Smart Growth America
Making Neighborhoods Great Together

National Complete Streets Coalition

Dangerous by Design 2014

May 2014

Acknowledgments

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 community, by changing the way most roads are planned, designed and constructed. Complete Streets policies direct transportation planners and engineers to consistently plan and design streets with all users in mind.

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.

This project was made possible by the following organizations and individuals:

AARP is a nonprofit, nonpartisan organization, with a membership of nearly 38 million, that helps people turn their goals and dreams into real possibilities, strengthens communities and fights for the issues that matter most to families such as healthcare, employment and income security, retirement planning, affordable utilities and protection from financial abuse. We advocate for individuals in the marketplace by selecting products and services of high quality and value to carry the AARP name as well as help our members obtain discounts on a wide range of products, travel, and services. A trusted source for lifestyle tips, news and educational information, AARP produces AARP The Magazine, the world's largest circulation magazine; AARP Bulletin; www.aarp.org/; AARP TV & Radio; AARP Books; and AARP en Español, a Spanish-language website addressing the interests and needs of Hispanics. AARP does not endorse candidates for public office or make contributions to political campaigns or candidates. The AARP Foundation is an affiliated charity that provides security, protection, and empowerment to older persons in need with support from thousands of volunteers, donors, and sponsors. AARP has staffed offices in all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. Learn more at www.aarp.org/.

Founded in 1899, the **American Society of Landscape Architects** is the national professional association for landscape architects, representing more than 15,000 members in 49 professional chapters and 72 student chapters. Members of the Society use "ASLA" after their names to denote membership and their commitment to the highest ethical standards of the profession. Landscape architects lead the stewardship, planning, and design of our built and natural environments; the Society's mission is to advance landscape architecture through advocacy, communication, education, and fellowship.

America Walks is the only national organization devoted exclusively to making America a great place to walk. We do this by providing a voice for walking and walkability through federal government affairs, by providing strategy support, training and technical assistance to regional, statewide and local organizations and individuals, and via the Every Body Walk! Collaborative, a national partnership focused on increasing the visibility of walking and cultivating consumer demand for more walkable places.

Project Team

Geoff Anderson, Smart Growth America
Craig Chester, Smart Growth America
Kara Davis, Loop Strategies
Steve Davis, Transportation for America
Alex Dodds, Smart Growth America
Derek Eder, DataMade
Michelle Ernst, Ernst Transportation Analytics
David Goldberg, Transportation for America
Jeri Mintzer, Smart Growth America
Colin Murphy, Smart Growth America
Ilana Preuss, Smart Growth America
Laura Searfoss, Smart Growth America
Stefanie Seskin, Smart Growth America
Sam Warlick, Smart Growth America

This report, including data for each state and an interactive map of 47,000+ pedestrian fatalities from 2003 to 2012, can be accessed online at www.smartgrowthamerica.org/dangerous-by-design.

Cover photo: April Bertelsen, Portland Bureau of Transportation

Table of Contents

Introduction

American communities are poised for a renaissance in walking. We're walking more often, for fun and to get to places in our neighborhood. We turn to WalkScore.com when figuring out where to live and our most walkable places often are among the most economically vibrant in the country. Hundreds of cities have adopted Complete Streets policies to ensure walking is at the forefront of our decisions regarding street design. Public health organizations from the U.S. Centers for Disease Control and the Office of the Surgeon General to the local doctor's office are encouraging us to get out for a walk for physical activity and to combat chronic disease. And indeed, we are walking: six out of 10 people walk for physical activity, and the share of adults who said they walk for transportation grew 6 percent from 2005 to 2010, according to the most recent data available.[1]

But we are still dealing with a legacy of roadways that fail to account for the safety of people on foot.

In the decade from 2003 through 2012, **47,025 people died** while walking on our streets. That's sixteen times the number of Americans who died in natural disasters—earthquakes, floods, hurricanes and tornadoes—over the last 10 years.[2]

On top of that, an estimated **676,000 were injured**—meaning someone on foot was hit by a car about every eight minutes.[3]

Nationally, pedestrians represented 12.3 percent of total traffic deaths over this decade (see Figure 1 on page 2). After decreasing slightly in the first few years of the past decade, the fatality numbers have been rising more recently. A total of 4,280 people walking died in traffic crashes in 2010. That number increased to 4,432 in 2011, and 4,743 in 2012. **In 2012, people on foot represented nearly 15 percent of all traffic fatalities (see Figure 1 on page 2).**[4]

When emphasizing safety and protective design for cars, we've witnessed improved safety. The number of drivers and passengers of vehicles who died in traffic crashes dropped by one third from 2003 to 2012. We realized this significant drop by focusing on vehicle design, encouraging and enforcing seat belt use, cracking down on drunk driving and curbing distracted driving—saving thousands of loved ones.

We have invested nowhere near the same level of money and energy in providing for the safety and security of people when they are walking.

---

1 U.S. Centers for Disease Control and Prevention. (August 2012). More people walk to better health. CDC Vital Signs. Retrieved from www.cdc.gov/vitalsigns/pdf/2012-08-vitalsigns.pdf.

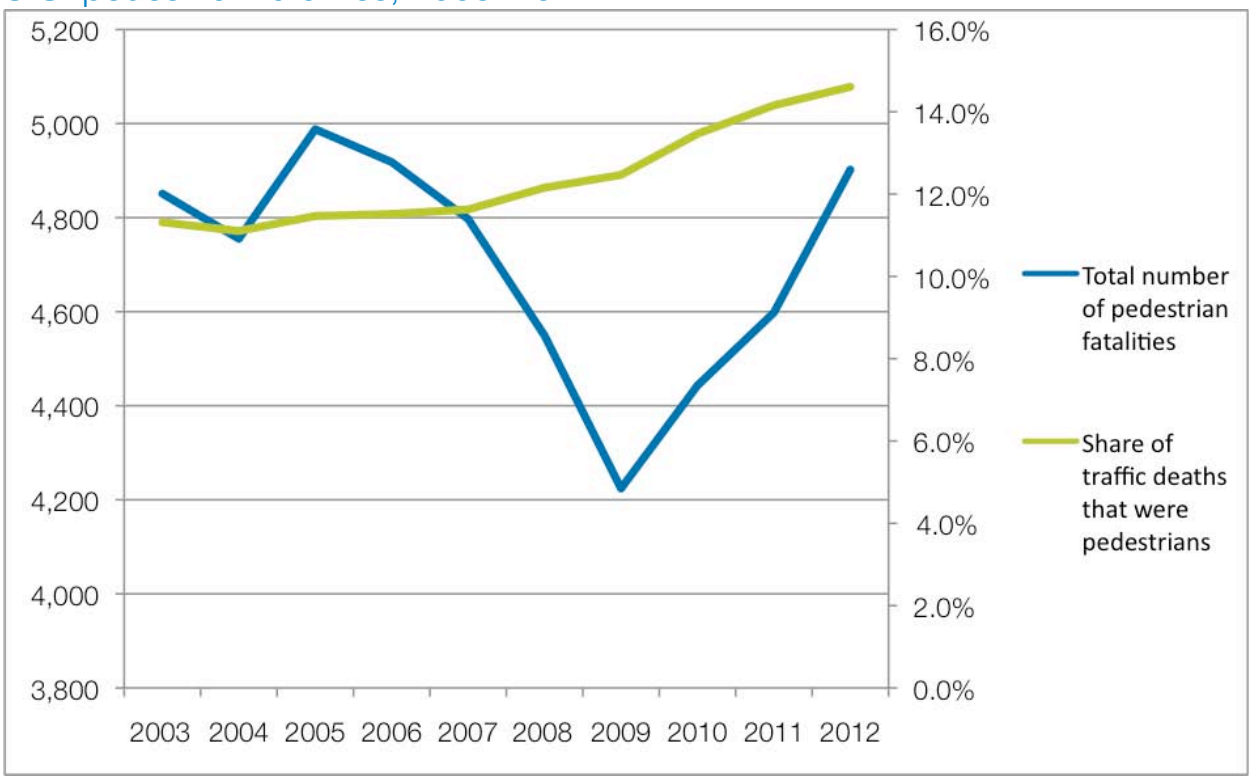
2 According to data available from the National Weather Service and the U.S. Geological Survey. See www.nws.noaa.gov/om/hazstats/resources/weather_fatalities.pdf and earthquake.usgs.gov/earthquakes/states/us_deaths.php.

3 National Highway Traffic Safety Administration. General Estimates System. Available at www.nhtsa.gov.

4 Data for all of 2013 was not yet available as of this writing.

FIGURE 1

U.S. pedestrian fatalities, 2003–2012



While pedestrian deaths are labeled “accidents,” the data reviewed here indicate we can prevent the majority of them by taking deliberate steps, through better policy, design, practice and regulation—just as we have done with vehicular deaths. The majority of pedestrian deaths occur on arterial roadways, planned and engineered for speeding automobiles with little consideration for the diversity of people—young, old, with and without disabilities, walking and bicycling—who rely on these streets to get them from point A to point B. The lion’s share of these roadways were built with federal money and designed to federal specifications, so fixing the legacy of dangerous conditions undoubtedly will need to be a national project with federal support.

The urgent need to act is compounded by projected demographic changes. The nation’s older population will nearly double in size in the next 30 years. The number of racial and ethnic minorities is also projected to grow significantly. These groups, along with children, are disproportionately represented in pedestrian deaths.

Most dangerous places to walk

In order to compare the relative safety of one place to another, this report uses a Pedestrian Danger Index (PDI) that gives an indication of the likelihood of a person on foot being hit by a vehicle and killed. The PDI is based on 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 five years of data on pedestrian fatalities.

From 2003-2012, the national PDI was 52.2, and the average annual pedestrian fatality rate was 1.56 per 100,000 people.

As in past years, communities in the Sunbelt, particularly the South, top the list of most dangerous places to walk. These places grew in the post-war period, mostly through rapid spread of low-density neighborhoods that rely on wider streets with higher speeds to connect homes, shops and schools—roads that tend to be more dangerous for people walking.

Metro Orlando tops the list of most dangerous areas to walk this year, followed by the Tampa–St. Petersburg, Jacksonville, Miami and Memphis regions. Across the Orlando region, the calculated PDI for 2003–2012 was 244.28, four times higher than the national PDI. The Birmingham, Houston, Atlanta, Phoenix and Charlotte regions round out the list of the ten most dangerous places to walk.

Table 1 on page 4 ranks the largest U.S. metropolitan areas according to their five-year PDI. The safest places for walking are those with relatively more walking and fewer deaths per capita, as shown by a lower PDI. The less dangerous regions tend to be more compactly developed and place more emphasis on pedestrian safety. We note, however, that in response to previous rankings as “most dangerous,” Florida is improving safety for their residents. See page 8 for more on Florida’s work.

Table 2 on 7 lists the metropolitan areas by share of all roadway deaths that are pedestrians, without controlling for the number of people walking. Communities topping this list include some metro areas that rank lower in PDI, such as the New York–New Jersey metro and the San Francisco region, but it also includes some that rank high for pedestrian danger. Tampa and Miami metros appear at the top of both lists, with a high proportion of pedestrian fatalities and a high risk of being killed.

TABLE 1

Large metro areas, ranked by Pedestrian Danger Index

Rank	Metropolitan area	Total pedestrian deaths (2003–2012)	Annual pedestrian deaths per 100,000 (2008–2012)	Percent of people commuting by foot (2008–2012)	Pedestrian Danger Index (2008–2012)
1	Orlando-Kissimmee, FL	583	2.75	1.1	**244.28**
2	Tampa-St. Petersburg-Clearwater, FL	874	2.97	1.6	**190.13**
3	Jacksonville, FL	359	2.48	1.4	**182.71**
4	Miami-Fort Lauderdale-Pompano Beach, FL	1,539	2.58	1.8	**145.33**
5	Memphis, TN-MS-AR	239	1.72	1.3	**131.26**
6	Birmingham-Hoover, AL*	148	1.33	1.1	**125.60**
7	Houston-Sugar Land-Baytown, TX	1,034	1.70	1.4	**119.64**
8	Atlanta-Sandy Springs-Marietta, GA	839	1.59	1.3	**119.35**
9	Phoenix-Mesa-Scottsdale, AZ	840	1.86	1.6	**118.64**
10	Charlotte-Gastonia-Concord, NC-SC	254	1.65	1.5	**111.74**
11	Detroit-Warren-Livonia, MI	713	1.55	1.4	**111.63**
12	Dallas-Fort Worth-Arlington, TX	900	1.31	1.2	**107.54**
13	Las Vegas-Paradise, NV	413	1.85	1.8	**102.67**
14	Riverside-San Bernardino-Ontario, CA	889	1.81	1.8	**102.17**
15	Nashville-Davidson-Murfreesboro-Franklin, TN	210	1.25	1.2	**100.79**
16	Raleigh-Cary, NC*	165	1.37	1.4	**100.35**
17	Louisville-Jefferson County, KY-IN	200	1.60	1.6	**98.48**
18	San Antonio, TX	373	1.86	1.9	**96.87**
19	Richmond, VA	167	1.32	1.4	**94.98**
20	Oklahoma City, OK	177	1.43	1.6	**87.16**
21	Kansas City, MO-KS	228	1.13	1.3	**85.74**
22	New Orleans-Metairie-Kenner, LA	272	2.09	2.5	**84.90**
23	Sacramento-Arden-Arcade-Roseville, CA	390	1.66	2.0	**81.27**
24	Austin-Round Rock, TX	251	1.44	1.8	**78.58**
25	Indianapolis-Carmel, IN	199	1.16	1.6	**72.98**
26	St. Louis, MO-IL	364	1.22	1.7	**69.69**
27	Los Angeles-Long Beach-Santa Ana, CA	2,435	1.79	2.7	**66.91**
28	Baltimore-Towson, MD	482	1.78	2.7	**66.42**

(Table continues on next page)

Rank	Metropolitan area	Total pedestrian deaths (2003–2012)	Annual pedestrian deaths per 100,000 (2008–2012)	Percent of people commuting by foot (2008–2012)	Pedestrian Danger Index (2008–2012)
29	San Diego-Carlsbad-San Marcos, CA	576	1.79	2.7	**66.02**
30	San Jose-Sunnyvale-Santa Clara, CA	260	1.35	2.1	**65.58**
31	Denver-Aurora-Broomfield, CO	349	1.24	2.1	**58.13**
32	Columbus, OH	187	1.20	2.1	**56.29**
33	Salt Lake City, UT	132	1.26	2.3	**55.28**
34	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	959	1.64	3.7	**44.27**
35	Washington-Arlington-Alexandria, DC-VA-MD-WV	843	1.41	3.2	**44.06**
36	Virginia Beach-Norfolk-Newport News, VA-NC	186	1.13	2.6	**43.60**
37	Buffalo-Niagara Falls, NY	147	1.29	3.0	**43.06**
38	Hartford-West Hartford-East Hartford, CT	121	1.11	2.7	**41.58**
39	Providence-New Bedford-Fall River, RI-MA	198	1.26	3.2	**39.94**
40	Cincinnati-Middletown, OH-KY-IN	187	0.84	2.1	**39.54**
41	Milwaukee-Waukesha-West Allis, WI	183	1.07	2.8	**38.79**
42	Cleveland-Elyria-Mentor, OH	142	0.73	2.1	**34.37**
43	Rochester, NY	121	1.20	3.5	**33.97**
44	Chicago-Naperville-Joliet, IL-IN-WI	1,165	1.03	3.1	**32.94**
45	Portland-Vancouver-Beaverton, OR-WA	250	1.12	3.5	**32.19**
46	Minneapolis-St. Paul-Bloomington, MN-WI	249	0.72	2.2	**32.15**
47	San Francisco-Oakland-Fremont, CA	633	1.36	4.3	**31.44**
48	New York-Northern New Jersey-Long Island, NY-NJ-PA	3,384	1.76	6.2	**28.43**
49	Seattle-Tacoma-Bellevue, WA	375	0.96	3.6	**26.81**
50	Pittsburgh, PA	234	0.90	3.6	**25.10**
51	Boston-Cambridge-Quincy, MA-NH	476	0.99	5.3	**18.65**

Note: Metro areas marked with an asterisk (*) denote a margin of error more than 10 percent for journey-to-work data in the American Community Survey.

Origin and methodology of the PDI

The PDI represents a way to measure the relative exposure rate across the county's metropolitan areas. First developed in the 1990s by the Surface Transportation Policy Partnership and used more recently by Transportation for America, 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 fatalities simply as a function of higher numbers of people on foot overall. 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 2008–2012 American Community Survey, to approximate the total number of people who walk for all trips.

TABLE 2

Large metro areas, ranked by percentage of traffic deaths that were pedestrians, 2003–2012

Rank	Metropolitan area	Total pedestrian deaths (2003–2012)	Total traffic-related deaths (2003–2012)	Pedestrian Danger Index (2008–2012)	Percentage of traffic deaths that were pedestrians (2003–2012)
1	New York-Northern New Jersey-Long Island, NY-NJ-PA	3,384	10,414	28.43	**32.5**
2	Los Angeles-Long Beach-Santa Ana, CA	2,435	8,616	66.91	**28.3**
3	San Francisco-Oakland-Fremont, CA	633	2,360	31.44	**26.8**
4	San Jose-Sunnyvale-Santa Clara, CA	260	1,008	65.58	**25.8**
5	Miami-Fort Lauderdale-Pompano Beach, FL	1,539	6,690	145.33	**23.0**
6	San Diego-Carlsbad-San Marcos, CA	576	2,592	66.02	**22.2**
7	Tampa-St. Petersburg-Clearwater, FL	874	3,998	190.13	**21.9**
8	Detroit-Warren-Livonia, MI	713	3,387	111.63	**21.1**
9	Las Vegas-Paradise, NV	413	2,045	102.67	**20.2**
10	Baltimore-Towson, MD	482	2,394	66.42	**20.1**
11	Washington-Arlington-Alexandria, DC-VA-MD-WV	843	4,204	44.06	**20.1**
12	Boston-Cambridge-Quincy, MA-NH	476	2,399	18.65	**19.8**
13	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	959	4,984	44.27	**19.2**
14	Seattle-Tacoma-Bellevue, WA	375	1,968	26.81	**19.1**
15	Sacramento-Arden-Arcade-Roseville, CA	390	2,051	81.27	**19.0**
16	Buffalo-Niagara Falls, NY	147	774	43.06	**19.0**
17	Denver-Aurora-Broomfield, CO	349	1,845	58.13	**18.9**
18	Orlando-Kissimmee, FL	583	3,093	244.28	**18.8**
19	New Orleans-Metairie-Kenner, LA	272	1,480	84.90	**18.4**
20	Portland-Vancouver-Beaverton, OR-WA	250	1,366	32.19	**18.3**
21	Chicago-Naperville-Joliet, IL-IN-WI	1,165	6,370	32.94	**18.3**
22	Milwaukee-Waukesha-West Allis, WI	183	1,037	38.79	**17.6**

(Table continues on next page)

Rank	Metropolitan area	Total pedestrian deaths (2003–2012)	Total traffic-related deaths (2003–2012)	Pedestrian Danger Index (2008–2012)	Percentage of traffic deaths that were pedestrians (2003–2012)
23	Jacksonville, FL	359	2,060	182.71	**17.4**
24	Phoenix-Mesa-Scottsdale, AZ	840	4,936	118.64	**17.0**
25	Houston-Sugar Land-Baytown, TX	1,034	6,201	119.64	**16.7**
26	San Antonio, TX	373	2,297	96.87	**16.2**
27	Salt Lake City, UT	132	842	55.28	**15.7**
28	Providence-New Bedford-Fall River, RI-MA	198	1,273	39.94	**15.6**
29	Dallas-Fort Worth-Arlington, TX	900	5,838	107.54	**15.4**
30	Riverside-San Bernardino-Ontario, CA	889	5,901	102.17	**15.1**
31	Charlotte-Gastonia-Concord, NC-SC	254	1,751	111.74	**14.5**
32	Atlanta-Sandy Springs-Marietta, GA	839	5,976	119.35	**14.0**
33	Austin-Round Rock, TX	251	1,793	78.58	**14.0**
34	Virginia Beach-Norfolk-Newport News, VA-NC	186	1,334	43.60	**13.9**
35	Raleigh-Cary, NC	165	1,190	100.35	**13.9**
36	Rochester, NY	121	874	33.97	**13.8**
37	Hartford-West Hartford-East Hartford, CT	121	940	41.58	**12.9**
38	Louisville-Jefferson County, KY-IN	200	1,606	98.48	**12.5**
39	Minneapolis-St. Paul-Bloomington, MN-WI	249	2,016	32.15	**12.4**
40	Memphis, TN-MS-AR	239	2,007	131.26	**11.9**
41	Indianapolis-Carmel, IN	199	1,684	72.98	**11.8**
42	Columbus, OH	187	1,656	56.29	**11.3**
43	Oklahoma City, OK	177	1,571	87.16	**11.3**
44	St. Louis, MO-IL	364	3,299	69.69	**11.0**
45	Cleveland-Elyria-Mentor, OH	142	1,309	34.37	**10.8**
46	Richmond, VA	167	1,579	94.98	**10.6**
47	Kansas City, MO-KS	228	2,185	85.74	**10.4**
48	Pittsburgh, PA	234	2,302	25.10	**10.2**
49	Cincinnati-Middletown, OH-KY-IN	187	1,962	39.54	**9.5**

(Table continues on next page)

Rank	Metropolitan area	Total pedestrian deaths (2003–2012)	Total traffic-related deaths (2003–2012)	Pedestrian Danger Index (2008–2012)	Percentage of traffic deaths that were pedestrians (2003–2012)
50	Nashville-Davidson-Murfreesboro-Franklin, TN	210	2,270	100.79	**9.3**
51	Birmingham-Hoover, AL	148	1,950	125.60	**7.6**

Florida responds to its worst-in-the-nation safety ranking

When the 2011 edition of *Dangerous by Design* ranked four Florida metropolitan areas among the most dangerous in the nation, the state's transportation secretary, Ananth Prasad, responded by creating the state's Bicycle/Pedestrian Focused Initiative. Secretary Prasad appointed his department's District One Secretary, Billy Hattaway, to lead the initiative and champion pedestrian and bicycle safety. Since then, the Florida Department of Transportation (FDOT) has added two full-time pedestrian and bicycle safety specialists to each of its seven district offices and another two serving the full state from the central offices. These pairs split duties: One focuses on street planning and design, while the other works on policy and education.

FDOT issued a *Pedestrian and Bicycle Strategic Safety Plan* (PBSSP) in February 2013, providing comprehensive objectives and strategies to improve pedestrian and bicycle safety in the state. Exhibiting the multidisciplinary approach needed to achieve such a goal, FDOT developed the PBSSP with help from the Department of Highway Safety and Motor Vehicles, the Department of Health, law enforcement, local governing agencies and pedestrian and bicycle safety advocates.

The PBSSP has seven emphasis areas, ranging from data analysis to law enforcement, from engineering choices to engaging with citizens firsthand to promote safety. That last item includes events such as the Heat Cycle for Safety, where NBA Miami Heat coach Erik Spoelstra led 550 Floridians on a four-mile bike ride. Data analysis includes the December 2013 *Comprehensive Study to Reduce Pedestrian Crashes in Florida*, which crunches data related to pedestrian crashes to identify patterns, causes and contributing factors. The researchers also propose potential design solutions for high-crash locations. These recommendations include, but are not limited to, converting intersections to roundabouts, installing raised medians and refuge islands, installing pedestrian signals, modifying signal phasing, installing pedestrian countdown signals, improving lighting at intersections and illuminating crosswalks.

Cities and counties across Florida also are working to improve pedestrian safety. Since the last edition of *Dangerous by Design*, 26 agencies have adopted Complete Streets policies. In the southeast region of the state, planning agencies, public health organizations and local officials collaborated on new street design guidelines for Broward County and its 31 municipalities that ensure that transportation planning and design decisions emphasize the safety and comfort of those walking.

The City of Jacksonville has taken a multipronged approach, hiring a full-time bicycle and pedestrian coordinator to work on street planning and design solutions and enacting a city ordinance that will lead to new walking-friendly design standards in urban priority areas of the city. It is also improving coordination between the city's transportation staff and law enforcement. Public service announcements created by FDOT are aired to remind everyone of the deadly consequences of unsafe behavior.

In central Florida, the Best Foot Forward coalition has set a goal to reduce the number of pedestrian fatalities and injuries by 50 percent in 5 years by employing engineering, education and enforcement strategies. With a specific focus on making sure people driving vehicles yield to people crossing the street on foot, the coalition has already seen great results. In one year, law enforcement issued more than 3,200 warnings to drivers who failed to yield. An estimated 91,000 households in Orange County and Orlando have been exposed to the effort through flyers, television coverage and outreach to schools and homeowner associations. Crosswalks were improved too, including 37 near schools. As a result, the number of drivers who yield has jumped to 48 percent—compared with the baseline of 12 percent.

The characteristics of dangerous roads

This report also analyzes the data to determine the types of roadways where pedestrian deaths are most common. The examination of data in the federal Fatality Analysis Reporting System (FARS) reveals that people on foot were most often killed on higher capacity and higher speed roads classified as arterial.

In transportation planning and engineering, arterial roads are expected to move the most automobile traffic possible with minimal delay over longer distances, meaning they often are built wide, fast, and flat to serve the purpose of quick automobile travel. At the same time, however, these arterials have become the Main Streets of our communities, and now typically are flanked by apartment complexes, shopping centers and office parks. Design guidelines do provide some flexibility, but too often the needs of people and communities have been secondary concerns or simply left out of the process entirely.

Indeed, more than half—52.3 percent—of the 45,284 pedestrian deaths (for which roadway classification data were recorded) over the last decade occurred on arterial roadways.

These streets are part of the National Highway System (NHS), a designation developed in 1991 to extend federal transportation funding to the roads that had significance for transportation, commerce and national defense. The NHS includes Interstate highways, and as of 2008, includes the overwhelming majority (83.3 percent) of arterials in rural areas and over one third of urban arterials.[5] Under the 2012 federal transportation law, known as MAP-21, another 230,000 lane miles—including a large share of urban arterials—are expected to be included in the NHS.[6] From 2003 through 2012, 29.6 percent of all pedestrian fatalities for which data was collected occurred on NHS roadways.

"The establishment of well-connected walking and bicycling networks is an important component for livable communities, and their design should be a part of federal-aid project developments."
– U.S. DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, March 2010

In the decade from 2003 through 2012, almost 68 percent of all pedestrian fatalities were on roadways funded in some part by federal money and designed in accordance with federal guidelines.

Vehicle speed is a major factor in all types of crashes and has especially serious consequences for people on foot. Where the posted speed limit was recorded, **61.3 percent of pedestrian fatalities were on roads with a speed limit of 40 mph or higher.** This figure compares to just 9 percent of fatalities that occurred on roads with speed limits less than 30 mph.

---

5 Federal Highway Administration and Federal Transit Administration. 2010 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance. Available at www.fhwa.dot.gov.

6 Federal Highway Administration. National Highway System Questions & Answers. Retrieved from www.fhwa.dot.gov/map21/qandas/qanhs.cfm.

Small towns and rural areas, while built differently than urban areas, still face significant road safety challenges. While not represented in our PDI ranking, 27 percent of pedestrian fatalities in 2012 occurred in rural areas. These communities often have more fast-moving, wide arterial streets than larger urbanized areas, where other types of roadways can provide connections between places. The design of arterials in both urban and rural areas often leaves out the sidewalks and street crossings that are vital to safe pedestrian travel.

West Jefferson, NC

For many years, the state highway that serves as the main street of West Jefferson, a mountain town of 1,300 in northwestern North Carolina, was designed more for the passage of large trucks than to support town life. But a series of low-cost safety improvements helped convert it to a destination that encourages residents and tourists alike to stroll, linger and patronize local businesses.

The town worked with the North Carolina Department of Transportation (NCDOT) to make the key changes to Jefferson Avenue during a routine resurfacing effort: converting two traffic signals with four-way stops, painting high-visibility crosswalks, reusing street space to increase the amount of on-street parking, extending curbs to shorten the crossing distance for people on foot, and including benches, trees, and other plantings. During the construction period, the local electric utility company also removed overhead wires.

The new Jefferson Avenue prompted a downtown renaissance. Local leaders specifically credit the slower traffic and improved pedestrian environment with bringing businesses and residents back, filling vacant storefronts and boosting retail sales. Since the streetscape and reconfiguration projects, downtown West Jefferson has seen $500,000 in renovations and investment, 10 new businesses, more than 55 new jobs, and a 19 percent increase in tourist visits. Commercial vacancies in the district dropped from 33 to 5 storefronts since the removal of the signals. The entire town has seen crashes drop nearly 30 percent, though travel to the town has increased following the redesign.

Town of West Jefferson

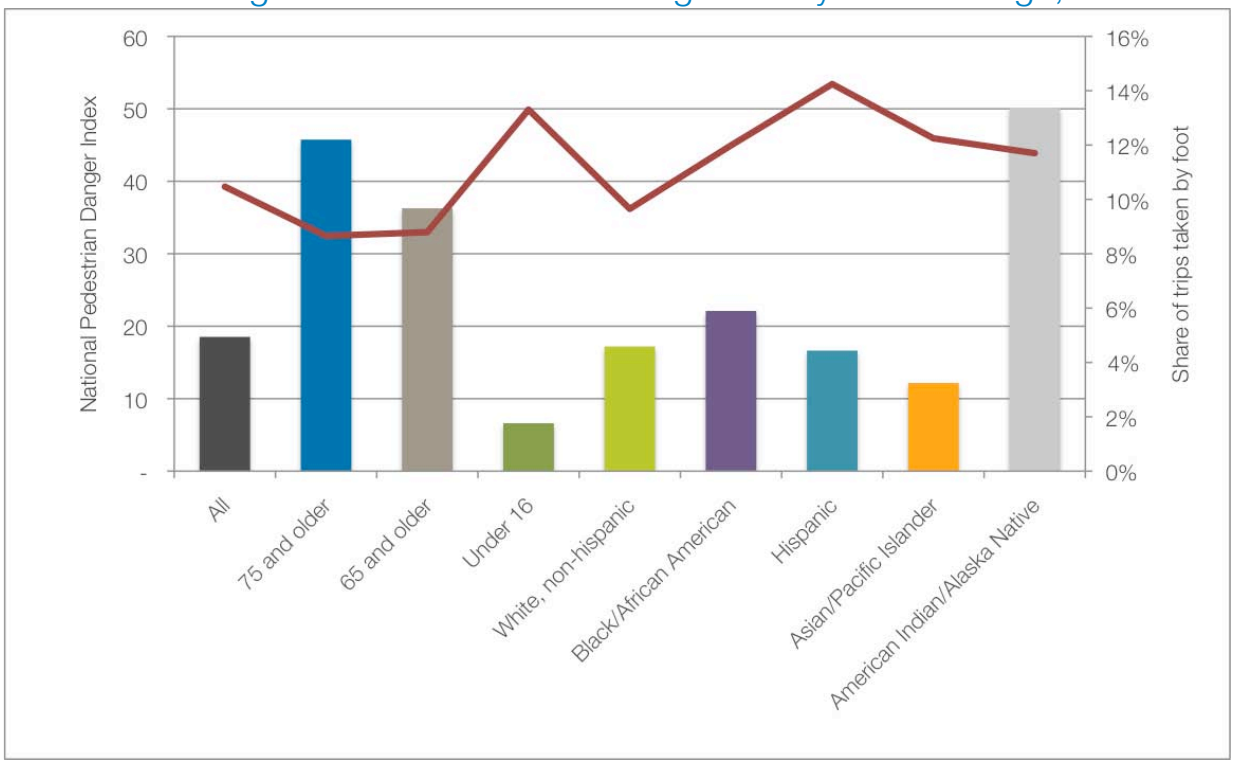
The most threatened populations

Overwhelmingly, children, older adults and people of color suffer disproportionately from traffic violence.

As with our metro area analysis, the fatality rates for racial and ethnic minorities and for older pedestrians must be considered relative to an exposure measure to offer a fair comparison. Because the American Community Survey (ACS) journey-to-work data excludes non-work trips, as well as shorter segments of multi mode trips, it is problematic for comparisons across demographic cohorts. This limitation is especially true for children and adults who have retired or are not working, whose trips are not captured in journey-to-work data.

FIGURE 2

Pedestrian Danger Index relative to walking rates by race and age, 2009



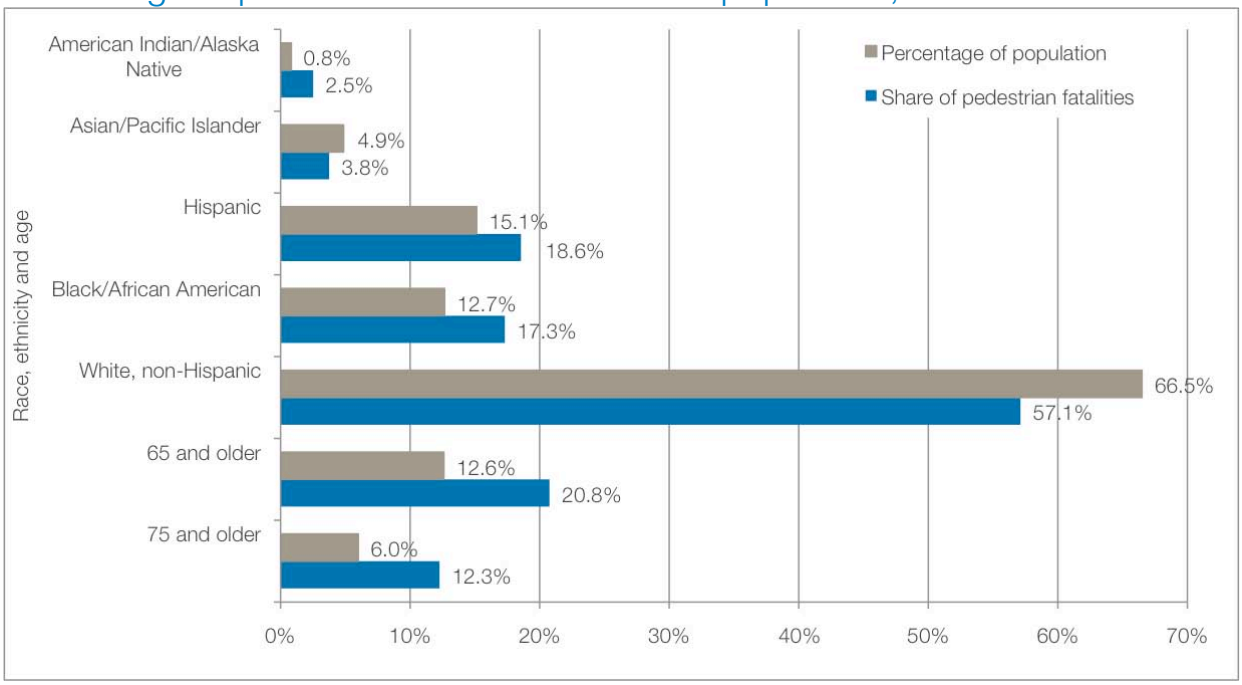
For the purpose of this analysis, we used the National Household Travel Survey from 2009. Small sample sizes make the data inadequate for our metro area analysis, but for a national analysis, the data is satisfactory. As with the metro area and state PDI we divided the fatality rate per 100,000 people by the percentage of trips taken on foot for each demographic group.

Our analysis shows the PDI in a tight range between 12.2 and 22.1 (see Figure 2 above). A few outliers emerge. Children under 16 of all races and ethnicities have the lowest PDI at 6.6, meaning a low risk of dying as a pedestrian. Older pedestrians have the highest risk of dying while on foot with PDIs of 36.3 for pedestrians 65 years and older and 45.8 for pedestrians aged 75 years and older. The disparities among racial and ethnic minorities are moderated by the differing walk rates. African Americans still have a relatively high PDI at 20.

Yet, older adults regardless of race, African Americans and Hispanics identify neighborhood characteristics such as sidewalks, crosswalks and lighting as significantly more important in achieving physical activity goals than younger Whites. A 2011 study reported in the *Journal of Physical Activity and Health* found that a majority of adults view neighborhood infrastructure as highly important to physical activity. For African Americans, 72.4 percent identified those characteristics as highly important, and 67.3 of Hispanics surveyed also viewed those characteristics as highly important. The majority (62.5 percent) of adults aged 65 years and older identified neighborhood characteristics as important to physical activity.[7]

FIGURE 3

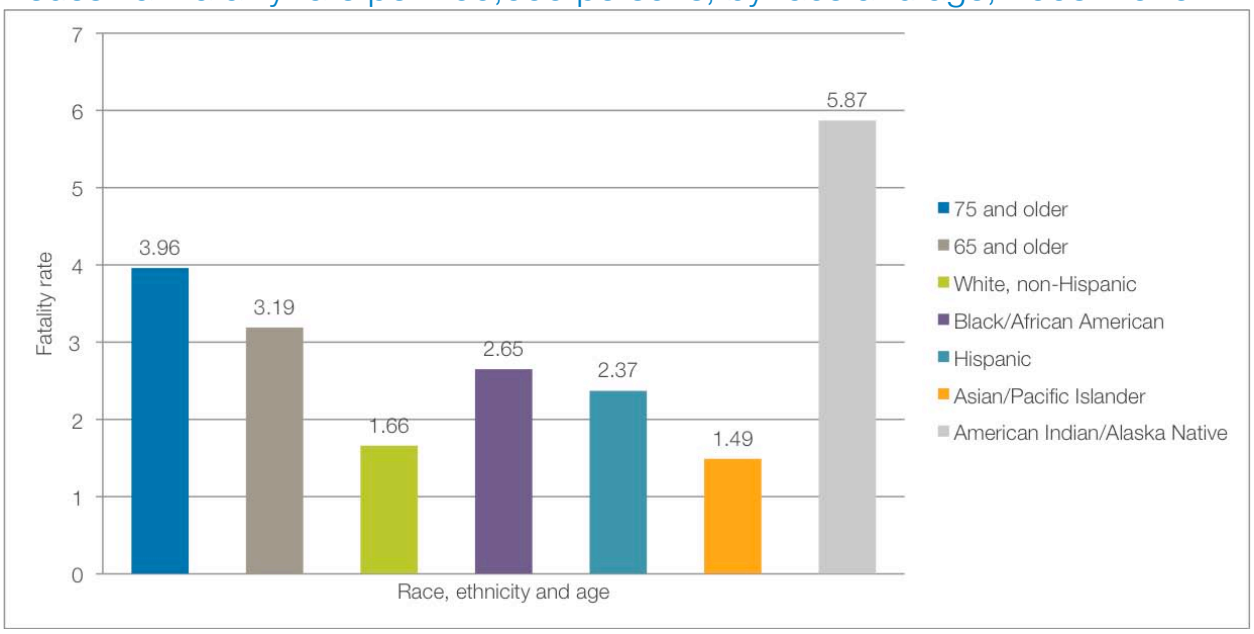
Percentage of pedestrian fatalities relative to population, 2003–2010



7 Carlson, S., Guide, R., et al. (2011). "Public support for street-scale urban design practices and policies to increase physical activity." Journal of Physical Activity and Health, *8(Suppl 1)*. S125–S134.

FIGURE 4

Pedestrian fatality rate per 100,000 persons, by race and age, 2003–2010



Children

The number of children killed as pedestrians has declined dramatically in recent decades, from more than 1,000 fatalities in 1984 to 319 in 2012. This decline is often attributed to a general drop in physical activity. Though the drop in deaths is certainly a bright spot in our analysis, it is tempered by the corresponding rise in childhood obesity and associated chronic diseases related to lack of physical activity.

Further, fatal pedestrian injury remains a leading cause of death for those 15 years and younger. According to the Centers for Disease Control and Prevention, 4,394 children aged 1 to 15 were killed as pedestrians from 2003 through 2010, the most recent year for which data was available. That grim figure is 68 percent higher than the number of children who drowned in swimming pools; 38 percent higher than the number killed by fires or burns; 126 percent higher than the number who suffocated; and more than three times the number who were killed by poison. Though pedestrians killed in motor vehicle collisions are included in the broad category of motor vehicle traffic deaths, if pulled out as a separate category, pedestrian death would rank as the third leading cause of accidental injury death for children aged 1 to 15.

Other studies have shown the risk of pedestrian injury to children. The most common cause of traumatic brain injury for children aged 5 to 9 is pedestrian injury.[8] Nearly 18,000 children each year are admitted to the hospital for pedestrian injury, a figure that accounts for 31 to 61 percent of all injury-related hospital admissions. Eleven percent of those 18,000 children require surgical intervention for their injuries.[9] Pedestrian injuries to children can have serious and long-lasting psychological consequences for both the injured child (23 percent of children struck by cars suffer from psychological harm) and their parents.[10]

Children are especially vulnerable to pedestrian injury because their smaller size makes them less visible to motorists. But they are also at risk because their ability to judge the travel speed of oncoming traffic is not yet fully developed. A recent study of perceptions of children aged 6 to 11 found that they lack the ability to detect vehicles moving faster than 20 mph.[11] They don't see the cars coming.

Federal transportation policy responded to concerns about child pedestrian deaths by establishing a funding program known as Safe Routes to School (SRTS) in 2005. This program allocated $612 million in federal funds to states specifically to build sidewalks, crosswalks and other amenities to improve pedestrian and bicyclist safety along routes to schools. A recent evaluation of that program found that in Census tracts with SRTS programs, pedestrian injuries for children aged 5 to 19 declined by 44 percent during school hours. This compares to virtually no change in Census tracts without SRTS projects.[12] However, in the most recent federal transportation law, MAP-21, this program was eliminated.

---

8 Hotz, G., Kennedy, A., Lufti, K., and Cohn, S.M. (2009). Preventing pediatric pedestrian injuries. *J Trauma 66(5)*. 1492–1499.

9 Merrell, G.A., Driscoll, J.C., Degutis, L.C., and Renshaw, T.S. (2002). Prevention of childhood pedestrian trauma: A study of interventions over six years. J Bone Joint Surg Am. 84-A(5). 863–867.

10 Mayr, J.M., Eder, C., et al. (2003). Causes and consequences of pedestrian injuries in children. *Eur J Pediatr*. 162(3). 184–190.

11 Wann, J., Poulter, D., and Purcell, C. (2011). Reduced sensitivity to visual looming inflates the risk posed by speeding vehicles when children try to cross the road. *Psychological Science*. 22(4). 1–6.

12 DiMaggio, C., and Li, G. (2013). Effectiveness of a safe routes to school program in preventing child pedestrian injury. *Pediatrics 131*. 290.

Older adults

Older adults suffer disproportionately from pedestrian deaths in the US. **While comprising 12.6 percent of the total population, adults aged 65 and older account for nearly 21 percent of pedestrian fatalities nationwide from 2003 to 2010.** The pedestrian fatality rate for older adults is 3.19 per 100,000 capita, compared with 1.75 for people under 65 years old, and 1.94 for all ages.[13] Of adults aged 65 or older killed while walking between 2003 and 2012, 57 percent died on arterial roadways, a percentage slightly higher than the national average (see Figures 3 and 4 on pages 14 and 15, respectively).

Older adults face more risks as pedestrians because they may be less able to react quickly to an oncoming vehicle. Once struck, their increased frailty makes them less likely to recover from a serious collision. Further, older adults may have greater exposure to pedestrian crashes as they increasingly give up their car keys and seek alternative ways to get around. An AARP Public Policy Institute analysis of the 2009 National Household Travel Survey (the most recent available) found that between 2001 and 2009, the share of trips older adults made by transit increased by 40 percent.[14] As most transit trips involve some amount of walking, we would expect that walking trips also have increased considerably among the older population.

For those 75 and older, pedestrian fatality rates are even more alarming, with 3.96 fatalities per 100,000 capita.[15] People aged 75 years and older account for six percent of the total U.S. population, but more than 12 percent of pedestrian fatalities.[16]

Pedestrian fatality rates for older adults vary widely from state to state (see Table 3 on page 18). Hawaii suffers from the highest older pedestrian fatality rate in the country, with 6.81 deaths per 100,000 for adults aged 65 years and older, three times the statewide rate for all ages. For those 75 and older living in Hawaii, the rate is an astonishing 9.75 per 100,000. Next highest is California, where the pedestrian fatality rate for older adults is 5.03 for those 65 and older, and 6.4 for those 75 years and older. With a pedestrian fatality rate of 4.94 per 100,000 for those 65 and older, and 6.02 for those 75 and older, New York rounds out the top three most dangerous states for older pedestrians.[17]

As tourist destinations, the fatality rates in these states may be somewhat skewed. The CDC data on fatal injury rates does not take into account the residence of the victim; if an older pedestrian from another state is killed in Hawaii, that fatality is counted against Hawaii's resident population of older adults.

Florida's older pedestrian fatality rate, while high at 3.92 fatalities per 100,000, is only marginally higher than the state's overall pedestrian fatality rate for all ages (3.08). Given its reputation as a destination for retirees, Florida may be tagged as inflating the nationwide older pedestrian fatality rate, but the percentage of Florida's pedestrian fatalities among older adults is only slightly higher than the national average and far lower than many other states.

---

13 Analysis based on the Center for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System (WISQARS), 2003–2010.

14 Lynott and Figueiredo. (2011). How the travel patterns of older adults are changing: highlights from the 2009 National Household Travel Survey. AARP Public Policy Institute. Fact Sheet 218. Retrieved from http://assets.aarp.org/rgcenter/ppi/liv-com/fs218-transportation.pdf.

15 See note 13.

16 See note 13.

17 See note 13.

TABLE 3

State pedestrian fatality rate per 100,000 persons, among persons aged 65 and older, 2003–2010

Rank	State	Pedestrian fatalities per 100,000 people 65 and older (2003–2010)	Pedestrian fatalities per 100,000 people 75 and older (2003–2010)	Pedestrian fatalities per 100,000 people of all ages (2003–2010)
1	Hawaii	6.81	9.75	2.23
2	California	5.03	6.40	2.28
3	New York	4.94	6.02	1.96
4	District of Columbia	4.47	4.24	2.99
5	Florida	3.92	4.73	3.08
6	Nevada	3.74	4.76	2.48
7	New Jersey	3.74	4.42	1.97
8	Utah	3.51	4.98	1.52
9	Idaho	3.37	3.76	1.40
10	Montana	3.33	4.12	1.99
11	New Mexico	3.32	4.30	3.19
12	Washington	3.27	4.40	1.46
13	Arizona	3.24	3.46	2.87
14	Massachusetts	3.20	4.04	1.29
15	Alaska	3.18	N/A	1.73
16	North Dakota	3.15	3.24	1.36
17	Texas	3.12	3.79	2.18
18	Maryland	3.11	3.15	2.33
19	Mississippi	3.10	4.07	2.52
20	Rhode Island	3.09	4.06	1.37
21	Colorado	3.06	3.37	1.49
22	Maine	2.97	3.80	1.26
23	Pennsylvania	2.97	3.92	1.59
24	Oregon	2.90	3.37	1.77
25	New Hampshire	2.81	2.87	1.01
26	Illinois	2.80	3.41	1.67

(Table continues on next page)

Rank	State	Pedestrian fatalities per 100,000 people 65 and older (2003–2010)	Pedestrian fatalities per 100,000 people 75 and older (2003–2010)	Pedestrian fatalities per 100,000 people of all ages (2003–2010)
27	Connecticut	2.76	3.38	1.34
28	Kentucky	2.66	3.41	1.62
29	Virginia	2.58	2.98	1.35
30	Michigan	2.56	3.10	1.64
31	Georgia	2.48	3.12	2.15
32	Delaware	2.44	N/A	2.06
33	South Carolina	2.43	2.80	2.52
34	Arkansas	2.36	2.90	1.89
35	Wisconsin	2.36	3.24	1.19
36	South Dakota	2.35	3.45	1.94
37	North Carolina	2.29	2.97	2.28
38	Minnesota	2.26	3.08	1.09
39	Oklahoma	2.24	2.67	1.81
40	Indiana	2.19	2.88	1.37
41	West Virginia	2.18	2.35	1.71
42	Tennessee	2.16	2.94	1.71
43	Louisiana	2.15	2.47	2.63
44	Kansas	2.00	2.36	1.20
45	Missouri	2.00	2.40	1.66
46	Wyoming	1.93	N/A	1.72
47	Alabama	1.87	2.47	1.97
48	Ohio	1.85	2.48	1.23
49	Iowa	1.64	2.07	1.07
50	Vermont	1.63	N/A	0.90
51	Nebraska	1.26	1.64	0.88
National Average		**3.19**	**3.96**	**1.94**

People of color

Like older adults, people of color are disproportionately represented among pedestrian fatalities. While non-Hispanic Whites have an age-adjusted pedestrian fatality rate of 1.66 per 100,000 persons, African Americans suffer a rate 60 percent higher, at 2.65 per 100,000 persons (age-adjusted). Hispanics of any race have a rate nearly 43 percent higher: 2.37 per 100,000 persons. While African Americans comprise 12.7 percent of the U.S. population, they account for 17.3 percent of all pedestrian fatalities. Hispanics make up just over 15 percent of the population, but 18.6 percent of pedestrian fatalities (See Figures 3 and 4 on pages 14 and 15, respectively).[18]

While there are many possible explanations for why people of color suffer higher fatality rates, the most obvious is that with higher rates of walking, they have greater exposure to pedestrian injury. According to the U.S. Census's five-year estimate, Whites make 2.6 percent of their work trips on foot, while Blacks and African Americans make 2.8 percent of work trips by foot, and Hispanics make 3.3 percent of work trips by foot.[19] Data from the National Household Travel Survey shows even greater disparity when all types of trips are considered. According to that survey, Whites make 9.7 percent of all trips by foot, compared to 12 percent for blacks and African Americans, and 14.2 percent for Hispanics.[20]

Another explanation for the disparity in pedestrian fatality rates among people of color is that African Americans and Hispanics are more likely to live in urbanized areas, and in particular, suburban locations and along busy arterials routes, which, as discussed previously in this report, are especially dangerous for pedestrians.[21, 22]

As with older pedestrians, the disparities in pedestrian fatality rates for people of color vary by state (see Table 4 on page 21). For example, Hispanics in South Carolina were 189 percent more likely than Whites to be killed as a pedestrian. In Kentucky, Hispanics were 135 percent more likely to die as pedestrians than Whites. Similar patterns are apparent for African Americans in Wisconsin, where they suffer a pedestrian fatality rate 145 percent higher than Whites in the state. In Michigan, African Americans are 134 percent more likely to die as a pedestrian than Whites.

---

18 See note 13.

19 U.S. Census Bureau. American Community Survey Five-Year Estimates, 2008–2012. Available at www.census.gov/acs/www/.

20 Analysis of FHWA. National Household Travel Survey, 2009.

21 Wilson, J.H. (2009). Trends in U.S. immigration. Presentation given at the American Society of Public Administrators National Conference. Retrieved from www.brookings.edu/~/media/Files/rc/speeches/2009/0324_immigration_wilson/0324_immigration_wilson.pdf.

22 Williams-Derry, C. (2013, January 4). "Traffic affects the poor and people of color." Sightline Daily. Retreived from http://daily.sightline.org/2013/01/04/traffic-affects-the-poor-and-people-of-color/.

TABLE 4

State pedestrian fatality rate per 100,000 persons, among people of color, 2003–2010

State	American Indian/ Alaska Native	Asian/ Pacific Islander	Black or African American	Hispanic	White, non-Hispanic
Alabama	N/A	N/A	3.03	2.85	1.54
Alaska	5.73	N/A	N/A	N/A	0.92
Arizona	16.62	0.97	2.43	2.89	1.96
Arkansas	N/A	N/A	3.2	1.14	1.69
California	3.68	1.80	3.25	2.48	2.08
Colorado	3.43	1.34	2.39	2.10	1.26
Connecticut	N/A	N/A	1.49	1.42	1.34
Delaware	N/A	N/A	1.93	2.05	2.08
District of Columbia	N/A	N/A	3.63	3.74	1.59
Florida	4.17	0.98	3.47	3.43	2.85
Georgia	N/A	1.34	2.74	3.19	1.74
Hawaii	N/A	2.44	N/A	1.82	1.97
Idaho	N/A	N/A	N/A	1.51	1.36
Illinois	N/A	0.97	2.68	1.71	1.43
Indiana	N/A	N/A	2.02	1.36	1.30
Iowa	N/A	N/A	1.69	1.47	1.04
Kansas	N/A	N/A	1.58	1.45	1.10
Kentucky	N/A	N/A	2.12	3.28	1.54
Louisiana	N/A	2.15	3.47	2.52	2.17
Maine	N/A	N/A	N/A	N/A	1.26
Maryland	N/A	1.68	2.93	3.60	1.93
Massachusetts	N/A	1.17	1.35	1.17	1.31
Michigan	2.03	1.02	3.00	1.69	1.39
Minnesota	6.07	1.17	1.38	0.81	1.00
Mississippi	N/A	N/A	2.95	3.16	2.14
Missouri	N/A	1.51	2.58	1.59	1.53
Montana	6.83	N/A	N/A	N/A	1.60
Nebraska	N/A	N/A	N/A	N/A	0.84
Nevada	5.58	1.46	2.45	2.07	2.65

(Table continues on next page)

State	American Indian/ Alaska Native	Asian/ Pacific Islander	Black or African American	Hispanic	White, non-Hispanic
New Hampshire	N/A	N/A	N/A	N/A	0.98
New Jersey	N/A	1.23	2.47	2.22	1.89
New Mexico	12.79	N/A	N/A	2.63	1.80
New York	3.06	1.91	1.84	2.31	1.86
North Carolina	6.14	N/A	2.94	3.44	1.90
North Dakota	7.77	N/A	N/A	N/A	1.01
Ohio	0.00	0.71	1.73	1.66	1.14
Oklahoma	3.07	N/A	2.02	1.53	1.67
Oregon	3.67	0.81	N/A	1.53	1.82
Pennsylvania	N/A	1.2	2.23	1.87	1.50
Rhode Island	N/A	N/A	N/A	N/A	1.38
South Carolina	N/A	N/A	3.56	4.87	1.93
South Dakota	10.09	N/A	N/A	N/A	1.15
Tennessee	N/A	1.55	2.46	2.10	1.52
Texas	1.85	0.86	2.72	2.30	2.01
Utah	N/A	1.96	N/A	1.50	1.50
Vermont	N/A	N/A	N/A	N/A	0.92
Virginia	N/A	1.27	1.66	2.01	1.19
Washington	6.77	1.25	1.64	1.43	1.36
West Virginia	N/A	N/A	2.29	N/A	1.69
Wisconsin	3.84	1.21	2.35	0.78	1.10
Wyoming	12.40	N/A	N/A	N/A	1.50
National Average	**5.87**	**1.49**	**2.65**	**2.37**	**1.66**

Phoenix, AZ
In 2012, the City of Phoenix began the process of redesigning 1st Street to meet the needs of people walking, bicycling and driving, while addressing flooding issues.

The first phase focused on six blocks adjacent to Arizona State University's downtown campus. The design team, led by Gavan & Barker Inc., found that there was more street capacity than was needed for car traffic and repurposed some of that space to accommodate shade trees and wider sidewalks. The project also added frequent crosswalks, ADA-compliant curb ramps and crossings, improved drainage systems and permeable pavers to reduce flooding. The narrower street helped improve safety by reducing automobile speeds through the area and making it easier to cross.

In late 2013, the city extended this project through interim measures using paint and planters to define new spaces for residents and visitors. Red paint and planted trees define new diagonal parking and street names are painted into high-visibility crosswalks.

Gavan and Barker, Inc.

Street design improves safety

The data show that street design matters. When the needs of all users—all ages, abilities and modes of travel—are properly balanced, our streets are safer and easier to navigate for everyone.

In recognition of this fact, and the desire of many communities to promote health and safety, professional organizations that guide transportation engineering and planning decisions in recent years have introduced new best-practice manuals that emphasize the importance of providing safer streets. In 2010, the Institute of Transportation Engineers issued its recommended practice called *Walkable Urban Thoroughfares: A Context Sensitive Approach*. New crossing treatments proven to improve safety are now included in the *Manual on Uniform Traffic Control Devices*, published by the Federal Highway Administration (FHWA). Numerous states and cities have issued their own guidelines, going even further to require safe and attractive streets for all users. Nearly every major national conference for transportation professionals includes sessions on walking and safety.

> "Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems."
> *– U.S. DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, March 2010*

Using the best and latest in design standards is especially important for the millions of miles of arterial roadways in our rural and urban communities. Arterials that are part of the NHS must be designed according to standards adopted by FHWA, currently the 2004 guidelines, known as the "Green Book" for its green cover, issued by the American Association of State Highway and Transportation Officials. That document—and its 2011 update—allows transportation agencies flexibility to design streets that are safer for pedestrians and more appropriate for community contexts.

Last summer, FHWA emphasized its support for design flexibility by endorsing the use of *Designing Urban Walkable Thoroughfares: A Context Sensitive Approach* and the *Urban Bikeway Design Guide*, issued by the National Association of City Transportation Officials (NACTO). NACTO's recently released *Urban Street Design Guide* offers comprehensive principles and design guidance to safely balance the needs of many travelers on community streets. The guide recognizes that streets within communities are fundamentally different than the roads and highways between communities, providing transportation professionals guidance and additional flexibility to design streets that are not only safe for people walking, but also welcoming for everyone. As of early May 2014, the states of California, Massachusetts, Minnesota, Washington, Utah, the District of Columbia and more than thirty cities have endorsed the guide.

A growing body of research supports this recognition by practitioners. 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.[23]

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

FHWA offers comprehensive information and tools for transportation agencies in designing roadways that are safe for pedestrians. In addition to the research document *Countermeasures That Work*, its *Pedestrian Safety Guide and Countermeasure Selection System* is particularly useful in helping practitioners understand and apply 55 engineering and design approaches that have proven effective in improving pedestrian safety.

Generally, designing for safe, walkable communities begins with understanding how people use—and want to use—streets and public spaces to access destinations. From there flow general considerations such as separate people walking from people driving vehicles; keep traffic speeds low; ensure all 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, transportation planners 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.

New York City Department of Transportation

Boston's *Complete Streets Design Guidelines* defines the primary design elements relevant to the pedestrian experience.

MULTIMODAL INTERSECTIONS

Pedestrian Experience

The primary needs of pedestrians at intersections include:

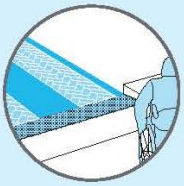
Safety

Lower motor vehicle speeds:

- Narrower motor vehicle lane widths
- Reduced turning radii
- Traffic calming measures

Less exposure to conflicts:

- Dedicated space
- Shorter crossing distances
- Improved sight lines and visibility
- Crossing islands where appropriate
- Appropriate signal timing and crossing treatments



Accessible crossings:

- American's with Disabilities Act (ADA) compliant curb ramps that prevent ponding of precipitation
- ADA compliant crosswalks
- Accessible pedestrian signals that inform users when signals have been activated

Convenience

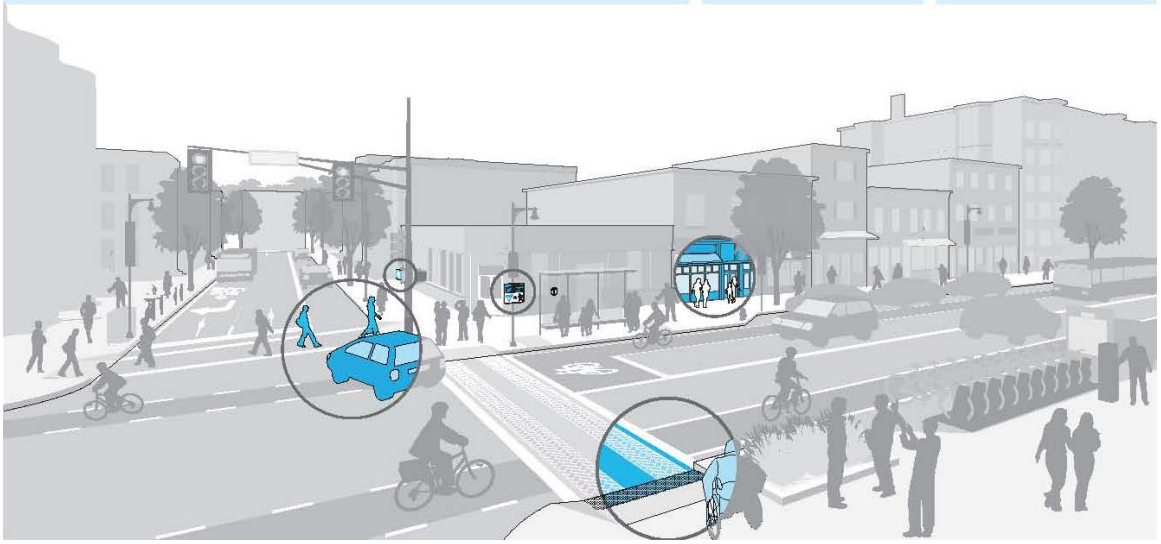
Comfortable and inviting spaces:

- Appropriate sidewalk widths for pedestrian volumes
- Crossings that reflect pedestrian desire lines
- Buildings that front the street
- Transparent store fronts
- Street trees
- Amenities such as benches, recycling and trash receptacles, public art, street cafés, etc.

Minimal Delay

Frequent opportunities to cross:

- Appropriate traffic controls (i.e., signage vs. signalization)
- Pre-timed pedestrian signals for every cycle
- Responsive pushbuttons where applicable
- Direct routes across complex intersections



Boston Transportation Department

Speed

Some common practices intended to improve safety sometimes have had the opposite effect: promoting speeding on streets intended for lower speeds and putting everyone on the road at risk. Nationally, speeding is a leading cause of preventable deaths, causing nearly one-third of all traffic fatalities each year, or close to 10,000 lives. Speeding not only increases the likelihood of crashes with people on foot, it increases the probability that those crashes will cause injuries that are far more serious.[24] At 20 mph, the risk of death to a person on foot struck by the driver of 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.[25]

Policy, design, enforcement and culture all contribute to these dangerously high speeds. In the transportation engineering realm, road designs meant for highways—such as wide, straight lanes—can lead to speeding when applied to the streets that go through our communities and are lined with homes, shops, schools and offices. This allows drivers to feel safe moving 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. Changing that practice by setting a vision for safer, slower streets allows transportation agency staff to find the appropriate design solutions, regardless of prevailing speed. They can design and redesign streets to include features to encourage safer—and slower—driving and 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.

Traditional enforcement of speed limits can be effective in convincing drivers that they will face a penalty for going over the legal speed limit. Automated enforcement is increasingly seen as a cost-effective method for keeping speeds in check and reducing fatalities. Enforcement has helped reduce the number of crashes and injuries in Washington, DC[26] However, making streets safer requires more than just posting lower speeds or enforcing those speeds; streets and intersections must be designed for those lower speeds. DC complements its enforcement efforts with the implementation of its 2009 *Pedestrian Master Plan*, which aims to improve walking conditions through physical changes to the streetscape.[27]

---

24 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 from www.nhtsa.gov/people/injury/research/pub/HS809012.html.

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

26 Cheeks, James, et al. (2014). Speed Limit and Safety Nexus Studies for Automated Speed Enforcement for the District of Columbia. District Department of Transportation.

27 The District of Columbia Department of Transportation. (2009). *Pedestrian Master Plan*. Retrieved from ddot.dc.gov/page/pedestrian-master-plan-2009.

Seattle, WA

The Seattle Department of Transportation (SDOT) redesigned NE 125th Street in 2011 with the aim to improve safety for everyone, whether driving, bicycling, walking or taking public transportation. SDOT changed the lane configuration between Roosevelt Way NE and 30th Avenue NE from four lanes of automobile travel with sidewalks on both sides to a design with bike lanes next to sidewalks, a travel lane in each direction and a two-way left turn lane in the middle.

With the previous configuration, 87 percent of drivers exceeded the speed limit—and 16 percent drove more than 10 mph over it. Modifying roads to discourage speeding is one of the recommended actions in Seattle's *Road Safety Action Plan*, which has a goal of zero traffic fatalities and serious injuries by 2030. The redesign brought about a dramatic 69 percent decrease in people driving more than 10 mph over the speed limit, with an 11 percent decrease in speeding.

More people are now driving, walking and bicycling along this stretch of 125th Street.[28] Despite this increase in volume, the rate of collisions has dropped by 10 percent and there has been little delay for drivers. Those heading to a church or preschool near 20th Avenue NE now have a marked crosswalk. A repaving project completed in late 2013 added to the safer, accessible vision for the street by laying down fresh asphalt, updating or adding 85 curb ramps compliant with the needs of people with disabilities and constructing two new bus shelters.

Seattle Department of Transportation

28 Seattle Department of Transportation. (2013). *NE 125th Street Rechannelization Before and After Report*.

A collaborative approach

Planning and designing our streets for people on foot, in addition to those traveling by public transportation, bicycle and automobile, is the most important approach to improving street safety. Without sidewalks, safe and convenient street crossings and slower design speeds no amount of programmatic or regulatory efforts will curb the epidemic of pedestrian deaths.

But we must use every tool available to improve safety, just as we did in the campaign to increase seatbelt use. In that case, a concerted, collaborative approach among government officials, law enforcement and private companies helped boost seat belt use and saved thousands of lives.

As noted above, speeding presents a major danger to people who are walking. Improving enforcement efforts to ensure drivers understand they will face a penalty for breaking the law is important to change culture and prevent injuries and deaths. Other dangerous behavior, such as distracted driving, must also be met with appropriate and clear penalties and sanctions.

"Increased driver awareness through activities such as safety campaign messaging and enforcement activities may contribute to fewer crashes, but improved infrastructure and crossings are the best countermeasure to reduce crashes. NCDOT adopted a Complete Streets policy in 2009 and has subsequently focused on training engineers and planners how to implement policies through new guidelines."
– North Carolina Department of Transportation (NCDOT)

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.

Cities prioritize safety with "Vision Zero"

In the New York City metropolitan area, people who are walking represent 10 percent of all commuters,[29] but a startling one-third of all traffic deaths over the last decade—nearly one death every single day. In New York City, 56 percent of all traffic fatalities are pedestrians.[30] While a number of recent street redesigns are showing great impact in reducing deaths and injuries, families in every borough have demanded that more be done.

Mayor Bill de Blasio's administration responded with an action plan to eliminate these deaths. Dubbed "Vision Zero," the plan encompasses numerous city agencies and demands action and leadership from each. Street design plays a major role, and the Department of Transportation is tasked with carrying out safety improvements at 50 corridors and intersections annually—an aggressive response based on the city's own research that shows the importance of street design.[31]

San Francisco Mayor Ed Lee recently announced the City's own Vision Zero plan, with a similar focus on redesigning streets to improve pedestrian safety. Despite being known as a great city for walking, 21 people were struck and killed by drivers in 2013.[32] The City has focused on pedestrian safety in recent years, re-engineering streets and building partnerships between transportation, public health and law enforcement agencies. With Vision Zero, city leaders acknowledge that more must be done.

New York City Department of Transportation

29 U.S. Census Bureau. *American Community Survey Five-Year Estimates, 2008–2012.* Available at www.census.gov/acs/www/.

30 City of New York. Vision Zero Action Plan 2014. Available at www.nyc.gov/html/visionzero/pages/home/home.html.

31 Since 2005, major street redesign projects have reduced fatalities by 34%, twice the rate of improvement at other locations. See note 29.

32 Colliver, V. (2014, January 16). In S.F., pedestrian deaths shine light on street safety. *San Francisco Chronicle*. Retrieved from www.sfgate.com/bayarea/article/In-S-F-pedestrian-deaths-shine-light-on-street-5146884.php.

We need better data

Dangerous by Design uses the best publicly available data to assess pedestrian danger in the US, but significant data challenges limit our analysis. Those limitations include a lack of information on crashes, crash victims, infrastructure conditions, spending on street safety and on walking rates beyond commuting.

We only estimate the number of non-fatal injuries. While the National Highway Traffic Safety Administration FARS provides detailed information about fatal pedestrian crashes, no national database tracks non-fatal pedestrian crashes; even severe injuries causing a life-long disability are omitted. As such, our analysis only offers a snapshot of the true danger to pedestrians. NHTSA estimates pedestrian injuries using its General Estimation System, and in 2012 estimated that 76,000 pedestrians were injured in collisions, a figure that dwarfs the number of pedestrians killed in crashes. Without knowing where these non-fatal crashes occur, we cannot pinpoint particularly dangerous intersections or blocks or fully understand the factors that contribute to pedestrian danger.

The FARS database is often incomplete. In particular, some states fail to report information on the race and ethnicity of the victim. Because of these gaps in data, our analysis relies on data collected by the Centers for Disease Control and Prevention, a source that is available only at the state level through 2010.

Details on existing infrastructure are also limited. While the FARS database provides information on the type of roadway and intersection where the crash occurred, it cannot tell us whether or not there was a sidewalk available. The FARS database may also tell us that the crash occurred away from the intersection, but it cannot tell us that the nearest crosswalk was a half-mile away. NHTSA has been working to correct some of these deficiencies, but early data on sidewalk and crosswalk availability was pulled when deemed unreliable.

We can't accurately measure the outcomes of our investments. FHWA keeps track of state spending of federal highway funds, including information on bicycle and pedestrian spending. But the quality and accuracy of that information depends on how states report project spending. Bicycle or pedestrian projects included as part of a road reconstruction may not be identified separately, so that our figures on state bicycle and pedestrian spending may be an underestimate for some states. Consistent reporting both to FHWA and in State Transportation Improvement Plans would help us more accurately gauge how well states are using available funding to improve pedestrian safety.

We're not sure how often people walk. Finally, the biggest gap in our analysis arises from a dearth of information on how much people actually walk. For this report, we use the U.S. Census ACS five-year data on means of transportation to work by state and metropolitan area. The ACS replaced the decennial census long form and has the advantage of being more current. But the sample sizes are much smaller than with the census long form, so for smaller metropolitan areas, the data suffers from high margins of error. That said, even if the sample sizes were much larger, ACS data only captures work trips, which tend to account for a small share of total trips, and particularly walking trips. Though the National Household Travel Survey does capture all trips, it is less current than the ACS and the sample sizes are too small to provide a reliable measure of walking rates for all large metro areas.

Solana Beach, CA

Highway 101 through Solana Beach in San Diego County was often used as an alternative route to Interstate 5, which runs parallel. As a result, people often sped through the historic downtown core, to the detriment of local businesses and people on foot. Through an extensive planning process that engaged community members and business owners, Highway 101 was redesigned to be a safe and appealing complement to the community's character.

The redesign of Highway 101 narrowed travel lanes and added wide, continuous sidewalks and used curb extensions to narrow the crossing distance at intersections. It also added mid-block crosswalks at popular crossing points. The city also built new transit shelters, made bicycling improvements, reduced the speed limit, planted street trees and designed for better stormwater management. While speeds were reduced, automobile access was not diminished—in fact, the number of on-street parking spaces increased by 25 percent and two travel lanes were retained in each direction.

The safer and more appealing street has encouraged store owners to renovate their facades, and new businesses have opened.

Nasland Engineering and Parterre Landscape Architecture

Recommendations: A national call to action

The fundamental function of government is the protection of its people. National transportation policy has long been based in the agreed-upon belief that our roadways should be safe. For decades, "safe" has been defined to include people walking, bicycling and driving.

Yet taxpayer money distributed to the states through the federal government often has not been applied to projects that would improve safety for all. Of the 45,284 pedestrian deaths from 2003–2012 for which roadway classification information was collected, almost 68 percent occurred on federal-aid roadways—roads that follow federal guidelines or oversight and that are eligible to receive federal funds. Yet, from 2009 to 2013, less than one-half of one percent of all available federal safety related funds was obligated to projects that improve safety for people walking. At the same time, pedestrian deaths were on the rise, hitting a five-year high in 2012 when more than 4,700 people were killed while walking.

Cities and towns, counties, regions and states across the country recognize the importance of safe streets. More than 600 of them have adopted policies that establish a clear vision for streets that are safe, comfortable and convenient for people walking. Such policies direct city and transportation leaders to include the needs of all users in the planning and design of local streets. But when these communities attempt to fulfill that vision by implementing those policies, they find state and national laws and practices block their efforts. They often face obstacles in gaining access to federal funding or making design changes, and their residents suffer.

At the national level, the Obama administration and Congress have several near-term opportunities to help communities save lives and improve the safety and comfort for everyone who uses our roadways.

Strengthen the Transportation Alternatives Program (TAP). Since 1991, federal surface transportation laws have included funds specific to biking and walking projects, including its current iteration in the Transportation Alternatives Program (TAP). Investment of these dollars has helped cities and states improve safety, public health and the vitality of local economies. TAP should be retained in future laws and strengthened in several key ways. MAP-21 combined the popular Safe Routes to School, Transportation Enhancement and Recreational Trails programs to create TAP and unfortunately funding for combined program is much lower than the dedicated funding for the three programs under previous law. Specifically, funding was reduced from $1.12 billion to $808 million. Investment of TAP funding has helped cities and states improve safety, public health and the vitality of local economies. The program should be retained in the future and strengthened by ensuring local communities have greater control over deciding how to invest these funds through increased sub-allocation of funding. Funding eligibilities should be extended to non-profits.

The U.S. Department of Transportation (USDOT) should follow Congressional intent and hold states accountable for traffic fatalities and serious injuries. In MAP-21, Congress required states to begin setting targets for performance, with safety a primary goal. However, USDOT's proposed rules could undermine the intent of that legislation. The proposed rules not only do not require separate measures for non-motorized and motorized travelers, but they also allow states to fail to achieve as many as half of their safety targets, with a definition of "significant

progress" that could define an increase in deaths as progress. And those targets aren't based on a real vision for improved safety: They're based on historical trends. USDOT must require states to set, work toward and be held accountable for achieving real targets in reducing fatalities and serious injuries among people walking, bicycling, driving or riding in a bus or car.

Make safety for people on foot or bicycle a clear performance measure for future federal transportation law. Though the intent to provide for those walking and bicycling is clear in MAP-21, the section related to performance measures does not spell out the need for a separate target for non-motorized modes. In the reauthorization bill this year, Congress should require states to set and meet goals that reduce the number of people who are seriously injured or die while walking and bicycling. That goal should be separate from the goal to continue significantly reducing the number of vehicle drivers and passengers who are seriously injured or die.

Adopt a national Complete Streets policy. Congress should require all federally funded road projects to consider the safety of all travelers, including those who are walking, taking public transportation, bicycling and driving, regardless of age or ability. Doing so fulfills our national responsibility to make roads safe. The Safe Streets Act (S. 2004/H.R. 2468) will ensure consistency and flexibility in the processes and standards that direct road-building at all levels of governance and reflects the 600-plus local- and state-level Complete Streets policies already adopted. A national Complete Streets policy is a forward-looking strategy, applied to new and reconstruction projects, to gradually improve roads through cost-effective best practices and proven safety measures.

Increase the federal cost share for certain safety programs. The safety of all users of the transportation system is critical. Safety project investments are some of the most important projects that communities invest in. A 100 percent cost share eligibility should be extended to pedestrian hybrid beacons, medians and pedestrian crossing islands, and Safe Routes to Schools Projects.

Ensure better data collection. Without more complete information about who is killed and injured on our streets—including better measures of where and how often—our ability to effectively prevent these tragic deaths is limited. Federal data collection should be improved with a uniform methodology to include additional information about fatalities and injuries with additional clarity from states regarding how they spend their federal safety funds to improve walking environments. A recommended system to routinely collect more information about how often and where people walk, in addition to commuting, and the number and location of fatalities and injuries suffered, will help transportation agencies better plan for walking and understand high-risk areas.

Albuquerque, NM
Before June 2012, Lead and Coal avenues in Albuquerque were high-traffic, one-way arterials traversing nearly six miles of some of the city's most historic neighborhoods. The existing three-lane streets encouraged speeding and weaving, making them unpredictable and unfriendly to the many people walking along and across them.

Lead and Coal corridors were transformed to two-lane routes and became accessible to people with disabilities with the installation of more than 500 curb ramps. In addition, designated transit stops with shaded structures were installed, bike lanes were added throughout the length of the project, signals and lighting were updated and the existing three-foot sidewalks were widened to a minimum of six feet.

"I can't tell you how much nicer it is to walk around the neighborhood now," Jennifer Simpson, president of the University Heights Neighborhood Association and a homeowner at Coal and Cornell SE, told the *Albuquerque Journal*. "You're not trying to sprint across three lanes of fast traffic."

Wilson & Co. with Morrow Reardon Wilkinson Miller Ltd.

Appendix A: State activities to improve pedestrian safety

While the federal government sets the tone for a national approach to safety, states—as recipients of federal transportation funds—have the ultimate responsibility to reduce pedestrian fatalities and injuries and should set aggressive goals to do so. With that goal in place, they can then align all other plans, policies and processes to achieve it. Table 5 on page 38 ranks states by PDI and below are some suggested activities to improve safety from the state level.

Adopt a Complete Streets policy and comprehensive implementation plan. States can commit to a Complete Streets vision that fully integrates the needs of all users, regardless of mode, age or ability into the project development and delivery system and then develop a plan to examine and update their processes, manuals and practices to remove barriers to improved pedestrian safety; ensure staff at every level understand and follow this goal in their everyday work; and collect and measure the outcomes of their projects as they relate to non-motorized as well as motorized users.

Emphasize walking and bicycling in the Strategic Highway Safety Plan (SHSP). States are required to develop data-driven SHSPs, which define state safety goals, rank dangerous locations and include a list of projects. States use the SHSP to decide how to spend the money allotted in the federal Highway Safety Improvement Program. In the past, these plans have failed to emphasize non-motorized safety, so very little available money has been spent to make walking and bicycling safer. MAP-21 doubled the amount of money available for states to spend on improving roadway safety and made clear that eligible projects included those to make streets safer for people walking and bicycling and those with disabilities. States should capitalize on this opportunity by prioritizing and funding such projects through their SHSPs.

Maximize the use of all federal funding programs for walking and bicycling projects. MAP-21 allows states to spend money from several other major programs on walking and bicycling projects, including the Surface Transportation Program, Congestion Mitigation and Air Quality program, and the Transportation Alternatives Program (TAP). TAP funds, particularly, should be reserved to help those who are walking or bicycling. In addition to planning and building streets, states should employ full-time staff to provide policy, planning and technical expertise related to walking and bicycling facilities.

Reform methods for evaluating roadway performance to account for the needs of all travelers. Measures of congestion such as "level of service," or LOS, are often cited as a major reason for making expensive capacity additions—sometimes to the detriment of people walking. LOS only measures whether drivers can move quickly along a specific stretch of roadway. Instead, LOS could consider overall corridor travel speed and time, factor in "person delay" rather than vehicle delay, or account for the needs of people who are walking, bicycling and taking public transportation. Redefining LOS in these ways, among others, will help ensure that streets through communities are better planned and designed for walking, as well as driving.

Use practical design and Context Sensitive Solutions (CSS). Rather than a one-size-fits-all approach with rigid minimum requirements and outputs, states can design projects to be context sensitive, taking into account the surrounding community, environment and specific transportation needs. CSS has been used in many states to help make smart, cost-effective and community-

supported design decisions. Effective CSS initiatives involve a commitment to changing both agency culture and the way the agency communicates with the public. To ensure design flexibility, CSS may require a review and update of existing state design standards or the introduction of new design standards (see below).

Update design policies and standards. While groups such as the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), the National Association of City Transportation Officials (NACTO) and others have produced guidelines and recommended practices for context-sensitive, multimodal design, many state-level guidelines follow conservative minimums for walking and bicycling and preclude responsible design flexibility. DOTs can achieve better design outcomes by reviewing and revising their existing standards, allowing the use of a wider range of guidelines (including those from ITE and NACTO) and providing additional support to explore feasible design alternatives. Agency guidelines are helpful for local and county transportation agencies as well.

Map existing infrastructure, including facilities under local jurisdiction, to identify gaps in the walking and bicycling network. Working with regional and local agencies and plans, states can identify state-owned roads, state-owned lands (such as parks) and state-funded projects under local jurisdiction that can provide missing links in the roadway network. Such connections are especially important where employment centers, retail destinations or residential developments are only accessible by using a state highway or state-funded roadway. These gaps, as well as high-crash locations, can inform priorities and projects in the SHSP.

Gather good data. States should develop and implement a plan to collect and analyze data related to non-motorized use and crashes that is complete, accurate, uniform and accessible. Activities could include regular statewide surveys of socioeconomic characteristics and travel behavior of households and of knowledge and attitudes about pedestrian and bicycle safety. States can work within and across agencies to link crash, injury, violation and registration records to better understand all traffic crashes and fatalities, including pedestrians.

Reform policy for establishing speed limits to provide local control. State legislation can prevent local governments from controlling the safety of their streets by forcing them to submit to arduous processes and expensive engineering studies to lower speed limits; setting minimum speed limits above 20 mph; or mandating speed limits based on how fast 85 percent of drivers are currently traveling on a street. Local governments are most familiar with their roadways, so allowing them to set safe and reasonable speed limits on their own streets is a common-sense move.

Encourage collaboration across transportation, public health and law enforcement agencies. State transportation agencies should lead these efforts, but other agencies and organizations must work collaboratively with them. Health departments, state and regional transportation professional organizations, law enforcement, academia, media and other public interest groups can collaborate on data collection efforts, public outreach and educational campaigns.

TABLE 5

States ranked by Pedestrian Danger Index

Rank	State	Total traffic fatalities (2003–2012)	Total pedestrian fatalities (2003–2012)	Percentage of traffic deaths that were pedestrians (2003–2012)	Annual pedestrian deaths per 100,000 (2003–2012)	State Pedestrian Danger Index
1	Florida	29,302	5,189	17.7	2.83	**168.6**
2	Alabama	10,061	723	7.2	1.55	**125.2**
3	Louisiana	8,673	1,030	11.9	2.29	**116.6**
4	South Carolina	9,546	1,020	10.7	2.29	**110.4**
5	Georgia	14,748	1,564	10.6	1.67	**104.0**
6	Delaware	1,223	194	15.9	2.22	**103.6**
7	Mississippi	7,833	527	6.7	1.80	**102.6**
8	Arizona	9,960	1,434	14.4	2.34	**101.2**
9	North Carolina	14,486	1,683	11.	1.84	**99.8**
10	Texas	34,107	4,192	12.3	1.74	**97.5**
11	Tennessee	11,309	799	7.1	1.29	**88.6**
12	New Mexico	4,131	504	12.2	2.53	**88.5**
13	Nevada	3,322	540	16.3	2.10	**85.3**
14	Arkansas	6,181	403	6.5	1.41	**80.0**
15	Maryland	5,799	1,067	18.4	1.88	**78.6**
16	Oklahoma	7,338	513	7.0	1.40	**73.3**
17	California	35,829	6,798	19.0	1.86	**62.0**
18	Missouri	9,978	762	7.6	1.29	**59.6**
19	Michigan	10,364	1,373	13.2	1.38	**59.4**
20	Kentucky	8,496	539	6.3	1.26	**58.3**
21	New Jersey	6,644	1,501	22.6	1.72	**53.0**
22	Virginia	8,663	841	9.7	1.08	**43.6**
23	Indiana	8,315	640	7.7	1.00	**43.1**
24	Ohio	11,807	1,012	8.6	0.88	**39.0**
25	Utah	2,706	279	10.3	1.07	**37.8**
26	West Virginia	3,747	219	5.8	1.19	**37.1**
27	Connecticut	2,780	351	12.6	0.99	**35.0**
28	Hawaii	1,269	262	20.6	1.98	**35.0**

(Table continues on next page)

Rank	State	Total traffic fatalities (2003–2012)	Total pedestrian fatalities (2003–2012)	Percentage of traffic deaths that were pedestrians (2003–2012)	Annual pedestrian deaths per 100,000 (2003–2012)	State Pedestrian Danger Index
29	Colorado	5,386	565	10.5	1.17	**34.1**
30	Oregon	4,165	497	11.9	1.33	**33.0**
31	Illinois	11,429	1,488	13.0	1.17	**32.3**
32	Rhode Island	769	121	15.7	1.14	**31.1**
33	Pennsylvania	14,341	1,555	10.8	1.24	**30.0**
34	North Dakota	1,217	68	5.6	1.03	**28.9**
35	Kansas	4,232	215	5.1	0.77	**28.7**
36	Washington	5,391	678	12.6	1.04	**28.5**
37	Wisconsin	6,870	522	7.6	0.93	**27.1**
38	Minnesota	4,835	395	8.2	0.76	**24.8**
39	New York	13,144	3,097	23.6	1.61	**24.5**
40	Montana	2,334	116	5.0	1.20	**24.2**
41	Wyoming	1,550	49	3.2	0.91	**23.5**
42	Idaho	2,365	119	5.0	0.79	**22.3**
43	Massachusetts	4,015	716	17.8	1.10	**21.9**
44	Maine	1,716	108	6.3	0.82	**20.4**
45	New Hampshire	1,294	100	7.7	0.76	**19.7**
46	Iowa	4,062	221	5.4	0.73	**18.5**
47	South Dakota	1,559	80	5.1	1.00	**18.4**
48	Nebraska	2,362	91	3.9	0.51	**16.2**
49	District of Columbia	368	133	36.1	2.26	**14.5**
50	Alaska	725	87	12.0	1.26	**13.9**
51	Vermont	743	45	6.1	0.72	**13.0**
National Average		**383,489**	**47,025**	**12.3**	**1.56**	**52.2**

Appendix B: Resources for transportation professionals

Transportation planners, engineers, and designers play a key role in making streets safe and comfortable for people traveling by foot or wheelchair. They may consult dozens of resources and guidance. A sampling of recent resources and nationally recognized best practices are listed here.

State-of-the-practice design guidance

- *Urban Street Design Guidelines*, National Association of City Transportation Officials (2013)
- *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach: An ITE Recommended Practice*, Institute of Transportation Engineers and the Congress for the New Urbanism (2010)
- *A Policy on Geometric Design of Highways and Streets, 6th Edition*, American Association of State Highway and Transportation Officials (2011)
- *Manual on Uniform Traffic Control Devices, Federal Highway Administration (2009, with Revision Numbers 1 and 2 incorporated, dated May 2012)*
- *Proposed Guidelines for Pedestrian Facilities in the Public Right of Way*, U.S. Access Board (2011)
- *U.S. Traffic Calming Manual*, APA Planners Press (2009)
- *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 1st Edition*, American Association of State Highway and Transportation Officials (2004, update forthcoming)

Template design guidance

- *Complete Streets, Complete Networks: A Manual for the Design of Active Transportation*, Active Transportation Alliance (2012)
- *Model Design Guide for Livable Streets*, Los Angeles County Department of Public Health (2011)
- *Re:Streets*, National Endowment for the Arts (n.d.)

Sample design guides

- *Active Design Guidelines*, New York City (2010)
- *Better Streets Plan: Policies and Guidelines for the Pedestrian Realm*, City and County of San Francisco (2010)
- *Boston Complete Streets Design Guidelines*, City of Boston (2013)
- *Complete Streets Chicago: Design Guidelines*, City of Chicago (2013)
- *Urban Street Design Guidelines*, City of Charlotte (2007)

Research and reports

- *Practice-Ready Papers*, Transportation Research Board. These peer-reviewed research papers contribute to the solution of current or future transportation problems or issues for practitioners. Information is ready for immediate implementation or requires minimal additional research or implementation effort. Recent papers related to non-motorized transportation can be found online: http://prp.trb.org/results.aspx?q=&subject=Pedestrians+and+Bicyclists#
- *Pedestrian Safety Guide and Countermeasure Selection System*, Federal Highway Administration (2013)

- *Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices, Seventh Edition*, Federal Highway Administration (2013)
- *Evaluation of Pedestrian-Related Roadway Measures: A Summary of Available Research*, Pedestrian and Bicycle Information Center for Federal Highway Administration (2013)
- *Steps to a Walkable Community: A Guide for Citizens, Planners, and Engineers*, America Walks and Sam Schwartz Engineering (2012)
- *The Innovative DOT: A Handbook of Policy and Practice*, State Smart Transportation Institute and Smart Growth America (2014)
- *Public Policies for Pedestrian and Bicycle Safety and Mobility: An Implementation Project of the Pedestrian and Bicyclist Safety and Mobility International Scan*, Federal Highway Administration (2010)
- *Planning Complete Streets for an Aging America*, AARP (2009)
- *How to Develop a Pedestrian Safety Action Plan*, Federal Highway Administration and National Highway Traffic Safety Administration (2006)

Appendix C: Methodology

The National Highway Traffic Safety Administration (NHTSA) collects data on every traffic-related fatality occurring on U.S. roadways. To determine how many pedestrians were killed in a given year and county, we queried NHTSA's Fatality Analysis Reporting System (FARS) for pedestrians who suffered fatal injuries from 2003 through 2012. We then aggregated the county-level data to the state and Metropolitan Statistical Area for 360 metro areas. Dividing this figure by the appropriate population estimate from the U.S. Census Bureau, and multiplying by 100,000 gave us a yearly fatality rate per 100,000 persons.[33]

We used the Pedestrian Danger Index (PDI) to compare metro areas while taking into account the exposure to injury that pedestrians face in a given metro area. This exposure measure is derived from the U.S. Census Bureau's American Community Survey (ACS), which asks respondents to indicate the mode they most often used to get to work. This data is limited in that it only captures the pedestrian trips to work, excluding trips made by walking to school, to the corner grocery or to visit friends. It also fails to capture trips that are partially made on foot and partially by some other mode, for example, a walking trip to the bus stop or train station.

Small sample sizes in the ACS are corrected for by aggregating data across a five-year period, so that the journey-to-work data reported by metro area is for the period 2008 to 2012. Nevertheless, some medium- and smaller-sized metropolitan areas show high margins of error in the walk-to-work rate and are excluded from our analysis.

We calculated the PDI by dividing the average annual fatality rate for a metro area by the percentage of commuters walking to work in that metro area. The PDI calculation looks like this:

$$\frac{\text{Average 2008-2012 (annual pedestrian fatalities/population)*100,000}}{\text{Percentage of commuters walking to work}}$$

Pedestrian fatality data by race and ethnicity are from the Centers for Disease Control and Prevention web-based Injury Statistical Query and Reporting System. This data was determined to be a more reliable source of race and ethnicity than the FARS data, which had a high percentage of records without race or ethnicity information.

Other analysis of the data—by victim age, road type, crosswalk availability, etc.—were made using the FARS online query system, and combining these data with U.S. Census population estimates in some cases.

33 For definition of Metropolitan Statistical Area, see U.S. Census Bureau, www.census.gov/population/www/metroareas/metrodef.html.

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. For more information visit www.smartgrowthamerica.org.