



## Methodology

### *Data Sources*

In June 2008, data requests for the numbers of persons living with HIV (non-AIDS) and AIDS, at any time between January 1, 2006 and December 31, 2006, cross-tabulated by county, age, gender, and race/ethnicity, were sent via e-mail to the HIV/AIDS-surveillance branches within the departments of health in all 50 U.S. states, the District of Columbia, Puerto Rico, and the Virgin Islands for the years 2005, 2006, and 2007. Data from the year 2006 were used unless these data were not available from the states. The request specified that if the department could not provide data at the county level, the department should aggregate the data to a region or state level. (The term region is used generically to refer to an aggregation of more than one county.) E-mail requests were followed up with telephone calls when necessary. If states were unable to fulfill the request, the numbers of persons living with HIV (non-AIDS) and AIDS were obtained from the Centers for Disease Control and Prevention (CDC) HIV/AIDS 2006 Surveillance Report [1].

### *Prevalence Estimation*

The population in each county as reported in the 2000 US census [2] was used as an estimate for the number of persons in each county. For states that provided region or state-level data, the census estimates were aggregated to the same geographic areas.

Prevalence is the probability of an outcome in the population [3]. The estimated prevalence of HIV (non-AIDS) and AIDS for each geographic level, *A*, were calculated as follows:

$$\text{Prevalence} = \frac{\text{Number of persons living with disease in geographic area } A}{\text{Number of persons living in geographic area } A} \times 100$$

The prevalence is displayed as a percentage. For states providing data in geographic areas other than counties, prevalence in each area was estimated and applied to each county in that area.

In addition to the county prevalence, we also estimated prevalence of HIV (non-AIDS) and AIDS for Congressional Districts, the States, and the Nation.

Congressional Districts are not spatially aligned with counties like States; the boundaries of the two geographic units often cross each other. To estimate prevalence in Congressional Districts, we used zip codes (a much smaller geography unit) as intermediate layer. First, all zip codes were assigned county prevalence for the county where the zip code centroid falls (point-in-polygon method), then these zip codes (with prevalence and population known) were assigned to Congressional Districts using the same point-in-polygon approach. The prevalence of Congressional Districts was calculated by averaging zip code prevalence estimates weighted by zip code population.

State prevalence estimates were calculated by averaging county prevalence estimates weighted by county population. For some states (*e.g.*, Iowa) where source data were provided at the state level, state prevalence was calculated directly using the equation above.

National prevalence was calculated by averaging state prevalence estimates weighted by state population.

#### *Count Estimation*

We estimated counts of HIV (non-AIDS) and AIDS combined for Counties, Congressional Districts, the States and the Nation. We used original counts for counties and states when available, and computed estimated counts for the rest of areas and geography units by multiplying their population with corresponding prevalence estimates. For a few states (*e.g.*, DC, RI) either HIV (non-AIDS) or AIDS data were not available (see Table 1), so the combined counts were therefore underestimated. For confidentiality reasons, we masked any areas with less than 10 HIV (non-AIDS) and AIDS combined cases and these areas were shown in gray and labeled as N/A.

#### *Geographical Analysis*

ArcView 9.2 software was used to produce maps of HIV and AIDS prevalence and counts, using natural breaks (Jenks' method) [4]. Several states that provided county-level data were unable to provide estimates for some counties due to small numbers of living persons with HIV (non-AIDS) or AIDS in these areas and these counties were shaded gray.

#### *Review for Accuracy*

The numbers of persons living with HIV (non-AIDS) and AIDS provided by each state were aggregated to the state level and cross-checked with the CDC HIV/AIDS 2006 Surveillance Report [1]. After the estimated prevalence from each state was calculated, staff contacts at participating departments of health were asked to review the county-level maps for their states.

#### *Results*

Table 1 summarizes the geographic levels of data used to estimate the prevalence of HIV (non-AIDS) and AIDS in each state. Among the 54 areas from which data were requested, 29 provided data at the county level, 12 provided data at the regional or district level, and 8 provided data at the state level. Five states were unable to provide the numbers of persons living with HIV (non-AIDS) and AIDS; the CDC 2006 HIV/AIDS Surveillance Report [1] was used to estimate prevalence in these states.

### **Limitations**

As the surveillance departments gather more data from clinics and hospitals, the numbers of persons diagnosed with HIV and AIDS are updated. The data obtained from the state health departments have not been adjusted for delays in reporting; they reflect the numbers of persons living with HIV (non-AIDS) and AIDS that the states were able to report at the time of the request. The CDC 2006 HIV/AIDS Surveillance Report adjusts its counts for delays in reporting; therefore the U.S. HIV/AIDS Index maps based on the CDC data may slightly overestimate prevalence.

Although most states provided data on persons living with HIV (non-AIDS) and AIDS at any point in time during the year, some provided data on such persons who were alive as of the end of the year.

Prevalence rates might be underestimated in these states due to deaths that occurred during the year; however, the difference would likely be relatively small, as the percent of deaths reported in 2006 among AIDS patients was estimated to be less than 4% of the total living cases [1].

Seventeen states were able to exclude prisoners from the data (Table 1). For those states that could not exclude prisoners, counties (or regions) in which prisons or other correctional facilities are located would tend to have greatly elevated prevalence rates, which would overstate the situation in the community-at-large.

Estimates of HIV (non-AIDS) prevalence rates may not be entirely comparable among states due to transitions from code-based reporting systems to confidential name-based reporting systems [5]. In 2005, CDC recommended that states collect HIV (non-AIDS) data through a name-based reporting system, because estimates based on name-based reporting are more accurate than those based on codes. In recent reports, CDC has reported HIV (non-AIDS) data only from states and territories that have conducted confidential name-based HIV infection reporting for at least four years. The U.S. HIV/AIDS Index presents prevalence estimates in areas for which states have collected data, regardless of the states' method of reporting or the quality of the surveillance system.

Other factors may influence the quality of state surveillance systems and, consequently, the maps of these states in the U.S. HIV/AIDS Index. These factors include differences in data-release restrictions for confidentiality, in the number of years that a surveillance system has been established, and in funding to support the surveillance system. In addition, prevalence estimates based on small populations may not be as stable as those based on larger populations. For a county with a small population, the addition or removal of a single living case would increase or decrease the prevalence of disease in this population by a much larger percentage and thus have a greater impact on the estimate than in a county with a larger population.

Table 1: Summary of Geographic Levels of Data Used to Create the Index (n=54)

Summarization Level	Geographic Areas
County	AR <sup>1</sup> , AZ, CA <sup>2,7</sup> , CO, CT <sup>7</sup> , DC <sup>1,5a,7</sup> , DE <sup>7</sup> , FL <sup>1</sup> , GA <sup>3</sup> , HI <sup>5a,7</sup> , IL <sup>1,7</sup> , IN, LA, ME <sup>1,4a,7</sup> , MA <sup>1,7</sup> , MI <sup>1</sup> , MO <sup>1</sup> , NH <sup>4b,7</sup> , NC, NJ <sup>1</sup> , NM, NV, NYC, RI <sup>2,4a,5b,7</sup> , SC <sup>1</sup> , TX <sup>1</sup> , VA <sup>7</sup> , WA <sup>3,4b</sup> , WY <sup>1</sup>
Region	AL, ID <sup>3</sup> , KS <sup>4b</sup> , KY <sup>2,5a,7</sup> , MD <sup>3,1</sup> , MN, MS, NY <sup>1,2,3</sup> , OH <sup>1</sup> , PR <sup>4a</sup> , TN, UT <sup>2,3,6</sup>
State or territory	IA <sup>1</sup> , MT <sup>4b,7</sup> , OR <sup>2,3,7</sup> , PA <sup>2,7</sup> , SD, VT <sup>7</sup> , WV <sup>1</sup> , VI <sup>6</sup>
CDC-published data were used 3,6	AK, ND <sup>7</sup> , NE, OK, WI

1 Prisoners were excluded from the data (n=17)

2 The total number of persons living with HIV (non-AIDS) or AIDS by county or region were obtained from an online report on the state department of health Web site and used to determine the overall prevalence of HIV (non-AIDS) or AIDS at the county or region level (n=7)

3 The total number of persons living with HIV (non-AIDS) or AIDS were not available by age (n=7)

4a Data were provided for 2005 only (n=3)

4b Data were provided for 2007 only (n=4)

5a The total number of persons living with HIV (non-AIDS) was not available (n=3)

5b The total number of persons living with AIDS was not available (n=1)

6 The total number of persons living with HIV (non-AIDS) or AIDS were not available by race/ethnicity (n=2)

7 States did not have confidential name-based HIV infection reporting for a sufficient length of time (since at least 2003) (n=15)

## Index Development

The U.S. HIV/AIDS Index is a project of the National Minority Quality Forum, with support from Gilead Sciences, Inc.

The data were collected and analyzed by NMQF staff in partnership with the Department of Epidemiology & Biostatistics at the School of Public Health & Health Services of The George Washington University in Washington, D.C.

## About the National Minority Quality Forum

Founded as a non-profit organization in 1998, the National Minority Quality Forum was established to strengthen national and local efforts to eliminate the disproportionate burden of premature death and preventable illness in racial and ethnic minorities and other special populations through the use of evidence-based, data-driven initiatives. See [www.nmqf.org](http://www.nmqf.org).

## References

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