

State-Level Estimates of HIV Incidence, Prevalence, and Undiagnosed Infections

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BACKGROUND

- The burden of HIV infection and health outcomes for people living with HIV vary widely across the United States.
- New methods allow for estimating HIV incidence, prevalence, and percent of undiagnosed infections using case surveillance data and CD4 test results.
- Estimating HIV outcomes with appropriate models is important to aid in the development and evaluation of HIV care, prevention, and treatment programs and for monitoring progress towards the goals of the National HIV/AIDS Strategy for the United States.

OBJECTIVES

- To assess trends in HIV incidence, prevalence, and undiagnosed infections among adults and adolescents for each state, the District of Columbia, and nationally for 2008–2014.

METHODS

- Data source:** National HIV Surveillance System.
- Study population:** Persons aged 13 years and older.
- Statistical analyses:**
 - HIV case surveillance data and the first CD4 value after diagnosis were used to estimate the distribution of delay from infection to diagnosis based on a well characterized CD4 depletion model.
 - The distribution of diagnosis delay was used to estimate HIV incidence (includes diagnosed and undiagnosed infections).
 - HIV incidence data, combined with information on cumulative numbers of diagnoses and deaths, were used to estimate HIV prevalence (persons living with diagnosed and undiagnosed infections).
 - Estimated HIV prevalence and the number of persons living with diagnosed HIV infection were used to estimate the number and percentage of undiagnosed infection.
 - Estimated annual percentage changes (EAPCs) were calculated for each outcome and considered significant if the p-value was <0.05.

Table 1. Estimated HIV incidence among persons aged ≥13 years, 2014, United States

Area of residence	2014			Trend 2008-2014			
	No.	95% Confidence intervals	EAPC	L95	U95	p-value	
United States	37,600	35,400–39,800	-3.6	-4.3	-2.9	<0.01	
Alabama	560	290–830	-5.7	-11.2	0	0.05	
Alaska	40	0–110	—	—	—	—	
Arizona	780	460–1,100	-0.5	-6	5.3	0.86	
Arkansas	310	110–520	3.5	-5.5	13.4	0.46	
California	5,100	4,300–5,900	-1.7	-3.7	0.3	0.09	
Colorado	340	140–540	-5.9	-12.8	1.5	0.12	
Connecticut	260	80–450	-3.3	-11.1	5.1	0.43	
Delaware	110	0–220	-3.2	-15.6	11.1	0.65	
District of Columbia	490	240–750	-10	-14.7	-4.9	<0.01	
Florida	4,700	3,900–5,500	-1.9	-4	0.2	0.08	
Georgia	1,900	1,400–2,400	-6.1	-9	-3.2	<0.01	
Hawaii	100	0–210	—	—	—	—	
Idaho	10	0–40	—	—	—	—	
Illinois	1,200	820–1,600	-4.3	-7.9	-0.5	0.03	
Indiana	420	190–650	-2.8	-9.2	3.9	0.4	
Iowa	80	0–170	—	—	—	—	
Kansas	90	0–190	—	—	—	—	
Kentucky	270	100–450	-1.9	-9.6	6.4	0.64	
Louisiana	1,100	690–1,400	-1.4	-5.9	3.3	0.54	
Maine	80	0–180	—	—	—	—	
Maryland	1,200	830–1,700	-7.5	-11.1	-3.7	<0.01	
Massachusetts	740	430–1,000	-1.8	-6.8	3.5	0.5	
Michigan	800	480–1,100	-0.4	-5.5	5	0.89	
Minnesota	280	100–470	-5.6	-12.9	2.3	0.16	
Mississippi	360	140–580	-4.4	-11.5	3.2	0.25	
Missouri	440	210–680	-5.3	-11.4	1.1	0.1	
Montana	30	0–80	—	—	—	—	
Nebraska	70	0–160	—	—	—	—	
Nevada	400	170–630	-1.9	-8.8	5.5	0.61	
New Hampshire	40	0–100	—	—	—	—	
New Jersey	1,100	680–1,400	-3.6	-7.9	0.9	0.11	
New Mexico	130	0–260	-2	-13.7	11.3	0.76	
New York	3,600	2,900–4,200	-5.1	-7.2	-2.9	<0.01	
North Carolina	1,200	840–1,600	-4.9	-8.5	-1.2	0.01	
North Dakota	20	0–80	—	—	—	—	
Ohio	710	410–1,000	-1.9	-6.7	3.2	0.46	
Oklahoma	210	50–370	-3.1	-11.6	6.1	0.5	
Oregon	190	40–330	-8.2	-16.5	0.9	0.08	
Pennsylvania	770	440–1,100	-7.3	-11.4	-3	<0.01	
Rhode Island	110	0–240	—	—	—	—	
South Carolina	700	390–1,000	-2.5	-7.8	3.1	0.37	
South Dakota	20	0–80	—	—	—	—	
Tennessee	760	450–1,100	-1.6	-6.4	3.6	0.54	
Texas	4,100	3,400–4,900	-2.4	-4.6	-0.2	0.03	
Utah	120	10–240	-5	-16.7	8.2	0.44	
Vermont	10	0–40	—	—	—	—	
Virginia	880	540–1,200	-3.4	-7.9	1.4	0.16	
Washington	380	170–600	-4.1	-10	2.2	0.2	
West Virginia	90	0–180	—	—	—	—	
Wisconsin	200	40–370	-6.5	-14.6	2.3	0.14	
Wyoming	0	0–20	—	—	—	—	

EAPC, estimated annual percentage change.
Note: Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. Grey: Jurisdictions with numerically unstable estimates (<100 HIV diagnoses per year).
Orange: Significant decrease in trends from 2008–2014. Blue: Significant increase in trends from 2008–2014.

Table 2. Estimated HIV prevalence among persons aged ≥13 years, 2014, United States

Area of residence	2014			Trend 2008-2014			
	No.	95% Confidence intervals	EAPC	L95	U95	p-value	
United States	1,107,700	1,088,500–1,127,000	2.4	2.1	2.6	<0.01	
Alabama	14,700	12,500–17,000	2.3	0.1	4.6	0.04	
Alaska	780	260–1,300	—	—	—	—	
Arizona	17,400	15,000–19,700	2.8	0.9	4.8	0.01	
Arkansas	6,100	4,700–7,600	2.5	-0.8	5.9	0.15	
California	199,900	183,100–216,700	2.8	2.1	3.6	<0.01	
Colorado	12,800	11,000–14,600	2.0	-0.1	4.1	0.07	
Connecticut	11,300	9,400–13,200	1.0	-1.4	3.4	0.43	
Delaware	3,700	2,600–4,800	1.0	-3.1	5.4	0.63	
District of Columbia	18,200	15,700–20,700	2.9	0.8	5.0	0.01	
Florida	121,300	114,700–127,800	2.5	1.7	3.3	<0.01	
Georgia	59,800	51,400–60,100	2.8	1.7	4.0	<0.01	
Hawaii	3,100	2,200–4,000	2.3	—	—	—	
Idaho	1,100	590–1,500	—	—	—	—	
Illinois	40,200	36,600–43,800	2.5	1.1	3.8	<0.01	
Indiana	12,200	10,200–14,200	2.5	0.1	4.9	0.04	
Iowa	2,800	1,900–3,700	—	—	—	—	
Kansas	3,400	2,300–4,400	—	—	—	—	
Kentucky	7,700	6,100–9,200	2.7	-0.3	5.7	0.08	
Louisiana	23,300	20,300–26,200	2.5	0.6	4.4	0.01	
Maine	1,700	980–2,400	—	—	—	—	
Maryland	37,200	33,600–40,900	2.2	0.8	3.7	<0.01	
Massachusetts	22,400	19,800–25,000	2.4	0.7	4.2	0.01	
Michigan	18,200	15,600–20,800	2.9	0.8	5.1	0.01	
Minnesota	8,900	7,300–10,400	2.8	0.2	5.5	0.04	
Mississippi	10,300	8,400–12,100	1.6	-0.9	4.3	0.21	
Missouri	13,400	11,400–15,500	2.3	0.1	4.6	0.04	
Montana	650	210–1,100	—	—	—	—	
Nebraska	2,400	1,500–3,200	—	—	—	—	
Nevada	10,200	8,400–12,000	2.8	0.3	5.4	0.03	
New Hampshire	1,400	800–2,000	—	—	—	—	
New Jersey	39,200	35,500–42,800	0.9	-0.4	2.2	0.19	
New Mexico	3,700	2,600–4,800	2.3	1.9	6.8	0.29	
New York	145,900	139,200–152,600	1.4	0.7	2.0	0.01	
North Carolina	34,000	30,600–37,400	3.0	1.5	4.4	<0.01	
North Dakota	380	10–760	—	—	—	—	
Ohio	22,500	19,800–25,200	2.5	0.8	4.3	<0.01	
Oklahoma	6,400	4,900–7,900	2.2	-1.1	5.6	0.2	
Oregon	7,300	5,800–8,700	1.7	-1.2	4.6	0.26	
Pennsylvania	36,700	33,300–40,100	1.3	0.0	2.7	0.05	
Rhode Island	2,700	1,700–3,600	—	—	—	—	
South Carolina	19,100	16,600–21,600	2.0	0.2	4.0	0.03	
South Dakota	540	130–940	—	—	—	—	
Tennessee	19,600	16,400–21,600	2.7	0.8	4.7	0.01	
Texas	95,600	89,700–101,600	3.6	2.7	4.5	<0.01	
Utah	3,000	2,100–4,000	3.1	-1.4	7.9	0.19	
Vermont	700	310–1,100	—	—	—	—	
Virginia	25,100	22,300–27,900	2.6	0.9	4.2	0.01	
Washington	14,100	12,100–16,200	2.5	0.4	4.7	0.02	
West Virginia	2,100	1,300–2,900	—	—	—	—	
Wisconsin	7,100	5,600–8,600	2.5	-0.6	5.6	0.11	
Wyoming	320	10–620	—	—	—	—	

Table 3. Estimated percentages of persons aged ≥13 years living with undiagnosed HIV infection, 2014, United States

Area of residence	2014			Trend 2008-2014			
	%	95% Confidence intervals	EAPC	L95	U95	p-value	
United States	15.0	14.3–15.7	-3.4	-4.1	-2.6	<0.01	
Alabama	16.2	9.7–22.8	-4.9	-10.6	1.2	0.11	
Alaska	18.3	0.0–47.2	—	—	—	—	
Arizona	16.0	10.3–21.8	-2.7	-8.4	3.3	0.37	
Arkansas	16.1	6.1–26.1	-2.7	-12.1	7.8	0.6	
California	15.0	12.9–17.1	-2.6	-4.9	-0.3	0.05	
Colorado	13.1	6.9–19.3	-3.5	-10.7	4.4	0.38	
Connecticut	11.2	4.1–18.4	-2.6	-12.5	8.4	0.63	
Delaware	14.0	1.3–26.8	-3.1	-16.4	12.2	0.67	
District of Columbia	17.2	11.3–23.1	-1.6	-7.4	4.5	0.59	
Florida	15.6	13.4–17.9	-1.3	-3.7	1.3	0.33	
Georgia	16.6	13.3–19.9	-6.1	-8.9	-3.2	<0.01	
Hawaii	12.0	0.0–23.0	—	—	—	—	
Idaho	4.4	0.0–24.9	—	—	—	—	
Illinois	14.2	10.4–18.0	-5.0	-8.9	-1.0	0.02	
Indiana	16.6	9.6–23.7	-4.2	-10.4	2.5	0.22	
Iowa	16.3	1.9–30.6	—	—	—	—	
Kansas	15.1	1.8–28.4	—	—	—	—	
Kentucky	15.6	6.9–24.3	-6.0	-13.6	2.2	0.15	
Louisiana	19.1	13.5–24.7	-5.3	-9.4	-1.0	0.02	
Maine	14.9	0.0–33.1	—	—	—	—	
Maryland	15.3	11.2–19.4	-4.3	-8.4	-0.1	0.05	
Massachusetts	15.4	10.3–20.4	-0.5	-6.2	5.5	0.87	
Michigan	18.9	12.7–25.1	-2.8	-8.0	2.6	0.31	
Minnesota	15.7	8.0–23.5	-3.7	-11.2	4.5	0.37	
Mississippi	13.6	6.0–21.2	-7.3	-14.4	0.4	0.06	
Missouri	14.4	7.9–20.9	-4.1	-10.8	3.2	0.27	
Montana	15.6	0.0–45.1	—	—	—	—	
Nebraska	15.9	0.4–31.4	—	—	—	—	
Nevada	18.0	10.4–25.6	-3.0	-9.4	3.8	0.	