

Section 6. HIV Incidence Estimate

HIV Incidence

There has been continuing interest in the District of Columbia to report on the number of new HIV infections . Measuring these new infections is called Incidence. This is different than the numbers of new diagnoses or cases that the Department of Health reports on every year. New cases are when medical providers and laboratories notify the Department of a new diagnosis. The diagnosis is not necessarily when the person was actually infected with HIV. Science has not yet captured the exact time when a person was infected with HIV. However, there is a model developed by the U.S. Centers for Disease Control and Prevention (CDC) that provides an estimate by taking a sample of new cases and applying a mathematical formula to arrive at a population level number.

The significance of incidence data is that it gives another window into the HIV epidemic by examining the number and characteristics of those infections during a year. This first ever report on HIV incidence in the District does provide an important snapshot of what the epidemic looks like in a more current timeframe. The data shows some significant findings:

Decline in new infections – there was a decrease of 29% in new infections from 922 in 2008 to 651 in 2011.

New infections trend younger – the trend is younger people ages 13-29 are being infected at slightly higher proportion than people ages 30-49 (44.9% v. 41.0%).

Increase in proportion of heterosexual infections – the percentage of new infections among heterosexuals nearly doubled from 16.9% in 2008 to 33.0% in 2011. The percentage of new infections attributed to men who have sex with men decreased by one-fifth from 56.8% in 2008 to 45.2% in 2011.

It is important to note that the incidence numbers **are not** a sub-set of the new cases reported during that year because the calculation takes into consideration all people who are at risk and may include people who are not yet diagnosed. However, there are some similar characteristics between the two sets of data: men are more likely to have HIV than women; African Americans are disproportionately impacted by HIV; and the modes of transmission show about half are among men who have sex with men and one-third among heterosexuals.

The Department of Health will continue to compile and analyze incidence data to contribute to the pool of information on the District epidemic and inform programmatic and policy responses.

Understanding the HIV Incidence Estimate

The 2013 HIV incidence estimate provides a projected number of newly acquired infections occurring each year among District residents during the four year span from 2008 to 2011. The calculation of the estimate takes into consideration the likelihood of newly acquired infections among the entire population at risk, thus it includes cases that have not yet been diagnosed. For this reason, ***the incidence estimate cannot be considered as the same data as the annual number of new cases reported in the Annual Epidemiology and Surveillance Report as new cases reflect the date of diagnosis and are not indicative of when a person was infected with HIV.*** The estimate provides greater insight in determining among whom new infections are occurring. This data can inform prevention strategies and allow for more effective resource allocation to reduce HIV transmission in the District.

Methodology of the HIV Incidence Estimate

This is the first time the DC Department of Health is reporting on HIV incidence. The CDC supports a select number of jurisdictions, including the District of Columbia to conduct incidence surveillance activities. The Department used the Serologic Testing Algorithm for Recent HIV Seroconversion (STARHS) method to estimate HIV incidence. STARHS is a two test methodology which uses the enzyme-linked immunoassay (EIA) to determine if an individual is HIV-positive and then utilizes the BED HIV-1 capture enzyme immunoassay to classify newly diagnosed individuals as either recent (less than 5 months from time of infection) or long-standing infections. The BED test is meant for surveillance purposes only and is not intended for clinical use. Eligible blood samples for STARHS must be collected within 90 days of diagnosis of HIV and are transported to the New York State STARHS Lab for testing. The incidence estimate is calculated using statistical imputation (a method of using available data and similar substitutes for missing information) to estimate the number of newly infected individuals in DC based on the known STARHS results. This statistical algorithm also relies on the testing and antiretroviral use history information collected from new diagnoses through the Adult Case Report Form. A stratified extrapolation approach was used for assessing the probability of the three different elements of the estimate: the probability of getting an HIV test within one year of becoming infected, the probability of being tested using STARHS after a new diagnosis, and the probability of being classified as a recent infection. The final result of the analysis is an estimate of the number of newly infected individuals in the District.

Limitations and Assumptions of the Incidence Estimate

Computing the HIV incidence estimate uses data collected from STARHS results as well as the testing and antiretroviral use history collected through the Adult Case Report Form. Due to the calculated nature of the HIV incidence estimate, there are several limitations and assumptions to consider:

Repeat Testing:

People who test more than once a year can lead to an overestimate of HIV incidence because if they seroconvert their likelihood of testing BED recent is greater than among persons who test less frequently. However, this limitation is unavoidable because the District recommends that persons in high prevalence groups, such as men who have sex with men, test more than once a year.

Delayed Reporting:

Incidence estimates are subject to variation and fluctuations since they are based on reported surveillance data. The statistical imputation used to complete the missing data adjusts for reporting delays using historic data to estimate current timeliness.

Changes in Surveillance Procedures Over Time:

Although instituted in 2007, systematic collection of laboratory data began in 2009; data collected prior to 2009 are not as complete or reliable as data collected starting in 2009.

Missing Data:

Incidence testing uses both laboratory data and testing and antiretroviral use history data. For some cases this data may be unavailable; however, they are included in the report. For these cases it is assumed that the information is missing at random. Statistical imputation (i.e. replacing missing data with substituted values) was used to estimate the missing information.

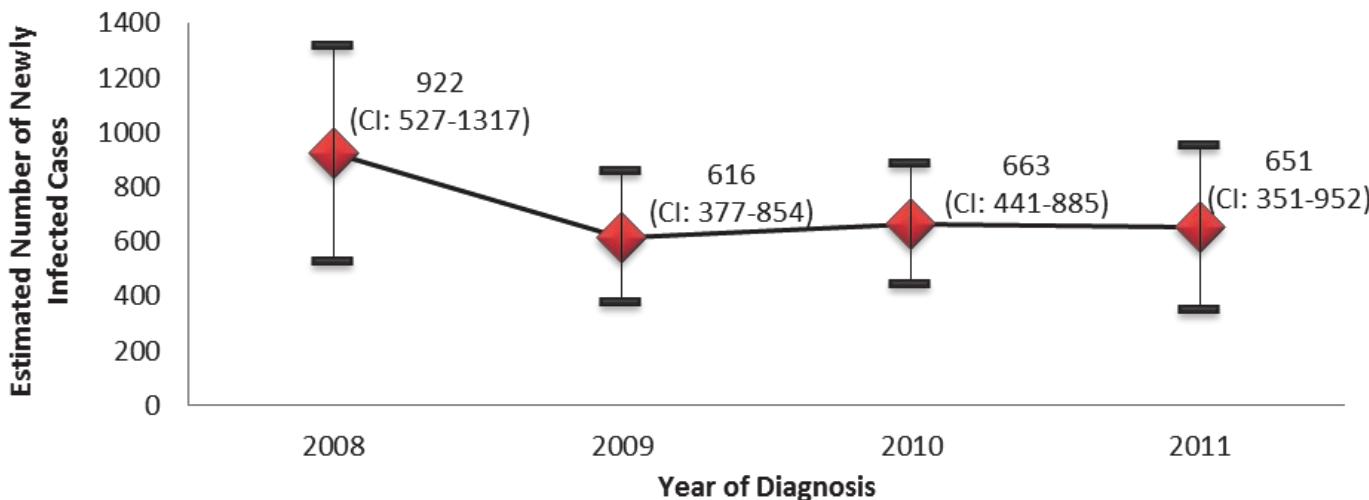
Insufficient Quantities:

For some sub-groups there was not sufficient data/numbers, thus reducing the reliability of the estimate for those particular sub-groups. Due to this limitation, sub-groups with insufficient data/numbers are deemed unreliable and will not have values reported.

Overview of Incidence Estimate

Between 2008 and 2011, an estimated 616 (lowest: 2009) to 922 (highest: 2008) new HIV infections occurred in the District. In 2010, the latest available national data, the estimated rate of new infections in the District was at 125.5 estimated cases per 100,000 persons compared to the national rate of 27.5 estimated cases per 100,000 persons. By the end of 2011, it is estimated that more than two-thirds of new infections were among men (69.3%), close to three-fourths were among blacks (71.7%), almost half were among individuals ages 13-29 (44.9%), and men who had sex with men (45.2%).

Figure 23. Estimated Number of Newly Infected HIV Cases by Year
District of Columbia, 2008-2011



Government of the District of Columbia

Figure 23 represents the overall estimated new infections of HIV in the District during the four year period from 2008 to 2011. Since the number of new infections of HIV is an estimate, the 95% confidence interval (i.e., the range of values most likely to contain the true estimate) is shown after adjusting for variability in sampling and timing of testing. During the four year period, the estimated number of new infections declined by 29% from 922 cases in 2008 to 651 cases in 2011. The estimated number of new infections in the District remained relatively stable from 2009 to 2011.

Table 9. Estimated Number of New HIV Infections by Sex, Race/Ethnicity, Age at Diagnosis, and Mode of Transmission District of Columbia, 2008-2011[†]

	2008 Estimate (CI)	%	2009 Estimate (CI)	%	2010 Estimate (CI)	%	2011 Estimate (CI)	%
Sex								
Men	820 (442-1,199)	88.9%	407 (224-590)	66.1%	413 (252-574)	62.3%	451 (220-682)	69.3%
Women	--	--	209 (45-373)	33.9%	250 (73-428)	37.7%	200 (5-396)	30.7%
Total	922 (527-1,317)	100.0%	616 (377-854)	100.0%	663 (441-885)	100.0%	651 (351-952)	100.0%
Race/Ethnicity								
White	--	--	--	--	--	--	--	--
Black	714 (390-1,038)	77.4%	425 (226-625)	69.0%	482 (290-673)	72.7%	467 (218-717)	71.7%
Other	--	--	--	--	--	--	--	--
Total	922 (527-1,317)	100.0%	616 (377-854)	100.0%	663 (441-885)	100.0%	651 (351-952)	100.0%
Age								
13-29	459 (221-698)	49.8%	191 (64-318)	31.0%	283 (152-414)	42.7%	292 (108-475)	44.9%
30-49	389 (146-632)	42.2%	332 (174-489)	53.9%	280 (153-407)	42.2%	267 (100-434)	41.0%
50-59	--	--	--	--	--	--	--	--
>=60	--	--	--	--	--	--	--	--
Total	922 (527-1,317)	100.0%	616 (377-854)	100.0%	663 (441-885)	100.0%	651 (351-952)	100.0%
Mode of Transmission								
MSM	524 (234-815)	56.8%	296 (146-446)	48.1%	269 (151-388)	40.6%	294 (122-467)	45.2%
IDU	--	--	--	--	--	--	--	--
MSM/IDU	--	--	--	--	--	--	--	--
Heterosexual Contact	156 (27-285)	16.9%	196 (70-322)	31.8%	232 (91-373)	35.0%	215 (40-390)	33.0%
Other**	--	--	--	--	--	--	--	--
Risk Not Identified	--	--	--	--	113 (26-199)	17.0%	--	--
Total	922 (527-1,317)	100.0%	616 (377-854)	100.0%	663 (441-885)	100.0%	651 (351-952)	100.0%

[†]strata with insufficient quantities will not have values reported

*Other includes mixed race individuals, Asians, Alaska Natives, American Indians, Native Hawaiians, Pacific Islanders, and unknown

**Other mode of transmission includes hemophilia, blood transfusion, and occupational exposure (healthcare workers)

- Men consistently represented the largest proportion of estimated new infections with the ratio of men to women approximately 3 to 1 in 2011.
- Between 2009 and 2011 the greatest proportion of estimated new infections shifted from cases aged 30-49 to those age 13-29.
- Among ages 30-49, there was a 20% decline in estimated new infections between 2009 and 2011. During the same period, there was a 53% increase in the estimated new infections among cases aged 13-29.

Table 10. Estimated Rate of New HIV Infections per 100,000 persons by Sex, Race/Ethnicity, and Age at Diagnosis District of Columbia, 2008-2011[†]

	2008 Estimated Rate per 100,000 (95% CI)	2009 Estimated Rate per 100,000 (95% CI)	2010 Estimated Rate per 100,000 (95% CI)	2011 Estimated Rate per 100,000 (95% CI)
Sex				
Men	344.2 (185.5-503.3)	169.6 (93.3-245.8)	167.3 (102.1-232.5)	178.8 (87.2-270.4)
Women	--	75.7 (16.3-135.2)	88.9 (26.0-152.2)	69.7 (1.7-138.0)
Total	180.6 (103.2-257.9)	119.4 (73.1-165.5)	125.5 (83.5-167.6)	120.7 (65.1-176.6)
Race/Ethnicity				
White	--	--	--	--
Black	267.9 (146.3-389.5)	158.5 (84.3-233.0)	188.5 (113.4-263.1)	180.6 (84.3-277.3)
Other*	--	--	--	--
Total	180.6 (103.2-257.9)	119.4 (73.1-165.5)	125.5 (83.5-167.6)	120.7 (65.1-176.6)
Age				
13-29	275.0 (132.4-418.1)	116.9 (39.2-194.7)	153.9 (82.7-225.2)	158.4 (58.6-257.7)
30-49	225.5 (84.6-366.4)	186.6 (97.8-274.8)	160.6 (87.8-233.5)	147.9 (55.4-240.4)
50-59	--	--	--	--
>=60	--	--	--	--
Total	180.6 (103.2-257.9)	119.4 (73.1-165.5)	125.5 (83.5-167.6)	120.7 (65.1-176.6)

*strata with insufficient quantities will not have values reported

*Other race includes mixed race individuals, Asians, Alaska Natives, American Indians, Native Hawaiians, Pacific Islanders, and unknown

† The estimated rate of new infection is unavailable for mode of transmission because population estimates are not available.

- The estimated rate of new infections among men is approximately twice that among women from 2009 to 2011.
- Among blacks, the rate of new HIV infections decreased by 41% from 2008 to 2009, but remained relatively stable from 2009 to 2011.
- Between 2009 and 2011, the estimated new HIV infection rate increased 36% among ages 13-29 and decreased 21% among ages 30-49. Thus the highest estimated rate of new infections by age in 2011 was among persons ages 13-29.