



# Geographic Summary of Pedestrian Traffic Fatalities

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## Summary

Pedestrian fatalities in crashes increased 44 percent in the last decade (2010 to 2019), with the pedestrians' share of traffic fatalities increasing 32 percent, from 13 to 17 percent. This research note examines the location of pedestrian fatalities. Key results of this analysis show:

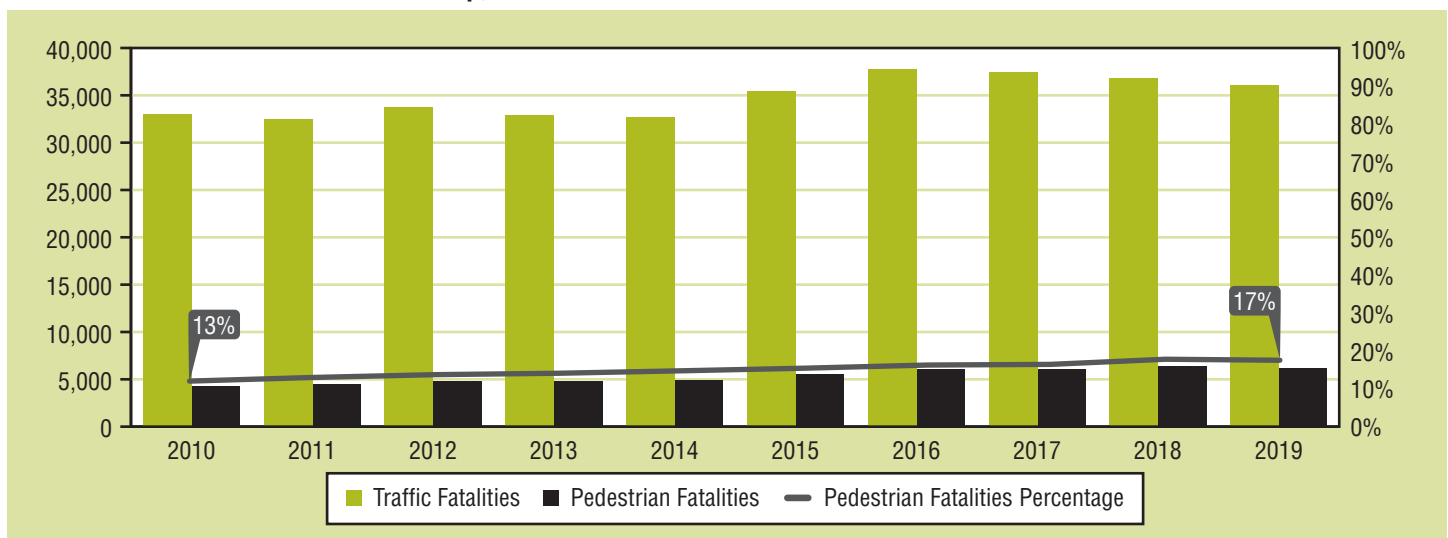
- From 2015 to 2019 the number of counties with at least 1 pedestrian fatality increased 5 percent, the number of urbanized areas with at least one pedestrian fatality increased by 1, and the number of metropolitan statistical areas with at least 1 pedestrian fatality increased 2 percent.
- In 2019 about 74 percent of pedestrian fatalities nationwide occurred in urbanized areas and 88 percent in metropolitan statistical areas (MSAs).

## Introduction

From 2010 to 2019 fatalities in motor vehicle traffic crashes increased 9 percent overall. The trend of the increase over the last decade is seen in Figure 1. Pedestrian fatalities increased 44 percent during this time. In 2010 pedestrians accounted for 13 percent of all crash fatalities. This increased at varying rates, averaging 3 percent annually from 2010 to 2019, to 17 percent by 2019. In 2019 pedestrian fatalities, as a proportion of all traffic fatalities, decreased for the first time since 2006.

From the NHTSA report Geospatial Summary of Crash Fatalities (Webb, 2020) we know that fatal crashes involving pedestrians occur primarily in and around areas categorized as urban. Specifically, 79 percent occurred in areas classified as urban in 2018, and 96 percent of all pedestrian-involved fatalities occurred in the areas covered by urban areas and the adjacent 7.5 miles.

Figure 1  
Crash Fatalities and Pedestrian Makeup, 2009-2018



Source: FARS 2010-2018 Final File, 2019 FARS Annual Report File (ARF)

## Data and Methods

### Counties

There are 3,142 counties and county equivalents in the United States. For example, Washington, DC, and the adjacent Virginia, West Virginia, and Maryland counties surrounding it are shown in Figure 2.

Figure 2  
**Washington, DC, and Other Counties and County Equivalents**

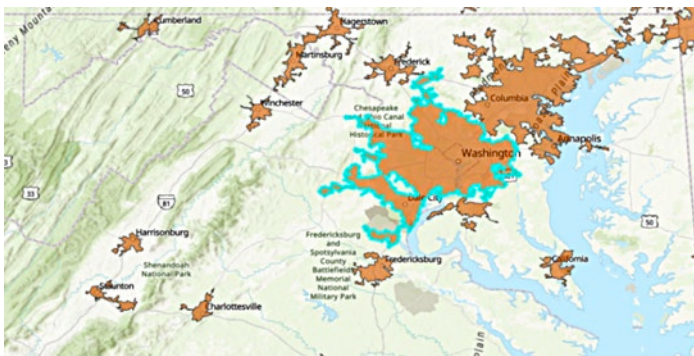


Source: 2019 TIGER/Line Shapefiles: Counties (and equivalent)

### Urbanized Areas

The Census Bureau's "urbanized areas," UAs, represent densely populated (50,000 or more people) developed territory and encompass residential, commercial, and other non-residential urban land (Census, 2012). As of 2019 there are 486 UAs in the Nation. Those surrounding the Washington, DC-VA-MD Urbanized Area are shown in Figure 3 as an example.

Figure 3  
**Washington, DC-VA-MD Urbanized Area and Other Urbanized Areas**

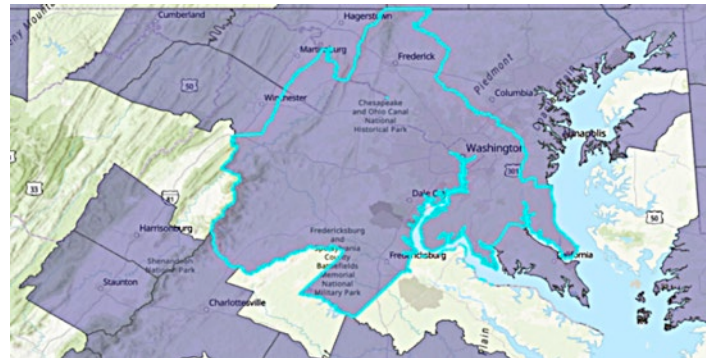


Source: 2019 TIGER/Line Shapefiles: Core Based Statistical Areas

### Metropolitan Statistical Area

A metropolitan statistical area, MSA, is a region with a UA core, made up of the central county or counties or equivalent entities containing the core, plus adjacent counties having high degrees of social and economic integration with the central county or counties as measured through commuting (Census, 2012). Using data from the Census Bureau, the Office of Management and Budget defines MSAs by criteria modified most recently in 2010 (Census, 2018). As of 2019 there are 384 MSAs in the United States. The Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Area is shown in Figure 4.

Figure 4  
**Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Area and Surrounding MSAs**



Source: 2019 TIGER/Line Shapefiles: Metropolitan Statistical Areas

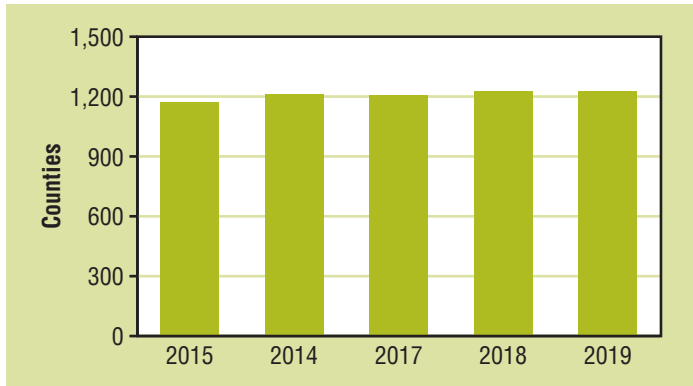
The analysis used NHTSA's Fatality Analysis Reporting System (FARS) data. The 2015-2018 FARS Final Files were used along with the 2019 Annual Report File (ARF). When considering fatalities from a county level, the county reported on the police crash report (PCR) was used, due to the higher accuracy compared to latitude/longitude reporting. The UA and MSA counts were generated using Esri's ArcGIS Pro software, integrating the 2019 TIGER/Line Core Based Statistical Areas shapefile with the FARS latitude/longitude information. UAs and MSAs are defined decennially. This analysis used the most recently available files (2019) for the entire study period (2015-2019). There were 6,205 pedestrian fatalities in 2019 and 99.9 percent had usable latitude/longitude data (6,196).

## Results

### Counties

In 2015 there were 37 percent of counties (1,170) that had at least 1 pedestrian fatality. About 18 percent (551) had 1 pedestrian fatality, and 20 percent (619) had 2 or more pedestrian fatalities. By 2019 some 39 percent of counties (1,226) had at least 1 pedestrian fatality. About 18 percent (563) had 1 pedestrian fatality, and 21 percent (663) had 2 or more pedestrian fatalities. The number of counties with at least 1 pedestrian fatality increased 5 percent from 2015 to 2019, seen in Figure 5.

Figure 5  
Counties With at Least One Pedestrian Fatality, 2015-2019



Source: FARS 2015-2018 Final File, FARS 2019 ARF

Approximately 10 percent (613) of all pedestrian fatalities can be accounted for in 4 counties: Los Angeles County, California; Maricopa County, Arizona; Harris County, Texas; and Cook County, Illinois. These four counties also contain very large cities: Los Angeles, Phoenix, Houston, and Chicago.

Twenty-five counties that had the highest pedestrian fatality counts annually from 2015 to 2019 are listed below in Table 2. Some like Los Angeles County, Maricopa County, Harris County, and Cook County, had the most pedestrian fatalities all 5 years. Other counties like Pima County, Arizona; Bernalillo County, New Mexico; Queens County, New York; and Wayne County, Michigan, had the highest counts for one or several years, but not all.

Table 1  
**Counties With 25 Highest Annual Pedestrian Fatalities 2015-2019 by 2019 Counts**

County	State	2015	2016	2017	2018	2019
Los Angeles County	California	209	278	265	248	265
Maricopa County	Arizona	97	131	138	158	126
Harris County	Texas	98	130	109	103	119
Cook County	Illinois	81	73	77	76	103
Miami-Dade County	Florida	86	83	58	107	90
San Diego County	California	74	73	74	95	83
Dallas County	Texas	71	84	73	72	83
San Bernardino County	California	60	61	86	77	79
Broward County	Florida	58	67	64	71	64
Riverside County	California	42	62	65	78	63
Bexar County	Texas	46	68	50	54	63
Orange County	Florida	40	48	62	55	56
Sacramento County	California	29	48	40	50	56
Hillsborough County	Florida	48	50	50	52	53
Orange County	California	58	67	57	69	47
Duval County	Florida	39	37	40	34	44
Clark County	Nevada	55	57	71	61	43
Pima County	Arizona	19	21	28	31	43
Palm Beach County	Florida	37	37	41	40	42
Bernalillo County	New Mexico	16	32	31	37	42
Santa Clara County	California	36	34	28	42	42
Pinellas County	Florida	35	41	37	37	40
Queens County	New York	34	29	28	40	39
Shelby County	Tennessee	30	29	37	36	38
Travis County	Texas	39	35	24	37	38
Tarrant County	Texas	39	40	45	46	37
Kings County	New York	46	34	25	34	37
Fulton County	Georgia	28	41	36	37	34
Kern County	California	31	32	41	20	33
Wayne County	Michigan	68	47	38	48	33
Suffolk County	New York	52	40	37	42	32
Philadelphia County	Pennsylvania	26	43	37	41	29
Nassau County	New York	36	27	23	22	25
New York County	New York	20	39	17	18	24

\*Highlighted cells were the 25 counties with the most pedestrian fatalities for that year.  
Source: FARS 2015-2018 Final File, FARS 2019 ARF

## Urbanized Area

As seen in Table 2, some 75 percent of pedestrian fatalities in 2015 occurred in UAs. This percentage remained mostly steady across the 5 years. In 2015 some 80 percent (387) of UAs had at least 1 fatality; 20 percent (99) had 1 pedestrian fatality and 59 percent (288) had 2 or more pedestrian fatalities. By 2019 about 80 percent of urbanized areas (387) had at least 1 pedestrian fatality; 21 percent (101) had 1 pedestrian fatality and 59 percent (286) had 2 or more pedestrian fatalities.

Table 2

### Pedestrian Fatalities That Occurred Inside UAs

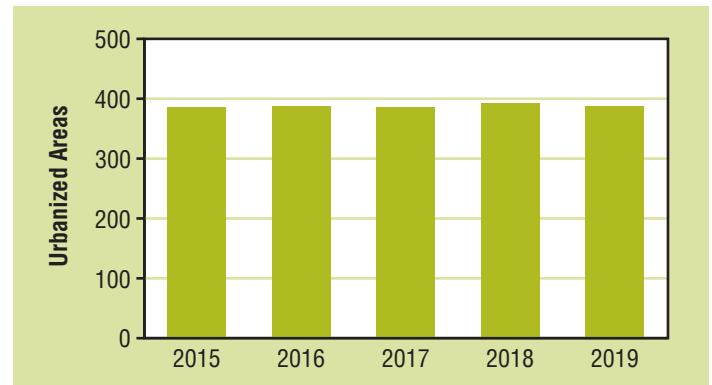
Year	Pedestrian Fatalities In UAs	Percent of Pedestrian Fatalities With Known Lat-Long Info
2015	4,087	75%
2016	4,499	74%
2017	4,541	75%
2018	4,696	74%
2019	4,616	74%

Sources: FARS 2015-2018 Final File, FARS 2019 ARF; 2019 TIGER/Line Shapefiles: Core Based Statistical Areas

The number of urbanized areas with at least 1 pedestrian fatality increased by 1 urbanized area from 2015 to 2019, seen in Figure 6. Despite the increase in the number of UAs having pedestrian fatalities, we know from prior NHTSA research that the spatial distribution of pedestrian-involved fatal crashes has remained mostly steady (Webb, 2020).

Ten percent (593) of the pedestrian fatalities in 2019 with usable lat-long data can be accounted for considering only 2 urbanized areas: Los Angeles—Long Beach—Anaheim (California), and New York—Newark, NY—NJ—CT. Urbanized areas with the 25 highest annual pedestrian fatality counts from 2015 to 2019 are listed below in Table 3. Some like Los Angeles—Long Beach—Anaheim; New York—Newark, NY—NJ—CT; Miami and Atlanta had the most pedestrian fatalities all 5 years. Other urbanized areas like Austin, Texas; Denver – Aurora, CO; St. Louis, MO—IL; and Memphis, TN—MS—AR were only in the highest counts for 1 or several years, but not all.

Figure 6  
Urbanized Areas With at Least One Pedestrian Fatality, 2015-2019



Sources: FARS 2015-2018 Final File, FARS 2019 ARF; 2019 TIGER/Line Shapefiles: Core Based Statistical Areas

Table 3  
**Urbanized Areas With 25 Highest Annual Pedestrian Fatalities 2015-2019 by 2019 Counts**

Urbanized Area	2015	2016	2017	2018	2019
Los Angeles--Long Beach--Anaheim, CA Urbanized Area	254	325	308	300	300
New York--Newark, NY--NJ--CT Urbanized Area	343	307	276	301	293
Miami, FL Urbanized Area	174	185	158	216	192
Atlanta, GA Urbanized Area	103	128	145	128	143
Chicago, IL--IN Urbanized Area	118	106	112	114	130
Houston, TX Urbanized Area	107	140	120	108	126
Dallas--Fort Worth--Arlington, TX Urbanized Area	109	123	120	120	121
Philadelphia, PA--NJ--DE--MD Urbanized Area	90	111	111	115	118
Phoenix--Mesa, AZ Urbanized Area	83	118	132	141	117
Tampa--St. Petersburg, FL Urbanized Area	92	107	103	104	107
Washington, DC--VA--MD Urbanized Area	66	62	60	83	81
San Diego, CA Urbanized Area	71	71	70	89	76
San Francisco--Oakland, CA Urbanized Area	64	58	62	55	69
Orlando, FL Urbanized Area	45	52	68	59	64
Detroit, MI Urbanized Area	92	84	70	67	63
San Antonio, TX Urbanized Area	51	65	53	52	62
Sacramento, CA Urbanized Area	36	50	41	49	61
Riverside--San Bernardino, CA Urbanized Area	51	40	68	61	60
Baltimore, MD Urbanized Area	40	55	45	61	54
Denver--Aurora, CO Urbanized Area	31	42	46	46	49
Seattle, WA Urbanized Area	43	43	45	44	48
St. Louis, MO--IL Urbanized Area	47	45	36	38	47
Jacksonville, FL Urbanized Area	41	39	40	34	44
Albuquerque, NM Urbanized Area	16	30	30	35	43
Tucson, AZ Urbanized Area	17	19	27	28	42
Boston, MA--NH--RI Urbanized Area	40	52	40	49	41
Memphis, TN--MS--AR Urbanized Area	31	33	40	43	40
Las Vegas--Henderson, NV Urbanized Area	53	55	68	60	39
Portland, OR--WA Urbanized Area	29	35	41	41	39
Austin, TX Urbanized Area	36	38	27	39	38

\*Highlighted cells were the 25 UAs with the most pedestrian fatalities for that year.

Sources: FARS 2015-2018 Final File, 2019 FARS ARF; 2019 Census TIGER/Line Shapefile: Core Based Statistical Areas

## Metropolitan Statistical Areas

Seen in Table 4, some 89 percent of pedestrian fatalities in 2015 occurred inside MSAs. This percentage remained steady across the 5 years. 88 percent (339) of MSAs had at least 1 pedestrian fatality in 2015; about 14 percent (53) had 1 pedestrian fatality and 74 percent (286) had 2 or more pedestrian fatalities. By 2019 more than 90 percent (346) of MSAs had at least 1 pedestrian fatality; 16 percent (60) had 1 pedestrian fatality and 74 percent (286) had 2 or more pedestrian fatalities. Seen in Figure 7, MSAs with at least 1 pedestrian fatality increased 2 percent from 2015 to 2019.

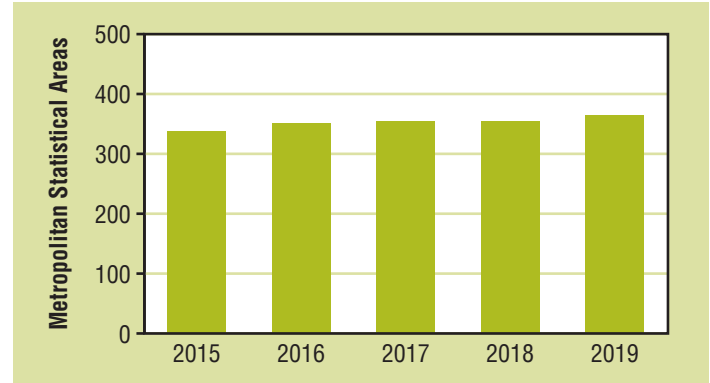
Table 4  
**Pedestrian Fatalities That Occurred Inside MSAs**

Year	Pedestrian Fatalities In MSAs	Percent of Pedestrian Fatalities With Known Lat-Long Info
2015	4,835	89%
2016	5,401	89%
2017	5,388	89%
2018	5,619	89%
2019	5,467	88%

Sources: FARS 2015-2018 Final File, FARS 2019 ARF; 2019 TIGER/Line Shapefiles: Metropolitan Statistical Areas

In 2019 approximately 10 percent (608) of pedestrian fatalities with known lat-long information occurred within only 2 metropolitan statistical areas: Los Angeles-Long Beach-Anaheim and New York-Newark-Jersey City, NY-NJ-PA.

Figure 7  
**Metropolitan Statistical Areas With at Least One Pedestrian Fatality, 2015-2019**

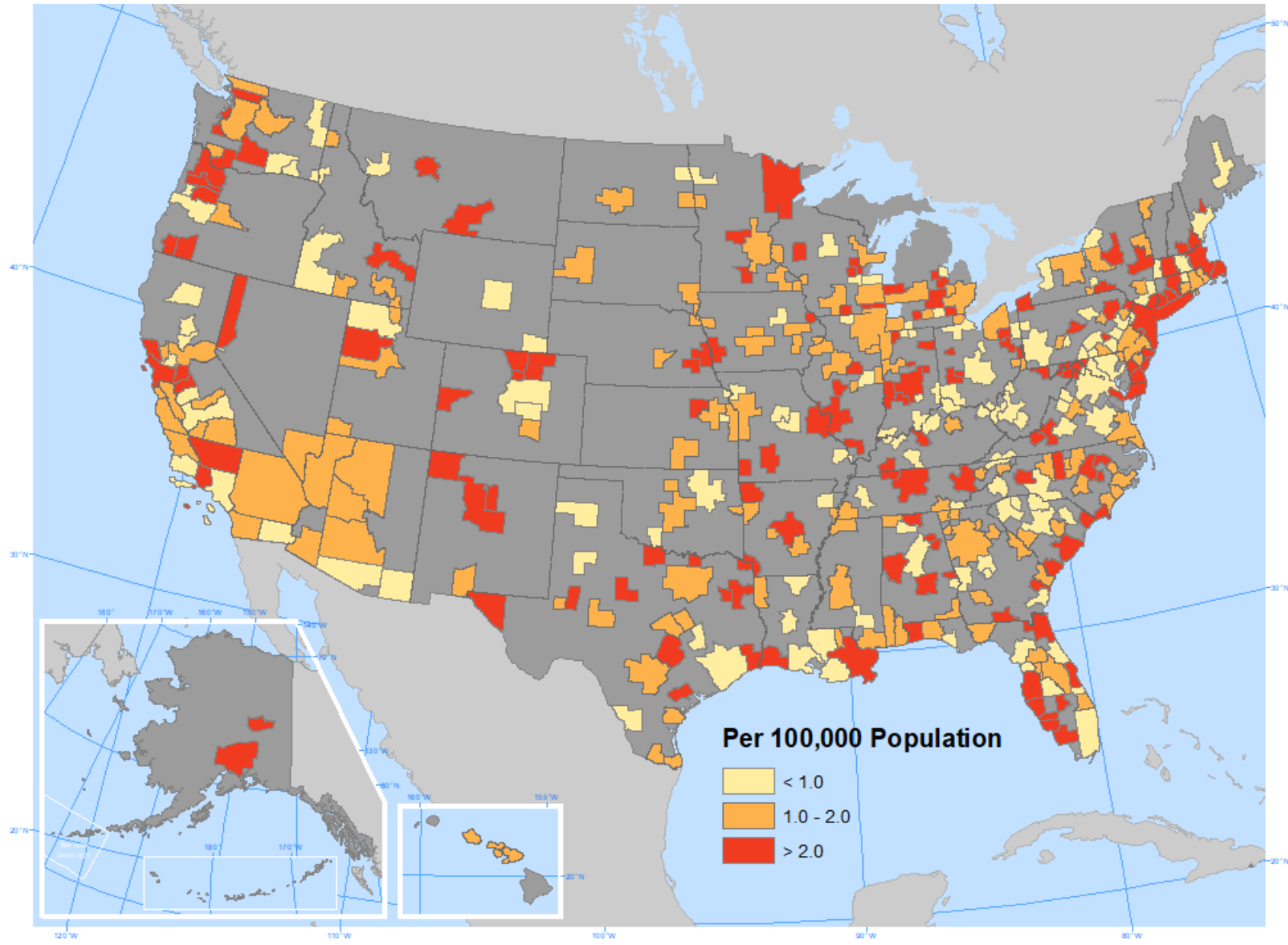


Sources: FARS 2015-2018 Final File, FARS 2019 ARF; 2019 TIGER/Line Shapefiles: Metropolitan Statistical Areas

Twenty-five MSAs with the highest annual pedestrian fatality counts from 2015 to 2019 are listed in below in Table 5. Some, like Los Angeles-Long Beach-Anaheim; New York-Newark-Jersey City, Miami-Fort Lauderdale-West Palm Beach, and Houston-The Woodlands-Sugar Land, had the most pedestrian fatalities all 5 years. Other MSAs like Seattle-Tacoma-Bellevue, St. Louis, MO-IL; and Boston-Cambridge-Newton were only in the highest counts for 1 or several years, but not all.

Farmington, New Mexico, had the highest pedestrian fatality rate per 100k population in 2019 (6.5), seen in Figure 8. Of the 346 MSAs with pedestrian fatalities in 2019 the average rate per 100k population was 1.9 and the median rate was 1.6. Orlando-Kissimmee-Sanford, FL, had the highest pedestrian fatality rate of the MSAs with the most pedestrian fatalities at 3.8 per 100k population, seen in Table 5.

Figure 8  
Metropolitan Statistical Area Pedestrian Fatality Rate, 2019



Sources: FARS 2019 ARF; 2019 TIGER/Line Shapefiles; Metropolitan Statistical Areas; 2019 Census Annual Estimates of Population



Table 5

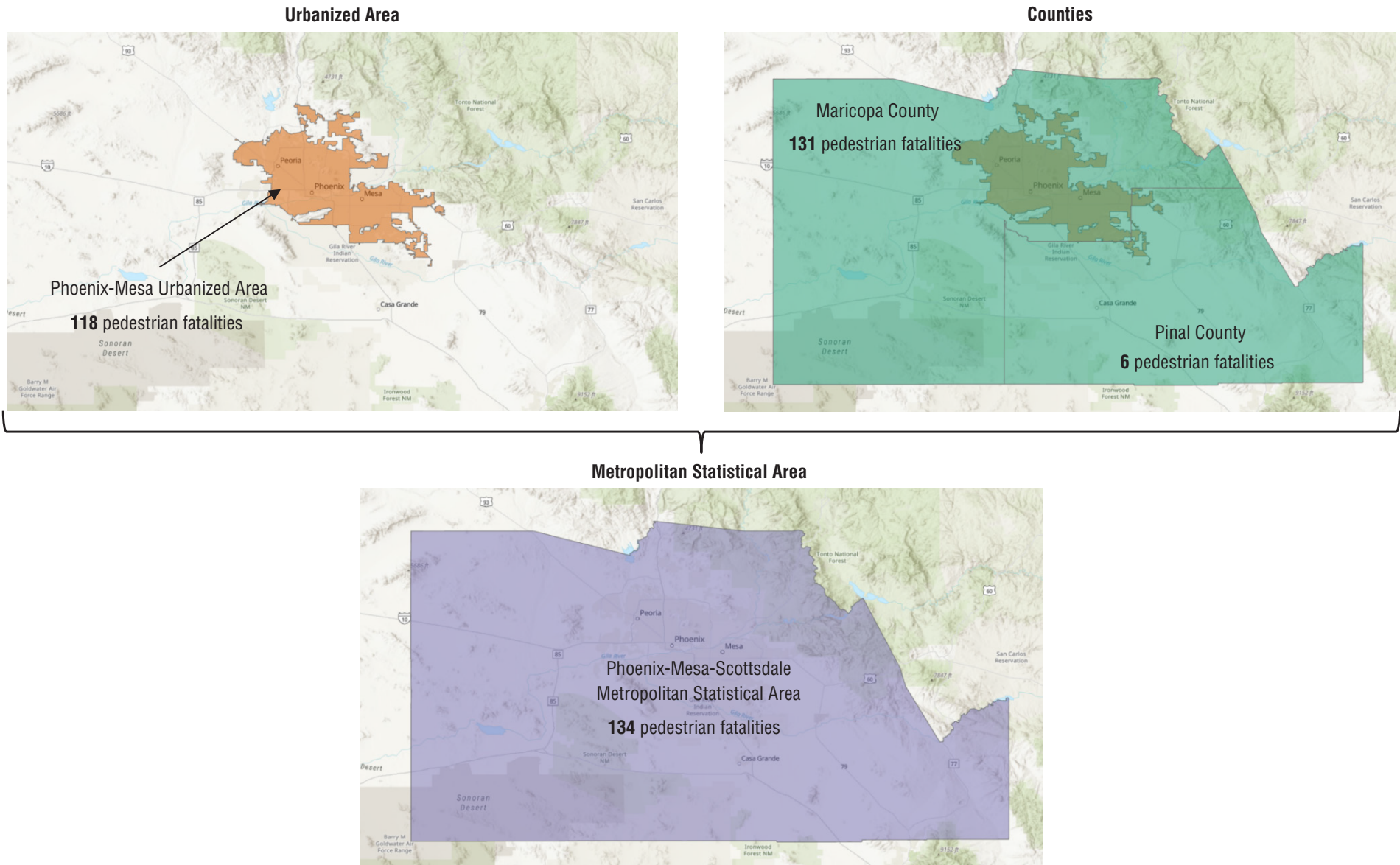
**Metropolitan Statistical Areas With 25 Highest Annual Pedestrian Fatalities 2015-2019 and 2019 Pedestrian Fatality Rate**

Metropolitan Statistical Area	Pedestrian Fatalities					Fatality Rate per 100k Population
	2015	2016	2017	2018	2019	2019
Los Angeles-Long Beach-Anaheim, CA	267	345	321	317	312	2.36
New York-Newark-Jersey City, NY-NJ-PA	348	318	277	305	296	1.54
Miami-Fort Lauderdale-Pompano Beach, FL	181	187	163	218	196	3.18
Houston-The Woodlands-Sugar Land, TX	137	177	144	133	161	2.28
Atlanta-Sandy Springs-Alpharetta, GA	115	142	159	149	151	2.51
Riverside-San Bernardino-Ontario, CA	102	123	151	154	143	3.07
Dallas-Fort Worth-Arlington, TX	131	150	148	146	143	1.89
Chicago-Naperville-Elgin, IL-IN-WI	124	119	124	131	140	1.48
Phoenix-Mesa-Chandler, AZ	96	134	145	150	134	2.71
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	100	122	119	126	126	2.06
Tampa-St. Petersburg-Clearwater, FL	101	111	112	112	121	3.79
Washington-Arlington-Alexandria, DC-VA-MD-WV	72	75	81	98	100	1.59
Orlando-Kissimmee-Sanford, FL	75	82	94	82	100	3.83
San Francisco-Oakland-Berkeley, CA	81	77	83	64	85	1.80
San Diego-Chula Vista-Carlsbad, CA	74	73	73	96	82	2.46
San Antonio-New Braunfels, TX	55	76	65	62	70	2.74
Sacramento-Roseville-Folsom, CA	43	64	49	58	70	2.96
Detroit-Warren-Dearborn, MI	100	91	78	75	67	1.55
Baltimore-Columbia-Towson, MD	47	61	51	66	60	2.14
Seattle-Tacoma-Bellevue, WA	50	45	50	49	54	1.36
St. Louis, MO-IL	60	52	41	44	53	1.89
Denver-Aurora-Lakewood, CO	37	48	46	49	52	1.75
Jacksonville, FL	54	52	56	50	50	3.21
Charlotte-Concord-Gastonia, NC-SC	35	41	57	56	49	1.86
Memphis, TN-MS-AR	34	38	47	53	49	3.64
Austin-Round Rock-Georgetown, TX	49	49	36	49	48	2.16
Portland-Vancouver-Hillsboro, OR-WA	31	39	46	46	47	1.89
Las Vegas-Henderson-Paradise, NV	55	57	71	61	43	1.90
Boston-Cambridge-Newton, MA-NH	44	57	40	52	39	0.80

\*Highlighted cells were the top 25 MSAs with the most pedestrian fatalities for that year.

Sources: FARS 2015-2018 Final File, 2019 ARF; 2019 Census TIGER/Line Shapefiles: Metropolitan Statistical Areas; 2019 Census Annual Estimates of Population

Figure 9  
**Phoenix-Mesa UA, Maricopa and Pinal Cos Relation to Phoenix-Mesa-Scottsdale MSA**



Sources: 2019 Census/TIGER Line Shapefiles: Core Based Statistical Areas, Metropolitan Statistical Areas, Counties (and equivalent); FARS 2016

## Discussion

As discussed in the Data and Methods section, an MSA is a region with a UA core, comprised of the core's central county or counties or equivalent entities, plus adjacent counties. For example, the Phoenix-Mesa-Scottsdale MSA is made up of Maricopa and Pinal counties, with the Phoenix-Mesa UA core, as shown in Figure 9.

Figure 9 shows the UA core of Phoenix-Mesa, in green. In Table 4 we saw 118 pedestrian fatalities here in 2016. In Table 1, we saw 131 pedestrian fatalities in Maricopa County in 2016. Maricopa County is shown as the northwestern county in green. Pinal County, shown as the southeastern county in green, had 6 pedestrian fatalities in 2016, as reported on PCRs. In Table 6 we saw 134 pedestrian fatalities in the Phoenix-Mesa-Scottsdale MSA. The counties do not sum to the MSA total in this case due to erroneous latitude/longitude reporting for crashes. For example, a crash was reported in Maricopa County but the coordinates were in Pima County, outside the MSA. There were two pedestrian fatalities in Maricopa County without valid latitude/longitude data and thus were omitted from geo-location-based analysis.

## References

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This Research Note was written by Caitlin N. Webb, mathematical statistician in the Mathematical Analysis Division, National Center for Statistics and Analysis, NHTSA. For questions regarding the information presented in this document, please contact [NCSARequests@dot.gov](mailto:NCSARequests@dot.gov). Access this Research Note and other general information on traffic safety at <https://crashstats.nhtsa.dot.gov/>.



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