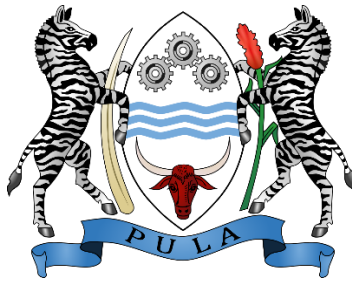


Standard Operating Procedures

**Data Analysis, Visualization, and Dissemination
Plan for the Botswana HIV Case Based Surveillance
Protocol**



Republic of Botswana

MINISTRY OF HEALTH & WELLNESS

Written by: Case Base Surveillance (CBS) Technical Working Group (TWG)	
Reviewed by: Akeem Ketlogetswe and Chris Serumola	Current Version: 1.0
Approved by: Penny Makuruetsa	Effective Date: 01/07/2021

Date of Development: July 2021
Updated: October 2021

1.0 TITLE

Data Analysis, Visualization and Dissemination Plan for the Botswana HIV Case Based Surveillance Protocol

2.0 PURPOSE

- 2.1** The purpose of this standard operating procedure (SOP) is to define procedures for data analysis and dissemination of data collected during the implementation of the HIV Case Based Surveillance protocol in Botswana.
- 2.2** This document serves to define the processes involved in designing, implementing, and running the data analysis and visualization processes for the HIV Case Based Surveillance in Botswana.

3.0 USERS

- 3.1** This SOP applies to all who have direct involvement in data analysis, visualization, and data dissemination during the lifetime of the case-based surveillance activities. This will include national data warehouse (NDW) officers, Monitoring & Evaluation officers, and the CBS data analysis team.

3.1.1 Data Analysis Team

Data analysis will be conducted by the Ministry of Health and Wellness (MOHW) surveillance officer or their designee with support from implementing partners (IP). The team will conduct analyses using HIV CBS data to broadly answer key questions related to who is bearing the burden of HIV disease; who is contributing to new HIV cases; what is the progression of disease and mortality for those diagnosed with HIV; and how are the cases distributed. The data analysis team will guide the development of the CBS data analysis plan and will provide guidance to the NDW team on the development of the dashboards for visualization of CBS data. The team will prepare and submit quarterly and annual CBS reports to the TWG and to identified stakeholders.

3.2 Data Analysis Plan

The data analysis team will conduct data analysis on an extracted CBS dataset to produce quarterly and annual reports based on a pre-defined CBS indicator algorithm and CBS Data Dictionary. The CBS dataset will be updated at least quarterly and more frequently if need be for analysis purposes.

- a) MOHW and IP NDW developers will develop a CBS dashboard that feeds directly from the CBS dataset to enable the TWG to visualize indicators of interest.
- b) The first part of the data analysis plan is to summarize, for all individuals with available data, the sentinel event variables (demographic and clinical factors).
- c) Additional statistical analysis to answer the research questions in the protocol will be done using STATA 17, SAS 9.4, and R 3.6.2.
- d) The data analysis team will produce quarterly and annual surveillance summary reports.

Description of Analysis of Sentinel Events:

New Diagnosis

This includes all newly diagnosed people living with HIV (PLHIV). Date of first positive HIV test will be used to ascertain the first positives. Line graphs will be used to display the distribution of the first positives by year of diagnosis stratified by sex and modalities. Bar graphs will be used to display the distribution of the first positives against age categories and geographic distribution (districts).

Recency Status

Number of HIV+ cases with RITA (Recent Infection Testing Algorithm) within the reporting period. Bar graphs will be used to display the number of people recently infected grouped by sex and year. Spatial analysis and maps to display hotspots with new infections.

Linkage to Treatment

This is the process of initiating HIV-related medical and social services for newly diagnosed HIV-positive persons. The IDCC HIV diagnosis and ART initiation dates will be used to ascertain those linked to treatment. Proportion of linkage to treatment will be computed by using number of those who linked to treatment divide by all PLHIV. Linkage to treatment will be stratified as same day, within 7 days of HIV

diagnosis, within two weeks of HIV diagnosis, after two weeks, and none. Bar graphs will be used to display number of individuals linked to treatment by year of diagnosis and time to linkage grouped by sex. We will also compare with ART initiation, a MER routine indicator.

ART Initiation

This is the start date of ART for persons who have been diagnosed with HIV. The HIV diagnosis and ART start dates will be used to define ART initiation. A line graph will be used to display the number of individuals who initiated ART by year of diagnosis stratified by sex. Bar graphs will be used to display the number of individuals who initiated ART by geographic location (districts). Spatial analysis will be conducted, and findings will be visualized on maps.

First CD4 count

HIV test date and the first CD4 count will be used to ascertain the first CD4 count for all PLHIV. The first CD4 count will be stratified as < 200, 200-349, 350-499, or \geq 500. Proportion of patients with CD4 count for each CD4 strata will be computed among those patients with baseline CD4 count. The line graphs will be used to display the distribution of CD4 by sex and age categories.

WHO Clinical Staging (Advanced HIV Disease).

This is the baseline WHO clinical staging i.e., first WHO stage measurement after diagnosis of HIV. WHO staging and HIV diagnosis dates will be used to derive it. A line graph will be used to display the distribution of baseline WHO staging by year of HIV diagnosis. The data will be displayed using bar charts and graphs.

Tuberculosis

All patients diagnosed with Tuberculosis (TB) will be quantified. The distribution of the TB infection will be plotted against year of HIV diagnosis stratified by sex. Bar graphs will be used to display the distribution of tuberculosis by age categories and geographic location (districts). We will also include numbers on TPT.

ART retention

Retention in treatment will be defined as drug refill appointment visit made within 90 days of a scheduled appointment among PLHIV who initiated ART. Retention will be computed at 3, 6, and 12 months.

Proportion of patients retained will be computed by using number of patients who refilled their drugs within 90 days from their scheduled visit divided by all PLHIV who initiated treatment. Bar graphs will be used to display the distribution of proportion of patients retained in care.

Attrition

This includes PLHIV who stopped treatment, refused treatment, lost to follow up (LTFU) on treatment at ≥ 90 days from the scheduled visit. The patient should not be documented as dead or transferred to another health facility to continue treatment. The distribution of attrition will be plotted against year of attrition stratified by sex. Bar graphs will be used to display the distribution of attrition by age categories.

Monitoring Viral Load

Viral load (VL) tests measure the amount of HIV's genetic material in a blood sample. The ART start date, viral load sample collection date, viral load test result, and last drug-pickup will be used to describe VL monitoring. Bar graphs will be used to display, patients eligible for viral load testing, number of viral samples collected, number of viral load test done, and number of PLHIV who are virally suppressed (VL<400copies/ml).

Death

Line graphs will be used to display the distribution of deaths by year of deaths stratified by sex. Bar graphs will be used to display the distribution of deaths by geographic location (Districts).

Perinatal HIV Infection

Refers to HIV positive test in children <5 years. The child's date of birth, child HIV test date, and child HIV test results will be used to ascertain perinatal HIV infection. Line graphs will be used to display the distribution of perinatal infections by year of diagnosis stratified by sex. Bar graphs will be used to display the distribution of perinatal infections by geographic location (Districts).

Addressing Missingness in the Data

If date of first positive HIV test is missing, then the following variable(s) may be used as proxies:

- Date of HIV Positive Verification Test
- ART Initiation Date
- First CD4 Sample Collection Date, or
- Date Started on 1st Line

If ART initiation date is missing, then the following variable(s) may be used as proxies:

- Previous ART Initiation Date
- Date of HIV Positive Verification Test
- First CD4 Sample Collection Date, or
- Date Started on 1st Line

If HIV diagnosis date is missing, then the following variable(s) may be used as proxies:

- Previous ART Initiation Date
- Date of HIV Positive Verification Test
- First CD4 Sample Collection Date, or
- Date Started on 1st Line

If first CD4 sample collection date is missing, then the following variable(s) may be used as proxies:

- Date of first positive HIV test
- ART Initiation Date

While using proxy date variables please take note of the following:

- When the year the test-and-start policy was implemented
- The difference between the proxy date variables should not be too wide (TBD).

3.3 Data Visualization

The following table includes CBS sentinel events, the data elements related to the sentinel events, description of the analysis to be conducted, and visualizations that will be included in the dashboards, quarterly and annual reports, and other dissemination venues (including presentations at meetings or writing manuscripts for publication in relevant journals).

Sentinel Event/Visualization Product	Data Elements	Description of Analysis	Infographic/Visualization
95-95-95 Cascade	<ul style="list-style-type: none"> HTS test/visit Date VL date/count ART start date Sex Age District 	<ul style="list-style-type: none"> HIV clinical cascade 	<ul style="list-style-type: none"> Bar Charts – Geographic Distribution, Age Band and Sex,
1st Positive Test/HIV diagnosis	<ul style="list-style-type: none"> HTS test/visit Date Sex at birth Date of birth Modality Age District 	<ul style="list-style-type: none"> Report HIV diagnoses by year of diagnosis, distribution by sex, age and by district Trend analysis 	<ul style="list-style-type: none"> Line Graph Bar Charts – Geographic Distribution, Age Band and Sex, Modes of Transmission Map – Geographic Distribution
TB Status	<ul style="list-style-type: none"> TB Status Initial TB Status Clinical TB Screenings 	<ul style="list-style-type: none"> Trend of TB among PLHIV by sex and year of HIV diagnosis 	<ul style="list-style-type: none"> Line Graph
TPT Status	<ul style="list-style-type: none"> TPT Status Initial TPT Status Clinical TPT Screenings 	<ul style="list-style-type: none"> Trend of TPT among PLHIV by sex and year of HIV diagnosis 	<ul style="list-style-type: none"> Line Graph
1st and Follow Up CD4 Test	<ul style="list-style-type: none"> CD4 Count CD4 Test Date HIV Diagnosis Date Age Sex 	<ul style="list-style-type: none"> Trends by year of diagnosis 	<ul style="list-style-type: none"> Line Graph
1st and follow up viral load.	<ul style="list-style-type: none"> Sample Collection Date ART Start Date Lab result description Last drug pickup 	<ul style="list-style-type: none"> Proportion eligible for VL Proportion with VL in the past 6/12 months Proportion that are virally suppressed 	<ul style="list-style-type: none"> Cascade of Bar Charts

WHO Clinical Staging (Advanced HIV Disease)	<ul style="list-style-type: none"> • WHO Clinical Stage • HIV Diagnosis Date • Information collected from all PLHIV • Sex • Age 	<ul style="list-style-type: none"> • Proportion and trend of baseline stage by year of diagnosis • Proportion with AIDS defining illness at time of diagnosis 	<ul style="list-style-type: none"> • Line Graph
Linked to Care	<ul style="list-style-type: none"> • IDCC Registration Date • Date of HIV Diagnosis 	<ul style="list-style-type: none"> • Proportion linked to care within a defined time period • Time to linkage 	<ul style="list-style-type: none"> • Line graph – trends • Histogram – time to linkage
ART Initiation	<ul style="list-style-type: none"> • ART Start Date • Date of HIV Diagnosis 	<ul style="list-style-type: none"> • Time to ART initiation from date of diagnosis (including same day) 	<ul style="list-style-type: none"> • Line Graph – Trends, Breakout within 2 weeks, 2-4 weeks, after 4 weeks and none; then breakdown by age groups and sex (0-4; 5-9; 10-15 and so on).
ART Retention	<ul style="list-style-type: none"> • Regimen Description • Regimen Duration • Clinic Visit Date 	<ul style="list-style-type: none"> • Proportion retained in care annually, 3, 6 month time periods 	<ul style="list-style-type: none"> • Bar Chart Cascade
Attrition	<ul style="list-style-type: none"> • District • Sex • Drug pickups • Stopped Treatment • Date Stopped • Death • Date Deceased • Transferred Out • Date Transferred Out 	<ul style="list-style-type: none"> • Trend analysis • LTFU • Proportion and number by age, sex, KP and district 	<ul style="list-style-type: none"> • Cascade of Bar Charts
Death	<ul style="list-style-type: none"> • District • Sex • Death • Date Deceased • ICD code 	<ul style="list-style-type: none"> • Trends in reported deaths of PLWHIV • Proportion of deaths by age band, sex and district 	<ul style="list-style-type: none"> • Line Graph – trends • Maps – geographic distribution • Bar charts – District and facility

3.4 Data Use and Dissemination

The following means shall be utilized to disseminate CBS reports and data quarterly and annually:

- a) Stakeholder consultation forums.
- b) Abstracts, manuscripts, and publications in journals.
- c) Publish aggregate data, no personally identifying information (PII).
- d) Data review meetings at the district:
Conduct quarterly data review meetings at the district level as guided by the phase of implementation as outlined in the CBS Implementation Guide.
- e) CBS TWG meetings:
Conduct quarterly data review meetings at which data will be reviewed, challenges discussed, and lessons learned are shared.
- f) Data Use TWG: Make CBS presentations during the Data Use TWG.