Dangerous by Design 2016

JANUARY 2017

Smart Growth America
Improving lives by improving communities

National Complete Streets Coalition

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Smart Growth America advocates for people who want to live and work in great neighborhoods.

Smart Growth America is the only national organization dedicated to researching, advocating for and leading coalitions to bring better development to more communities nationwide. From providing more sidewalks to ensuring more homes are built near public transportation or that productive farms remain a part of our communities, smart growth helps make sure people across the nation can live in great neighborhoods. Learn more at smartgrowthamerica.org.

The National Complete Streets Coalition, a program of Smart Growth America, seeks to fundamentally transform the look, feel and function of the roads and streets in our communities, by changing the way most roads are planned, designed and constructed. Complete Streets policies direct transportation planners and engineers to consistently design with all users in mind. More at smartgrowthamerica.org/complete-streets.

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This report, including data for each state and an interactive map, can be accessed online at www.smartgrowthamerica.org/dangerous-by-design.

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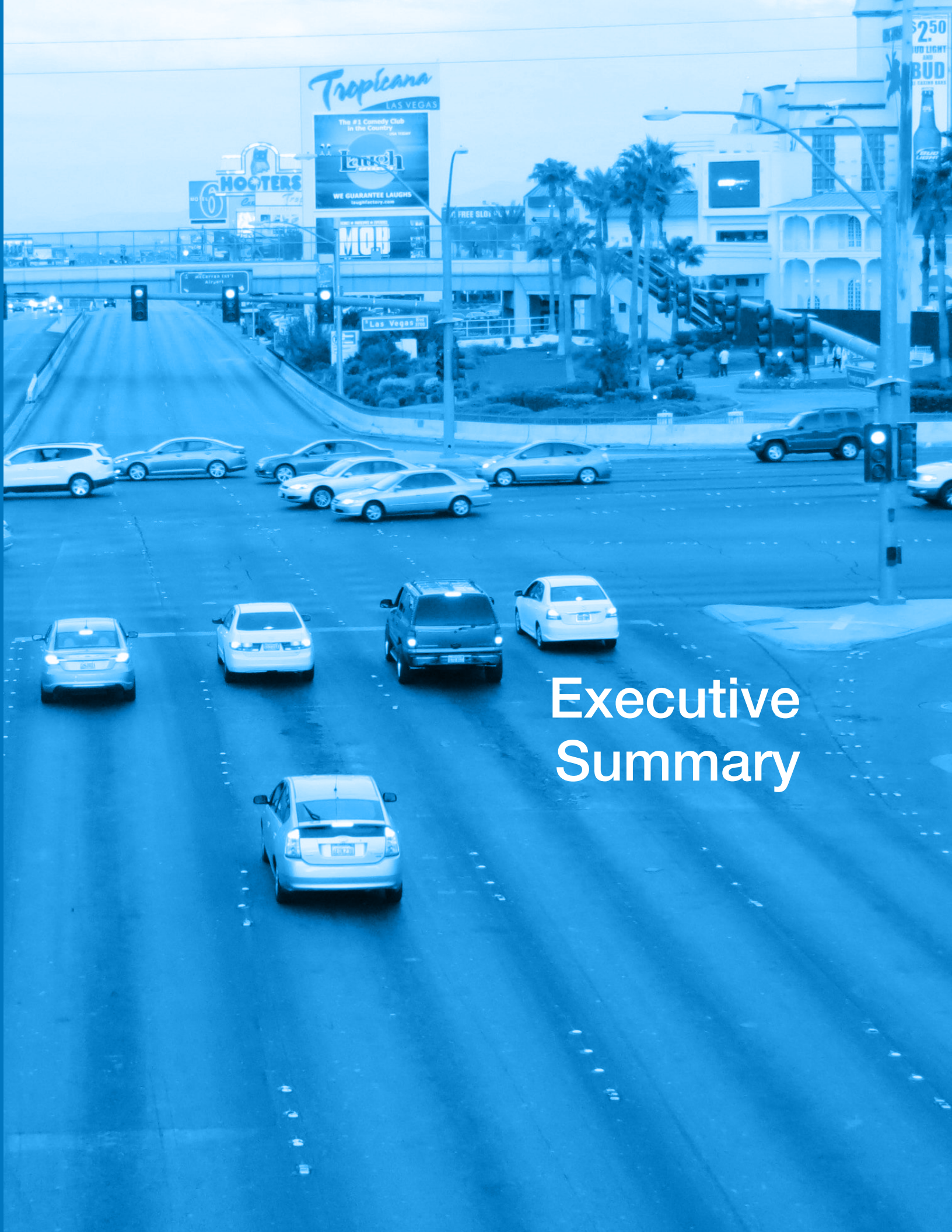


Executive Summary

Executive Summary

More than 1,200 Complete Streets policies are now in place at the state, regional, and local levels. And over the last year, federal agencies have followed suit with new changes in national policy intended to make streets safer for everyone.

These policies are a good starting point, but alone are not enough to keep people safe while walking on America's streets. Between 2005 and 2014, a total of **46,149 people were struck and killed by cars while walking**. In 2014, the most recent year for which data are available, 4,884 people were killed by a car while walking—105 people more than in 2013. On average, 13 people were struck and killed by a car while walking every day in 2014. And between 2005 and 2014, Americans were 7.2 times more likely to die as a pedestrian than from a natural disaster. Each one of those people was a child, parent, friend, classmate, or neighbor. And these tragedies are occurring across the country—in small towns and big cities, in communities on the coast and in the heartland.

Dangerous by Design 2016 takes a closer look at this alarming epidemic. The fourth edition of this report once again examines the metro areas that are the most dangerous for people walking. It also includes a racial and income-based examination of the people who are most at risk, and for the first time also ranks states by their danger to pedestrians.

Dangerous by Design ranks the 104 largest metro areas in the country, as well as every state, by a "Pedestrian Danger Index," or PDI. PDI is a calculation of the share of local commuters who walk to work and the most recent data on pedestrian deaths.

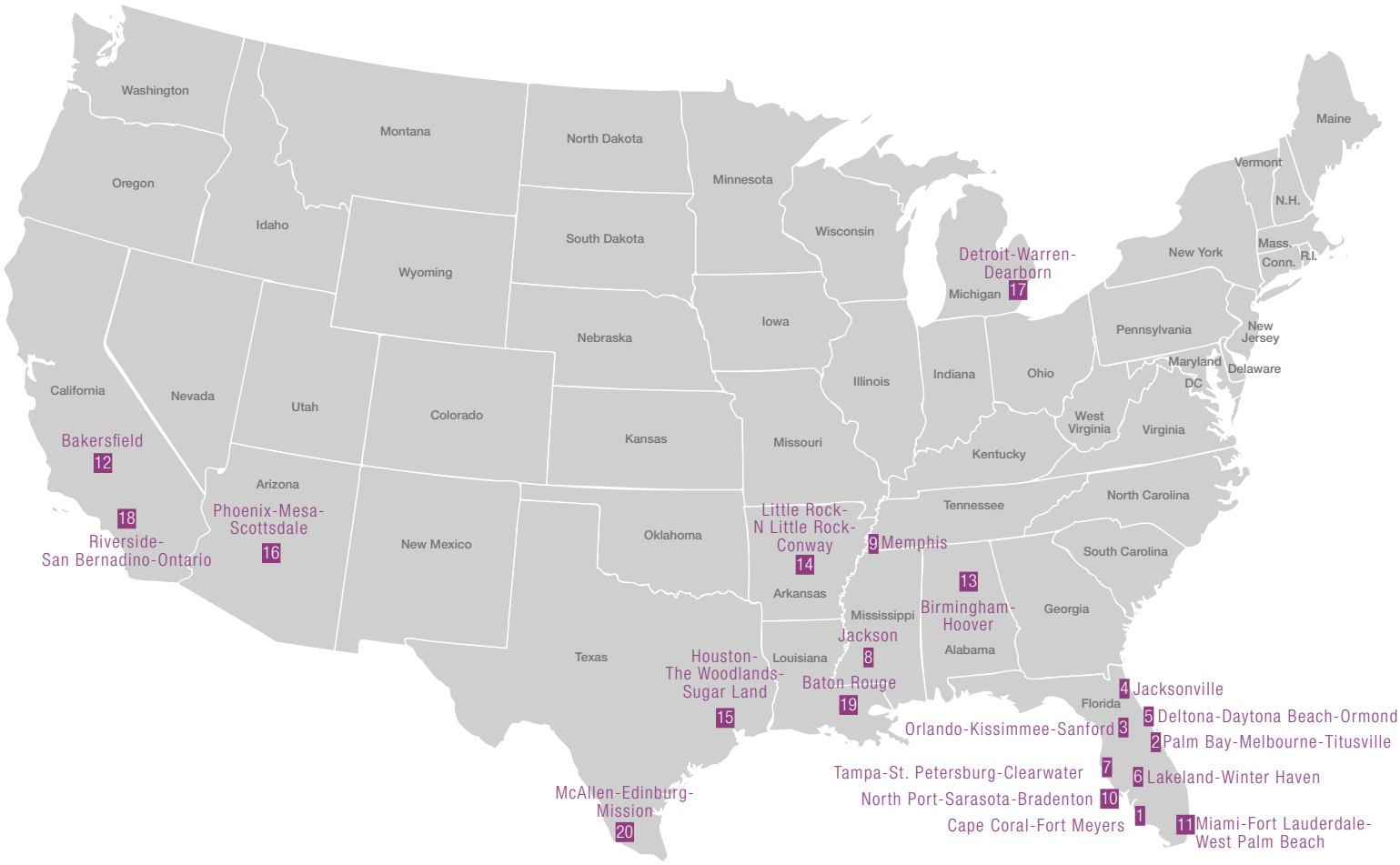
Based on PDI, the 20 most dangerous metro areas for walking in the United States are shown in Figure 1, on page iii.

Most dangerous metro areas for people walking based on PDI, 2016

2016 rank	Metro area	2016 PDI
1	Cape Coral-Fort Myers, FL	283.1
2	Palm Bay-Melbourne-Titusville, FL	235.2
3	Orlando-Kissimmee-Sanford, FL	234.7
4	Jacksonville, FL	228.7
5	Deltona-Daytona Beach-Ormond Beach, FL	228.2
6	Lakeland-Winter Haven, FL	200.6
7	Tampa-St. Petersburg-Clearwater, FL	192.0
8	Jackson, MS	189.6
9	Memphis, TN-MS-AR	153.3
10	North Port-Sarasota-Bradenton, FL	148.2
11	Miami-Fort Lauderdale-West Palm Beach, FL	145.1
12	Bakersfield, CA	132.8
13	Birmingham-Hoover, AL	132.1
14	Little Rock-North Little Rock-Conway, AR	127.9
15	Houston-The Woodlands-Sugar Land, TX	127.2
16	Phoenix-Mesa-Scottsdale, AZ	125.1
17	Detroit-Warren-Dearborn, MI	124.2
18	Riverside-San Bernardino-Ontario, CA	123.4
19	Baton Rouge, LA	120.6
20	McAllen-Edinburg-Mission, TX	118.8

FIGURE 1

Map of most dangerous metro areas for people walking based on PDI, 2016



Who are the victims of these collisions? People of color and older adults are overrepresented among pedestrian deaths.

Who are the victims of these collisions? **People of color and older adults are over-represented among pedestrian deaths.** Non-white individuals account for 34.9 percent of the national population but make up 46.1 percent of pedestrian deaths. In some states, this disparity is even starker. In North Dakota, for example, Native Americans make up just five percent of the population but account for almost 38 percent of pedestrian deaths. Older adults are similarly at higher risk: individuals 65 years or older are 50 percent more likely than younger individuals to be struck and killed by a car while walking.

Even after controlling for the relative amounts of walking among these populations, risks continue to be higher for some people of color and older adults—indicating that these people most likely face disproportionately unsafe conditions for walking. In 2014, an average of four people of color were struck and killed while walking every day—and these numbers are likely low, due to lack of adequate data. In 2014, an average of 13 people were struck and killed every day. Of those, four were people of color and two were over 65.

In addition, **PDI is strongly correlated with median household income and rates of uninsured individuals**. Low-income metro areas are predictably more dangerous than higher-income ones: as median household incomes drop, PDI rises. Similar trends bear out with rates of uninsured individuals: as rates of uninsured individuals rise, so do PDIs, meaning that the people who can least afford to be injured often live in the most dangerous places. The temptation is to think this may be due to lower income people walking more but this study seeks to control for that.

The way we design streets is a factor in these fatal collisions. Many of these deaths occur on streets with fast-moving cars and poor pedestrian infrastructure. People walk along these roads despite the clear safety risks—a sign that streets are not adequately serving everyone in the community.

Everyone involved in the street design process—from federal policymakers to local elected leaders to transportation engineers—must take action to end pedestrian deaths and make roads safer for everyone. So long as streets are built to prioritize high speeds at the cost of pedestrian safety, this will remain a problem. And as the nation's population grows older on the whole, and as we become more diverse both racially and economically, the need for these safety improvements will only become more dire in years to come.

Dangerous by Design 2016 outlines where to focus these actions and the first steps to making it happen.

People walk along these roads despite the clear safety risks—a sign that streets are not serving everyone in the community.

Dangerous by Design

Introduction

One Friday night in August 2014, Thomas DeSoto decided to go out for a sandwich. Thomas, then 68, lived in Cape Coral, FL, and for years he had worked in patient care at hospitals in the area before retiring.

Thomas left his home and walked out to Fowler Street. As he was crossing the five-lane arterial, a driver struck him and quickly fled, later being arrested and charged with a hit-and-run and tampering with evidence. Thomas died of his injuries at the scene.[1]

This story is as tragic as it is common. Each year in the United States, thousands of people are struck and killed by cars while walking. Between 2005 and 2014, a total of 46,149 people were killed by cars while walking. In 2014, the most recent year for which data are available, 4,884 people were killed by cars while walking, continuing the upward trend that has persisted since 2009 (see Figure 2, below).

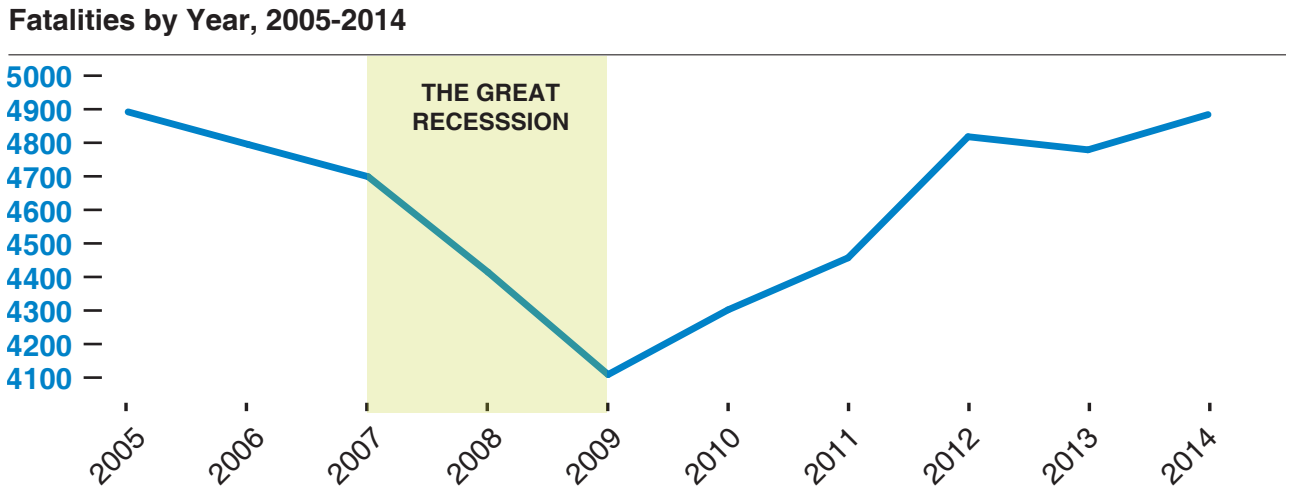
Traffic crashes were the second-leading cause of unintentional injury death in the United States between 2011 and 2014.[2] On average, 13 people were struck and killed by cars while walking every day in 2014. And between 2005 and 2014, Americans were 7.2 times more likely to die as a pedestrian than from a natural disaster.

And while cars have become increasingly safe for the people inside, we have failed to make similar strides to protect people who are walking. Pedestrians now comprise a larger share of traffic deaths than before: between 2003 and 2012, 12.3 percent of the people killed in car crashes were pedestrians.[3] Between 2005 and 2014, that number rose to 12.7 percent.[4]

Disturbingly, this is happening at a time when the country's top health experts are encouraging Americans to walk more. The nation faces well-known problems related to lack of physical activity: one out of every two U.S. adults is living with a chronic disease like heart disease, cancer, or diabetes, and these diseases contribute to disability, premature death, and rising health care costs.[5] To reverse these trends the U.S. Surgeon General has urged Americans to get more physical activity, and specifically encouraged people to walk to school, work, or around their neighborhood.[6] The Centers for Disease Control and Prevention recommends Complete Streets as one strategy for promoting health.[7] Yet too often that is a dangerous or potentially deadly prescription.

FIGURE 2

Pedestrian deaths nationally by year, 2005-2014



Nowhere is this more true than in low-income neighborhoods and communities of color. These communities already face higher rates of obesity-related diseases.[8] As this report shows, people in these communities are also at higher risk of being struck and killed while walking.

We must use every tool available to improve safety for pedestrians. Ending drunk or distracted driving, enforcing speed limits, and reminding pedestrians to cross streets safely are all important parts of this effort. So too is better, safer street design.

The way we design, plan for, and build streets is an enormous part of both this problem and its solution. Streets without sidewalks or pedestrian crossings, with wide lanes that encourage people to drive fast are simply designed to be dangerous for people walking. People walk along these roads despite the clear safety risk. This is not user error. Rather, it is a sign that these streets are failing to adequately meet the needs of everyone in a community.

Policymakers across governments can do more to make sure streets are routinely designed and operated to enable safe access for all users, regardless of age, ability, income, race, ethnicity, or mode of transportation—and in many places, they have. Over the last 10 years, more than 1,200 communities nationwide have passed local Complete Streets policies, and for the first time in history, Complete Streets provisions were included in Congress's 2015 federal transportation bill.

This is happening at a time when the country's top health experts are encouraging Americans to walk more.

We must now turn those ideas into practice and implement Complete Streets policies. It will take all of us working together to make streets across the country less dangerous by design.

Between 2005 and 2014, a total of 46,149 people were killed by cars while walking. The majority of these fatalities occurred in densely populated cities like San Francisco and New York. Taken at face value, these numbers might make these places seem extremely dangerous to walk. But with much larger populations and much higher rates of walking than other places in the country, measuring deaths in these places without context is misleading.

The Most Dangerous Places to Walk in the United States

The "Pedestrian Danger Index," or PDI, puts these numbers into better context. The PDI is a calculation of the share of local commuters who walk to work—the best available measure of how many people are likely to be out walking each day—and the most recent data on pedestrian deaths. First developed in the 1990s by the Surface Transportation Policy Partnership and used more recently by Smart Growth America's Transportation for America program, PDI is the rate of pedestrian deaths relative to the number of people who walk to work in the region. Measuring danger as a rate and not an absolute count corrects for cities that may have higher numbers of deaths simply as a function of higher numbers of people on foot overall.

The 2016 calculations examine data spanning 2005 to 2014, the most recent decade for which data are available. Mode share data are taken from the U.S. Census Bureau's 2014 American Community Survey, and corresponds to the percentage of respondents who self-reported walking as their primary mode to and from work.[9] The percentage represents the median of a 90 percent confidence interval that the true value is in fact the reported value.

Table 1 on page 5 details the PDI for the 104 largest metropolitan statistical areas (which we will refer to from here forward as "metro areas") in the country. Higher PDI numbers correspond to higher rates of pedestrian deaths.

On average, metro areas are slightly more dangerous than in the 2014 report. The comparison is not perfect, however. In 2014, when we last calculated these numbers, we examined 51 metro areas. Their weighted average PDI was 72.3.[10] In 2016, the weighted average of those 51 metros is 73.4—an increase of 1.1. However, the 2016 analysis has expanded to include 104 metro areas. The weighted average PDI for all 104 metro areas included in this year's analysis is 64.1.[11] We examine the change in individual metro areas' PDI in Table 3 on page 12.

The higher a metro area's PDI, the more dangerous it is for people walking.

TABLE 1

Metro area PDIs, 2016

2016 rank	Metro area	Pedestrian deaths (2005-2014)	Annual pedestrian fatalities per 100,000	2016 Pedestrian Danger Index
1	Cape Coral-Fort Myers, FL	165	2.55	**283.1**
2	Palm Bay-Melbourne-Titusville, FL	142	2.59	**235.2**
3	Orlando-Kissimmee-Sanford, FL	575	2.58	**234.7**
4	Jacksonville, FL	379	2.74	**228.7**
5	Deltona-Daytona Beach-Ormond Beach, FL	191	3.19	**228.2**
6	Lakeland-Winter Haven, FL	161	2.61	**200.6**
7	Tampa-St. Petersburg-Clearwater, FL	821	2.88	**192.0**
8	Jackson, MS	109	1.90	**189.6**
9	Memphis, TN-MS-AR	246	1.84	**153.3**
10	North Port-Sarasota-Bradenton, FL	150	2.08	**148.2**
11	Miami-Fort Lauderdale-West Palm Beach, FL	1,508	2.61	**145.1**
12	Bakersfield, CA	205	2.39	**132.8**
13	Birmingham-Hoover, AL	150	1.32	**132.1**
14	Little Rock-North Little Rock-Conway, AR	110	1.53	**127.9**
15	Houston-The Woodlands-Sugar Land, TX	1,026	1.65	**127.2**
16	Phoenix-Mesa-Scottsdale, AZ	814	1.88	**125.1**
17	Detroit-Warren-Dearborn, MI	693	1.61	**124.2**
18	Riverside-San Bernardino-Ontario, CA	858	1.97	**123.4**
19	Baton Rouge, LA	167	2.05	**120.6**
20	McAllen-Edinburg-Mission, TX	115	1.43	**118.8**
21	Las Vegas-Henderson-Paradise, NV	401	2.00	**117.7**
22	Augusta-Richmond County, GA-SC	119	2.07	**114.8**
23	Albuquerque, NM	194	2.16	**113.6**
24	Tulsa, OK	137	1.44	**110.5**
25	Dallas-Fort Worth-Arlington, TX	888	1.32	**110.4**
26	Atlanta-Sandy Springs-Roswell, GA	819	1.50	**107.2**
27	Raleigh, NC	165	1.39	**106.7**
28	San Antonio-New Braunfels, TX	421	1.88	**104.5**
29	Stockton-Lodi, CA	137	1.95	**102.9**
30	Modesto, CA	96	1.84	**102.0**
31	Greenville-Anderson-Mauldin, SC	162	1.92	**101.2**
32	Winston-Salem, NC	84	1.30	**99.7**
33	Charlotte-Concord-Gastonia, NC-SC	317	1.38	**98.5**
34	Louisville/Jefferson County, KY-IN	194	1.55	**96.7**

Twenty most dangerous metro areas based on PDI are highlighted in red; middle rankings are highlighted in blue; 20 least dangerous metro areas based on PDI are highlighted in green.

2016 rank	Metro area	Pedestrian deaths (2005-2014)	Annual pedestrian fatalities per 100,000	2016 Pedestrian Danger Index
35	Greensboro-High Point, NC	106	1.44	**96.0**
36	Fresno, CA	190	2.00	**95.4**
37	Nashville-Davidson-Murfreesboro-Franklin, TN	209	1.21	**92.9**
38	New Orleans-Metairie, LA	272	2.22	**88.7**
39	El Paso, TX	158	1.91	**86.8**
40	Oklahoma City, OK	180	1.39	**86.7**
41	Knoxville, TN	87	1.03	**85.5**
42	Tucson, AZ	197	1.98	**82.6**
43	Sacramento-Roseville-Arden-Arcade, CA	375	1.71	**81.3**
44	Richmond, VA	150	1.22	**81.0**
45	Kansas City, MO-KS	210	1.03	**79.2**
46	Charleston-North Charleston, SC	152	2.18	**77.9**
47	Austin-Round Rock, TX	257	1.40	**77.8**
48	San Jose-Sunnyvale-Santa Clara, CA	271	1.43	**75.1**
49	Ogden-Clearfield, UT	64	1.04	**74.4**
50	Indianapolis-Carmel-Anderson, IN	216	1.12	**69.9**
51	Los Angeles-Long Beach-Anaheim, CA	2,370	1.81	**69.8**
52	St. Louis, MO-IL	351	1.25	**69.7**
53	Wichita, KS	61	0.96	**68.5**
54	Youngstown-Warren-Boardman, OH-PA	64	1.14	**67.3**
55	Baltimore-Columbia-Towson, MD	470	1.71	**65.7**
56	San Diego-Carlsbad, CA	559	1.76	**62.7**
57	Columbia, SC	162	2.06	**62.6**
58	Denver-Aurora-Lakewood, CO	327	1.23	**58.7**
59	Chattanooga, TN-GA	58	1.08	**56.8**
60	Oxnard-Thousand Oaks-Ventura, CA	91	1.09	**54.4**
	National total	**31,701**	**1.51**	**53.8**
61	Salt Lake City, UT	125	1.11	**53.0**
62	Grand Rapids-Wyoming, MI	103	1.02	**51.1**
63	Des Moines-West Des Moines, IA	47	0.80	**49.7**
64	Toledo, OH	76	1.25	**48.0**
65	Allentown-Bethlehem-Easton, PA-NJ	102	1.23	**47.5**
66	Columbus, OH	198	1.02	**46.2**
67	Akron, OH	55	0.78	**46.0**
68	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	979	1.63	**44.0**
69	Washington-Arlington-Alexandria, DC-VA-MD-WV	817	1.39	**43.5**
70	Durham-Chapel Hill, NC	72	1.37	**42.9**
71	Scranton-Wilkes-Barre-Hazleton, PA	84	1.49	**42.7**
72	Buffalo-Cheektowaga-Niagara Falls, NY	134	1.18	**40.7**
73	Hartford-West Hartford-East Hartford, CT	130	1.07	**39.6**

2016 rank	Metro area	Pedestrian deaths (2005-2014)	Annual pedestrian fatalities per 100,000	2016 Pedestrian Danger Index
74	Milwaukee-Waukesha-West Allis, WI	169	1.08	**38.6**
75	Providence-Warwick, RI-MA	195	1.22	**38.0**
76	Cincinnati, OH-KY-IN	168	0.79	**37.5**
77	Virginia Beach-Norfolk-Newport News, VA-NC	189	1.11	**37.1**
78	Harrisburg-Carlisle, PA	69	1.24	**35.5**
79	Dayton, OH	71	0.89	**35.4**
80	Chicago-Naperville-Elgin, IL-IN-WI	1,043	1.10	**34.2**
81	Bridgeport-Stamford-Norwalk, CT	86	0.92	**34.1**
82	Urban Honolulu, HI	172	1.76	**33.9**
83	New Haven-Milford, CT	103	1.19	**33.1**
84	Worcester, MA-CT	82	0.89	**31.7**
85	San Francisco-Oakland-Hayward, CA	618	1.38	**31.4**
86	Portland-Vancouver-Hillsboro, OR-WA	251	1.10	**31.3**
87	Boise City, ID	40	0.63	**31.3**
88	Cleveland-Elyria, OH	138	0.67	**30.3**
89	Spokane-Spokane Valley, WA	48	0.90	**30.0**
90	Omaha-Council Bluffs, NE-IA	47	0.53	**29.5**
91	Rochester, NY	113	1.04	**29.0**
92	Springfield, MA	71	1.13	**28.3**
93	Minneapolis-St. Paul-Bloomington, MN-WI	222	0.65	**28.2**
94	Albany-Schenectady-Troy, NY	90	1.03	**27.8**
95	New York-Newark-Jersey City, NY-NJ-PA	3,216	1.62	**27.0**
96	Pittsburgh, PA	213	0.90	**26.6**
97	Seattle-Tacoma-Bellevue, WA	316	0.89	**24.7**
98	Lancaster, PA	45	0.85	**24.4**
99	Syracuse, NY	70	1.06	**23.0**
100	Provo-Orem, UT	44	0.80	**19.5**
101	Boston-Cambridge-Newton, MA-NH	444	0.95	**18.0**
102	Madison, WI	53	0.85	**16.4**
103	Portland-South Portland, ME	30	0.58	**14.8**
104	Colorado Springs, CO	37	0.55	**13.5**

Twenty most dangerous metro areas based on PDI are highlighted in red; middle rankings are highlighted in blue; 20 least dangerous metro areas based on PDI are highlighted in green.

Statewide Rankings

In addition to metro areas, this year we also looked at statewide PDIs for the first time. The states with the highest and lowest PDI scores are illustrated in the map in Figure 3, below. Table 2 on page 9 details the PDI for all 50 states and the District of Columbia.

On average, states have also gotten slightly more dangerous since the 2014 report. That year, when we last calculated these numbers, the weighted average state PDI was 65.4.[12] In 2016, the weighted average state PDI rose to 67.0, indicating that states became more dangerous.

FIGURE 3

Pedestrian Danger Index (PDI) by State, 2016

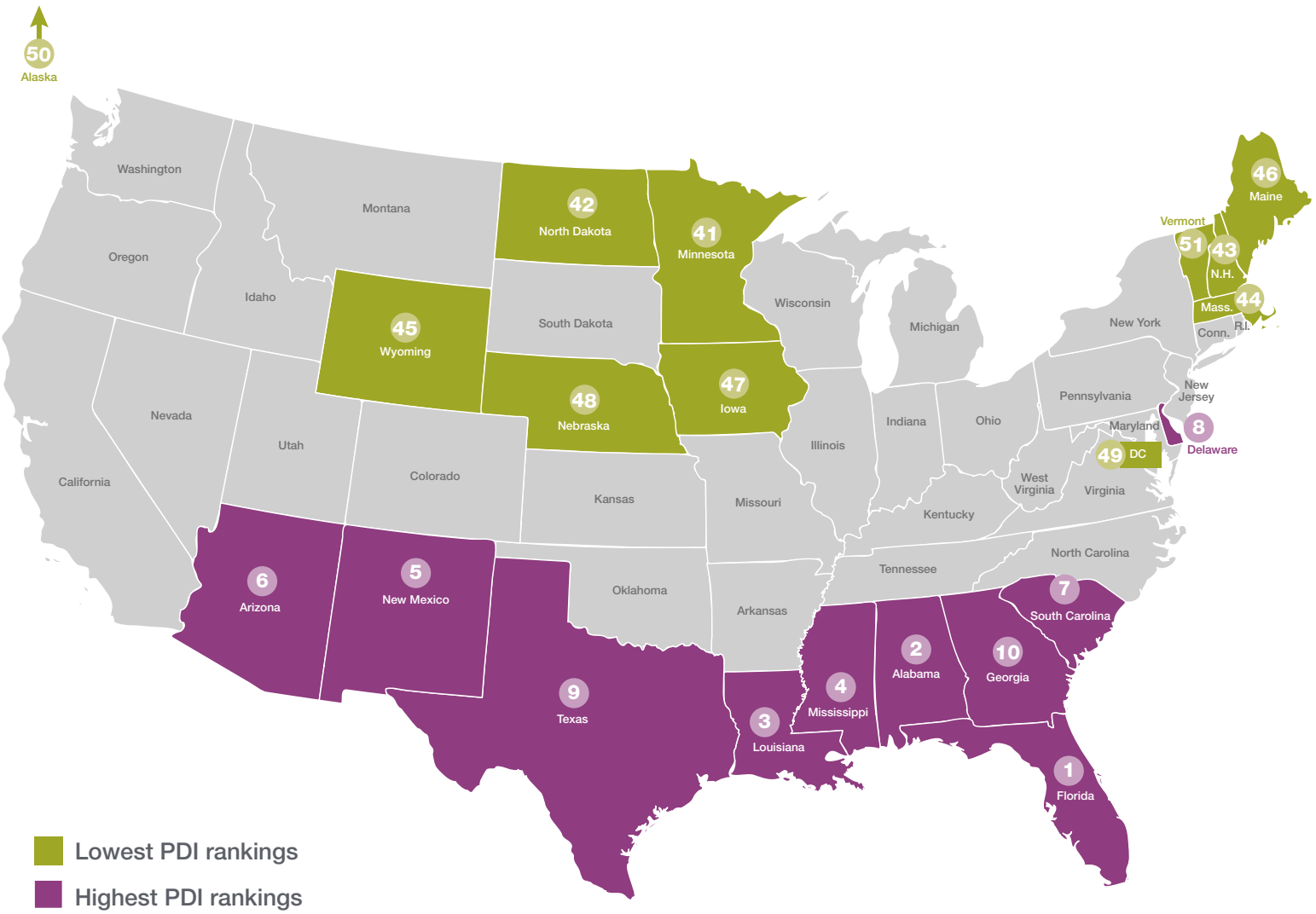


TABLE 2

Statewide PDIs, 2016

2016 rank	State	Pedestrian deaths (2005-2014)	Annual pedestrian fatalities per 100,000	2016 Pedestrian Danger Index
1	Florida	5,142	2.66	**177.0**
2	Alabama	724	1.50	**136.6**
3	Louisiana	1,024	2.23	**117.1**
4	Mississippi	545	1.83	**114.1**
5	New Mexico	516	2.48	**112.8**
6	Arizona	1,424	2.17	**108.5**
7	South Carolina	1,057	2.24	**106.5**
8	Delaware	207	2.26	**102.6**
9	Texas	4,219	1.62	**101.1**
10	Georgia	1,555	1.57	**98.1**
11	North Carolina	1,690	1.73	**96.3**
12	Nevada	529	1.92	**91.2**
13	Tennessee	759	1.18	**90.5**
14	Arkansas	404	1.37	**80.6**
15	Maryland	1,053	1.79	**77.8**
16	Oklahoma	523	1.37	**76.1**
17	California	6,616	1.74	**64.4**
18	Michigan	1,328	1.34	**61.0**
19	Missouri	726	1.20	**60.2**
20	New Jersey	1,493	1.68	**56.1**
21	Kentucky	529	1.21	**54.9**
	National total	**46,149**	**1.47**	52.5
22	Indiana	636	0.97	**46.3**
23	West Virginia	216	1.17	**41.6**
24	Virginia	813	0.99	**41.4**
25	Utah	278	0.97	**38.9**
26	Hawaii	251	1.80	**38.3**
27	Ohio	964	0.83	**36.3**
28	Connecticut	376	1.05	**34.9**
29	Illinois	1,356	1.05	**34.0**
30	Colorado	525	1.01	**33.7**
31	Rhode Island	126	1.20	**32.3**
32	Oregon	491	1.26	**30.7**
33	Kansas	211	0.73	**30.5**
34	Pennsylvania	1,510	1.18	**30.3**
35	Montana	131	1.30	**27.1**
36	Washington	641	0.93	**26.5**
37	Wisconsin	484	0.85	**25.6**

Ten most dangerous states based on PDI are highlighted in red; middle rankings are highlighted in blue; 10 least dangerous states based on PDI are highlighted in green.

2016 rank	State	Pedestrian deaths (2005-2014)	Annual pedestrian fatalities per 100,000	2016 Pedestrian Danger Index
38	New York	3,007	1.53	**24.0**
39	Idaho	114	0.71	**23.8**
40	South Dakota	78	0.93	**22.8**
41	Minnesota	341	0.63	**22.6**
42	North Dakota	61	0.87	**22.2**
43	New Hampshire	85	0.64	**22.2**
44	Massachusetts	693	1.04	**22.1**
45	Wyoming	48	0.83	**22.0**
46	Maine	103	0.78	**19.9**
47	Iowa	212	0.69	**19.7**
48	Nebraska	90	0.49	**17.3**
49	District of Columbia	121	1.91	**15.4**
50	Alaska	84	1.15	**14.6**
51	Vermont	40	0.64	**11.4**

Florida tops most dangerous list for fourth consecutive time

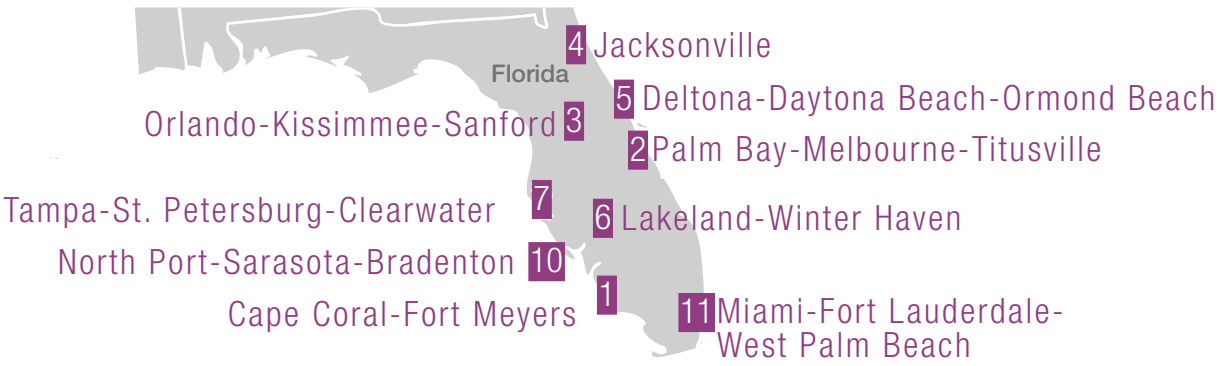
Florida has been the most dangerous state for walking since we first began tracking these numbers in 2009. This year's analysis is no different: Florida has the highest PDI of any state, and it's home to eight of the ten most dangerous metro areas in the nation.[13]

State leaders have seen these sobering numbers and are taking action. In September 2014, four months after *Dangerous by Design 2014* came out, the Florida Department of Transportation adopted a Complete Streets policy with the goal of reducing pedestrian deaths in the state. Not content to simply pass a policy, the agency has also taken decisive steps to put it into practice. In December 2015, the agency published its Complete Streets Implementation Plan, an ambitious and comprehensive commitment to change the way roads are designed and built in Florida to make them safer for all types of travelers.[14] Florida's improved safety efforts are reflected its statewide PDI, which, though still the worst in the nation, has declined by 5.8 points since 2011. (See Table 4 on page 14.)

Local communities in Florida are joining the effort as well: more than 70 Complete Streets policies are now in place across the state.[15] Many of these metro areas have seen their PDIs decline since 2011—most notably Miami-Fort Lauderdale (-22.8), Tampa-St. Petersburg (-20.7), and Orlando-Kissimmee (-20.7). See Table 3 on page 12 for more information.

FIGURE 4

Pedestrian Danger Index (PDI) in Florida Metro Regions, 2016



Change in Metro Area and Statewide PDIs

How have individual PDIs changed over time? Which have improved and which have gotten worse? To answer these questions, we compared both metro areas' and statewide PDIs in 2016 to those from 2011.[16]

Table 3, below, shows how metro area PDIs have changed from 2011 to 2014 to 2016. Our 2011 and 2014 analyses examined only 51 metro areas, and we are thus only able to examine year-over-year change in those 51. Metro areas with positive numbers in the far right column, highlighted in red, have become *more dangerous* since 2014.

The majority of individual metro areas' PDIs have improved since 2014. Thirty out of 51 metro areas became less dangerous, with lower PDIs in 2016 compared to 2014.

Three saw no change, and 18 became more dangerous and saw their PDIs rise. Readers may note that metro areas have become more dangerous on average, yet Table 3 shows that the majority of individual metro areas have gotten safer. A few of the declines are of very small magnitude and likely reflect natural variation in the data. The rise in PDI in Jacksonville, FL, Memphis, TN, and Riverside, CA were all significant enough to increase metro areas' overall average PDI this year.

TABLE 3

Change in large metro area PDIs

Metro area	2011 PDI	2014 PDI	2016 PDI	Change in PDI since 2014
Jacksonville, FL	177.8	182.7	228.7	+46.0
Memphis, TN-MS-AR	132.6	131.3	153.3	+22.0
Riverside-San Bernardino-Ontario, CA	139.2	102.2	123.4	+21.2
Las Vegas-Henderson-Paradise, NV	135.2	102.7	117.7	+15.0
Detroit-Warren-Dearborn, MI	118.4	111.6	124.2	+12.6
San Jose-Sunnyvale-Santa Clara, CA	68.4	65.6	75.1	+9.5
Houston-The Woodlands-Sugar Land, TX	128.2	119.6	127.2	+7.6
San Antonio-New Braunfels, TX	87.5	96.9	104.5	+7.6
Birmingham-Hoover, AL	104.3	125.6	132.1	+6.5
Phoenix-Mesa-Scottsdale, AZ	132.4	118.6	125.1	+6.5
Raleigh, NC	117.2	100.4	106.7	+6.3
New Orleans-Metairie, LA	107.1	84.9	88.7	+3.8
Dallas-Fort Worth-Arlington, TX	119.4	107.5	110.4	+2.9
Los Angeles-Long Beach-Anaheim, CA	76.0	66.9	69.8	+2.9
Tampa-St. Petersburg-Clearwater, FL	212.7	190.1	192.0	+1.9
Pittsburgh, PA	30.4	25.1	26.6	+1.5
Chicago-Naperville-Elgin, IL-IN-WI	46.8	32.9	34.2	+1.3
Denver-Aurora-Lakewood, CO	74.3	58.1	58.7	+0.6

Metro area	2011 PDI	2014 PDI	2016 PDI	Change in PDI since 2014
Sacramento-Roseville-Arden-Arcade, CA	90.7	81.3	81.3	0.0
St. Louis, MO-IL	88.2	69.7	69.7	0.0
San Francisco-Oakland-Hayward, CA	38.5	31.4	31.4	0.0
Miami-Fort Lauderdale-West Palm Beach, FL	167.9	145.3	145.1	-0.2
Milwaukee-Waukesha-West Allis, WI	37.3	38.8	38.6	-0.2
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	43.6	44.3	44.0	-0.3
Oklahoma City, OK	89.5	87.2	86.7	-0.5
Washington-Arlington-Alexandria, DC-VA-MD-WV	54.6	44.1	43.5	-0.6
Baltimore-Columbia-Towson, MD	62.2	66.4	65.7	-0.7
Boston-Cambridge-Newton, MA-NH	21.6	18.7	18.0	-0.7
Austin-Round Rock, TX	96.1	78.6	77.8	-0.8
Portland-Vancouver-Hillsboro, OR-WA	36.3	32.2	31.3	-0.9
New York-Newark-Jersey City, NY-NJ-PA	30.4	28.4	27.0	-1.4
Louisville/Jefferson County, KY-IN	95.7	98.5	96.7	-1.8
Providence-Warwick, RI-MA	41.6	39.9	38.0	-1.9
Hartford-West Hartford-East Hartford, CT	47.9	41.6	39.6	-2.0
Cincinnati, OH-KY-IN	37.7	39.5	37.5	-2.0
Seattle-Tacoma-Bellevue, WA	35.9	26.8	24.7	-2.1
Salt Lake City, UT	60.2	55.3	53.0	-2.3
Buffalo-Cheektowaga-Niagara Falls, NY	49.0	43.1	40.7	-2.4
Indianapolis-Carmel-Anderson, IN	63.5	73.0	69.9	-3.1
San Diego-Carlsbad, CA	74.7	66.0	62.7	-3.3
Minneapolis-St. Paul-Bloomington, MN-WI	35.1	32.2	28.7	-4.0
Cleveland-Elyria, OH	29.4	34.4	30.3	-4.1
Rochester, NY	35.1	34.0	29.0	-5.0
Kansas City, MO-KS	83.3	85.7	79.6	-6.5
Virginia Beach-Norfolk-Newport News, VA-NC	37.0	43.6	37.1	-6.5
Nashville-Davidson-Murfreesboro-Franklin, TN	109.7	100.8	92.9	-7.9
Orlando-Kissimmee-Sanford, FL	255.4	244.3	234.7	-9.6
Columbus, OH	49.2	56.3	46.2	-10.1
Atlanta-Sandy Springs-Roswell, GA	119.3	119.4	107.2	-12.2
Charlotte-Concord-Gastonia, NC-SC	99.6	111.7	98.5	-13.2
Richmond, VA	90.9	95.0	81.0	-14.0

Top 10 worst PDI ratings are highlighted in pink
Middle ranking PDI ratings are highlighted in blue
Top 10 best PD ratings are highlighted in green

In addition to the change in metro area PDIs, we also examined the change in statewide PDIs. Table 4, below, shows how statewide PDIs have changed from 2011 to 2014 to 2016. States with positive numbers in the far right column, highlighted in red, have become *more dangerous* since 2014.

As Table 4 shows, most individual state PDIs have worsened since 2014. Thirty-one states and the District of Columbia saw their PDI numbers rise, meaning they became more dangerous for people walking. Nineteen states saw their PDI numbers decline—meaning they became safer for people walking since 2014. The rise in most individual state PDIs is in keeping with the rise in their overall average PDI.

TABLE 4

Change in statewide PDIs

State	2011 PDI	2014 PDI	2016 PDI	Change in PDI since 2014
New Mexico	121.1	88.5	112.8	+24.3
Mississippi	107.9	102.6	114.1	+11.5
Alabama	116.7	125.2	136.6	+11.4
Florida	182.8	168.6	177	+8.4
Arizona	113.1	101.2	108.5	+7.3
Nevada	105.3	85.3	91.2	+5.9
West Virginia	45.8	37.1	41.6	+4.5
South Dakota	29.3	18.4	22.8	+4.4
Texas	104.3	97.5	101.1	+3.6
Hawaii	48.5	35	38.3	+3.3
Indiana	43.0	43.1	46.3	+3.2
New Jersey	53.2	53	56.1	+3.1
Montana	24.3	24.2	27.1	+2.9
Oklahoma	67.2	73.3	76.1	+2.8
New Hampshire	23.9	19.7	22.2	+2.5
California	71.0	62	64.4	+2.4
Tennessee	93.2	88.6	90.5	+1.9
Kansas	29.5	28.7	30.5	+1.8
Illinois	42.2	32.3	34.0	+1.7
Michigan	64.3	59.4	61.0	+1.6
Idaho	25.7	22.3	23.8	+1.5
Iowa	19.0	18.5	19.7	+1.2
Rhode Island	35.7	31.1	32.3	+1.2
Nebraska	18.8	16.2	17.3	+1.1
Utah	40.0	37.8	38.9	+1.1
District of Columbia	22.6	14.5	15.4	+0.9
Alaska	18.3	13.9	14.6	+0.7
Arkansas	76.7	80	80.6	+0.6
Missouri	68.7	59.6	60.2	+0.6

State	2011 PDI	2014 PDI	2016 PDI	Change in PDI since 2014
Louisiana	122.2	116.6	117.1	+0.5
Pennsylvania	32.1	30	30.3	+0.3
Massachusetts	24.9	21.9	22.1	+0.2
Connecticut	37.1	35	34.9	-0.1
Colorado	42.8	34.1	33.7	-0.4
Maine	22.4	20.4	19.9	-0.5
New York	26.6	24.5	24.0	-0.5
Maryland	76.4	78.6	77.8	-0.8
Delaware	82.2	103.6	102.6	-1.0
Wisconsin	26.5	27.1	25.6	-1.5
Wyoming	26.8	23.5	22.0	-1.5
Vermont	11.2	13	11.4	-1.6
Washington	31.8	28.5	26.5	-2.0
Minnesota	26.6	24.8	22.6	-2.2
Virginia	51.2	43.6	41.4	-2.2
Oregon	35.2	33	30.7	-2.3
Ohio	36.8	39	36.3	-2.7
Kentucky	56.5	58.3	54.9	-3.4
North Carolina	102.7	99.8	96.3	-3.5
South Carolina	124.1	110.4	106.5	-3.9
Georgia	102.9	104	98.1	-5.9
North Dakota	20.2	28.9	22.2	-6.7

Thirty-one states and the District of Columbia saw their PDI numbers rise, meaning they became more dangerous for people walking.

Most Vulnerable Populations

Who are the victims of these crashes? Each individual struck and killed by a car is a child, parent, friend, classmate, or neighbor. And these deaths happen in small towns and big cities, in communities on the coasts and in the heartland.

Taken together, however, broader themes begin to emerge about who is at highest risk for pedestrian death. The data show that **people of color and older adults are disproportionately represented** among pedestrian deaths compared to their representation in the population. Specifically, Native Americans and African Americans, as well as adults 65 years and older, are all at higher risk of being struck and killed by a car while walking than people in other demographics. Even after controlling for the relative amounts of walking among these populations, risks continue to be higher for some people of color and older adults—indicating that these people most likely face disproportionately unsafe conditions for walking.

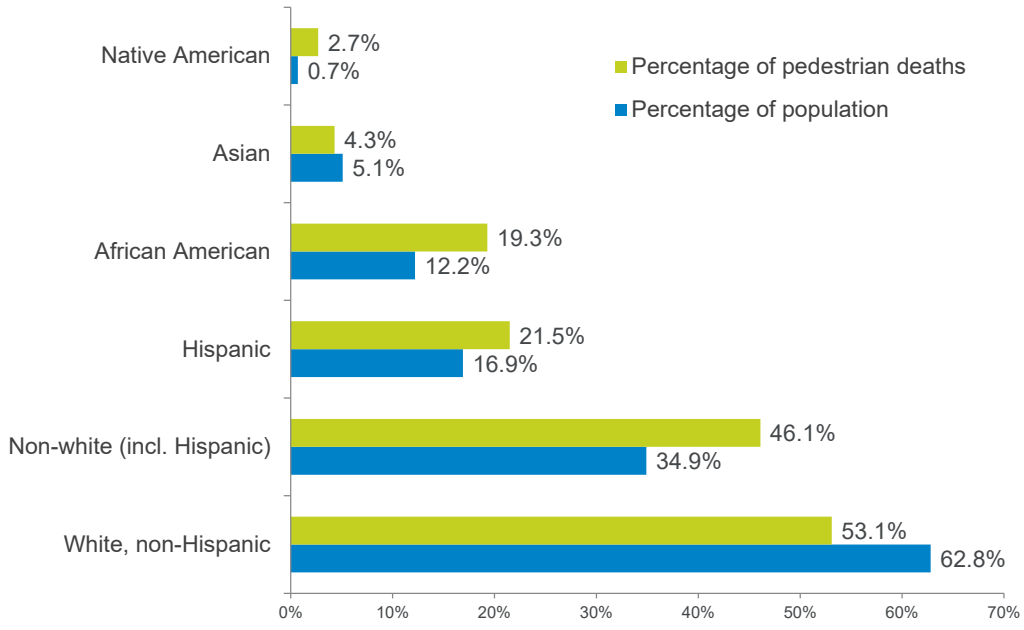
The data also shows information about where these crashes take place. Most notably, at the metro area level, **median household income and PDI are negatively correlated.** This means that the lower a metro area's median household income, the more likely it is that its residents will be killed by cars while walking. Similarly, **the rate of uninsured people is also strongly correlated with a metro area's PDI,** meaning that the places where people are most likely to lack access to high-quality medical care are also the places where people are likely to be struck and killed by a car while walking.

Some of these outcomes are due to the fact that low income communities and communities of color have more people who walk and they tend to walk more. The risk of being hit as a pedestrian goes up the more often one is a pedestrian. And for many, walking is a necessity, not a choice, and individuals are forced to increase their exposure to these risks.

In other cases, it is not just a matter of increased risk from increased exposure. Instead, after controlling for the amount of walking (as was done for the metro area comparisons on pages 5 and 12) risks continue to be higher—indicating disproportionately unsafe conditions for pedestrians.

FIGURE 5

Pedestrian deaths by race/ethnicity relative to U.S. population, 2005-2014



People of Color

People of color are less likely to own a personal vehicle,[17] increasing their likelihood of walking. This fact is reflected in the number of pedestrian deaths that are people of color. In 2014, 34.9 percent of the United States population identified as non-white or Hispanic, yet these groups accounted for 46.1 percent of all pedestrian deaths between 2005 and 2014.[18] In 2014, an average of four people of color were struck and killed while walking every day. These numbers may be higher: a significant portion of collision data, race and ethnicity are not reported.[19] Figure 5 on page 16 shows the relationship between pedestrian deaths and the U.S. population, by race and ethnicity.

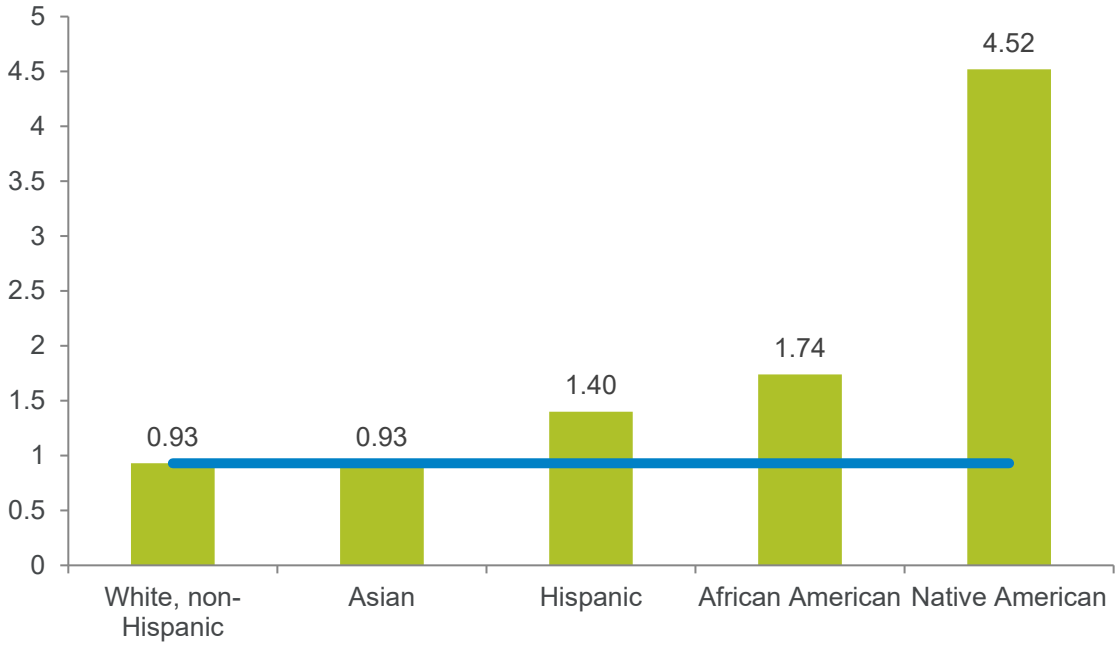
Native Americans are one of the most overrepresented racial group in pedestrian deaths compared to their representation in the population. Native Americans account for only 0.7 percent of the U.S. population but make up 2.7 percent of pedestrian deaths. The overrepresentation is evident at the state level: Native Americans are overrepresented in pedestrian deaths in 33 out of 49 states and the District of Columbia.[20] In some cases the magnitude is striking. In North Dakota, for example, Native Americans account for only 5.1 percent of the state population, but 37.5 percent of pedestrian deaths.

African Americans are also overrepresented in pedestrian deaths compared to their population. Nationally, African Americans account for 12.2 percent of the population but comprise 19.3 percent of pedestrian deaths. African Americans are also overrepresented in pedestrian deaths in 41 of 49 states and the District of Columbia.[21] Again, see Table A1 in the appendix on page 32 for full state-by-state information.

How does this risk compare across racial groups? Figure 6, below, shows annual pedestrian fatalities per 100,000 people by race, and makes clear how much more at risk Hispanics, African Americans, and Native Americans are of being struck and killed by a car while walking.

FIGURE 6

Annual pedestrian fatalities per 100,000 people by race/ethnicity (2005-2014)



These disparities become even more alarming when comparing "white" to "non-white" pedestrian deaths. "Non-white," as designated by the U.S. Census's American Community Survey, includes Native American, Asian, Hispanic, and African American people as well as people who identify as "other race" and "two or more races." Table 5 lists states by the annual fatalities per 100,000 people between 2005 and 2014, and the relative risk of pedestrian death for non-white compared to white individuals. Note that this table excludes 11,963 pedestrian fatalities (25.9 percent of all fatalities between 2005 and 2014) for incomplete race/ethnicity data. As the table shows, **non-white individuals are overrepresented in pedestrian deaths in 42 out of 49 states and the District of Columbia.**[22]

These data below show that people of color are at distinctly higher risk of being struck and killed by cars while walking than white individuals.

TABLE 5

Relative risk of pedestrian death for white vs. non-white individuals, by state

State	Percentage of population, non-white	Percentage of pedestrian deaths, non-white	Pedestrian fatalities per 100,000, white	Pedestrian fatalities per 100,000, non-white	Relative risk
Louisiana†	38.7%	85.4%	0.26	2.36	9.03
South Dakota	14.1%	54.9%	0.46	3.31	7.21
North Dakota	10.4%	41.1%	0.53	3.14	5.89
Montana	10.6%	32.2%	0.89	3.48	3.91
Alaska*	29.8%	64.3%	0.55	2.07	3.80
Texas†	54.1%	77.8%	0.43	1.23	2.87
Michigan*	21.6%	41.3%	0.81	2.00	2.49
District of Columbia*	62.4%	78.4%	0.98	2.02	2.06
Arizona†	41.1%	58.8%	1.10	2.17	1.97
Wisconsin	15.5%	26.8%	0.65	1.27	1.95
Colorado	28.2%	44.1%	0.72	1.40	1.94
Wyoming	13.3%	23.3%	0.68	1.30	1.93
Missouri	17.3%	28.8%	0.95	1.78	1.88
Utah†	18.3%	30.0%	0.58	1.09	1.87
New Mexico	58.7%	72.1%	1.50	2.63	1.75
Georgia†	43.2%	56.8%	0.61	1.03	1.68
Alabama	31.9%	44.5%	1.12	1.87	1.67
Oklahoma*	25.3%	38.2%	1.04	1.71	1.66
South Carolina	34.3%	46.8%	1.67	2.73	1.64
Arkansas	24.2%	34.7%	1.07	1.74	1.62
Indiana†	17.3%	25.4%	0.60	0.96	1.60
Tennessee	23.2%	32.8%	0.94	1.48	1.58
Nebraska	16.9%	24.4%	0.41	0.64	1.55
National total	**34.9%**	**46.1%**	**0.93**	**1.44**	**1.54**

State	Percentage of population, non-white	Percentage of pedestrian deaths, non-white	Pedestrian fatalities per 100,000, white	Pedestrian fatalities per 100,000, non-white	Relative risk
Ohio	17.3%	24.3%	0.69	1.03	1.49
North Carolina	33.4%	43.4%	1.36	2.02	1.49
Virginia*	33.4%	43.4%	0.67	0.98	1.47
Illinois*	35.4%	43.9%	0.72	1.00	1.39
Mississippi	41.3%	49.6%	1.43	1.95	1.37
Minnesota*	15.5%	20.2%	0.50	0.67	1.34
Hawaii	57.9%	77.1%	1.60	2.13	1.33
Kansas	19.9%	24.2%	0.65	0.80	1.24
Idaho*	14.7%	17.9%	0.59	0.72	1.24
Iowa*	10.6%	12.4%	0.57	0.68	1.18
Washington	24.5%	28.2%	0.83	0.95	1.14
Rhode Island*	22.0%	24.8%	1.00	1.12	1.12
New Jersey*	40.2%	43.3%	1.22	1.34	1.10
Kentucky	12.4%	13.6%	1.05	1.14	1.09
New Hampshire*	6.6%	7.2%	0.53	0.57	1.08
Massachusetts*	22.5%	24.3%	0.87	0.93	1.07
California	57.9%	60.2%	1.53	1.57	1.02
Maryland*	43.9%	45.5%	1.35	1.38	1.02
Florida	41.5%	42.5%	2.37	2.40	1.01
Connecticut*	28.0%	27.8%	0.89	0.86	0.96
New York†	40.6%	39.3%	0.71	0.65	0.92
Oregon	19.0%	16.7%	1.22	1.00	0.82
West Virginia	5.3%	4.3%	1.04	0.81	0.78
Delaware	33.3%	27.2%	2.36	1.70	0.72
Nevada*	44.1%	36.6%	1.90	1.31	0.69
Maine*	4.1%	2.3%	0.67	0.36	0.54
Vermont	4.3%	0.0%	0.61	0.00	0.00

* Missing >15% of fatalities with incomplete race/ethnicity data

† Missing >30% of fatalities with incomplete race/ethnicity data

Pennsylvania excluded from chart, >90% of fatalities lack race/ethnicity data

Older Adults

Older adults are also at higher risk of being struck and killed by a car while walking. Older adults are often less mobile, may have greater difficulty seeing or hearing, and are more likely to use an assistive device. Pedestrian infrastructure is frequently not designed to accommodate these impairments.

TABLE 6

Relative risk of pedestrian death for 65 and over vs. under 65, by state

Listed by annual pedestrian fatalities per 100,000 (2005-2014) and relative risk of pedestrian death for 65 years and older compared to under 65. *Table excludes 332 (0.7 percent) pedestrian fatalities with incomplete age data*

State	Percentage of population 65 years and over	Percentage of pedestrian deaths 65 years and older	Pedestrian fatalities per 100,000, under 65 years old	Pedestrian fatalities per 100,000, 65 years and older	Relative risk
Hawaii	15.2%	42.2%	1.22	4.96	4.07
Vermont	15.7%	42.5%	0.44	1.73	3.96
New Hampshire	14.7%	38.1%	0.46	1.65	3.58
Massachusetts	14.4%	33.4%	0.81	2.41	2.98
New York	14.1%	31.3%	1.20	3.34	2.78
Maine	17.0%	35.9%	0.60	1.63	2.73
Rhode Island	15.1%	32.5%	0.95	2.58	2.72
Idaho	13.3%	27.2%	0.60	1.45	2.43
California	12.1%	24.1%	1.49	3.43	2.30
District of Columbia	11.3%	21.8%	3.63	1.65	2.19
Utah	9.5%	18.7%	0.87	1.91	2.19
Washington	13.2%	24.8%	0.80	1.75	2.18
Connecticut	14.8%	27.1%	0.89	1.90	2.14
Minnesota	13.6%	25.0%	0.55	1.16	2.12
Wisconsin	14.4%	26.1%	0.73	1.53	2.10
Pennsylvania	16.0%	28.2%	1.01	2.08	2.06
New Jersey	14.1%	24.0%	1.48	2.85	1.93
Iowa	15.3%	25.0%	0.61	1.13	1.85
Illinois	13.2%	20.3%	0.96	1.62	1.68
Kansas	13.7%	20.9%	0.67	1.11	1.66
Nevada	13.1%	19.5%	1.77	2.84	1.61
Colorado	11.8%	17.1%	0.95	1.46	1.54
National total	**13.7%**	**19.4%**	**1.36**	**2.06**	**1.51**
Virginia	13.0%	18.1%	0.93	1.39	1.48
Alaska	8.5%	11.9%	1.11	1.61	1.45
Oregon	14.9%	20.2%	1.18	1.70	1.44
Indiana	13.6%	18.1%	0.91	1.28	1.41
Nebraska	13.9%	18.0%	0.46	0.62	1.36

State	Percentage of population 65 years and over	Percentage of pedestrian deaths 65 years and older	Pedestrian fatalities per 100,000, under 65 years old	Pedestrian fatalities per 100,000, 65 years and older	Relative risk
Montana	13.1%	16.7%	0.80	1.06	1.33
Wyoming	15.7%	19.8%	1.24	1.64	1.33
North Dakota	14.3%	18.0%	0.83	1.09	1.32
Ohio	10.9%	13.2%	1.55	1.93	1.24
Texas	14.7%	17.6%	0.81	1.00	1.24
Maryland	13.0%	15.3%	1.72	2.09	1.22
Kentucky	14.0%	16.1%	1.18	1.38	1.17
Florida	18.2%	19.7%	2.58	2.85	1.10
Arizona	14.9%	16.0%	2.13	2.33	1.09
South Dakota	14.7%	15.4%	0.93	0.98	1.06
Michigan	14.6%	14.8%	1.34	1.36	1.02
Tennessee	14.2%	14.0%	1.18	1.15	0.98
Missouri	14.6%	14.3%	1.21	1.18	0.97
Alabama	14.5%	13.2%	1.52	1.36	0.89
Oklahoma	14.0%	12.6%	1.39	1.24	0.89
Georgia	11.5%	10.1%	1.56	1.35	0.87
North Carolina	13.8%	11.9%	1.76	1.49	0.84
Mississippi	13.5%	11.4%	1.87	1.54	0.82
New Mexico	14.2%	11.7%	2.53	2.03	0.80
South Carolina	14.7%	12.0%	2.28	1.80	0.79
Delaware	15.4%	12.4%	1.84	2.36	0.78
West Virginia	16.8%	13.4%	1.21	0.93	0.77
Arkansas	15.0%	11.4%	1.43	1.04	0.73
Louisiana	12.9%	7.8%	2.33	1.33	0.57

An aging nation

In 2014, 46.2 million people in the United States were 65 years older. By 2060, the U.S. Department of Health and Human Services projects there will be 98 million people 65 years or older—more than double the number in 2014.[23] Despite this approaching wave of older adults, transportation planners and engineers do not routinely consider the needs of older people in their street planning. Even among communities that have passed Complete Streets policies, few make explicit mention of older road users.

AARP, a partner on this report, advocates for street design that allows people of all ages to get where they need to go "whether by car, public transportation, bicycle, wheelchair, or foot" and specifically encourages planners and engineers to "build upon the principles of Complete Streets to address the specific needs of older drivers and pedestrians. Adoption of these principles ultimately improves the safety for all road users."[24]

PDI by age, race, and ethnicity

To understand the risks for ethnic, racial and elderly groups after controlling for exposure, a national Pedestrian Danger Index was developed for each racial and ethnic group as well as by age. To calculate this we used a different database for walking rates that includes non-work trips. The Fatality Analysis Reporting System (FARS) data which we normally use to calculate PDI is missing nearly 25 percent of the data for race and ethnicity, making it challenging to calculate PDI for these groups. To account for this, we used more complete data from the Centers for Disease Control and Prevention (CDC) for fatality rates, and the 2009 National Household Travel Survey to calculate "journeys." [26] Figure 7 below compares PDI across populations based on age, race, and ethnicity.

As Figure 7 shows, the analysis adjusting for walk rates and exposure shows the Black Non-Hispanic community demonstrates a higher PDI than the population as a whole. According to the CDC data, pedestrians identified as Black Non-Hispanic community died at a rate of 2.65 people per 100,000. This community also tends to walk more than the general population—the National Household Travel Survey data showed that the Black Non-Hispanic community walked for almost 12 percent the trips taken, compared to 10.5 percent for the population overall. By contrast, the PDI for the Hispanic population is lower than the PDI for the population as a whole despite the fact that their death rate is disproportionately high when compared simply against their representation in the population.

Also striking is the PDI for older adults: PDI is significantly higher than average for individuals over 65 years old, and even higher for individuals over 75. The PDI for this population group hovers near 42.5, compared to 18.5 for the general population. This is because this group walks less than other groups and yet these individuals are struck and killed more than other groups analyzed in this chart.

FIGURE 7

PDI by age, race, and ethnicity

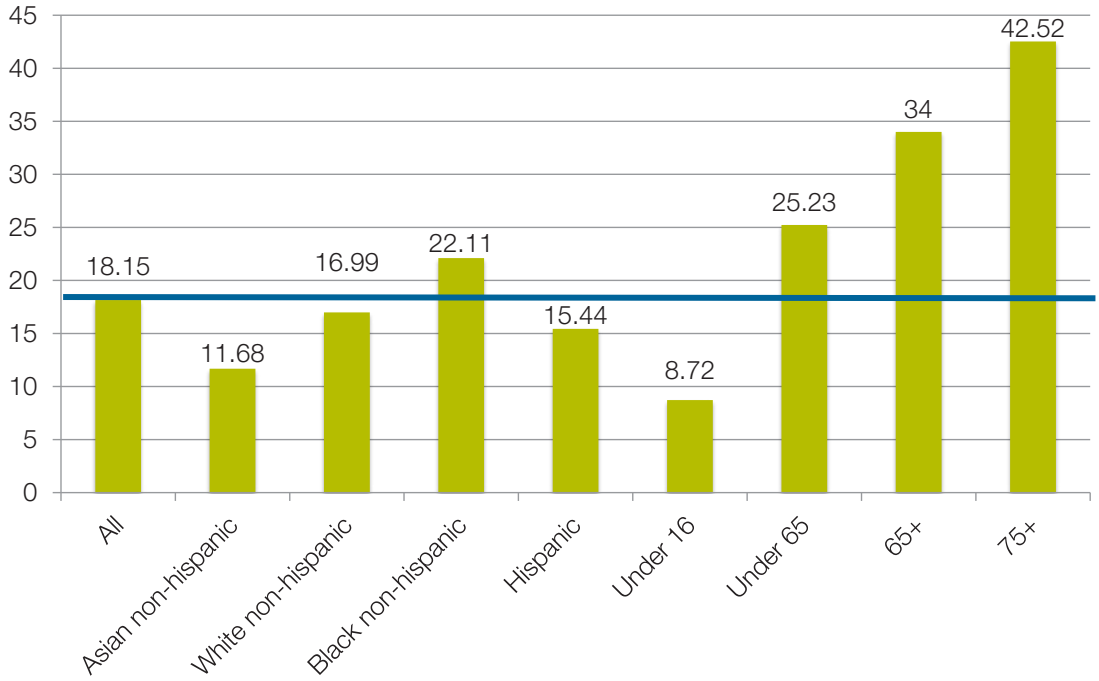
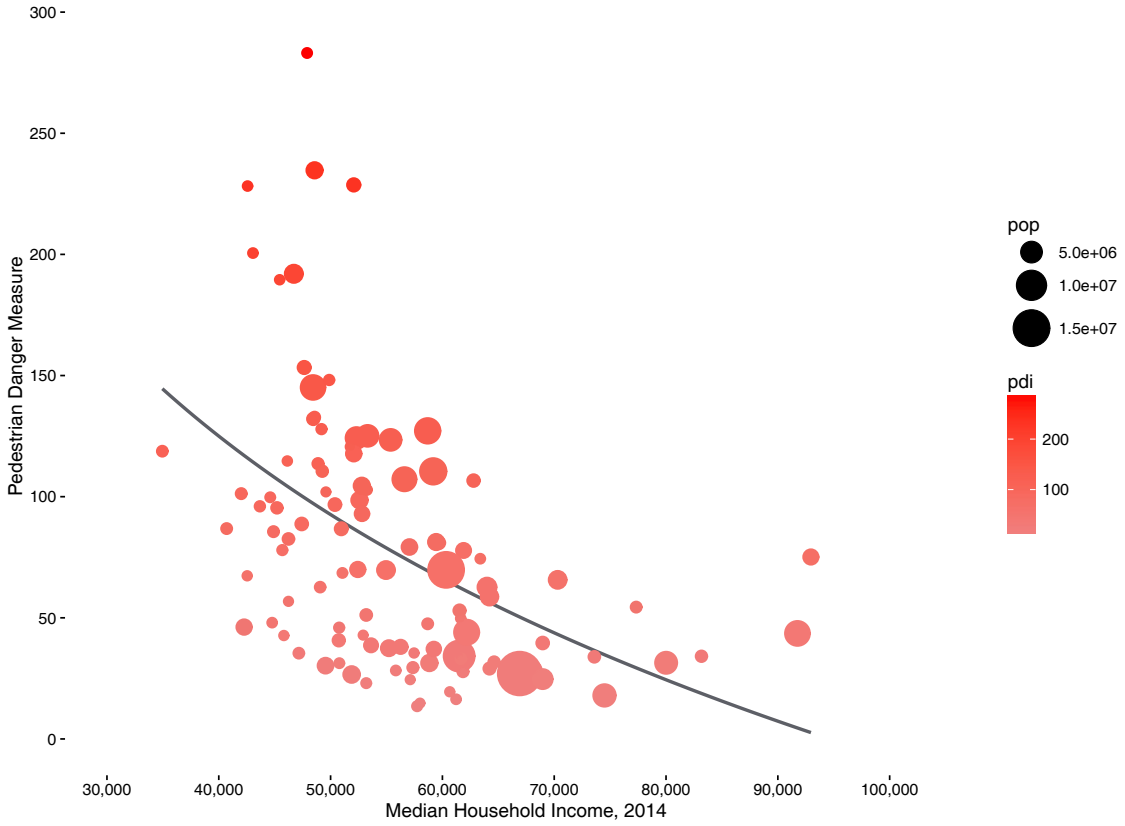


FIGURE 8

Relationship between metro area median household income and PDI



Income and income-related indicators

In addition to examining who the victims are of these crashes, we also examined where crashes take place. The data show a negative correlation between a metro area's median household income and its PDI. **Higher-income metro areas are correlated with lower PDIs** than lower-income metro areas. Figure 8 above shows how PDIs decrease as median household incomes rise.

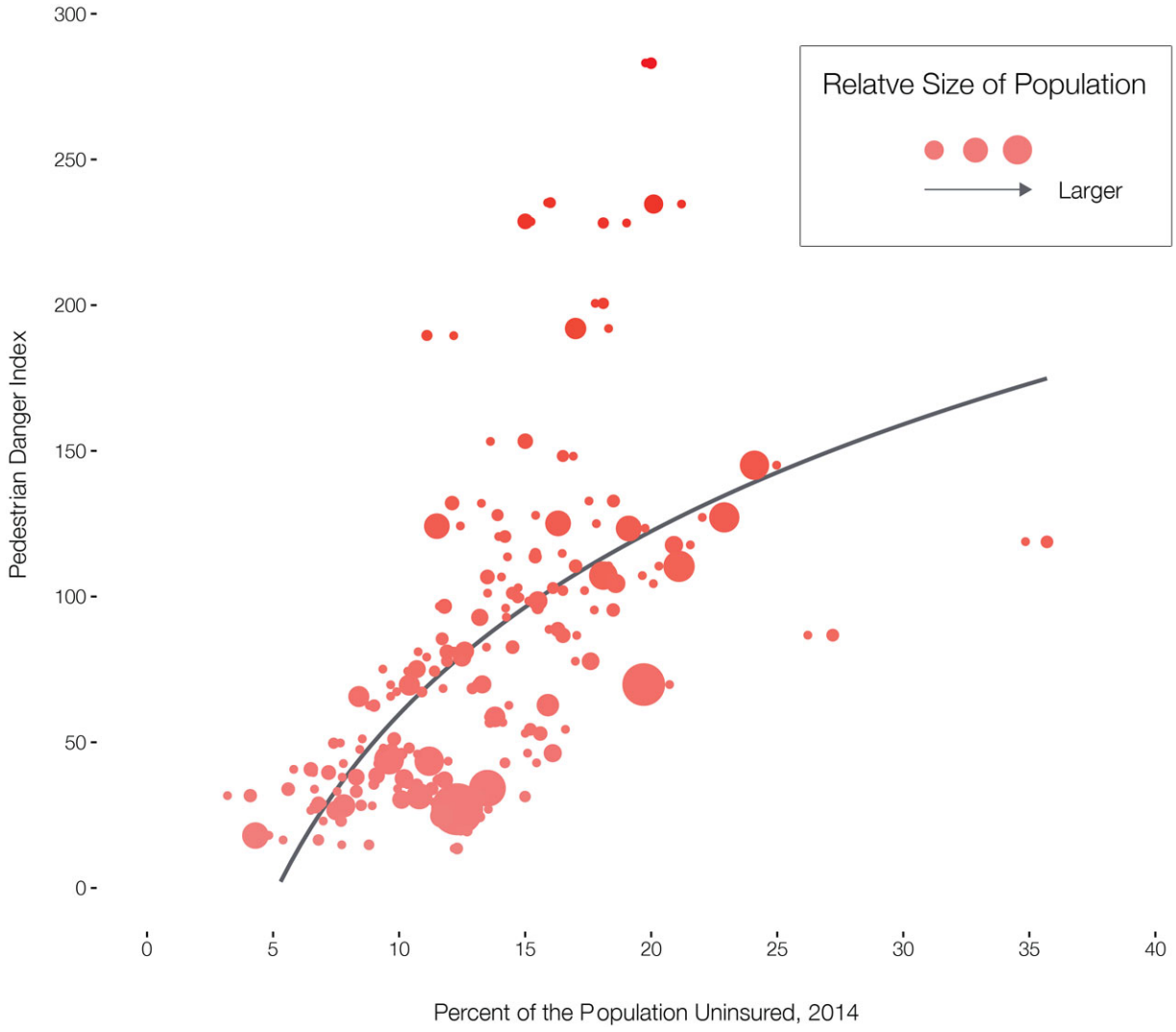
Similar to income, **the rate of uninsured people is also correlated with a metro area's PDI.** Figure 9 on page 24 shows how rates of uninsured people predictably rise along with PDI.

The rate of uninsured individuals is closely related to income levels, so it is unsurprising that examining these factors yield related results. However, these data on uninsured rates are deeply troubling for the simple reason that the places where people are most likely to lack access to high-quality medical care are also the places where people are likely to be struck and killed by a car while walking.

Like the points on page 16 about people of color and older adults, lower income metro areas may experience relatively higher levels of pedestrian fatalities simply because more people walk in those places. And as before, lower incomes may make walking a necessity, forcing people to higher levels of exposure and therefore risk.

FIGURE 9

Relationship between percentage of uninsured individuals and PDI



Making Streets Safer

Making Streets Safer by Design

We must use every tool available to improve safety for pedestrians. Public awareness campaigns around drunk or distracted driving, speed limit enforcement, and reminding pedestrians to cross streets safely are all important parts of this effort. So is better, safer street design.

The data show that street design matters. Multiple studies have found that reducing the number of travel lanes and installing median islands have substantially reduced all crashes, including those that often result in serious injury or death for pedestrians.[27] Reducing speeding can be similarly lifesaving. Nationally, speeding causes nearly one-third of all traffic fatalities each year, or close to 10,000 deaths. Speeding increases the likelihood of crashes with people walking and also it increases the probability that those crashes will cause injuries that are far more serious.[28] At 20 mph, the risk of death to a person on foot struck by a vehicle is 6 percent. At 30 mph, that risk of death is three times greater. And at 45 mph, the risk of death is 65 percent—11 times greater than at 20 mph. When struck by a car going 50 mph, pedestrian fatality rates are 75 percent and injury rates are more than 90 percent.[29]

Policy, design, enforcement, and culture all contribute to these dangerously high speeds. Road designs meant for highways—such as wide, straight lanes—can be dangerous when applied to the streets that go through communities and are lined with homes, shops, schools and offices. These road designs can encourage people to drive far faster than intended or appropriate for these community streets where people need and want to walk. Common practice in traffic engineering calls for speed limits to be set based on how fast drivers tend to go on a given section of roadway—a self-fulfilling prophecy when roads are designed for higher speeds.

Policy, design, enforcement, and culture can also be part of the solution. Understanding how people use—and want to use—streets and public spaces is the first step. People walk along dangerous roads despite the clear safety risk. This is not user error. Rather, it is a sign that these streets are failing to serve the needs of everyone in a community.

A Complete Streets approach helps transportation planners and engineers see streets from this perspective, and consider how to keep people walking separate from people driving vehicles; keep traffic speeds low; ensure sidewalks and curb ramps are accessible to people with disabilities; and clarify where each road user should be expected to travel. With these principles set, planners, landscape architects, and engineers can select from a large set of nationally used appropriate design elements, including but not limited to: wide sidewalks; curb extensions; refuge islands; pedestrian countdown signals; leading pedestrian interval signal timing; midblock crossings (especially at transit stops); pedestrian hybrid beacons; narrow travel lanes; planting street trees; restricted right turns on red lights; compact intersections; back-in angled parking and smaller curb radii.

Setting a vision for safer streets allows transportation agency staff to find appropriate design solutions, regardless of prevailing speed. They can design and redesign streets to include features to encourage safer—and slower—driving speeds. In addition, they can also employ tools to provide people walking with sidewalks, frequent safe opportunities to cross streets and, where possible, greater separation from traffic with landscaped buffers, protected bike lanes or parked cars. In some cases, this means changing city or state policy to allow for lower speed limits, especially in residential areas or near parks and schools.

Finally, transportation agencies should work with law enforcement, hospital staff and emergency responders to better track injuries. Many crashes with pedestrians that result in injury are not included in current data because they are unreported. By coordinating data, communities have a better idea of where and how often crashes and injuries occur—and can begin to prevent them from happening in the future through appropriate targeted interventions.

Recommendations

Governments at all levels need to do more to protect people from being struck and killed or injured by cars while walking. In particular, leaders must take action to better protect people who are consistently at higher risk of these collisions.

Changing how we design and build infrastructure is an enormous part of the solution. Local, state, and federal government all play a role in creating and maintaining our transportation system. That also means government can and should take action to transform our historical transportation planning processes that focus just on vehicles to one that recognizes all users, regardless of age, race, ethnicity, gender, income, ability, or mode.

Mayors, city councils, county, and regional governments

At the local level, city, county, and regional governments are responsible for maintaining and creating locally owned transportation infrastructure, including sidewalks, bike lanes, and trails. In addition, local governments create and oversee the land use regulations for their communities, which dictate the rules and regulations around transportation. Local governments fund part of the transportation system within their jurisdictions. Local governments also oversee public works, such as storm water and drainage projects, which have opportunities to change the street network.

Because local governments exercise so much control of the day-to-day ways in which their transportation systems are built, they should both adopt and implement Complete Streets policies. To date, over 1,200 communities in the United States have adopted Complete Streets policies. However, those communities must take the bold steps to implement their policies, which requires a DOT not only changing their planning processes, project selection criteria procedures, design guidelines, land use regulations, and exceptions processes, but also their organizational culture to recognize all modes of transportation. Local jurisdictions must commit to the long-term work of turning the Complete Streets policies into practice.

Governors and state departments of transportation staff

States are often responsible for the design of major arterial roads in cities, and can do more to make these dangerous streets safer. Eighteen states have already adopted Complete Streets policies. They must now work to implement the policies by addressing the institutional, policy and culture barriers to making streets safer.

Many states have adopted a Vision Zero or Toward Zero Deaths program with the goal of ending all traffic deaths. These partnerships between state departments of transportation and law enforcement are largely focused on vehicle and truck driver safety, and usually focus on reducing distracted driving, driving under the influence, and falling asleep at the wheel. These programs should be broadened to include street design, pedestrian and bicycle deaths, collision data collection and analysis, as well as programs aimed to keep pedestrians and bicyclists safe.

States can also make sure highway interchanges within communities accommodate safe access for pedestrians and bicyclists. When highways go through a community, interchanges often become home to amenities like movie theatres, shopping centers, medical facilities, and even transit

Road designs meant for highways can be dangerous when applied to the streets that go through communities.

We must use every tool available to improve safety for pedestrians.

stations. Many interchanges prioritize fast vehicle movement at the cost of pedestrian safety, making it difficult for both drivers and pedestrians to find a way to safely use the same space. Keeping crossing distances short, allowing for mid-block crossings when distances between signalized intersections are long, allowing enough signal time for every person to safely cross, and lighting the crossings are among some of the strategies that are appropriate for these kinds of streets. Better integration of safe streets principles at interchanges would help everyone travel safely in these places.

Federal agency staff and members of Congress

Federal agencies also influence how America's roads are designed and built. The federal government should continue to encourage design and engineering flexibility. The Federal Highway Administration's recently published guide to help states, local governments, transit agencies, and others make the most of their road infrastructure is one great example of how agencies can encourage better practices nationwide.[30]

The most recent transportation bill, 2015's FAST Act, included several provisions that would make streets safer. Those provisions include technical training to states and MPOs on how to implement a Complete Streets approach, and a national repository of best practices on safe and adequate accommodation of all users of a transportation network in all phases of project planning, development, and operation. The FAST Act also called for a report cataloging examples of state law or policy that provide for the safe and adequate accommodation of all users. The next administration should take action on all these items.

The federal government also distributes billions of dollars every year to states and local jurisdictions for highways, roads projects, transit, transit-oriented development, and bicycle and pedestrian facilities. This includes the popular TIGER Program, which has invested hundreds of millions of dollars into active transportation projects, such as a $14.1 million grant to Mobile, AL to support their Complete Streets work. The Surface Transportation Block Grant program, formally known as the Transportation Alternatives Program, and Safe Routes to Schools program are other worthwhile programs that the federal government should continue to invest in.

Federal funding should go to projects that will move the most people—regardless of how they travel. Federal funding should also be directed to projects that will make streets safer for all users of the roadway system. The allocation of any new transportation package should be transparent and deliver safety, accessibility, and opportunity for everyone living in America, regardless of age, gender, race, gender, income, or ethnicity.

Every American

Every American who walks, bikes, or wheelchair rolls along America's streets—as well as those who want to but don't have a safe place—can encourage policymakers to take the actions outlined above. Make sure your local elected leaders know you care about safer street design. Ask your state legislators what they're doing to address pedestrian deaths. And urge your members of Congress to invest federal dollars in projects that use a Complete Streets approach.

Communities across the country are taking action to make streets safer for people walking. Over 1,200 Complete Streets policies at the state and local level, along with changes to federal legislation and guidance, are undeniably praiseworthy. They are also only the first step.

Conclusion

The next step is to transform these policies into changes on the ground. Communities across the country must use these policies to change how transportation decisions are made, how roadways are designed, and ultimately, how projects get built.

Many of the roads where fatal collisions occurred were built with federal money and to the specifications of federal guidance. New federal guidelines are a great start to making these streets safer. But elected leaders at all levels of government can take action to address the alarming problem of pedestrian deaths.

The National Complete Streets Coalition works every day to help transportation engineers understand and use a Complete Streets approach to making streets safer for people biking, walking, taking transit, and using assistive devices as well as driving. We have helped communities across the country draft Complete Streets policies and put them in to action. We would look forward to working with your community, too. Get more information about writing and implementing policies, as well as how the Coalition can help your community, at smartgrowthamerica.org/complete-streets.

Together we can make America's streets safer for everyone who uses them. The life of your child, parent, neighbor—or your own life—could depend on it.

Every American who walks, bikes, or wheelchair rolls along America's streets—as well as those who want to but don't have a safe place—can encourage policymakers to take action.

Appendix

Methodology

The Pedestrian Danger Index is a measure developed to account for raw pedestrian fatalities, relative populations of each place we measured and the most accurate source of pedestrian data we have – the US Census reported "Travel to Work" data. The formula allows Dangerous by Design to compare data regarding pedestrian deaths, whether the count is measured in Wyoming or California, or in a place like New York City, where many people die each year on foot, but many more people are walking on a daily basis, too. The formula looks like this:

$$\frac{\text{Average annual pedestrian fatalities (2009-2014) /total population (in 2014)} \times 100{,}000}{\text{Percentage of commuters who walk to work}}$$

We chose to use the American Community Survey estimate for population from 2009 to 2014 to ensure that the PDI was calculated with the most up-to-date population numbers.

The measure called Relative Risk aims to compare a population-adjusted look at the disparity among certain groups of people through a lens of age, race, or ethnicity. This measure looked to calculate the rate of in-group pedestrian deaths (i.e. population over 65 years old, population that identified as non-white) as compared to that from outside the group (i.e. population not over 65 years old, and population that identified as white). We are limited to the data that is actually reported, and some states have been more diligent than others since 2009. For example, Hawaii's population over 65 died at a rate of 4.96 people per 100,000, compared to its under-65 population, which died at a rate of 1.22 people per 100,000. This number is 4.07 times lower, so we state that the *relative risk* for the over-65 population is 4.07, or: in Hawai'i a person older than 65 is 4.07 *times more likely to die* as a pedestrian younger than 65.

Wherever possible, complete records are used for Fatality Analysis Reporting System (FARS) data and all trends are calculated using at least a 90 percent confidence interval. Trends are reported as descriptive statistics and are not necessarily validated for predictive modeling.

To calculate the number of pedestrian fatalities by state, we used the State designation as reported by FARS. We believe that these data are complete as reported. To calculate the number of fatalities by metropolitan statistical area (MSA), we performed a spatial join with the latitude/longitude as reported by FARS. Because not every entry into the database was fully complete—including some missing spatial data—there is a chance that the estimated deaths per MSA is conservative.

Socio-economic data are presented at the MSA level to generalize geographic statistics in conjunction with the larger report themes. Journey to work data, as presented in calculating the Pedestrian Danger Index, is taken to mean that the pedestrian mode share is the primary mode from origin to destination.

A Point About Our Data

The 2014 edition of *Dangerous by Design* called for better data in future versions. Unfortunately, many of the same data challenges remain for this edition.

The FARS database is often incomplete, and details on existing infrastructure are limited. We are also not sure how often people walk—the U.S. Census Bureau's Travel to Work data is a close approximation but far from perfect.

Data on all these issues should be collected better, more frequently, be more open, and more interactive. State departments of transportation can and should measure the impact of pedestrian, bicyclist, and Complete Streets projects, both in terms of dollars spent as well as crash, injury, and mortality rates both before and after project completion. This type of reporting would create a baseline national metric, allow agencies to share ideas, and most importantly, help reduce the number of people being killed while walking on America's streets.

Additional state information

TABLE A1

Pedestrian deaths by race relative to state population, 2005-2014

Numbers where pedestrian deaths by race are overrepresented are highlighted in red.

State	Pop., Native American	Deaths, Native American	Pop., Asian	Deaths, Asian	Pop., Hispanic	Deaths, Hispanic	Pop., African American	Deaths, African American	Pop., white	Deaths, white
Alabama	0.5%	0.2%	1.2%	1.4%	4.0%	5.6%	26.2%	37.9%	66.6%	55.6%
Alaska*	13.7%	60.9%	6.6%	1.4%	6.2%	0.0%	3.3%	1.4%	62.9%	36.2%
Arizona†	4.0%	24.4%	3.0%	0.5%	30.1%	35.9%	3.9%	5.6%	56.9%	41.8%
Arkansas	0.6%	0.3%	1.5%	0.9%	6.7%	5.6%	15.5%	29.5%	73.9%	68.7%
California	0.4%	1.2%	13.7%	11.0%	38.2%	41.5%	5.7%	10.5%	39.2%	40.5%
Colorado	0.5%	2.4%	2.9%	2.2%	20.9%	34.0%	3.8%	8.7%	69.4%	56.6%
Connecticut*	0.1%	0.0%	4.1%	4.2%	14.3%	10.1%	9.5%	15.0%	69.8%	72.6%
Delaware	0.3%	0.0%	3.4%	2.1%	8.6%	7.9%	21.1%	17.8%	64.4%	72.8%
District of Columbia*	0.2%	1.0%	3.6%	2.0%	9.9%	13.7%	48.7%	64.7%	35.4%	21.6%
Florida	0.2%	0.4%	2.5%	1.3%	23.3%	29.8%	15.4%	17.3%	56.6%	58.3%
Georgia†	0.2%	0.3%	3.5%	2.9%	9.1%	13.8%	30.4%	43.8%	55.0%	44.3%
Hawaii	0.1%	1.8%	46.3%	69.5%	9.6%	8.2%	1.8%	1.4%	22.9%	23.2%
Idaho*	1.1%	4.3%	1.4%	0.0%	11.7%	16.0%	0.5%	0.0%	83.3%	83.0%
Illinois*	0.1%	0.0%	4.9%	3.3%	16.3%	19.5%	14.2%	24.1%	62.9%	56.7%
Indiana†	0.2%	0.2%	1.8%	1.4%	6.3%	7.1%	9.0%	18.1%	80.8%	75.3%
Iowa*	0.3%	0.0%	2.0%	2.8%	5.3%	4.0%	3.0%	5.6%	87.8%	87.6%
Kansas	0.7%	2.7%	2.6%	0.5%	11.0%	10.8%	5.7%	9.7%	77.4%	77.8%
Kentucky	0.2%	0.0%	1.3%	0.4%	3.2%	3.1%	7.8%	11.6%	85.8%	86.4%
Louisiana†	0.6%	0.2%	1.7%	1.8%	4.6%	8.0%	31.9%	84.7%	59.7%	16.0%
Maine*	0.5%	2.3%	1.1%	0.0%	1.4%	0.0%	1.1%	0.0%	94.0%	97.7%
Maryland*	0.2%	0.0%	5.9%	3.0%	8.8%	5.6%	29.0%	38.3%	53.6%	54.8%
Massachusetts*	0.1%	0.2%	5.8%	4.6%	10.2%	10.2%	6.4%	11.2%	75.0%	76.1%
Michigan*	0.5%	3.4%	2.6%	2.1%	4.6%	4.4%	13.8%	32.4%	76.1%	58.8%
Minnesota*	1.0%	7.2%	4.3%	2.9%	4.9%	3.6%	5.3%	6.5%	82.1%	79.8%
Mississippi	0.4%	0.6%	0.9%	1.2%	2.8%	3.7%	37.2%	45.9%	57.6%	50.6%
Missouri	0.4%	0.2%	1.8%	2.1%	3.8%	3.5%	11.4%	22.6%	80.5%	72.4%
Montana	6.3%	28.1%	0.7%	0.0%	3.2%	2.6%	0.4%	0.9%	87.2%	68.4%
Nebraska	0.7%	4.9%	2.0%	0.0%	9.7%	11.1%	4.5%	9.9%	81.2%	76.5%
Nevada*	0.9%	1.4%	8.0%	7.0%	27.2%	22.6%	8.0%	13.7%	52.7%	64.2%
New Hampshire*	0.2%	0.0%	2.3%	1.5%	3.1%	1.5%	1.1%	2.9%	91.7%	94.1%
New Jersey*	0.1%	0.2%	8.8%	6.6%	18.6%	23.3%	12.8%	17.9%	57.8%	57.9%
New Mexico	8.5%	35.9%	1.3%	0.7%	47.0%	39.1%	1.8%	2.5%	39.6%	28.7%
New York†	0.2%	0.5%	7.7%	9.2%	18.2%	20.9%	14.4%	17.1%	57.3%	72.3%
North Carolina	1.1%	2.7%	2.4%	1.3%	8.7%	10.5%	21.2%	32.3%	64.6%	58.3%
North Dakota	5.1%	37.5%	1.2%	0.0%	2.6%	3.6%	1.5%	1.8%	87.7%	58.9%
Ohio	0.1%	0.1%	1.8%	1.3%	3.3%	3.6%	12.0%	20.0%	80.5%	76.4%

State	Pop., Native American	Deaths, Native American	Pop., Asian	Deaths, Asian	Pop., Hispanic	Deaths, Hispanic	Pop., African American	Deaths, African American	Pop., white	Deaths, white
Oklahoma*	6.9%	17.5%	1.9%	1.0%	9.4%	9.6%	7.1%	13.0%	67.8%	64.4%
Oregon	1.0%	2.7%	4.2%	2.9%	12.1%	10.4%	1.7%	2.0%	77.6%	83.3%
Rhode Island*	0.4%	2.0%	3.1%	2.9%	13.3%	9.8%	5.2%	12.7%	75.1%	77.5%
South Carolina	0.3%	0.1%	1.4%	0.2%	5.3%	7.9%	27.4%	39.3%	63.9%	53.4%
South Dakota	8.3%	50.0%	1.2%	1.4%	3.2%	2.9%	1.5%	0.0%	83.6%	45.7%
Tennessee	0.2%	0.0%	1.6%	1.7%	4.8%	7.3%	16.7%	26.0%	75.0%	68.6%
Texas†	0.3%	0.7%	4.1%	2.9%	38.2%	52.4%	11.6%	24.2%	44.3%	22.5%
Utah†	1.0%	5.3%	3.0%	6.8%	13.3%	19.5%	1.0%	0.0%	79.8%	70.0%
Vermont	0.3%	0.0%	1.3%	0.0%	1.6%	0.0%	1.0%	0.0%	93.9%	100.0%
Virginia*	0.2%	0.2%	5.8%	5.7%	8.4%	7.8%	18.9%	30.6%	63.9%	56.9%
Washington	1.2%	7.3%	8.0%	7.2%	11.7%	10.0%	3.5%	4.7%	71.3%	73.1%
West Virginia	0.2%	0.0%	0.7%	0.5%	1.3%	1.1%	3.2%	3.2%	92.7%	95.7%
Wisconsin	0.8%	3.8%	2.4%	3.3%	6.2%	9.5%	6.1%	12.4%	82.7%	73.2%
Wyoming	2.0%	16.3%	1.0%	2.3%	9.4%	7.0%	1.0%	0.0%	84.8%	76.7%

* Missing >15% of fatalities with incomplete race/ethnicity data

† Missing >30% of fatalities with incomplete race/ethnicity data

Pennsylvania excluded from chart, >90% of fatalities lack race/ethnicity data

Endnotes

Endnotes

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8 The State of Obesity: A Project of the Trust for America's Health and the Robert Wood Johnson Foundation. (2014). "Obesity Prevention In Black Communities." Retrieved December 30, 2016 from http://stateofobesity.org/disparities/blacks/.

9 No common, rigorous survey of all walking trips exists across cities, regions or states. We use the share of people who walk to work, as reported in the U.S. Census Bureau's American Community Survey, to approximate the total number of people who walk for all trips.

10 No national average for metro areas was included in Dangerous by Design 2014. The 72.26 number was calculated by averaging the numbers in Table 1, starting on page 5, and weighting them for population. Available at https://smartgrowthamerica.org/resources/dangerous-by-design-2014/.

11 National average PDI is weighted based on population.

12 State average PDIs are weighted by population.

13 Eight Florida metro areas are included in the list of the ten highest PDIs in the country. They are: Cape Coral-Fort Myers, FL; Palm Bay-Melbourne-Titusville, FL; Orlando-Kissimmee-Sanford, FL; Jacksonville, FL; Deltona-Daytona Beach-Ormond Beach, FL; Lakeland-Winter Haven, FL; Tampa-St. Petersburg-Clearwater, FL; and North Port-Sarasota-Bradenton, FL.

14 Smart Growth America for the Florida Department of Transportation. (2015, December). "Complete Streets Implementation Plan." Available at https://smartgrowthamerica.org/fdots-new-complete-streets-implementation-plan-will-take-policy-into-practice/.

15 A full list of Complete Streets policies in place across the country is available on Smart Growth America's website at https://smartgrowthamerica.org/program/national-complete-streets-coalition/policy-development/policy-atlas/.

16 We chose to compare 2016's PDIs to those from 2011, not 2014, in reflection of the fact that substantial changes to street networks often take longer than two years. The first edition of Dangerous by Design was released in 2009. However, our methodology has changed significantly enough since 2009 to render that comparison inaccurate.

17 Hardy, M., Long, L., Oakley, J., Pisarski, AE, Polzin, SE, Spear, B., Weinberger, P. (2013, September). "Commuting in America: The National Report on Commuting Patterns and Trends, Brief 7. Vehicle and Transit Availability." AASHTO Census Transportation Planning Products Program. Retrieved on December 20, 2016 from http://traveltrends.transportation.org/Documents/B7_Vehicle%20and%20Transit%20Availability_CA07-4_web.pdf.

18 In addition to African American, Hispanic, Asian, and Native American, "non-white" also includes "Other race" and "Two or more races," hence why the total of "non-white" deaths is greater than the sum of the four additional categories listed here.

19 We use the Fatality Analysis Reporting System (FARS) data to calculate fatalities by race, but nearly one quarter of FARS records are missing race information.

20 Pennsylvania was excluded from our analysis of deaths by race: over 90% of fatalities in Pennsylvania lack race or ethnicity data.

21 Ibid.

22 Ibid.

23 U.S. Department of Health and Human Services, Administration for Community Living. "Aging Statistics." Retrieved December 19, 2016 from https://aoa.acl.gov/Aging_Statistics/index.aspx.

24 AARP Public Policy Institute. (2009, May). "Planning Complete Streets for an Aging America." Retrieved December 19, 2016 from http://assets.aarp.org/rgcenter/ppi/liv-com/2009-12-streets.pdf.

25 The Centers for Disease Control and Prevention WISQUARS database is available at https://www.cdc.gov/injury/wisqars/fatal_injury_reports.html. The National Household Travel Survey is available at http://nhts.ornl.gov/. Because of the relatively small sample size from the NHTS, this database is not appropriate to use when calculating state or metro area PDI. 2009 is the most recent year for which data are available.

26 Federal Highway Administration. Office of Safety. (n.d.). Proven Safety Countermeasures. Retrieved from http://safety.fhwa.dot.gov/provencountermeasures/.

27 Leaf, W.A. and Preusser, D.F. (1999). "Literature review on vehicle travel speeds and pedestrian injuries among selected racial/ethnic groups." U.S. Department of Transportation National Highway Traffic Safety Administration. Retrieved December 19, 2016 from http://www.nhtsa.gov/people/injury/research/pub/HS809012.html.

28 Tefft, B. (2013). "Impact Speed and a Pedestrian's Risk of Severe Injury or Death." Accident Analysis and Prevention, 50, 871-878.

29 Federal Highway Administration. (2016, August). "Achieving Multimodal Networks: Applying Design Flexibility and Reducing Conflicts." Available at http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_networks/.