Terms, Definitions, and Calculations Used in CDC HIV Surveillance Publications

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The Centers for Disease Control and Prevention (CDC) collects, analyzes, and disseminates surveillance data on HIV infection and AIDS; these data are the nation's source of timely information on the burden of HIV infection. HIV surveillance data are used by CDC's public health partners in other federal agencies, health departments, nonprofit organizations, and academic institutions to help target prevention efforts, plan for services, and develop policy.

BACKGROUND

This fact sheet contains terms, definitions, and methods of calculation that are commonly applied to HIV surveillance data.

Data on HIV infection in the current HIV Surveillance Report reflect the date of diagnosis of HIV infection—not the date of report to CDC.

In the HIV Surveillance Report, CDC publishes data for cases of HIV infection and stage 3 (AIDS). The data include persons with diagnosed HIV infection and those whose infection has been classified as having progressed to stage 3 (AIDS), and have been reported to CDC by state and local health departments through a given point in time. As of April 2008, all 50 states, the District of Columbia, and 6 US dependent areas (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, the Republic of Palau, and the US Virgin Islands) had implemented confidential name-based HIV infection reporting. Data for the most current year are considered preliminary as they are based on 6 months reporting delay. Due to delays in reporting, CDC recommends allowing for a 12-month reporting delay before including data in trend analyses.

Adjusted (estimated) data: The 2015 *HIV Surveillance Report* marked the transition to presenting diagnosis, death, and prevalence data without statistical adjustments for delays in reporting of cases to CDC. CDC periodically assesses the portfolio of the National HIV Surveillance System (NHSS) to determine whether methods and efficiencies in data collection and analysis meet the information needs of the nation. In determining that adjustments for reporting delays were no longer necessary, CDC considered improvements in data quality as a result of the following: availability of additional case information; shorter time for processing duplicates from multiple states; a better system for national data processing. CDC continues to statistically adjust transmission category data by using multiple imputation techniques to account for missing transmission category information in cases reported to CDC.

TERMS, DEFINITIONS, AND CALCULATIONS

HIV diagnoses and stage 3 (AIDS) classifications

HIV infection is classified as stage 3 (AIDS) when the immune system of a person infected with HIV becomes severely compromised (measured by CD4 cell count) and/or the person becomes ill with an opportunistic infection. In the absence of treatment, AIDS usually develops 8 to 10 years after initial HIV infection; with early HIV diagnosis and treatment, this may be delayed by many years. With the release of the *Revised Surveillance Case Definition for HIV Infection — United States, 2014* (www.cdc.gov/mmwr/preview/mmwrhtml/rr6303a1.htm?s_cid=rr6303a1_e), CDC now uses a stage system to describe HIV infection (see Stage of Disease).

Diagnoses of HIV infection and deaths of persons with diagnosed HIV infection are the number of persons diagnosed with HIV infection and the number of persons with a diagnosed HIV infection who have died in a given time period, respectively. Note that diagnoses of HIV infection are regardless of stage of disease at diagnosis (that is, persons diagnosed with HIV infection who have not progressed to stage 3 (AIDS); persons who were diagnosed with HIV infection and classified as stage 3 (AIDS) at the same time; and persons who were diagnosed with HIV infection that later received a stage (3) classification. Also note that deaths of persons with a diagnosis of HIV infection may be due to any cause (i.e., the death may or may not be related to HIV infection). Other systems, such as the National Vital Statistics Reports, provide data on HIV infection as a cause of death in the US population.

To provide the reader with a more accurate understanding of the number of persons diagnosed with HIV infection who have died, CDC includes in its surveillance report data on persons diagnosed with HIV infection regardless of the stage of disease at death, which includes persons with infection that may have been classified as stage 3 at the time of death.

Stage 3 (AIDS) and deaths of persons with infection ever classified as stage 3 (AIDS) are the number of persons with infection classified as stage 3 (AIDS) and the number of persons with infection ever classified as stage 3 (AIDS) who have died in a given time period, respectively. Note that deaths of persons with infection ever classified as stage 3 can be due to any cause (i.e., the death may or may not be related to HIV infection), and the category is therefore different from the designation deaths due to AIDS.

Uses of these data: Diagnoses of HIV infection (including stage 3 classifications), and death data provide trends of the burden of disease and are useful for tracking the time from a diagnosis of HIV infection to a stage 3 classification or death. Disparities between populations in the time from HIV infection diagnoses to stage 3 classifications or time to death underscore inequities in access to testing and care; this knowledge can help direct resource allocation.

HIV incidence

In general, HIV incidence is expressed as the estimated number of persons newly infected with HIV during a specified time period (e.g., a year), or as a rate calculated by dividing the estimated number of persons newly infected with HIV during a specified time period by the number of persons at risk for HIV infection.

It is important to understand the difference between HIV incidence and new diagnoses of HIV infection. HIV incidence refers to persons newly infected with HIV, whereas individuals newly diagnosed with HIV may have been infected years before being diagnosed.

Uses of these data: Incidence estimates are useful for planning and for allocating of funds, as well as evaluating the impact of prevention programs.

Persons living with diagnosed HIV infection or infection ever classified as stage 3 (AIDS)

These terms denote the number of persons in the 50 states and 6 US dependent areas who have received a diagnosis of HIV infection and are still alive, or the number of persons with infection that has been classified as stage 3, and are still alive.

The data in the HIV Surveillance Report represent the number of persons living with HIV infection who have been diagnosed, have been reported to the HIV surveillance system, and have not been reported as deceased.

HIV prevalence

The number of persons living with HIV disease at a given time regardless of the time of infection, whether the person has received a diagnosis (aware of infection), or the stage of HIV disease. Although prevalence does not indicate how long a person has had a disease, it can be used to estimate the probability that a person selected at random from a population will have the disease. CDC reports prevalence as the number of persons living with HIV infection in a given population at a given time and also reports prevalence rates, calculated per 100,000 population.

Uses of these data: Prevalence is useful for planning and resource allocation, as it reflects the number of people currently needing care and treatment services for HIV infection. Prevalence rates are useful for comparing HIV disease between populations and for monitoring trends over time.

Rate

A measure of the frequency of an event compared with the number of persons at risk for the event. Rates are calculated by dividing the number of events (numerator) by the size of the population (denominator) and including a measure of time. When comparing rates between populations, it is typical to standardize the denominator in order to make direct comparisons. This standardization will depend on the magnitude of the local surveillance data—for national data, the population size is most often standardized to 100,000.

- **Incidence rate:** a measure of the frequency with which new cases of illness, injury, or other health condition occur, expressed explicitly per a time frame. Incidence rate is calculated as the number of new cases during a specified period divided either by the average population (usually mid-period) or by the cumulative person-time the population was at risk.
- **Prevalence rate:** the proportion of a population that has a particular disease, injury, other health condition, or attribute at a specified point in time or during a specified period.

Percentage

A proportion of the whole, in which the whole is 100.

Proportion

A portion of a population or a data set, usually expressed as a decimal fraction (e.g., 0.2), a fraction (1/5), or a percentage of the population (20%) or of the data set.

Stage of disease

In April 2014, CDC published the *Revised Surveillance Case Definition for HIV Infection — United States, 2014* (www.cdc.gov/mmwr/preview/mmwrhtml/rr6303a1.htm?s_cid=rr6303a1_e). This surveillance case definition revises and combines the surveillance case definitions for human immunodeficiency virus (HIV) infection into a single case definition for persons of all ages (i.e., adults and adolescents aged ≥13 years and children aged <13 years). The revisions were made to address multiple issues, the most important of which was the need to adapt to recent changes in diagnostic criteria.

Laboratory criteria for defining a confirmed case now accommodate new multitest algorithms, including criteria for differentiating between HIV-1 and HIV-2 infection and for recognizing early HIV infection. The surveillance case definition is intended primarily for monitoring the HIV infection burden and planning for prevention and care on a population level, not as a basis for clinical decisions for individual patients.

Additional Resources

CDC-INFO
1-800-CDC-INFO (232-4636)
www.cdc.gov/info

CDC HIV Website
www.cdc.gov/hiv

CDC Act Against AIDS Campaign
www.cdc.gov/actagainstaids

A confirmed case can be classified in one of five HIV infection stages (0, 1, 2, 3, or unknown):

- If there was a negative HIV test within 6 months of the first HIV infection diagnosis, the stage is 0, and remains 0 until 6 months after diagnosis.

  A. Otherwise, if a stage-3-defining opportunistic illness has been diagnosed, the stage is 3.

  B. Otherwise, the stage is determined by the CD4 test immunologic criteria shown in the following table:

Table. HIV infection stage, based on age-specific CD4+ T-lymphocyte count or CD4+ T-lymphocyte percentage of total lymphocytes*

Stage*	Age on date of CD4 T-lymphocyte test					
	<1 year		1—5 years		6 years through adult	
	Cells/µL	%	Cells/µL	%	Cells/µL	%
1	≥1,500	≥34	≥1,000	≥30	≥500	≥26
2	750—1,499	26—33	500—999	22—29	200—499	14—25
3	<750	<26	<500	<22	<200	<14

*The stage is based primarily on the CD4+ T-lymphocyte count; the CD4+ T-lymphocyte count takes precedence over the CD4 T-lymphocyte percentage, and the percentage is considered only if the count is missing.

  C. If none of the above apply (e.g., because of missing information on CD4 test results), the stage is U (unknown).

Transmission category

The term for summarizing the multiple risk factors that a person may have had by selecting the one most likely to have resulted in HIV transmission. For surveillance purposes, persons with more than one reported risk factor are classified in the transmission category listed first in the hierarchy and therefore counted only once. The exception is men who report sexual contact with other men and injection drug use; this group makes up a separate transmission category. Due to the large number of cases reported without transmission category information, transmission category data are statistically adjusted using multiple imputation techniques to account for missing transmission category information in cases reported to CDC.

- **Male-to-male sexual contact:** Persons whose transmission category is classified as male-to-male sexual contact include men who had sexual contact with other men (i.e., homosexual contact) and men who had sexual contact with both men and women (i.e., bisexual contact).
- **Heterosexual contact:** Persons whose transmission category is classified as heterosexual contact are persons who had heterosexual contact with a person known to have, or to be at high risk for, HIV infection (e.g., an injection drug user or a man who has sex with men).
- **Injection drug use:** Persons whose transmission category is classified as injection drug use are persons who received an injection, either self-administered or given by another person, of a drug that was not prescribed by a physician for this person. The drug itself is not the source of the HIV infection, but rather the sharing of syringes or other injection equipment (e.g., cookers and cottons), which can result in transmission of bloodborne pathogens, such as HIV.
- **Male-to-male sexual contact and injection drug use:** Persons whose transmission category is classified as male-to-male sexual contact and injection drug use include men who had injected drugs as well as had sexual contact with other men or sexual contact with both men and women.