TDS3401 Data Visualization
Project:
Creating Interactive Visualizations

Project Report

Project Title:
A Visualization of Death Rates for Major Death Causes in United States for 2016

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1.0 Interactive Visualization Application

The final interactive visualization application which the team has built for this project is in a form of html page developed using HTML, Javascript as well as the D3 library. The application has been developed with the aim to visualize the dataset the group has chosen and proposed in the proposal of this project, “Deaths: Final Data for 2016” as an article of National Vital Statistics Reports, Volume 67, Number 5; published on the 26th of July 2018. The visualization has given emphasis of interactivity between different forms of visualization as given by the project guidelines as one of the goals. The interactive visualization application is composed of 4 different forms of visualization or charts designed to provide unique perspectives towards the target dataset. The 4 different charts include a heatmap, a map visualization, a bar chart and lastly a pie chart with a table legend. The visualizations used in the application as well as the interactivity techniques applied on them will be further clarified below.

1.1 Heatmap with Color-scale

As described in the proposal of the team for this project, the team used a heatmap with color-scale as a form of visualization for the display of different rates for each of the 7 major death causes in US for each of the 56 territories or states of the United States of America. A sequential color scale is applied to provide a visual reference for different rate of death from low to high. In the visualization application, a green color scale is applied. A darker shade of green implies a relatively high rate as well as a lighter shade of green representing a relatively low rate. The applied color scale consists of 6 colors and the thresholds of these 6 shades of green are 10, 50, 100, 150, 200 and 250 age-adjusted deaths per 100,000 population respectively. The final design for the heatmap is as in Figure 1.0 and Figure 1.1.

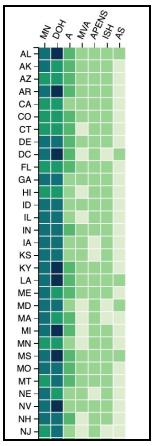

Figure 1.0

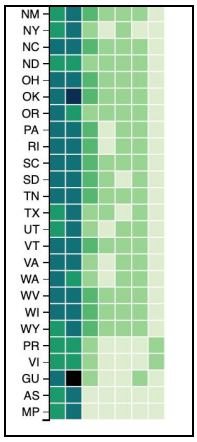

Figure 1.1

The reason for using a heatmap with color scale as a form of visualization in the visualization application is due to the fact that a heatmap with a fixed color scale can easily visualize the difference between rates by comparing multiple dimensions. For example, on the y-axis, there is the 56 different territories or states of the United States, for each of the areas, comparison between rates of the 7 major death cause can be done for each areas by comparing the shades. Whereas on the x-axis where the 7 major death causes in US sit on, comparison of death rates between all 56 areas can be done for each of the 7 death causes. These comparisons are possible due to the fact that the color scale is based on a fixed threshold.

1.2 Map Visualization

In accordance with the proposal submitted by the team for this project, a map visualization is included in the visualization application. The map visualization consists of a US map only including all 50 states but not the rest of the 6 territories of US which are included in the target dataset due to technical issue of adding the rest of the territory's geographical map into the visualization. Although the map visualization might seem to provide similar data visualization as the heatmap, a map visualization does also provide geographical position of each states instead of a plain list of areas or states. A drop down menu is also added for this visualization to provide some interactivity. The drop down menu contains the 7 major causes of death in US, upon selecting one of the options, the map visualization will change its color scale according to the selected cause of death. In addition, a tooltip feature is also added to the visualization. Upon having the cursor hovering on top of any states on the map visualization, a tooltip box will appear showing the age-adjusted death rate per 100,000 population for all 7 major death causes for the particular selected state. The color scale used to show the difference of age-adjusted death rate for each state is a sequential red color scale from dark red to light red representing high to low rate. The color scale does not have a fixed threshold but a dynamic scale for each of the 7 major death causes in the way that the color scale adjusts itself according to the minimum rate and maximum rate of death for the selected cause of death. The map visualization is as shown in Figure 1.2 and FIgure 1.3.

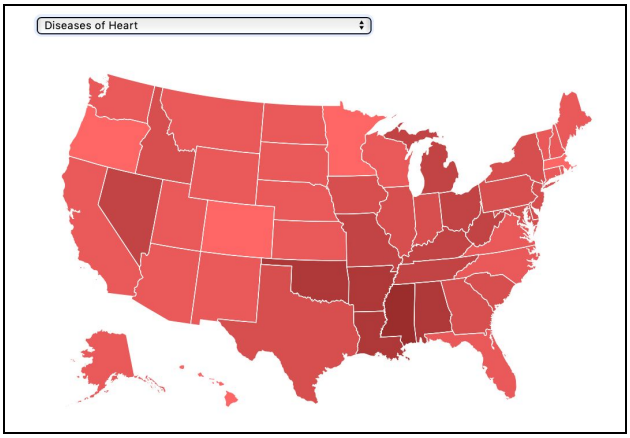

Figure 1.2

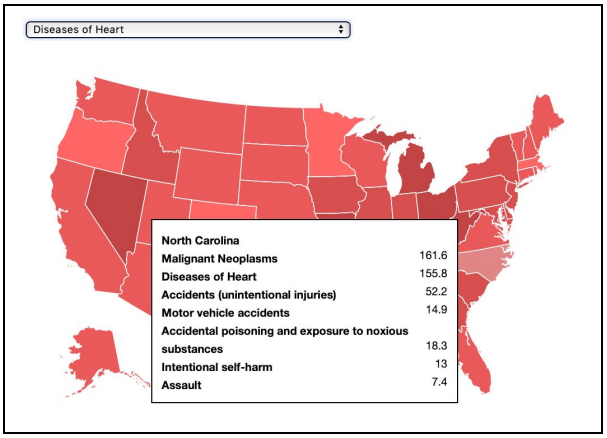

Figure 1.3

1.3 Bar chart and Pie chart

As proposed in the proposal submitted by the team for this project, a bar chart visualization has been added into the interactive visualization application. The last visualization that has been proposed in the proposal was a boxplot chart which will be showing where does the death rates of each of the 7 major causes of death stands statistically for each areas or states. But in the actual designing process of the visualization, the team realized that the number of points that needed to be incorporated into each of the boxplots are 56 points as there are 56 different areas in US including 50 states and 6 other territories. This arises a problem where there are too many dots on the spine of each boxplots let alone the adding the name of the areas or states beside all 56 dots. Hence, the team decided to use a pie chart with a table legend to replace the boxplot visualization. The reason behind choosing a pie chart visualization with a table legend is due to the fact that it can be designed to interact with the bar chart that can maximize the interactivity of different visualization for different perspective as well as dimensions.

In the default representation, the bar chart will visualize the sum of age-adjusted death rates for all 7 major death causes for each of the 56 US areas, y-axis representing the death rate and the x-axis holding the 56 different areas. Whereas for the pie chart, it will be visualizing the average age-adjusted death rate of each of the 7 major death causes for all of US with the table legend displaying the value of the death rate as well as the weightage of the average death rates of each death causes in the 7 major death causes. Other than the default representation of both of the charts, when the cursor hovers on top of any of the 56 bars representing the 56 US areas, the area that the bar represents will be highlighted and the the pie chart will display the weightages of the age-adjusted death rates of each of the 7 major death causes for that area. The table legend will

also update the table values accordingly to the area highlighted. In the other hand, when the cursor hovers on top of any of the 7 major death causes within the pie chart, the bar chart will adjusts itself to visualize the age-adjusted death rates for each of the 56 US areas for that highlighted death cause. This form of interactive visualization with the bar chart and pie chart can easily provide the straight forward visual comparison of the death rate differences between 56 US areas for any of the 7 major death causes as well as the death rate differences between the 7 major death causes for any of the 56 US areas, that are more detailed and clearer than what can be provided by the visualization of heatmap and map. The interactive visualization for the pie chart and bar chart are as shown in Figure 1.4 and Figure 1.5.

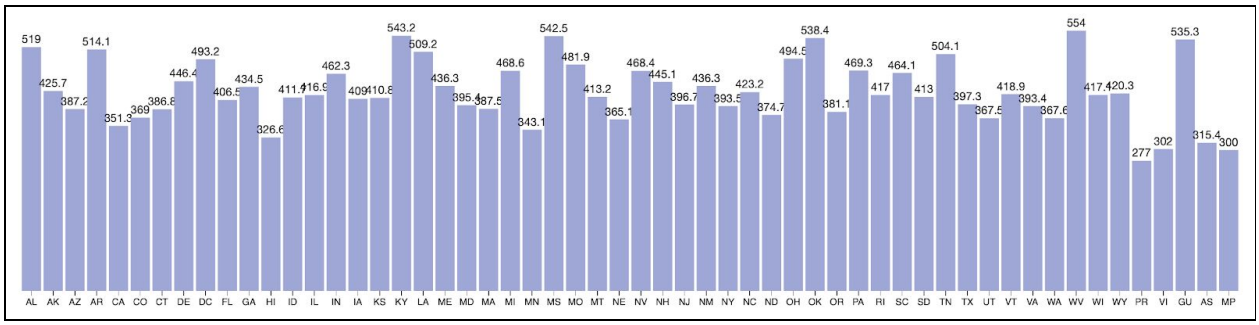

Figure 1.4

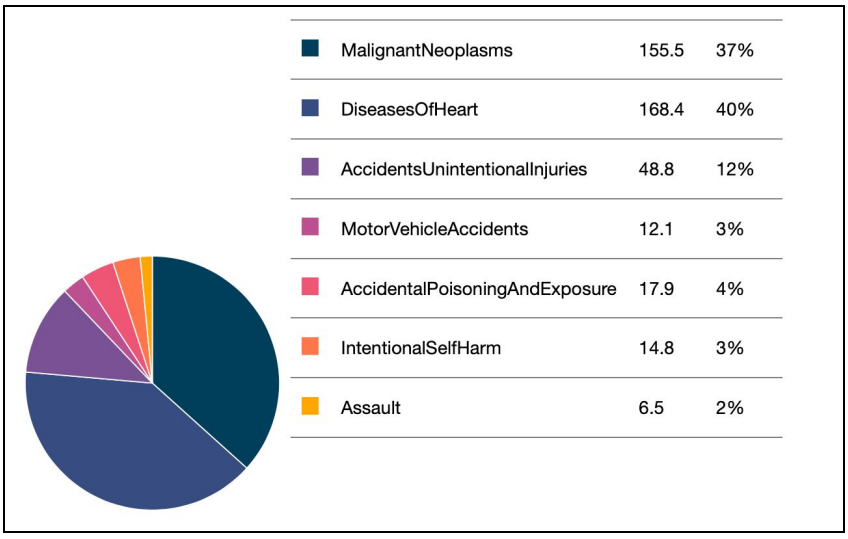

Figure 1.5

All 4 visualizations are combined together to create a dashboard for the target dataset, as a interactive visualization application. Figure 1.6 shows the final design of the dashboard containing all the visualizations mentioned above.

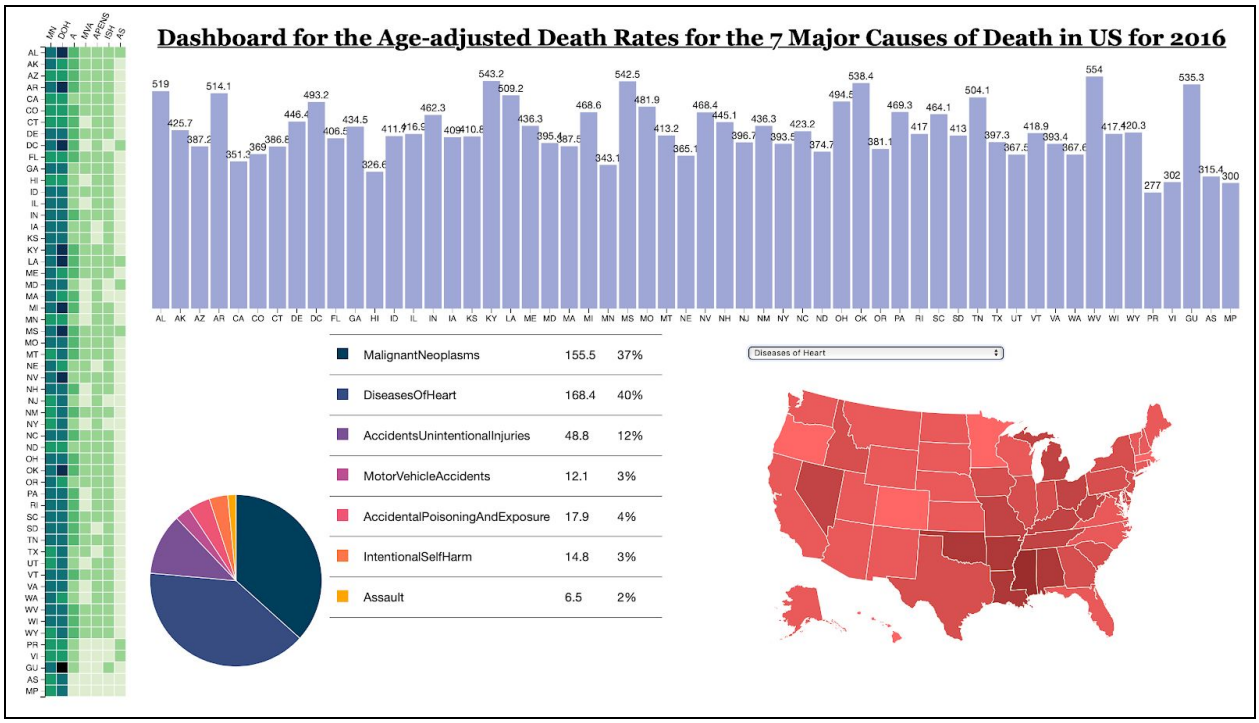

Figure 1.6

2.0 The Development Process

The workload of developing process of the visualization as well as the interactive visualization application has been split among the 2 members of the team. As the team leader, Samuel Wong was in charge of the two of the 4 visualizations, which are the bar chart and the pie chart. Wayile Jialade was responsible for the rest of the two visualizations which are the heatmap and the map visualization. Lastly, it is a combinational effort to combine all of the visualizations into one dashboard.

For all 4 of the visualizations including the heatmap, map, pie chart and the bar chart visualizations are completed in D3 with the help of multiple references of examples of D3 codes on the Internet. The team proceeded with the development of the project by taking reference from available resources or guides with appropriate modification to the point that the desired visualization of the team were be able to be produced.

The most time-consuming aspect of the development process of the application is the data cleaning part of the process. As not all of the visualizations are reading from the same source of data due to the fact that the way each visualization reads from the data differs slightly, the team took a large portion of the development time to manually transform the raw data which is in the form of a pdf file instead of a commonly used dataset file such as tsv or csv into datasets with the desired format for further reading by different visualization codes. Overall, this interactive visualization application took around 15 to 20 man-hours to complete excluding the writing of the project report.

3.0 Dataset

The dataset which the group used in this project is the dataset provided as reference dataset in the section, National Center of Health Statistics under the Centers for Disease Control and Prevention website. The dataset is described within a document named “Deaths: Final Data for 2016” as an article of National Vital Statistics Reports, Volume 67, Number 5; published on the 26th of July 2018. The proposed dataset is one of multiple datasets that are included in the article, specifically named, “Number of deaths, death rates, and age-adjusted death rates for major causes of death: United States, each state, Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas, 2016”. The dataset mainly shows data of the number of deaths and the death rate per 100,000 population for 7 main major causes of deaths in 2016 for United States, as well as for each of the 50 states of United States, Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas. The dataset found by the team is only available in PDF form instead of in a proper dataset format such as csv or tsv. The raw data is shown below.

Table 12. Number of deaths, death rates, and age-adjusted death rates for major causes of death: United States, each state, Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas, 2016

[Rates per 100,000 population; age-adjusted rates per 100,000 U.S. standard population; see Technical Notes. Codes in parentheses after causes of death are categories of the *International Classification of Diseases, Tenth Revision* (ICD–10). The asterisks (*) preceding cause-of-death codes indicate they are not part of ICD–10; see Technical Notes]

Area	All causes			Malignant neoplasms (C00–C97)			Diseases of heart (I00–I09,I11,I13,I20–I51)			Accidents (unintentional injuries) (V01–X59,Y85–Y86)		
	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]
United States[2]	2,744,248	849.3	728.8	598,038	185.1	155.8	635,260	196.6	165.5	161,374	49.9	47.4
Alabama	52,466	1,078.8	920.4	10,419	214.2	174.0	12,832	263.9	222.5	2,755	56.6	55.5
Alaska	4,494	605.7	745.6	995	134.1	158.7	831	112.0	141.0	439	59.2	63.1
Arizona	56,645	817.3	675.8	11,876	171.3	136.8	11,957	172.5	138.9	4,010	57.9	54.2
Arkansas	31,756	1,062.7	893.2	6,612	221.3	178.8	8,090	270.7	223.7	1,604	53.7	51.8
California	262,240	668.1	616.9	59,515	151.6	139.7	61,573	156.9	143.1	13,213	33.7	32.0
Colorado	37,530	677.4	669.5	7,928	143.1	137.1	7,277	131.3	129.8	2,880	52.0	51.2
Connecticut	30,543	854.0	654.0	6,696	187.2	144.9	7,051	197.2	144.3	1,978	55.3	50.3
Delaware	8,874	932.1	746.2	2,124	223.1	170.8	1,974	207.3	163.2	516	54.2	52.4
District of Columbia	5,037	739.5	766.0	1,044	153.3	160.1	1,375	201.9	211.7	401	58.9	58.3
Florida	197,313	957.3	666.6	44,266	214.8	146.9	45,659	221.5	146.2	12,561	60.9	54.9
Georgia	81,428	789.8	800.4	17,184	166.7	160.2	18,143	176.0	179.0	4,701	45.6	45.8
Hawaii	10,913	763.9	572.0	2,401	168.1	128.7	2,488	174.2	127.0	577	40.4	35.3
Idaho	13,366	794.1	725.0	2,884	171.3	150.9	2,969	176.4	160.0	849	50.4	49.5
Illinois	107,020	836.0	724.3	24,389	190.5	163.5	25,013	195.4	165.7	5,508	43.0	41.0
Indiana	63,473	956.9	835.0	13,424	202.4	172.5	13,952	210.3	180.6	3,496	52.7	51.6
Iowa	29,538	942.3	721.1	6,432	205.2	159.8	6,937	221.3	162.8	1,608	51.3	45.8
Kansas	26,245	902.7	756.8	5,484	188.6	158.6	5,672	195.1	159.2	1,444	49.7	45.7
Kentucky	47,827	1,077.9	938.4	10,363	233.6	193.8	10,519	237.1	203.0	3,194	72.0	71.0
Louisiana	44,306	946.4	870.5	9,149	195.4	171.9	10,943	233.7	213.1	2,710	57.9	57.4
Maine	14,182	1,065.1	759.0	3,275	246.0	168.9	2,907	218.3	149.5	909	68.3	62.4
Maryland	48,824	811.5	717.6	10,911	181.4	156.5	11,390	189.3	164.3	2,271	37.7	35.7
Massachusetts	56,961	836.2	669.0	12,717	186.7	150.2	11,921	175.0	134.8	3,831	56.2	52.8
Michigan	96,231	969.3	785.4	20,870	210.2	166.4	25,304	254.9	200.6	5,313	53.5	50.5
Minnesota	43,078	780.4	648.1	9,857	178.6	148.6	7,825	141.8	114.9	2,697	48.9	43.8
Mississippi	31,741	1,062.0	948.9	6,568	219.8	187.7	7,865	263.2	233.1	1,803	60.3	59.2
Missouri	59,873	982.7	808.2	12,696	208.4	167.0	14,579	239.3	192.1	3,625	59.5	57.0
Montana	9,905	950.1	743.2	2,031	194.8	145.9	2,138	205.1	154.4	626	60.0	54.1
Nebraska	16,217	850.3	707.0	3,477	182.3	153.6	3,322	174.2	140.3	772	40.5	37.0
Nevada	23,902	813.0	762.6	5,214	177.3	157.3	6,457	219.6	205.9	1,395	47.4	46.0
New Hampshire	12,203	914.2	721.5	2,875	215.4	164.1	2,631	197.1	151.1	924	69.2	66.6
New Jersey	73,155	817.9	668.5	16,377	183.1	149.7	18,597	207.9	164.7	3,839	42.9	40.8
New Mexico	18,365	882.5	753.4	3,560	171.1	138.8	3,800	182.6	150.6	1,487	71.5	69.5
New York	154,358	781.7	640.7	35,368	179.1	147.5	44,076	223.2	177.8	7,354	37.2	34.2
North Carolina	90,465	891.6	782.4	19,523	192.4	161.6	18,266	180.0	155.8	5,476	54.0	52.2
North Dakota	6,242	823.5	688.4	1,253	165.3	142.7	1,338	176.5	140.9	371	48.9	45.4
Ohio	119,572	1,029.5	832.3	25,509	219.6	173.4	27,410	236.0	185.1	7,999	68.9	66.6
Oklahoma	39,276	1,001.0	888.4	8,115	206.8	177.8	10,209	260.2	228.2	2,592	66.1	64.1
Oregon	35,778	874.0	705.9	8,078	197.3	155.9	6,968	170.2	135.0	2,105	51.4	46.0
Pennsylvania	133,040	1,040.7	770.1	28,492	222.9	164.7	31,990	250.2	176.2	8,410	65.8	61.8
Rhode Island	9,735	921.5	690.1	2,171	205.5	158.0	2,256	213.6	152.4	675	63.9	56.6
South Carolina	48,130	970.1	829.8	10,356	208.7	167.7	10,195	205.5	173.8	3,012	60.7	58.9
South Dakota	7,845	906.5	719.5	1,694	195.7	156.7	1,729	199.8	153.4	505	58.4	53.4
Tennessee	67,857	1,020.2	886.3	14,450	217.3	179.9	15,429	232.0	198.8	4,238	63.7	61.1
Texas	191,966	689.0	730.6	40,195	144.3	148.5	43,772	157.1	167.7	10,536	37.8	38.6
Utah	17,913	587.1	714.7	3,125	102.4	122.4	3,636	119.2	150.0	1,211	39.7	43.8
Vermont	5,909	946.1	712.8	1,356	217.1	158.4	1,366	218.7	158.8	372	59.6	54.8
Virginia	66,473	790.2	715.5	15,027	178.6	156.1	14,124	167.9	150.7	3,710	44.1	42.4
Washington	54,769	751.5	672.0	12,594	172.8	150.9	11,161	153.1	136.1	3,221	44.2	41.4
West Virginia	22,732	1,241.4	943.3	4,659	254.4	182.2	4,767	260.3	191.0	1,705	93.1	89.7
Wisconsin	51,815	896.7	717.9	11,498	199.0	158.0	11,526	199.5	154.9	3,575	61.9	55.6
Wyoming	4,722	806.5	720.9	962	164.3	140.9	1,051	179.5	157.8	371	63.4	61.9
Puerto Rico	29,338	860.0	637.9	5,124	150.2	109.2	5,345	156.7	111.0	837	24.5	20.6
Virgin Islands	632	587.9	575.1	131	121.8	109.2	144	133.9	124.5	25	23.3	23.6
Guam	998	598.0	871.4	185	110.8	157.0	354	212.1	330.1	28	16.8	19.1
American Samoa	278	532.9	971.6	44	84.3	149.6	48	92.0	165.8	13	*	*
Northern Marianas	220	418.9	840.7	39	74.3	118.0	52	99.0	182.0	12	*	*

Table 12. Number of deaths, death rates, and age-adjusted death rates for major causes of death: United States, each state, Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas, 2016—Con.

[Rates per 100,000 population; age-adjusted rates per 100,000 U.S. standard population; see Technical Notes. Codes in parentheses after causes of death are categories of the *International Classification of Diseases, Tenth Revision* (ICD–10). The asterisks (*) preceding cause-of-death codes indicate they are not part of ICD–10; see Technical Notes]

Area	Motor vehicle accidents[3]			Accidental poisoning and exposure to noxious substances (X40–X49)			Intentional self-harm (suicide) (*U03,X60–X84,Y87.0)			Assault (homicide) (*U01–*U02,X85–Y09,Y87.1)		
	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]
United States[2]	40,327	12.5	12.1	58,335	18.1	18.2	44,965	13.9	13.5	19,362	6.0	6.2
Alabama	1,158	23.8	23.9	726	14.9	15.6	788	16.2	15.7	544	11.2	11.8
Alaska	97	13.1	12.9	129	17.4	16.9	193	26.0	25.8	54	7.3	7.3
Arizona	993	14.3	14.1	1,299	18.7	19.2	1,271	18.3	17.7	420	6.1	6.3
Arkansas	634	21.2	20.8	345	11.5	12.1	555	18.6	18.2	248	8.3	8.7
California	4,155	10.6	10.2	4,324	11.0	10.5	4,294	10.9	10.5	2,074	5.3	5.3
Colorado	635	11.5	11.1	848	15.3	15.0	1,168	21.1	20.5	235	4.2	4.3
Connecticut	305	8.5	8.1	928	25.9	26.4	397	11.1	10.1	88	2.5	2.7
Delaware	117	12.3	12.0	272	28.6	29.5	119	12.5	11.5	63	6.6	7.0
District of Columbia	34	5.0	4.8	253	37.1	36.3	40	5.9	5.2	127	18.6	16.8
Florida	3,239	15.7	15.2	4,417	21.4	22.5	3,143	15.2	14.0	1,294	6.3	6.8
Georgia	1,628	15.8	15.5	1,336	13.0	12.8	1,409	13.7	13.3	806	7.8	7.9
Hawaii	135	9.5	9.1	175	12.3	11.6	174	12.2	12.1	39	2.7	2.8
Idaho	271	16.1	16.2	189	11.2	11.8	351	20.9	21.4	30	1.8	1.9
Illinois	1,177	9.2	8.9	2,282	17.8	17.9	1,415	11.1	10.7	1,157	9.0	9.2
Indiana	846	12.8	12.4	1,412	21.3	22.2	1,034	15.6	15.4	480	7.2	7.6
Iowa	431	13.7	13.5	289	9.2	9.7	451	14.4	14.6	85	2.7	2.8
Kansas	432	14.9	14.4	272	9.4	9.7	514	17.7	17.9	147	5.1	5.3
Kentucky	874	19.7	19.2	1,356	30.6	32.2	756	17.0	16.8	302	6.8	7.2
Louisiana	835	17.8	17.8	934	20.0	20.5	677	14.5	14.2	648	13.8	14.3
Maine	176	13.2	12.8	324	24.3	26.8	226	17.0	15.9	19	*	*
Maryland	568	9.4	9.3	621	10.3	10.1	586	9.7	9.4	579	9.6	10.1
Massachusetts	464	6.8	6.3	2,185	32.1	32.5	631	9.3	8.8	137	2.0	2.1
Michigan	986	9.9	9.6	2,056	20.7	21.5	1,364	13.7	13.3	624	6.3	6.7
Minnesota	477	8.6	8.3	650	11.8	11.9	745	13.5	13.2	129	2.3	2.4
Mississippi	785	26.3	26.2	334	11.2	11.5	383	12.8	12.7	345	11.5	12.1
Missouri	1,004	16.5	16.2	1,227	20.1	21.3	1,133	18.6	18.4	570	9.4	9.9
Montana	199	19.1	18.5	102	9.8	10.1	267	25.6	25.9	42	4.0	4.3
Nebraska	216	11.3	11.2	122	6.4	6.6	246	12.9	13.1	60	3.1	3.3
Nevada	359	12.2	11.8	568	19.3	18.6	650	22.1	21.4	211	7.2	7.4
New Hampshire	132	9.9	9.2	448	33.6	36.9	244	18.3	17.2	18	*	*
New Jersey	628	7.0	6.8	2,014	22.5	22.9	687	7.7	7.2	395	4.4	4.6
New Mexico	417	20.0	20.1	501	24.1	25.4	471	22.6	22.5	185	8.9	9.4
New York	1,145	5.8	5.4	3,412	17.3	16.9	1,679	8.5	8.1	696	3.5	3.6
North Carolina	1,541	15.2	14.9	1,811	17.8	18.3	1,373	13.5	13.0	735	7.2	7.4
North Dakota	126	16.6	16.5	73	9.6	10.2	140	18.5	19.0	17	*	*
Ohio	1,324	11.4	11.0	4,156	35.8	37.7	1,707	14.7	14.2	721	6.2	6.5
Oklahoma	720	18.4	18.1	779	19.9	20.6	822	21.0	21.0	322	8.2	8.6
Oregon	525	12.8	12.2	455	11.1	10.9	772	18.9	17.8	129	3.2	3.3
Pennsylvania	1,283	10.0	9.7	4,402	34.4	36.2	1,970	15.4	14.7	723	5.7	6.0
Rhode Island	58	5.5	5.2	332	31.4	31.3	126	11.9	11.2	25	2.4	2.3
South Carolina	1,074	21.6	21.5	844	17.0	17.5	815	16.4	15.7	426	8.6	9.0
South Dakota	137	15.8	16.1	69	8.0	8.5	163	18.8	20.2	38	4.4	4.7
Tennessee	1,099	16.5	16.1	1,528	23.0	23.1	1,111	16.7	16.3	563	8.5	8.8
Texas	4,022	14.4	14.4	2,649	9.5	9.5	3,488	12.5	12.6	1,669	6.0	6.0
Utah	285	9.3	9.8	494	16.2	17.2	620	20.3	21.8	80	2.6	2.5
Vermont	67	10.7	10.4	104	16.7	19.2	118	18.9	17.3	11	*	*
Virginia	834	9.9	9.6	1,336	15.9	15.9	1,166	13.9	13.2	455	5.4	5.5
Washington	620	8.5	8.2	1,001	13.7	13.2	1,141	15.7	14.9	216	3.0	2.9
West Virginia	299	16.3	15.6	848	46.3	49.9	362	19.8	19.3	108	5.9	6.3
Wisconsin	655	11.3	10.9	1,009	17.5	18.2	866	15.0	14.7	256	4.4	4.8
Wyoming	106	18.1	17.7	95	16.2	16.8	144	24.6	25.2	17	*	*

Table 12. Number of deaths, death rates, and age-adjusted death rates for major causes of death: United States, each state, Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas, 2016—Con.

[Rates per 100,000 population; age-adjusted rates per 100,000 U.S. standard population; see Technical Notes. Codes in parentheses after causes of death are categories of the *International Classification of Diseases, Tenth Revision* (ICD–10). The asterisks (*) preceding cause-of-death codes indicate they are not part of ICD–10; see Technical Notes]

Area	Motor vehicle accidents[3]			Accidental poisoning and exposure to noxious substances (X40–X49)			Intentional self-harm (suicide) (*U03,X60–X84,Y87.0)			Assault (homicide) (*U01–*U02,X85–Y09,Y87.1)		
	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]	Number	Rate	Age-adjusted rate[1]
Puerto Rico	305	8.9	8.4	44	1.3	1.2	188	5.5	5.1	680	19.9	21.5
Virgin Islands	9	*	*	1	*	*	2	*	*	41	38.1	44.7
Guam	12	*	*	–	*	*	47	28.2	29.1	2	*	*
American Samoa	1	*	*	1	*	*	3	*	*	2	*	*
Northern Marianas	4	*	*	–	*	*	7	*	*	1	*	*

* Figure does not meet standards of reliability or precision; see Technical Notes.
– Quantity zero.
[1]Death rates are affected by the population composition of the area. Age-adjusted death rates should be used for comparisons between areas; for method of computation, see Technical Notes.
[2]Excludes data for Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas.
[3]ICD–10 codes for Motor vehicle accidents are V02–V04, V09.0, V09.2, V12–V14, V19.0–V19.2, V19.4–V19.6, V20–V79, V80.3–V80.5, V81.0–V81.1, V82.0–V82.1, V83–V86, V87.0–V87.8, V88.0–V88.8, V89.0, and V89.2; see Technical Notes.

SOURCE: NCHS, National Vital Statistics System, Mortality.