do not want family to know about illness"	1 (3.4%)	0 (0%)	1 (2.6%)
"Not happy with service at OPC"	1 (3.4%)	1 (11.1%)	2 (5.3%)
Work conflict, distance to OPC too far, or relocated housing	1 (3.4%)	1 (11.1%)	2 (5.3%)
Other	12 (41.4 %%)	3 (33.3%)	4 (10.5%)
Unknown	1 (3.4%)	2 (22.2%)	3 (7.9%)

Reported reasons by patient, family, or caregivers contacted.

Among ART-eligible patients, more than half did not return to clinic to start ART. Fifteen percent of transfer patients did not start ART due to imprisonment or detention. Sixty-seven percent of deaths among ART eligible patients did not return to clinic or died before starting ART.

Table 3b. Reported Reasons for Not Starting ART among ART-Eligible Patients

Reported Reasons for Not Starting ART	LTFU (n=135)	Transferred (n=65)	Dead (n=283)	Total (n=483)
"Refused treatment"	2 (1.5%)	0 (0%)	2 (0.7%)	4 (0.8%)
Did not return to clinic	85 (63.0%)	34 (52.3%)	132 (46.6%)	251 (52.0%)
Died before starting ART	1 (0.7%)	0 (0%)	59 (20.8%)	60 (12.4%)
Medical reasons	4 (3.0%)	1 (1.5%)	10 (3.5%)	15 (3.1%)
Transfer to other clinic	0 (0%)	13 (20.0%)	14 (4.9%)	27 (5.6%)
Prison/Detention	7 (5.2%)	10 (15.4%)	18 (6.4%)	35 (7.2%)
Determined ineligible by medical staff	0 (0%)	3 (4.6%)	4 (1.4%)	7 (1.4%)
Other	36 (26.7%)	4 (6.2%)	44 (15.5%)	84 (17.4%)

Timing of death differed between those patients originally reported dead and those LTFU and transfer patients discovered to be dead after contact tracing. The mean time between last visit and time of death was relative short at 42.3 days for patients originally classified as dead versus 181.5 days for patient found to be dead after contact tracing. When all deaths were combined, pulmonary and extrapulmonary tuberculosis accounted for the 23.9% of deaths. AIDS wasting syndrome and liver disease were reported as causes for 36.1 and 6.5% of deaths, respectively.

Table 3c. Timing and Causes of Death (Final Classification) Reported and newly identified deaths

Reported timing and causes of death (a)	Pre-ART (N=) n (%)	On ART (N=) n (%)	Total (N=)
Time between date of death and last visit to OPC (days) for original OPC reported deaths	(n=38)	(n=191)	(n=229)
Mean (SD)	51.6 (77.2)	40.4 (60.5)	42.3 (63.5)
Median (IQR)	21.5 (5 – 58)	24 (11 – 47)	24 (11 – 47)
Time between date of death and last visit to OPC (days) for newly identified deaths after contact tracing	(n=2)	(n=13)	(n=15)
Mean (SD)	63.5 (19.1)	199.7 (227.3)	181.5 (215.8)
Median (Q1-Q3)	63.5 (50 – 77)	85 (21 – 351)	77 (21 – 351)
AIDS Related Conditions for all deaths (b)	(n=131)	(n=379)	(n=510)
Pulmonary or Extrapulmonary TB	34 (26.0%)	88 (23.2%)	122 (23.9%)
PCP or respiratory disorder	1 (0.8%)	2 (0.5%)	3 (0.6%)
Septicemia/Sepsis	10 (7.6%)	9 (2.4%)	19 (3.7%)
Penicillium marneffei	1 (0.8%)	3 (0.8%)	4 (0.8%)
Cryptococcus neoformans	1 (0.8%)	5 (1.3%)	6 (1.2%)
Toxoplasmosis	4 (3.1%)	8 (2.1%)	12 (2.4%)
AIDS wasting syndrome	53 (40.5%)	131 (34.6%)	184 (36.1%)
Non-AIDS Related Condition			
Liver disease, including cirrhosis and hepatitis	3 (2.3%)	30 (7.9%)	33 (6.5%)
Drug overdose	4 (3.1%)	21 (5.5%)	25 (4.9%)
Accident (not HIV/AIDS related)	0 (0%)	12 (3.2%)	12 (2.4%)
Suicide	0 (0%)	6 (1.6%)	6 (1.2%)
Other illness	12 (9.2%)	50 (13.2%)	62 (12.2%)
Unknown	8 (6.1%)	14 (3.7%)	22 (4.3%)

Reported reasons by OPC staff per medical records including documentation from hospital discharge summaries. If a cause of death was unknown based on chart review, contact was attempted with the patient's family or caregivers by study staff to identify cause of death.

More than one response for cause of death was permitted; numbers reflect total number of reported conditions associated with death rather than total deaths.

7. Discussion

This study provides important data on current reporting of LTFU, transfers, and deaths among PLHIV across Vietnam that can guide future quality improvement initiatives for patient care and program monitoring [2]. We found levels of misclassification of LTFU and transfer patient that are comparable to other low to middle-income settings [4]. Roughly, a third of all LTFU patients contact traced were misclassified. The large portion of patients who self-initiated a transfer or reengaged in care after LTFU is concerning for unnecessary treatment interruptions and emphasizes the need improved patient convenience and tracking and support systems for facility to facility transfers.

A large proportion of LTFU patients traced were also found to be in prison or detention. These detainees may stay anytime between 3 months to four years in one or different centers [15]. Access to HIV testing and care is extremely limited in these settings and as a result PLHIV must often wait for release to receive either. In some cases, HIV care including ART is brought from surrounding OPCs into detention centers or by family members of detainees will bring ARV medications from the OPCs to the patient. However, quality of services including adherence to treatment and systematic monitoring is not optimal in these situations. Moreover, referrals after release are not routine, leading to additional interruptions in HIV care [16].

Nearly a third and more than half of LTFU patients fell out of care within the first six months and two years after enrollment, respectively, and 17% of LTFU patients traced were dead. Interestingly, the median CD4 count for LTFU patients was relatively high at 385 cells/mm3 and more than twice that of all those patients who died. The high rate of LTFU and death among LTFU patients traced suggests that there are at least (or two easily discerned) two distinct patient groups entering the HIV care system. One group is relatively healthy without a perceived need for HIV care and another group that waits and presents at late stage of disease only after developing symptoms. "Feeling healthy" was reported as the most common reason for LTFU among Pre-ART patients in our study and has been reported in other settings and Vietnam as a common reason for delaying entry into HIV care until late stage of disease [14, 17, 18]. Thirty-nine percent of LTFU patients were pre-ART patients and not eligible for ART. Without expansion of ART eligibility and targeted counseling and follow-up, it will likely be difficult to retain this population in care. Regardless, during the first six months of enrollment all patients should get intensive case management, counseling, treatment support through SMS reminders, treatment buddies, and other community based support.

Although reported adherence to care by patients across groups was similar, LTFU patients were much more likely to have an interruption in ART of at least 3 days during the previous 12 months. This finding suggests that late or missed appointments that are associated with interruption in ART can be used as an indicator for LTFU risk. These patients should be identified early and receive targeted interventions to support their retention in care.

Tracing of transfer patients in our study showed high success rates. In the vast majority of cases, transfers were requested for work and relocation issues. This present opportunity to identify patients who would benefit from relocation of point of HIV care due to work conflicts or relocation with OPC facilitated referrals and tracking systems. With the support of USAID/SMART TA and the Clinton Health Access Initiative, HCMC PAC implemented an SMS referral tracking system. The system included pre-transfer counseling including information on new OPC location as well as benefits of avoiding any interruption in HIV care through mobile phone text (SMS) reminders and community based supporters. As a result, 93% of patients had documentation of successful transfers to OPCs outside of HCMC to two neighboring provinces using the SMS system [19].

Patients who lived more than 10 km were also more likely to transfer to a new site of care. The association of distance and transfer suggests that convenience to routine care is critical to long term adherence to treatment. An expenditure analysis conducted across three Vietnamese provinces that included provincial hospitals and district health centers estimated that 28% of total outpatient care service delivery costs were related to transportation [20]. Ongoing decentralization of HIV care to the commune level that offers services throughout the week would likely improve patient convenience and retention in care [16, 21].

Patients found to be dead through this assessment were much more likely to have initially presented for care with lower CD4 counts and either clinical stage III or IV condition. Over 95% of these patients were eligible for ART at their first assessment. Only one a third of these patients received ART within 30 day of eligibility and one out of every four deceased patients did not receive ART at all. Together these finding suggest that a number of measures need to be taken to reduce the time from HIV detection to determination of ART eligibility and initiation on ART. In Vietnam, all HIV positive rapid screening tests must be confirmed at the provincial level with three HIV tests. Once confirmed positive, patients with Stage III or IV illness can be started on ART immediately. Otherwise, CD4 counts must be drawn and sent to provincial lab for processing. As a result, there is a delay between diagnosis and ART eligibility determination of 1-3 weeks and risk for losing patients at each step (rapid test to confirmation; confirmation to CD4 count drawn; return for CD4 results). Implementation of a rapid HIV testing algorithm and point-of-positive (sending CD4 count with all rapid positive HIV tests) or point-of-care CD4 counts (CD4 lab capacity at site level) could dramatically reduce the time between diagnosis and determination of ART eligibility and improve retention in care during this critical period [3, 22].

TB was the second most common reported cause of death with one third of all patients found to be dead having had a known diagnosis of TB within the past six months before the last recorded visit. A number of studies have shown the benefits of early ART within two weeks for patients co-infected with tuberculosis, particularly among patients with lower CD4 counts [23-25]. Many doctors continue to delay ART in the severely ill due to concerns of drug interactions and immune-reconstitution syndrome. Additional clinical training and guidance on the timing of ART for TB/HIV co-infected patients is warranted to improve outcomes for those co-infected patient presenting at late stage of disease. The leading reported cause of death among PLHIV in our study was AIDS wasting. It is likely that a number of the remaining patients died with undiagnosed TB. These patients would benefit from intensive case finding (ICF) with PCR sputum based tests such as GeneXpert with higher sensitivity of detecting TB among PLHIV. Lastly, a small percentage of patients in our study received and Isoniazid Preventive Therapy (IPT), which can dramatically reduce the burden of TB among PLHIV.

The third leading cause of death in our study was drug overdose for heroin. Very few patients in our study had a history of methadone treatment. Mortality due to overdose will likely fall with expansion of methadone treatment in Vietnam. Methadone is an effective tool for the treatment of addiction and supports the stabilization of lives of drug-users to reintegrate into mainstream society, reduces the incidence of HIV among persons who inject drugs (PWID), and improve adherence to treatment and retention in HIV care [26-28].

Our study has a number of limitations. The most significant limitation is the difficulty in tracing LTFU patients and identifying reasons why patients did not return to care. Patients were called six times before contact tracing was discontinued. It is apparent that finding those classified as LTFU in a concentrated epidemic may be more difficult than in a generalized epidemic. In addition, our classification is based on identified status of patients at the time tracing. In some cases, deaths and timing of death were reported by family members and not confirmed with hospital discharge summaries or other reports. Moreover, in many situations, there was an extended time period between the date of the last OPC visit and actual date of death of those reported LTFU or transfer patients who were identified as found to be dead. This limitation is due to the cross-sectional assessment of the status. However, the extended period does highlight a missed opportunity to save the lives of these patients with program interventions including active outreach and reengagement in care. Most often, there was time to reach out to them and re-engage them in care and treatment. If death prevention with intensive treatment support for those enrolled with CD4 counts less than 100 cells/mm^3 and active reengagement interventions for LTFU patients are not mobilized, high death rates will continue among PLHIV.

Whenever possible, we relied on reported cause of death recorded in charts. We did not conduct verbal autopsies or do any other further investigations on the cause of death. It is likely that causes of death recorded in charts were reported to providers through family members when death reports or hospital summaries were not available. Likewise, for a small number of cases when cause of death was not known per medical records, we relied on a report from a family member.

8. Conclusion

Misclassification of reported LTFU and transfer patients was common across Vietnam. More than one third of LTFU patients have actually returned to care or died. Many of these patients could be screened for high-risk to LTFU and provided programmatic interventions to prevent LTFU before it occurs. In particular, patients who are within the first six months of diagnosis, work or live more than 10 km from the clinic, and have been late for appointments are at high risk for LTFU. Decentralization of HIV care to the commune level and prisons would help improve convenience and ensure that PLHIV are identified and receive timely and continuous HIV treatment. A number of targeted interventions could reduce LTFU. CD4 counts performed at the point of positive HIV testing or care would reduce time to determining ART eligibility. Treatment literacy on benefits of HIV care for long-term health and reduced transmission would support retention of pre-ART patients with higher CD4 counts. Active case management, treatment buddies, and community supporters could be used to retain and reengage all patients in care. Compassionate release of PLHIV patients from detention centers without HIV care should be considered, as this was a common reported reason for LTFU and unsuccessful transfers. Moreover, improved preparation of transfer patients and tracking systems are needed to insure patients do not have unnecessary interruption in HIV care. These systems can be SMS based and not need be expensive to be effective.

Death among PLHIV continues to be primarily due entry into care at late stage of HIV disease with AIDS wasting syndrome and TB/HIV co-infection. Broader and targeted HIV testing and enrollment of expanded ART eligibility will facilitate early entry into care. Those patients that enroll with CD4 counts less than 100 cells/mm^3 should receive intensive case management and treatment support.

The continued high mortality from TB among PLHIV warrants improved ICF and expanded IPT among PLHIV. In addition, emergency ART clinical guidance to initiate ART within a shorter time after HIV positive diagnosis and more coordinated or integrated TB/HIV service provision is needed to avoid premature death in this vulnerable population.

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