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Potentially Preventable Deaths Among the Five Leading Causes of Death — United States, 2010 and 2014

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Death rates by specific causes vary across the 50 states and the District of Columbia.* Information on differences in rates for the leading causes of death among states might help state health officials determine prevention goals, priorities, and strategies. CDC analyzed National Vital Statistics System data to provide national and state-specific estimates of potentially preventable deaths among the five leading causes of death in 2014 and compared these estimates with estimates previously published for 2010. Compared with 2010, the estimated number of potentially preventable deaths changed (supplemental material at https://stacks.cdc.gov/view/cdc/42472); cancer deaths decreased 25% (from 84,443 to 63,209), stroke deaths decreased 11% (from 16,973 to 15,175), heart disease deaths decreased 4% (from 91,757 to 87,950), chronic lower respiratory disease (CLRD) (e.g., asthma, bronchitis, and emphysema) deaths increased 1% (from 28,831 to 29,232), and deaths from unintentional injuries increased 23% (from 36,836 to 45,331). A better understanding of progress made in reducing potentially preventable deaths in the United States might inform state and regional efforts targeting the prevention of premature deaths from the five leading causes in the United States.

To determine significant changes in the number of potentially preventable deaths for the five leading causes of death in the United States, CDC analyzed National Vital Statistics System mortality data from 2014 (*1*) using the same analytic model presented in the original report that used 2010 data as benchmarks (*2*). The number of potentially preventable deaths per year per state in persons aged <80 years was determined by comparing the number of expected deaths (based on the cause-specific average death rate of the three states with the lowest 2008–2010 average rate by age groups) with the number of observed deaths in 2010 and 2014. Further detail on age-adjusted rates by state and cause can be found in yearly publications on final death data (*1*).

Population estimates for 2010 and 2014 were produced by the U.S. Census Bureau. The calculations of potentially preventable deaths were restricted to U.S. residents and deaths in persons aged <80 years. Premature death was defined as a death that occurred in a person aged <80 years, based on the average life expectancy for the total U.S. population, which was nearly

* http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_04.pdf.

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79 years in 2010 (*2*). Analysis was restricted to deaths with an underlying cause of death among the five leading causes, based on *International Classification of Diseases, 10th Revision* (ICD-10) codes.[†] The five leading causes of death represented 63% of all deaths in 2014, a decrease of 2.3% compared with 2010. In 2014 the next five most frequent causes accounted for approximately 12% of deaths (*3*).

The number of potentially preventable deaths for each of the five leading causes of death by state in 2014 was calculated in four steps. The first step was to calculate and rank state disease-specific death rates by age group. Using 2008–2010 data, the three states with the lowest observed death rates for each age group and specific cause of death category were selected and their death rates averaged across the three states to calculate a lowest average age-specific death rate for each cause of death. For example, during 2008–10, among persons aged 40–49 years, the three states with the lowest rate of death from unintentional injuries were Maryland, New Jersey, and New York, and the benchmark average was 25.2 (supplemental material at https://stacks.cdc.gov/view/cdc/42342).

The average of the lowest three states was chosen to minimize the effect of any extreme outlier and to represent the low end of the distribution of death rates among the states. The second step was to calculate expected deaths for each age group and state by multiplying the age-specific state populations for 2010 by the 2010 benchmark death rates (i.e., the lowest three-state average age-specific death rates for each cause). Total expected deaths for each cause and state were calculated by summing expected deaths over all age groups aged <80 years, effectively taking into account differences in mortality across age groups. These state-specific and cause-specific expected death counts represent the number of deaths expected if all states were to achieve the 2010 death rate benchmarks (*2*). Third, the 2010 potentially preventable deaths were calculated by subtracting expected deaths from 2010 observed deaths. Finally, the same 2010 benchmark death rates for each cause were used to calculate 2014 potentially preventable deaths by repeating the third and fourth steps with 2014 population and mortality data. Specifically, the number of expected deaths in 2014 was calculated by multiplying the 2010 benchmark death rates by the 2014 age-specific populations; these expected counts were then subtracted from 2014 observed deaths. The numbers of potentially preventable deaths for each cause were assumed to follow a Poisson distribution, and standard errors were calculated, taking into account stochastic variation, consistent with methods described previously (*2*), in both the expected and observed number of deaths[§] for each cause and year. Statistically significant changes from 2010–2014 were

[†] Diseases of the heart codes I00-I09, I11, I13, I20-I51; cancer C00-C97; CLRD J40-J47; cerebrovascular diseases (stroke) I60-I69; and unintentional injuries V01-X59, Y85-Y86.

[§] Standard error = the square root of [expected number + observed number of deaths].

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assessed using a two-sided z-test (p<0.01). Results are presented for the United States as a whole, by state, and by the 10 U.S. Department of Health and Human Services regions.¶

The five leading causes of death for persons aged <80 years in 2014 (diseases of the heart, malignancies [cancer], cerebrovascular diseases [stroke], chronic lower respiratory diseases [CLRD], and unintentional injuries [accidents]) represent 63% of deaths from all causes. The estimated number of potentially preventable deaths and the proportion preventable among the five leading causes of death in persons aged <80 years were 87,950 for diseases of the heart (30% preventable); 63,209 for cancer (15% preventable); 45,331 for unintentional injuries (43% preventable); 29,232 for CLRD (36% preventable); and 15,175 for stroke (28% preventable) (Figure).

Potentially preventable deaths from cancer declined 25% from 2010 to 2014 (the increase in the expected number of deaths was greater than the increase in the observed number). This decline appears to be driven by a 12% decrease in the age-adjusted death rate from lung cancer from 2010 and 2014. Decreases in age-adjusted death rates from cancer were observed across all U.S. states, except the District of Columbia (supplemental material at https://stacks.cdc.gov/view/cdc/42343). The expected number of deaths was based on benchmark death rates from 2010; however, cancer-related death rates declined during 2010–2014. In both 2010 and 2014 the Southeast (Region 4) had the highest number of potentially preventable deaths for each of the five leading causes of death (Table 1). In 2014, the Northwest (Region 10) had the lowest number of potentially preventable deaths for each of the five leading causes of death except deaths from CLRD and unintentional injuries, where the lowest number occurred in New York and New Jersey (Region 2) (Table 2).

Consistent with increases in population since 2010, particularly among older age groups, the number of observed deaths

¶ *Region 1:* Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. *Region 2:* New Jersey, New York, Puerto Rico, and the U.S. Virgin Islands. *Region 3:* Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia. *Region 4:* Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. *Region 5:* Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. *Region 6:* Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. *Region 7:* Iowa, Kansas, Missouri, and Nebraska. *Region 8:* Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming. *Region 9:* Arizona, California, Hawaii, Nevada, American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Marshall Islands, and Republic of Palau. *Region 10:* Alaska, Idaho, Oregon, and Washington.

FIGURE. Number of potentially preventable deaths among the five leading causes of death, for persons aged <80 years — United States, 2010 and 2014

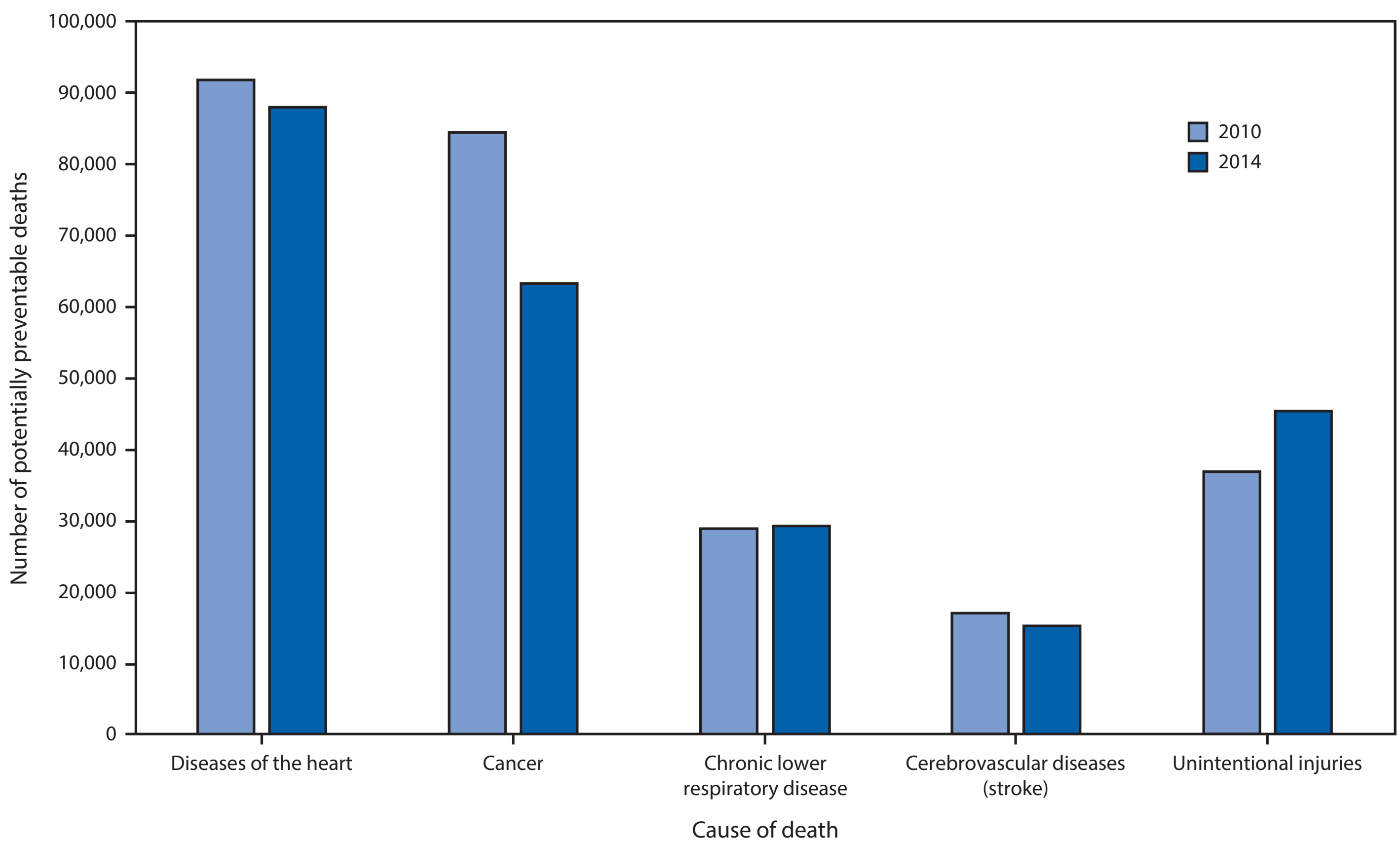

TABLE 1. Number of expected, observed, and potentially preventable deaths among the five leading causes of death and significant changes in potentially preventable deaths, for persons aged <80 years, by U.S. Department of Health and Human Services (HHS) region — United States, 2010 and 2014

	2010			2014			
HHS region	Expected	Observed	Potentially preventable	Expected	Observed	Potentially preventable	Z-test significance
Diseases of the heart							
1	8,904	10,286	1,382	9,798	10,468	670	*
2	16,765	24,477	7,712	18,170	24,272	6,102	*
3	18,327	28,563	10,236	20,099	29,185	9,086	*
4	38,367	65,198	26,831	43,235	69,897	26,662	
5	30,726	47,280	16,554	33,618	50,437	16,819	
6	20,656	35,898	15,242	23,245	39,907	16,662	*
7	8,281	12,769	4,488	8,958	13,425	4,467	
8	5,782	6,464	682	6,616	7,325	709	
9	26,030	33,352	7,322	29,622	35,133	5,511	*
10	7,422	8,401	979	8,539	9,216	677	
Malignant neoplasms (cancers)							
1	15,587	19,061	3,474	17,216	18,995	1,779	*
2	29,259	34,735	5,476	31,827	34,826	2,999	*
3	32,039	42,003	9,964	35,241	43,236	7,995	*
4	66,962	90,439	23,477	75,522	95,461	19,939	*
5	53,686	71,553	17,867	58,975	73,529	14,554	*
6	36,074	46,950	10,876	40,693	49,216	8,523	*
7	14,443	19,028	4,585	15,692	19,653	3,961	
8	10,123	10,708	585	11,625	11,387	-238†	*
9	45,439	50,611	5,172	51,835	53,179	1,344	*
10	13,041	15,861	2,820	15,018	16,700	1,682	*
Cerebrovascular diseases (stroke)							
1	1,722	1,863	141	1,914	1,781	-133	*
2	3,261	3,742	481	3,556	3,716	160	*
3	3,568	5,239	1,671	3,947	5,511	1,564	
4	7,538	12,960	5,422	8,567	13,934	5,367	
5	5,988	8,832	2,844	6,603	9,143	2,540	
6	4,040	7,174	3,134	4,575	7,749	3,174	
7	1,628	2,405	777	1,773	2,490	717	
8	1,128	1,374	246	1,302	1,440	138	
9	5,078	6,904	1,826	5,822	6,952	1,130	*
10	1,439	1,867	428	1,679	1,991	312	
Chronic lower respiratory diseases (CLRD)							
1	2,234	2,774	540	2,505	3,068	563	
2	4,218	4,794	576	4,634	4,697	63	*
3	4,630	6,951	2,321	5,166	7,234	2,068	
4	9,820	18,612	8,792	11,254	21,025	9,771	*
5	7,740	13,494	5,754	8,623	14,669	6,046	
6	5,174	9,539	4,365	5,911	10,547	4,636	
7	2,111	4,318	2,207	2,317	4,644	2,327	
8	1,442	2,447	1,005	1,686	2,681	995	
9	6,514	8,447	1,933	7,550	8,977	1,427	*
10	1,857	3,082	1,225	2,195	3,357	1,162	
Unintentional injuries (accidents)							
1	2,771	3,703	932	2,866	4,817	1,951	*
2	5,357	5,692	335	5,531	6,824	1,293	*
3	5,703	8,769	3,066	5,916	10,261	4,345	*
4	11,650	23,804	12,154	12,338	24,789	12,451	
5	9,724	15,104	5,380	9,984	17,898	7,914	*
6	7,040	13,487	6,447	7,530	14,598	7,068	*
7	2,566	4,720	2,154	2,639	4,901	2,262	
8	1,985	3,479	1,494	2,136	4,046	1,910	*
9	8,845	12,264	3,419	9,420	13,768	4,348	*
10	2,414	3,840	1,426	2,569	4,358	1,789	*

* Significant change from 2010 to 2014, $p<0.01$.

† Negative potentially preventable deaths occurred when an HHS region included one or more of the states with the lowest three death rates (the lowest three death rates were averaged to create the benchmark death rates) for at least a few age groups. Negative potentially preventable deaths are preserved in this table to test changes from 2010 to 2014.

TABLE 2. Number of expected, observed, and potentially preventable deaths among the five leading causes of death and significant changes in potentially preventable deaths, for persons aged <80 years, by state — United States, 2010 and 2014

	2010			2014			
State	Expected	Observed	Potentially preventable (95% CI)	Expected	Observed	Potentially preventable (95% CI)	Z-test significance
Diseases of the heart							
Alabama	2,993	6,604	3,611 (3,419–3,803)	3,266	6,933	3,667 (3,469–3,865)	
Alaska	331	463	132 (77–187)	377	497	120 (62–178)	
Arizona	3,885	4,735	850 (668–1,032)	4,512	5,061	549 (357–741)	
Arkansas	1,845	3,808	1,963 (1,816–2,110)	1,998	4,258	2,260 (2,105–2,415)	*
California	19,742	24,707	4,965 (4,552–5,378)	22,358	25,338	2,980 (2,552–3,408)	*
Colorado	2,707	2,815	108 (-38–254)	3,153	3,246	93 (-64–250)	
Connecticut	2,176	2,569	393 (258–528)	2,362	2,552	190 (53–327)	
Delaware	575	857	282 (208–356)	658	929	271 (193–349)	
District of Columbia	310	729	419 (356–482)	337	733	396 (332–460)	
Florida	13,352	17,586	4,234 (3,889–4,579)	15,121	19,121	4,000 (3,637–4,363)	
Georgia	5,120	9,103	3,983 (3,749–4,217)	5,890	9,911	4,021 (3,775–4,267)	
Hawaii	836	1,007	171 (87–255)	920	1,217	297 (206–388)	
Idaho	883	1,080	197 (110–284)	1,025	1,240	215 (122–308)	
Illinois	7,249	11,424	4,175 (3,907–4,443)	7,898	11,839	3,941 (3,666–4,216)	
Indiana	3,783	6,421	2,638 (2,440–2,836)	4,145	6,779	2,634 (2,429–2,839)	
Iowa	1,892	2,716	824 (691–957)	2,032	2,622	590 (456–724)	
Kansas	1,636	2,248	612 (490–734)	1,766	2,402	636 (509–763)	
Kentucky	2,662	5,332	2,670 (2,495–2,845)	2,912	5,798	2,886 (2,703–3,069)	
Louisiana	2,609	5,784	3,175 (2,995–3,355)	2,861	6,149	3,288 (3,102–3,474)	
Maine	928	1,083	155 (67–243)	1,026	1,167	141 (49–233)	
Maryland	3,303	5,321	2,018 (1,836–2,200)	3,701	5,476	1,775 (1,587–1,963)	
Massachusetts	3,926	4,416	490 (311–669)	4,333	4,382	49 (-134–232)	*
Michigan	6,056	10,327	4,271 (4,020–4,522)	6,646	11,461	4,815 (4,551–5,079)	*
Minnesota	3,050	2,720	-330[†] (-479 to -181)	3,414	2,951	-463 (-619 to -307)	
Mississippi	1,750	4,183	2,433 (2,282–2,584)	1,903	4,428	2,525 (2,369–2,681)	
Missouri	3,691	6,553	2,862 (2,664–3,060)	4,011	7,113	3,102 (2,895–3,309)	
Montana	650	826	176 (101–251)	733	910	177 (98–256)	
Nebraska	1,063	1,252	189 (95–283)	1,149	1,288	139 (42–236)	
Nevada	1,566	2,903	1,337 (1,206–1,468)	1,832	3,517	1,685 (1,542–1,828)	*
New Hampshire	828	916	88 (6–170)	931	976	45 (-41–131)	
New Jersey	5,243	7,106	1,863 (1,645–2,081)	5,703	7,145	1,442 (1,220–1,664)	*
New Mexico	1,253	1,510	257 (154–360)	1,382	1,642	260 (152–368)	
New York	11,522	17,371	5,849 (5,516–6,182)	12,467	17,127	4,660 (4,323–4,997)	*
North Carolina	5,679	9,021	3,342 (3,104–3,580)	6,456	9,223	2,767 (2,522–3,012)	*
North Dakota	406	512	106 (47–165)	437	542	105 (44–166)	
Ohio	7,164	11,875	4,711 (4,441–4,981)	7,736	12,697	4,961 (4,681–5,241)	
Oklahoma	2,267	4,857	2,590 (2,425–2,755)	2,456	5,300	2,844 (2,671–3,017)	
Oregon	2,364	2,421	58 (-79–193)	2,714	2,622	-92 (-235–51)	
Pennsylvania	8,221	12,668	4,447 (4,164–4,730)	8,824	12,689	3,865 (3,578–4,152)	*
Rhode Island	636	820	184 (109–259)	689	855	166 (89–243)	
South Carolina	2,896	5,413	2,517 (2,338–2,696)	3,335	5,742	2,407 (2,220–2,594)	
South Dakota	491	590	99 (35–163)	541	741	200 (130–270)	
Tennessee	3,916	7,956	4,040 (3,826–4,254)	4,353	8,741	4,388 (4,164–4,612)	
Texas	12,683	19,939	7,256 (6,902–7,610)	14,549	22,558	8,009 (7,631–8,387)	*
Utah	1,194	1,229	35 (-61–131)	1,383	1,349	-34 (-136–68)	
Vermont	411	482	71 (12–130)	457	536	79 (17–141)	
Virginia	4,609	6,588	1,979 (1,772–2,186)	5,185	6,978	1,793 (1,577–2,009)	
Washington	3,844	4,437	593 (415–771)	4,424	4,857	433 (244–622)	
West Virginia	1,308	2,400	1,092 (973–1,211)	1,395	2,380	985 (865–1,105)	
Wisconsin	3,424	4,513	1,089 (914–1,264)	3,779	4,710	931 (750–1,112)	
Wyoming	333	492	159 (103–215)	369	537	168 (109–227)	
United States	**181,261**	**272,688**	**91,757 (90,436–93,078)**	**201,902**	**289,265**	**87,950 (86,576–89,324)**	*
Malignant neoplasms (cancers)							
Alabama	5,227	7,595	2,368 (2,146–2,590)	5,714	7,796	2,082 (1,854–2,310)	
Alaska	588	703	115 (45–185)	670	782	112 (37–187)	
Arizona	6,775	7,460	685 (451–919)	7,857	8,085	228 (-19–475)	*
Arkansas	3,219	4,720	1,501 (1,326–1,676)	3,487	4,897	1,410 (1,231–1,589)	
California	34,454	38,226	3,772 (3,244–4,300)	39,157	39,678	521 (-29–1071)	*
Colorado	4,752	4,944	192 (-1–385)	5,553	5,188	-365 (-568 to -162)	*
Connecticut	3,805	4,367	562 (385–739)	4,144	4,219	75 (-104–254)	*
Delaware	1,006	1,352	346 (251–441)	1,151	1,426	275 (176–374)	

See table footnotes on page 1253.

TABLE 2. (*Continued*) Number of expected, observed, and potentially preventable deaths among the five leading causes of death and significant changes in potentially preventable deaths, for persons aged <80 years, by state — United States, 2010 and 2014

State	2010 Expected	2010 Observed	2010 Potentially preventable (95% CI)	2014 Expected	2014 Observed	2014 Potentially preventable (95% CI)	Z-test significance
District of Columbia	543	742	199 (129–269)	592	837	245 (171–319)	
Florida	23,195	28,249	5,054 (4,609–5,499)	26,279	29,519	3,240 (2,777–3,703)	*
Georgia	8,967	11,820	2,853 (2,570–3,136)	10,323	12,738	2,415 (2,117–2,713)	
Hawaii	1,467	1,555	88 (-20–196)	1,616	1,693	77 (-36–190)	
Idaho	1,546	1,753	207 (94–320)	1,796	1,995	199 (78–320)	
Illinois	12,654	16,558	3,904 (3,569–4,239)	13,840	16,862	3,022 (2,679–3,365)	*
Indiana	6,612	9,385	2,773 (2,525–3,021)	7,268	9,821	2,553 (2,297–2,809)	
Iowa	3,295	4,127	832 (663–1,001)	3,559	4,258	699 (526–872)	
Kansas	2,854	3,624	770 (612–928)	3,098	3,758	660 (498–822)	
Kentucky	4,655	7,499	2,844 (2,628–3,060)	5,104	7,815	2,711 (2,488–2,934)	
Louisiana	4,562	6,909	2,347 (2,137–2,557)	5,021	7,137	2,116 (1,900–2,332)	
Maine	1,627	2,259	632 (510–754)	1,805	2,186	381 (257–505)	*
Maryland	5,788	7,218	1,430 (1,206–1,654)	6,499	7,616	1,117 (884–1,350)	
Massachusetts	6,865	8,319	1,454 (1,212–1,696)	7,609	8,341	732 (484–980)	*
Michigan	10,600	14,394	3,794 (3,484–4,104)	11,671	14,884	3,213 (2,894–3,532)	
Minnesota	5,328	6,273	945 (734–1,156)	5,992	6,267	275 (58–492)	*
Mississippi	3,055	4,731	1,676 (1,503–1,849)	3,330	5,019	1,689 (1,510–1,868)	
Missouri	6,442	9,023	2,581 (2,337–2,825)	7,020	9,345	2,325 (2,074–2,576)	
Montana	1,143	1,304	161 (64–258)	1,291	1,445	154 (51–257)	
Nebraska	1,852	2,254	402 (276–528)	2,014	2,292	278 (149–407)	
Nevada	2,743	3,370	627 (474–780)	3,205	3,723	518 (355–681)	
New Hampshire	1,455	1,772	317 (206–428)	1,642	1,846	204 (88–320)	
New Jersey	9,147	10,948	1,801 (1,523–2,079)	9,986	10,965	979 (695–1,263)	*
New Mexico	2,194	2,393	199 (66–332)	2,423	2,451	28 (-109–165)	
New York	20,112	23,787	3,675 (3,264–4,086)	21,842	23,861	2,019 (1,600–2,438)	*
North Carolina	9,931	13,297	3,366 (3,067–3,665)	11,304	14,393	3,089 (2,775–3,403)	
North Dakota	708	780	72 (-4–148)	767	852	85 (6–164)	
Ohio	12,514	17,413	4,899 (4,560–5,238)	13,570	18,043	4,473 (4,125–4,821)	
Oklahoma	3,957	5,787	1,830 (1,637–2,023)	4,293	5,896	1,603 (1,405–1,801)	
Oregon	4,153	5,212	1,059 (869–1,249)	4,771	5,496	725 (526–924)	
Pennsylvania	14,340	19,114	4,774 (4416–5,132)	15,463	19,064	3,601 (3,237–3,965)	*
Rhode Island	1,112	1,423	311 (212–410)	1,210	1,442	232 (131–333)	
South Carolina	5,079	7,063	1,984 (1,768–2,200)	5,846	7,487	1,641 (1,415–1,867)	
South Dakota	856	1,054	198 (112–284)	950	1,115	165 (76–254)	
Tennessee	6,853	10,185	3,332 (3,076–3,588)	7,622	10,694	3,072 (2,807–3,337)	
Texas	22,143	27,141	4,998 (4,563–5,433)	25,469	28,835	3,366 (2,909–3,823)	*
Utah	2,080	1,931	-149 (-273 to -25)	2,413	2,105	-308 (-440 to -176)	
Vermont	723	921	198 (119–277)	807	961	154 (72–236)	
Virginia	8,073	10,162	2,089 (1,824–2,354)	9,090	10,651	1,561 (1,286–1,836)	*
Washington	6,754	8,193	1,439 (1,199–1,679)	7,781	8,427	646 (396–896)	*
West Virginia	2,289	3,415	1,126 (978–1,274)	2,446	3,642	1,196 (1,043–1,349)	
Wisconsin	5,978	7,530	1,552 (1,324–1,780)	6,635	7,652	1,017 (783–1251)	*
Wyoming	585	695	110 (40–180)	651	682	31 (-41–103)	
United States	**316,652**	**400,949**	**84,443 (82,783–86,103)**	**353,645**	**416,182**	**63,209 (61,489–64,929)**	*
Cerebrovascular diseases (stroke)							
Alabama	588	1,277	689 (604–774)	646	1,335	689 (602–776)	
Alaska	62	91	29 (5–53)	72	87	15 (-10–40)	
Arizona	771	848	77 (-2–156)	905	912	7 (-77–91)	
Arkansas	365	718	353 (289–417)	398	738	340 (274–406)	
California	3,839	5,366	1,527 (1,339–1,715)	4,374	5,324	950 (757–1,143)	*
Colorado	520	604	84 (18–150)	614	633	19 (-50–88)	
Connecticut	420	425	5 (-52–62)	460	405	-55 (-113–3)	
Delaware	113	170	57 (24–90)	130	172	42 (8–76)	
District of Columbia	61	107	46 (21–71)	66	88	22 (-2–46)	
Florida	2,655	3,481	826 (672–980)	3,030	3,812	782 (620–944)	
Georgia	989	1,965	976 (869–1,083)	1,150	2,060	910 (799–1,021)	
Hawaii	163	244	81 (41–121)	182	234	52 (12–92)	
Idaho	174	234	60 (20–100)	204	268	64 (21–107)	
Illinois	1,412	2,047	635 (520–750)	1,547	2,175	628 (508–748)	
Indiana	739	1,240	501 (414–588)	816	1,289	473 (383–563)	
Iowa	373	462	89 (32–146)	403	465	62 (4–120)	
Kansas	321	485	164 (108–220)	349	489	140 (83–197)	

See table footnotes on page 1253.

TABLE 2. (*Continued*) Number of expected, observed, and potentially preventable deaths among the five leading causes of death and significant changes in potentially preventable deaths, for persons aged <80 years, by state — United States, 2010 and 2014

State	2010			2014			Z-test significance
	Expected	Observed	Potentially preventable (95% CI)	Expected	Observed	Potentially preventable (95% CI)	
Kentucky	520	934	414 (339–489)	573	948	375 (299–451)	
Louisiana	510	1,003	493 (417–569)	564	1,176	612 (530–694)	
Maine	180	229	49 (9–89)	202	222	20 (-20–60)	
Maryland	636	935	299 (221–377)	720	1,025	305 (223–387)	
Massachusetts	761	807	46 (-32–124)	846	784	-62 (-141–17)	
Michigan	1,178	1,743	565 (459–671)	1,306	1,792	486 (377–595)	
Minnesota	592	662	70 (1–139)	669	705	36 (-37–109)	
Mississippi	344	827	483 (416–550)	377	858	481 (412–550)	
Missouri	724	1,164	440 (355–525)	793	1,263	470 (381–559)	
Montana	127	162	35 (2–68)	146	182	36 (1–71)	
Nebraska	209	294	85 (41–129)	227	273	46 (2–90)	
Nevada	305	446	141 (87–195)	361	482	121 (64–178)	
New Hampshire	158	163	5 (-30–40)	181	174	-7 (-44–30)	
New Jersey	1,015	1,319	304 (209–399)	1,111	1,322	211 (114–308)	
New Mexico	246	310	64 (18–110)	275	321	46 (-2–94)	
New York	2,246	2,423	177 (43–311)	2,445	2,394	-51 (-187–85)	
North Carolina	1,108	1,894	786 (679–893)	1,271	2,110	839 (725–953)	
North Dakota	80	127	47 (19–75)	87	120	33 (5–61)	
Ohio	1,400	2,271	871 (752–990)	1,523	2,328	805 (683–927)	
Oklahoma	448	889	441 (369–513)	488	894	406 (333–479)	
Oregon	461	635	174 (109–239)	536	699	163 (94–232)	
Pennsylvania	1,611	2,194	583 (462–704)	1,740	2,388	648 (522–774)	
Rhode Island	123	148	25 (-7–57)	135	114	-21 (-52–10)	
South Carolina	567	1,119	552 (472–632)	661	1,185	524 (440–608)	
South Dakota	97	126	29 (0–58)	107	108	1 (-28–30)	
Tennessee	765	1,463	698 (605–791)	859	1,626	767 (669–865)	
Texas	2,471	4,254	1,783 (1,622–1,944)	2,850	4,620	1,770 (1,601–1,939)	
Utah	238	282	44 (-1–89)	276	325	49 (1–97)	
Vermont	79	91	12 (-14–38)	90	82	-8 (-34–18)	
Virginia	891	1,369	478 (385–571)	1,014	1,354	340 (245–435)	
Washington	743	907	164 (84–244)	867	937	70 (-13–153)	
West Virginia	257	464	207 (154–260)	276	484	208 (154–262)	
Wisconsin	667	869	202 (125–279)	742	854	112 (34–190)	
Wyoming	65	73	8 (-15–31)	73	72	-1 (-25–23)	
United States	**35,390**	**52,360**	**16,973 (16,392–17,554)**	**39,737**	**54,707**	**15,175 (14,573–15,777)**	*
Chronic lower respiratory diseases							
Alabama	765	1,778	1,013 (914–1,112)	848	1,897	1,049 (946–1,152)	
Alaska	77	112	35 (8–62)	92	116	24 (-4–52)	
Arizona	1,004	1,558	554 (455–653)	1,189	1,870	681 (573–789)	
Arkansas	476	1,101	625 (547–703)	523	1,339	816 (731–901)	*
California	4,904	6,047	1,143 (938–1,348)	5,650	6,073	423 (211–635)	*
Colorado	665	1,141	476 (393–559)	795	1,301	506 (416–596)	
Connecticut	544	509	-35 (-99–29)	601	586	-15 (-83–53)	
Delaware	147	224	77 (39–115)	172	231	59 (20–98)	
District of Columbia	78	73	-5 (-29–19)	85	73	-12 (-37–13)	
Florida	3,501	5,327	1,826 (1,642–2,010)	4,018	5,855	1,837 (1,642–2,032)	
Georgia	1,263	2,413	1,150 (1,031–1,269)	1,486	2,729	1,243 (1,116–1,370)	
Hawaii	212	141	-71 (-108 to -34)	239	151	-88 (-127 to -49)	
Idaho	224	409	185 (136–234)	267	485	218 (164–272)	
Illinois	1,815	2,740	925 (793–1,057)	2,010	2,891	881 (744–1,018)	
Indiana	954	2,154	1,200 (1,091–1,309)	1,063	2,389	1,326 (1,211–1,441)	
Iowa	485	859	374 (302–446)	528	968	440 (364–516)	
Kansas	414	826	412 (343–481)	455	938	483 (410–556)	
Kentucky	675	1,792	1,117 (1,020–1,214)	750	2,078	1,328 (1,224–1,432)	*
Louisiana	658	1,106	448 (366–530)	733	1,360	627 (537–717)	*
Maine	237	443	206 (155–257)	268	494	226 (172–280)	
Maryland	818	1,035	217 (133–301)	936	998	62 (-24–148)	
Massachusetts	984	1,115	131 (41–221)	1,105	1,205	100 (6–194)	
Michigan	1,527	2,721	1,194 (1,066–1,322)	1,712	2,939	1,227 (1,093–1,361)	
Minnesota	762	960	198 (117–279)	871	1,153	282 (194–370)	
Mississippi	446	1,016	570 (495–645)	492	1,129	637 (558–716)	
Missouri	941	2,090	1,149 (1,041–1,257)	1,039	2,175	1,136 (1025–1,247)	

See table footnotes on page 1253.

TABLE 2. (*Continued*) Number of expected, observed, and potentially preventable deaths among the five leading causes of death and significant changes in potentially preventable deaths, for persons aged <80 years, by state — United States, 2010 and 2014

State	2010			2014			Z-test significance
	Expected	Observed	Potentially preventable (95% CI)	Expected	Observed	Potentially preventable (95% CI)	
Montana	166	341	175 (131–219)	192	380	188 (141–235)	
Nebraska	270	543	273 (217–329)	296	563	267 (210–324)	
Nevada	395	701	306 (241–371)	472	883	411 (339–483)	
New Hampshire	206	315	109 (64–154)	237	352	115 (67–163)	
New Jersey	1,312	1,436	124 (21–227)	1,447	1,391	-56 (-160–48)	
New Mexico	320	535	215 (158–272)	361	605	244 (183–305)	
New York	2,906	3,358	452 (297–607)	3,186	3,306	120 (-38–278)	*
North Carolina	1,436	2,698	1,262 (1,136–1,388)	1,663	3,077	1,414 (1,279–1,549)	
North Dakota	104	170	66 (34–98)	113	162	49 (17–81)	
Ohio	1,818	3,729	1,911 (1,765–2,057)	1,996	3,922	1,926 (1,775–2,077)	
Oklahoma	581	1,736	1,155 (1,061–1,249)	638	1,787	1,149 (1,052–1,246)	
Oregon	599	1,110	511 (430–592)	706	1,153	447 (363–531)	
Pennsylvania	2,101	3,051	950 (809–1,091)	2,287	3,223	936 (791–1,081)	
Rhode Island	160	225	65 (27–103)	176	242	66 (26–106)	
South Carolina	740	1,391	651 (561–741)	870	1,693	823 (724–922)	
South Dakota	126	226	100 (63–137)	140	202	62 (26–98)	
Tennessee	995	2,197	1,202 (1,091–1,313)	1,125	2,567	1,442 (1,323–1,561)	*
Texas	3,139	5,061	1,922 (1,745–2,099)	3,656	5,456	1,800 (1,613–1,987)	
Utah	298	383	85 (34–136)	350	451	101 (46–156)	
Vermont	103	167	64 (32–96)	118	189	71 (37–105)	
Virginia	1,148	1,647	499 (395–603)	1,320	1,714	394 (286–502)	
Washington	956	1,451	495 (399–591)	1,130	1,603	473 (371–575)	
West Virginia	338	921	583 (513–653)	367	995	628 (556–700)	
Wisconsin	862	1,190	328 (239–417)	970	1,375	405 (310–500)	
Wyoming	83	186	103 (71–135)	95	185	90 (57–123)	
United States	**45,738**	**74,458**	**28,831 (28,151–29,511)**	**51,840**	**80,899**	**29,232 (28,518–29,946)**	
Unintentional injuries (accidents)							
Alabama	910	2,036	1,126 (1,020–1,232)	939	2,104	1,165 (1,057–1,273)	
Alaska	131	331	200 (158–242)	137	348	211 (168–254)	
Arizona	1,191	2,341	1,150 (1,034–1,266)	1,284	2,562	1,278 (1,156–1,400)	
Arkansas	551	1,221	670 (587–753)	568	1,172	604 (522–686)	
California	6,886	8,627	1,741 (1,497–1,985)	7,315	9,818	2,503 (2,246–2,760)	*
Colorado	940	1,525	585 (488–682)	1,018	1,833	815 (710–920)	*
Connecticut	679	905	226 (148–304)	696	1,142	446 (362–530)	*
Delaware	172	296	124 (82–166)	183	350	167 (122–212)	
District of Columbia	117	169	52 (19–85)	128	177	49 (15–83)	
Florida	3,675	6,927	3,252 (3,050–3,454)	3,951	6,997	3,046 (2,841–3,251)	
Georgia	1,791	3,133	1,342 (1,204–1,480)	1,905	3,342	1,437 (1,295–1,579)	
Hawaii	259	344	85 (37–133)	272	356	84 (35–133)	
Idaho	285	516	231 (176–286)	304	575	271 (213–329)	
Illinois	2,395	3,093	698 (553–843)	2,449	3,642	1,193 (1,040–1,346)	*
Indiana	1,209	2,064	855 (743–967)	1,250	2,425	1,175 (1,056–1,294)	*
Iowa	571	892	321 (246–396)	587	948	361 (284–438)	
Kansas	525	1,010	485 (408–562)	539	1,004	465 (388–542)	
Kentucky	826	2,240	1,414 (1,305–1,523)	852	2,225	1,373 (1,264–1,482)	
Louisiana	850	1,771	921 (821–1,021)	882	2,074	1,192 (1,085–1,299)	*
Maine	262	390	128 (78–178)	267	487	220 (166–274)	
Maryland	1,093	1,065	-28 (-119–63)	1,147	1,217	70 (-25–165)	
Massachusetts	1,252	1,507	255 (152–358)	1,310	2,085	775 (661–889)	*
Michigan	1,869	2,923	1,054 (918–1,190)	1,916	3,455	1,539 (1,395–1,683)	*
Minnesota	993	1,342	349 (254–444)	1,034	1,440	406 (309–503)	
Mississippi	553	1,395	842 (756–928)	567	1,438	871 (783–959)	
Missouri	1,133	2,328	1,195 (1,080–1,310)	1,164	2,414	1,250 (1,133–1,367)	
Montana	190	416	226 (178–274)	199	418	219 (170–268)	
Nebraska	337	490	153 (97–209)	349	535	186 (128–244)	
Nevada	510	952	442 (367–517)	549	1,032	483 (405–561)	
New Hampshire	255	381	126 (77–175)	263	507	244 (190–298)	*
New Jersey	1,665	1,888	223 (106–340)	1,718	2,309	591 (467–715)	*
New Mexico	386	1,013	627 (554–700)	397	1,249	852 (772–932)	*
New York	3,692	3,804	112 (-58–282)	3,813	4,515	702 (523–881)	*
North Carolina	1,802	3,268	1,466 (1,326–1,606)	1,915	3,592	1,677 (1,532–1,822)	
North Dakota	127	193	66 (31–101)	138	233	95 (57–133)	

See table footnotes on the next page.

TABLE 2. (*Continued*) Number of expected, observed, and potentially preventable deaths among the five leading causes of death and significant changes in potentially preventable deaths, for persons aged <80 years, by state — United States, 2010 and 2014

State	2010 Expected	2010 Observed	2010 Potentially preventable (95% CI)	2014 Expected	2014 Observed	2014 Potentially preventable (95% CI)	Z-test significance
Ohio	2,184	4,016	1,832 (1,678–1,986)	2,230	4,928	2,698 (2,532–2,864)	*
Oklahoma	703	1,870	1,167 (1,068–1,266)	732	1,944	1,212 (1,111–1,313)	
Oregon	730	1,068	338 (255–421)	773	1,254	481 (393–569)	
Pennsylvania	2,435	4,319	1,884 (1,723–2,045)	2,486	4,993	2,507 (2,337–2,677)	*
Rhode Island	200	339	139 (93–185)	205	408	203 (154–252)	
South Carolina	883	1,910	1,027 (923–1,131)	942	2,032	1,090 (983–1,197)	
South Dakota	151	284	133 (92–174)	159	320	161 (118–204)	
Tennessee	1,209	2,895	1,686 (1,560–1,812)	1,268	3,059	1,791 (1,662–1,920)	
Texas	4,551	7,612	3,061 (2,845–3,277)	4,951	8,159	3,208 (2,984–3,432)	
Utah	470	765	295 (226–364)	510	927	417 (343–491)	
Vermont	122	181	59 (25–93)	125	188	63 (28–98)	
Virginia	1,521	1,889	368 (254–482)	1,604	2,390	786 (662–910)	*
Washington	1,269	1,925	656 (545–767)	1,355	2,181	826 (709–943)	
West Virginia	364	1,031	667 (594–740)	368	1,134	766 (690–842)	
Wisconsin	1,074	1,666	592 (489–695)	1,105	2,008	903 (794–1,012)	*
Wyoming	106	296	190 (151–229)	111	315	204 (164–244)	
United States	**58,055**	**94,862**	**36,836 (36,070–37,602)**	**60,929**	**106,260**	**45,331 (44,530–46,132)**	*

Abbreviation: CI = confidence interval.
* Significant change from 2010 to 2014, p<0.01.
† Negative potentially preventable deaths occurred when a U.S. Department of Health and Human Services region included one or more of the states with the lowest three death rates (the lowest three death rates were averaged to create the benchmark death rates) for at least a few age groups. Negative potentially preventable deaths were preserved in this table to test changes from 2010 to 2014, but were truncated to zero and not included in the totals for the United States in the table and text.

increased for each of the five leading causes of deaths in 2014, and age-adjusted death rates declined during 2010–2014 for each category except unintentional injuries. Specifically, from 2010 to 2014, age-adjusted death rates per 100,000 population for heart disease declined 6.8% from 179.1 to 167.0; for cancer, from 172.8 to 161.2 (6.7% decrease); for stroke, from 39.1 to 36.5 (6.6% decrease); and for CLRD, from 42.2 to 40.5 (4.0% decrease). For unintentional injuries, age-adjusted death rates increased 6.6%, from 38.0 to 40.5 (supplemental material at https://stacks.cdc.gov/view/cdc/42341) (*1*). Among subcategories of unintentional injury deaths for all ages, age-adjusted death rates for poisonings increased 25%, and falls increased by 12% (supplemental material at https://stacks.cdc.gov/view/cdc/42344). Prescription drug and illicit drug overdose was a major contributor to the increase in poisonings during 2010–2014 (*4*).

Discussion

The results of this analysis show that the number of observed deaths increased for each of the leading five causes of death, consistent with increases in population size in 2014, compared with 2010. Age-adjusted death rates declined overall for all causes of death combined in 2014 compared with 2010. Potentially preventable deaths declined during 2010–2014 for three of the five leading causes of death: diseases of the heart, cancer, and stroke. No change was observed for potentially preventable deaths from CLRD. Potentially preventable deaths from unintentional injuries increased from 2010 compared with 2014. States in the Southeast continued to have the highest number of potentially preventable deaths from all five causes in 2014.

Although substantial progress was made in combatting infectious diseases during the early part of the 20th century, additional focus has shifted toward prevention of noncommunicable diseases, including chronic diseases, and unintentional injuries (*5*,*6*). The decrease in cancer deaths can be attributed, in part, to progress in prevention, early detection, and treatment (*7*). Improvement of quality of care and reduction in risk factors, including increased number of persons with hypertension under control, have contributed to the decline in death rates for heart disease and stroke.** Tobacco use is a risk factor for some of the deaths included in this report, such as heart disease, cancer, CLRD, and cerebrovascular diseases.†† Mortality from tobacco-related causes has decreased in conjunction with national decreases in tobacco use across the United States, but an estimated 40 million adults (16.8%) smoked in 2014 (*8*). Implementation of evidence-based tobacco control interventions, including increased tobacco product prices, implementation and enforcement of comprehensive smoke-free laws, media campaigns, and access to proven resources (e.g., quit lines) to help persons quit tobacco use§§ varies among states. In addition to tobacco use, other health behaviors contribute to premature deaths and create opportunities for prevention. For example,

** http://www.cdc.gov/nchs/data/databriefs/db220.pdf.
†† http://www.surgeongeneral.gov/library/reports/50-years-of-progress/.
§§ http://www.cdc.gov/tobacco/stateandcommunity/best_practices/index.htm.

obesity increases the risk for CLRD, diseases of the heart, and cerebrovascular disease, in addition to some cancers.[¶¶]

Although the number of potentially preventable deaths declined during 2010–2014 for heart disease, cancer, and stroke, observed deaths increased overall for these causes. Based on the methodology used for this analysis, when the pace of the increase in observed deaths is slower than the growth in population, potentially preventable deaths will decrease. Observed deaths increased 6% for heart disease, 4% for cancer, 4% for stroke, and 8% for CLRD. These increases were smaller than would be expected to result from population growth, particularly growth in population size among older age groups during this period.

In contrast, both observed and potentially preventable deaths from unintentional injuries increased during 2010–2014. Examples of state actions to reduce drug overdose include developing or enhancing prescription drug monitoring programs, adopting clinical prescribing guidelines, and increasing access to medication-assisted treatment for opioid use disorder and naloxone to reverse opioid-related poisoning (*9*). As the U.S. population aged, falls among older adults increased. Tools such as STEADI, designed to assist clinicians in assessing fall risk, educating patients, and selecting interventions, are available from CDC.[***]

The findings in this report are subject to at least five limitations. First, the same method used in a previous report was applied to set a benchmark for potentially preventable deaths (*2*). These benchmarks are based on data from the states with the lowest death rates for each condition during 2008–2010 alone. The benchmarks might need to be reevaluated over time, especially given shifts in cause-specific death rates observed using provisional mortality data from 2015–2016.[†††] For example, death rates from unintentional injury were increasing before 2008–2010, resulting in benchmarks that might not be comparable to historical lows or international points of reference. Second, alternative ways of defining and measuring potentially preventable or premature avoidable mortality have been used in other studies and no gold standard exists (*10*). Third, a lowest average rate was calculated based on individual states. The sum of the individual potentially preventable deaths by state is qualitatively different from estimating the number of potentially preventable deaths for the United States as a whole. Fourth, changes in the number of potentially preventable deaths by cause are not necessarily independent. For example, whereas some cancer deaths might be prevented entirely, some might be shifted into another cause grouping, such as heart disease. Finally, defining potentially preventable deaths across the five leading causes does not take into consideration the fact that these are complex and diverse causes of death. Not all deaths are equivalently preventable across the leading causes or within each leading cause. For example, certain types of cancer might be considered more or less preventable than other types, and some specific mechanisms of injury deaths (e.g., drug poisoning) might be considered completely preventable and other mechanisms less preventable. In addition, the majority of risk factors do not occur randomly in populations; they are closely related to the social, demographic, environmental, economic, and geographic attributes of the neighborhoods in which persons live and work.[§§§] However, from a health equity perspective, every state can be compared with the same benchmark rates regardless of demographic differences. If health disparities were eliminated, as is called for by *Healthy People 2020*,[¶¶¶] all

Summary

What is already known about this topic?

Deaths from heart disease, cancer, chronic lower respiratory disease, cerebrovascular diseases (stroke), and unintentional injuries account for the five leading causes of death in the United States. Death rates for these diseases vary widely across states, related to variation in the distribution of social determinants of health, access and use of health services, and public health efforts.

What is added by this report?

There has been a significant decrease in the number of potentially preventable deaths among three of the five leading causes of death (diseases of the heart, cancer, and stroke) during 2010–2014. However, the number of potentially preventable deaths from unintentional injuries increased significantly during the same period. This is mostly attributed to an increase in drug poisoning (overdose from prescription and illicit drugs) and falls. No significant change was observed in potentially preventable deaths from chronic lower respiratory disease (e.g., asthma, bronchitis, and emphysema).

What are the implications for public health practice?

Public health officials can use the decreases observed as benchmarks for improving population health, while using observed increases to direct targeted efforts to reduce the number of potentially preventable deaths. A joint effort of public health and health care organizations can support analysis and action to reduce the number of potentially preventable deaths from the five leading causes of death. Specifically, given the reported increase in potentially preventable deaths from unintentional injuries, these findings might inform the selection and implementation of evidence-based interventions to prevent deaths from injuries such as falls and drug overdoses, based on epidemiologic burden.

¶¶ http://www.nhlbi.nih.gov/sites/www.nhlbi.nih.gov/files/obesity-evidence-review.pdf.
*** http://www.cdc.gov/steadi/pdf/stay_independent_brochure-a.pdf.
††† http://www.cdc.gov/nchs/products/vsrr/mortality-dashboard.htm.
§§§ http://www.cdc.gov/mmwr/preview/ind2013_su.html.
¶¶¶ https://www.healthypeople.gov/.

states could be closer to achieving the lowest possible death rates for the five leading causes of death.

Further analysis of state and regional differences in death rates for the five leading causes of death could assist state and federal health officials in establishing prevention goals, priorities, and strategies. Clinical preventive services, including physician tobacco cessation counseling, as recommended by the U.S. Preventive Services Task Force**** for heart disease, stroke, cancer, and CLRD also provide opportunities for addressing preventable deaths.††††

**** https://www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations/.

†††† https://www.uspreventiveservicestaskforce.org/Page/Name/tools-and-resources-for-better-preventive-care.

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Trends in Obesity Among Participants Aged 2–4 Years in the Special Supplemental Nutrition Program for Women, Infants, and Children — United States, 2000–2014

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Childhood obesity is associated with negative health consequences in childhood (*1*) that continue into adulthood (*2*), putting adults at risk for type 2 diabetes, cardiovascular disease, and certain cancers (*1*). Obesity disproportionately affects children from low-income families (*3*). Through a collaboration with the United States Department of Agriculture (USDA), CDC has begun to use data from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) Participants and Program Characteristics (WIC PC) to replace the Pediatric Nutrition Surveillance System (PedNSS) (*4*,*5*) for obesity surveillance among young children from low-income families. CDC examined trends in obesity prevalence during 2000–2014 among WIC participants aged 2–4 years using WIC PC data. Overall obesity prevalence increased from 14.0% in 2000 to 15.5% in 2004 and 15.9% in 2010, and then decreased to 14.5% in 2014. During 2010–2014, the prevalence of obesity decreased significantly overall, among non-Hispanic whites, non-Hispanic blacks, Hispanics, American Indian/Alaska Natives and Asians/Pacific Islanders, and among 34 (61%) of the 56 WIC state agencies in states, the District of Columbia, and U.S. territories. Despite these declines, the obesity prevalence among children aged 2–4 years in WIC remains high compared with the national prevalence of 8.9% among children aged 2–5 years in 2011–2014. Continued initiatives to work with parents and other stakeholders to promote healthy pregnancies, breastfeeding, quality nutrition, and physical activity for young children in multiple settings are needed to ensure healthy child development.

To improve maternal and child health among women and children at risk for poor nutrition, WIC provides supplemental foods, nutrition education, and health care referral for low-income women who are pregnant, postpartum, or breastfeeding, and infants and children aged up to 5 years. WIC is administered in each state or territory by state health departments or Indian tribal organizations. WIC PC is a biennial census conducted by the USDA in even years that includes participants certified to receive WIC benefits in April of the reporting year. To be eligible for WIC, women, infants, and children have to meet residential, income (gross household income ≤185% of the U.S. Poverty Level or adjunctively eligible for other child nutrition programs), and nutrition risk requirements.* Children's weight and height were measured by clinic-trained staff members according to a standard protocol†; children's weight and height records during the most recent certification or recertification were included. Obesity was defined as sex-specific body mass index (BMI)-for-age ≥95th percentile on the 2000 CDC growth charts.

JoinPoint regression was used to identify the inflection years when changes in the overall trend occurred. Log binomial regression adjusted for age, sex, and race/ethnicity was used to estimate prevalence ratios that represent relative changes in prevalence between two inflection years. Differences in adjusted prevalence were then calculated ([prevalence at beginning of period] x [adjusted prevalence ratio] – [prevalence at beginning of period]). Changes in obesity prevalence were considered statistically significant if the 95% confidence intervals for differences in adjusted prevalence did not include zero.

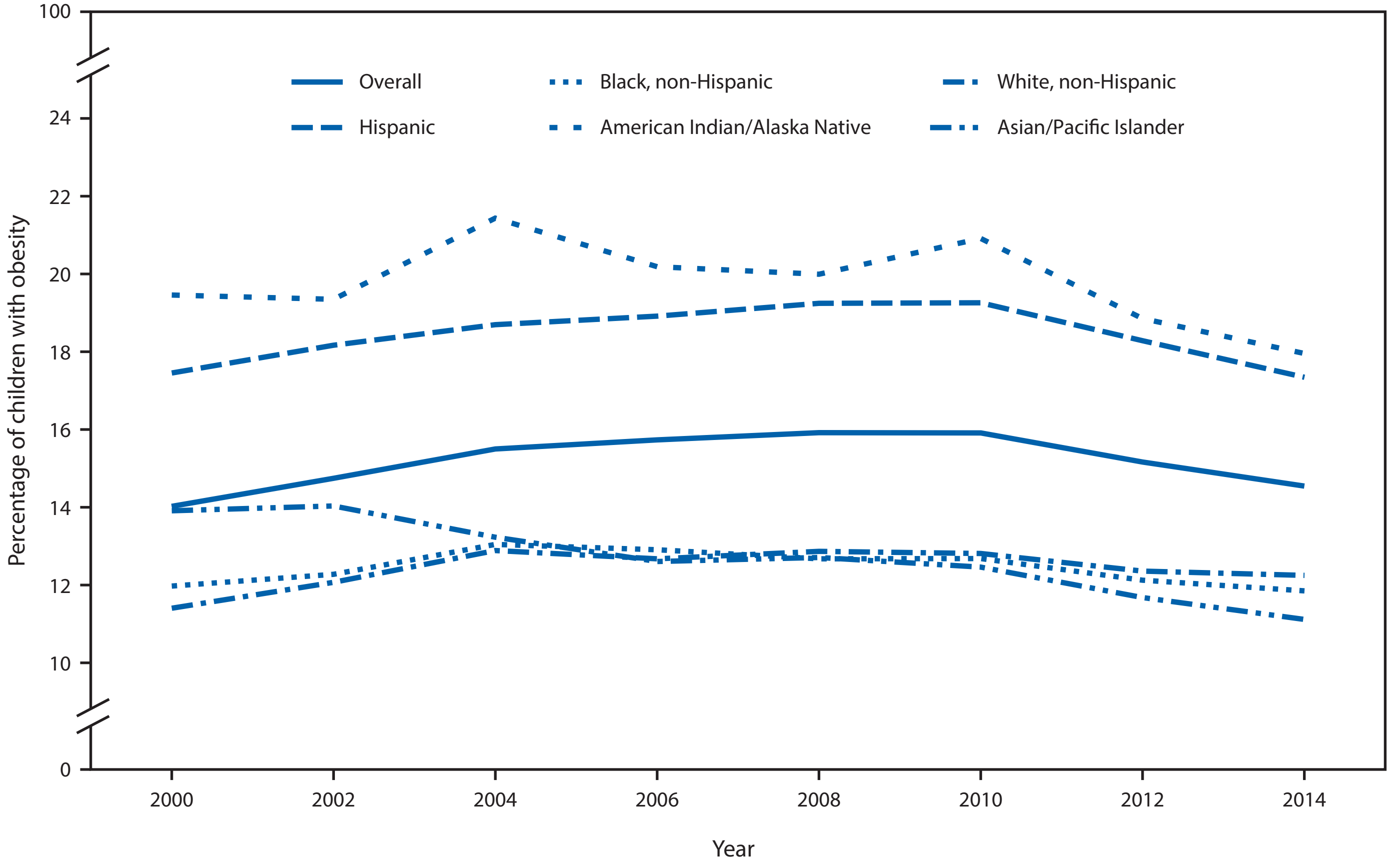
Data from the WIC state agencies in 50 states, the District of Columbia, and five U.S. territories are included in the analyses. Approximately 90% of participants lived in households with gross incomes ≤185% of the U.S. Poverty Level. Approximately 75% of the anthropometric data were collected within 6 months before April of the reporting year. Data on 24,472 (0.11%) children from Hawaii in 2002 and 2004 were excluded because these prevalence estimates differed by >10 percentage points from the values predicted by a robust regression model, as were children whose weight and height were measured >1 year before the reporting year (n = 1,062 [0.005%]) or whose sex, weight, height, or BMI were missing or biologically implausible (194,526 [0.85%]) (*6*). The final analytic sample included 22,553,518 children aged 2–4 years from 56 WIC state agencies.

During 2000–2010, overall obesity prevalence increased significantly from 14.0% (2000) to 15.5% (2004) and 15.9% (2010); during 2010–2014, obesity prevalence decreased significantly to 14.5% (2014) (Figure) (Table). In a sensitivity analysis to assess the impact on the effect from Hawaii and the Northern Mariana Islands, which did not have consistent, reliable data during 2000–2014, the overall prevalence remained the same during 2000, 2004, and 2010 and increased slightly

* www.fns.usda.gov/wic/wic-eligibility-requirements.

† https://wicworks.fns.usda.gov/wicworks/Sharing_Center/PA/Anthro/lib/pdf/Anthropometric_Training_Manual.pdf.

FIGURE. Prevalence of obesity* among WIC participants aged 2–4 years, overall and by race/ethnicity — United States,† 2000–2014



Abbreviation: WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.
* Defined as sex-specific body mass index-for-age ≥95th percentile based on 2000 CDC growth charts.
† Includes data from all the WIC state agencies in 50 states (except for Hawaii data in 2002 and 2004), the District of Columbia, and five U.S. territories.

from 14.5% to 14.6% in 2014, when data from Hawaii and the Northern Mariana Islands were excluded. Patterns in overall obesity trends remained the same.

Obesity prevalence in all years was highest among American Indians/Alaska Natives and Hispanics. Among non-Hispanic whites, non-Hispanic blacks, Hispanics, and American Indians/Alaska Natives, prevalence increased significantly during 2000–2004, then decreased significantly during 2010–2014. Among Asians/Pacific Islanders, prevalence decreased significantly throughout the study period (Figure). Patterns in obesity trends remained the same for all racial/ethnic groups if Hawaii and the Northern Mariana Islands were excluded.

The JoinPoint analysis identified 2004 and 2010 as the inflection years for overall obesity trend. Obesity prevalences by WIC state agency are observed at four time points (2000, 2004, 2010, and 2014), with comparisons in adjusted prevalence during 2004 and 2000, 2010 and 2004, and 2014 and 2010 (Table). Among the 54 state agencies with data for 2000 and 2004, an increase in obesity prevalence was observed in 48 (89%); among these, 38 (70%) were statistically significant; the largest increase occurred in Kansas (from 11.8% to 16.7%). Obesity prevalence decreased for four (7%) WIC state agencies; Puerto Rico was the only WIC state agency with a significant decrease (from 22.1% to 21.3%) (Table).

Among the 54 WIC state agen_cies with data for 2004 and 2010, an increase in prevalence occurred in 26 (48%), including 17 (31%) that were statistically significant; a decrease occurred in 27 (50%) WIC state agencies, including 20 (37%) that were statistically significant. The largest increase in obesity prevalence occurred in New Mexico (from 11.0% to 15.7%) and the largest decrease occurred in Illinois (from 20.3% to 15.7%) (Table).

Among the 56 WIC state agencies with data for 2010 and 2014, only nine (16%) experienced an increase in obesity prevalence, including four (7%) in which the increase was statistically significant. The largest significant increase occurred in Nebraska (from 14.4% to 16.9%). In contrast, a decrease in obesity prevalence occurred in 45 (80%) WIC state agencies, including 34 (61%) in which the difference was statistically significant. The adjusted prevalence decreased by more than 3 percentage points in six WIC state agencies; the largest significant decrease was in Puerto Rico (from 20.3% to 13.9%).

TABLE. Prevalence of obesity* among WIC participants aged 2–4 years, by WIC state agency and year — United States, the District of Columbia (DC), and five U.S. territories, 2000–2014

	No. WIC participants aged 2–4 years				Obesity prevalence (%)[†]				Difference in adjusted obesity prevalence		
									2004 vs 2000	2010 vs 2004	2014 vs 2010
WIC state agency	2000	2004	2010	2014	2000	2004	2010	2014	% Difference[§] (95% CI)	% Difference[§] (95% CI)	% Difference[§] (95% CI)
Overall[¶]	**2,352,648**	**2,648,564**	**3,307,442**	**3,016,487**	**14.0**	**15.5**	**15.9**	**14.5**	**1.2** (1.2 to 1.3)**	**0.1** (0.1 to 0.2)**	**-1.3[††] (-1.4 to -1.3)**
Alabama	28,680	39,859	45,743	43,509	13.2	14.1	15.8	16.3	0.5 (0.0 to 1.0)	0.7** (0.2 to 1.2)	0.3 (-0.2 to 0.8)
Alaska	7,879	9,297	10,108	5,552	18.8	20.6	21.2	19.1	1.9** (0.7 to 3.2)	0.1 (-1.0 to 1.2)	-1.7[††] (-2.9 to -0.4)
Arizona	37,898	50,484	72,933	53,044	11.3	12.1	15.0	13.3	0.7** (0.3 to 1.2)	2.7** (2.3 to 3.1)	-1.7[††] (-2.1 to -1.3)
Arkansas	22,085	24,713	31,245	28,543	11.0	12.5	14.8	14.4	1.2** (0.6 to 1.8)	1.8** (1.2 to 2.4)	-0.4 (-1.0 to 0.1)
California	449,965	482,239	583,008	551,510	16.4	16.4	18.4	16.6	0.0 (-0.2 to 0.1)	1.7** (1.6 to 1.9)	-1.7[††] (-1.8 to -1.6)
Colorado	20,972	25,835	39,612	33,057	8.4	9.8	9.6	8.5	0.9** (0.4 to 1.4)	-0.7[††] (-1.1 to -0.2)	-1.0[††] (-1.4 to -0.6)
Connecticut	17,973	18,421	22,988	19,839	16.9	17.8	17.1	15.3	0.7 (-0.1 to 1.5)	-1.0[††] (-1.7 to -0.3)	-1.7[††] (-2.4 to -1.1)
Delaware	4,475	5,993	7,650	7,251	14.9	15.5	18.4	17.2	-0.3 (-1.6 to 1.1)	1.6** (0.4 to 3.0)	-0.3 (-1.5 to 1.0)
DC	4,806	5,165	5,182	4,608	13.4	14.0	14.4	13.0	0.0 (-1.3 to 1.3)	-0.6 (-1.8 to 0.7)	-1.4 (-2.6 to 0.0)
Florida	96,465	127,203	194,924	182,567	13.2	14.5	14.6	12.7	0.8** (0.5 to 1.1)	-0.5[††] (-0.7 to -0.2)	-1.7[††] (-1.9 to -1.5)
Georgia	58,132	78,835	104,959	93,386	11.5	13.3	14.4	13.0	1.0** (0.6 to 1.4)	0.7** (0.4 to 1.0)	-1.3[††] (-1.6 to -1.1)
Hawaii	12,377	NA	14,504	12,987	11.7	NA	9.7	10.3	NA	NA	0.6 (-0.1 to 1.3)
Idaho	11,729	12,563	18,704	15,087	10.8	12.3	11.9	11.6	1.4** (0.6 to 2.3)	-0.9[††] (-1.5 to -0.2)	-0.5 (-1.1 to 0.2)
Illinois	76,596	78,564	108,762	96,060	16.2	20.3	15.7	15.2	3.3** (2.9 to 3.8)	-5.3[††] (-5.6 to -5.0)	-0.1 (-0.4 to 0.3)
Indiana	37,253	40,746	63,220	54,717	12.5	14.6	15.1	14.3	1.4** (0.9 to 1.9)	0.3 (-0.2 to 0.7)	-0.8[††] (-1.1 to -0.4)
Iowa	20,622	19,016	29,481	24,835	12.7	15.0	15.6	14.7	2.0** (1.3 to 2.7)	-0.2 (-0.8 to 0.5)	-0.7[††] (-1.3 to -0.1)
Kansas	17,750	24,336	30,458	25,532	11.8	16.7	13.7	12.8	4.5** (3.7 to 5.3)	-3.3[††] (-3.9 to -2.8)	-1.1[††] (-1.6 to -0.5)
Kentucky	37,609	41,122	45,761	44,355	14.6	16.7	18.2	13.3	2.0** (1.4 to 2.5)	1.2** (0.7 to 1.8)	-5.0[††] (-5.4 to -4.6)
Louisiana	28,800	35,556	48,145	39,507	12.4	14.8	13.8	13.2	2.4** (1.8 to 3.0)	-1.4[††] (-1.8 to -0.9)	-0.8[††] (-1.2 to -0.4)
Maine	7,325	7,722	10,410	9,034	14.1	16.7	15.2	15.1	2.5** (1.3 to 3.8)	-1.6[††] (-2.6 to -0.5)	-0.2 (-1.1 to 0.9)
Maryland	26,943	34,104	51,280	49,008	13.3	14.9	17.1	16.5	0.8** (0.3 to 1.4)	0.6** (0.1 to 1.1)	-0.6[††] (-1.1 to -0.2)
Massachusetts	43,334	42,986	49,178	44,350	16.3	18.1	17.1	16.6	1.5** (1.0 to 2.1)	-1.0[††] (-1.5 to -0.5)	-0.7[††] (-1.2 to -0.2)
Michigan	76,127	79,619	85,293	86,139	12.3	13.9	14.4	13.4	1.3** (0.9 to 1.6)	0.2 (-0.1 to 0.6)	-0.7[††] (-1.0 to -0.3)
Minnesota	28,340	41,316	57,529	47,773	12.6	13.9	12.7	12.3	1.3** (0.8 to 1.9)	-1.8[††] (-2.2 to -1.4)	-0.6[††] (-1.0 to -0.2)
Mississippi	20,068	28,505	36,519	26,007	13.2	16.4	14.9	14.5	3.3** (2.6 to 4.1)	-1.8[††] (-2.3 to -1.2)	-0.5 (-1.1 to 0.0)
Missouri	42,380	44,784	50,575	43,895	12.0	14.6	14.4	13.0	2.3** (1.8 to 2.8)	-0.2 (-0.6 to 0.2)	-1.5[††] (-1.9 to -1.1)
Montana	7,435	7,509	7,194	7,288	10.5	12.2	13.4	12.5	1.5** (0.5 to 2.6)	0.9 (-0.1 to 2.1)	-0.9 (-1.9 to 0.1)
Nebraska	10,444	13,859	15,622	13,726	13.2	14.2	14.4	16.9	0.1 (-0.7 to 1.0)	-0.4 (-1.1 to 0.4)	2.5** (1.6 to 3.4)
Nevada	14,955	13,801	25,855	26,884	11.8	15.7	15.0	12.0	3.4** (2.6 to 4.3)	-0.9[††] (-1.6 to -0.2)	-2.8[††] (-3.3 to -2.2)
New Hampshire	5,667	5,707	7,263	5,551	14.2	14.8	15.0	15.1	0.4 (-0.9 to 1.7)	0.1 (-1.1 to 1.4)	0.0 (-1.2 to 1.3)
New Jersey	37,374	43,686	59,000	56,815	18.6	18.7	18.9	15.3	-0.3 (-0.8 to 0.2)	-0.5[††] (-1.0 to -0.1)	-3.4[††] (-3.8 to -3.0)
New Mexico	19,951	19,047	21,968	20,515	8.2	11.0	15.7	12.5	2.8** (2.1 to 3.5)	4.4** (3.7 to 5.2)	-3.3[††] (-3.9 to -2.7)

See table footnotes on the next page.

Discussion

The prevalence of obesity among young children from low-income families participating in WIC in U.S. states and territories was 14.5% in 2014. This estimate was higher than the national estimate (8.9%) among all U.S. children in a slightly different age group (2–5 years) based on data from the 2011–2014 National Health and Nutrition Examination Survey (*7*). Since 2010, statistically significant downward trends in obesity prevalence among WIC young children have been observed overall, in all five racial/ethnic groups, and in 34 of the 56 WIC state agencies, suggesting that prevention initiatives are making progress, potentially by impacting the estimated excess of calories eaten versus energy expended for this vulnerable group (*8*).

Nutrition during pregnancy and early childhood is critical for healthy child growth and development. A recent review of factors contributing to childhood obesity identified risk factors present during pregnancy and the first 2 years of life, including high maternal prepregnancy BMI, excess maternal gestational weight gain, gestational diabetes, high infant birth weight, and rapid infant weight gain that can influence the risk for obesity in later childhood (*9*). The USDA WIC program reaches low-income mothers and children with nutritional risk during this critical developmental period. WIC promotes healthy eating and provides nutrition education that emphasizes the nutritional needs of women who are pregnant, postpartum, or breastfeeding, and children aged up to 5 years. In 2009, the WIC food packages were revised[§] to align with the Dietary Guidelines for Americans and the infant feeding practice guidelines of the American Academy of Pediatrics. The revisions promote and support breastfeeding, provide WIC participants with a wider variety of healthy food options, and improve availability of and access to healthy foods in communities (*10*).

[§] http://www.fns.usda.gov/wic/final-rule-revisions-wic-food-packages.

TABLE. (*Continued*) Prevalence of obesity* among WIC participants aged 2–4 years, by WIC state agency and year — United States, the District of Columbia (DC), and five U.S. territories, 2000–2014

	No. WIC participants aged 2–4 years				Obesity prevalence (%)†				Difference in adjusted obesity prevalence		
									2004 vs 2000	2010 vs 2004	2014 vs 2010
WIC state agency	2000	2004	2010	2014	2000	2004	2010	2014	% Difference§ (95% CI)	% Difference§ (95% CI)	% Difference§ (95% CI)
New York	151,124	161,904	186,760	195,413	16.5	17.4	16.1	14.3	0.7** (0.4 to 1.0)	-1.5†† (-1.7 to -1.3)	-1.7†† (-1.9 to -1.5)
North Carolina	52,651	62,956	89,798	92,407	11.6	13.6	13.9	15.0	1.3** (0.9 to 1.7)	-0.4†† (-0.7 to -0.03)	1.3** (1.0 to 1.6)
North Dakota	5,049	4,848	5,484	4,586	10.8	12.7	14.5	14.4	1.5** (0.2 to 2.9)	1.2 (-0.1 to 2.6)	0.0 (-1.3 to 1.4)
Ohio	78,769	88,873	102,803	81,440	11.6	12.1	12.6	13.1	0.3 (0.0 to 0.6)	0.4** (0.1 to 0.7)	0.3** (0.03 to 0.6)
Oklahoma	28,650	27,244	37,849	32,754	11.1	13.7	15.4	13.8	2.0** (1.4 to 2.6)	1.2** (0.6 to 1.8)	-1.7†† (-2.2 to -1.2)
Oregon	23,948	33,521	43,209	38,378	14.7	14.8	15.8	15.0	-0.4 (-1.0 to 0.2)	0.5** (0.03 to 1.0)	-0.7†† (-1.2 to -0.2)
Pennsylvania	77,518	81,491	96,762	84,996	12.1	12.6	12.8	12.9	0.2 (-0.1 to 0.5)	0.0 (-0.3 to 0.3)	0.1 (-0.2 to 0.4)
Rhode Island	7,005	7,498	10,783	8,853	17.3	18.3	16.4	16.3	0.8 (-0.4 to 2.1)	-1.9†† (-2.9 to -0.8)	-0.3 (-1.3 to 0.8)
South Carolina	27,083	28,169	39,785	32,346	12.3	15.6	13.3	12.0	2.8** (2.2 to 3.4)	-2.8†† (-3.2 to -2.3)	-1.4†† (-1.8 to -0.9)
South Dakota	6,274	6,697	7,884	5,179	12.0	14.9	17.3	17.1	3.1** (1.8 to 4.5)	1.5** (0.3 to 2.8)	-0.5 (-1.7 to 0.9)
Tennessee	43,309	48,114	57,153	54,429	11.8	13.5	16.0	14.9	1.2** (0.7 to 1.6)	1.7** (1.3 to 2.2)	-1.0†† (-1.4 to -0.6)
Texas	255,124	306,999	361,823	307,498	12.5	15.9	16.9	14.9	3.3** (3.1 to 3.5)	0.7** (0.5 to 0.8)	-1.6†† (-1.8 to -1.5)
Utah	19,555	21,345	26,045	22,919	10.3	12.3	12.5	8.2	2.0** (1.3 to 2.7)	-0.7†† (-1.2 to -0.1)	-4.3†† (-4.7 to -3.8)
Vermont	5,848	6,308	6,964	5,574	12.5	14.6	13.8	14.1	2.0** (0.7 to 3.3)	-0.7 (-1.8 to 0.6)	0.1 (-1.1 to 1.4)
Virginia	45,135	42,233	48,920	57,983	14.0	18.3	21.5	20.0	3.8** (3.2 to 4.3)	1.7** (1.2 to 2.2)	-1.5†† (-2.0 to -1.1)
Washington	56,173	63,851	78,336	76,564	13.4	14.5	14.9	13.6	0.7** (0.3 to 1.1)	-0.3 (-0.7 to 0.1)	-1.4†† (-1.7 to -1.1)
West Virginia	15,654	17,687	17,669	14,902	11.9	13.7	14.4	16.4	1.6** (0.9 to 2.4)	0.8** (0.1 to 1.6)	1.9** (1.1 to 2.8)
Wisconsin	35,780	39,710	48,511	39,965	11.6	14.4	15.2	14.7	2.5** (2.0 to 3.0)	0.2 (-0.2 to 0.7)	-0.6†† (-1.1 to -0.2)
Wyoming	3,596	3,658	4,413	3,731	8.1	10.0	11.8	9.9	2.1** (0.7 to 3.7)	1.0 (-0.3 to 2.5)	-2.1†† (-3.2 to -0.8)
Territory											
American Samoa	2,028	3,157	3,221	3,160	16.5	16.8	14.6	16.3	0.4 (-1.6 to 2.7)	-2.3†† (-3.9 to -0.6)	1.6 (-0.1 to 3.6)
Guam	1,415	1,842	3,248	2,737	10.7	11.6	11.4	8.7	0.7 (-1.3 to 3.2)	-0.1 (-1.8 to 1.9)	-2.8†† (-4.1 to -1.4)
Northern Mariana Islands	NA	NA	2,157	1,808	NA	NA	14.1	9.0	NA	NA	-5.3†† (-6.7 to -3.5)
Puerto Rico	75,865	85,711	70,699	74,118	22.1	21.3	20.3	13.9	-1.0†† (-1.4 to -0.6)	-1.1†† (-1.4 to -0.7)	-6.4†† (-6.7 to -6.1)
Virgin Islands	2,686	2,156	2,093	1,816	11.4	12.0	12.4	11.9	0.5 (-1.2 to 2.5)	0.4 (-1.5 to 2.5)	-0.5 (-2.4 to 1.7)

Abbreviation: NA = No data collected, or data were considered unreliable if sample size was <50 or prevalence changed by >10 percentage points from previous year.
* Defined as sex-specific body mass index-for-age ≥the 95th percentile on the CDC growth charts.
† Crude prevalence of obesity.
§ Calculated as [prevalence at beginning of period] x [adjusted prevalence ratio] – [prevalence at beginning of period]. The adjusted prevalence ratios that represent relative changes in obesity prevalence between two inflection years were calculated from log binomial regression models adjusted for age, sex, and race/ethnicity.
¶ Includes data from all the WIC state agencies in 50 states, DC, and five U.S. territories, except for Hawaii data in 2002 and 2004.
** Statistically significant increase based on log binomial regression model adjusted for age, sex, and race/ethnicity.
†† Statistically significant decrease based on log binomial regression model adjusted for age, sex, and race/ethnicity.

Other factors also might be contributing to the modest declines in obesity among WIC young children. Local, state, and national obesity initiatives and reports such as Let's Move,¶ the White House Childhood Obesity Task Force report,** and the Institute of Medicine recommendations†† have raised awareness and drawn the attention of stakeholders, including parents, early care and education (ECE) providers, community and business leaders, industry, health care providers, and public health officials. A number of federal initiatives have provided support to states and localities to assist ECE programs to improve nutrition, breastfeeding support, physical activity, and screen time standards. For example, CDC supports states in embedding these standards in their ECE systems through various mechanisms, including the State Public Health Actions§§ and the ECE Obesity Prevention cooperative agreements.

The findings in this report are subject to at least two limitations. First, findings might not be generalizable to all young children from low-income families, because the study includes only young children who participated in WIC and only about 50% of WIC eligible young children were enrolled in the program.¶¶ Second, findings of this study are not directly comparable to those based on the older PedNSS data, which also included WIC participants (*4,5*). Data collected by PedNSS in January–December calendar years included participants from some other child nutrition programs (<20%), in addition to WIC, but did not have consistent data for all WIC state agencies over time.

¶ http://www.letsmove.gov.
** http://www.letsmove.gov/sites/letsmove.gov/files/TaskForce_on_Childhood_Obesity_May2010_FullReport.pdf.
†† https://www.nap.edu/read/13275/chapter/1.
§§ https://www.cdc.gov/chronicdisease/about/state-public-health-actions.htm.
¶¶ http://www.fns.usda.gov/sites/default/files/WICEligibles2000-2009Vol2_0.pdf.

Summary

What is already known about this topic?

Previous analyses using Pediatric Nutrition Surveillance System (PedNSS) data found that during 2008–2011, obesity prevalence among children aged 2–4 years who participated in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and other nutrition and health programs declined slightly overall, among non-Hispanic whites, non-Hispanic blacks, Hispanics, and Asians/Pacific Islanders, and in 19 of 43 states and U.S. territories.

What is added by this report?

The WIC Participants and Program Characteristics (WIC PC) census data replaces the PedNSS system to report obesity prevalence among low-income young children from more jurisdictions consistently. This is the first study to use WIC PC data to examine early childhood obesity among low-income WIC young children. Modest declines in obesity prevalence from 2010 to 2014 were observed overall and in all five racial/ethnic groups. Among the 56 WIC state agencies in states, the District of Columbia, and U.S. territories, 34 had statistically significant declines. Despite the recent downward trends, the overall obesity prevalence among WIC children aged 2–4 years remains high at 14.5% in 2014.

What are the implications for public health practice?

Continued obesity prevention initiatives at the national, state, and local levels are needed. Policy and practice changes in key settings (community, early care and education, and health care), and initiatives that support pregnant women, parents, and key care providers to promote healthy pregnancies, breastfeeding, quality nutrition, and physical activity for young children are needed to further reduce the prevalence of early childhood obesity.

Despite the recent declining trends, the obesity prevalence for young, low-income children in WIC remains high at 14.5% in 2014. To reduce the high prevalence of early childhood obesity among low-income families, new and continued implementation of evidence-based measures are needed to support and educate pregnant women, ensure parents and families have the appropriate information about healthy behaviors, and encourage stakeholders across various settings and sectors to create supportive nutrition and physical activity environments.

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CDC Grand Rounds: A Public Health Approach to Detect and Control Hypertension

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Hypertension is generally defined as systolic blood pressure ≥140 mmHg, or diastolic blood pressure ≥90 mmHg. A person who currently uses blood pressure-lowering medication is also defined as having hypertension. Hypertension is a leading risk factor for cardiovascular disease and stroke (*1*,*2*). Hypertension affects nearly one third of U.S. residents aged ≥18 years (approximately 75 million persons), and in approximately one half of adults with hypertension (nearly 35 million persons), it is uncontrolled (*2*). Among these 35 million U.S. residents with uncontrolled hypertension, 33% (11.5 million persons) are not aware of their hypertension, 20% (7 million persons) are aware of their hypertension, but are not being treated for it, and approximately 47% (16.1 million persons) are aware of their hypertension and being treated for it, but treatment (by medication and/or lifestyle modification) is not adequately controlling their blood pressure (Figure) (*2*).

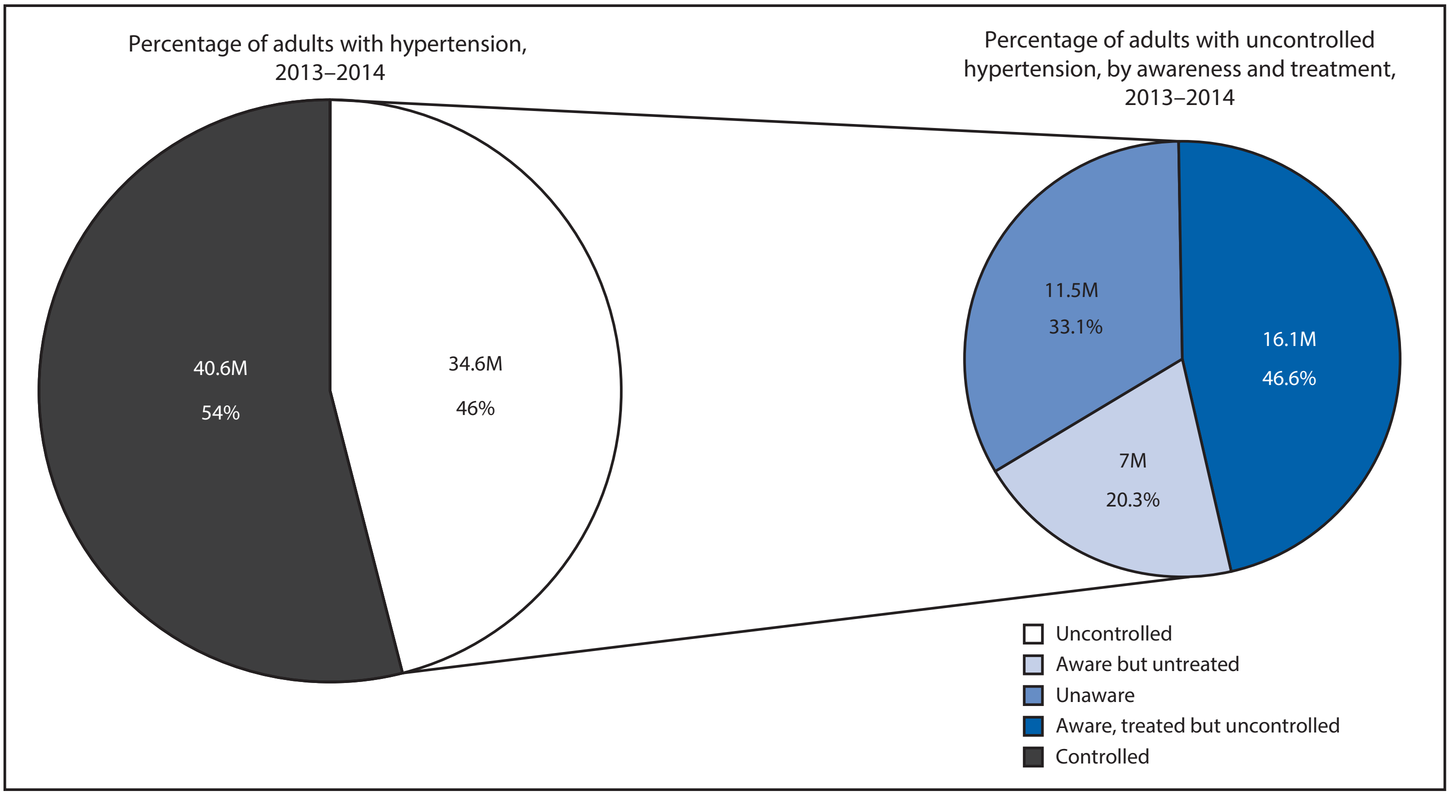
Uncontrolled hypertension is associated with increased cardiovascular morbidity and mortality and an increased use of health care resources (*3*), with approximately $49 billion spent annually in direct and indirect medical expenses (*4*). Seventy-seven percent of persons who have a first stroke have hypertension (*4*). Of the 35 million U.S. residents who have uncontrolled hypertension, 81% (30 million) have health insurance, 83% (31 million) have a usual source of care, and 79% (30 million) received medical care in the previous year (Table). These data point to gaps and barriers in the current system that, if addressed, could lead to improved control of hypertension in the U.S. population, and considerable reduction in hypertension-associated morbidity and mortality.

Accurate diagnosis and appropriate management of hypertension require multiple reliable blood pressure readings over time. Missed opportunities to detect and control hypertension can arise at the individual level, the care provider level, and at the health care system level. Persons might not recognize that hypertension is uncontrolled because they do not experience symptoms. Many persons find it challenging to follow proper medication regimens, or make appropriate lifestyle changes such as eating a healthy, low-sodium diet and quitting smoking (*5*). During office visits, providers often must address other pressing issues, and might miss opportunities to reinforce the importance of, and strategies for, effective blood pressure control. At the health care system level, lack of access to blood pressure readings done elsewhere within a health care system, or concern over the reliability of those readings can lead to missed opportunities to diagnose and treat hypertension (*6*). These varied reasons for lack of hypertension control underscore the need for multiple approaches and a more coordinated effort to reduce the prevalence of hypertension and its associated morbidity and mortality.

The Million Hearts Initiative (Million Hearts) is a U.S. Department of Health and Human Services initiative, that focuses on efforts of federal agencies, state and local governments, health care providers and systems, community-based organizations, employers, and persons, with the overall goal of preventing one million heart attacks and strokes by 2017 (*7*). Hypertension is a major modifiable risk factor for heart attacks and strokes; thus, one major Million Hearts objective is to increase by 10 million the number of persons in the United States whose hypertension is under control (*7*). To achieve this, Million Hearts aims to enhance detection and control of hypertension by facilitating more accurate blood pressure measurement and monitoring, improving blood pressure treatment, and increasing awareness of hypertension in populations considered at increased risk. This report summarizes specific efforts to achieve these aims in two health care systems and a public health department.

NorthShore University Health System. NorthShore University Health System, in Illinois, is a health care delivery system that includes >800 physicians, four community hospitals, and a research institute; NorthShore uses an integrated and unified electronic health record (EHR) that stores data and makes data accessible across the entire health system. The NorthShore Undiagnosed Hypertension Quality Improvement Project was established to improve screening to identify patients with elevated blood pressure; ensure accuracy and reliability of office blood pressure measurement; recognize patients at risk at the point of care; and provide clinical decision support tools to facilitate appropriate treatment. NorthShore's Ambulatory Primary Care Innovations Group and clinical informatics team developed an enterprise-wide hypertension surveillance system within the EHR, which included point-of-care alerts for both clinic staff and physicians. Data were queried from the EHR using several unique algorithms to identify patients meeting the criteria for elevated blood pressure, and who might have hypertension (*8*). These algorithms, called NorthShore hypertension criteria, were derived from accepted clinical practices, guidelines, and research literature. Patients satisfying at least one of the hypertension criteria were notified that

FIGURE. Number and percentage of adults with hypertension and uncontrolled hypertension, by awareness and treatment — National Health and Nutrition Examination Survey, United States, 2013–2014



Abbreviation: M = million.

they might be at risk for hypertension, and urged to schedule an automated office blood pressure (AOBP) visit. At AOBP visits, a consistent protocol for measuring blood pressure was followed to verify whether patients had hypertension. Among patients who satisfied the NorthShore hypertension criteria, but chose not to come in for an AOBP visit, electronic "best practice advisories" alerted clinic staff and physicians each time the patient came for an office visit that the patient remained at risk for hypertension. These alerts continued until either an AOBP was performed, or a blood pressure-related diagnosis was placed in the EHR.

During the first 8 months of the project, 435 (52%) of 836 patients with previously undiagnosed and untreated hypertension received a hypertension diagnosis using the algorithm alerts and confirmatory AOBP readings across the system's 23 primary care clinics. For patients meeting the NorthShore hypertension criteria, triggering recall to the office, 97% now have a diagnosis of hypertension in their EHR, and 94% of persons with newly diagnosed hypertension were prescribed medication within 90 days of diagnosis. Screening for patients with undiagnosed hypertension using EHR data, combined with electronic alerts at the point of care was effective in this health care setting and reduced the number of undiagnosed hypertensive patients.

MedStar Health. MedStar Health is the largest healthcare system in the Maryland and Washington, D.C. area with 10 hospitals, ambulatory care and urgent care centers, approximately 100 community locations, and during 2012, >160,000 hospital admissions and 1.5 million outpatient visits. MedStar typically records a patient's blood pressure at every visit. To improve hypertension control, MedStar implemented a system-wide EHR prompt with suggested guidelines recommending default blood pressure goals, which took into account comorbid conditions, (e.g., diabetes, prior stroke, or acute myocardial infarction). If the provider did not further personalize the recommended blood pressure goal, the default blood pressure goal would autoinsert into the EHR. Once a guideline recommended blood pressure goal was inserted into a patient's record, every subsequent visit to any primary care doctor within the MedStar system presented an opportunity to verify that the patient's blood pressure was at the specified goal. Through the use of additional prompts, alerts, and patient handouts that were automatically generated, providers and patients were made aware that a patient's blood pressure did or did not meet the

TABLE. Access to health care among 35 million persons with uncontrolled hypertension — National Health and Nutrition Examination Survey, United States, 2011–2014

Characteristic	No. (millions)
Have health insurance	
Yes	29.9
No	4.7
Have usual source of health care	
Yes	30.8
No	3.9
No. of health care visits during past year	
≥2	25.3
1	4.7
0	4.7

Source: CDC. National Health and Nutrition Examination Survey Data 2011–2014 (http://www.cdc.gov/nchs/nhanes.htm).

recommended goal, and patients were informed if additional consultations or treatments should be considered.

One year into MedStar's program to improve hypertension control, the percentage of patients with hypertension and a documented evidence-based blood pressure goal increased from 5% to 92%. The percentage of patients with uncontrolled hypertension declined during this same period, from 32% to 28%. Although these preliminary results represent a modest improvement in hypertension control, MedStar has begun evaluating best practices from high-performing providers and assessing the characteristics of patients with uncontrolled hypertension to identify potential next steps to further reduce uncontrolled hypertension.

Philadelphia Department of Public Health. Philadelphia has one of the highest hypertension prevalence rates in the nation, (44.7% of adult males and 47.6% of adult females have hypertension) and has one of the highest rates of uncontrolled hypertension (18.9% of adult males and 21.4% of adult females) in the United States (*9*).

In 2010, the Philadelphia Department of Public Health (PDPH), through a CDC cooperative agreement, sought to improve public health data infrastructure to gather, store, analyze, and share more and higher quality data for the entire Philadelphia jurisdiction; the agreement focused on hypertension, adult immunization, and cancer screening. The Office of Health Information and Improvement was established within the Health Commissioner's Office, and the PDPH assembled a work group to secure hypertension data. The workgroup included state agencies, academic health systems, the prison system, the county medical society, the federation representing a majority of the Federally Qualified Health Centers, a community health service not-for-profit organization, and the regional hospital association. The Office of Health Information and Improvement asked this work group to share deidentified, aggregated data for their total patient population. The requested data elements included age, sex, race/ethnicity, and insurance type (if known); the number of persons within the patient population aged ≥18 years who could be identified as hypertensive (using *International Classification of Diseases, 9th Revision, Clinical Modification* [ICD-9-CM] codes); and the number of patients who had their blood pressure under control (≤140/90 mmHg). In response, partners provided prevalence data from EHRs, or administrative databases, along with existing reports, such as the Uniform Data System.

Data were also received from insurers covering 585,922 of Philadelphia's population aged ≥18 years (just under 50% of that age cohort). Overall, hypertension prevalence was 24.2%, which was lower than national survey data; however, this might be related to the age distribution of the insured population; 56.1% of the insured patients were aged <44 years. The percentage of the hypertensive population with adequately controlled hypertension among payer groups ranged from 35.4% to 62.5%, possibly because of the variety of proxy measures used (e.g., medication adherence data). Among the payer groups, the population with Medicare had the highest prevalence of hypertension (79.5%) and the highest prevalence of hypertension control (62.5%). Provider data covered 355,057 adults aged ≥18 years, with an average hypertension prevalence of 17.1% and control ranging from 42.1% to 65.7%.

This data exchange enabled PDPH to have a better understanding of the variations in hypertension prevalence and control, identified considerable gaps in control, and provided an impetus to improve. By looking beyond the realm of traditional public health, PDPH and its partners are working to expand dialogue, data exchange, and collaborations to improve overall system performance in detecting and controlling high blood pressure in this high-need population.

Reaching the Million Hearts hypertension goal of 10 million more persons in the United States whose hypertension is under control will require more of these innovative efforts in health systems and communities. Collaborative and coordinated efforts are required to leverage the strengths and resources of both public health and health care systems. The NorthShore and MedStar Health examples demonstrate how health information technology tools can be used to help busy health care providers and their patients more effectively detect and control high blood pressure. PDPH demonstrates how public health can engage stakeholders (e.g., insurers, healthcare systems) to work together across systems to address this problem.

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Disparities in the Prevalence of Diagnosed Diabetes — United States, 1999–2002 and 2011–2014

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The prevalence of diabetes mellitus has increased rapidly in the United States since the mid-1990s. By 2014, an estimated 29.1 million persons, or 9.3% of the total population, had received a diagnosis of diabetes (*1*). Recent evidence indicates that the prevalence of diagnosed diabetes among non-Hispanic black (black), Hispanic, and poorly educated adults continues to increase but has leveled off among non-Hispanic whites (whites) and persons with higher education (*2*). During 2004–2010, CDC reported marked racial/ethnic and socioeconomic position disparities in diabetes prevalence and increases in the magnitude of these disparities over time (*3*). However, the magnitude and extent of temporal change in socioeconomic position disparities in diagnosed diabetes among racial/ethnic populations are unknown. CDC used data from the National Health Interview Survey (NHIS) for the periods 1999–2002 and 2011–2014 to assess the magnitude of and change in socioeconomic position disparities in the age-standardized prevalence of diagnosed diabetes in the overall population and among blacks, whites, and Hispanics. During each period, significant socioeconomic position disparities existed in the overall population and among the assessed racial/ethnic populations. Disparities in prevalence increased with increasing socioeconomic disadvantage and widened over time among Hispanics and whites but not among blacks. The persistent widening of the socioeconomic position gap in prevalence suggests that interventions to reduce the risk for diabetes might have a different impact according to socioeconomic position.

To assess progress toward eliminating socioeconomic position disparities in diabetes prevalence, CDC used NHIS data for the periods 1999–2002 and 2011–2014 (*4*). These survey periods were selected to allow for prevalence estimates that were relatively similar within each period and distinct between the comparison periods (*5*). NHIS is an ongoing, cross-sectional, household interview survey of a representative sample of the civilian, noninstitutionalized, U.S. population. A randomly selected adult (aged ≥18 years) in each family was asked whether they had ever been told by a health care professional that they had diabetes; women who were told only during pregnancy were considered not to have diabetes. Prevalence was calculated for adults aged ≥18 years. Statistical software was used to account for the complex sampling design. Data were weighted to provide representative population estimates. Estimates were age-standardized by the direct method to the 2000 U.S. Census population.

Socioeconomic position disparities for the periods 1999–2002 and 2011–2014 and the change in the magnitude of these disparities between the two periods were measured in the overall population and within the three largest U.S. racial/ethnic populations (white, black, and Hispanic). Socioeconomic position was defined by educational attainment (less than high school, high school diploma/General Education Diploma, some college, and college degree or higher) and the income-to-poverty ratio (IPR) (poor <100% federal poverty level [FPL]; near poor 100%–199% FPL; middle-income 200%–399% FPL; and high-income ≥400% FPL) (*6*). The category of each socioeconomic position indicator with the lowest prevalence was designated as the referent category. The magnitudes of the disparities in each period were calculated by pairwise comparison to estimate the absolute difference (i.e., percentage-point difference) between the values in each educational attainment or IPR subgroup and the respective referent group (*3*,*7*). The relative difference (i.e., percentage difference) was calculated by dividing the absolute difference by the referent value.

Marked changes in the distributions of the socioeconomic position indicators occurred in the U.S. population between the periods studied. For example, in the 2011–2014 NHIS sample, the proportion of persons reporting less than a high school education declined by 3.6 percentage points (ppt) overall, with the greatest declines occurring among Hispanics (-9.3 ppt) and blacks (-7.4 ppt). To account for these changes when assessing the population impact of the health disparities, weighted least squares regression was used to estimate summary measures of percentage and percentage-point differences in socioeconomic position (*7*). The magnitude and direction of changes over time were assessed as the simple differences between the periods, expressed as a percentage. Using the z-score and a two-tailed t-test, differences were considered significant at $p<0.05$.

Overall and within each racial/ethnic population, significant socioeconomic position disparities in the age-standardized prevalence of self-reported physician-diagnosed diabetes that increased in magnitude with decreasing socioeconomic advantage were identified (Table 1). During 1999–2002, the absolute disparities between the least and most educated groups and between the lowest and highest IPR groups were 4.2 ppt and 3.7 ppt, respectively.

TABLE 1. Socioeconomic position disparities in age-standardized prevalence of physician-diagnosed diabetes among adults aged ≥18 years, overall and by three racial/ethnic populations — National Health Interview Survey, United States, 1999–2002 and 2011–2014

	1999–2002				2011–2014			
Socioeconomic position indicator	No. in sample	Age-standardized % (95% CI)	Absolute (percentage-point) difference	Relative (%) difference	No. in sample	Age-standardized % (95% CI)	Absolute (percentage-point) difference	Relative (%) difference
Educational attainment								
All racial/ethnic populations combined								
<High school	25,776	7.8 (7.5–8.2)	4.2*	116.0*	21,740	11.0 (10.6–11.5)	6.0*	120.4*
High school/GED	36,599	5.7 (5.5–6.0)	2.1*	57.0*	35,781	8.3 (8.0–8.6)	3.3*	65.6*
Some college	35,509	5.0 (4.7–5.3)	1.4*	37.5*	42,286	7.5 (7.2–7.8)	2.5*	49.4*
College or higher	28,199	3.6 (3.4–3.9	ref	ref	38,241	5.0 (4.8–5.3)	ref	ref
White, non-Hispanic								
<High school	11,162	7.2 (6.7–7.8)	4.0*	123.5*	8,059	10.0 (9.2–10.8)	5.6*	126.3*
High school/GED	25,580	5.2 (4.0–5.5)	1.9*	59.8*	21,791	7.6 (7.2–8.1)	3.2*	73.0*
Some college	24,726	4.5 (4.3–4.8)	1.3*	40.2*	27,284	6.7 (6.3–7.0)	2.3*	51.2*
College or higher	21,942	3.2 (3.0–3.5)	ref	ref	27,004	4.4 (4.1–4.7)	ref	ref
Black, non-Hispanic								
<High school	4,353	9.9 (9.0–10.8)	2.7*	37.3*	3,840	13.3 (12.2–14.4)	4.7*	55.6*
High school/GED	5,178	9.5 8.6–10.5)	2.3*	32.3*	6,058	11.3 (10.4–12.2)	2.8*	32.3*
Some college	5,212	7.8 (6.8–8.9)	0.6	8.2	6,680	11.8 (10.9–12.8)	3.3*	38.4*
College or higher	2,556	7.2 (6.0–8.6)	ref	ref	3,787	8.5 (7.5–9.6)	ref	ref
Hispanic								
<High school	9,653	8.9 (8.2–9.6)	2.8*	47.0*	8,705	12.6 (11.8–13.3)	5.7*	83.4*
High school/GED	4,955	7.0 (6.0–8.0	0.9	15.1	6,040	10.5 (9.5–11.5)	3.6*	52.6*
Some college	4,396	7.4 (6.1–8.9)	1.3	22.0	5,854	9.6 (8.5–10.8)	2.7*	39.6*
College or higher	1,909	6.0 (4.3–8.4)	ref	ref	2,901	6.9 (5.8–8.1)	ref	ref
Income-to-poverty ratio†								
All racial/ethnic populations combined								
Poor	19,453	7.9 (7.4–8.3)	3.7*	88.1*	25,056	10.9 (10.5–11.4)	5.5*	100.4*
Near poor	25,596	7.0 (6.7–7.4)	2.8*	66.7*	29,389	9. 5 (9.1–9.9)	4.0*	74.1*
Middle income	39,745	5.6 (5.3–5.8)	1.4*	33.3*	40,462	7.6 (7.4–7.9)	2.2*	40.0*
High income	42,629	4.2 (3.9–4.4)	ref	ref	43,791	5.5 (5.2–5.7)	ref	ref
White, non-Hispanic								
Poor	8,271	6.8 (6.2–7.5)	3.0*	78.7*	10,292	9.7 (9.5–10.4)	4.9*	101.7*
Near poor	14,383	6.2 (5.8–6.7)	2.4*	62.5*	15,184	8.7 (9.1–9.2)	3.8*	79.5*
Middle income	27,639	5.1 (4.9–5.4)	1.3*	34.9*	26,133	7.0 (6.6–7.3)	2.1*	44.4*
High income	33,849	3.8 (3.6–4.1)	ref	ref	32,768	4.8 (4.6–5.1)	ref	ref
Black, non-Hispanic								
Poor	4,501	9.7 (8.7–10.7)	2.4*	31.9*	5,929	12.8 (11.8–13.8)	3.4*	36.9*
Near poor	4,235	10.2 (9.2–11.3)	2.9*	39.2*	5,203	12.0 (11.1–13.0)	2.7*	29.2*
Middle income	5,053	8.3 (7.4–9.2)	1.0	12.8	5,468	11.1 (10.2–12.1)	1.8*	19.5*
High income	3,730	7.3 (6.1–8.8)	ref	ref	3,897	9.3 (8.2–10.5)	ref	ref
Hispanic								
Poor	5,899	9.3 (8.3–10.3)	2.5*	36.4*	6,190	12.8 (11.9–13.8)	3.8*	42.3*
Near poor	6,160	8.8 (7.9–9.8)	2.0*	29.6*	7,084	11.0 (10.2–11.9)	2.0*	22.2*
Middle income	5,832	6.8 (5.9–7.8)	-0.02	-0.3	6,215	9.7 (8.9–10.7)	0.7	8.2
High income	3,346	6.8 (5.4–8.5)	ref	ref	3,499	9.0 (7.8–10.3)	ref	ref

Abbreviations: CI = confidence interval; GED = General Education Diploma; ref = referent.
* Difference between the group estimate and the reference category significant at p<0.05.
† Based on the federal poverty level (FPL): poor, <100% FPL; near poor, 100–199% FPL; middle income, 200–399% FPL; high income, ≥400% FPL.

During 2011–2014, these absolute disparities had widened to 6.0 ppt and 5.5 ppt. Similar patterns in socioeconomic position disparities in the age-standardized prevalence of diagnosed diabetes were observed for each racial/ethnic population (Table 1).

The regression-based summary measure of absolute differences indicated that the socioeconomic position disparities in prevalence were not limited to the extremes of the distributions of each socioeconomic position indicator, but were present across all socioeconomic subgroups in the entire population (Table 2). During 1999–2002, both the average difference in prevalence from the lowest to the highest education group and the average difference across the IPR groups were -4.7 ppt. During 2011–2014, the magnitude of the absolute prevalence differences for educational attainment (-6.7 ppt) and IPR (-7.1 ppt) were significantly larger than during 1999–2002, indicating that socioeconomic position disparities in the prevalence of age-standardized diagnosed diabetes widened over time in the overall population.

TABLE 2. Regression-based summary measures of absolute* and relative† educational attainment and income-to-poverty ratio disparities in age-standardized prevalence of physician diagnosed diabetes and change in disparities over time among adults aged ≥18 years, overall and by three racial/ethnic populations — National Health Interview Survey, United States, 1999–2002 and 2011–2014

	Absolute (percentage-point) difference (95% CI)			Relative (%) difference (95% CI)		
Socioeconomic position indicator	1999–2002	2011–2014	% change, 1999–2002 to 2011–2014	1999–2002	2011–2014	% change, 1999–2002 to 2011–2014
Educational attainment						
All racial/ethnic populations combined	-4.7 (-5.4 to -4.2)	-6.7 (-7.2 to -6.1)	-41.5§	-0.9 (-1.0 to -0.8)	-0.9 (-1.0 to -0.8)	-2.0
White, non-Hispanic	-4.1 (-5.4 to -3.7)	-6.0 (-6.7 to -5.3)	-44.2§	-0.9 (-1.0 to -0.8)	-0.9 (-1.0 to -0.8)	-5.3
Black, non-Hispanic	-3.7 (-5.4 to -2.0)	-4.3 (-6.0 to -2.6)	-16.4	-0.4 (-0.6 to -0.2)	-0.4 (-0.5 to -0.2)	9.5
Hispanic	-3.4 (-5.4 to -1.4)	-6.4 (-8.1 to -4.7)	-89.1¶	-0.4 (-0.7 to -0.2)	-0.6 (-0.8 to -0.4)	-40.5
Income-to-poverty ratio**						
All racial/ethnic populations combined	-4.7 (-5.3 to -4.2)	-7.1 (-7.6 to -6.5)	-49.4§	-0.9 (-1.0 to -0.8)	-0.9 (-1.0 to -0.9)	-8.7
White, non-Hispanic	-3.8 (-4.5 to -3.2)	-6.4 (-7.1 to -5.7)	-66.9§	-0.8 (-0.9 to -0.7)	-1.0 (-1.1 to -0.9)	-23.6¶
Black, non-Hispanic	-3.6 (-5.6 to -1.6)	-4.4 (-6.2 to -2.6)	-22.1	-0.4 (-0.6 to -0.2)	-0.4 (-0.6 to -0.2)	5.4
Hispanic	-3.8 (-5.8 to -1.7)	-4.9 (-6.6 to -3.1)	-28.5	-0.5 (-0.7 to -0.2)	-0.5 (-0.6 to -0.3)	5.1

Abbreviation: CI = confidence interval.

* The socioeconomic position domain consists of groups ordered from the lowest to the highest levels of educational attainment and income-to-poverty ratio (IPR). The summary measure of absolute difference was obtained by using regression to fit a straight line to the prevalence estimates ordered from the lowest to the highest levels of educational attainment or IPR. The slope of the regression line is interpreted as the average absolute change in the age-standardized prevalence of diagnosed diabetes from the lowest to the highest level of each socioeconomic position indicator. The regression-based summary measure of absolute difference, also known as the Slope Index of Inequality, is expressed in percentage points. **Source:** Keppel K, Pamuk E, Lynch J, et al. Methodological issues in measuring health disparities. Vital Health Stat 2 2005;141:1–16.

† The summary measure of relative difference was obtained by dividing the absolute difference by the prevalence of age-standardized diagnosed diabetes in the total population. It is interpreted as the average percentage change in the age-standardized prevalence of diagnosed diabetes from the lowest to the highest level of each socioeconomic position indicator. The regression-based summary relative difference, also known as the Relative Index of Inequality, is expressed as a percentage.

§ Difference between the absolute differences during 1999–2002 and 2011–2014 significant at p<0.01.

¶ Difference significant at p<0.05.

** Based on the federal poverty level.

During 1999–2002, the summary measure of educational disparities in diabetes prevalence showed no significant racial/ethnic differences (whites [-4.1 ppt], blacks [-3.7 ppt], and Hispanics [-3.4 ppt]) (Table 2). By 2011–2014, the summary measure of absolute differences for education and IPR disparities in prevalence had widened between whites (-6.0 ppt [education] and -6.4 ppt [IPR]) and Hispanics (-6.4 ppt [education] and -4.9 ppt [IPR]). Among blacks, the magnitudes of absolute differences (-4.3 ppt and -4.4 ppt) were similar to those in the earlier period (-3.7 ppt and -3.6 ppt). The patterns of relative socioeconomic position disparities in the age-standardized prevalence were similar in each racial/ethnic group.

Changes in socioeconomic position disparities in the age-standardized prevalence of diagnosed diabetes over time were observed (Table 2). The regression-based summary measure of absolute socioeconomic position disparity was significantly higher during 2011–2014 than during 1999–2002, indicating that the gap in prevalence between the referent and lower socioeconomic position groups widened. The average absolute educational and IPR disparities in diabetes prevalence increased by at least 40% in the overall population (41.5% [education], 49.4% [IPR]) and among whites (44.2% [education], 66.9% [IPR]), but showed no significant change over time among blacks (16.4% [education], 22.1% [IPR]) (Table 2). Although the average absolute educational disparities in diabetes prevalence among Hispanics increased over time, there were no statistical differences in the IPR-related prevalence disparities. As expected, the changes in the regression-based summary measure of relative differences were smaller; only the increasing relative IPR disparity among whites was statistically significant, but most were in the same direction as the absolute differences.

Discussion

During 1999–2002 and 2011–2014, significant socioeconomic position disparities in the age-standardized prevalence of self-reported physician-diagnosed diabetes existed among U.S. adults in the overall population and among blacks, whites, and Hispanics. During each period, socioeconomic position disparities were present from the lowest to the highest socioeconomic position group and increased with socioeconomic disadvantage. Socioeconomic position disparities in prevalence among whites widened over time, whereas no significant temporal change was observed among blacks. Among Hispanics, educational disparities in prevalence widened over time, but IPR disparities did not.

The findings in this report are consistent with an earlier report describing the presence of and temporal increase in socioeconomic position disparities in diabetes prevalence in the overall U.S. population (*3*). However, these findings are not strictly comparable with that report. First, this study examined a longer interval than the 5-year intervals studied earlier; the disparities observed over the longer interval might reflect more closely the population response to diabetes risk-reduction efforts. In addition, the summary measures indicated that the socioeconomic position disparities were present across the entire distribution of each socioeconomic position indicator rather than just at the extremes, and differed by racial/ethnic population. The racial/ethnic analyses revealed that the socioeconomic position disparities in prevalence increased over time, even among whites, the group with the lowest diabetes prevalence.

The findings in this report are subject to at least two limitations. First, all data are self-reported and therefore subject to recall and social desirability bias. However, self-reported diagnosed diabetes has been shown to have high reliability (*2*). To avoid bias related to the high nonresponse to survey questions on income, NHIS datasets with imputed income were used. Second, these findings do not reflect disparities in the prevalence of all diabetes (diagnosed plus undiagnosed); approximately 28% of all diabetes is undiagnosed (*2*) and might vary by socioeconomic position and race/ethnicity. However, the socioeconomic patterning of disparities in prevalence of diagnosed diabetes is consistent with reports on diabetes risk in the U.S. adult population (*2*).

One of the overarching goals of *Healthy People 2020* is to achieve health equity, eliminate disparities, and improve the health of all groups.* Evidence-based public health interventions that are designed to delay or prevent diabetes target diabetes-related lifestyle factors such as obesity, physical inactivity, and poor dietary habits, which increase with decreasing socioeconomic circumstances among persons and the places where they live (*8*). The persistent widening of the socioeconomic position gap in the prevalence of physician-diagnosed diabetes observed in this study is consistent with an increasing body of evidence that suggests that interventions to reduce diabetes or its risk factors can have different impacts according to socioeconomic position (*9*,*10*). Evaluation of the effectiveness of such interventions across socioeconomic groups might be critical to understanding whether risk reduction efforts achieve the national health equity goal.

* https://www.healthypeople.gov/sites/default/files/HP2020_brochure_with_LHI_508_FNL.pdf.

Summary

What is already known about this topic?

During the first decade of the 2000s, marked socioeconomic position disparities in the age-standardized prevalence of physician-diagnosed diabetes were found among the U.S. adult population. These disparities widened over time.

What is added by this report?

This report confirmed the presence of substantial socioeconomic position disparities in the overall population. In 1992–2002, the absolute differences in education and income-to-poverty ratio (IPR) were both 4.7 percentage points (ppt). In 2011–2014, the differences were 6.1 ppt for education and 7.1 for IPR. Similar patterns were observed among non-Hispanic blacks, non-Hispanic whites, and Hispanics. The report also provides evidence that socioeconomic position disparities widened over time.

What are the implications for public health practice?

Eliminating disparities and achieving health equity are important U.S. public health goals. Interventions designed to achieve health equity target lifestyle factors such as obesity, physical inactivity and poor dietary habits that are most common among persons and in places associated with low socioeconomic circumstances. The widening socioeconomic position disparities in diagnosed diabetes in the interval between 1999–2002 and 2011–2014 suggests that efforts at diabetes risk reduction might have had differential impact by socioeconomic position. Evaluation of the effectiveness of interventions across socioeconomic groups might be crucial to understanding the extent to which national goals are achieved.

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Global Routine Vaccination Coverage, 2015

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In 1974, the World Health Organization (WHO) established the Expanded Program on Immunization* to provide protection against six vaccine-preventable diseases through routine infant immunization (*1*). Based on 2015 WHO and United Nations Children's Fund (UNICEF) estimates, global coverage with the third dose of diphtheria-tetanus-pertussis vaccine (DTP3), the first dose of measles-containing vaccine (MCV1) and the third dose of polio vaccine (Pol3) has remained stable (84%–86%) since 2010. From 2014 to 2015, estimated global coverage with the second MCV dose (MCV2) increased from 39% to 43% by the end of the second year of life and from 58% to 61% when older age groups were included. Global coverage was higher in 2015 than 2010 for newer or underused vaccines, including rotavirus vaccine, pneumococcal conjugate vaccine (PCV), rubella vaccine, *Haemophilus influenzae* type b (Hib) vaccine, and 3 doses of hepatitis B (HepB3) vaccine. Coverage estimates varied widely by WHO Region, country, and district; in addition, for the vaccines evaluated (MCV, DTP3, Pol3, HepB3, Hib3), wide disparities were found in coverage by country income classification. Improvements in equity of access are necessary to reach and sustain higher coverage and increase protection from vaccine-preventable diseases for all persons.

WHO and UNICEF derive national coverage estimates through an annual country-by-country review of all available data, including administrative† and survey-based§ reviews (*2*,*3*). To analyze equity of vaccination coverage, countries were categorized by World Bank income classification (low, lower-middle, upper-middle, high) based on 2015 per capita gross national income (GNI) (*4*) and eligibility for financial support from Gavi, the Vaccine Alliance (Gavi), for new vaccine introduction at any time since 2005¶ (*5*). Eligibility for Gavi support is typically based on a country's GNI per capita; the threshold for support started at US$1,000 per capita in 2000 and increased to US$1,580 by 2016.

Endorsed by the World Health Assembly in 2012, the *Global Vaccine Action Plan 2011–2020* (*6*) calls on all countries to reach ≥90% national coverage and ≥80% coverage in every district or equivalent administrative unit for all vaccines in the country's national immunization schedule by 2020. DTP3 coverage by age 12 months is an indicator of immunization program performance (*2*). During 2015, a total of 116 million children received DTP3; DTP3 coverage ranged from 76% in the WHO African Region to 94% in the Western Pacific Region (Table 1). National DTP3 coverage estimates ranged from 16% to 99% and the national DTP1 (first dose of DTP) to DTP3 dropout rates (the proportion of children who received DTP1 but did not receive DTP3) ranged from 0% to 61%. Overall, 124 (65%) countries achieved ≥90% national DTP3 coverage (Table 2). National DTP3 coverage was 80%–89% in 34 countries, 70%–79% in 12 countries, and <70% in 22 countries. Among the 19.4 million children worldwide who did not receive 3 DTP doses during the first year of life, 11.7 million (60%) lived in 10 countries (Figure). Among all children who did not complete the 3-dose DTP series, 12.8 million (66%) never received the first DTP dose, and 6.6 million (34%) started, but did not complete the series.

DTP3 coverage estimates in low-income countries were lower than in higher-income countries (Table 2). On average, DTP3 coverage was 11% lower in countries eligible for 2016 Gavi support (see supplemental figure at https://stacks.cdc.gov/view/cdc/42377). More than half of the 10 countries with the lowest 2015 DTP3 coverage estimates (Equatorial Guinea [16%]; Ukraine [23%]; South Sudan [31%]; Syrian Arab Republic [41%]; Somalia [42%]; Central African Republic [47%]; Guinea [51%]; Liberia [52%]; Chad [55%]; and Nigeria [56%]) are currently experiencing civil unrest or economic turmoil, which can lead to disruption of vaccination services (*7*). Complete subnational coverage data, based on country-reported administrative sources, were available for 158 countries in 2015; among these, 54 (34%) reported achieving ≥80% DTP3 coverage in every district, and 21 (13%) reported that ≥10% of districts had DTP3 coverage <50%.

MCV1 coverage in 2015 ranged from 74% in the African Region to 96% in the Western Pacific Region (Table 1) and from 20% to 99% by country; MCV2 coverage varied from 18% to 93% by region and from 8% to 99% by country. Globally, 119 (61%) countries achieved the ≥90%

* The original EPI vaccines were Bacille Calmette-Guérin vaccine (BCG) (to protect against tuberculosis), polio vaccine (Pol), measles-containing vaccine (MCV), and diphtheria-tetanus-pertussis vaccine (DTP).

† Administrative coverage is calculated as the number of vaccine doses administered to persons in a specified target group divided by the estimated target population.

§ During vaccination coverage surveys, a representative sample of households are visited and caregivers of children in a specified target group (aged 12–23 months) are interviewed. Dates of vaccination are transcribed from the child's home-based record or are recorded based on caregiver recall or from health facility records. Coverage is calculated as the proportion of persons in a target age group who received a vaccine dose.

¶ Gavi Phase 2 classification (73 eligible countries).

TABLE 1. Vaccination coverage, by vaccine and World Health Organization (WHO) region — worldwide, 2015

Vaccine	No. countries including vaccine*	WHO region (% coverage)†						
		Global	African	Americas	Eastern Mediterranean	European	South-East Asia	Western Pacific
BCG	158	88	80	95	87	89	87	96
HepB BD	97	39	10	72	23	39	34	83
HepB3	185	84	76	89	80	81	87	90
DTP3	194	86	76	91	80	93	87	94
Hib3	191	64	76	90	80	77	56	25
Pol3	194	86	76	91	80	94	86	96
Rota	84	23	41	76	21	18	0	1
PCV3	129	37	59	85	48	48	5	11
MCV1	194	85	74	94	76	94	85	96
RCV1	147	46	12	94	45	94	14	89
MCV2	160	61	18	53	68	89	71	93

Abbreviations: BCG = Bacille Calmette-Guérin vaccine; DTP3 = 3 doses of diphtheria-tetanus-pertussis vaccine; HepB BD = birth dose of hepatitis B vaccine; HepB3 = 3 doses of hepatitis B vaccine; Hib3 = 3 doses of *Haemophilus influenzae* type b vaccine; MCV1 = first dose of measles-containing vaccine (MCV); MCV2 = second dose of MCV; PCV3 = 3 doses of pneumococcal conjugate vaccine; Pol3 = 3 doses of polio vaccine; RCV1 = first dose of rubella-containing vaccine; Rota = final dose of rotavirus vaccine.
* Number of countries that include the specified vaccine in the routine immunization schedule.
† Weighted regional average. Coverage based on all countries listed in region or globally, including those that have not yet introduced a given vaccine.

national MCV1 coverage target,** including 51 (91%) of 56 high-income countries and five (16%) of 31 low-income countries (Table 2).

During 2010–2015, global coverage increased for completed series of rotavirus (from 8% to 23%), PCV (11% to 37%), rubella (35% to 46%), Hib (42% to 64%) and HepB (74% to 84%) vaccines (Table 1)]. For the universally recommended vaccines that have been introduced globally into national schedules of most (>80%) countries, coverage estimates in low-income countries were lower than those in higher-income countries (Table 2). Among the 50 lower middle-income countries, a higher percentage of the 13 non-Gavi–eligible lower middle-income countries had achieved ≥90% national vaccination coverage than had the 37 Gavi-eligible lower middle-income countries for MCV1 (54% in non-Gavi eligible versus 38% in Gavi-eligible lower middle-income countries), MCV2 (31% versus 24%), DTP3 (46% versus 43%), Pol3 (54% versus 43%), HepB3 (46% versus 43%), and Hib3 (46% versus 43%).

Discussion

Commitment by country governments and the collaboration of multiple global immunization partners has led to a reduction in the number of incompletely vaccinated children to an all-time low of 19.4 million in 2015. Since 2000, approximately 70 low- and middle-income countries have benefitted from Gavi support to increase equitable use of vaccines by strengthening health systems and accelerating the introduction and use of newer and underused vaccines such as PCV and rotavirus and rubella vaccines. However, despite substantial progress in increasing the number of children vaccinated worldwide, global DTP3, MCV1 and Pol3 coverage has remained at 84%–86% since 2010, with coverage improving in some countries and deteriorating in others; 68 (35%) countries have not yet met the *Global Vaccine Action Plan 2011–2020* target of 90% national DTP3 coverage. Coverage varies widely among and within WHO Regions, countries, and communities. Even though vaccines are being introduced into low-income countries more rapidly than ever before (*8*), equity in coverage has not yet been achieved, and disparities exist, even for vaccines with long-standing recommendations, such as DTP and MCV, with higher coverage in higher-income countries. Furthermore, in lower middle-income countries, vaccination coverage in Gavi-eligible countries still lags behind coverage in non–Gavi-eligible countries despite Gavi support, and nine of the 10 countries with the largest number of incompletely vaccinated children are current or former Gavi-eligible countries, indicating that continued Gavi support for immunization system strengthening is necessary. Ensuring that eligible persons within each district are fully vaccinated according to the national schedule regardless of location, age, sex, ethnicity, educational level, and socioeconomic level is a considerable challenge to the successful delivery of equitable immunization services.

WHO/UNICEF vaccination coverage estimates are supported by or based on vaccination coverage surveys that disaggregate coverage data by demographic and other factors. The Demographic and Health Surveys and Multiple Indicator Cluster Surveys conducted during 2005–2013 indicate that DTP3 coverage is lower in children from poorer households

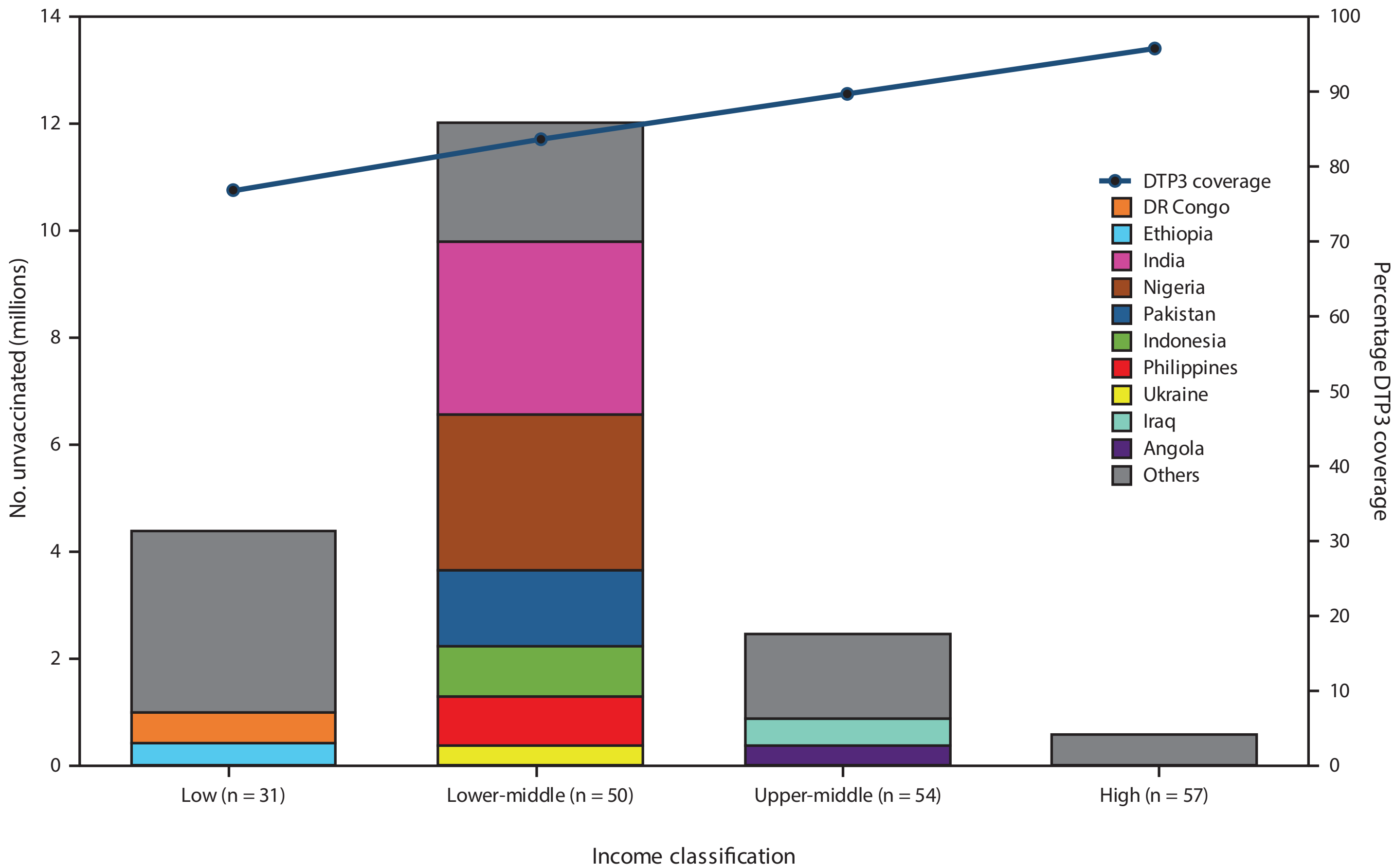
** The 2015 milestone in the Global Measles and Rubella Strategic Plan 2012–2020 was to achieve ≥90% coverage with the first routine dose of MCV (or measles-rubella-containing vaccine as appropriate) nationally and >80% vaccination coverage in every district or equivalent administrative unit. http://measlesrubellainitiative.org/wp-content/uploads/2013/06/Measles-Rubella-Strategic-Plan.pdf.

TABLE 2. Number of countries reaching national 90% coverage with MCV1, MCV2, DTP3, Pol3, HepB3, and Hib3 vaccines, by World Bank income category — worldwide, 2015

Income category* (no. countries)	Vaccines with 90% coverage, no. (%) of countries					
	MCV1	MCV2	DTP3	Pol3	HepB3	Hib3
High (57)	52 (91)	34 (60)	56 (98)	54 (95)	43 (76)	55 (96)
Upper-Middle (54)	40 (73)	27 (50)	38 (70)	35 (65)	39 (72)	30 (56)
Lower-Middle (50)	21 (42)	13 (26)	22 (44)	23 (46)	22 (44)	22 (44)
Low (31)	5 (16)	1 (3)	8 (26)	8 (26)	8 (26)	8 (26)
All income categories (192)	**117 (61)**	**75 (39)**	**124 (65)**	**120 (63)**	**113 (57)**	**115 (60)**

Abbreviations: MCV1 = first dose of measles-containing vaccine (MCV); MCV2 = second dose of MCV; DTP3 = 3 doses of diphtheria-tetanus-pertussis vaccine; Pol3 = 3 doses of polio vaccine; HepB3 = 3 doses of hepatitis B vaccine; Hib3 = 3 doses of *Haemophilus influenzae* type b vaccine.
* World Bank income category based on countries' per capita gross national income (GNI) in 2015. Argentina was categorized based on 2014 GNI per capita. Cook Islands and Niue are not included because of lack of recently available GNI estimates.

FIGURE. Average 3-dose diphtheria-tetanus-pertussis vaccine (DTP3) coverage and estimated number of incompletely vaccinated children, by country income category* — 10 countries† and worldwide, 2015



Abbreviation: DR Congo = Democratic Republic of the Congo.
* Categories are 2016 World Bank income classifications, which are based on 2015 per capita gross national income and eligibility for financial support from Gavi, the Vaccine Alliance for new vaccine introduction at any time since 2000. Argentina was categorized based on 2014 GNI per capita and Cook Islands and Niue are not included because of lack of World Bank estimate for country income category.
† The 10 countries specified are those with the largest number of incompletely vaccinated children. Others = all other countries within given country income category.

and increases with higher economic status in most low- and middle-income countries (*9*). These surveys also indicate that coverage is generally higher in urban than rural areas and increases with level of mother's education; no significant differences in coverage are observed by sex.

The findings in this report are subject to at least two limitations. First, inaccuracy in estimation of target population figures might result in over- or under-estimation of administrative coverage. Second, parental recall bias could lead to inaccurate estimates of survey-based coverage (*2*,*3*).

Summary

What is already known about this topic?

In 1974, the World Health Organization (WHO) established the Expanded Program on Immunization to ensure that all children have access to routinely recommended vaccines. Since then, global coverage with vaccines to prevent tuberculosis, diphtheria, tetanus, pertussis, poliomyelitis, and measles has increased from <5% to ≥85%, and additional vaccines have been added to the recommended schedule. Coverage with the third dose of diphtheria-tetanus-pertussis vaccine (DTP3) by age 12 months is an indicator of immunization program performance.

What is added by this report?

Global DTP3 coverage has not increased above 85%–86% since 2010. Vaccination coverage varies widely across WHO Regions, countries, and districts, and between population groups and communities, with lower coverage and higher numbers of under-immunized children in lower-income countries and among children from poorer households.

What are the implications for public health practice?

Equitable access to immunization to achieve and sustain high coverage and reduce child mortality can be enhanced through continued financial and technical support for program strengthening and vaccine introductions in lower-income settings; community engagement to increase vaccination acceptance and demand; the collection and use of high quality vaccination data; and government commitment to initiatives to improve immunization services.

Equitable access to immunization is a key goal of the *Global Vaccine Action Plan 2011–2020* and is essential to reducing child mortality. Equity-oriented immunization programs that include effective community-centered activities to communicate the value and benefits of vaccination are required to reach marginalized populations and sustain high coverage. Because disease burden is often disproportionately higher in disadvantaged populations, reaching these persons could also have a larger health impact and contribute to economic development (*6*). National commitment and ownership of initiatives to introduce new vaccines and achieve high vaccination coverage is essential to the success of such programs.

Although global commitment and Gavi support have improved introduction of new vaccines into low-income countries (*8*), wide disparities in vaccination coverage by country income group exist, even for vaccines recommended since the inception of the Expanded Program on Immunization. The proportion of lower middle-income countries reaching the *Global Vaccine Action Plan 2011–2020* targets of 90% coverage could be improved for both Gavi-eligible and non-Gavi-eligible countries, reflecting that resources are still needed to provide adequate system strengthening even after vaccines have been introduced. Strengthening immunization services, especially in countries with the highest numbers of undervaccinated children, should be a priority to help achieve the United Nation's third Sustainable Development Goal of ending preventable deaths of newborns and children aged <5 years by 2030 (*10*).

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Notes from the Field

Fungal Bloodstream Infections Associated with a Compounded Intravenous Medication at an Outpatient Oncology Clinic — New York City, 2016

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On May 24, 2016, the New York City Department of Health and Mental Hygiene notified CDC of two cases of *Exophiala dermatitidis* bloodstream infections among patients with malignancies who had received care from a single physician at an outpatient oncology facility (clinic A). Review of January 1–May 31, 2016 microbiology records identified *E. dermatitidis* bloodstream infections in two additional patients who also had received care at clinic A. All four patients had implanted vascular access ports and had received intravenous (IV) medications, including a compounded IV flush solution containing saline, heparin, vancomycin, and ceftazidime, compounded and administered at clinic A.

E. dermatitidis (previously known as *Wangiella dermatitidis*) is a neurotropic, dark pigment–forming fungus that is found in the environment (*1*). Health care–associated infections have been reported and include catheter-associated fungemia (*1*) and an outbreak of *E. dermatitidis* meningitis associated with contaminated injectable steroids prepared by a compounding pharmacy (*2*).

A case was defined as any non-*Candida* species yeast or mold identified on culture of blood or central venous catheter (CVC) (implanted port or peripherally inserted central catheter) from a patient who received care at clinic A during January 1–May 31, 2016. Case finding included microbiology record review, medical record review, and requests for screening blood and CVC cultures for all patients who had received an IV medication at clinic A during this period.

During January 1–May 31, 2016, a total of 153 patients were seen at clinic A, 38 (25%) of whom received an IV medication. Among these 38 patients, six were deceased before the investigation began with case status undetermined, and three declined to be evaluated, leaving 29 patients for analysis. Seventeen (59%) of the 29 patients met the case definition, including 13 whose cultures yielded *E. dermatitidis*, two with *Rhodotorula mucilaginosa,* and two with both fungi. No cases were identified among patients who did not receive IV medications. Five of the 17 cases were identified in symptomatic patients who sought medical care for infection or underlying medical conditions, and the remaining 12 were identified by screening blood or CVC culture. Two of the infected patients died at 10 days and 12 weeks after positive culture, respectively; it was unclear whether the deaths were related to the infections.

The 17 patients with a positive culture (by blood or CVC culture) did not share a common chemotherapeutic exposure or a common adjunctive IV therapy (e.g., dexamethasone or ondansetron). However, all patients with or without a positive culture were exposed to the compounded IV flush solution. Patients with a positive culture received a median of 12 flushes (range = 2–20) during the study period compared with a median of four flushes for those with a negative culture (range = 1–12) ($p = 0.004$, Kruskal-Wallis test).

Twenty-four of the 29 patients had a CVC, and five received IV medications through a peripheral line; all 17 patients with a positive culture had a CVC (attack rate of 71% compared with 0% among those with a peripheral line). After the screening blood culture was obtained, all patients with a CVC had their venous access removed and began 4–6 weeks of antifungal therapy. The five patients who received IV medications through a peripheral line had negative screening blood cultures, and antifungal treatment was not recommended.

Assessment of clinic A revealed failures to meet CDC infection control standards for outpatient oncology settings (*3*) as well as standards for sterile medication compounding and handling of hazardous drugs as outlined by *U.S. Pharmacopeia* chapters 797 and 800 (*4*,*5*) and the Food and Drug Administration (*6*). Investigators learned that IV flush bags containing saline, heparin, vancomycin, and ceftazidime had been compounded under substandard conditions, stored in a refrigerator, and accessed daily for multiple patients over approximately 4–8 weeks until the solution was depleted.

Upon issuance of an order by the commissioner of the New York City Department of Health and Mental Hygiene on May 31, 2016, the provider ceased treating patients at clinic A until it became compliant with medication preparation and infection prevention standards. This outbreak highlights the gaps in both awareness and enforcement of national and state pharmacy and infection control standards in outpatient settings that perform parenteral medication compounding and infusion services (*3*–*6*).

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Notes from the Field

Cardiac Dysrhythmias After Loperamide Abuse — New York, 2008–2016

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Loperamide is an over-the-counter antidiarrheal with opioid-receptor agonist properties. Recommended over-the-counter doses (range = 2–8 mg daily) do not produce opioid effects in the central nervous system because of poor oral bioavailability and P-glycoprotein efflux* of the medication (*1*); recent reports suggest that large doses (50–300 mg) of loperamide produce euphoria, central nervous system depression, and cardiotoxicity (*2*–*4*). Abuse of loperamide for its euphoric effect or for self-treatment of opioid withdrawal is increasing (*5*). Cases of loperamide abuse reported to the Upstate New York Poison Center and New York City Poison Control Center were analyzed for demographic, exposure, clinical, and laboratory characteristics. Cases of intentional loperamide abuse reported to the National Poison Database System (NPDS) also were analyzed for demographic, dose, formulation, and outcome information.

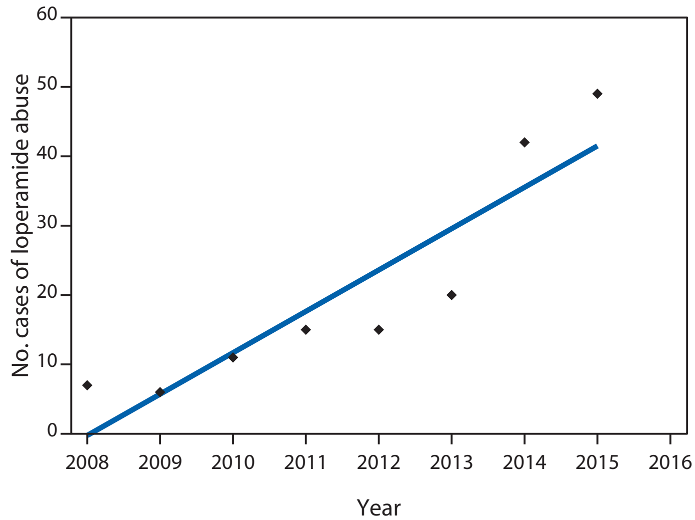
A New York case of loperamide abuse was defined as any call to the Upstate New York Poison Center or New York City Poison Control Center reporting intentional loperamide abuse during January 1, 2008–March 31, 2016. An NPDS loperamide abuse case was defined as any exposure reported to NPDS citing intentional loperamide abuse during January 1, 2008–March 31, 2016.

Among the 22 New York loperamide abuse cases identified, 18 patients were male. Median patient age was 30 years (range = 19–48 years). Electrocardiogram abnormalities included QTc prolongation in 15 (68%) patients, QRS prolongation in nine (41%) patients, and ventricular dysrhythmia in eight (36%) patients. The average reported daily dose was 358 mg (range = 34–1,200 mg). Previous opioid abuse was reported by 15 patients, previous treatment with methadone or buprenorphine (a partial opioid agonist used to treat opioid addiction) by eight patients, and chronic abuse by 13 patients. Opioid withdrawal symptoms after cessation of loperamide were reported by nine patients. Serum loperamide concentrations were obtained from four patients and ranged from 77–210 ng/mL, representing 25–875 times the therapeutic range of 0.24–3.1 ng/mL (*6*).

A total of 179 NPDS cases were identified, approximately half of which were reported after January 1, 2014 (Figure).

* P-glycoprotein acts as a cell membrane pump and increases the elimination of loperamide from the CNS and systemic circulation.

FIGURE. Number of reported cases of intentional loperamide abuse, by year — National Poison Database System, January 1, 2008–March 31, 2016



Among the 179 cases, 137 (77%) of the patients were male, the median patient age was 26 years (range = 7–87 years), and 154 (86%) were admitted to or treated in a health care facility. The average loperamide dose was 196.5 mg (range = 2–1,200 mg), and nearly all cases (95%) involved tablets or capsules. Cardiac conduction disturbances were reported in 24 (13%) patients, ventricular tachycardia or fibrillation in 16 (9%) patients, other dysrhythmias in 10 (6%) patients, and other electrocardiogram changes in five (3%) patients. Outcome was reported for 132 patients and was coded as moderate (pronounced or prolonged systemic symptoms, non–life threatening) or major (life-threatening symptoms or residual disability) for 66 patients (50%). Four (3%) deaths were reported.

These cases support the reported association between loperamide abuse and cardiac toxicity. Although laboratory confirmation was only available in four cases, clinical features were consistent with previously reported cases (*2*–*4*). Optimal management of loperamide-associated cardiac toxicity is not yet clear; multiple interventions have been reported (*2*,*4*). Health care providers and public health officials should remain vigilant for loperamide abuse and report adverse events to the U.S. Food and Drug Administration's MedWatch reporting system (http://www.fda.gov/Safety/MedWatch). Education of the public and health care providers regarding the dangers of loperamide abuse is an important component of combating opioid addiction in the United States.

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Announcement

National Chronic Obstructive Pulmonary Disease Awareness Month — November 2016

Approximately 15.7 million U.S. adults have received a diagnosis of chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema (*1*). However, many more adults with symptoms of COPD, including frequent coughing, shortness of breath, excess phlegm or sputum production, wheezing, or difficulty taking a deep breath, might not be aware that they have COPD, or they may not be receiving treatment for COPD because they have never received a diagnosis. Geographic variations in the availability of primary care physicians and COPD specialists for the U.S. population suggest that 3.7 million adults do not have access to a pulmonologist within 50 miles; in many counties where patients have access to a pulmonologist within 50 miles, the COPD patient-to-pulmonologist ratio may exceed 6,000 (*2*). Therefore, early diagnosis, treatment, and management of COPD is dependent on adults communicating COPD symptoms to their primary care physician.

November is National COPD Awareness Month, an observance supported by the National Heart, Lung, and Blood Institute's campaign, "COPD: Learn More, Breathe Better." This year's theme, "Spotlight on COPD," will raise awareness about the signs and symptoms of COPD, and encourage persons with symptoms to speak to their physicians. More information about COPD is available at http://www.cdc.gov/copd and http://www.nhlbi.nih.gov/health/educational/copd.

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Announcement

World Day of Remembrance for Road Traffic Victims — November 20, 2016

In October 2005, the General Assembly of the United Nations (UN) adopted a resolution calling for governments and nongovernmental organizations to mark the third Sunday in November each year as World Day of Remembrance for Road Traffic Victims. World Remembrance Day is dedicated to remembering persons killed or injured in road crashes and their families and communities. The day also pays tribute to the emergency crews, police and medical professionals who deal with the traumatic aftermath of road deaths and injuries (http://www.worlddayofremembrance.org).

Road traffic injuries are the ninth leading cause of death worldwide, and the leading cause of death among persons aged 15–29 years. Approximately 1.25 million persons die each year on the world's roads, and 20–50 million persons sustain nonfatal injuries (*1*). A recent CDC report comparing the United States with 19 other high-income countries determined that the United States had the highest number of motor vehicle crash deaths per 100,000 persons, and per 10,000 registered vehicles; the second highest percentage of deaths involving alcohol-impaired driving; and the third lowest use of front seat belts (*2*). During 2015, deaths from car crashes increased in the United States (*3*), and an increase is projected for the first half of 2016 (*4*). The U.S. Department of Transportation has joined with partners to launch the "Road to Zero" coalition, with the goal of ending U.S. traffic fatalities within 30 years (http://www.nhtsa.gov/About-NHTSA/Press-Releases/nhtsa_zero_deaths_coalition_10052016). Implementing proven effective strategies to prevent road traffic fatalities can save thousands of lives and hundreds of millions of dollars in the United States (*2*).

CDC supports UN and World Health Organization (WHO) measures to dedicate 2011–2020 as the Decade of Action for Road Safety. The Decade of Action for Road Safety was launched in May 2011 in more than 100 countries, with the goal of preventing 5 million road traffic deaths globally by 2020. The UN is also committed to measures to reduce the number of global road traffic deaths and injuries by half by 2020 as part of the UN's Sustainable Development Goals (http://www.un.org/sustainabledevelopment/sustainable-development-goals/).

Organizations interested in action strategies to support victims and survivors (*5*) can find materials and additional information about the World Day of Remembrance at http://www.worlddayofremembrance.org.

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Errata

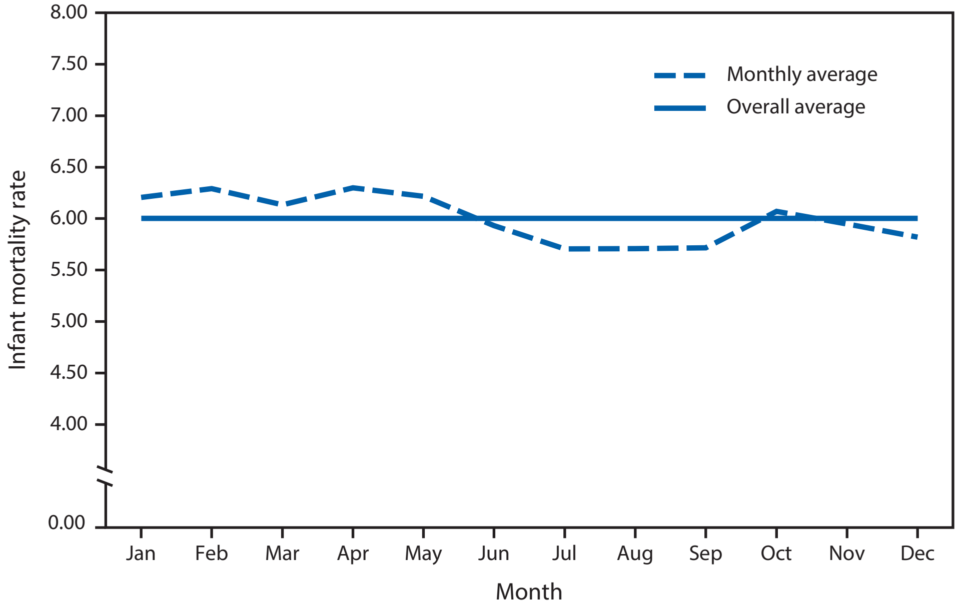
Vol. 65, No. 39

For the report, "Vaccination Coverage Among Children in Kindergarten — United States, 2015–16 School Year," on page 1061, the third sentence of the second full paragraph should read, "For example, the **California Department of Public Health** worked to improve vaccination coverage at schools identified from local-level data as having high levels of provisional enrollment." In addition, the fifth sentence of the same paragraph should read, "As a result, from 2014–15 to 2015–16, the number of provisionally enrolled kindergartners decreased from 36,731 (**6.9%**) to 24,424 (4.4%), MMR coverage increased from 92.6% to 94.5%, and DTaP coverage increased from 92.4% to 94.2% (*4*)."

QuickStats

FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

Average Infant Mortality Rate,* by Month — National Vital Statistics System, United States, 2010–2014



* Infant mortality rate = number of deaths of infants aged <1 year per 1,000 live births.

During 2010–2014, the infant mortality rate averaged approximately 6.00 infant deaths per 1,000 live births each month. The infant mortality rate peaked in February and April at approximately 6.30 and was lowest from July to September with approximately 5.71 infant deaths per 1,000 live births.

Source: CDC/NCHS, National Vital Statistics System, 2010–2014, Mortality and Births. CDC Wonder online database. http://wonder.cdc.gov/ucd-icd10.html and http://wonder.cdc.gov/natality.html.

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