

## **Who is dying with HIV/AIDS, and how has this changed over time? Detailed Data Tables and Technical Notes**

### **Recent changes to the presentation of Massachusetts HIV/AIDS surveillance data**

Effective January 1, 2011, the Massachusetts Department of Public Health (MDPH), Bureau of Infectious Diseases, HIV/AIDS fact sheets, epidemiologic reports and other HIV data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts. As of January 1, 2011, this resulted in the removal of 2,297 HIV/AIDS cases, of which 739 have died and 1,558 were living. These persons living with HIV/AIDS may still continue to reside and receive care in the Commonwealth. The total number of persons living with HIV/AIDS, irrespective of location of diagnosis, is the basis for MDPH service planning. This change is partially a result of increased activities required by the Centers for Disease Control and Prevention (CDC) for de-duplication among states in an effort to identify cases that are counted multiple times in the national HIV/AIDS surveillance system. The cases are assigned to the state that reports the earliest date of AIDS diagnosis if available. If the case has not progressed to AIDS, the case is assigned to the state with the earliest HIV diagnosis date. Please note that all previous HIV/AIDS fact sheets, data reports and presentations include cases that may have been first diagnosed in another state.

Also effective January 1, 2011, the Massachusetts Department of Public Health (MDPH) HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to eliminate the presumed heterosexual exposure mode category for males; those cases have been reassigned to the no identified risk (NIR) exposure mode category. The presumed heterosexual exposure mode category was used with the intention of identifying HIV exposure mode for females when sex with males is the only reported risk factor, there is no evidence of current or past injection drug use (IDU), and behavioral risk and HIV status information about male sexual partners are unknown. Twenty-nine percent of females living with HIV/AIDS and 41% of recent female HIV diagnoses are reported in the presumed heterosexual exposure mode category. The application of the presumed heterosexual exposure mode category to males is overly inclusive in that female to male HIV transmission is biologically less efficient, and there are alternate exposure modes that are possible for males, including sex with other men (MSM) or IDU. The CDC reports males diagnosed with HIV/AIDS who report sex with females as their only risk factor, without corresponding partner risk or HIV status information, in the NIR exposure mode category. This revision to report presumed heterosexual male HIV/AIDS cases as NIR will bring Massachusetts HIV/AIDS cases among males in alignment with CDC standards. The MDPH maintains presumed heterosexual and heterosexual exposure mode categories for females.

To describe who is dying with HIV/AIDS and how this has changed over time, these tables and the accompanying fact sheet present a profile of deaths during the ten-year period from 2000–2009 among individuals diagnosed with HIV infection and AIDS. Additionally, information about deaths among people reported with AIDS for the ten-

Detailed Data Tables and Technical Notes: Who is dying with HIV/AIDS, and how has this changed over time?

year period 2000 to 2009, as well as the years 1985, 1990, and 1995 is included for historical perspective. Death data are not available for people reported with HIV infection (non- AIDS) prior to 1999, as HIV infection was not a reportable condition before this time.

Death data presented in this analysis include all deaths among people reported with HIV infection or AIDS in Massachusetts. This includes deaths from non HIV-related causes, such as cardiovascular disease, liver disease, cancer and drug or alcohol abuse. Therefore, the number of deaths reported here will vary from the number of HIV/AIDS deaths reported in *Massachusetts Deaths* by the Massachusetts Department of Public Health, Registry of Vital Records and Statistics, Bureau of Health Information, Statistics, Research and Evaluation.

On an annual basis, the HIV/AIDS Surveillance Program matches all reports of individuals living with HIV/AIDS against that year's vital statistics file of all individuals who died in Massachusetts. Additionally, death certificates with HIV/AIDS among reported underlying conditions are received by the HIV/AIDS Surveillance Program, and providers may report deaths among their patients.

**Table 1. Ranking of ten leading underlying causes of death among persons 25–44 years of age: Massachusetts, 2008**

<b>Cause</b>	<b>Ranking</b>	<b>N</b>	<b>% of Total Deaths (N=1,906)</b>
Unintentional Injuries	1	482	25.3%
Cancer	2	289	15.2%
Heart Disease	3	244	12.8%
Suicide	4	175	9.2%
Homicide	5	73	3.8%
Ill-defined conditions	6	67	3.5%
Chronic liver disease	7	63	3.3%
HIV/AIDS	8	38	2.0%
Injuries of Undetermined Intent <sup>1</sup>	9	31	1.6%
Diabetes	10	30	1.6%

Data Source: Bureau of Health Information, Statistics, Research and Evaluation, Massachusetts Deaths 2008, available online at [www.mass.gov](#)  
<sup>1</sup> Deaths where investigation has not determined whether injuries were accidental or purposely inflicted.

**Table 2. Deaths among persons reported with HIV infection (non-AIDS) and AIDS by year of death: Massachusetts, selected years, 1985–2009<sup>1</sup>**

<b>Year of death</b>	<b>HIV N</b>	<b>AIDS N</b>	<b>Total HIV + AIDS</b>
1985	-- <sup>2</sup>	118	118
1990	-- <sup>2</sup>	617	617
1995	-- <sup>2</sup>	1,133	1,133
2000	38	312	350
2001	56	356	412
2002	50	310	360
2003	63	318	381
2004	48	297	345
2005	48	269	317
2006	42	273	315
2007	45	234	279
2008	59	207	266
2009	38	175	213

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

<sup>2</sup> HIV infection reporting was implemented in 1999; therefore there are no data for deaths among people with HIV that did not progress to AIDS during this time period.

Data Source MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

<b>Table 3. Deaths among persons reported with HIV and AIDS by gender, race/ethnicity and exposure mode: Massachusetts<sup>1</sup>, 2000–2009</b>					
Gender:	HIV		AIDS		Total
	N	%	N	%	N
Male	326	67%	1,965	71%	<b>2,291</b>
Female	161	33%	786	29%	<b>947</b>
Race/Ethnicity:	N	%	N	%	N
White (non-Hispanic)	264	54%	1,370	50%	<b>1,634</b>
Black (non-Hispanic)	112	23%	734	27%	<b>846</b>
Hispanic/Latino	104	21%	624	23%	<b>728</b>
Asian/Pacific Islander	5	1%	19	1%	<b>24</b>
Other/Unknown	2	<1%	4	<1%	<b>6</b>
Exposure Mode:	N	%	N	%	N
Male-to-male Sex (MSM)	92	19%	543	20%	<b>635</b>
Injection Drug Use (IDU)	253	52%	1,374	50%	<b>1,627</b>
MSM/IDU	18	4%	140	5%	<b>158</b>
Heterosexual Sex (HTSX)	42	9%	255	9%	<b>297</b>
Other	2	<1%	54	2%	<b>56</b>
Total Undetermined	80	16%	385	14%	<b>465</b>
• Presumed HTSX <sup>2</sup>	26	5%	103	4%	<b>129</b>
• Undetermined <sup>3</sup>	54	11%	282	10%	<b>336</b>
<b>Total</b>	<b>487</b>	<b>100%</b>	<b>2,751</b>	<b>100%</b>	<b>3,238</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.

<sup>2</sup> Includes female sex with male of unknown HIV status or risk. This category is limited to females only.

<sup>3</sup> Includes male sex with female of unknown HIV status or risk, those still being followed up for risk information, those who have died with no determined risk, those lost to follow-up, and those with confirmed occupational exposure.

Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), data as of 1/1/11

*Note: The category of “presumed heterosexual” is used in Massachusetts to re-assign females who are reported with an exposure of heterosexual sex, but only with a partner of unknown HIV status or behavioral risk. Massachusetts uses the category of presumed heterosexual to distinguish these female cases from other undetermined cases about which we know less. Prior to January 1, 2011, the presumed heterosexual category was also used to report HIV data in males. The rationale for the application of the presumed heterosexual exposure mode category to females only has been addressed in the MDPH OHA report “Intersecting Risks: HIV Infection among Heterosexual Women and Men in Massachusetts.” (2010)*

*[http://www.mass.gov/Eeohhs2/docs/dph/aids/intersecting\\_risks.pdf](http://www.mass.gov/Eeohhs2/docs/dph/aids/intersecting_risks.pdf) . Nationally, the Centers for Disease Control and Prevention categorize “presumed heterosexual” cases as “no identified risk” (NIR). As such, comparisons of the presumed heterosexual category cannot be made to national data. Caution should be used in interpreting data*

Detailed Data Tables and Technical Notes: Who is dying with HIV/AIDS and how has this changed over time?

*for presumed heterosexual, as it is still not clear what the exposure risk was for females in this category. Although a person may not report other risk behaviors, such as injection drug use to a health care provider, it does not exclude the possibility that an individual has experienced these other risks. There are many barriers to disclosing HIV risk behaviors in the health care setting such as a limited patient-provider relationship or stigma.*

**Table 4. Deaths among persons reported with HIV/AIDS by gender and year of death: Massachusetts<sup>1</sup>, 2000–2009**

Year of death	Male		Female		Total
	N	%	N	%	N
2000	256	73%	94	27%	<b>350</b>
2001	290	70%	122	30%	<b>412</b>
2002	257	71%	103	29%	<b>360</b>
2003	249	65%	132	35%	<b>381</b>
2004	258	75%	87	25%	<b>345</b>
2005	220	69%	97	31%	<b>317</b>
2006	227	72%	88	28%	<b>315</b>
2007	196	70%	83	30%	<b>279</b>
2008	193	73%	73	27%	<b>266</b>
2009	145	68%	68	32%	<b>213</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

Data Source MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

**Table 5. Deaths among persons reported with HIV/AIDS by place of birth and year of death: Massachusetts<sup>1</sup>, 2000–2009**

Year of Death	US		Puerto Rico/ US Dependency <sup>2</sup>		Non-US		Total
	N	%	N	%	N	%	N
2000	271	77%	59	17%	20	6%	350
2001	322	78%	52	13%	38	9%	412
2002	276	77%	50	14%	34	9%	360
2003	298	78%	50	13%	33	9%	381
2004	259	75%	57	17%	29	8%	345
2005	237	75%	53	17%	27	9%	317
2006	246	78%	42	13%	27	9%	315
2007	225	81%	34	12%	20	7%	279
2008	195	73%	40	15%	31	12%	266
2009	166	78%	26	12%	21	10%	213

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.

<sup>2</sup> Ninety-five percent of all people diagnosed with HIV infection in MA who were born in a US dependency were born in Puerto Rico, 1% were born in the US Virgin Islands, <1% were born in American Samoa, and 4% were born in an unspecified dependency.

Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), data as of 1/1/11

**Table 6. Deaths among persons reported with HIV/AIDS by race/ethnicity and year of death: Massachusetts<sup>1</sup>, 2000–2009**

Year of Death	White NH		Black NH		Hispanic/ Latino		API		Other/Und.		Total
	N	%	N	%	N	%	N	%	N	%	N
2000	180	51%	84	24%	83	24%	2	1%	1	<1%	350
2001	218	53%	114	28%	79	19%	0	0%	1	<1%	412
2002	174	48%	101	28%	81	23%	3	1%	1	<1%	360
2003	186	49%	107	28%	86	23%	1	<1%	1	<1%	381
2004	176	51%	83	24%	83	24%	3	1%	0	0%	345
2005	152	48%	83	26%	79	25%	3	1%	0	0%	317
2006	169	54%	76	24%	68	22%	2	1%	0	0%	315
2007	141	51%	78	28%	59	21%	1	<1%	0	0%	279
2008	134	50%	70	26%	57	21%	4	2%	1	<1%	266
2009	104	49%	50	23%	53	25%	5	2%	1	<1%	213

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

NH=Non-Hispanic, API=Asian/Pacific Islander, Other/Und. = Other/Undetermined and includes American Indian/Alaska Native and undetermined race/ethnicity

Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

**Table 7. Deaths among *males* reported with HIV/AIDS by race/ethnicity and year of death: Massachusetts<sup>1</sup>, 2000–2009**

Year of Death	White NH		Black NH		Hispanic/Latino		API		Other/Und.		Total
	N	%	N	%	N	%	N	%	N	%	N
2000	142	55%	52	20%	59	23%	2	1%	1	<1%	<b>256</b>
2001	160	55%	73	25%	56	19%	0	0%	1	<1%	<b>290</b>
2002	134	52%	65	25%	54	21%	3	1%	1	<1%	<b>257</b>
2003	122	49%	64	26%	62	25%	1	<1%	0	0%	<b>249</b>
2004	141	55%	56	22%	58	22%	3	1%	0	0%	<b>258</b>
2005	110	50%	53	24%	54	25%	3	1%	0	0%	<b>220</b>
2006	131	58%	46	20%	48	21%	2	1%	0	0%	<b>227</b>
2007	112	57%	39	20%	44	22%	1	1%	0	0%	<b>196</b>
2008	103	53%	50	26%	35	18%	4	2%	1	1%	<b>193</b>
2009	70	48%	36	25%	33	23%	5	3%	1	1%	<b>145</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.  
 NH=Non-Hispanic, API=Asian/Pacific Islander, Other/Und. = Other/Undetermined and includes American Indian/Alaska Native and undetermined race/ethnicity  
 Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

**Table 8. Deaths among *females* reported with HIV/AIDS by race/ethnicity and year of death: Massachusetts<sup>1</sup>, 2000–2009**

Year of Death	White NH		Black NH		Hispanic/Latina		API		Other/Und.		Total
	N	%	N	%	N	%	N	%	N	%	N
2000	38	40%	32	34%	24	26%	0	0%	0	0%	<b>94</b>
2001	58	48%	41	34%	23	19%	0	0%	0	0%	<b>122</b>
2002	40	39%	36	35%	27	26%	0	0%	0	0%	<b>103</b>
2003	64	48%	43	33%	24	18%	0	0%	1	1%	<b>132</b>
2004	35	40%	27	31%	25	29%	0	0%	0	0%	<b>87</b>
2005	42	43%	30	31%	25	26%	0	0%	0	0%	<b>97</b>
2006	38	43%	30	34%	20	23%	0	0%	0	0%	<b>88</b>
2007	29	35%	39	47%	15	18%	0	0%	0	0%	<b>83</b>
2008	31	42%	20	27%	22	30%	0	0%	0	0%	<b>73</b>
2009	34	50%	14	21%	20	29%	0	0%	0	0%	<b>68</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.  
 NH=Non-Hispanic, API=Asian/Pacific Islander, Other/Und. = Other/Undetermined and includes American Indian/Alaska Native and undetermined race/ethnicity  
 Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

**Table 9. Deaths among persons reported with HIV/AIDS by exposure mode and year of death: Massachusetts<sup>1</sup>, 2000–2009**

	MSM		IDU		MSM/ IDU		HTSX		Other		Pres. HTSX <sup>2</sup>		Undeter- -mined <sup>3</sup>		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
2000	72	21%	185	53%	13	4%	21	6%	12	3%	12	3%	35	10%	350
2001	85	21%	211	51%	19	5%	28	7%	5	1%	17	4%	47	11%	412
2002	74	21%	194	54%	15	4%	33	9%	9	3%	10	3%	25	7%	360
2003	66	17%	191	50%	17	4%	45	12%	8	2%	10	3%	44	12%	381
2004	69	20%	170	49%	18	5%	30	9%	7	2%	11	3%	40	12%	345
2005	57	18%	164	52%	15	5%	33	10%	2	1%	19	6%	27	9%	317
2006	66	21%	157	50%	16	5%	30	10%	3	1%	16	5%	27	9%	315
2007	62	22%	121	43%	25	9%	28	10%	5	2%	12	4%	26	9%	279
2008	51	19%	124	47%	14	5%	26	10%	4	2%	11	4%	36	14%	266
2009	33	15%	110	52%	6	3%	23	11%	1	<1%	11	5%	29	14%	213

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

<sup>2</sup> Includes female sex with male of unknown HIV status or risk. This category is limited to females.

<sup>3</sup> Includes male sex with female of unknown HIV status or risk, those still being followed up for risk information, those who have died with no determined risk, and those lost to follow-up.

MSM = Male-to-Male Sex; IDU = Injection Drug Use; MSM/IDU = Male-to-Male Sex and Injection Drug Use; HTSX = Heterosexual Sex; Pres. HTSX = Presumed Heterosexual Sex

Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

**Table 10. Deaths among males reported with HIV/AIDS by exposure mode and year of death: Massachusetts<sup>1</sup>, 2000–2009**

	MSM		IDU		MSM/ IDU		HTSX		Other		Undeter- -mined <sup>2</sup>		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	
2000	72	28%	125	49%	13	5%	4	2%	9	4%	33	13%	256
2001	85	29%	130	45%	19	7%	11	4%	1	<1%	44	15%	290
2002	74	29%	129	50%	15	6%	9	4%	6	2%	24	9%	257
2003	66	27%	116	47%	17	7%	18	7%	4	2%	28	11%	249
2004	69	27%	115	45%	18	7%	16	6%	6	2%	34	13%	258
2005	57	26%	110	50%	15	7%	11	5%	2	1%	25	11%	220
2006	66	29%	105	46%	16	7%	11	5%	3	1%	26	11%	227
2007	62	32%	75	38%	25	13%	9	5%	2	1%	23	12%	196
2008	51	26%	81	42%	14	7%	13	7%	4	2%	30	16%	193
2009	33	23%	72	50%	6	4%	8	6%	1	1%	25	17%	145

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

<sup>2</sup> Includes male sex with female of unknown HIV status or risk, those still being followed up for risk information, those who have died with no determined risk, and those lost to follow-up.

MSM = Male-to-Male Sex; IDU = Injection Drug Use; MSM/IDU = Male-to-Male Sex and Injection Drug Use; HTSX = Heterosexual Sex

Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

**Table 11. Deaths among *females* reported with HIV/AIDS by exposure mode and year of death: Massachusetts<sup>1</sup>, 2000–2009**

	IDU		HTSX		Other		Pres. HTSX <sup>2</sup>		Undeter- mined <sup>3</sup>		Total N
	N	%	N	%	N	%	N	%	N	%	
2000	60	64%	17	18%	3	3%	12	13%	2	2%	<b>94</b>
2001	81	66%	17	14%	4	3%	17	14%	3	2%	<b>122</b>
2002	65	63%	24	23%	3	3%	10	10%	1	1%	<b>103</b>
2003	75	57%	27	20%	4	3%	10	8%	16	12%	<b>132</b>
2004	55	63%	14	16%	1	1%	11	13%	6	7%	<b>87</b>
2005	54	56%	22	23%	0	0%	19	20%	2	2%	<b>97</b>
2006	52	59%	19	22%	0	0%	16	18%	1	1%	<b>88</b>
2007	46	55%	19	23%	3	4%	12	14%	3	4%	<b>83</b>
2008	43	59%	13	18%	0	0%	11	15%	6	8%	<b>73</b>
2009	38	56%	15	22%	0	0%	11	16%	4	6%	<b>68</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being reported in Massachusetts.

<sup>2</sup> Includes female sex with male of unknown HIV status and risk. This category is limited to females.

<sup>3</sup> Includes those still being followed up for risk information, those who have died with no determined risk, and those lost to follow-up. IDU = Injection Drug Use; HTSX = Heterosexual Sex; Pres. HTSX = Presumed Heterosexual Sex

Data Source: MDPH HIV/AIDS Surveillance Program (percentages may not add up to 100% due to rounding), Data as of 1/1/11

## Technical Notes: Explanation of Crude and Age-Adjusted Rates of Death

A rate of a disease per 100,000 population is a more precise way to compare groups that have substantially different population sizes rather than relying on the raw number of deaths. To adjust for fluctuations in the annual rate of death among people reported with HIV/AIDS, an average annual rate of death for the period 2007 to 2009 is used. The average number of deaths is calculated over the three-year period by adding the total number of deaths among people reported with HIV/AIDS in each of the three years and dividing by three. The crude average annual rate of death is then calculated by dividing the average number of people reported with HIV/AIDS who died during the three years by the entire population (everyone or the sub-population involved) and multiplying by 100,000. (See example 1 below). The Massachusetts (Department of Public Health) Modified Age, Race/Ethnicity, & Sex Estimates 2005 (MMARS05) file is the source of population sizes for these calculations.

### Example 1: Calculation of Crude Average Annual Rate of Death among People Reported with HIV/AIDS for White Individuals, Massachusetts, 2007–2009 (2.4 per 100,000)

$$\begin{aligned} \text{Crude average annual rate of} & \\ \text{death among reported} & \\ \text{HIV/AIDS cases for white} & \\ \text{individuals, 2007–2009} & = (((\text{number of white individuals reported with HIV/AIDS} \\ & \text{who died in 2007} + \text{number of white individuals reported} \\ & \text{with HIV/AIDS who died in 2008} + \text{number of white} \\ & \text{individuals reported with HIV/AIDS who died in 2009}) \div 3) \\ & \div \text{population size of white individuals}) \times 100,000 \\ & = (((141 + 134 + 104) \div 3) \div 5,215,472) \times 100,000 \\ & = ((379 \div 3) \div 5,215,472) \times 100,000 \\ & = (126.3333 \div 5,215,472) \times 100,000 \\ & = 0.000024223 \times 100,000 \\ & = \mathbf{2.4} \end{aligned}$$

Sometimes, in addition to the population size being different, the age composition of the populations is different. In Massachusetts, black and Hispanic/Latino populations are younger than white. The median age of black people (29.7 years) and Hispanic/Latino people (24.5 years) is younger than that of white people (38.8 years). Therefore, it is necessary to “age-adjust” the rate of death among people reported with HIV/AIDS to get a true comparison of the impact of the disease across racial/ethnic groups without an effect from the differences in age composition. Age-adjustment of rates minimizes the distortion created by differences in age composition.

Age-adjusted rates are calculated by weighting the age-specific rates for a given population by the age distribution of a standard population. The age-specific rates are calculated for eleven age groups ranging from less than one year old to 85 years or above and are weighted by the 2000 US standard population. The weighted age-

Detailed Data Tables and Technical Notes: Who is dying with HIV/AIDS and how has this changed over time?

specific rates are then added to produce the adjusted rate for all ages combined. (See example 2 below).

**Example 2: Calculation of Age-adjusted Rate of Death among People Reported with HIV/AIDS for White Individuals, Massachusetts, 2007–2009, (2.2 per 100,000)**

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Age group (in years)	Average number of deaths among reported HIV/AIDS cases 2007–2009	Population (2005)	2000 US standard population weight	Age-adjusted rate ((B÷C×D)×100,000))
<1	0	57,670	0.013818	0.000000
1-4	0	230,681	0.055317	0.000000
5-14	0	614,485	0.145565	0.000000
15-24	0.33333333	646,026	0.138646	0.007154
25-34	2.66666667	636,970	0.135573	0.056757
35-44	30.66666667	823,238	0.162613	0.605754
45-54	58.66666667	818,844	0.134834	0.966028
55-64	26.33333333	601,053	0.087247	0.382247
65-74	6	352,672	0.066037	0.112349
75-84	1.66666667	299,510	0.044842	0.024953
85+ years	0	134,323	0.015508	0.000000
<b>Total</b>	126.333333	5,215,472	1	<b>2.2</b>

To see the effect of age-distribution on rates of death see Table 12 below for a comparison of crude and age-adjusted rates by race/ethnicity.

**Table 12. Crude and age-adjusted rates of death among people reported with HIV/AIDS per 100,000 population<sup>1</sup> by race/ethnicity and gender: average annual rate 2007–2009, Massachusetts<sup>2</sup>**

State Total:	Crude Rate per 100,000	Age-Adjusted Rate per 100,000
White (non-Hispanic)	2.4	2.2
Black (non-Hispanic)	17.0	19.3
Hispanic/Latino	11.1	16.3
<b>Mass. Total Rate</b>	<b>3.9</b>	<b>3.7</b>
Males:	Crude Rate per 100,000	Age-Adjusted Rate per 100,000
White (non-Hispanic) Males	3.8	3.3
Black (non-Hispanic) Males	22.1	26.4
Hispanic/Latino Males	14.8	23.5
<b>Mass. Total Rate Among Males</b>	<b>5.7</b>	<b>5.3</b>
Females:	Crude Rate per 100,000	Age-Adjusted Rate per 100,000
White (non-Hispanic) Females	1.2	1.1
Black (non-Hispanic) Females	12.2	13.3
Hispanic/Latina Females	7.5	10.2
<b>Mass. Total Rate Among Females</b>	<b>2.3</b>	<b>2.1</b>

<sup>1</sup> The denominators for rate calculations are from the Massachusetts (Department of Public Health) Modified Age, Race/Ethnicity, & Sex Estimates 2005; all rates are age-adjusted using the 2000 US standard population.

<sup>2</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.

Data Source: MDPH HIV/AIDS Surveillance Program; data as of 1/1/11

### **Technical Notes: Trends in survival after an AIDS diagnosis**

The following analyses describe changes over time in the survival of people who are diagnosed with AIDS in Massachusetts.

Tables 13–17 describe how many people died within 1 year of an AIDS diagnosis, between 1 and 2 years, between 2 and 3 years, etc., and up to 10 or more years for all people diagnosed with AIDS from 1987 to 2008. For example, the first column of Table 13 indicates that of 628 people diagnosed with AIDS in 1987, 250, or 40%, died within 1 year of diagnosis; 157, or 25%, died between 1 and 2 years of diagnosis; and 90, or 14%, died between 2 and 3 years of diagnosis.

It should be noted that if a person was diagnosed with AIDS in 2008, only one complete year of survival can be assessed, since this report includes data only up to January 1, 2010. Likewise, a diagnosis of AIDS in 2007 would not allow observation for more than two years, etc. These observations are relevant when interpreting the following tables and especially when comparing the distribution of survival times across years. With these caveats in mind, there has been a fairly consistent decline in the percentage of people who die within two years of an AIDS diagnosis. This most likely reflects higher rates of early diagnosis and improved care and treatment of people living with AIDS in the Commonwealth.

In comparing survival for people diagnosed in 1988 with people diagnosed in more recent years, it is evident that the proportion of people who are still alive is greater for each successive time period. More people are surviving for longer time periods after being diagnosed with AIDS. Advances in the prevention of opportunistic infections and the treatment of HIV infection over the years account for this significant increase in survival.

<b>Table 13. Time from AIDS diagnosis to death by year of AIDS diagnosis: Massachusetts<sup>1</sup>, 1987–1991</b>										
	<b>1987</b>		<b>1988</b>		<b>1989</b>		<b>1990</b>		<b>1991</b>	
Survival time <sup>2</sup>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<1 yr.	250	40%	256	31%	264	28%	272	26%	340	26%
1 - <2 yr.	157	25%	199	24%	216	23%	208	20%	296	23%
2 - <3 yr.	90	14%	139	17%	166	17%	192	18%	204	16%
3 - <4 yr.	44	7%	69	8%	85	9%	113	11%	114	9%
4 - <5 yr.	16	3%	35	4%	63	7%	63	6%	70	5%
5 - <6 yr.	11	2%	25	3%	43	4%	39	4%	35	3%
6 - <7 yr.	8	1%	12	1%	17	2%	14	1%	12	1%
7 - <8 yr.	5	1%	13	2%	7	1%	10	1%	13	1%
8 - <9 yr.	9	1%	3	<1%	4	<1%	10	1%	10	1%
9 - <10 yr.	0	0%	2	<1%	5	1%	7	1%	6	<1%
10+ yr.	9	1%	18	2%	26	3%	28	3%	37	3%
Still Alive	29	5%	65	8%	63	7%	93	9%	165	13%
<b>Total</b>	<b>628</b>	<b>100%</b>	<b>836</b>	<b>100%</b>	<b>959</b>	<b>100%</b>	<b>1,049</b>	<b>100%</b>	<b>1,302</b>	<b>100%</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.  
<sup>2</sup> Years between AIDS diagnosis and death  
 Data Source: MDPH Surveillance Program; data as of 1/1/11

<b>Table 14. Time from AIDS diagnosis to death by year of AIDS diagnosis: Massachusetts<sup>1</sup>, 1992–1996</b>										
	<b>1992</b>		<b>1993</b>		<b>1994</b>		<b>1995</b>		<b>1996</b>	
Survival time <sup>2</sup>	<b>N</b>	<b>%</b>								
<1 yr.	333	20%	324	19%	266	19%	195	15%	97	9%
1 - <2 yr.	360	21%	346	20%	246	17%	95	7%	45	4%
2 - <3 yr.	298	18%	254	15%	116	8%	56	4%	53	5%
3 - <4 yr.	170	10%	111	7%	51	4%	50	4%	40	4%
4 - <5 yr.	59	4%	47	3%	35	2%	40	3%	41	4%
5 - <6 yr.	32	2%	34	2%	40	3%	31	2%	37	3%
6 - <7 yr.	36	2%	32	2%	26	2%	35	3%	34	3%
7 - <8 yr.	15	1%	32	2%	43	3%	44	3%	23	2%
8 - <9 yr.	32	2%	21	1%	25	2%	28	2%	25	2%
9 - <10 yr.	21	1%	22	1%	17	1%	27	2%	17	2%
10+ yr.	73	4%	95	6%	88	6%	74	6%	56	5%
Still Alive	252	15%	384	23%	459	33%	649	49%	656	58%
<b>Total</b>	<b>1,681</b>	<b>100%</b>	<b>1,702</b>	<b>100%</b>	<b>1,412</b>	<b>100%</b>	<b>1,324</b>	<b>100%</b>	<b>1,124</b>	<b>100%</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.  
<sup>2</sup> Years between AIDS diagnosis and death  
 Data Source: MDPH Surveillance Program; data as of 1/1/11

**Table 15. Time from AIDS diagnosis to death by year of AIDS diagnosis: Massachusetts<sup>1</sup>, 1997–2001**

Survival time <sup>2</sup>	1997		1998		1999		2000		2001	
	N	%	N	%	N	%	N	%	N	%
<1 yr.	67	8%	52	6%	59	7%	55	7%	62	9%
1 - <2 yr.	38	4%	39	4%	30	3%	19	3%	23	3%
2 - <3 yr.	33	4%	19	2%	34	4%	25	3%	21	3%
3 - <4 yr.	28	3%	23	3%	22	3%	19	3%	14	2%
4 - <5 yr.	39	4%	27	3%	26	3%	21	3%	17	2%
5 - <6 yr.	24	3%	26	3%	18	2%	25	3%	18	3%
6 - <7 yr.	23	3%	25	3%	17	2%	12	2%	10	1%
7 - <8 yr.	22	2%	26	3%	18	2%	11	1%	9	1%
8 - <9 yr.	20	2%	18	2%	19	2%	11	1%	4	1%
9 - <10 yr.	20	2%	17	2%	12	1%	7	1%	-- <sup>3</sup>	-- <sup>3</sup>
10+ yr.	39	4%	20	2%	4	<1%	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>
Still Alive	540	60%	618	68%	614	70%	549	73%	507	74%
<b>Total</b>	<b>893</b>	<b>100%</b>	<b>910</b>	<b>100%</b>	<b>873</b>	<b>100%</b>	<b>754</b>	<b>100%</b>	<b>685</b>	<b>100%</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.

<sup>2</sup> Years between AIDS diagnosis and death

<sup>3</sup> Individuals diagnosed in this year have not yet had the opportunity to survive this many years before death.

Data Source: MDPH Surveillance Program; data as of 1/1/11

**Table 16. Time from AIDS diagnosis to death by year of AIDS diagnosis: Massachusetts<sup>1</sup>, 2002–2006**

Survival time <sup>2</sup>	2002		2003		2004		2005		2006	
	N	%	N	%	N	%	N	%	N	%
<1 yr.	42	6%	36	6%	45	7%	36	6%	28	5%
1 - <2 yr.	20	3%	18	3%	18	3%	10	2%	8	1%
2 - <3 yr.	13	2%	8	1%	15	2%	10	2%	9	2%
3 - <4 yr.	18	3%	14	2%	15	2%	7	1%	2	<1%
4 - <5 yr.	11	2%	14	2%	10	2%	5	1%	-- <sup>3</sup>	-- <sup>3</sup>
5 - <6 yr.	12	2%	9	2%	3	<1%	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>
6 - <7 yr.	15	2%	5	1%	-- <sup>3</sup>					
7 - <8 yr.	4	1%	-- <sup>3</sup>							
8 - <9 yr.	-- <sup>3</sup>									
9 - <10 yr.	-- <sup>3</sup>									
10+ yr.	-- <sup>3</sup>									
Still Alive	535	80%	468	82%	534	83%	567	89%	543	92%
<b>Total</b>	<b>670</b>	<b>100%</b>	<b>572</b>	<b>100%</b>	<b>640</b>	<b>100%</b>	<b>635</b>	<b>100%</b>	<b>590</b>	<b>100%</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.

<sup>2</sup> Years between AIDS diagnosis and death

<sup>3</sup> Individuals diagnosed in this year have not yet had the opportunity to survive this many years before death.

Data Source: MDPH Surveillance Program; data as of 1/1/11

**Table 17. Time from AIDS diagnosis to death by year of AIDS diagnosis: Massachusetts<sup>1</sup>, 2007–2009**

Survival time <sup>2</sup>	2007		2008		2009	
	N	%	N	%	N	%
<1 yr.	21	4%	22	6%	13	4%
1 - <2 yr.	16	3%	4	1%	-- <sup>3</sup>	-- <sup>3</sup>
2 - <3 yr.	5	1%	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>	-- <sup>3</sup>
3 - <4 yr.	-- <sup>3</sup>					
4 - <5 yr.	-- <sup>3</sup>					
5 - <6 yr.	-- <sup>3</sup>					
6 - <7 yr.	-- <sup>3</sup>					
7 - <8 yr.	-- <sup>3</sup>					
8 - <9 yr.	-- <sup>3</sup>					
9 - <10 yr.	-- <sup>3</sup>					
10+ yr.	-- <sup>3</sup>					
Still Alive	440	91%	353	93%	327	96%
<b>Total</b>	<b>482</b>	<b>100%</b>	<b>379</b>	<b>100%</b>	<b>340</b>	<b>100%</b>

<sup>1</sup> Effective, January 1, 2011 the Massachusetts Department of Public Health, Office of HIV/AIDS fact sheets, epidemiologic reports, and other data presentations have been updated to remove all HIV/AIDS cases that were first diagnosed in another state before being diagnosed and reported in Massachusetts.

<sup>2</sup> Years between AIDS diagnosis and death

<sup>3</sup> Individuals diagnosed in this year have not yet had the opportunity to survive this many years before death.

Data Source: MDPH Surveillance Program; data as of 1/1/11