Review of HIV Mortality Surveillance Methods

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Background

- HIV mortality surveillance data allow countries to monitor trends in deaths among people living with HIV, to assess the impact and progress of HIV prevention and treatment investments; and in combination with HIV incidence data, to measure HIV epidemic control.
- Mortality surveillance systems are underdeveloped in most countries supported by the U.S President's Emergency Plan for AIDS Relief (PEPFAR).

Methods

- We conducted a review to describe various mortality surveillance methods used to fill data gaps.
- We searched peer-reviewed literature using Medline and Google Scholar, and grey literature using Google's search engine to identify methods for mortality surveillance using "HIV", "mortality", and "surveillance" as search terms.
- We only included studies in English from 1990 onwards.
- We collected information on the strengths, weaknesses, and requirements of each method.

Results

- Civil Registration and Vital Statistics (CRVS) is the gold standard and captures all deaths and causes of deaths (CoD).
- Most PEPFAR countries do not have representative, reliable national CRVS systems.
- Table below lists various methods that can be utilized for HIV mortality surveillance. It also lists, strengths and weaknesses of each system along with availability of CoD information and representativeness of the system.

Conclusions

- In the absence of national CRVS systems, or while countries are implementing and strengthening their CRVS systems, other surveillance strategies can be implemented at the sub-national or sentinel level to fill the gaps in mortality data.
- Timely mortality data can inform HIV prevention, care, and treatment interventions and programs.

Mortality surveillance methods, along with their strengths, weaknesses, availability of causes of death and representativeness

Type of system	Strengths	Weaknesses	Cause of death (CoD)	Representativeness
Civil Registration and Vital Statistics (CRVS)	Gold standard for mortality data; can produce ongoing cause-specific mortality trends comparable over time and geographic area	CoD data reported to CRVS are frequently not available, inconsistent, or the quality of data is unreliable; is resource-intensive and only works well with complete or near-complete coverage	CoD available if medical certification of death is entered into the CRVS	National coverage
Burial systems	Captures all deaths, including community deaths, that are brought to burial sites; can be supplemented with VA	Deaths not brought to registered burial sites are missed; VA-related weaknesses if VA is conducted	All CoD may be available if VA is conducted	Depends on the coverage
Household surveys with mortality modules	Wide variety of survey methods; can be added as a supplement to an existing survey	Requires skilled and trained interviewers and adequate financial resources; may require additional resources if VA is included in a second survey phase	All CoD may be available if VA is conducted	May be representative based on sampling approach
Hospital data on cause-specific mortality	Uses existing data; can be combined with community-based mortality data sources to improve representativeness	Does not capture community deaths if used alone; absence of ICD-trained professionals may contribute to limited or inaccurate coding	CoD available through medical records	May be representative based on coverage of facilities
Loss to follow-up (LTFU) tracking	Uses existing HIV program data; can support efforts to re-link people living with HIV (PLHIV) LTFU back into care and treatment services	Only captures mortality among PLHIV on treatment; needs to be supplemented with VA to assign a CoD if not available through medical records	CoD only available if medically certified CoD is provided by next of kin	May be representative of all PLHIV on treatment if all sites are included
HIV Case Surveillance (CS)	Provides unique information on HIV mortality and can help define epidemic control; consists of routine reporting of longitudinal individual-level data on all PLHIV; facilitates HIV programs to monitor and address gaps	Most low- and middle-income countries rarely collect mortality data, including CoD; lack of mortality data hinders the measurement of epidemic control	CoD only available if the country collects mortality data or links from other data systems	Depends on the coverage
Autopsy	Most reliable method of CoD determination	Resource intensive; time consuming; conducted by trained medical professionals	Conducted to determine CoD	Depends on the coverage
Verbal autopsy (VA)	Can be used when deaths are not assigned a medical certificate of CoD, as in the cases of poorly functioning healthcare systems or deaths that occur in the community	Requires skilled and trained interviewers, data entry and database support, and either physician-coded or automated assignment of CoD; can be inaccurate for certain causes (e.g. TB) (36)	All CoD available from VA	Depends on the coverage
Sample Vital Registration with Verbal Autopsy (SAAVY)	Can be representative of larger geographic or administrative area if statistical sampling scheme is used; requires fewer resources compared to full CRVS	Same as VA	All CoD available from VA	May be representative based on sampling approach
Minimally invasive autopsy (MIA) / Minimally Invasive Tissue Sampling (MITS)	Sensitive in determining CoD compared to full post-mortem autopsies for infectious causes; less costly and time-consuming and more acceptable than full autopsy	Requires that pathology and laboratory infrastructure and personnel be in place (or be developed); less useful for non-infectious causes compared to full autopsy	CoD available based on the tests conducted on cadaver samples	Depends on the coverage
HIV biomarker surveillance in mortuaries	Only blood or oral fluid/saliva is collected, making specimen collection easier than MIA; can provide information on underlying (undiagnosed) HIV disease, ART status, and viral suppression	May require trained staff that can collect blood from the cadaver; if conducted in mortuaries, it may be limited to urban settings where the majority of mortuaries exist	Only available if extracted through medical records	Not representative

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