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Recent Increases in Injury Mortality Among Children and Adolescents Aged 10–19 Years in the United States: 1999–2016

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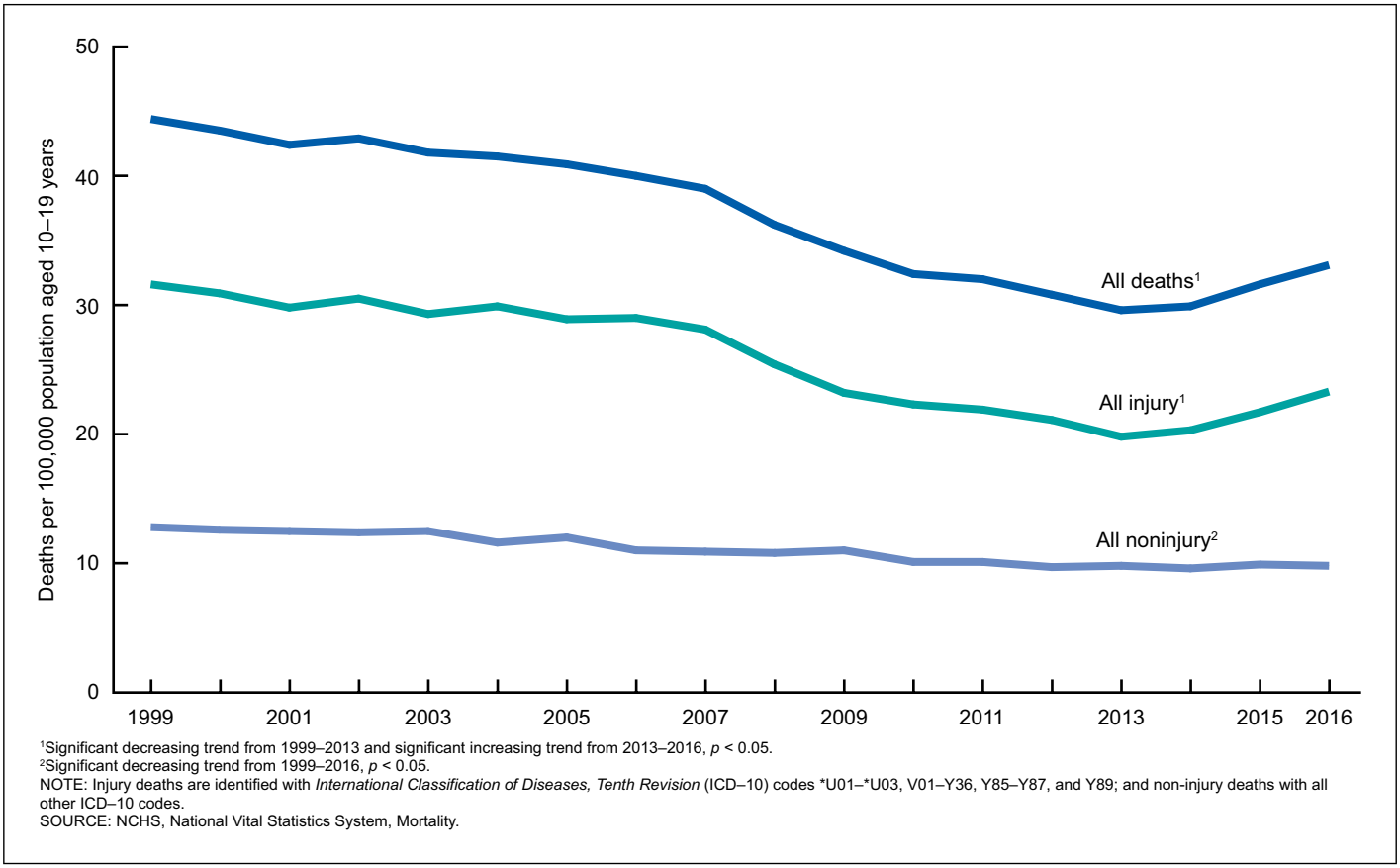
Abstract

Objectives—This report presents numbers of injury deaths and death rates for children and adolescents aged 10–19 years in the United States for 1999–2016. Numbers and rates are presented by sex for 1999–2016, by injury intent (e.g., unintentional, suicide, and homicide) and method (e.g., motor vehicle traffic, firearms, and suffocation). Numbers and rates of



[1]Significant decreasing trend from 1999–2013 and significant increasing trend from 2013–2016, $p < 0.05$.
[2]Significant decreasing trend from 1999–2016, $p < 0.05$.
NOTE: Injury deaths are identified with *International Classification of Diseases, Tenth Revision* (ICD–10) codes *U01–*U03, V01–Y36, Y85–Y87, and Y89; and non-injury deaths with all other ICD–10 codes.
SOURCE: NCHS, National Vital Statistics System, Mortality.

Figure 1. Total injury and noninjury death rates for children and adolescents aged 10–19 years: United States, 1999–2016

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death according to leading injury intents and methods are shown by sex for ages 10–14 years and 15–19 years for 2016.

Methods—Mortality statistics in this report are based on information from death certificates filed in all 50 states and the District of Columbia. Injury deaths are classified by the *International Classification of Diseases, Tenth Revision*; underlying cause-of-death codes *U01–*U03, V01–Y36, Y85–Y87, and Y89. Death rates are calculated per 100,000 population. Ranking of the three leading intents of injury deaths and methods are based on numbers of deaths.

Results—The total death rate for persons aged 10–19 years declined 33% between 1999 (44.4 per 100,000 population) and 2013 (29.6) and then increased 12% between 2013 and 2016 (33.1). This recent rise is attributable to an increase in injury deaths for persons aged 10–19 years during 2013–2016. Increases occurred among all three leading injury intents (unintentional, suicide, and homicide) during 2013–2016. Unintentional injury, the leading injury intent for children and adolescents aged 10–19 years in 2016, declined 49% between 1999 (20.6) and 2013 (10.6), and then increased 13% between 2013 and 2016 (12.0). The death rate for suicide, the second leading injury intent among ages 10–19 years in 2016, declined 15% between 1999 and 2007 (from 4.6 to 3.9), and then increased 56% between 2007 and 2016 (6.1). The death rate for homicide, the third leading intent of injury death in 2016, fluctuated and then declined 35% between 2007 (5.7) and 2014 (3.7) before increasing 27%, to 4.7 in 2016.

Keywords: death certificate • accidents • suicide • homicide

Introduction

During the 20th century, death rates for children and adolescents in the United States declined substantially and became increasingly injury related, due to the marked reduction in deaths for infectious diseases (1,2). This pattern continued into the 21st century, where the top three leading causes of death for persons aged 10–19 years were due to fatal injuries: unintentional injury (accidents), suicide, and homicide (3).

This report presents recent trends in total and injury mortality for children and adolescents aged 10–19 years in the United States from 1999–2016. Trends in injury numbers and death rates are presented in total and by intent (unintentional injury, suicide, and homicide) and leading methods (e.g., motor vehicle, firearms, and suffocation). Injury numbers and death rates are also presented by intent and leading methods by sex and 5-year age groups for 2016.

Data Source and Methods

Data

Data in this report are based on information from death certificates filed in the 50 states and the District of Columbia for 1999–2016, as collected and processed by the National Center for Health Statistics (NCHS) through the Vital Statistics Cooperative Program (4). Death certificates are generally completed by funeral directors, attending physicians, medical examiners, and coroners. For more information on the collection of the death certificate data, see Technical Notes.

Injury mortality by method and intent

Causes of death are classified according to the *International Classification of Diseases, Tenth Revision* (ICD–10) (5). Injury deaths are identified based on ICD–10 underlying cause-of-death codes *U01–*U03, V01–Y36, Y85–Y87, and Y89. Injury data in this report are presented using the external cause-of-injury mortality matrix for ICD–10. Injury deaths are organized principally by intent and then secondarily by method. Leading intents of injury deaths are ranked by the number of deaths. Injury intents are classified as unintentional, suicide, homicide, undetermined, and legal intervention/war. Deaths with undetermined intent or legal intervention/war for adolescents aged 10–19 years numbered 173 and 28, respectively in 2016. These deaths are included in the totals for all injury deaths but were not categorized separately due to the relatively small numbers, and are not shown further in this report. The ranking of the three leading methods of injury (e.g., motor vehicle, firearms, and suffocation) within specified intents are also determined by the number of deaths. Thus, two methods of death may have identical rates when rounded to one decimal point, but the method with the largest number of deaths will be ranked higher. This method is consistent with NCHS methods in ranking causes of death (3). For more information on cause-of-death classification, see Technical Notes.

Sex and age groupings

Overall deaths and death rates, and the ranked leading causes of injury deaths, are presented for males and females ages 10–19 years. Injury intent and method-specific deaths and death rates are also presented for groups aged 10–14 years and 15–19 years, by sex. Age and sex of the decedent are two demographic variables on the death certificate that are supplied to the funeral director by the informant, usually the next of kin.

Rates and significance testing

Annual death rates are calculated as the number of deaths per 100,000 age-specific population residing in the United States. Male-to-female rate ratios are computed by dividing the male rate by the female rate to quantify the difference in rates between sexes. Comparisons made in the text among rates, unless otherwise specified, are statistically significant at the 0.05 level of significance using the z test statistic. Tests of statistical significance are described elsewhere (4,6). For more detail, see Technical Notes. Trends were evaluated using the National Cancer Institute's Joinpoint Regression Program (7). The default setting of a maximum of three joinpoints were allowed to assess trends over the 1999–2016 study period.

Results

Trends in total and injury deaths and death rates

Trend in total injury and noninjury

The total number of deaths and death rate among persons aged 10–19 years declined between 1999 and 2013 but then increased between 2013 and 2016 (Table A and Figure 1). The total number of deaths increased 12% between 2013 (12,393) and 2016 (13,825); likewise, the overall death rate increased 12% (from 29.6 to 33.1). Injury deaths (i.e., unintentional injury, suicide, homicide, legal intervention/war, and undetermined intent) for persons aged 10–19 years comprised 70% of all deaths in this age range in 2016. Injury deaths for those aged 10–19 years numbered 9,716 in 2016 compared with 12,733 in 1999, a 24% decline (Table 1). However, the number of injury deaths in 2016 was 17% higher than the recent low point in 2013 (8,282). Similarly, the injury death rate for persons aged 10–19 years declined 37% from 1999–2013, from 31.6 per 100,000 to 19.8, and then increased each year during 2013–2016 (Figure 1). The injury death rate was 18% higher in 2016 (23.3) than in 2013 (19.8). In contrast, the noninjury death rate declined 23% between 1999 (12.8) and 2013 (9.8) and then was relatively stable through 2016 (9.8). Noninjury deaths include natural causes such as cancer and heart disease, which were the fourth and fifth leading causes of death for persons aged 10–19 years (data not shown).

The number and rate of total deaths in 2016 for adolescents aged 15–19 years (10,812, 51.2 per 100,000) was more than three times that of children and adolescents aged 10–14 years (3,013, 14.6). The total death rate for persons aged 10–14 years declined from 20.4 in 1999 to 13.9 in 2012 before increasing 5% to 14.6 in 2016. For older adolescents aged 15–19 years, the total death rate declined from 68.6 in 1999 to 44.8 in 2013 and then increased 14%, to 51.2 in 2016. For persons aged 10–14 years and 15–19 years, the recent increases in total death numbers and rates were attributable to increases in injury deaths. For children and adolescents aged 10–14 years, the injury death rate increased 11% from the recent low in 2012 (6.4) to 2016 (7.1). For adolescents aged 15–19 years, the injury death rate increased 19% from the recent low in 2013 (32.8) to 2016 (39.0). For ages 10–14 years and 15–19 years, noninjury death rates declined from 1999 to 2012–2013 and then were relatively stable through 2016.

Trends in total and injury deaths by sex

Both males and females aged 10–19 years experienced declines in their number and rate of total deaths from 1999 through 2013–2014 followed by recent increases (Table A). The total death rate for males in 2016 (44.5) increased 13% from its recent low point in 2013 (39.5); for females the total death rate in 2016 (21.3) increased 12% from its recent low point in 2014 (19.0). Females aged 10–19 years had a 39% decline in their injury death rate between 1999 (17.4) and 2014 (10.6) and then a 22% increase between 2014 and 2016 (12.9) (Table 1). Males had a 37% decline in the injury death rate between 1999 (45.1) and 2013 (28.5) and then a 16% increase between 2013 and 2016 (33.2). Despite recent increases, the injury death rates for both females and males were about one-quarter lower in 2016 than in 1999. Males consistently had higher total and injury death rates than females. The male-to-female total death rate ratio ranged between 2.0 and 2.2 over the period, indicating that the male rate was about twice the female rate. The male-to-female injury death rate ratio was always higher than the total death rate ratio, fluctuating over the period from 2.5 to 2.8; it was 2.6 in 2016. For ages 10–14 years and 15–19 years, male and female total and injury death rates generally followed the overall trend for ages 10–19 years, declining and then increasing recently. Male-to-female rate ratios were generally higher for ages 15–19 years compared with 10–14 years, particularly for injury deaths.

Injury intent

Injury mortality trends are described here by intent (unintentional injuries, suicide, and homicide) for 1999–2016 for ages 10–19 years in total. Injury intents of legal intervention/war and unspecified intent were not included in this section due to relatively small annual numbers; see "Methods" and Technical Notes.

Unintentional injury

Unintentional injuries were the leading intent of injury deaths for children and adolescents aged 10–19 years during 1999–2016, numbering 4,999 in 2016 (Table 1 and Figure 2). The rate of unintentional injuries for persons aged 10–19 years declined 49% between 1999 and 2013 (from 20.6 to 10.6), with the pace of the decline greater for 2007–2013 than 1999–2007. The rate then increased 13% between 2013 and 2016 (12.0). Males aged 10–19 years experienced a 48% decline in their unintentional injury death rate between 1999 (27.6) and 2013 (14.3) followed by an increase, to 16.1 in 2016. The unintentional injury death rate for females was reduced by more than one-half between 1999 (13.4) and 2014 (6.3) but then increased to 7.7 in 2016. During the 1999–2016 period, unintentional injury death rates for males aged 10–19 years were about twice those of females, as measured by the male-to-female rate ratio (2.1 in 2016).

Suicide and homicide

After a brief period of decline (1999–2001) and then increase between 2001 and 2007, homicide rates declined by 35% between 2007 (5.7) and 2014 (3.7) before increasing 27%, to 4.7 in 2016. The suicide rate for persons aged 10–19 years declined by 15% between 1999 (4.6) and 2007 (3.9) and then increased by 56% between 2007 and 2016 (6.1) (Table 1 and Figure 2). As a result of the suicide and homicide trends, suicide replaced homicide as the second leading intent of injury death among those aged 10–19 years in 2011, with the number of deaths due to suicide exceeding homicide. In 2016, suicides numbered 2,553, while homicides numbered 1,963.

Table A. Number and rate of total injury and noninjury deaths for children and adolescents aged 10–19 years, by age group and sex: United States, 1999–2016

[Rates are per 100,000 population; populations used for computing death rates are enumerated census counts for 2000 and 2010 and estimates as of July 1 in 1999 and 2001–2016; see Methods.]

	Total, ages 10–19 years						Total, ages 10–14 years						Total, ages 15–19 years					
	All deaths		Injury		Noninjury		All deaths		Injury		Noninjury		All deaths		Injury		Noninjury	
Injury deaths	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Total																		
2016	13,825	33.1	9,716	23.3	4,109	9.8	3,013	14.6	1,468	7.1	1,545	7.5	10,812	51.2	8,248	39.0	2,564	12.1
2015	13,195	31.6	9,066	21.7	4,129	9.9	3,009	14.6	1,361	6.6	1,648	8.0	10,186	48.3	7,705	36.5	2,481	11.8
2014	12,479	29.9	8,474	20.3	4,005	9.6	2,893	14.0	1,361	6.6	1,532	7.4	9,586	45.5	7,113	33.8	2,473	11.7
2013	12,393	29.6	8,282	19.8	4,111	9.8	2,913	14.1	1,345	6.5	1,568	7.6	9,480	44.8	6,937	32.8	2,543	12.0
2012	12,940	30.8	8,852	21.1	4,088	9.7	2,866	13.9	1,318	6.4	1,548	7.5	10,074	47.2	7,534	35.3	2,540	11.9
2011	13,544	32.0	9,282	21.9	4,262	10.1	2,950	14.2	1,354	6.5	1,596	7.7	10,594	48.9	7,928	36.6	2,666	12.3
2010	13,836	32.4	9,523	22.3	4,313	10.1	2,949	14.3	1,341	6.5	1,608	7.8	10,887	49.4	8,182	37.1	2,705	12.3
2009	14,648	34.2	9,947	23.2	4,701	11.0	3,128	15.1	1,395	6.8	1,733	8.4	11,520	51.9	8,552	38.5	2,968	13.4
2008	15,556	36.2	10,908	25.4	4,648	10.8	3,149	15.2	1,486	7.2	1,663	8.0	12,407	55.9	9,422	42.4	2,985	13.4
2007	16,735	39.0	12,059	28.1	4,676	10.9	3,436	16.5	1,656	7.9	1,780	8.5	13,299	60.3	10,403	47.1	2,896	13.1
2006	17,153	40.0	12,431	29.0	4,722	11.0	3,414	16.2	1,709	8.1	1,705	8.1	13,739	63.0	10,722	49.2	3,017	13.8
2005	17,468	40.9	12,351	28.9	5,117	12.0	3,765	17.7	1,877	8.8	1,888	8.9	13,703	63.8	10,474	48.7	3,229	15.0
2004	17,652	41.5	12,706	29.9	4,946	11.6	3,946	18.4	2,069	9.7	1,877	8.8	13,706	64.9	10,637	50.4	3,069	14.5
2003	17,651	41.8	12,378	29.3	5,273	12.5	4,056	18.9	2,009	9.4	2,047	9.6	13,595	65.4	10,369	49.9	3,226	15.5
2002	17,944	42.9	12,772	30.5	5,172	12.4	4,132	19.4	2,063	9.7	2,069	9.7	13,812	67.0	10,709	52.0	3,103	15.1
2001	17,557	42.4	12,362	29.8	5,195	12.5	4,002	19.1	2,048	9.8	1,954	9.3	13,555	66.3	10,314	50.4	3,241	15.8
2000	17,723	43.5	12,601	30.9	5,122	12.6	4,160	20.3	2,164	10.5	1,996	9.7	13,563	67.1	10,437	51.6	3,126	15.5
1999	17,899	44.4	12,733	31.6	5,166	12.8	4,121	20.4	2,158	10.7	1,963	9.7	13,778	68.6	10,575	52.7	3,203	15.9
Male																		
2016	9,477	44.5	7,074	33.2	2,403	11.3	1,764	16.8	904	8.6	860	8.2	7,713	71.4	6,170	57.1	1,543	14.3
2015	8,963	42.0	6,623	31.1	2,340	11.0	1,776	16.9	878	8.3	898	8.5	7,187	66.6	5,745	53.2	1,442	13.4
2014	8,599	40.3	6,314	29.6	2,285	10.7	1,771	16.8	905	8.6	866	8.2	6,828	63.3	5,409	50.2	1,419	13.2
2013	8,453	39.5	6,097	28.5	2,356	11.0	1,694	16.1	859	8.1	835	7.9	6,759	62.3	5,238	48.3	1,521	14.0
2012	8,940	41.5	6,582	30.6	2,358	11.0	1,716	16.2	874	8.3	842	8.0	7,224	65.9	5,708	52.1	1,516	13.8
2011	9,417	43.4	6,941	32.0	2,476	11.4	1,799	17.0	908	8.6	891	8.4	7,618	68.5	6,033	54.3	1,585	14.3
2010	9,595	43.8	7,115	32.5	2,480	11.3	1,729	16.3	882	8.3	847	8.0	7,866	69.6	6,233	55.1	1,633	14.4
2009	10,026	45.7	7,349	33.5	2,677	12.2	1,850	17.5	923	8.7	927	8.8	8,176	71.8	6,426	56.4	1,750	15.4
2008	10,842	49.3	8,171	37.1	2,671	12.1	1,884	17.8	995	9.4	889	8.4	8,958	78.5	7,176	62.9	1,782	15.6
2007	11,624	52.8	8,937	40.6	2,687	12.2	2,066	19.4	1,070	10.0	996	9.3	9,558	84.3	7,867	69.4	1,691	14.9
2006	11,992	54.6	9,232	42.0	2,760	12.6	2,074	19.3	1,115	10.4	959	8.9	9,918	88.5	8,117	72.4	1,801	16.1
2005	12,183	55.6	9,127	41.6	3,056	13.9	2,297	21.1	1,237	11.4	1,060	9.8	9,886	89.5	7,890	71.4	1,996	18.1
2004	12,032	55.1	9,192	42.1	2,840	13.0	2,354	21.5	1,329	12.1	1,025	9.3	9,678	89.1	7,863	72.4	1,815	16.7
2003	12,216	56.3	9,126	42.1	3,090	14.3	2,510	22.9	1,378	12.6	1,132	10.3	9,706	90.6	7,748	72.3	1,958	18.3
2002	12,340	57.3	9,348	43.4	2,992	13.9	2,496	22.9	1,352	12.4	1,144	10.5	9,844	92.6	7,996	75.2	1,848	17.4
2001	12,207	57.3	9,196	43.2	3,011	14.1	2,441	22.7	1,370	12.7	1,071	10.0	9,766	92.6	7,826	74.2	1,940	18.4
2000	12,248	58.6	9,306	44.5	2,942	14.1	2,551	24.2	1,465	13.9	1,086	10.3	9,697	93.3	7,841	75.5	1,856	17.9
1999	12,308	59.5	9,328	45.1	2,980	14.4	2,528	24.4	1,457	14.1	1,071	10.3	9,780	94.7	7,871	76.2	1,909	18.5

See footnotes at end of table.

Table A. Number and rate of total injury and noninjury deaths for children and adolescents aged 10–19 years, by age group and sex: United States, 1999–2016—Con.

[Rates are per 100,000 population; populations used for computing death rates are enumerated census counts for 2000 and 2010 and estimates as of July 1 in 1999 and 2001–2016; see Methods.]

	Total, ages 10–19 years						Total, ages 10–14 years						Total, ages 15–19 years					
	All deaths		Injury		Noninjury		All deaths		Injury		Noninjury		All deaths		Injury		Noninjury	
Injury deaths	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Female																		
2016	4,348	21.3	2,642	12.9	1,706	8.4	1,249	12.4	564	5.6	685	6.8	3,099	30.0	2,078	20.1	1,021	9.9
2015	4,232	20.7	2,443	12.0	1,789	8.8	1,233	12.2	483	4.8	750	7.4	2,999	29.1	1,960	19.0	1,039	10.1
2014	3,880	19.0	2,160	10.6	1,720	8.4	1,122	11.1	456	4.5	666	6.6	2,758	26.8	1,704	16.6	1,054	10.2
2013	3,940	19.3	2,185	10.7	1,755	8.6	1,219	12.1	486	4.8	733	7.3	2,721	26.4	1,699	16.5	1,022	9.9
2012	4,000	19.5	2,270	11.1	1,730	8.4	1,150	11.4	444	4.4	706	7.0	2,850	27.4	1,826	17.6	1,024	9.8
2011	4,127	20.0	2,341	11.3	1,786	8.7	1,151	11.4	446	4.4	705	7.0	2,976	28.3	1,895	18.0	1,081	10.3
2010	4,241	20.4	2,408	11.6	1,833	8.8	1,220	12.1	459	4.5	761	7.5	3,021	28.1	1,949	18.2	1,072	10.0
2009	4,622	22.1	2,598	12.4	2,024	9.7	1,278	12.7	472	4.7	806	8.0	3,344	30.9	2,126	19.7	1,218	11.3
2008	4,714	22.5	2,737	13.1	1,977	9.5	1,265	12.5	491	4.9	774	7.7	3,449	31.9	2,246	20.8	1,203	11.1
2007	5,111	24.5	3,122	14.9	1,989	9.5	1,370	13.5	586	5.8	784	7.7	3,741	34.9	2,536	23.6	1,205	11.2
2006	5,161	24.7	3,199	15.3	1,962	9.4	1,340	13.1	594	5.8	746	7.3	3,821	36.1	2,605	24.6	1,216	11.5
2005	5,285	25.4	3,224	15.5	2,061	9.9	1,468	14.2	640	6.2	828	8.0	3,817	36.6	2,584	24.8	1,233	11.8
2004	5,620	27.2	3,514	17.0	2,106	10.2	1,592	15.2	740	7.1	852	8.2	4,028	39.3	2,774	27.1	1,254	12.2
2003	5,435	26.5	3,252	15.8	2,183	10.6	1,546	14.8	631	6.0	915	8.8	3,889	38.6	2,621	26.0	1,268	12.6
2002	5,604	27.5	3,424	16.8	2,180	10.7	1,636	15.8	711	6.9	925	8.9	3,968	39.8	2,713	27.2	1,255	12.6
2001	5,350	26.6	3,166	15.7	2,184	10.8	1,561	15.3	678	6.6	883	8.6	3,789	38.2	2,488	25.1	1,301	13.1
2000	5,475	27.6	3,295	16.6	2,180	11.0	1,609	16.1	699	7.0	910	9.1	3,866	39.3	2,596	26.4	1,270	12.9
1999	5,591	28.5	3,405	17.4	2,186	11.1	1,593	16.2	701	7.1	892	9.1	3,998	41.0	2,704	27.7	1,294	13.3
Male–female rate ratio																		
2016	2.2	2.1	2.7	2.6	1.4	1.3	1.4	1.4	1.6	1.5	1.3	1.2	2.5	2.4	3.0	2.8	1.5	1.4
2015	2.1	2.0	2.7	2.6	1.3	1.3	1.4	1.4	1.8	1.7	1.2	1.1	2.4	2.3	2.9	2.8	1.4	1.3
2014	2.2	2.1	2.9	2.8	1.3	1.3	1.6	1.5	2.0	1.9	1.3	1.2	2.5	2.4	3.2	3.0	1.3	1.3
2013	2.1	2.0	2.8	2.7	1.3	1.3	1.4	1.3	1.8	1.7	1.1	1.1	2.5	2.4	3.1	2.9	1.5	1.4
2012	2.2	2.1	2.9	2.8	1.4	1.3	1.5	1.4	2.0	1.9	1.2	1.1	2.5	2.4	3.1	3.0	1.5	1.4
2011	2.3	2.2	3.0	2.8	1.4	1.3	1.6	1.5	2.0	2.0	1.3	1.2	2.6	2.4	3.2	3.0	1.5	1.4
2010	2.3	2.1	3.0	2.8	1.4	1.3	1.4	1.3	1.9	1.8	1.1	1.1	2.6	2.5	3.2	3.0	1.5	1.4
2009	2.2	2.1	2.8	2.7	1.3	1.3	1.4	1.4	2.0	1.9	1.2	1.1	2.4	2.3	3.0	2.9	1.4	1.4
2008	2.3	2.2	3.0	2.8	1.4	1.3	1.5	1.4	2.0	1.9	1.1	1.1	2.6	2.5	3.2	3.0	1.5	1.4
2007	2.3	2.2	2.9	2.7	1.4	1.3	1.5	1.4	1.8	1.7	1.3	1.2	2.6	2.4	3.1	2.9	1.4	1.3
2006	2.3	2.2	2.9	2.7	1.4	1.3	1.5	1.5	1.9	1.8	1.3	1.2	2.6	2.5	3.1	2.9	1.5	1.4
2005	2.3	2.2	2.8	2.7	1.5	1.4	1.6	1.5	1.9	1.8	1.3	1.2	2.6	2.4	3.1	2.9	1.6	1.5
2004	2.1	2.0	2.6	2.5	1.3	1.3	1.5	1.4	1.8	1.7	1.2	1.1	2.4	2.3	2.8	2.7	1.4	1.4
2003	2.2	2.1	2.8	2.7	1.4	1.3	1.6	1.5	2.2	2.1	1.2	1.2	2.5	2.3	3.0	2.8	1.5	1.5
2002	2.2	2.1	2.7	2.6	1.4	1.3	1.5	1.4	1.9	1.8	1.2	1.2	2.5	2.3	2.9	2.8	1.5	1.4
2001	2.3	2.2	2.9	2.8	1.4	1.3	1.6	1.5	2.0	1.9	1.2	1.2	2.6	2.4	3.1	3.0	1.5	1.4
2000	2.2	2.1	2.8	2.7	1.3	1.3	1.6	1.5	2.1	2.0	1.2	1.1	2.5	2.4	3.0	2.9	1.5	1.4
1999	2.2	2.1	2.7	2.6	1.4	1.3	1.6	1.5	2.1	2.0	1.2	1.1	2.4	2.3	2.9	2.8	1.5	1.4

NOTES: Injury deaths are identified with underlying cause-of-death codes *U01–*U03, V01–Y36, Y85–Y87, and Y89 from the *International Statistical Classification of Diseases and Related Health Problems Tenth Revision,* (ICD 10). Noninjury codes are all other ICD–10 codes.

SOURCE: NCHS, National Vital Statistics System, Mortality.

For males aged 10–19 years, the homicide rate decreased by one-third between 1999 (9.2) and 2014 (6.2) before increasing between 2014 and 2016 (7.7). The homicide rate for females aged 10–19 years declined by one-half between 1999 (2.2) and 2013 (1.1) before reversing and increasing between 2013 and 2016 (1.6). During the period, the male homicide rate was about four to six times higher than the female rate as shown in the male-to-female rate ratio, which was 4.8 in 2016.

For males aged 10–19 years, the suicide rate declined between 1999 (7.4) and 2007 (6.1), but then reversed and increased by 44% between 2007 and 2016 (8.8). For females aged 10–19 years, the suicide rate remained relatively stable from 1999–2010 and then increased by 70% between 2010 (2.0) and 2016 (3.4). In 1999, the male-to-female rate ratio for suicide was 4.6, but then fluctuated and generally declined to 2.6 in 2016, as the percent increases were greater for females than males over the period.

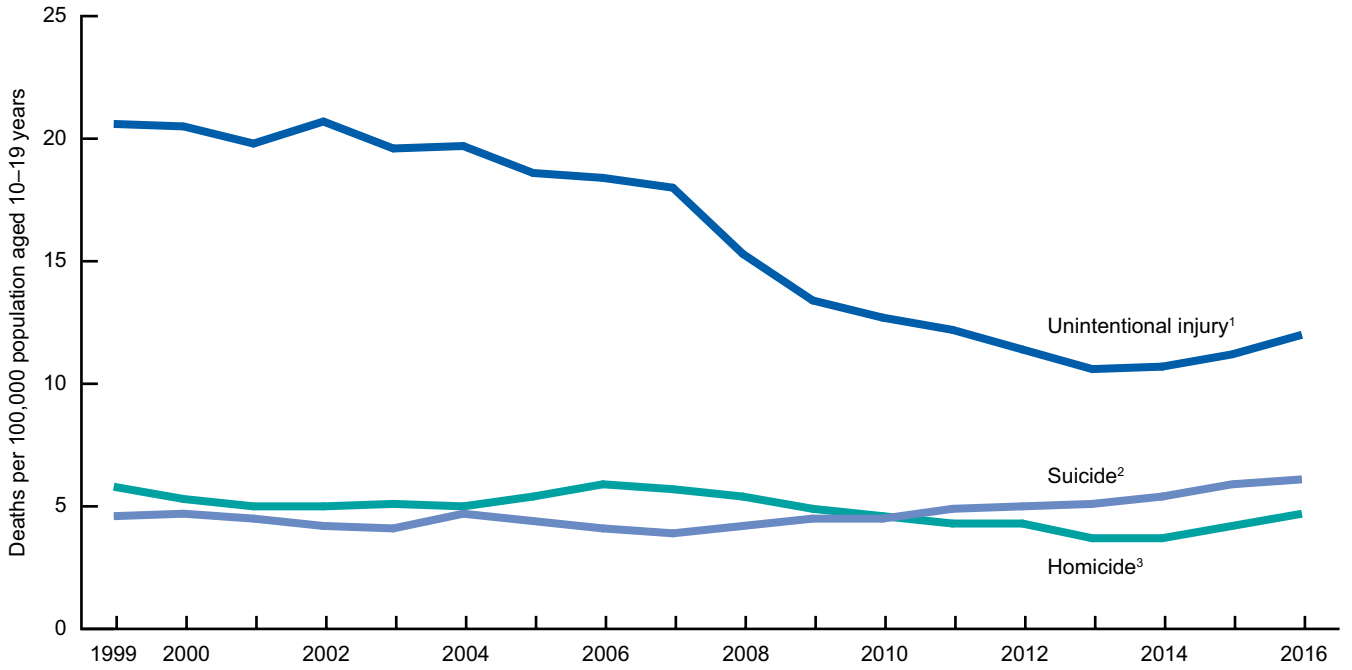
Injury deaths and death rates by intent and leading methods

Methods for unintentional injury

The three leading methods of unintentional injury deaths during the 1999–2016 period were motor vehicle traffic (MVT), drowning, and poisoning. These three methods accounted for 85% of all unintentional injury deaths in 2016 (Table 1).

The leading unintentional injury death was related to MVT during 1999–2016 (Table 2 and Figure 3). These deaths numbered 3,082 in 2016, and were down 48% from 5,982 in 1999 but higher than the recent low number in 2013 of 2,752. The MVT death rate was reduced by more than one-half (55%) between 1999 (14.8) and 2013 (6.6), with the pace of the decline greater for 2007–2013 than for 1999–2007. The MVT death rate then increased 12% between 2013 and 2016 (7.4). Despite the recent upturn, the 2016 rate was still one-half of the rate in 1999. Males and females had similar percentage declines in MVT death rates between 1999 and 2013–2014 (approximately 50%), followed by increases through 2016 (12% increase for males between the recent low point in 2013 [8.3] and 2016 [9.3]); and a 20% increase for females between the recent low point in 2014 [4.5] and 2016 [5.4]). The male-to-female rate ratio ranged from 1.7 to 2.0 during the period and was 1.7 in 2016.

Drownings were the second leading unintentional injury death for children and adolescents aged 10–19 years in 1999, numbering 536 deaths, but these deaths declined and dropped below unintentional poisonings for 2002–2016. The death rate due to drowning declined over the period, from 1.3 in 1999 to 0.9 in 2016, and was less than the rate for unintentional poisonings from 2003–2016. Both males and females aged 10–19 years experienced declines in drowning death rates over the period—male rates declined 39% (from 2.3 in 1999 to 1.4 in 2016; female rates generally declined, from 0.4 to 0.3). The male-to-female rate ratio for drowning death rates ranged between 4.7 and 8.5 over the period, and was 4.7 in 2016.



[1]Significant decreasing trend from 1999–2013 and significant increasing trend from 2013–2016, $p < 0.05$.
[2]Significant decreasing trend from 1999–2007 and significant increasing trend from 2007–2016, $p < 0.05$.
[3]Significant decreasing trend from 1999–2001, significant increasing trend from 2001–2007, significant decreasing trend from 2007–2014, and significant increasing trend from 2014–2016, $p < 0.05$.
NOTES: Unintentional injury deaths are identified with *International Classification of Diseases, Tenth Revision* (ICD–10) codes V01–X59 and Y85–Y86; suicide codes *U03, X60–X84, and Y87.0; and homicide codes *U01–*U02, X85–Y09, and Y87.1.
SOURCE: NCHS, National Vital Statistics System, Mortality.

Figure 2. Injury death rates for children and adolescents aged 10–19 years, by intent: United States, 1999–2016

The death rate for unintentional poisoning exceeded unintentional drowning from 2003–2016 (Figure 3). The unintentional poisoning death rate tripled between 1999 (0.7) and 2007 (2.1). The rate then dropped down to 1.4 in 2014 before increasing to 1.9 in 2016. For males, the rate more than tripled between 1999 (1.0) and 2007 (3.1), declined between 2008 (3.1) and 2014 (1.9), and then increased to 2.7 in 2016. The rate for females aged 10–19 more than doubled between 1999 (0.4) and 2007 (1.1) but then was generally stable through 2016 (1.1). During the 1999–2016 period, the male-to-female rate ratio varied between 2.1 and 3.4, and was 2.5 in 2016.

MVT deaths were the leading method of unintentional death in 2016 for males and females aged 10–14 years and 15–19 years (Table 2). Rates were highest for males aged 15–19 years (16.0) and lowest for females aged 10–14 years (1.9). For males and females aged 10–14 years, drownings were the second most leading method of unintentional injury death, with the male number (73) and rate (0.7) more than double that for females (30, 0.3). For males and females aged 15–19 years, poisonings were the second most frequent method of unintentional injury death, followed by drownings. While the poisoning deaths for males aged 15–19 years more than doubled those of their female counterparts (551 compared with 220), drowning deaths numbered 10 times higher for males than females (231 compared with 22).

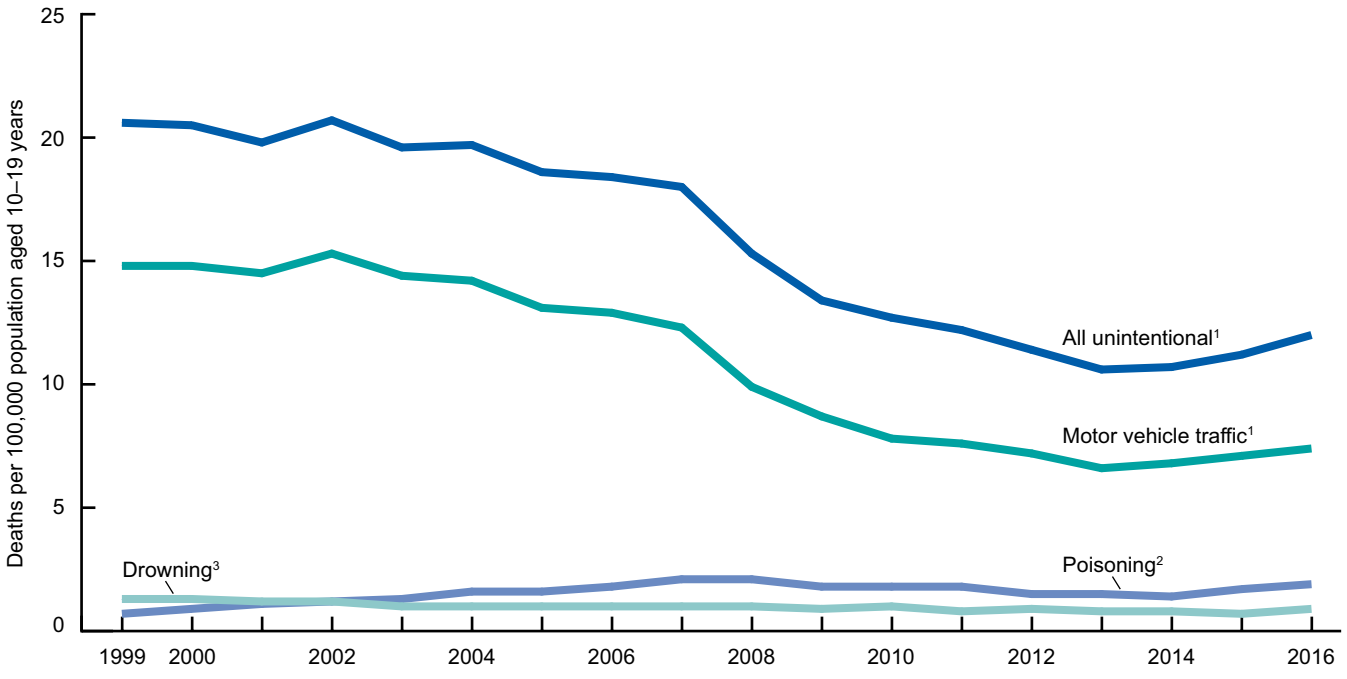
Methods for homicide

The three leading methods of homicide in 2016 were firearms, cut/pierce, and unspecified method. These three methods accounted for 96% of all homicide deaths among children and adolescents aged 10–19 years (Table 1).

Firearms were the leading method of homicide for persons aged 10–19 years during 1999–2016, accounting for 87% of all homicides in 2016 (Table 1). The firearm-homicide death rate declined and then rose during 1999–2007, dropped 33% from 2007 (4.8) to 2014 (3.2), and then increased 28% to 4.1 in 2016 (Figure 4). Cut/pierce was the second leading method of homicide for persons aged 10–19 years. The rate for homicide involving cut/pierce increased between 1999 (0.4) and 2008 (0.5) and then declined through 2016 (0.3). Homicides with information on the method missing (method unspecified) was the third leading method. Homicide rates with method unspecified was stable from 1999 through 2010 and then declined from 2010 (0.2) through 2016 (0.1). Firearms were the leading method of homicide for both males and females aged 10–14 and 15–19 years (Table 2).

Methods for suicide

The three leading methods of suicide in 2016 were suffocation, firearms, and poisoning, accounting for more than 9 in 10 (92%) of all suicide deaths (Table 1). Suicide involving



[1]Significant decreasing trend from 1999–2013; significant increasing trend from 2013–2016, $p < 0.05$.
[2]Significant increasing trend from 1999–2007; significant decreasing trend from 2007–2014; significant increasing trend from 2014–2016, $p < 0.05$.
[3]Significant decreasing trend from 1999–2016, $p < 0.05$.
NOTES: Unintentional injury deaths are identified with *International Classification of Diseases, Tenth Revision* (ICD–10) codes V01–X59 and Y85–Y86; unintentional motor vehicle traffic injuries with codes V02–V04 [.1,.9], V09.2, V12–V14 [.3–.9], V19 [.4–.6], V20–V28 [.3–.9], V29–V79 [.4–.9], V80 [.3–.5], V81.1, V82.1, V83–V86 [.0–.3], V87[.0–.8], and V89.2; unintentional drownings with codes W65–W74; and unintentional poisonings with codes X40–X49.
SOURCE: NCHS, National Vital Statistics System, Mortality.

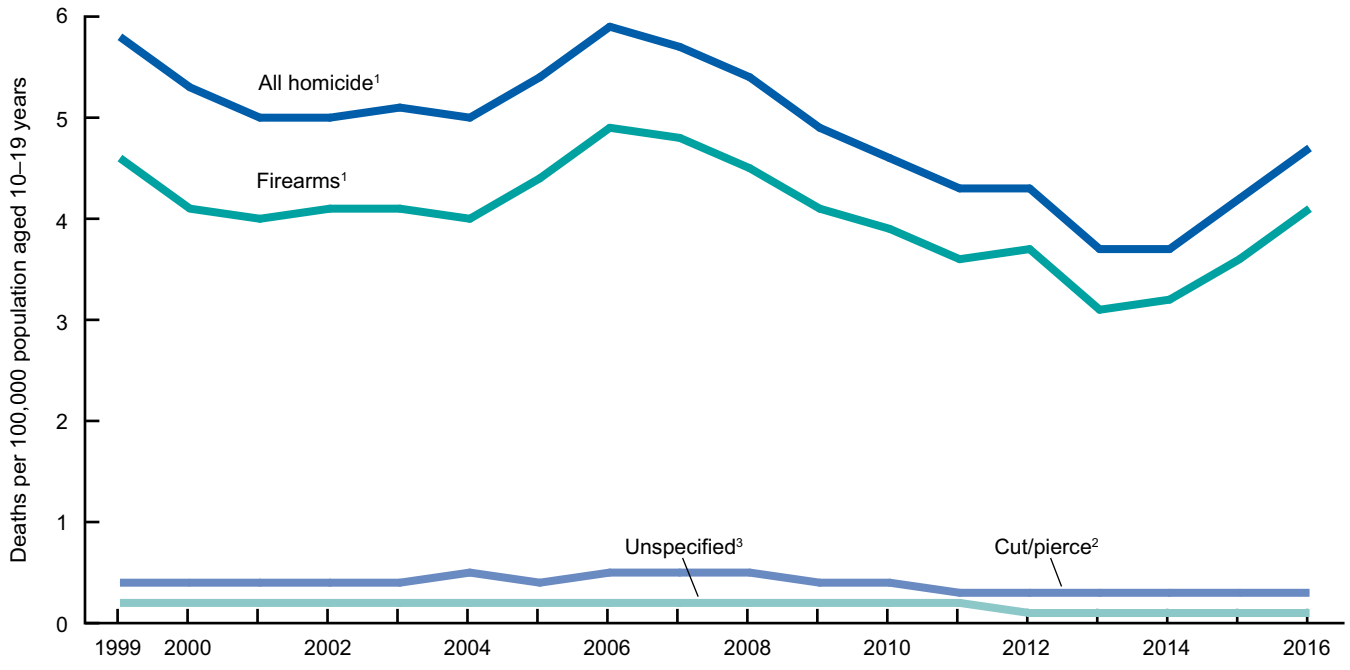
Figure 3. Unintentional injury death rates for children and adolescents aged 10–19 years for leading methods: United States, 1999–2016

suffocation was the leading method among children and adolescents aged 10–19 years in 2016, slightly outnumbering suicide involving firearms (1,103 and 1,102, respectively). Suicide rates in 2016 were the same for suffocation and firearms at 2.6 each. This was a change from the beginning of the period, in 1999, when both the number and rate of suicide involving firearms was nearly twice that of suffocation. The firearm-suicide rate generally declined from 1999 (2.7) through 2008 (1.7) but then increased from 2008 to 2016 (2.6), such that it nearly returned to its 1999 level (Figure 5). The suicide rate due to suffocation fluctuated and generally increased during 1999–2016 and was 86% higher in 2016 (2.6) than in 1999 (1.4). The third leading method of suicide death for aged 10–19 years in 2016 was poisoning, whose rate gradually increased over the period, from 0.3 in 1999 to 0.4 in 2016. Firearms were the leading suicide method for males aged 10–19 years in 2016, whereas suffocation was the leading method for females. Suicide male-to-female rate ratios in 2016 for adolescents aged 10–19 years were higher for suicide by firearm (5.5) than by suffocation (1.8). The number and rate of suicide deaths by poisoning was higher for females aged 10–19 years (95, 0.5) than for males (59, 0.3), yielding a male-to-female rate ratio of 0.6.

Suffocation was the leading suicide method for both males and females aged 10–14 years, followed by firearms (Table 2). Firearms were the leading suicide method for males aged 15–19 years, while suffocation was the leading method for females aged 15–19 years. The male-to-female rate ratio for ages 15–19 years was higher for firearm-suicides (5.8) than for suffocation (2.2). Poisoning was the third leading suicide method for both males and females aged 15–19 years, with the number and rate for females (78, 0.8) higher than for males (59, 0.5).

Comparisons across intents and leading methods of unintentional injury

Figure 6 presents death rates for 2016 for leading methods of unintentional injury (MVT, drownings, and poisonings), compared with suicide and homicide (all methods combined). For children and adolescents aged 10–19 years, the rate in 2016 for MVT deaths (7.4 per 100,000 population) was higher than the rate for suicide (6.1) and homicide (4.7). The death rate due to unintentional poisoning (1.9) was more than twice that of unintentional drowning (0.9). For persons aged 10–14 years, the MVT death rate was not statistically different than that of suicide (2.2 compared with 2.1). MVT and suicide death rates for ages 10–14 years were three times that of homicide (0.7) and four times that of drowning (0.5). There were too few (less than 20) unintentional poisoning deaths for aged 10–14 years to calculate a reliable rate. The death rate for MVT for persons aged 15–19 years (12.4) was higher than the rate for suicide (10.0) and homicide (8.6). The death rate for unintentional poisoning (3.6) was three times that of unintentional drowning (1.2).



[1]Significant decreasing trend from 1999–2001; significantly increasing trend from 2001–2007; significant decreasing trend from 2007–2014; significantly increasing trend from 2014–2016, $p < 0.05$.
[2]Significant increasing trend from 1999–2008; significant decreasing trend from 2008–2016, $p < 0.05$.
[3]Stable trend from 1999–2010; significantly decreasing trend from 2010–2016, $p < 0.05$.
NOTES: Homicide deaths are identified with *International Classification of Diseases, Tenth Revision* (ICD–10) codes *U01–*U02, X85–Y09, and Y87.1; homicides involving firearms with codes *U01.4, X93–X95; homicides involving cutting/piercing with ICD–10 code X99; and unspecified homicides with codes *U01.9 and Y09.
SOURCE: NCHS, National Vital Statistics System, Mortality.

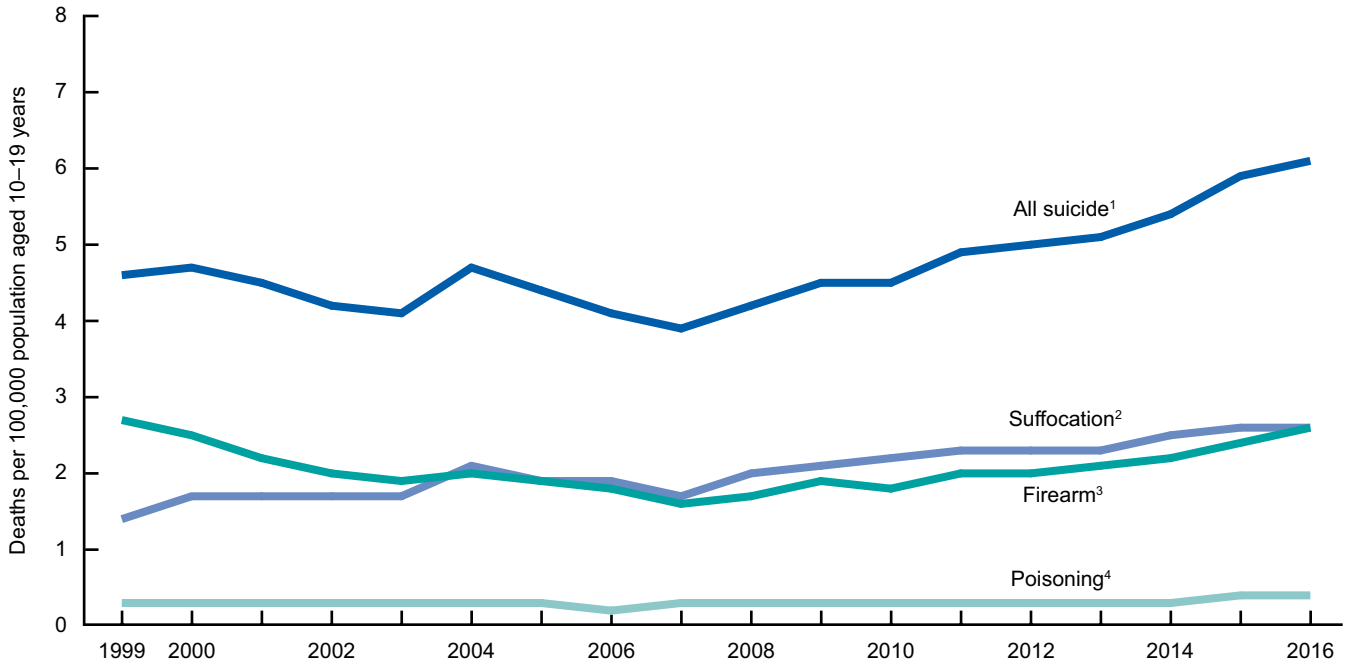
Figure 4. Homicide death rates for children and adolescents aged 10–19 years for leading methods: United States, 1999–2016

Discussion

There was an overall decline in the total death rate for children and adolescents aged 10–19 years during the 1999–2013 period, but then a reversal in this trend started in 2013, with rates increasing through 2016. The recent rise in the overall rate is attributable to a rise in injury deaths for persons aged 10–19 years whereas, noninjury deaths (including causes such as cancer and heart disease) were relatively stable from 2013–2016. All three leading intents of injury deaths (unintentional, suicide, homicide) contributed to the recent increase in total and injury deaths: Numbers and rates of unintentional injury and homicide began to increase in 2013–2014, after years of decline, whereas the reversal of the decreasing trend in suicide rates began earlier, in 2007.

Unintentional injury deaths were the leading injury intent for ages 10–19 years during 1999–2016, with MVT deaths as the leading method of unintentional injury. The MVT death rate declined from 1999–2013, with sharper declines during 2007–2013 than during 1999–2007. While the general decline in MVT deaths rates has been associated with multi-pronged prevention efforts as well as reduced driving among older adolescents (2,8), the sharp drop beginning in 2007 has also been associated with the economic recession in the United States (9). Although the death rate for MVT in 2016 was one-half of the 1999 rate, it represents a 12% increase since 2013, the recent low point. In 2016, MVT deaths rates were higher than suicide or homicide rates for adolescents aged 15–19 years. For aged 10–14 years, MVT and suicide death rates in 2016 were not significantly different. Drowning deaths had been the second leading method of unintentional injury deaths for persons aged 10–19 years in 1999, but were replaced by poisonings beginning in 2002. For children and adolescents aged 10–14 years, drownings remained the second leading method of injury death, as most of the poisoning deaths were for older adolescents aged 15–19 years and were drug overdoses, primarily due to opioids (including heroin) (10).

Suicide for persons aged 10–19 years initially declined from 1999–2007 and then rose by 56% between 2007 and 2016. The male-to-female suicide rate ratio narrowed over the period as the recent percentage increases were greater for females than males. The recent rise in suicide rates among those aged 10–19 years is consistent with recent data on emergency department visits for nonfatal, self-harm requiring treatment, which has been shown to be a precursor to suicidal behavior (11). The suicide rates for persons aged 10–19 years due to suffocation (including hangings) and firearms were equal in 2016, a change from 1999 when the firearm-suicide death rate was nearly twice that of suffocation. The death rate for suffocation-suicide increased nearly steadily over the period, whereas the rate for firearm-suicide declined from 1999–2008 but increased from 2008–2016, back to nearly its 1999 level. In 2016, suffocation was the leading suicide method for both males and females



[1]Significant decreasing trend from 1999–2007; significant increasing trend from 2007–2016, $p < 0.05$.
[2]Significant increasing trend from 1999–2016, $p < 0.05$.
[3]Significant decreasing trend from 1999–2008; significant increasing trend from 2008–2016, $p < 0.05$.
[4]Significant increasing trend from 1999–2016, $p < 0.05$.
NOTES: Suicide deaths are identified with *International Classification of Diseases, Tenth Revision* (ICD–10) codes *U03, X60-X84, and Y87.0; suicide deaths involving firearms with codes X72–X74; suicide deaths involving suffocation with code X70; and suicide involving poisoning with codes X60–X69.
SOURCE: NCHS, National Vital Statistics System, Mortality.

Figure 5. Suicide death rates for children and adolescents aged 10–19 years for leading methods: United States, 1999–2016

aged 10–14 years and for females aged 15–19 years, whereas firearms were the leading method for males aged 15–19 years.

Homicide rates for persons aged 10–19 years declined by about one-third during 2007–2014 and then reversed and increased through 2016. The homicide rate for both males and females followed this pattern of decline, followed by recent increases, although the male rate was more than four times the female rate throughout the period. Firearms were the leading method of homicide, accounting for almost 9 in 10 deaths, and the firearm-homicide rate increased by about one-quarter between 2014 and 2016.

The findings in this report are subject to some limitations. Suicide is believed to be underreported in general, and this may be particularly relevant for suicide involving drug overdoses (12,13). There is also considerable variation by geographic area in the threshold of evidence that medical examiners require to rule a death a suicide.

Although progress was made in reducing injury deaths among children and adolescents aged 10–19 years during 1999–2013, the recent upturn shows that persistent as well as emerging challenges remain. While deaths were reduced from some of the longstanding and leading causes of injury death, namely MVT deaths and homicide, these trends have reversed recently and further reductions will require renewed focus and effort. These results also document the increases in poisoning deaths (i.e., primarily opioid drug overdoses) and suicide in this young population, which may inform public health prevention efforts.

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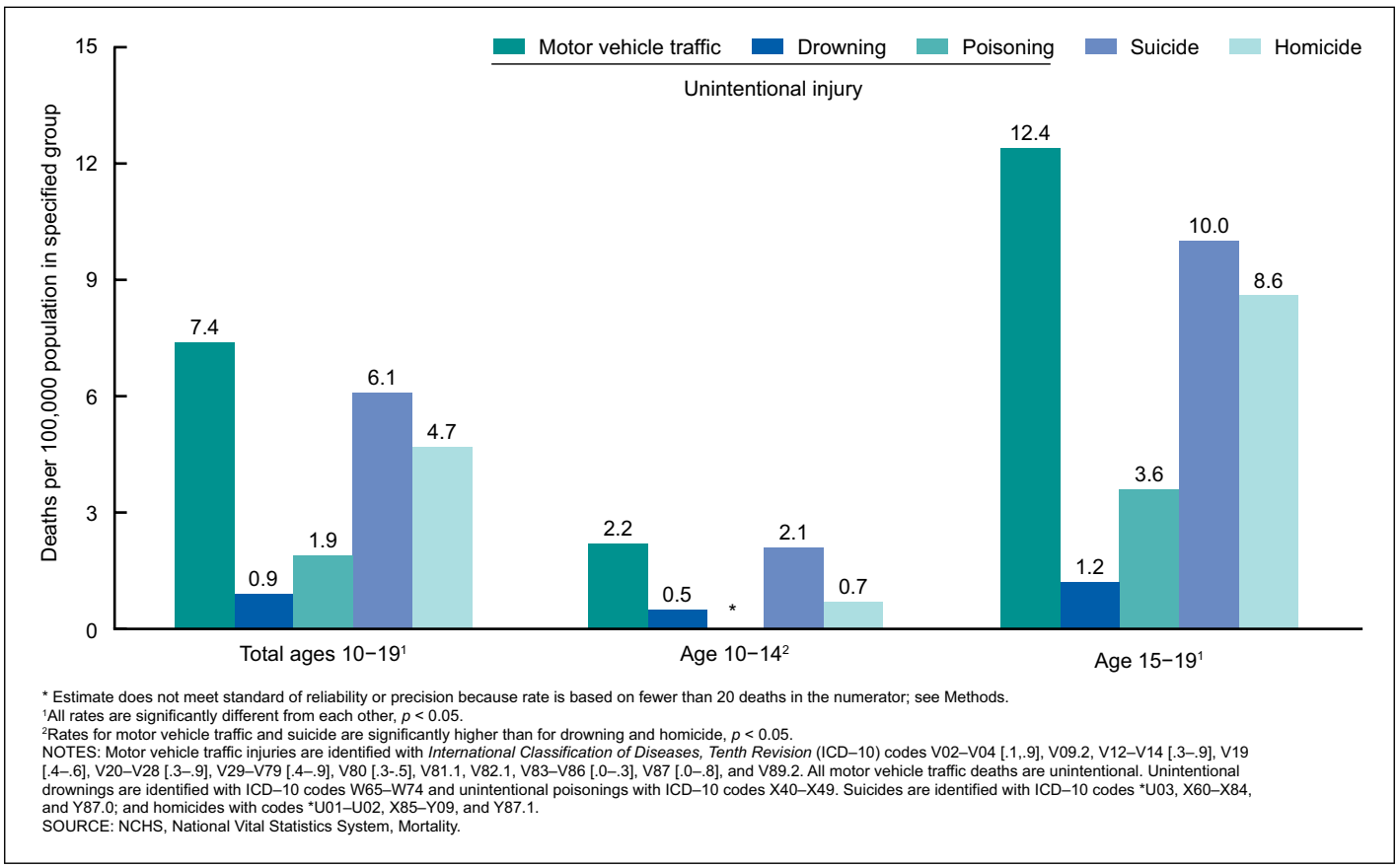

* Estimate does not meet standard of reliability or precision because rate is based on fewer than 20 deaths in the numerator; see Methods.
[1]All rates are significantly different from each other, $p < 0.05$.
[2]Rates for motor vehicle traffic and suicide are significantly higher than for drowning and homicide, $p < 0.05$.
NOTES: Motor vehicle traffic injuries are identified with *International Classification of Diseases, Tenth Revision* (ICD–10) codes V02–V04 [.1,.9], V09.2, V12–V14 [.3–.9], V19 [.4–.6], V20–V28 [.3–.9], V29–V79 [.4–.9], V80 [.3-.5], V81.1, V82.1, V83–V86 [.0–.3], V87 [.0–.8], and V89.2. All motor vehicle traffic deaths are unintentional. Unintentional drownings are identified with ICD–10 codes W65–W74 and unintentional poisonings with ICD–10 codes X40–X49. Suicides are identified with ICD–10 codes *U03, X60–X84, and Y87.0; and homicides with codes *U01–U02, X85–Y09, and Y87.1.
SOURCE: NCHS, National Vital Statistics System, Mortality.

Figure 6. Selected injury death rates by intent and leading methods of unintentional injury for children and adolescents aged 10–19 years, by age group: United States, 1999–2016

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List of Detailed Tables

Table 1. Number and rate of injury deaths, and male–female injury rate ratios by intent, for three leading methods for children and adolescents aged 10–19 years, by age group and sex: United States, 1999–2016

[Rates are per 100,000 population; populations used for computing death rates are enumerated census counts for 2000 and estimates as of July 1 in 1999 and 2001–2016; see Methods.]

			Unintentional								Homicide								Suicide							
	All injury		Total		MVT		Drowning		Poisoning		Total		Firearms		Cut/pierce		Unspecified		Total		Firearms		Suffocation		Poisoning	
Sex and year	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Total, ages 10–19																										
2016	9,716	23.3	4,999	12.0	3,082	7.4	356	0.9	799	1.9	1,963	4.7	1,706	4.1	123	0.3	51	0.1	2,553	6.1	1,102	2.6	1,103	2.6	154	0.4
2015	9,066	21.7	4,682	11.2	2,947	7.1	312	0.7	712	1.7	1,745	4.2	1,518	3.6	107	0.3	45	0.1	2,470	5.9	1,016	2.4	1,081	2.6	171	0.4
2014	8,474	20.3	4,474	10.7	2,834	6.8	350	0.8	589	1.4	1,562	3.7	1,354	3.2	116	0.3	33	0.1	2,262	5.4	932	2.2	1,049	2.5	134	0.3
2013	8,282	19.8	4,427	10.6	2,752	6.6	334	0.8	608	1.5	1,559	3.7	1,311	3.1	122	0.3	36	0.1	2,134	5.1	876	2.1	981	2.3	122	0.3
2012	8,852	21.1	4,802	11.4	3,040	7.2	372	0.9	632	1.5	1,787	4.3	1,547	3.7	127	0.3	42	0.1	2,088	5.0	860	2.0	982	2.3	108	0.3
2011	9,282	21.9	5,172	12.2	3,236	7.6	352	0.8	774	1.8	1,834	4.3	1,541	3.6	143	0.3	69	0.2	2,084	4.9	849	2.0	974	2.3	114	0.3
2010	9,523	22.3	5,422	12.7	3,347	7.8	418	1.0	784	1.8	1,982	4.6	1,661	3.9	163	0.4	82	0.2	1,926	4.5	748	1.8	920	2.2	121	0.3
2009	9,947	23.2	5,723	13.4	3,733	8.7	369	0.9	752	1.8	2,105	4.9	1,736	4.1	176	0.4	84	0.2	1,928	4.5	800	1.9	901	2.1	110	0.3
2008	10,908	25.4	6,565	15.3	4,243	9.9	410	1.0	889	2.1	2,302	5.4	1,928	4.5	195	0.5	76	0.2	1,819	4.2	748	1.7	854	2.0	115	0.3
2007	12,059	28.1	7,722	18.0	5,289	12.3	419	1.0	907	2.1	2,437	5.7	2,051	4.8	200	0.5	82	0.2	1,661	3.9	683	1.6	736	1.7	132	0.3
2006	12,431	29.0	7,873	18.4	5,517	12.9	426	1.0	778	1.8	2,532	5.9	2,115	4.9	220	0.5	82	0.2	1,771	4.1	763	1.8	795	1.9	90	0.2
2005	12,351	28.9	7,959	18.6	5,592	13.1	442	1.0	671	1.6	2,296	5.4	1,885	4.4	188	0.4	78	0.2	1,883	4.4	822	1.9	816	1.9	124	0.3
2004	12,706	29.9	8,365	19.7	6,035	14.2	442	1.0	690	1.6	2,139	5.0	1,717	4.0	193	0.5	84	0.2	1,983	4.7	846	2.0	879	2.1	140	0.3
2003	12,378	29.3	8,277	19.6	6,080	14.4	422	1.0	563	1.3	2,140	5.1	1,726	4.1	183	0.4	76	0.2	1,731	4.1	809	1.9	720	1.7	112	0.3
2002	12,772	30.5	8,679	20.7	6,396	15.3	482	1.2	514	1.2	2,108	5.0	1,717	4.1	160	0.4	79	0.2	1,773	4.2	828	2.0	704	1.7	129	0.3
2001	12,362	29.8	8,199	19.8	5,990	14.5	487	1.2	438	1.1	2,088	5.0	1,646	4.0	181	0.4	82	0.2	1,883	4.5	928	2.2	714	1.7	127	0.3
2000	12,601	30.9	8,343	20.5	6,041	14.8	545	1.3	379	0.9	2,145	5.3	1,686	4.1	176	0.4	87	0.2	1,921	4.7	1,007	2.5	682	1.7	126	0.3
1999	12,733	31.6	8,320	20.6	5,982	14.8	536	1.3	288	0.7	2,339	5.8	1,871	4.6	179	0.4	87	0.2	1,857	4.6	1,078	2.7	559	1.4	109	0.3
Male, ages 10–19																										
2016	7,074	33.2	3,429	16.1	1,986	9.3	304	1.4	566	2.7	1,633	7.7	1,463	6.9	100	0.5	27	0.1	1,866	8.8	938	4.4	722	3.4	59	0.3
2015	6,623	31.1	3,233	15.2	1,937	9.1	263	1.2	483	2.3	1,482	7.0	1,325	6.2	88	0.4	30	0.1	1,788	8.4	872	4.1	702	3.3	79	0.4
2014	6,314	29.6	3,189	14.9	1,915	9.0	314	1.5	415	1.9	1,315	6.2	1,177	5.5	92	0.4	21	0.1	1,682	7.9	813	3.8	715	3.4	61	0.3
2013	6,097	28.5	3,054	14.3	1,784	8.3	285	1.3	433	2.0	1,333	6.2	1,170	5.5	97	0.5	22	0.1	1,595	7.5	764	3.6	653	3.1	66	0.3
2012	6,582	30.6	3,339	15.5	1,968	9.1	317	1.5	471	2.2	1,509	7.0	1,358	6.3	98	0.5	22	0.1	1,593	7.4	749	3.5	687	3.2	62	0.3
2011	6,941	32.0	3,616	16.7	2,133	9.8	305	1.4	573	2.6	1,548	7.1	1,342	6.2	111	0.5	51	0.2	1,629	7.5	754	3.5	700	3.2	66	0.3
2010	7,115	32.5	3,773	17.2	2,185	10.0	366	1.7	578	2.6	1,685	7.7	1,468	6.7	126	0.6	55	0.3	1,503	6.9	669	3.1	653	3.0	71	0.3
2009	7,349	33.5	3,932	17.9	2,382	10.8	321	1.5	565	2.6	1,782	8.1	1,536	7.0	135	0.6	54	0.2	1,496	6.8	708	3.2	636	2.9	62	0.3
2008	8,171	37.1	4,624	21.0	2,796	12.7	346	1.6	692	3.1	1,942	8.8	1,689	7.7	155	0.7	51	0.2	1,433	6.5	681	3.1	614	2.8	58	0.3
2007	8,937	40.6	5,316	24.2	3,445	15.7	352	1.6	685	3.1	2,076	9.4	1,812	8.2	164	0.7	54	0.2	1,349	6.1	617	2.8	562	2.6	83	0.4
2006	9,232	42.0	5,464	24.9	3,609	16.4	371	1.7	600	2.7	2,158	9.8	1,886	8.6	171	0.8	52	0.2	1,413	6.4	691	3.1	584	2.7	47	0.2
2005	9,127	41.6	5,511	25.1	3,646	16.6	386	1.8	508	2.3	1,951	8.9	1,688	7.7	138	0.6	55	0.3	1,505	6.9	730	3.3	603	2.8	72	0.3
2004	9,192	42.1	5,723	26.2	3,897	17.9	383	1.8	521	2.4	1,769	8.1	1,506	6.9	144	0.7	52	0.2	1,530	7.0	738	3.4	635	2.9	70	0.3
2003	9,126	42.1	5,718	26.4	3,988	18.4	371	1.7	425	2.0	1,822	8.4	1,543	7.1	146	0.7	47	0.2	1,410	6.5	721	3.3	564	2.6	63	0.3
2002	9,348	43.4	5,974	27.8	4,191	19.5	406	1.9	384	1.8	1,737	8.1	1,485	6.9	124	0.6	49	0.2	1,476	6.9	736	3.4	573	2.7	75	0.3
2001	9,196	43.2	5,739	27.0	4,002	18.8	412	1.9	327	1.5	1,750	8.2	1,467	6.9	141	0.7	50	0.2	1,552	7.3	812	3.8	583	2.7	68	0.3
2000	9,306	44.5	5,794	27.7	3,984	19.1	469	2.2	288	1.4	1,763	8.4	1,491	7.1	124	0.6	56	0.3	1,589	7.6	883	4.2	549	2.6	78	0.4
1999	9,328	45.1	5,701	27.6	3,857	18.7	466	2.3	214	1.0	1,903	9.2	1,616	7.8	131	0.6	55	0.3	1,539	7.4	947	4.6	450	2.2	59	0.3
Female, ages 10–19																										
2016	2,642	12.9	1,570	7.7	1,096	5.4	52	0.3	233	1.1	330	1.6	243	1.2	23	0.1	24	0.1	687	3.4	164	0.8	381	1.9	95	0.5
2015	2,443	12.0	1,449	7.1	1,010	4.9	49	0.2	229	1.1	263	1.3	193	0.9	19	*	15	*	682	3.3	144	0.7	379	1.9	92	0.5
2014	2,160	10.6	1,285	6.3	919	4.5	36	0.2	174	0.9	247	1.2	177	0.9	24	0.1	12	*	580	2.8	119	0.6	334	1.6	73	0.4

See footnotes at end of table.

Table 1. Number and rate of injury deaths, and male–female injury rate ratios by intent, for three leading methods for children and adolescents aged 10–19 years, by age group and sex: United States, 1999–2016—Con.

[Rates are per 100,000 population; populations used for computing death rates are enumerated census counts for 2000 and estimates as of July 1 in 1999 and 2001–2016; see Methods.]

			Unintentional								Homicide								Suicide							
	All injury		Total		MVT		Drowning		Poisoning		Total		Firearms		Cut/pierce		Unspecified		Total		Firearms		Suffocation		Poisoning	
Sex and year	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Female, ages 10–19—Con.																										
2013	2,185	10.7	1,373	6.7	968	4.7	49	0.2	175	0.9	226	1.1	141	0.7	25	0.1	14	*	539	2.6	112	0.5	328	1.6	56	0.3
2012	2,270	11.1	1,463	7.1	1,072	5.2	55	0.3	161	0.8	278	1.4	189	0.9	29	0.1	20	0.1	495	2.4	111	0.5	295	1.4	46	0.2
2011	2,341	11.3	1,556	7.5	1,103	5.3	47	0.2	201	1.0	286	1.4	199	1.0	32	0.2	18	*	455	2.2	95	0.5	274	1.3	48	0.2
2010	2,408	11.6	1,649	7.9	1,162	5.6	52	0.2	206	1.0	297	1.4	193	0.9	37	0.2	27	0.1	423	2.0	79	0.4	267	1.3	50	0.2
2009	2,598	12.4	1,791	8.6	1,351	6.5	48	0.2	187	0.9	323	1.5	200	1.0	41	0.2	30	0.1	432	2.1	92	0.4	265	1.3	48	0.2
2008	2,737	13.1	1,941	9.3	1,447	6.9	64	0.3	197	0.9	360	1.7	239	1.1	40	0.2	25	0.1	386	1.8	67	0.3	240	1.1	57	0.3
2007	3,122	14.9	2,406	11.5	1,844	8.8	67	0.3	222	1.1	361	1.7	239	1.1	36	0.2	28	0.1	312	1.5	66	0.3	174	0.8	49	0.2
2006	3,199	15.3	2,409	11.5	1,908	9.1	55	0.3	178	0.9	374	1.8	229	1.1	49	0.2	30	0.1	358	1.7	72	0.3	211	1.0	43	0.2
2005	3,224	15.5	2,448	11.8	1,946	9.4	56	0.3	163	0.8	345	1.7	197	0.9	50	0.2	23	0.1	378	1.8	92	0.4	213	1.0	52	0.3
2004	3,514	17.0	2,642	12.8	2,138	10.3	59	0.3	169	0.8	370	1.8	211	1.0	49	0.2	32	0.2	453	2.2	108	0.5	244	1.2	70	0.3
2003	3,252	15.8	2,559	12.5	2,092	10.2	51	0.2	138	0.7	318	1.5	183	0.9	37	0.2	29	0.1	321	1.6	88	0.4	156	0.8	49	0.2
2002	3,424	16.8	2,705	13.3	2,205	10.8	76	0.4	130	0.6	371	1.8	232	1.1	36	0.2	30	0.1	297	1.5	92	0.5	131	0.6	54	0.3
2001	3,166	15.7	2,460	12.2	1,988	9.9	75	0.4	111	0.6	338	1.7	179	0.9	40	0.2	32	0.2	331	1.6	116	0.6	131	0.7	59	0.3
2000	3,295	16.6	2,549	12.8	2,057	10.4	76	0.4	91	0.5	382	1.9	195	1.0	52	0.3	31	0.2	332	1.7	124	0.6	133	0.7	48	0.2
1999	3,405	17.4	2,619	13.4	2,125	10.8	70	0.4	74	0.4	436	2.2	255	1.3	48	0.2	32	0.2	318	1.6	131	0.7	109	0.6	50	0.3
Male–female rate ratio																										
2016	2.7	2.6	2.2	2.1	1.8	1.7	5.8	4.7	2.4	2.5	4.9	4.8	6.0	5.8	4.3	5.0	1.1	1.0	2.7	2.6	5.7	5.5	1.9	1.8	0.6	0.6
2015	2.7	2.6	2.2	2.1	1.9	1.9	5.4	6.0	2.1	2.1	5.6	5.4	6.9	6.9	4.6	*	2.0	*	2.6	2.5	6.1	5.9	1.9	1.7	0.9	0.8
2014	2.9	2.8	2.5	2.4	2.1	2.0	8.7	7.5	2.4	2.1	5.3	5.2	6.6	6.1	3.8	4.0	1.8	*	2.9	2.8	6.8	6.3	2.1	2.1	0.8	0.8
2013	2.8	2.7	2.2	2.1	1.8	1.8	5.8	6.5	2.5	2.2	5.9	5.6	8.3	7.9	3.9	5.0	1.6	*	3.0	2.9	6.8	7.2	2.0	1.9	1.2	1.0
2012	2.9	2.8	2.3	2.2	1.8	1.8	5.8	5.0	2.9	2.8	5.4	5.0	7.2	7.0	3.4	5.0	1.1	1.0	3.2	3.1	6.7	7.0	2.3	2.3	1.3	1.5
2011	3.0	2.8	2.3	2.2	1.9	1.8	6.5	7.0	2.9	2.6	5.4	5.1	6.7	6.2	3.5	2.5	2.8	*	3.6	3.4	7.9	7.0	2.6	2.5	1.4	1.5
2010	3.0	2.8	2.3	2.2	1.9	1.8	7.0	8.5	2.8	2.6	5.7	5.5	7.6	7.4	3.4	3.0	2.0	3.0	3.6	3.5	8.5	7.8	2.4	2.3	1.4	1.5
2009	2.8	2.7	2.2	2.1	1.8	1.7	6.7	7.5	3.0	2.9	5.5	5.4	7.7	7.0	3.3	3.0	1.8	2.0	3.5	3.2	7.7	8.0	2.4	2.2	1.3	1.5
2008	3.0	2.8	2.4	2.3	1.9	1.8	5.4	5.3	3.5	3.4	5.4	5.2	7.1	7.0	3.9	3.5	2.0	2.0	3.7	3.6	10.2	10.3	2.6	2.5	1.0	1.0
2007	2.9	2.7	2.2	2.1	1.9	1.8	5.3	5.3	3.1	2.8	5.8	5.5	7.6	7.5	4.6	3.5	1.9	2.0	4.3	4.1	9.3	9.3	3.2	3.3	1.7	2.0
2006	2.9	2.7	2.3	2.2	1.9	1.8	6.7	5.7	3.4	3.0	5.8	5.4	8.2	7.8	3.5	4.0	1.7	2.0	3.9	3.8	9.6	10.3	2.8	2.7	1.1	1.0
2005	2.8	2.7	2.3	2.1	1.9	1.8	6.9	6.0	3.1	2.9	5.7	5.2	8.6	8.6	2.8	3.0	2.4	3.0	4.0	3.8	7.9	8.3	2.8	2.8	1.4	1.0
2004	2.6	2.5	2.2	2.0	1.8	1.7	6.5	6.0	3.1	3.0	4.8	4.5	7.1	6.9	2.9	3.5	1.6	1.0	3.4	3.2	6.8	6.8	2.6	2.4	1.0	1.0
2003	2.8	2.7	2.2	2.1	1.9	1.8	7.3	8.5	3.1	2.9	5.7	5.6	8.4	7.9	3.9	3.5	1.6	2.0	4.4	4.1	8.2	8.3	3.6	3.3	1.3	1.5
2002	2.7	2.6	2.2	2.1	1.9	1.8	5.3	4.8	3.0	3.0	4.7	4.5	6.4	6.3	3.4	3.0	1.6	2.0	5.0	4.6	8.0	6.8	4.4	4.5	1.4	1.0
2001	2.9	2.8	2.3	2.2	2.0	1.9	5.5	4.8	2.9	2.5	5.2	4.8	8.2	7.7	3.5	3.5	1.6	1.0	4.7	4.6	7.0	6.3	4.5	3.9	1.2	1.0
2000	2.8	2.7	2.3	2.2	1.9	1.8	6.2	5.5	3.2	2.8	4.6	4.4	7.6	7.1	2.4	2.0	1.8	1.5	4.8	4.5	7.1	7.0	4.1	3.7	1.6	2.0
1999	2.7	2.6	2.2	2.1	1.8	1.7	6.7	5.8	2.9	2.5	4.4	4.2	6.3	6.0	2.7	3.0	1.7	1.5	4.8	4.6	7.2	6.6	4.1	3.7	1.2	1.0

* Estimate does not meet standard of reliability or precision because rate is based on fewer than 20 deaths in the numerator; see Methods. For male–female rate ratios, one or both rates were not available due to fewer than 20 deaths in the numerator.

NOTES: A specific method of injury was presented if it was one of the top three leading methods based on the number in 2016. Unintentional injury deaths are those with *International Classification of Diseases, Tenth Revision* (ICD–10) underlying cause-of-death codes V01–X59 and Y85–Y86; motor vehicle traffic codes (MVT) V02–V04[.1,.9], V09.2,V12–V14[.3–.9],V19[.4–.6], V20–V28[.3–.9], V29–V79[.4–.9], V80[.3–.5], V81.1, V82.1, V83–V86[.0–.3], V87[.0–.8],and V89.2; poisoning codes X40–X49; and drowning codes W65–W74. Suicide deaths are those with ICD 10 underlying cause-of-death codes *U03, X60–X84, and Y87.0; suffocation code X70; firearms code X72–X74; and poisoning codes X60–X69. Homicide deaths are those with ICD 10 underlying cause-of-death codes *U01–*U02, X85–Y09, and Y87.1; firearm codes *U01.4, X93–X95; cut/pierce code X99; and unspecified codes *U01.9, Y09.

SOURCE: NCHS, National Vital Statistics System, Mortality.

Table 2. Number and rate of injury deaths and male–female injury rate ratios by intent, for three leading methods for children and adolescents aged 10–19 years, by age group and sex: United States, 2016

[Totals for selected causes of death differ from those shown in other tables that utilize standard mortality tabulation lists, see Technical Notes. Rates are per 100,000 population, see Methods. Populations used for computing death rates are postcensal estimates estimated as of July 1, 2016, see Methods. For explanation of asterisks preceding cause-of-death codes, see Methods.]

Selected intent and method of death								
Total			Male			Female			Male–female rate ratio
	Number	Rate		Number	Rate		Number	Rate	Ratio
Total, ages 10–19 years									
Unintentional	4,999	12.0	Unintentional	3,429	16.1	Unintentional	1,570	7.7	Unintentional 2.1
Motor vehicle traffic	3,082	7.4	Motor vehicle traffic	1,986	9.3	Motor vehicle traffic	1,096	5.4	Motor vehicle traffic 1.7
Poisoning	799	1.9	Poisoning	566	2.7	Poisoning	233	1.1	Poisoning 2.5
Drowning	356	0.9	Drowning	304	1.4	Drowning	52	0.3	Drowning 4.7
Homicide	1,963	4.7	Homicide	1,633	7.7	Homicide	330	1.6	Homicide 4.8
Firearms	1,706	4.1	Firearms	1,463	6.9	Firearms	243	1.2	Firearms 5.8
Cut/pierce	123	0.3	Cut/pierce	100	0.5	Unspecified	24	0.1	Cut/pierce 5.0
Unspecified	51	0.1	Unspecified	27	0.1	Cut/pierce	23	0.1	Unspecified 1.0
Suicide	2,553	6.1	Suicide	1,866	8.8	Suicide	687	3.4	Suicide 2.6
Suffocation	1,103	2.6	Firearms	938	4.4	Suffocation	381	1.9	Suffocation 1.8
Firearms	1,102	2.6	Suffocation	722	3.4	Firearms	164	0.8	Firearms 5.5
Poisoning	154	0.4	Poisoning	59	0.3	Poisoning	95	0.5	Poisoning 0.6
Ages 10–14 years									
Unintentional	847	4.1	Unintentional	521	5.0	Unintentional	326	3.2	Unintentional 1.6
Motor vehicle traffic	455	2.2	Motor vehicle traffic	260	2.5	Motor vehicle traffic	195	1.9	Motor vehicle traffic 1.3
Drowning	103	0.5	Drowning	73	0.7	Drowning	30	0.3	Drowning 2.3
Other land transport	64	0.3	Other land transport	44	0.4	Fire/flame	23	0.2	Other land transport ...
Suicide	436	2.1	Suicide	265	2.5	Suicide	171	1.7	Suicide 1.5
Suffocation	247	1.2	Suffocation	128	1.2	Suffocation	119	1.2	Suffocation 1.0
Firearms	160	0.8	Firearms	126	1.2	Firearms	34	0.3	Firearms 4.0
Poisoning	17	*	Fall	5	*	Poisoning	17	*	Poisoning *
			Other specified, classifiable injury	5	*				
Homicide	147	0.7	Homicide	90	0.9	Homicide	57	0.6	Homicide 1.5
Firearms	95	0.5	Firearms	65	0.6	Firearms	30	0.3	Firearms 2.0
Cut/pierce	16	*	Cut/pierce	10	*	Cut/pierce	6	*	Cut/pierce *
Other specified, not elsewhere classified	10	*	Other specified, not elsewhere classified	6	*	Unspecified	6	*	Other specified, not elsewhere classified ...
Ages 15–19 years									
Unintentional	4,152	19.6	Unintentional	2,908	26.9	Unintentional	1,244	12.0	Unintentional 2.2
Motor vehicle traffic	2,627	12.4	Motor vehicle traffic	1,726	16.0	Motor vehicle traffic	901	8.7	Motor vehicle traffic 1.8
Poisoning	771	3.6	Poisoning	551	5.1	Poisoning	220	2.1	Poisoning 2.4
Drowning	253	1.2	Drowning	231	2.1	Drowning	22	0.2	Drowning 10.5
Homicide	1,816	8.6	Homicide	1,543	14.3	Homicide	273	2.6	Homicide 5.5
Firearms	1,611	7.6	Firearms	1,398	12.9	Firearms	213	2.1	Firearms 6.1
Cut/pierce	107	0.5	Cut/pierce	90	0.8	Unspecified	18	*	Cut/pierce *
Unspecified	43	0.2	Unspecified	25	0.2	Cut/pierce	17	*	Unspecified *
Suicide	2,117	10.0	Suicide	1,601	14.8	Suicide	516	5.1	Suicide 2.9
Firearms	942	4.5	Firearms	812	7.5	Suffocation	262	2.5	Firearms 5.8
Suffocation	856	4.1	Suffocation	594	5.5	Firearms	130	1.3	Suffocation 2.2
Poisoning	137	0.6	Poisoning	59	0.5	Poisoning	78	0.8	Poisoning 0.6

... Category not applicable.
* Estimate does not meet standard of reliability or precision because rate is based on fewer than 20 deaths in the numerator; see Methods.

NOTES: A specific method of injury was presented if it was one of the top three leading methods in 2016 based on the number. A male–female rate ratio was computed if the method was one of the three leading causes for both males and females. Unintentional injury deaths are those with *International Classification of Diseases, Tenth Revision* (ICD–10) underlying cause-of-death codes V01–X59 and Y85–Y86; motor vehicle traffic codes V02–V04[.1, .9], V09.2, V12–V14[.3–.9], V19[.4–.6], V20–V28[.3–.9], V29–V79[.4–.9], V80[.3–.5], V81.1, V82.1, V83–V86[.0–.3], V87[.0–.8], and V89.2; poisoning codes X40–X49; drowning codes W65–W74; other land transport codes V20–V28[.0–.2], V29–V79[.0–.3], V80[.0–.2,.6–.9], V81–V82[.0,.2–.9], V83-V86[.4–.9], V87.9, V88[.0–.9], and V89[.0,.1,.3,.9]. Suicide deaths are those with ICD–10 underlying cause-of-death codes *U03, X60–X84, and Y87.0; suffocation code X70; firearms code X72–X74; and poisoning codes X60–X69. Homicide deaths are those with ICD–10 underlying cause-of-death codes *U01–*U02, X85–Y09, and Y87.1; firearm codes *U01.4 and X93–X95; cut/pierce code X99; other specified, not elsewhere classified codes *U01.8,*U02, Y08, and Y87.1; and unspecified code *U01.9 and Y09.

SOURCE: NCHS, National Vital Statistics System, Mortality.

Technical Notes

Data

Mortality statistics in this report are based on death-certificate information filed in the 50 states and the District of Columbia and processed by the National Center for Health Statistics (NCHS) through the Vital Statistics Cooperative Program. This report includes data for states using either the 1989 or 2003 revision of the U.S. Standard Certificate of Death during 1999–2016. In 2003, only five jurisdictions had implemented the 2003 revision of the death certificate, but by 2016, 49 states and the District of Columbia had made the transition (4). Although there are differences in wording and format across revisions for a few items, the items presented in this report are largely comparable, thus data from both groups of states are combined. More than 99% of deaths occurring in the United States are represented in the vital statistics data (4). Only deaths occurring to U.S. residents are included in this report.

Cause-of-death

Causes of death are classified according to the *International Classification of Diseases, Tenth Revision* (ICD–10) (5). Cause-of-death statistics presented are based on the underlying cause-of-death. The underlying cause is "the disease or injury which initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury" (5). The manner of death delineates the circumstances under which the death occurred, including intent, and is classified as natural, accident (unintentional injury), suicide, homicide, or undetermined. Both cause and manner of death are reflected in the coding of underlying cause-of-death (5).

Injury data in this report are presented using the external cause-of-injury mortality matrix for ICD–10. A detailed description of the categorization of injury deaths is available elsewhere (14). Injury deaths are organized principally by intent, and then secondarily by method. Injury deaths are identified with ICD–10 codes *U01–*U03, V01–Y36, Y85–Y87, and Y89. About 2% (173 deaths) of all injury deaths in 2016 had an undetermined intent, while 0.3% (28 deaths) were due to legal intervention/war. When the method of injury has missing information, these are classified as unspecified method. Particularly relevant to this report is that suicide deaths may be underreported in vital statistics, especially in the context of drug poisonings (12,13).

Rates and significance tests

Death rates for each year were calculated as the number of deaths per 100,000 population residing in the United States or in the specified state and the District of Columbia. Bridged-race estimates of the U.S. resident population were used to compute death rates in this report. For 1999, the populations are July 1 intercensal estimates; for 2001–2009 they are July 1 intercensal estimates; for 2011–2016 they are July 1 postcensal estimates based on the 2010 U.S. Census; and for 2000 and 2010, they are April 1 census counts (15–19).

Comparisons made in the text among rates, unless otherwise specified, are statistically significant at the 0.05 level of significance. Tests of statistical significance are described elsewhere (4,6). The mortality data presented in this report are not subject to sampling error. However, mortality data based on complete counts may be affected by random variation—that is, the number of deaths that actually occurred may be considered as one of a large series of possible results that could have arisen under the same circumstances (4,6). When there are fewer than 100 deaths, random variation tends to be relatively large. When there are 100 deaths or more, a normal approximation is used in calculating statistical tests. Most of the comparisons in this report are based on death rates where the number of deaths is greater than 100, and thus the normal distribution and the z test statistic were used to compute statistical significance. Rates are not computed if the number of deaths is fewer than 20, below which they are considered to be statistically unreliable for presentation (4). Trends shown in Figures 1–5 were evaluated using the Joinpoint Regression Program (7). The default setting of detecting up to three joinpoints during the 1999–2016 period was used.

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