Kansas Vulnerable Road User Safety Assessment

Technical Report

Acknowledgments

FINAL

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Kansas Department of Transportation

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The Kansas Department of Transportation (KDOT) appreciates the concerted effort of local, regional, and Tribal agencies that provided input in the Vulnerable Road User Safety Assessment. Additionally, the Strategic Highway Safety Plan partners, consisting of the Drive to Zero Coalition and the Emphasis Area Teams, are valuable partners in a shared mission of saving lives on public roads in Kansas. KDOT looks forward to continued partnership on this important subject.

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Abbreviations

4 Es	education, enforcement, engineering, and emergency medical services
AADT	Average Annual Daily Traffic
ACS	American Community Survey
ADA	Americans with Disabilities Act
ATP	Active Transportation Plan
BMT	Bureau of Multimodal Transportation
DAC	Disadvantaged Census Tract (as defined by USDOT)
DTZC	Drive To Zero Coalition
EAT	Emphasis Area Team
EMS	Emergency Medical Services
ETC	Equitable Transportation Community
FHWA	Federal Highway Administration
GIS	Geographic Information System
HIA	High-Injury Area
HIN	High-Injury Network
HRN	High-Risk Network
HSIP	Highway Safety Improvement Program
KA	"K" and "A" severity crashes from the KABCO scale of crash severity rating. K = fatal; A = serious injury or suspected serious injury
KATE	Kansas Active Transportation Enhancement
KCARS	Kansas Crash Analysis Reporting System
KDOT	Kansas Department of Transportation
KUTC	The University of Kansas Transportation Center
mph	miles per hour
MPO	Metropolitan Planning Organization
N/A	Not Available
NACTO	National Organization of City Transportation Officials
NIH	National Injury Hotspot
PC EAT	Pedestrians and Cyclists Emphasis Area Team

PHB	Pedestrian Hybrid Beacon
ROW	Right-of-way
RRFB	Rectangular Rapid Flashing Beacon
RSA	Road Safety Audit
SHSP	Strategic Highway Safety Plan
SRTS	Safe Routes to Schools
SSA	Safe System Approach
TA	Transportation Alternatives
TEAP	Traffic Engineering Assistance Program
USDOT	U.S. Department of Transportation
VRU	Vulnerable Road User
VRUSA	Vulnerable Road User Safety Assessment

1. Introduction

In 2023, the adoption of the Bipartisan Infrastructure Law included a provision for states to create a Vulnerable Road User Safety Assessment (VRUSA) to understand better how to improve safety for these users. The Kansas Department of Transportation (KDOT) finalized the VRUSA in November 2023 and adopted it as an addendum to the Strategic Highway Safety Plan (SHSP). KDOT prepared this document as a technical supplement to the Data Analysis, Stakeholder Engagement, and Strategic Highway Safety Plan chapters of the VRUSA.

Kansas Vulnerable Road User Safety Assessment

2. Data Analysis

2.1 Data Analysis Introduction

Data-driven safety analysis is key to implementing the Safe System Approach (SSA). KDOT analyzed data to understand the users, roadway features, and location context in which these crashes occurred. Data analysis is an important tool to uncover patterns, trends, and underlying factors that contribute to traffic crashes, especially when conducted in conjunction with stakeholder engagement. The first iteration was prepared prior to the statewide safety workshops to help inform attendees of the issues related to vulnerable road user (VRU) safety. Staff then gathered stakeholder feedback during the workshops and used it to refine the data analysis and explore additional topics raised by workshop attendees. Staff further refined the data analysis after the areas of higher-risk city workshops.

KDOT used four data analysis techniques:

1. **Crash Trends**: evaluating common and reoccurring trends in VRU fatal and suspected serious injury crashes (KA crashes).
    - **Contributing Circumstances**: exploring demographic, behavioral, and other factors indicated in crash reports completed by law enforcement officers.
2. **High-Injury Network (HIN)**: identifying roads with elevated VRU KA crash concentration based on past crashes, normalized by various factors such as population, land area, and VRU trips.
3. **High-Risk Network (HRN):** identifying roads with elevated risks to VRUs based on roadway configuration and contextual features identified by the systemic safety risk analysis.
    - **Systemic Safety Risk Assessment**, (2014–2021) analyzing VRU KA crash locations with roadway data to assess relative over- or underrepresentation of crashes to identify a proxy for VRU risk.
4. **High-Injury Areas (HIA)**: identifying areas with elevated risks based on past crashes in cities and county townships, normalized by various factors such as population, land area, and VRU trips.

KDOT focused on two separate land area contextual definitions:

1. **Development Density:** analysis of crashes by rural, suburban, and urban land areas.
2. **Equity:** analysis of crashes within and outside disadvantaged communities (DACs).[1]

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[1] KDOT used the U.S. Department of Transportation's definition of DACs, as shown in the Equitable Transportation Community (ETC) Explorer. More information on the DACs in Kansas is included in the Technical Report. U.S. Department of Transportation. (2023). *ETC Explorer.* https://www.transportation.gov/priorities/equity/justice40/etc-explorer.

Details on this methodology are included in Data Analysis Section 2.2 Methodology. More information on the DACs in Kansas and the version of DACs used is included in Section 2.2.2 Crash Mapping.

2.2 Methodology

To identify high-risk areas for VRUs, KDOT staff used a broad dataset in the data analysis that included historical records of road traffic crashes with a specific focus on incidents involving VRUs. The dataset incorporates essential information such as location, time, user type, and injury severity.

The KDOT-maintained Kansas Crash Analysis Reporting System (KCARS) crash record database serves as the crash database of police records for the state. For this data analysis, staff only considered crashes involving a pedestrian or pedal cyclist and focused exclusively on injury and fatal crashes. Throughout this document, the term "crash" refers solely to fatal or serious injury crashes involving pedestrians or pedal cyclists, which includes previously defined "disabling injury" and currently defined "suspected serious injury" crashes. These crashes are also known as "KA" crashes, relating to the KABCO scale of crash severity. The crash data time range for this analysis covers 2017 through 2021, except for the trend charts and systemic analysis, which uses crashes from 2014 to 2021. Staff also collected data from KDOT's KanPlan and KHub geodatabases as they related to roadway features and the linear reference system for state routes. In addition to this KDOT feature data, staff obtained geographic information system (GIS) data from various agencies across the state, including:

- Mid-America Regional Council
- Lawrence-Douglas County Metropolitan Planning Organization (MPO)
- Wichita Area MPO
- Metropolitan Topeka Planning Organization
- St. Joseph Area Transportation Study Organization
- Flint Hills MPO
- McPherson
- Emporia
- Lawrence
- Dodge City
- Garden City
- Hays
- Hutchinson
- Salina
- Dodge City

In addition to the traditional data sources, this analysis incorporates data from the data intelligence company Replica. Replica uses various data sources, such as location-based data from cell phone applications, connected vehicle probe data, retail business sales data, and U.S. Census Bureau data to generate transportation usage estimates. Staff used Replica data to estimate pedestrian, bicycle, and vehicle traffic in U.S. Census Bureau block groups across the state.

The USDOT ETC Explorer identifies and addresses DAC census tracts. Disparities and inequities in transportation access and resources characterize DAC census tracts. DACs often encompass communities that have faced historical marginalization or limited services and include low-income neighborhoods, communities of color, and areas lacking adequate transportation infrastructure. ETC Explorer areas included in the analysis were identified as of March 2023 and may not coincide with current definitions on the ETC Explorer website.

The ETC Explorer defines DACs through the following measurements:

- Transportation Insecurity: Transportation access, cost burden, and safety.
- Climate Risk Burden: Air and water quality and proximity to polluters.
- Social Vulnerability: Poverty, housing, disability, lack of internet access, age, and limited English proficiency.
- Health Vulnerability: Conditions such as asthma, cancer, high blood pressure, and mental health issues.
- Disaster Risk Burden: Extreme weather, annualized disaster loss, and water runoff.

Focusing on DACs allows policymakers, transportation planners, and community advocates to develop tailored strategies and investments to address the unique needs of these areas, reduce disparities, and improve the well-being of residents across Kansas. Figure 1 provides a map with DACs denoted in blue.

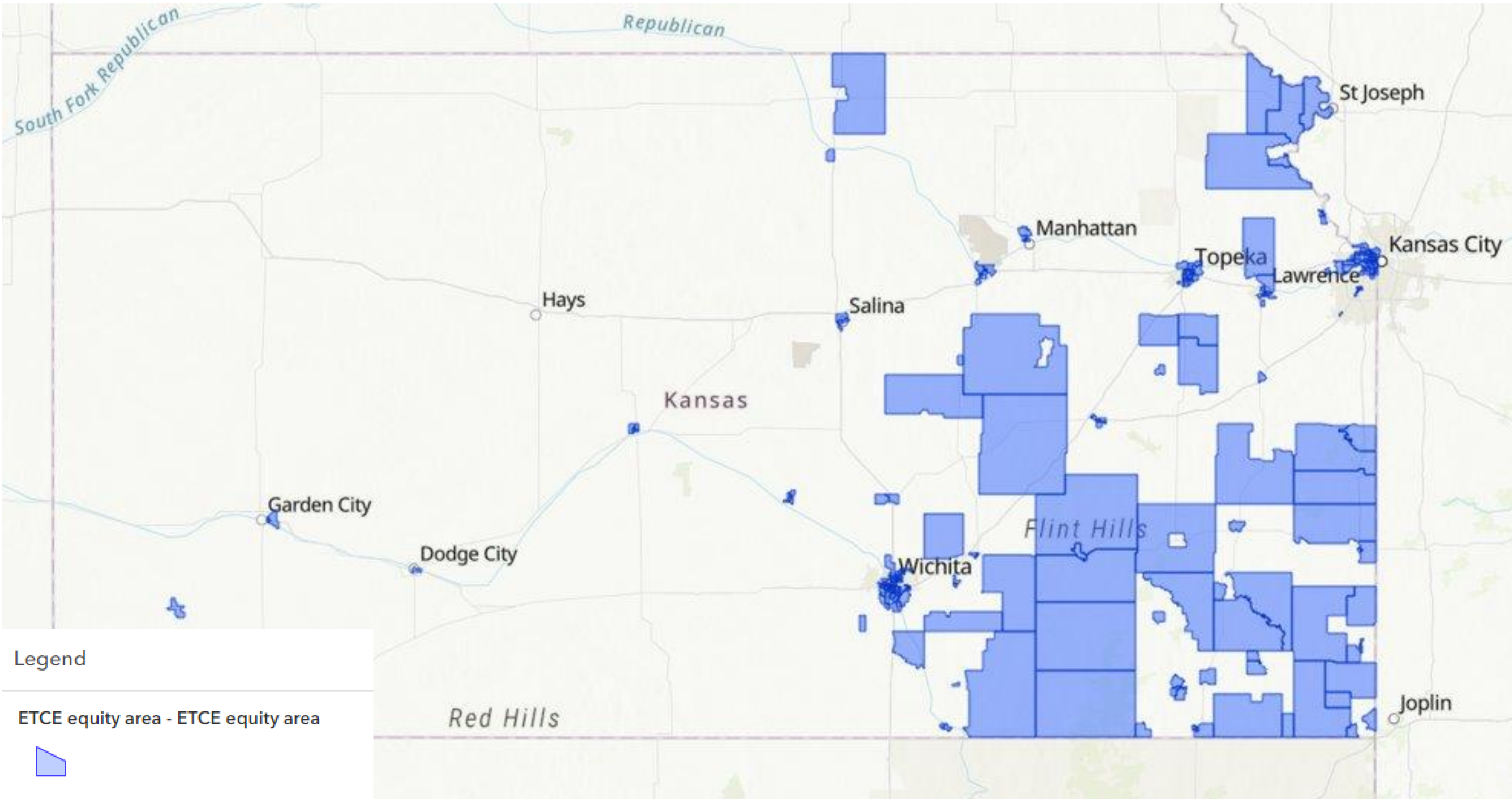

Figure 1: Kansas DAC Census Tract Map (October 2024)

2.2.1 Area Types

For this study, staff developed three area types—rural, suburban, and urban—to understand the different needs and safety issues related to VRUs in each region, includingthe characteristics and development patterns of each area type.

These area types are defined based on KDOT's urbanized and rural areas obtained from KanPlan. Staff further subdivided urban areas into urban and suburban categories. To achieve this subdivision, staff used the density of housing built prior to 1970 as a sufficient proxy to identify what practitioners typically refer to as "urban" versus "suburban"; housing built pre-1970 is considered "urban" and housing built post-1970 is considered "suburban".

Table 1 shows (1) how these areas were defined for this study, (2) population by area,and (3) total VRU crashes by area. Figure 2 shows a map of Kansas by area type: rural (red), suburban (yellow), and urban (green). A close-up of Topeka is also featured in Figure 2 to demonstrate how cities within the state can be broken down by area type.

Table 1: Area Types Definitions

Area Type	Definition	Population (2017–2021 ACS)	KA VRU Crashes (2014–2021)
Urban	Area with at least 200 homes per square mile built before 1970	1,045,060	518
Suburban	Area with fewer than 200 homes per square mile built before 1970	957,871	248
Rural	Majority of the census block group not in KDOT urbanized area	929,170	241

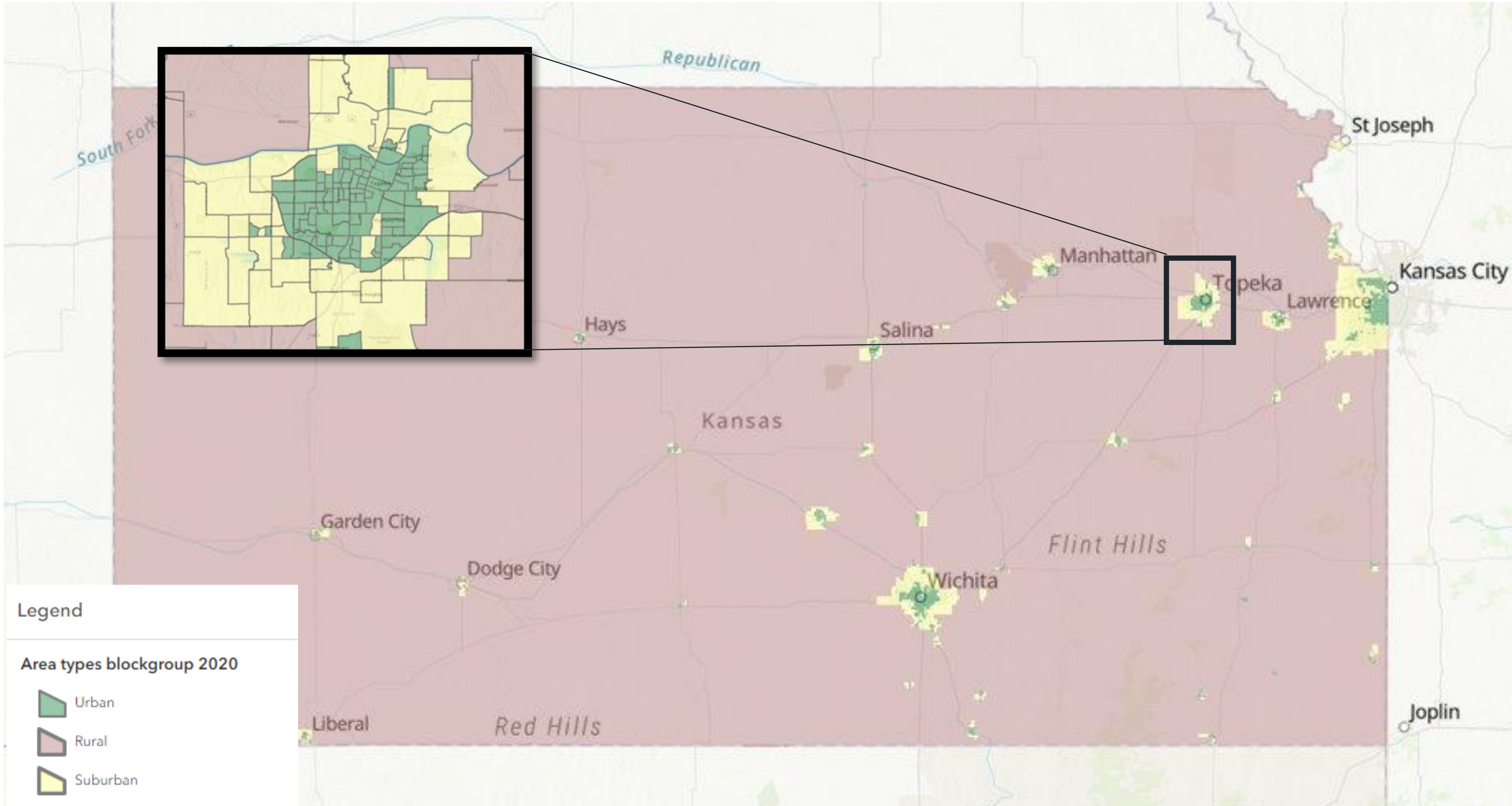

Figure 2: Area Type Map of Kansas

2.2.2 Crash Mapping Methodology

The HIA maps show the crash rate based on a variety of factors. KDOT staff mapped VRU crashes involving serious injuries between 2014 and 2021 using Census County Subdivision, which identifies geographic areas specific to municipal boundaries and county township subdivisions. Each crash rate map displays VRU crashes normalized by one factor, such as population, land area, roadway miles, or VRU trips. KDOT administrative districts overlay these maps for reference. Table 2 includes crash rate data by city and is broken down by population, land area, roadway miles, and VRU trips.

The crash rate detail maps are shown on the following pages. The statewide maps for the following categories are displayed:

- Number of KA VRU crashes (Figure 3)
- VRU KA crashes per centerline mile (Figure 4)
- VRU KA crashes per square mile (Figure 5)
- VRU KA crashes per 100,000 residents (Figure 6)
- VRU KA crashes per million VRU trips (Figure 7)

The statewide HIA maps can also be viewed online.[2]

[2] Kansas Department of Transportation (KDOT). No date. VRU Rate Maps. https://wspgeo.maps.arcgis.com/apps/mapviewer/index.html?webmap=d4c9b7e3f2454ec09cc0a555c518e66d.

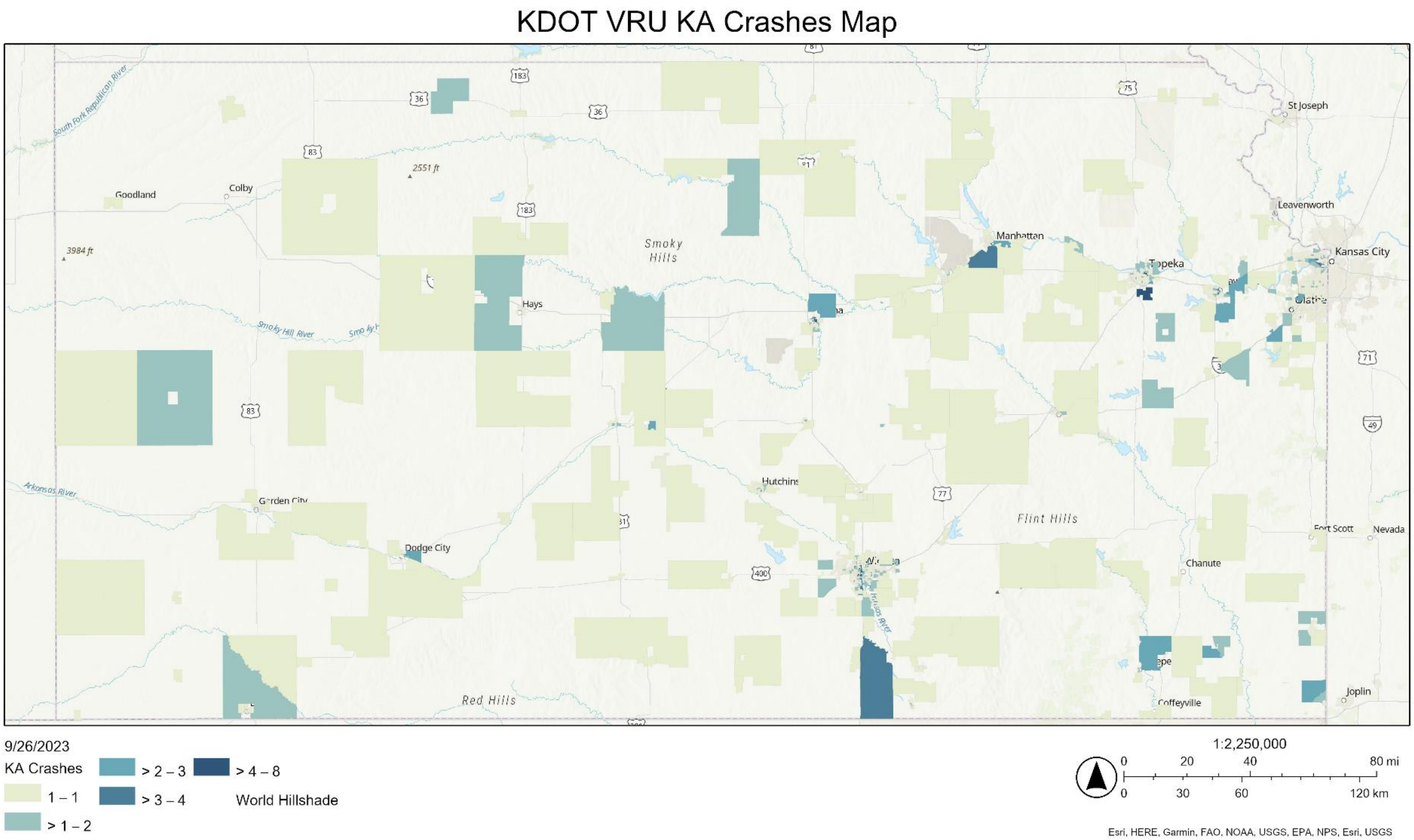

Figure 3: Total VRU KA Crashes

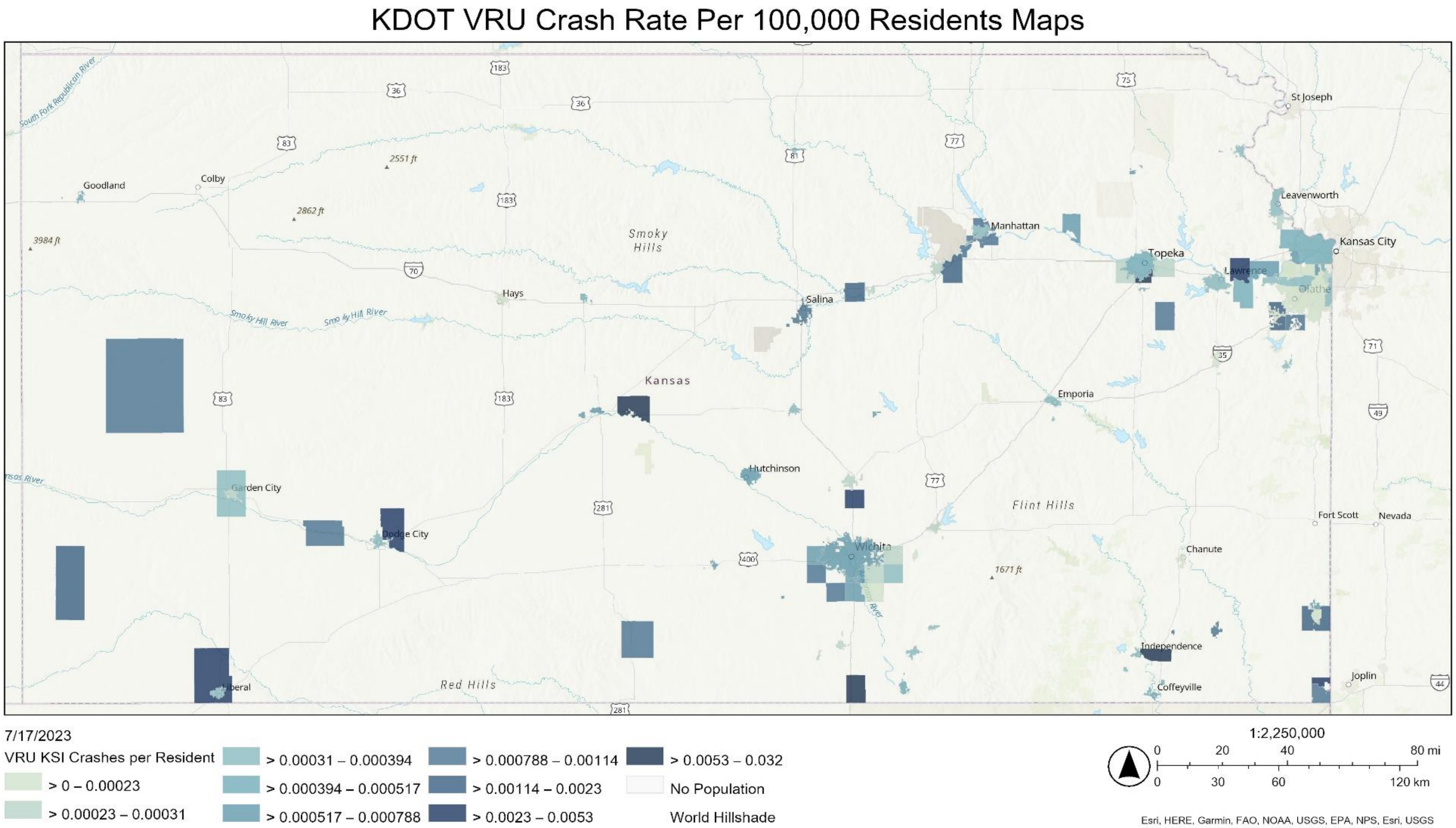

Figure 4: VRU KA Crash Rate Map per 100,000 Residents

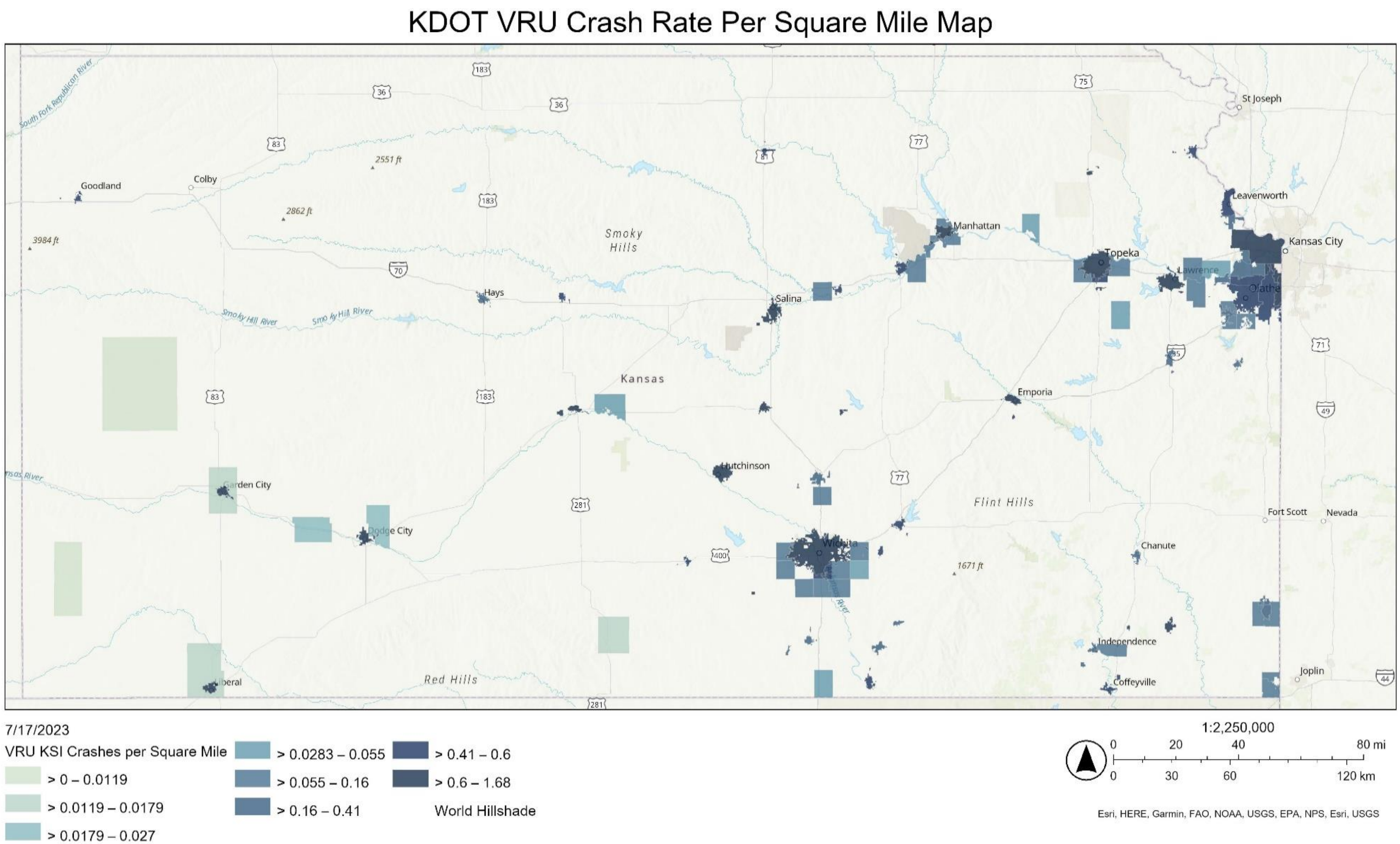

Figure 5: VRU KA Crash Rate Map per Square Mile

KDOT VRU Crash Rate Per Centerline Mile Map

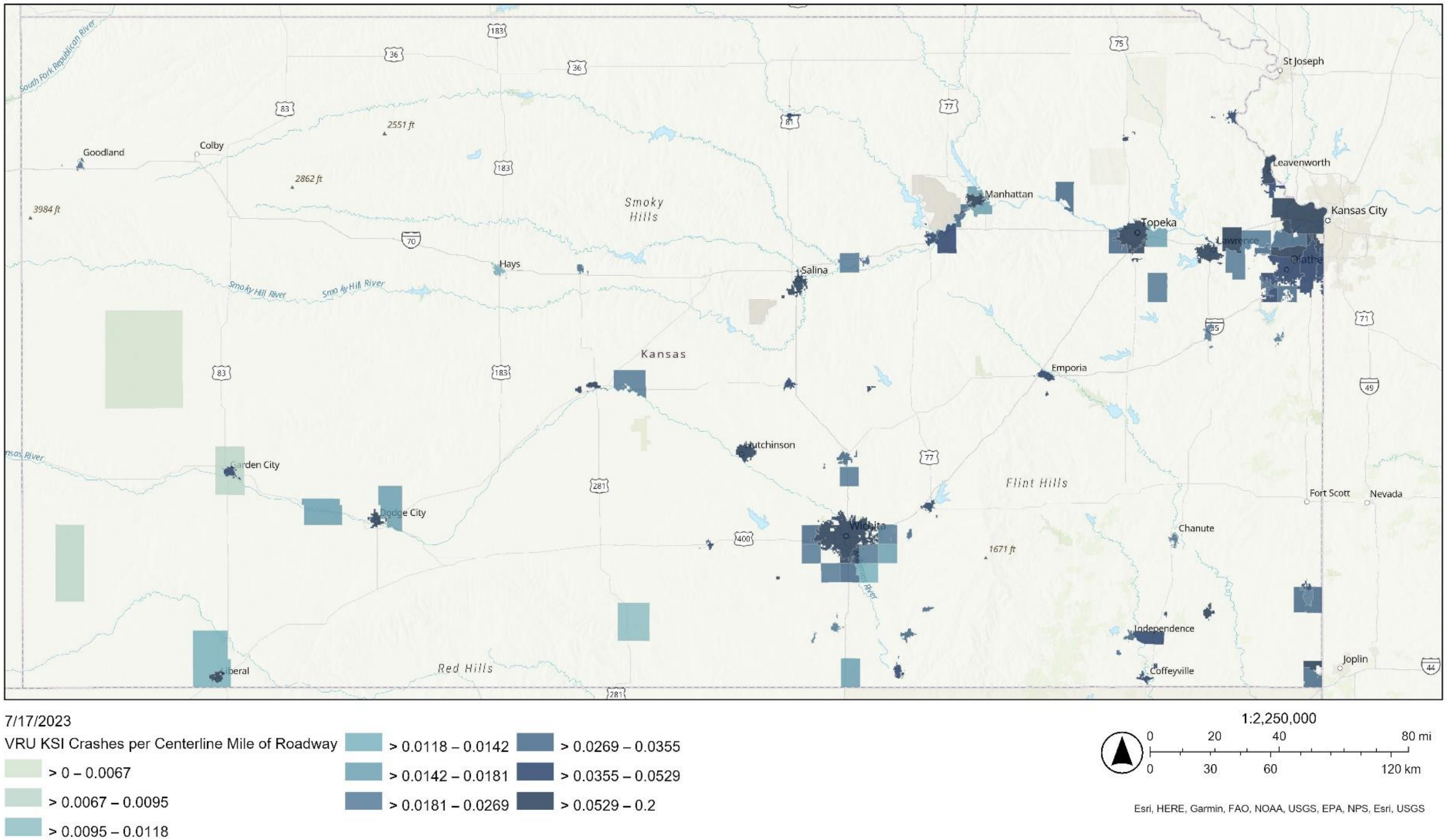

Figure 6: VRU KA Crash Rate Map per Centerline Mile

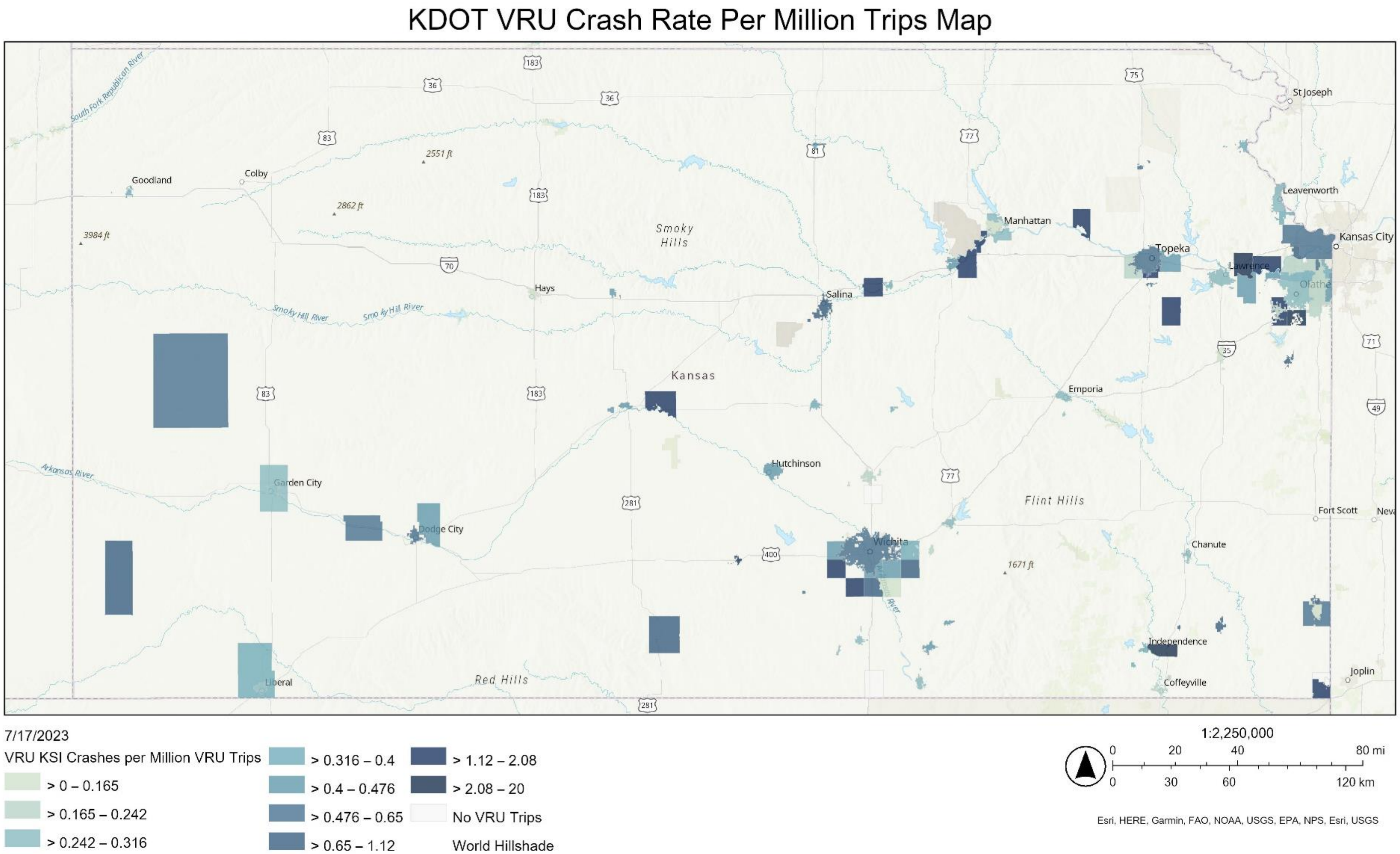

Figure 7: VRU KA Crash Rate Map per Million Trips

Table 2: Overall Sum of KA Crashes

City	Sum of KA VRU Crashes	Number of VRU KA Crashes per 100k Population	Number of VRU KA per Square Mile	Number of VRU KA Crashes per 1,000 Centerline Miles	Number of VRU KA Crashes per million VRU Trips
Wichita	225	56.60	1.39	94.04	0.56
Kansas City	79	50.40	0.63	65.90	0.50
Topeka	65	51.30	1.06	73.70	0.51
Overland Park	38	19.30	0.51	41.38	0.22
Salina	37	78.90	1.44	116.03	0.73
Lawrence	36	37.90	1.05	85.91	0.25
Olathe	28	19.80	0.45	45.02	0.24
Hutchinson	22	55.00	0.90	68.64	0.42
Lenexa	19	33.10	0.56	54.99	0.35
Manhattan	17	31.40	0.91	60.82	0.13
Leavenworth	14	37.50	0.58	76.25	0.26
Leawood	11	32.40	0.73	52.92	0.47
Shawnee	11	16.30	0.26	27.67	0.22
Dodge City	9	32.40	0.61	58.17	0.53
Great Bend	9	61.10	0.86	66.42	0.41
Emporia	8	33.10	0.66	52.19	0.26
Garden City	8	28.40	0.73	46.11	0.29
Parsons	8	83.30	0.75	71.14	0.66
Junction City	7	30.50	0.61	46.83	0.45
Liberal	7	35.30	0.61	59.06	0.29
Merriam	7	63.10	1.62	95.31	0.57
Prairie Village	7	30.50	1.13	61.86	0.37
Arkansas City	5	41.80	0.54	47.74	0.29
McPherson	5	35.50	0.67	51.63	0.32
Newton	5	26.90	0.34	33.82	0.21
Atchison	4	36.70	0.50	45.89	0.33
Coffeyville	4	45.30	0.42	35.79	0.23
El Dorado	4	31.10	0.44	41.78	0.25
Mission	4	40.20	1.50	73.84	0.36
Winfield	4	34.00	0.36	33.59	0.42
Edwardsville	3	63.60	0.33	66.40	0.65
Gardner	3	12.90	0.26	29.73	0.18
Independence	3	35.10	0.39	35.11	0.37
Lansing	3	26.70	0.24	47.21	0.40

City	Sum of KA VRU Crashes	Number of VRU KA Crashes per 100k Population	Number of VRU KA per Square Mile	Number of VRU KA Crashes per 1,000 Centerline Miles	Number of VRU KA Crashes per million VRU Trips
Pittsburg	3	14.50	0.23	21.05	0.10
Abilene	2	31.00	0.42	33.31	0.32
Augusta	2	21.60	0.47	31.96	0.22
Chanute	2	22.90	0.28	20.91	0.27
Concordia	2	39.10	0.44	38.21	0.40
De Soto	2	32.70	0.18	34.35	0.44
Frontenac	2	59.10	0.38	51.99	0.67
Goodland	2	44.80	0.44	33.69	0.34
Hays	2	9.50	0.23	12.44	0.09
Hillsboro	2	73.20	0.82	88.95	0.32
Holton	2	58.80	0.75	66.59	0.58
Kingman	2	64.40	0.56	48.61	1.56
Ottawa	2	15.80	0.19	21.16	0.12
Paola	2	34.70	0.39	22.67	0.81
Russell	2	45.40	0.41	30.69	0.48
Wellington	2	25.90	0.26	22.45	0.28
Statewide	754	39.50	0.67	61.88	0.37

2.3 Crash Trends

The VRUSA discusses key takeaways about VRUs killed or seriously injured by:

- User Type (Figure 8, Figure 9, and Figure 10)
- Area Type (Figure 11)
- Road Type (Figure 12)
- DACs (Figure 13)
- Age of VRUs (Figure 14)
- Sex of VRUs (Figure 15)
- Lighting Condition (Figure 16)

The figures within this section highlight patterns about the types of VRUs impact and their associated trends.

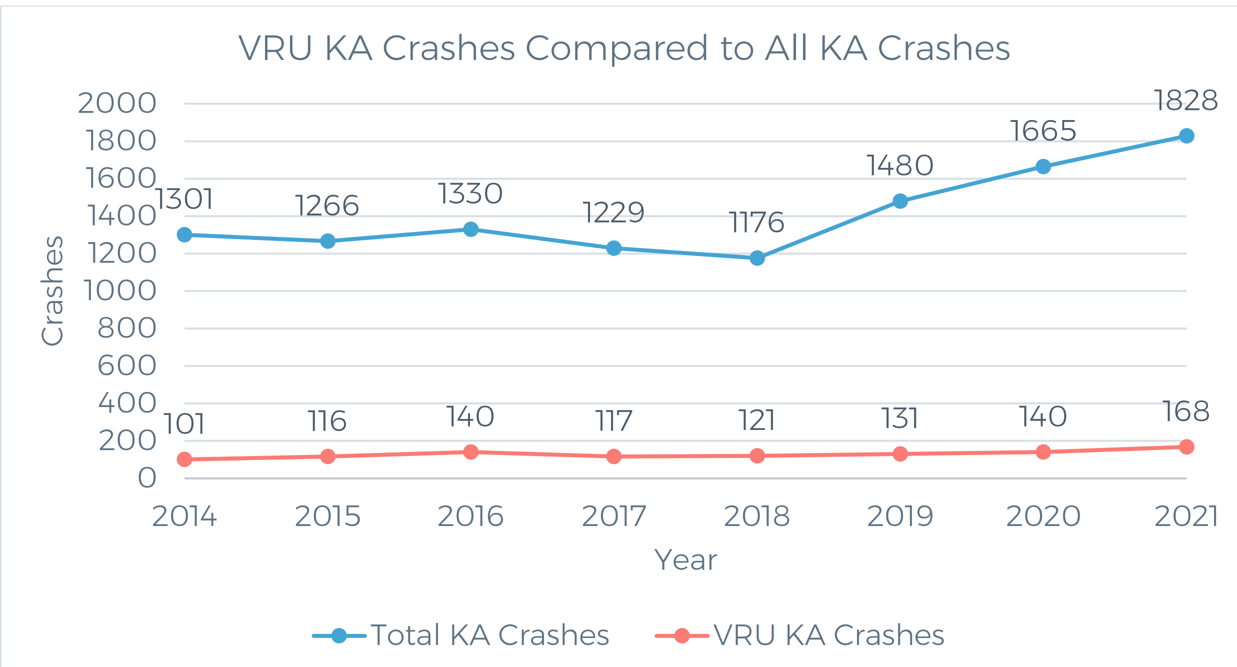

Figure 8: VRU KA Crashes Compared to All KA Crashes (2014–2021)

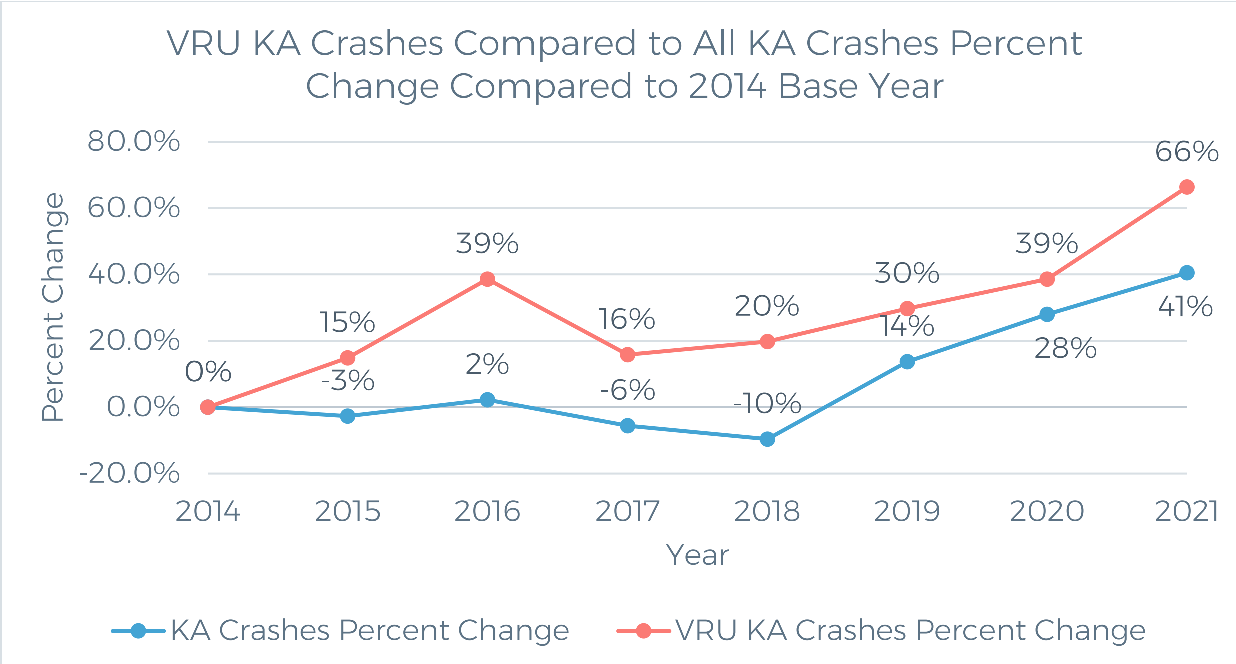

Figure 9: VRU KA Crashes Compared to All KA Crashes Percent Change Compared to 2014 Base Year (2014–2021)

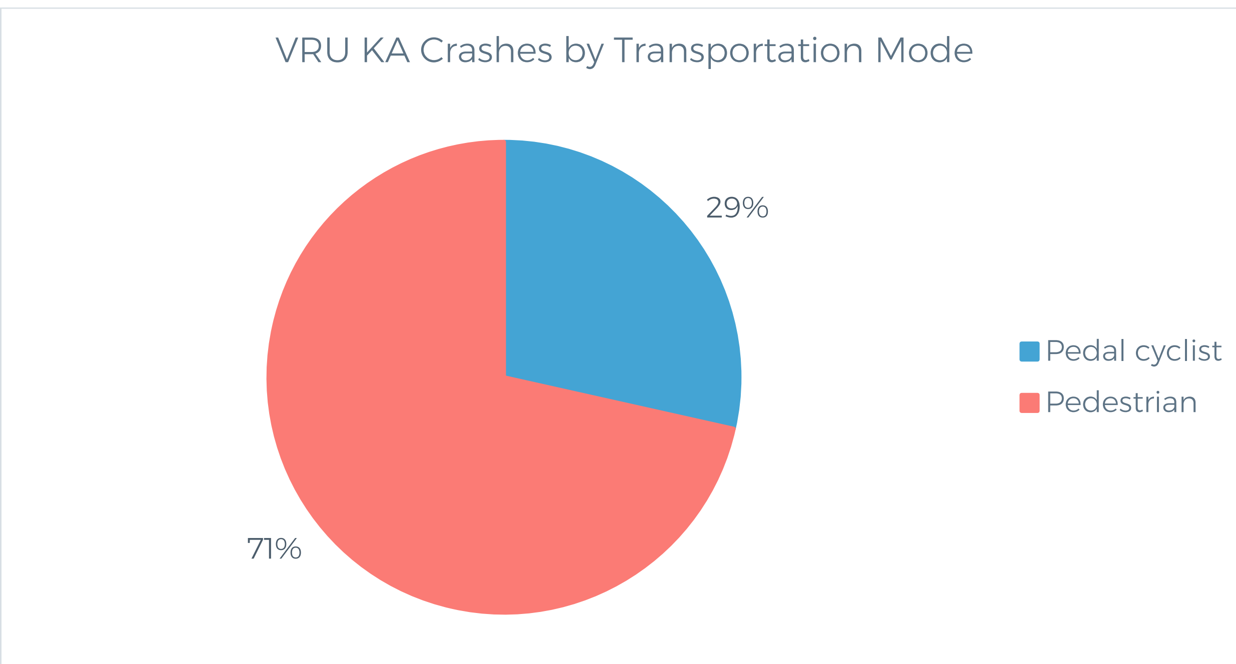

Figure 10: VRUs KA Crashes by Transportation Mode (2017–2021)

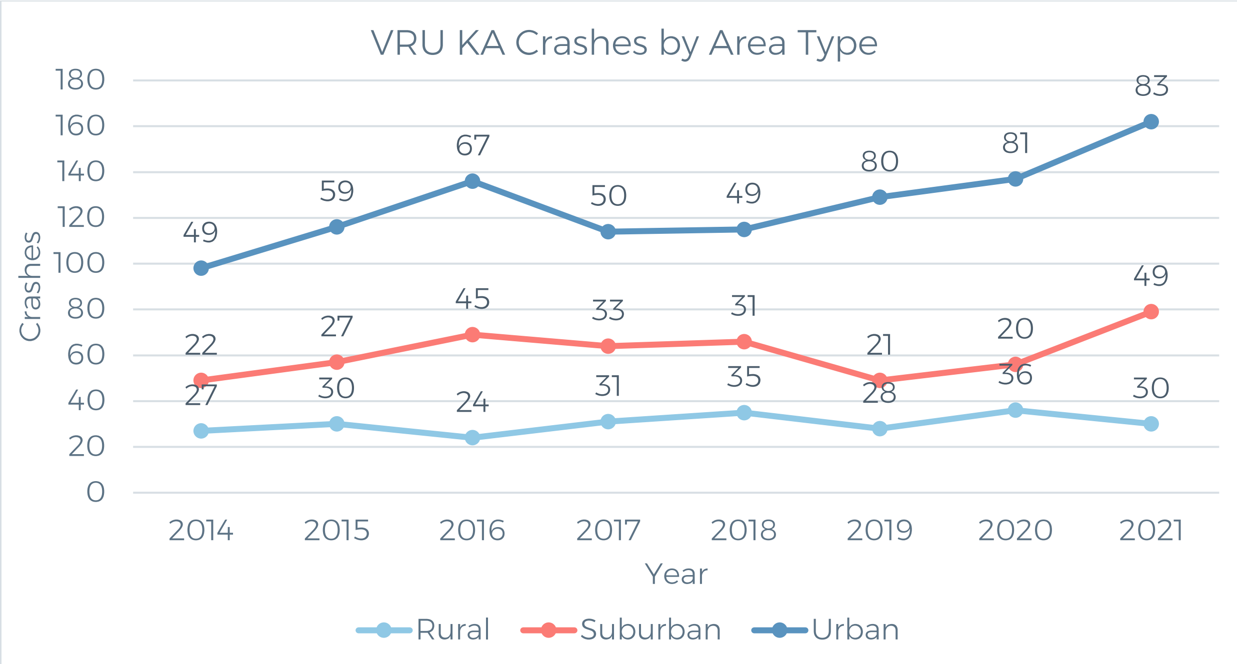

Figure 11: VRU KA Crashes by Area Type (2014–2021). Note: 27 VRU serious injury crashes lack sufficient geolocation data for area type classification and, therefore, are not included in this chart.

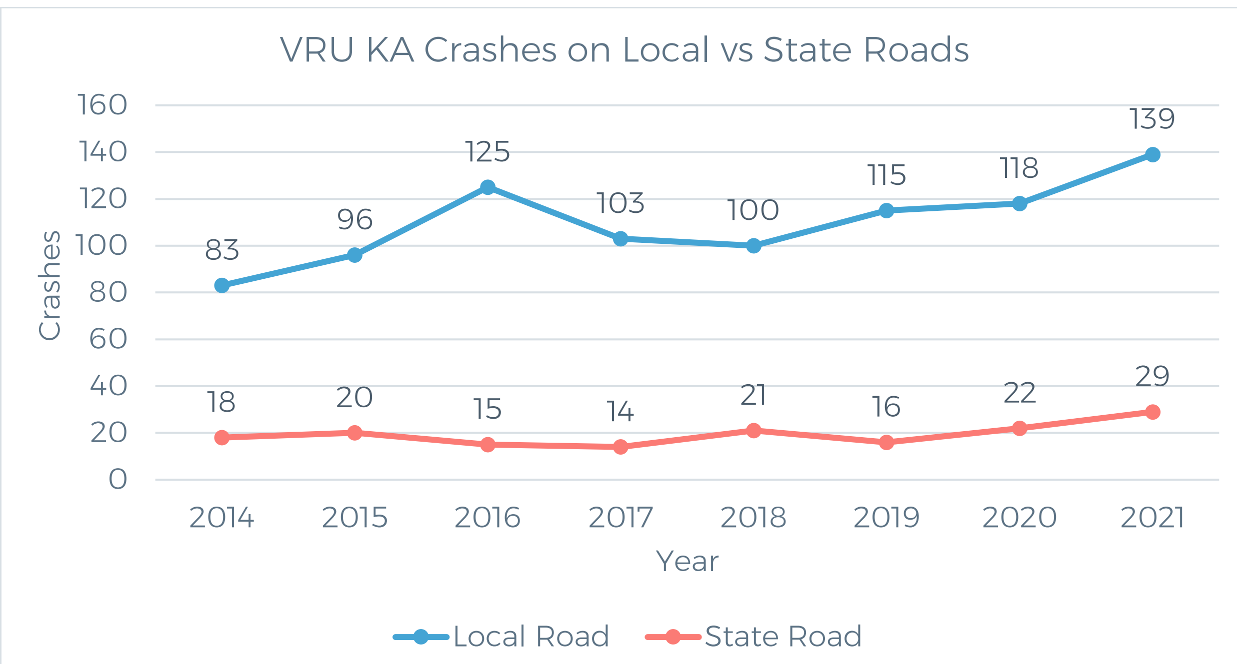

Figure 12: VRU KA Crashes on Local vs. State Roads (2014–2021). Note: 27 VRU serious injury crashes lack sufficient geolocation data for area type classification and, therefore, are not included in this chart.

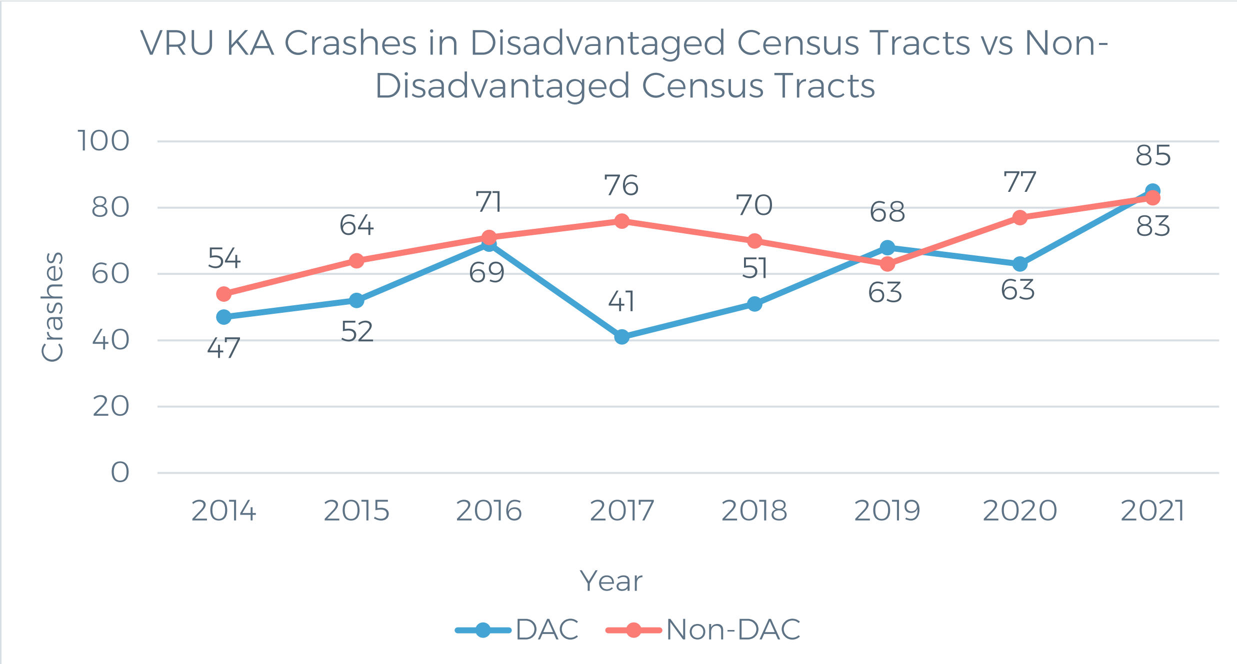

Figure 13: VRU KA Crashes Inside Disadvantaged Census Tracts vs. Outside Disadvantaged Census Tracts (2014–2021). Note: 27 VRU serious injury crashes lack sufficient geolocation data for area type classification and, therefore, are not included in this chart.

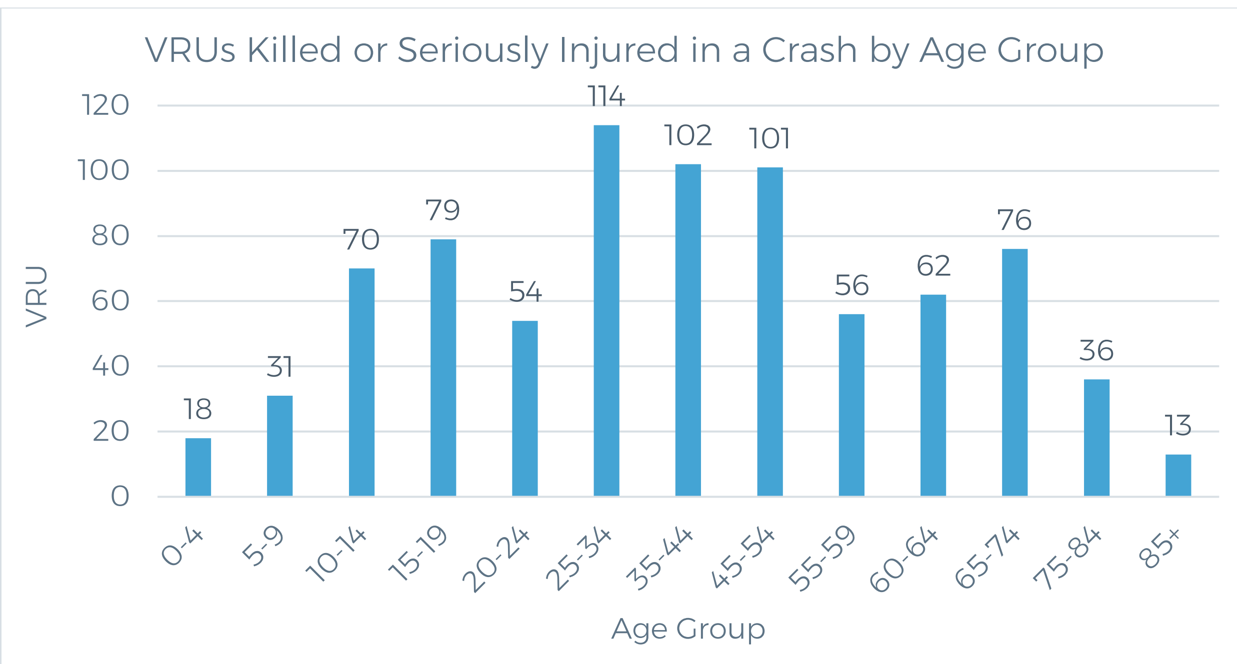

Figure 14: VRU Killed or Seriously Injured in a Crash by Age Group (2017–2021)

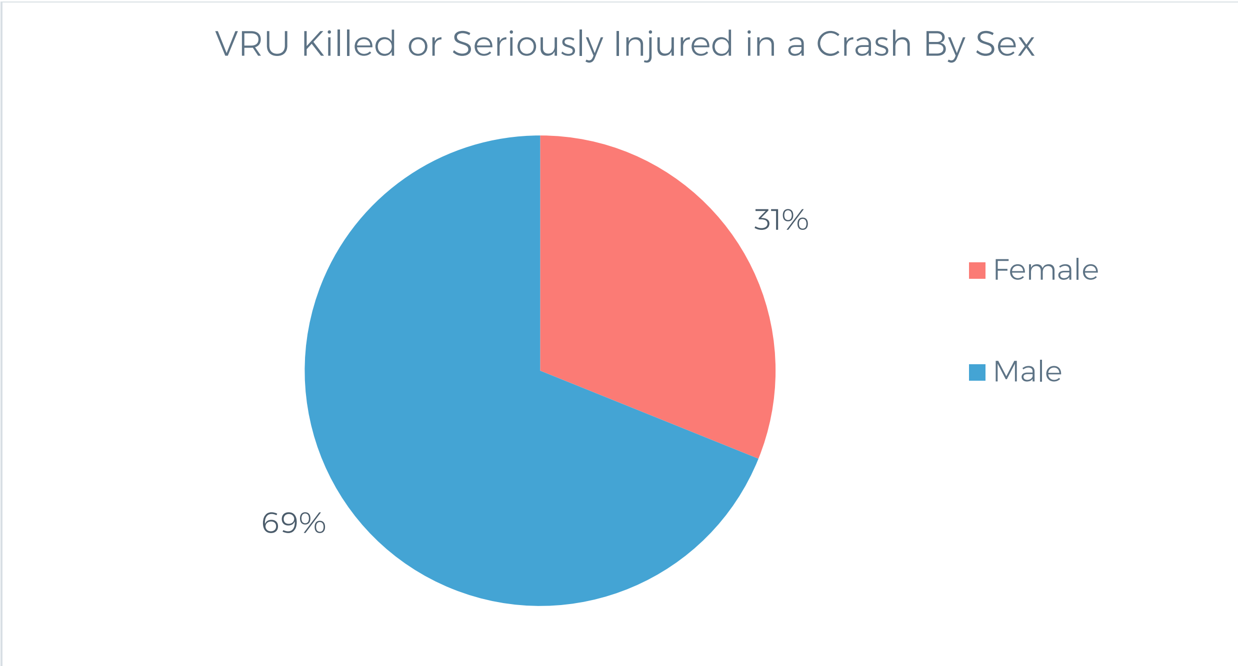

Figure 15: VRU Killed or Seriously Injured in a Crash by Sex (2017–2021)

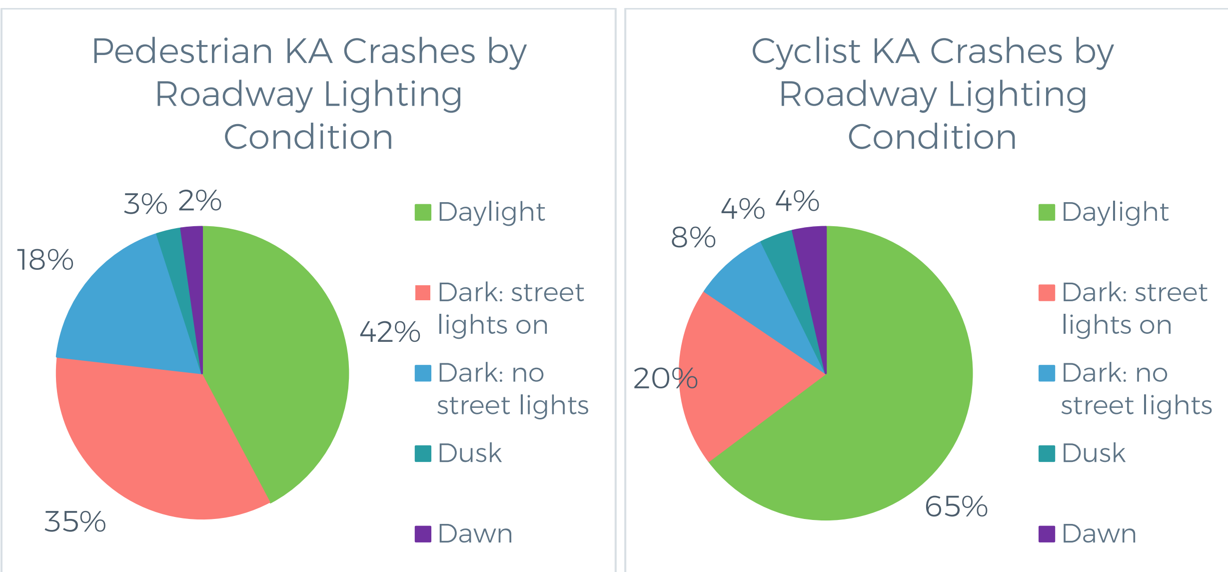

Figure 16: VRU KA Crashes by Roadway Lighting Condition (2014–2021)

2.4 Crash Mapping

Mapping crash locations shows where the greatest potential for safey improvements exist. The three maps below serve different purposes:

- HIN maps are based on locations that have the highest number of crashes relative to other Kansas locations and may benefit from targeted safety improvements.
- HRN maps are based on risk scoring. While these corridors may not have recent serious injury crashes, they do have features that may predict an increased likelihood of a serious crash occurring.
- HIA maps normalize crashes by comparing the number of VRU crashes to various factors, such as population, area, centerline miles of roads, and VRU trips.

2.4.1 High-Injury Network Methodology

To create the HIN, the fully automated process first calculates an injury score for VRUs from 2014 to 2021. For the injury score, each crash severity level, including fatal, serious, non-incapacitating, and possible injuries, has a score. The sum of the crash scores is the road segment injury score.

$$Segment\ Injury\ Score = (N_K * 15) + (N_A * 5) + (N_B * 2) + (N_C * 1)$$

N_K : the number of VRU fatalities on the road segment
N_A : the number of VRU serious injuries or suspected serious injuries on the road segment
N_B : the number of VRU non-incapacitating injuries on the road segment
N_C : the number of VRU possible injuries on the road segment

The crash rate of each road segment is then calculated by combining its initial injury score with the scores of adjacent segments and dividing the sum by the total length of those segments. The initial injury score of the center road segment is doubled before combining with scores of adjacent segments to reflect a higher weight for the actual location of VRU crashes. The number of adjacent segments considered depends on whether the road is in an urban or rural area. Urban road segments, which are typically 300 to 500 feet long, have the injury scores of six adjacent segments on the same route symmetrically selected to calculate the mean score. Rural road segments, which are typically around 3,000 feet long, have only the injury scores of two adjacent segments selected for mean score calculation.

$$Segment\ Crash\ Score = \frac{Center\ Segment\ Injury\ Score * 2 + \sum_{i=1}^{n} Adjacent\ Segment\ Injury\ Scores}{Center\ Segment\ Length + \sum_{i=1}^{n} Adjacent\ Segment\ Lengths}$$

$n = 2$ for rural road segments and $n=6$ for urban road segments

99.72% of milles are filtered out of the HIN based on crash injury scores and segment length. Segments with crash injury scores per mile less than 12 are filtered out; any remaining continuous segment groups shorter than 500 feet are not included.

Finally, the remaining segments are stratified into three classes: medium, high, and highest priority, based on their calculated injury scores. Approximately 50% of the segments were assigned to the medium priority class, 35% to the high priority class, and 15% to the highest priority class. These results are visualized in Figure 17.

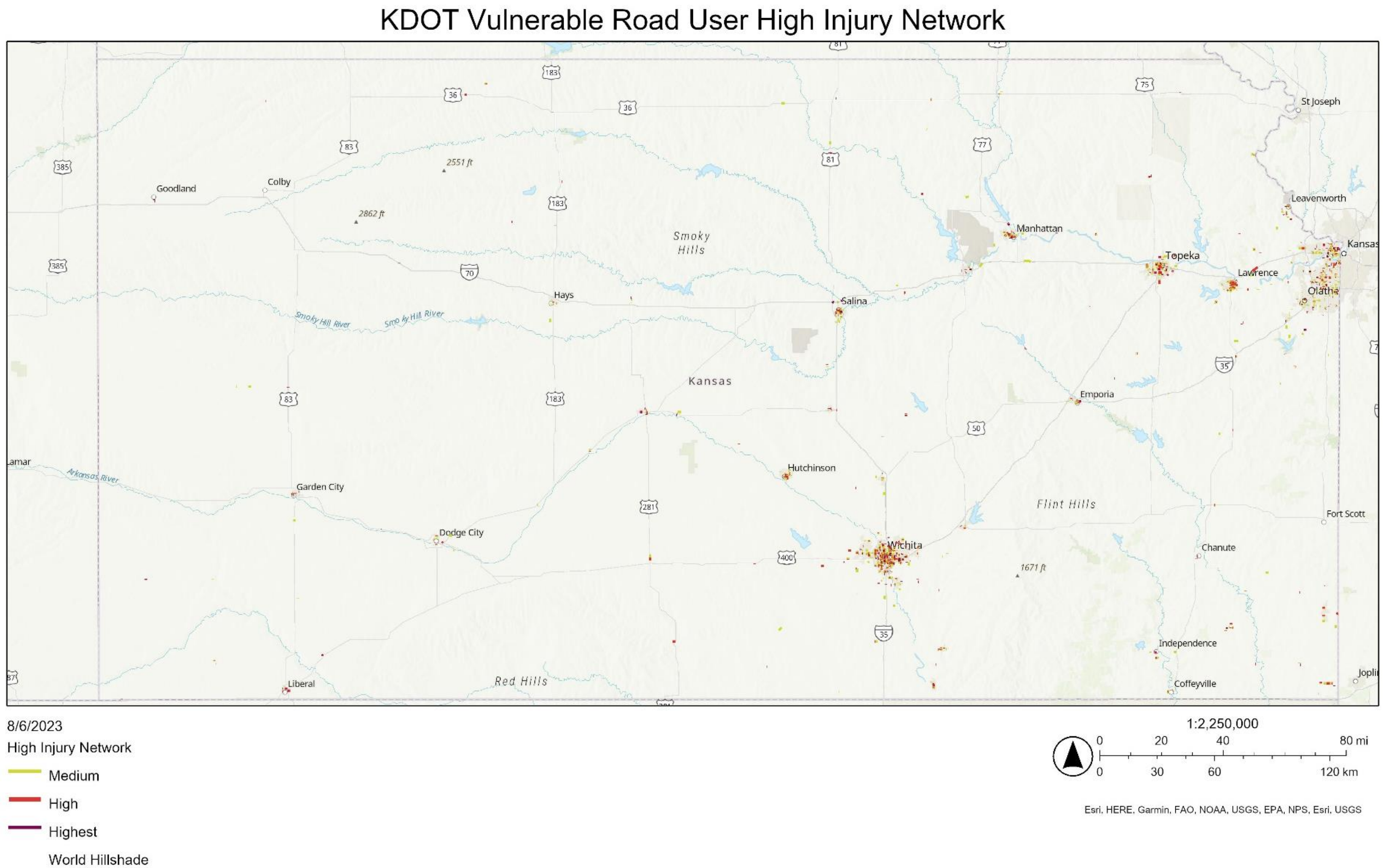

Figure 17: High-Injury Network of Kansas

2.4.1.1 High-Injury Network Mapping

The HIN contributed to the data analysis that VRU crashes occur on a small number of road segments. Table 3 shows that the highest priority segments encompass 31% of the KA crashes but only 59 miles (0.04%) of Kansas roads. **Table 4 shows that although most of the state is not in a DAC (84%), nearly half (46%) of the entire HIN is in a DAC.** It is important that any steps taken to improve safety consider equity.

The statewide HIN is viewable online.[3]

Table 3: High-Injury Network Statistics

HIN Designation	KA Crashes		Centerline Miles1	
	KA Crashes	% of KA Crashes	Total	%
Highest Priority HIN	323	31%	59	0.04%
High Priority HIN	282	27%	138	0.10%
Medium Priority HIN	138	13%	197	0.14%
Entire HIN	743	72%	394	0.28%
Statewide	1,034	100%	141,005	100%

Table 4: High-Injury Network Statistics for Disadvantaged Census Tracts

HIN Designation	Miles not in DAC	Miles in DAC	Percent in DAC
High Priority HIN	27	32	54%
High Priority HIN	69	69	50%
Medium Priority HIN	116	81	41%
Entire HIN	212	182	46%
Statewide	118,094	22,910	16%

With diverse geographical features, population densities, and transportation needs throughout the state, the district system allows KDOT to customize its strategies and initiatives to align with specific regional contexts. Table 5 shows the HIN breakdown by

[3] KDOT. No date. Vulnerable Road User High-Injury Network. https://wspgeo.maps.arcgis.com/apps/mapviewer/index.html?webmap=3ada92413b5449f9826df374cf80650c.

roadway miles in each district. Districts 1 and 5 contain the majority (82%) of the HIN segments in the state.

Table 5: Vulnerable Road User High-Injury Network by Mileage and Priority in KDOT Districts

HIN Designation	District 1	District 2	District 3	District 4	District 5	District 6
Highest Priority HIN	24.35	4.46	0.95	2.11	25.01	2.28
High Priority HIN	60.21	7.42	2.32	8.59	54.74	4.56
Medium Priority HIN	87.61	12.42	3.41	14.18	73.37	5.98
Entire HIN	172.18	24.29	6.67	24.87	153.11	12.82
All Centerline	24,835	21,867	23,882	20,345	31,072	19,004

2.4.2 High-Risk Network Methodology

Risk factors vary across road and area types, so the methodology separates roads into categories, including:

- State system rural roads
- State system urban roads
- Local rural roads
- Local urban roads

In this study, staff developed risk-scoring systems for these four roadway categories based on the systemic analysis outlined in Section 2.5, Systemic Risk Safety Analysis. Each of these categories has its own risk-scoring system, also described in Section 2.5, Systemic Risk Safety Analysis. Each risk feature in the scoring system was assigned a point according to its relative risk representation ratio suggested by the systemic analysis. The greater the awarded point, the higher the risk. The total possible risk scores for each road category are measured on a 50-point scale. Two categories are defined for assigning points: context category and street configuration category. The context points are additive (i.e., the score from the four contextual factors is added together to get the total context points). The street configuration points are based on a single selection (i.e., the specific roadway configuration based on the number of lanes and speeds/average annual daily traffic [AADT] is selected).

2.4.2.1 High-Risk Network Scoring

The HRN maps show risk scores on both state and local roads. With the risk scores applied to the Kansas state and local roads, staff-created HRN maps. These maps can be viewed online.[4]

The lists below show risk-scoring systems for the four road categories. Roadways are stratified into five classes (lowest, lower, moderate, higher, and highest) based on the calculated risk scores. The score categories and risk factors were identified based on the factors with the highest variations in risk based on the systemic risk assessment. For example, state system roads had greater variation in risk based on vehicle volume (AADT) compared to local roads which had greater variation in risk based on speed limits. This indicates that these factors are good measures of relative risk compared to factors that have little variation between different values within an independent variable. The lowest risk to highest risk breaks were identified at varying levels because of the difference in absolute scores between the risk scoring criteria and to distribute roadway miles and KA crash percentages across the risk categories.

State system rural roads with risk scores of:

- 10 or less were classified as lowest risk
- 11 to 20 were classified as lower risk
- 21 to 30 were classified as moderate risk
- 31 to 40 were classified as higher risk
- 41 and above were classified as the highest risk

State system urban roads with risk scores of:

- 25 or less were classified as lowest risk
- 26 to 30 were classified as lower risk
- 31 to 35 were classified as moderate risk
- 36 to 40 were classified as higher risk
- 41 and above were classified as highest risk

Local rural roads with risk scores of:

- 10 or less were classified as lowest risk
- 11 to 20 were classified as lower risk
- 21 to 30 were classified as moderate risk
- 31 to 40 were classified as higher risk
- 41 and above were classified as highest risk

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[4] KDOT. No date. Vulnerable Road User High Risk Network. https://wspgeo.maps.arcgis.com/apps/mapviewer/index.html?webmap=1ccd7a9fdb1e45d9a1aecece0e774ad.

Local urban roads with risk scores of:

- 20 or less were classified as lowest risk
- 21 to 30 were classified as lower risk
- 31 to 40 were classified as moderate risk
- 41 to 45 were classified as higher risk
- 46 and above were classified as highest risk

2.4.2.1.1 State Roads

The risk-scoring systems for state road categories are shown in Table 6 and Table 7.

Table 6: Rural State Level High-Risk Network Risk Scoring

State, Rural				
Feature	**1st Level Category**	**2nd Level Category**	**Risk Points**	**50-Point Risk Score**
DAC	Not a DAC		1	2
	DAC		2	3
School Area	Not near school		1	2
	Within 1 mile buffer of university or ½-mile buffer of a K-12 school or community college		4	7
Trauma Center	Within a 15-minute drive to a trauma center		1	2
	Not within a 15-minute drive to a trauma center		2	3
VRU Exposure*	Moderate		1	2
	High		2	3
	Highest		3	5
Context Total Possible Points			11	18
Number of Lanes + Average Annual Daily Traffic (AADT)	Two Lanes	Under 5k	1	2
		5k–10k	3	5
	Four Lanes	Under 5k	1	2
		5k–10k	3	5
		10k–15k	2	3
		15k–25k	5	8
		>25k	20	32
Street Configuration Total Possible Points			20	32
Total Possible Points			31	50

*based on Replica data

Table 7: Urban State Level High-Risk Network Risk Scoring

State, Urban				
Feature	**1st Level Category**	**2nd Level Category**	**Risk Points**	**50 Point Risk Score**
DAC	Not a DAC		1	4
	DAC		2	8
School Area	Not near school		1	4
	Within 1 mile buffer of university or ½-mile buffer of a K-12 school or community college		2	8
Land Use Context	Suburban		1	4
	Urban		2	8
VRU Exposure	Moderate		1	4
	High		2	9
	Highest		2	8
Context Total Possible Points			8	33
Number of Lanes + AADT	Two Lanes	Under 5k	1	4
		5k–10k	1	4
		10k–15k	3	13
	Four Lanes	5k–10k	2	8
		10k–15k	3	13
		15k–25k	3	13
		>25k	4	17
	Six Lanes	>25k	4	17
Street Configuration Total Possible Points			4	17
Total Possible Points			12	50

2.4.2.1.2 Local Roads

The risk-scoring systems for local road categories are shown in Table 8 and Table 9.

Table 8: Rural Local Level High-Risk Network Risk Scoring

Local, Rural				
Feature	**1st Level Category**	**2nd Level Category**	**Risk Points**	**50 Point Risk Score**
DAC	Not a DAC		1	1
	DA Census tract		2	3
School Area	Not near a school		1	1
	Within 1 mile buffer of university or ½-mile buffer of a K-12 school or community college		18	19
Trauma Center	Within a 15-minute drive of a trauma center		1	1
	Not within a 15-minute drive of a trauma center		2	3
VRU Exposure	Moderate		1	1
	High		4	5
	Highest		7	8
Context Total Possible Points			29	33
Number of Lanes + Speed Limit	Two Lanes	0–25 miles per hour (mph)	1	1
		30–35 mph	2	3
		40–50 mph	2	3
		50+ mph	2	2
	Four Lanes	30–35 mph	15	17
		40–50 mph	14	16
		50+ mph	10	11
Street Configuration Total Possible Points			15	17
Total Possible Points			44	50

Table 9: Urban Local Level High-Risk Network Risk Scoring

Local, Urban				
Feature	**1st Level Category**	**2nd Level Category**	**Risk Points**	**50 Point Risk Score**
DAC	Not a DAC		1	2
	DA Census tract		3	5.5
School Area	Not near a school		1	2
	Within 1 mile buffer of university or ½-mile buffer of a K-12 school or community college		3	5.5
Land Use Context	Suburban		1	2
	Urban		3	5.5
VRU Exposure	Moderate		1	2
	High		2	4
	Highest		3	5.5
Context Total Possible Points			12	22
Number of Lanes + Speed Limit	Two Lanes	0–25 miles per hour (mph)	1	2
		30–35 mph	4	7
		40–50 mph	2	4
		50+ mph	6	11
	Four Lanes	30–35 mph	15	28
		40–50 mph	11	20
		50+ mph	9	17
Street Configuration Total Possible Points			15	28
Total Possible Points			27	50

2.4.2.2 High-Risk Network Statistics

HRN statistics are provided in Table 10 through Table 13, broken down between state and local and then further between rural and urban. Table 14 shows the results in specific communities.

Table 15 displays the areas of higher-risk communities, and Table 16 displays the areas of lower-risk communities.

Table 10: Rural State High-Risk Network Statistics

Risk Class	Risk Scores	Roadway Miles	% Roadway Miles	% Miles in Disadvantaged Census Tract	KA Crashes	% of KA Crashes	KA Crash Per 100 Miles	KA Crash Per Mile
Lowest	<=10	1063.8	10.6%	0.6%	6	6.3%	0.6	0.0056
Lower	11-20	8859.1	88.5%	20.1%	79	83.2%	0.9	0.0089
Moderate	21-30	43.0	0.4%	30.0%	4	4.2%	9.3	0.0930
Higher	31-40	3.2	0.0%	0.0%	1	1.1%	31.7	0.3169
Highest	41+	37.3	0.4%	2.4%	5	5.3%	13.4	0.1340

Table 11: Urban State High-Risk Network Statistics

Risk Class	Risk Scores	Roadway Miles	% Roadway Miles	% Miles in Disadvantaged Census Tract	KA Crashes	% of KA Crashes	KA Crash Per 100 Miles	KA Crash Per Mile
Lowest	<=25	159.7	31.7%	21.2%	12	24.0%	7.5	0.0752
Lower	26-30	74.1	14.7%	47.2%	7	14.0%	9.4	0.0945
Moderate	31-35	87.9	17.4%	41.6%	5	10.0%	5.7	0.0569
Higher	36-40	83.2	16.5%	44.3%	10	20.0%	12.0	0.1202
Highest	41+	99.0	19.7%	54.6%	16	32.0%	16.2	0.1616

Table 12: Rural Local High-Risk Network Statistics

Risk Class	Risk Scores	Roadway Miles	% Roadway Miles	% Miles in Disadvantaged Census Tract	KA Crashes	% of KA Crashes	KA Crash Per 100 Miles	KA Crash Per Mile
Lowest	<=10	108612.5	91.8%	14.0%	59	39.9%	0.1	0.0005
Lower	11-20	3845.8	3.2%	49.4%	14	9.5%	0.4	0.0036
Moderate	21-30	5108.2	4.3%	18.5%	55	37.2%	1.1	0.0108
Higher	31-40	740.4	0.6%	27.7%	16	10.8%	2.2	0.0216
Highest	41+	41.6	0.0%	26.3%	4	2.7%	9.6	0.0962

Table 13: Urban Local High-Risk Network Statistics

Risk Class	Risk Scores	Roadway Miles	% Roadway Miles	% Miles in Disadvantaged Census Tract	KA Crashes	% of KA Crashes	KA Crash Per 100 Miles	KA Crash Per Mile
Lowest	<=20	8374.6	73%	20%	210	29.0%	2.5	0.0251
Lower	21-30	2202.9	19%	68%	249	34.0%	11.3	0.1130
Moderate	31-40	549.6	5%	27%	108	15.0%	19.7	0.1965
Higher	41-45	238.3	2%	35%	63	9.0%	26.4	0.2644
Highest	46-50	139.3	1%	86%	95	13.0%	68.2	0.6820

Table 14: High-Risk Network Statistics by Community Risk

Community	HRN Risk Class					Community Risk
	Lowest	Lower	Moderate	Higher	Highest	
Hutchinson	64%	28%	6%	0%	1%	Areas of Higher-Risk Community
Kansas City	66%	25%	5%	2%	1%	
Salina	64%	23%	9%	2%	2%	
Topeka	67%	24%	4%	3%	3%	
Wichita	63%	21%	7%	4%	6%	
Augusta	61%	35%	2%	1%	1%	Areas of Lower-Risk Community
Gardner	85%	8%	2%	4%	1%	
Hays	62%	23%	13%	2%	0%	
Manhattan	66%	24%	4%	3%	4%	
Newton	56%	30%	11%	3%	0%	
Ottawa	44%	30%	21%	1%	4%	
Pittsburg	36%	36%	19%	3%	6%	

Table 15: Top Areas of Higher-Risk Cities Statistics

Top Areas of Higher-Risk Cities	Total Crashes	% of Statewide Crashes	KA per 100k Residents	KA per Square Mile	KA per 100 Centerline Mile	KA per Million VRU Trips
Wichita	225	22.4%	56.6	1.39	94.04	0.56
Kansas City	79	7.9%	50.4	0.63	65.90	0.50
Topeka	65	6.5%	51.3	1.06	73.70	0.51
Salina	37	3.7%	83.3	1.44	116.03	0.73
Hutchinson	22	2.2%	55.0	0.90	68.64	0.42
State Total/Average	1005	100.0%	34.2	0.01	7.03	0.32

Table 16: Top Areas of Lower-Risk Cities Statistics

Top Areas of Lower-Risk Cities	Total Crashes	% of Statewide Crashes	KA per 100k Residents	KA per Square Mile	KA per 100 Centerline Mile	KA per Million VRU Trips
Hays	2	0.2%	9.5	0.23	12.44	0.09
Ottawa	2	0.2%	15.8	0.19	21.16	0.12
Augusta	2	0.2%	21.6	0.47	31.96	0.22
Pittsburg	3	0.3%	14.5	0.23	21.05	0.10
Gardner	3	0.3%	12.9	0.26	29.73	0.18
State Total/Average	1005	100.0%	34.2	0.01	7.03	0.32

2.4.2.3 High-Risk Network Mapping

The systemic risk analysis identified risk factors that correlate with VRU KA crashes to highlight roads with these features. HRN mapping is forward-facing—it identifies locations that may not have a history of VRU KA crashes but share characteristics with HIN roads, such as area context and street configuration.

In this study, KDOT developed risk-scoring systems for four roadway categories based on the systemic analysis outlined in Section 2.5. Each category has its own risk-scoring system. Each risk feature in the scoring system was assigned a point according to its relative risk representation ratio suggested by the systemic analysis. The greater the awarded point, the higher the risk.

Risk factors vary across road and area types, so the methodology separates roads into categories, including:

- State system rural roads
- State system urban roads
- Local rural roads
- Local urban roads

The statewide HRN can be viewed online.[5]

2.5 Systemic Risk Safety Analysis

A systemic risk safety analysis assesses how roadway contextual features relate to relative VRU safety. KDOT staff joined crash data, roadway data, and demographic data and analyzed these features together to develop a predictive framework to identify locations where crashes may occur in the future. This analysis enables KDOT to identify high-risk elements on roads and implement proactive measures for crash prevention. The following sections provide an overview of the systemic safety analysis.

2.5.1 Local Roadway Network Systemic Safety Analysis

Local roadways are all non-state system roads and state system roads that local agencies currently maintain.[6] The following sections highlight the systemic safety elements related to these roads. These local roads account for more than 129,500 centerline miles of Kansas' 141,005 centerline miles and over 80% of VRU KA crashes.

[5] KDOT. No date. Vulnerable Road User High Risk Network. https://wspgeo.maps.arcgis.com/apps/mapviewer/index.html?webmap=1ccd7a9fdb1e45d9a1aecece0e774ad.

[6] State system roads maintained by local agencies are known as "connecting link" roads and have maintenance agreements with the local agency.

2.5.1.1 Context Features

Context features encompass a range of elements, including the type of area, whether an incident occurred in a DAC, the level of exposure, proximity to a school, and proximity to a trauma center. These features provide an understanding of the context in which VRUs operate and encounter potential risks. Different types of areas, proximity to educational institutions, and the availability of trauma centers can impact VRU risk.

1. **Area Type:** Among KA crashes on local roads in a variety of area types, those in urban areas where the most overrepresented (Figure 18).
2. **DAC Census Tract:** VRU risk is greatest on local roads in DACs (Figure 19).
3. **Area Type and DAC:** Regardless of the area type, VRU risk was greatest in DACs (Figure 20).
4. **Exposure**: VRU crashes occurred most in areas with the highest amount of VRU usage (exposure) (Figure 21).
5. **School Proximity**: Across all area types, VRU crashes were more common near schools, with those in urban areas being the most overrepresented (Figure 22).
6. **Trauma Center**: VRU crashes that occurred near a trauma center resulted in lower rates of fatalities in rural areas. (Figure 23).

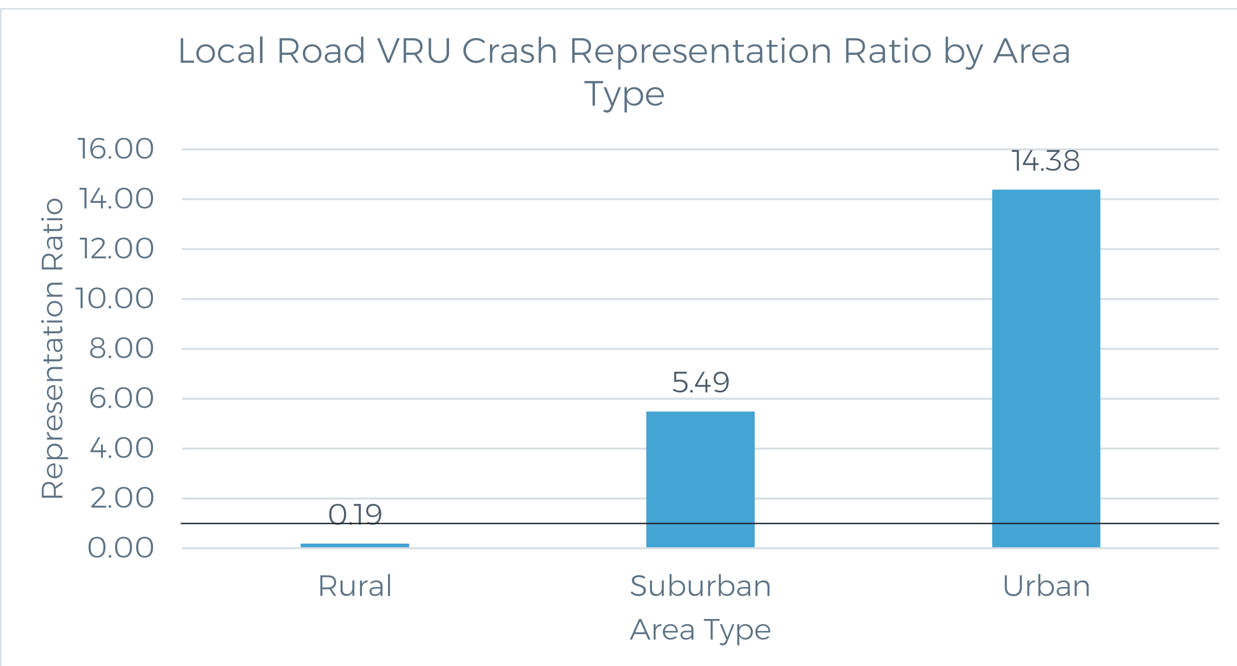


Figure 18: Local Road Vulnerable Road User Crash Representation Ratio by Area Type

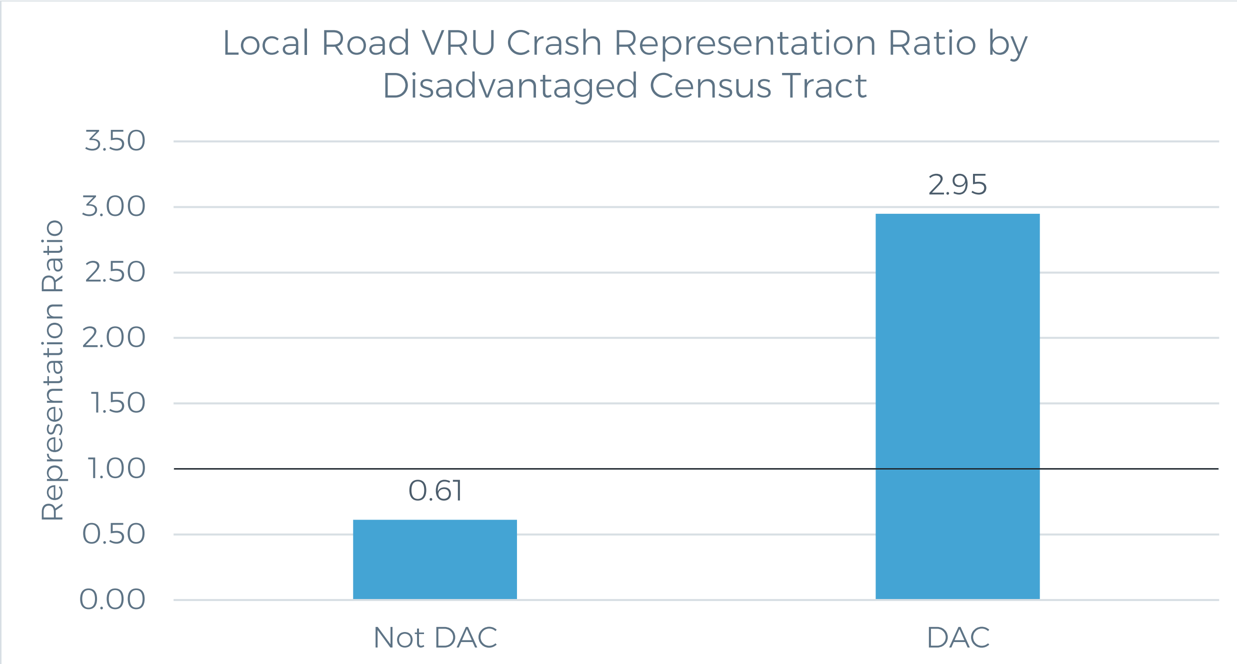


Figure 19: Local Road Vulnerable Road User Crash Representation Ratio by Disadvantaged Census Tract

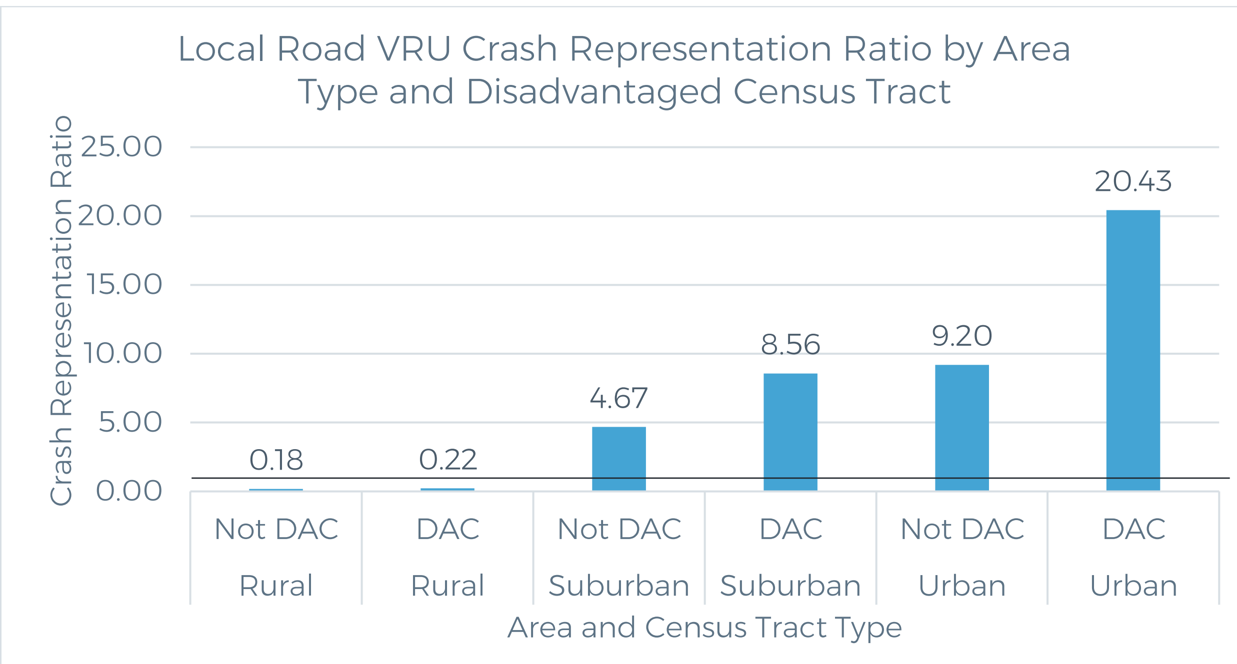


Figure 20: Local Road Representation Ratio of VRU Crashes by Area Type and DAC

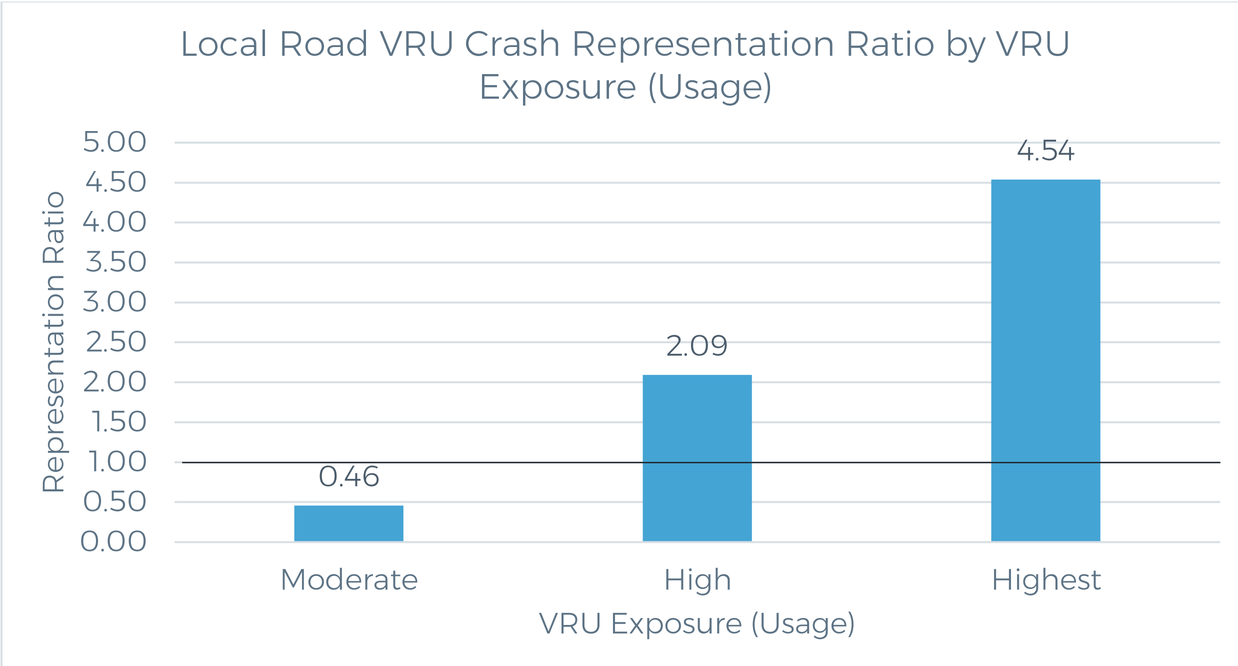


Figure 21: Local Road Representation Ratio of VRU Crashes by VRU Exposure (Usage)

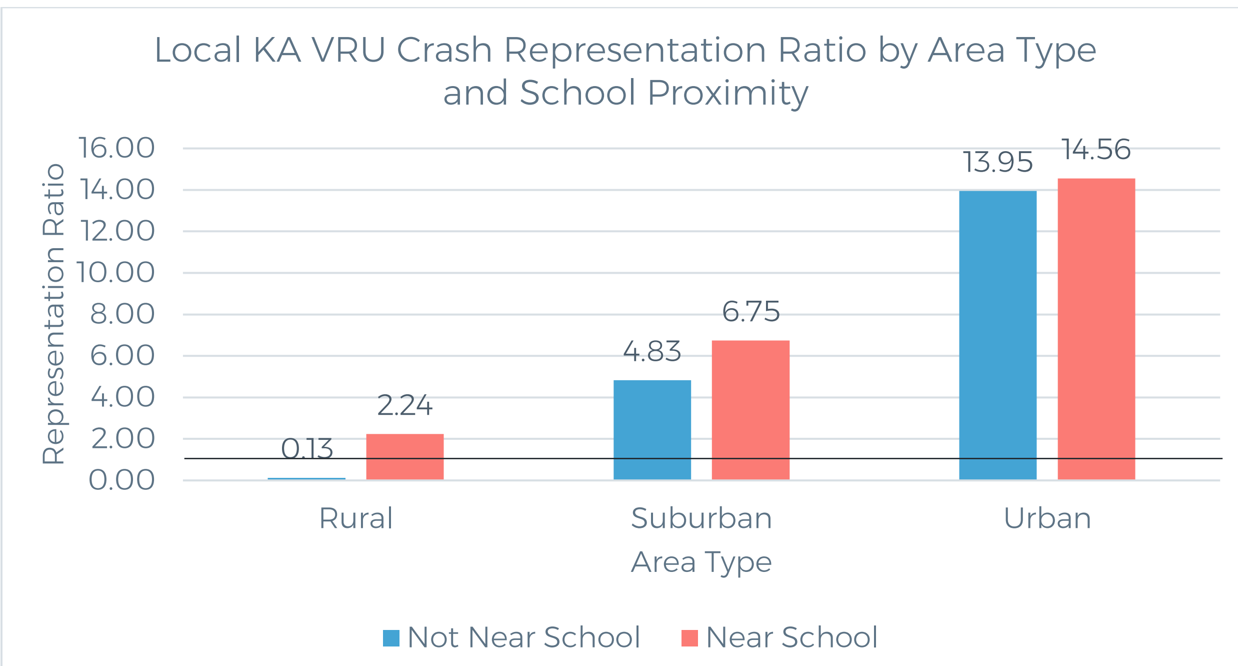


Figure 22: Local KA Crashes by Area Type and Proximity to Schools

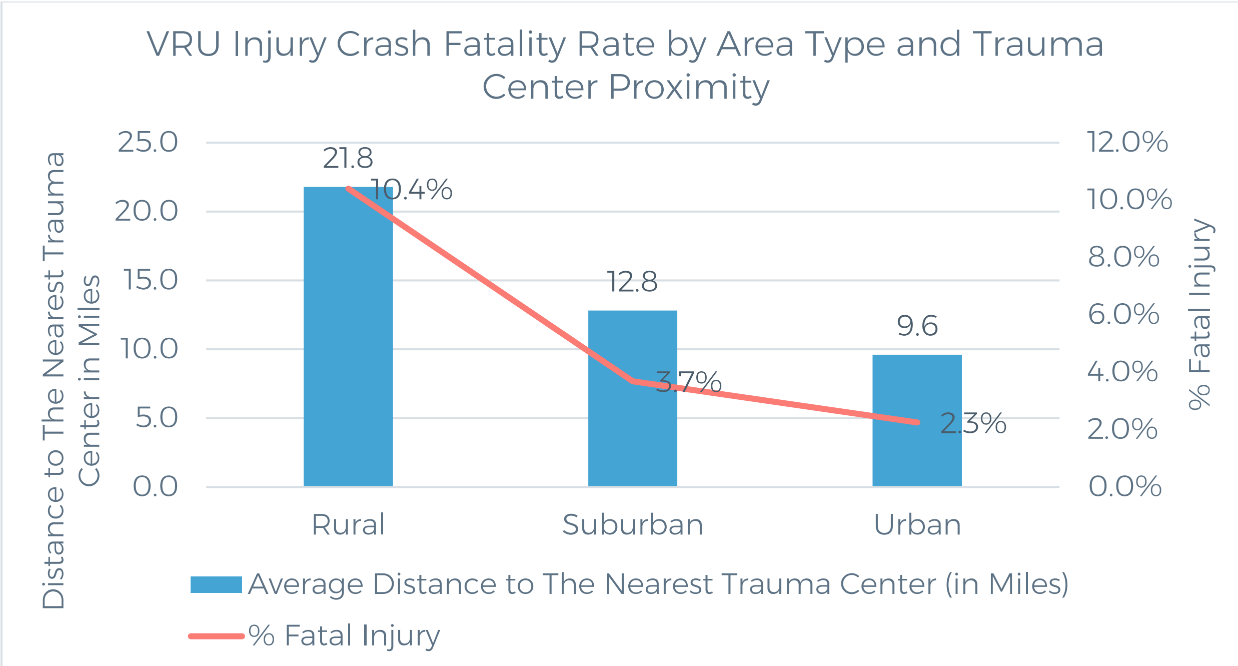


Figure 23: VRU Injury Crash Fatality Rate by Area Type and Trauma Center Proximity. % Fatal Crashes is based on the percentage of VRU KA crashes that resulted in a fatality versus a serious injury.

2.5.1.2 Roadway Features

Roadway features encompass various elements, including the AADT, posted speed limits, the functional classification of the road, the number of lanes, and the presence of transit routes. These features are essential in shaping the safety conditions for VRUs. From the given data, several takeaways exist with respect to the roadway features of local roads.

1. **Functional Classification**: Major and minor arterial roads pose the highest risk to VRUs (Figure 24).
2. **Number of Lanes**: Four-lane local roads have a higher VRU risk than roads with more or fewer lanes (Figure 25).
3. **Roadway Volume (AADT)**: VRU risk is greatest on roads with AADT between 10,000 and 25,000, but overall, different amounts of AADT had less influence than other roadway factors (Figure 26).
4. **Speed Limits**: Streets with speeds between 30 and 35 miles per hour (mph) present the highest VRU risk (Figure 27).

5. **Public Transportation**: The presence of bus routes correlates with an increased risk of VRU incidents regardless of road type or VRU exposure levels (Figure 28) and (Figure 29).

6. **Bike Facilities**: The presence of bike facilities correlates with an increase in the risk of VRU on all road types except major arterials (Figure 30).

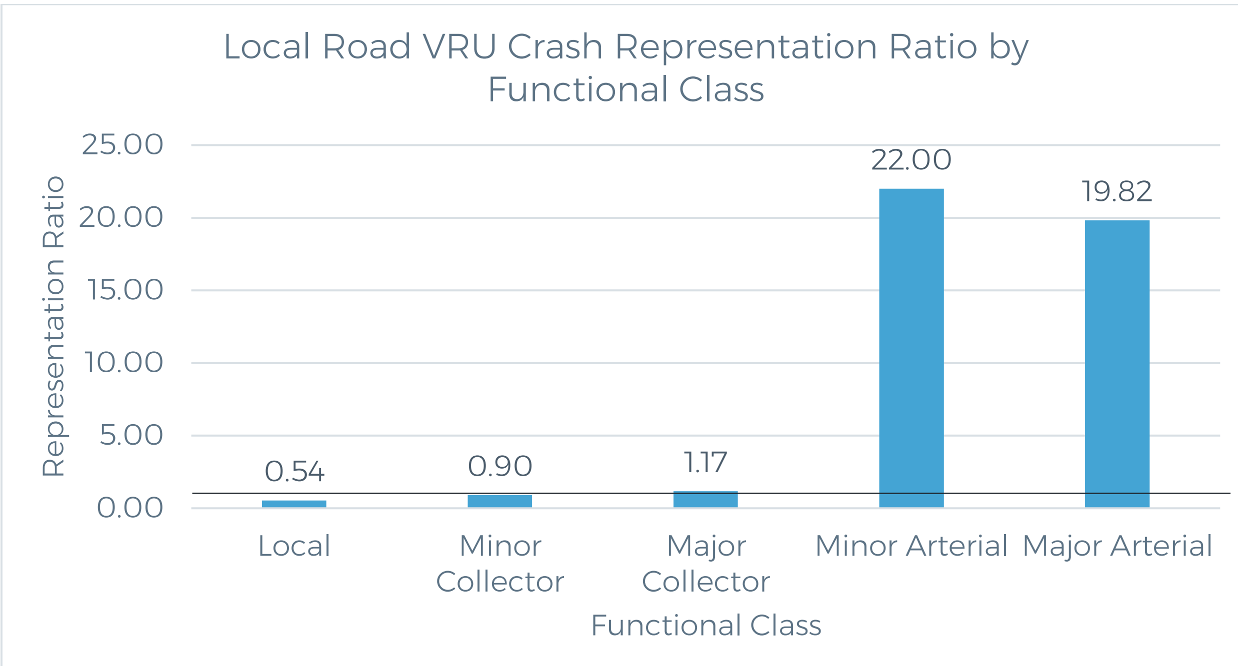


Figure 24: Local Road Vulnerable Road User Crash Representation Ratio by Functional Class

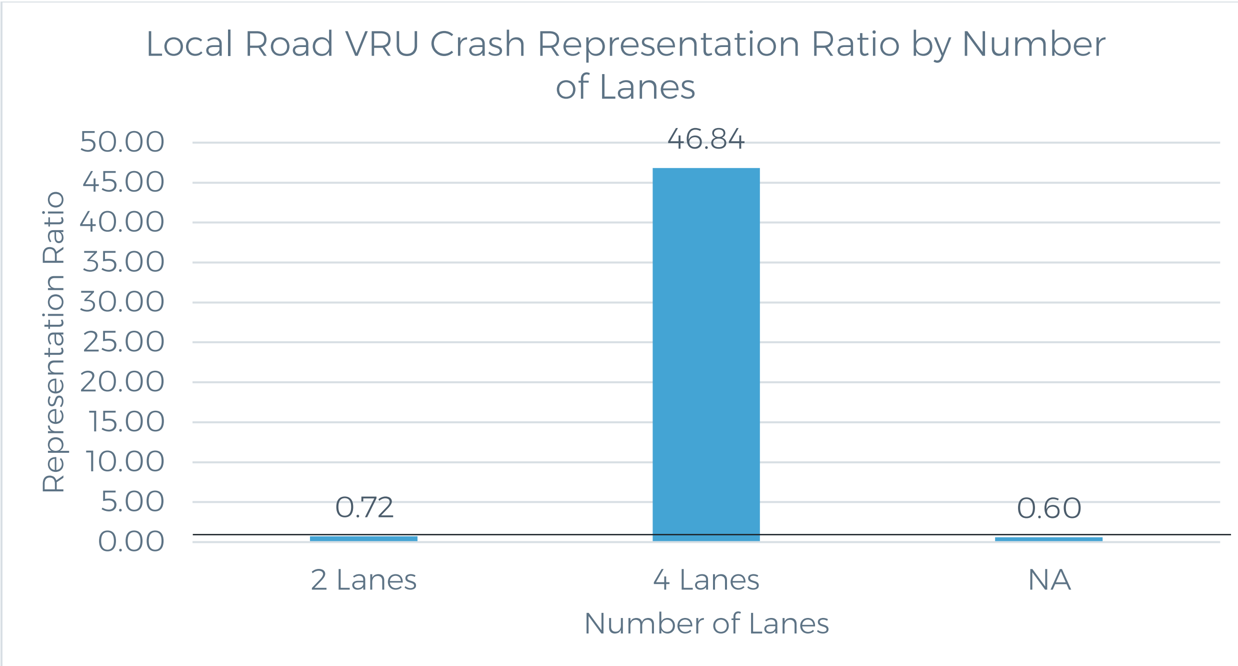


Figure 25: Local Road VRU Crash Representation Ratio by Number of Lanes

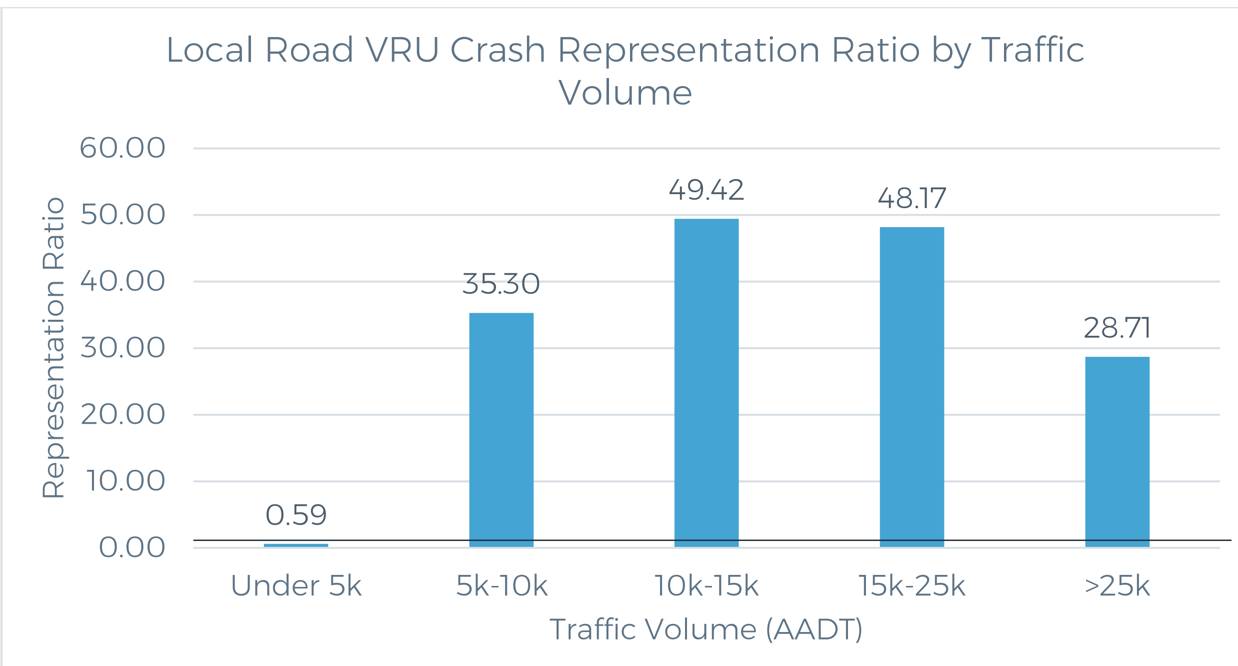


Figure 26: Local Road VRU Crash Representation Ratio by Daily Traffic Volumes

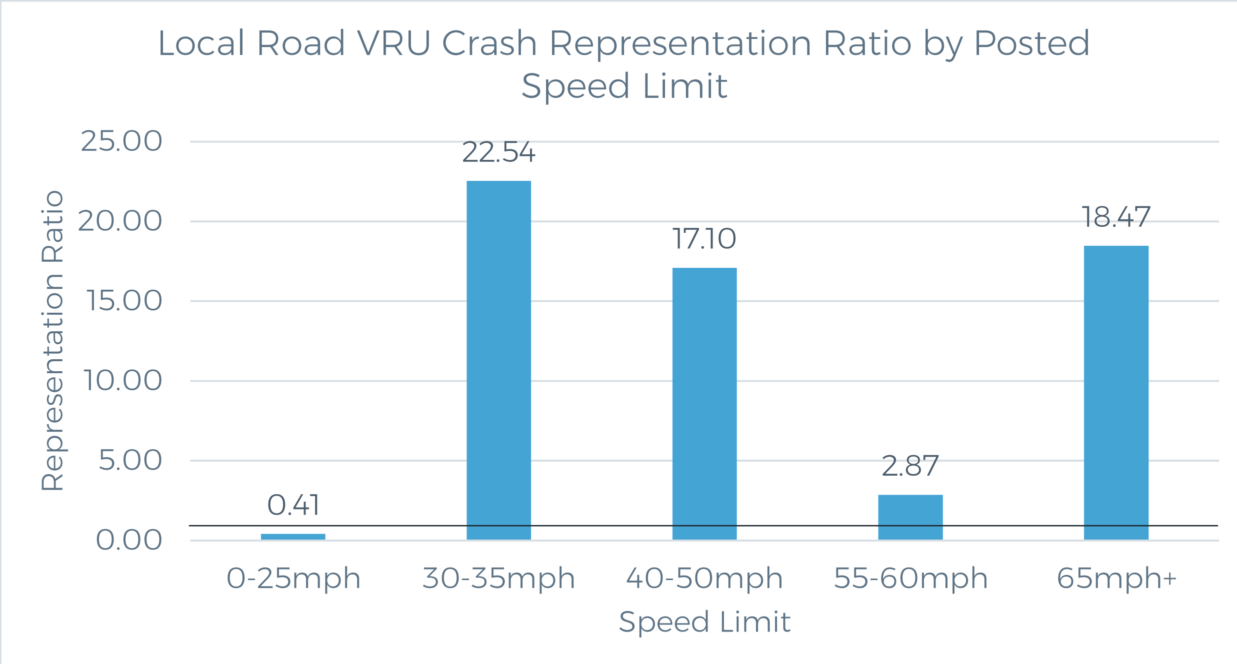


Figure 27: Local Road VRU Crash Representation Ratio by Posted Speed Limit

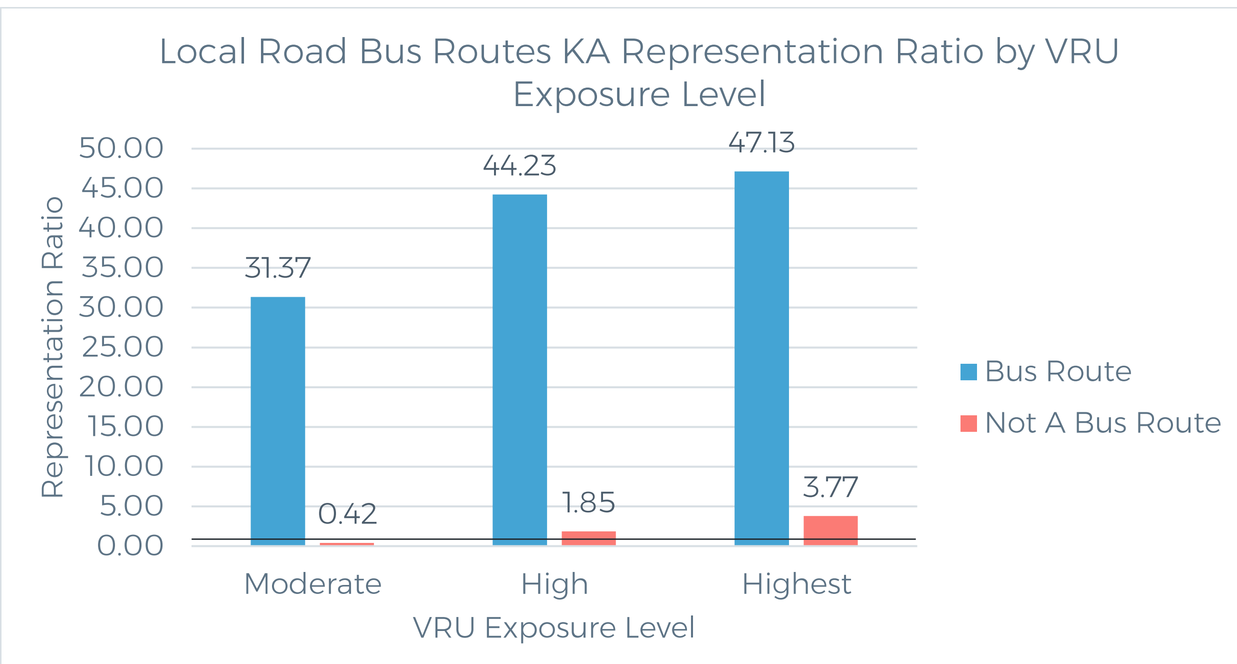


Figure 28: Local Road Bus Routes KA Representation Ratio by VRU Exposure Levels

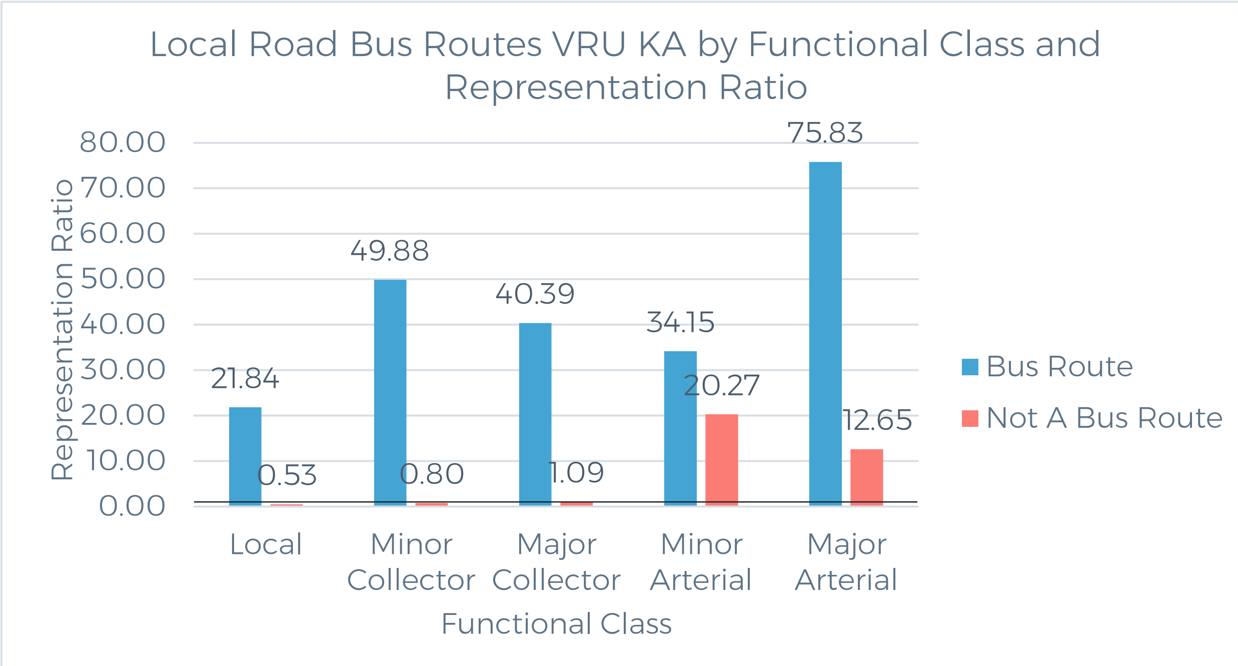


Figure 29: Local Road Bus Route VRU KA by Functional Class Representation Ratios

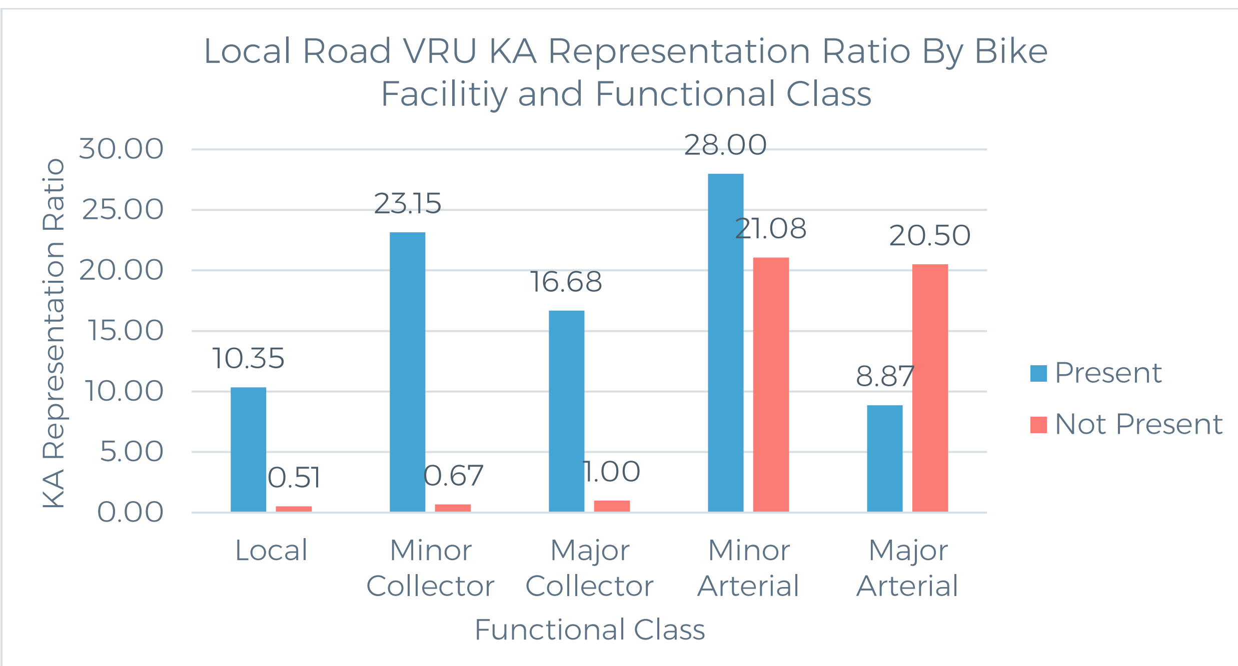


Figure 30: Local Road VRU KA Representation Ratio by Bicycle Facility and Functional Class

2.5.2 State Roadway Network Systemic Safety Analysis

The representative risk for the state routes was reviewed to determine which roadway characteristics contribute to VRU KA crashes overrepresented by the lane miles present in the state. Among these characteristics are area types, roadway characteristics, and DACs.

2.5.2.1 Context Features

On state roads, context features encompass factors like area type, incidents in disadvantaged census tracts, exposure levels, proximity to schools, and distance to trauma centers. These elements provide insight into the context in which VRUs face potential risks.

1. **Area Type**: State routes within urban areas are the most overrepresented in VRU crashes. Urban areas exhibit a representation ratio twice that of suburban areas (Figure 31).
2. **DAC Census Tracts**: State roads within DAC census tracts experience greater overrepresentation in VRU crashes, with representation ratios more than twice as high as those not in DAC census tracts (Figure 32).
3. **Area Type and DAC census tracts**: DAC census tracts are overrepresented across all area types, with a more pronounced overrepresentation in more urbanized areas (Figure 33).
4. **Exposure**: VRU crashes occurred most in areas with the highest amount of VRU usage (exposure) (Figure 34).
5. **School Proximity**: Across all area types, VRU crashes were more common near schools, with those in urban areas being the most overrepresented (Figure 35).
6. **Trauma Center**: VRU crashes that occurred near a trauma center resulted in lower rates of fatalities in rural areas (Figure 36).

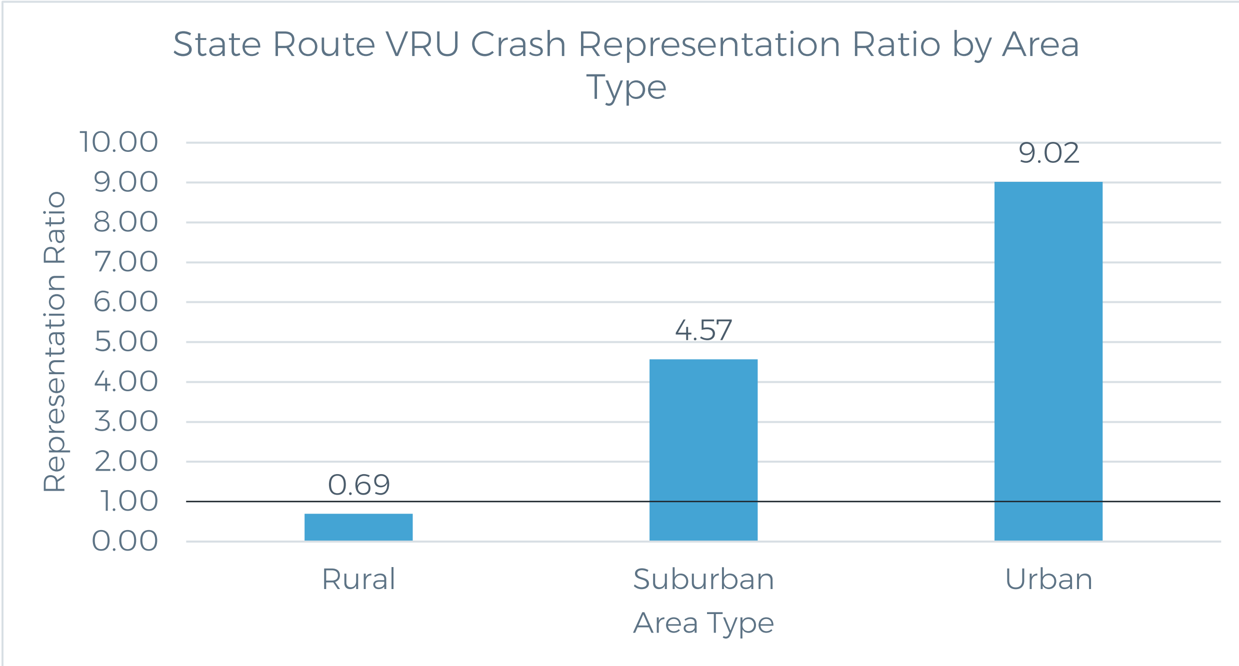


Figure 31: State Route VRU Crash Representation Ratio by Area Type

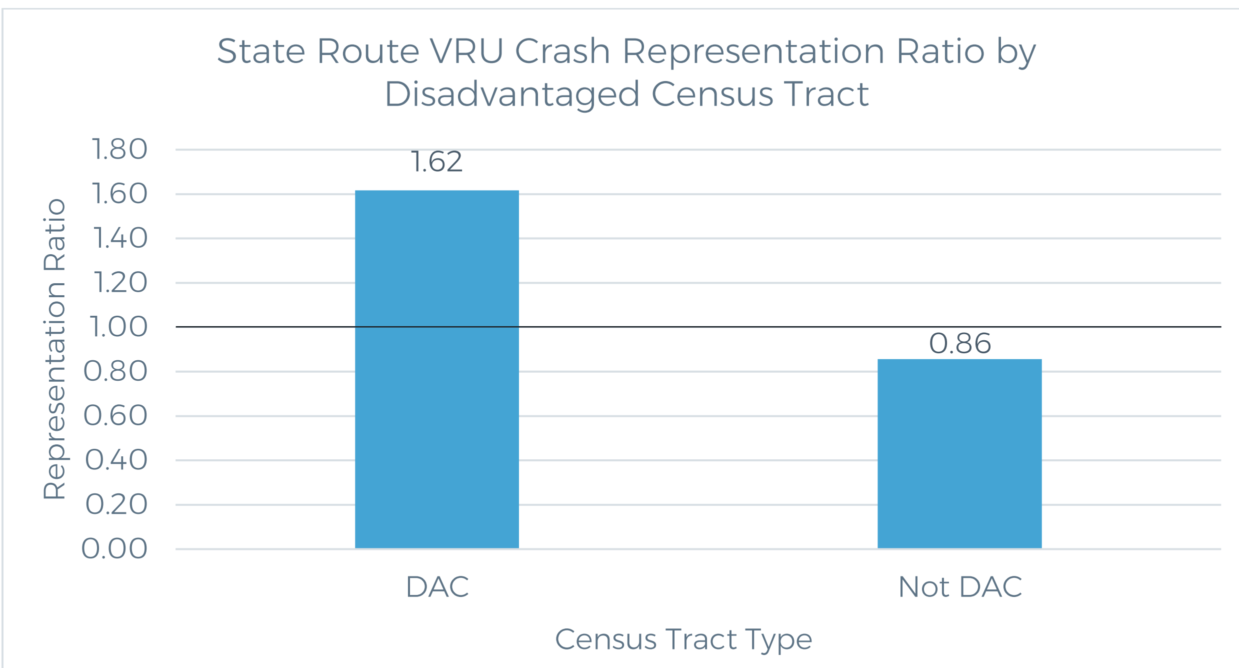


Figure 32: State Route VRU Crash Representation Ratio by DAC Census Tract

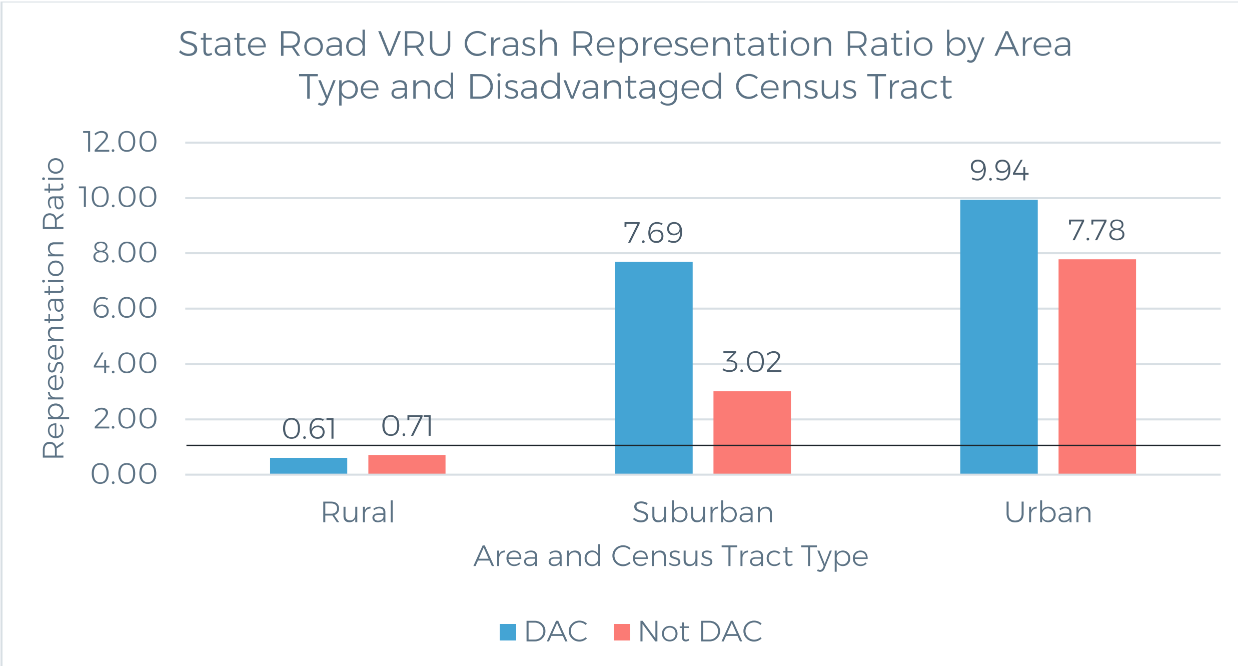


Figure 33: State Road Representation Ratio of VRU Crashes by Area Type and DAC Census Tract

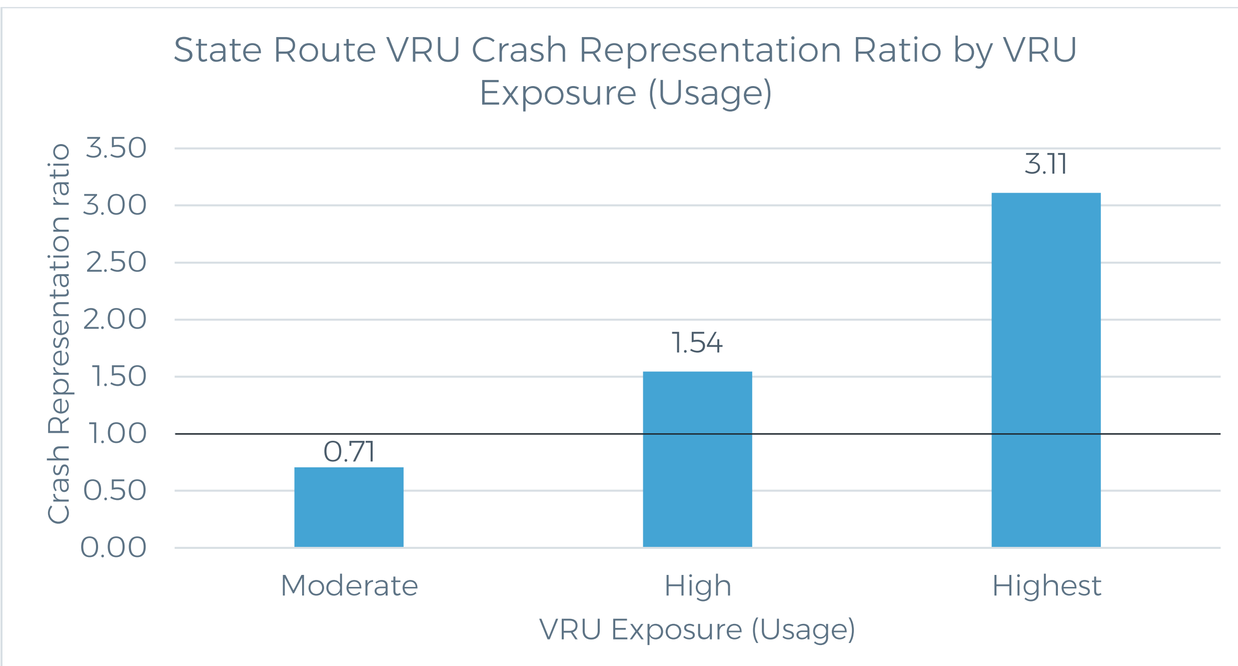


Figure 34: State Road Representation Ratio of VRU Crashes by VRU Exposure (Usage)

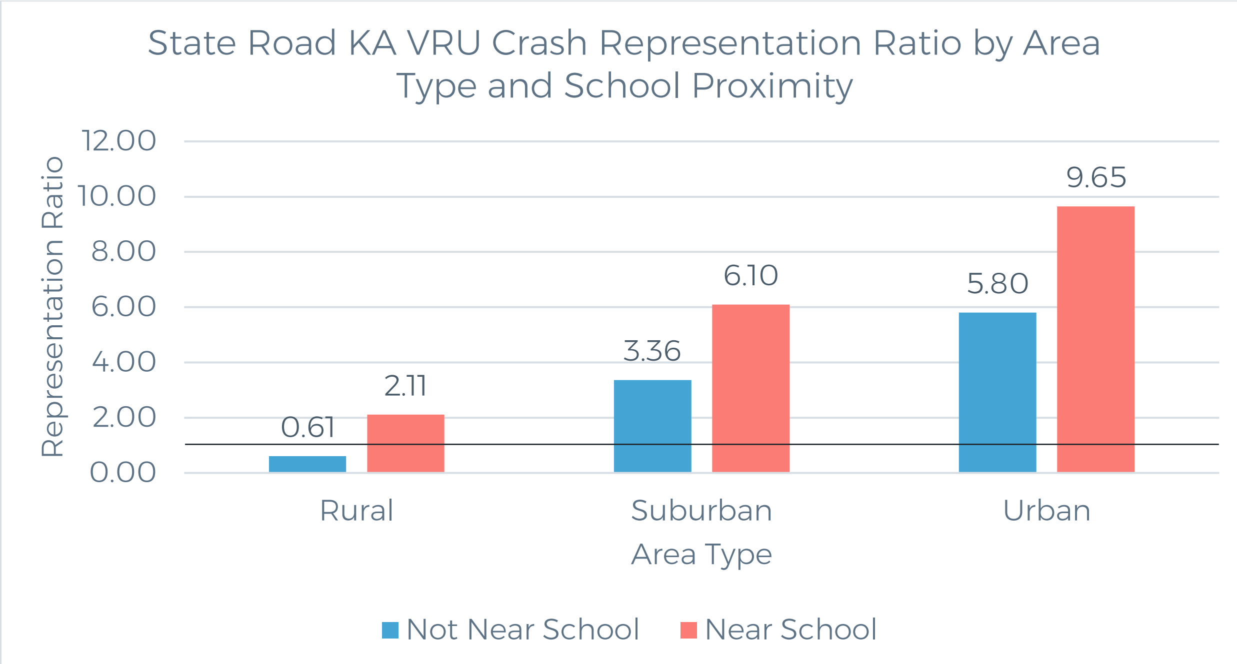


Figure 35: State KA Crashes by Area Type and Proximity to Schools

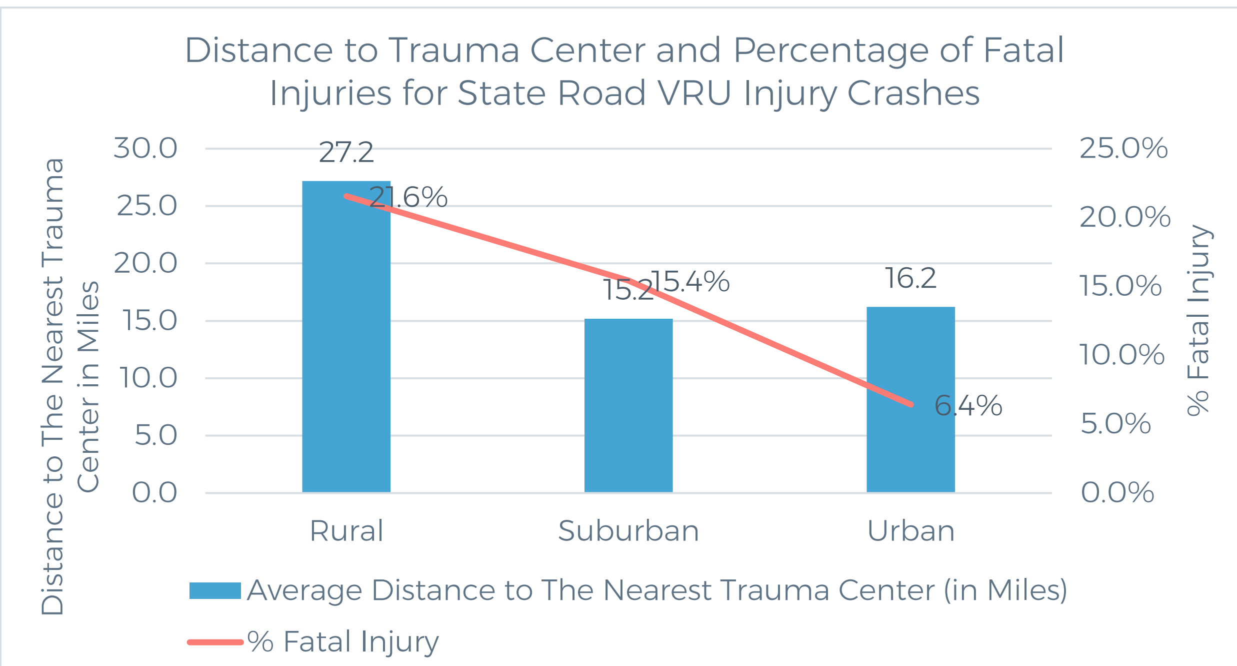


Figure 36: VRU Injury Crash Fatality Rate by Area Type and Trauma Center Proximity

2.5.2.2 Roadway Features

Regarding roadway context on state roads, factors include AADT, posted speed limits, road functional classification, the number of lanes, and the presence of bus and bike lanes. These features are fundamental in determining the safety conditions for VRUs. Major and minor arterial roads often possess unique attributes that impact VRU safety, and the number of lanes on state roads can also have an effect.

1. **Functional Classification**: Interstates, other freeways, and expressways pose the highest risk to VRUs (Figure 37).
2. **Roadway Volume (AADT)**: VRU risk is greatest on roads with AADT exceeding 25,000 (Figure 38).
3. **Number of Lanes**: Four-lane arterials and six-lane interstates have a higher VRU risk—over three times more than the next closest road classifications in terms of representation (Figure 39).
4. **Speed Limits**: Lower speed limit streets, especially those with speeds below 50 mph, present the highest VRU risk on state roads (Figure 40).

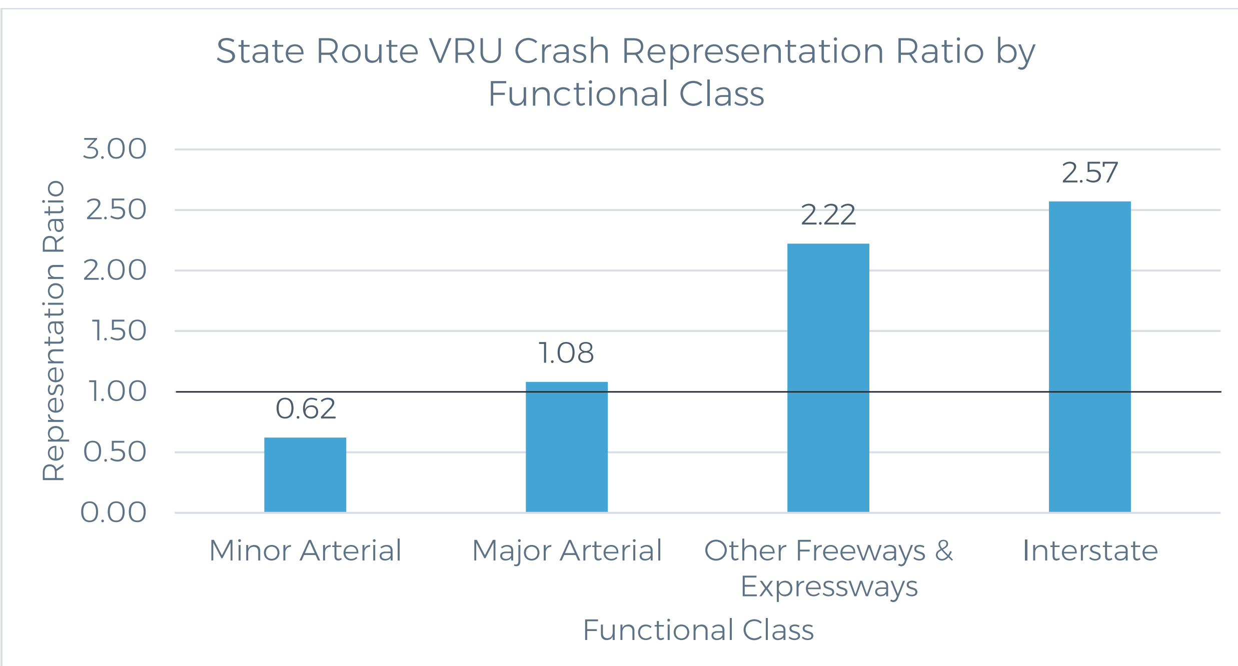


Figure 37: State Route VRU Crash Representation Ratio by Functional Class

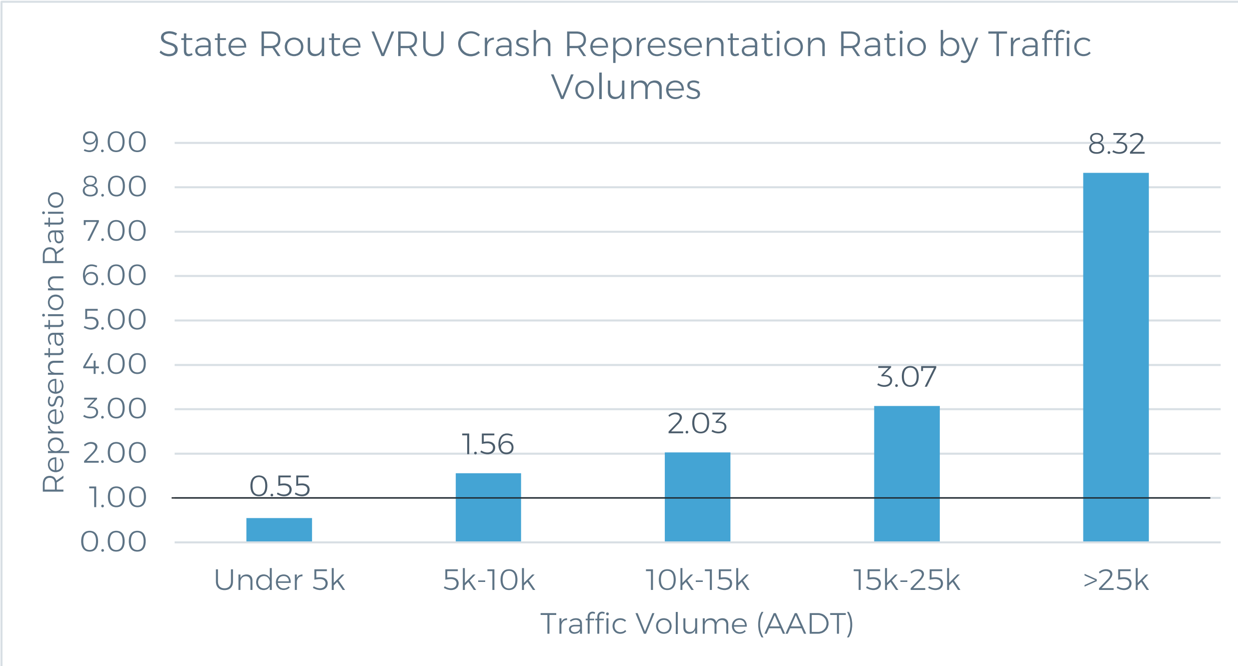


Figure 38: State Route VRU Crash Representation Ratio by Traffic Volumes

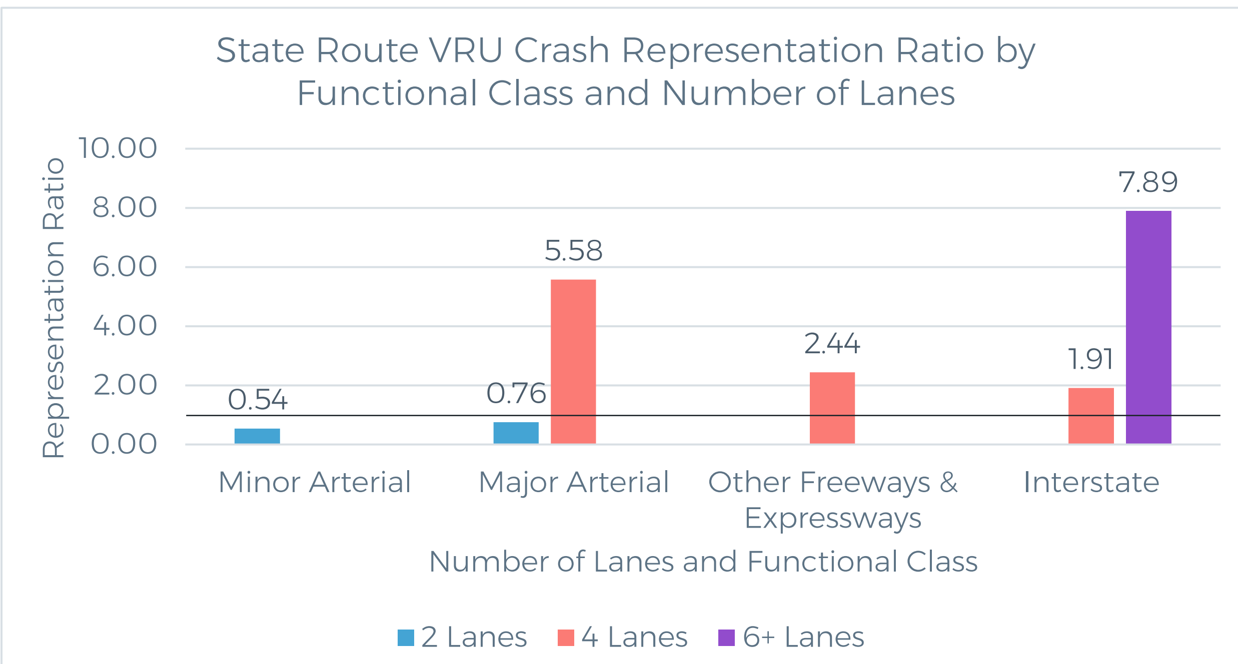


Figure 39: State Route VRU Crash Representation Ratio by Functional Class and Number of Lanes

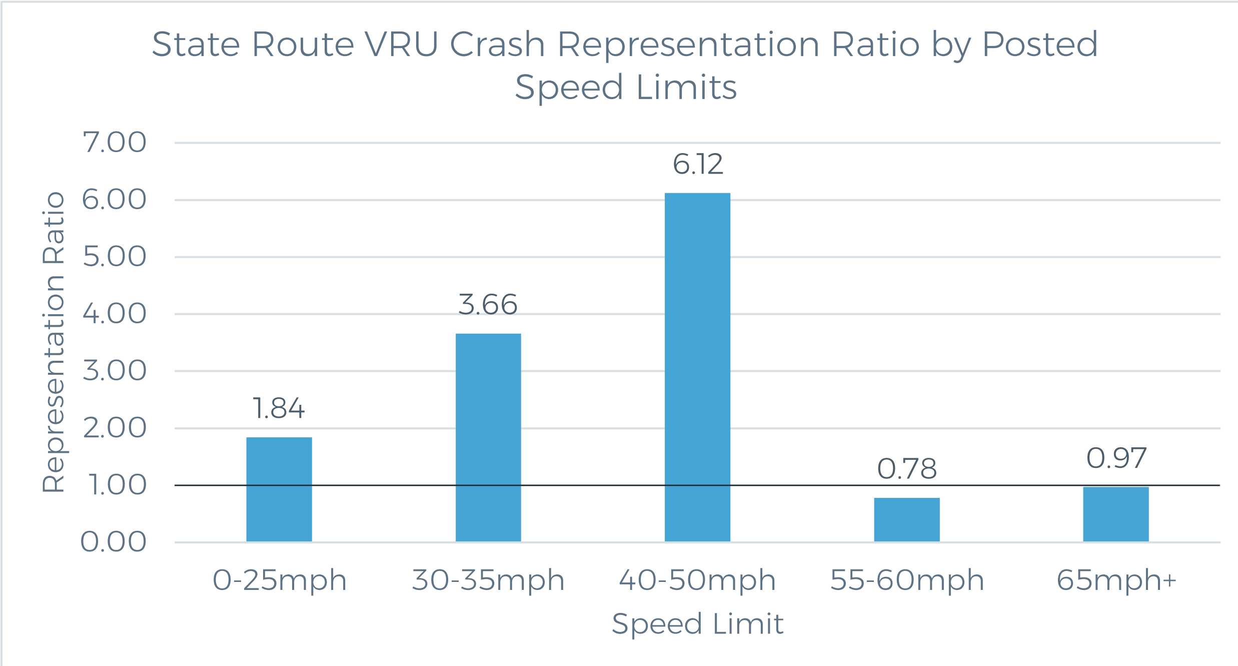


Figure 40: State Route VRU Crash Representation Ratio by Posted Speed Limits

2.5.3 Systemic Safety Analysis Crash Trees

Crash trees show crash representation ratios by specific roadway factors and locations. These crash trees show the representation ratio separated by land use and DAC designations. They identify the relative risk of a specific type of street in a specific area at each level, respective to the other features at that same level. Readers can evaluate the risks within the higher-level criteria for similar features by following the tree down the hierarchy.

The first level of the tree separates crashes through land use and DAC status. The second level separates crashes through factors including exposure, class, speed limit, AADT, number of lanes, operations, presence of a left turn lane, presence of a median, bus route, and school zone. The branches are also color-coded with light green to show a low representation ratio and dark red to show a high representation ratio. If only a few crashes occur on a large quantity of road miles, those roads can be identified as low risk. Conversely, if many crashes occur on only a few miles of roads, those roads can be identified as high risk.

A limitation of this analysis is the number of crashes and roadway mileage available. For example, if enough data were not available for a specific box to be meaningful, it was removed from the analysis; there was no data sufficient for AADT at volumes between 5,000 and 10,000, so they are not shown. Figure 41 through Figure 50 show the excerpts from the crash trees with sufficient data to draw conclusions.

To find a representation ratio via a crash tree, first select the area type of choice (e.g., rural, suburban, urban) or if the area of interest is in a DAC or not. Next, the user selects a branch of the tree based on the subclass of interest (e.g., speed limit, AADT, etc.). Finally, the user will select a “leaf” (aka a box) on the branch pertinent to the user’s interest. For example, if a user wanted to know the representation ratio in a rural area given proximity to a school, the user would start with Figure 41, follow the “School Zone” branch, then select the “Near School” leaf; the representation ratio for this would be 1.85.

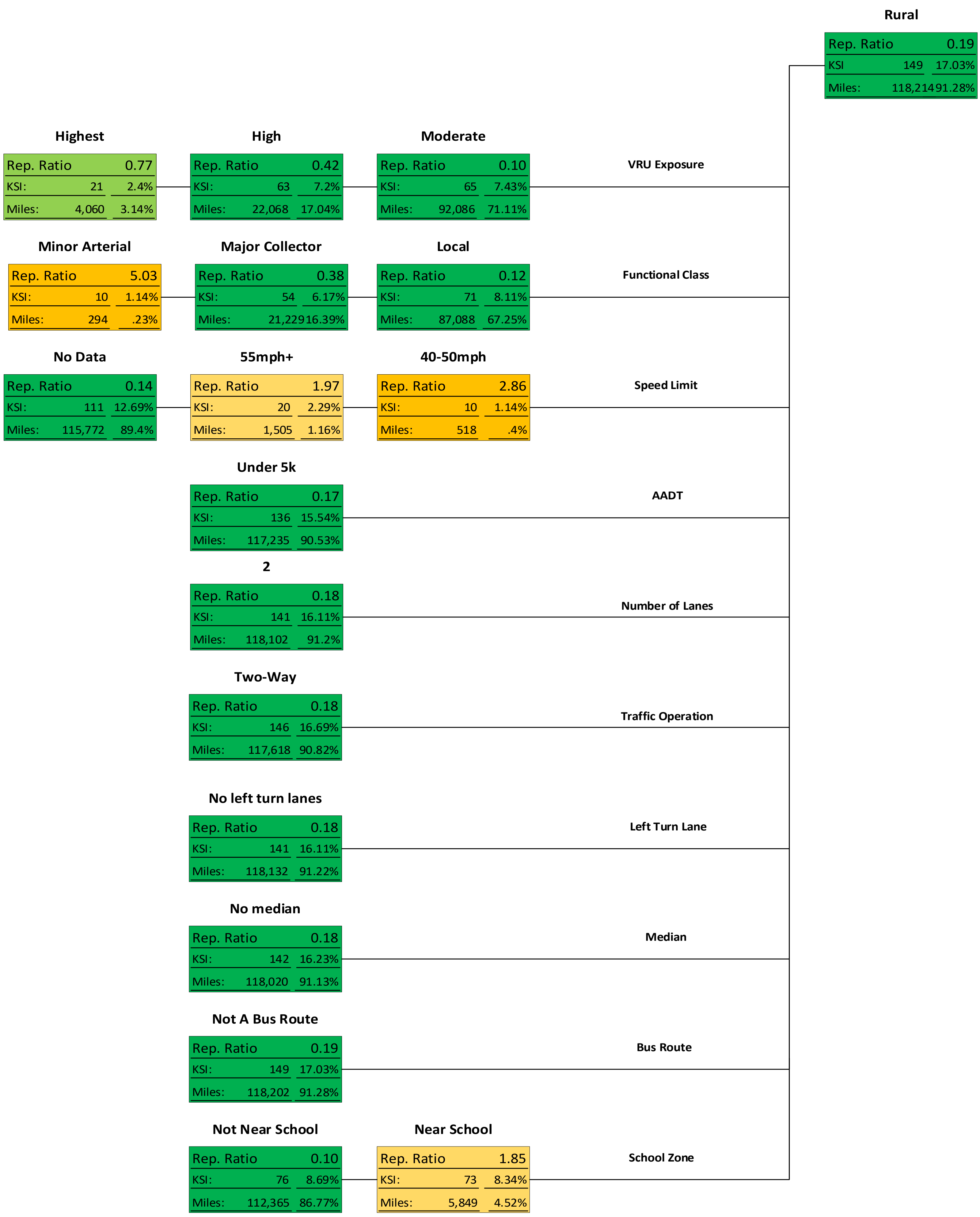


Figure 41: KA Crashes on Rural Local Roads

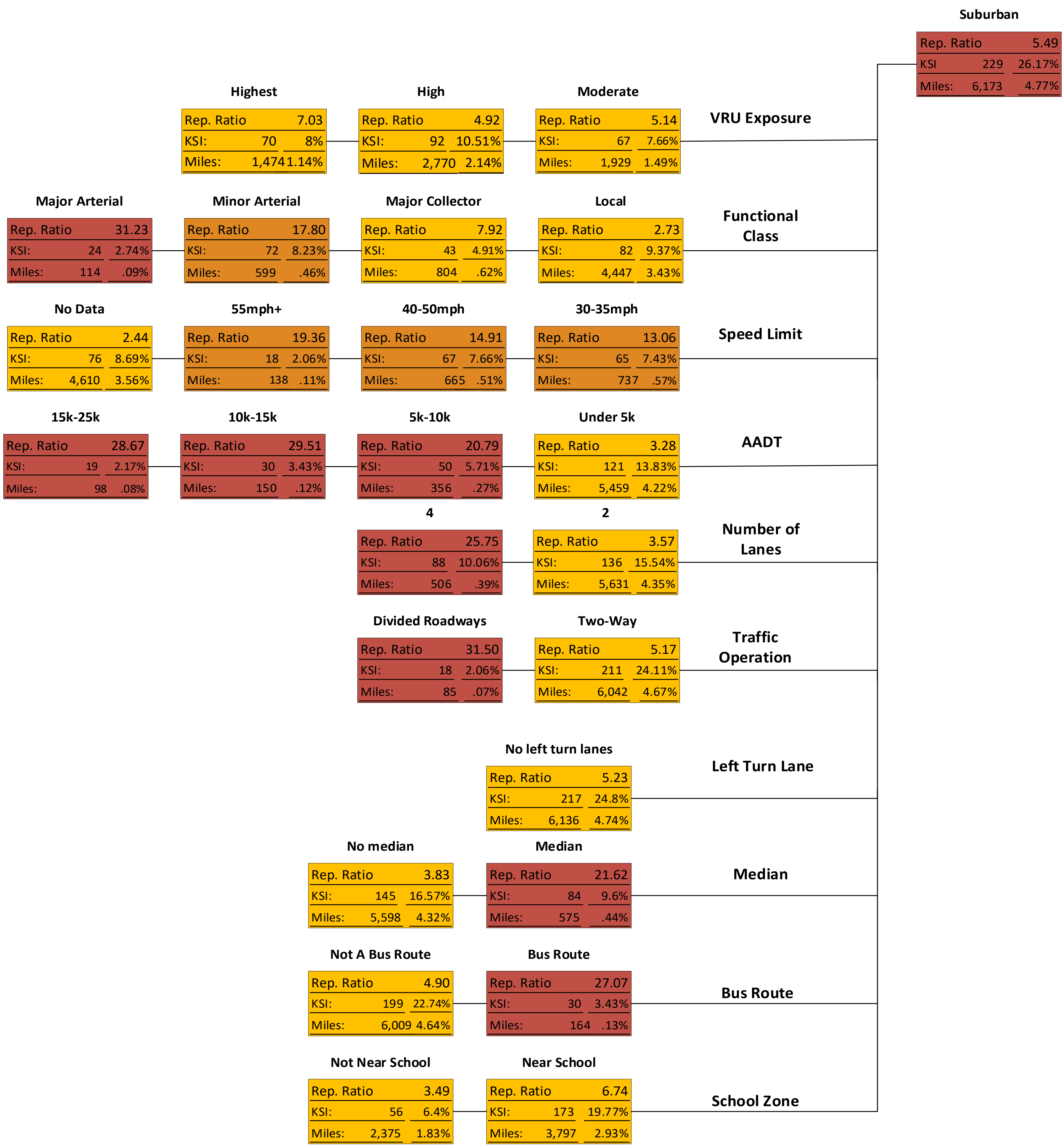


Figure 42: KA Crashes on Suburban Local Roads

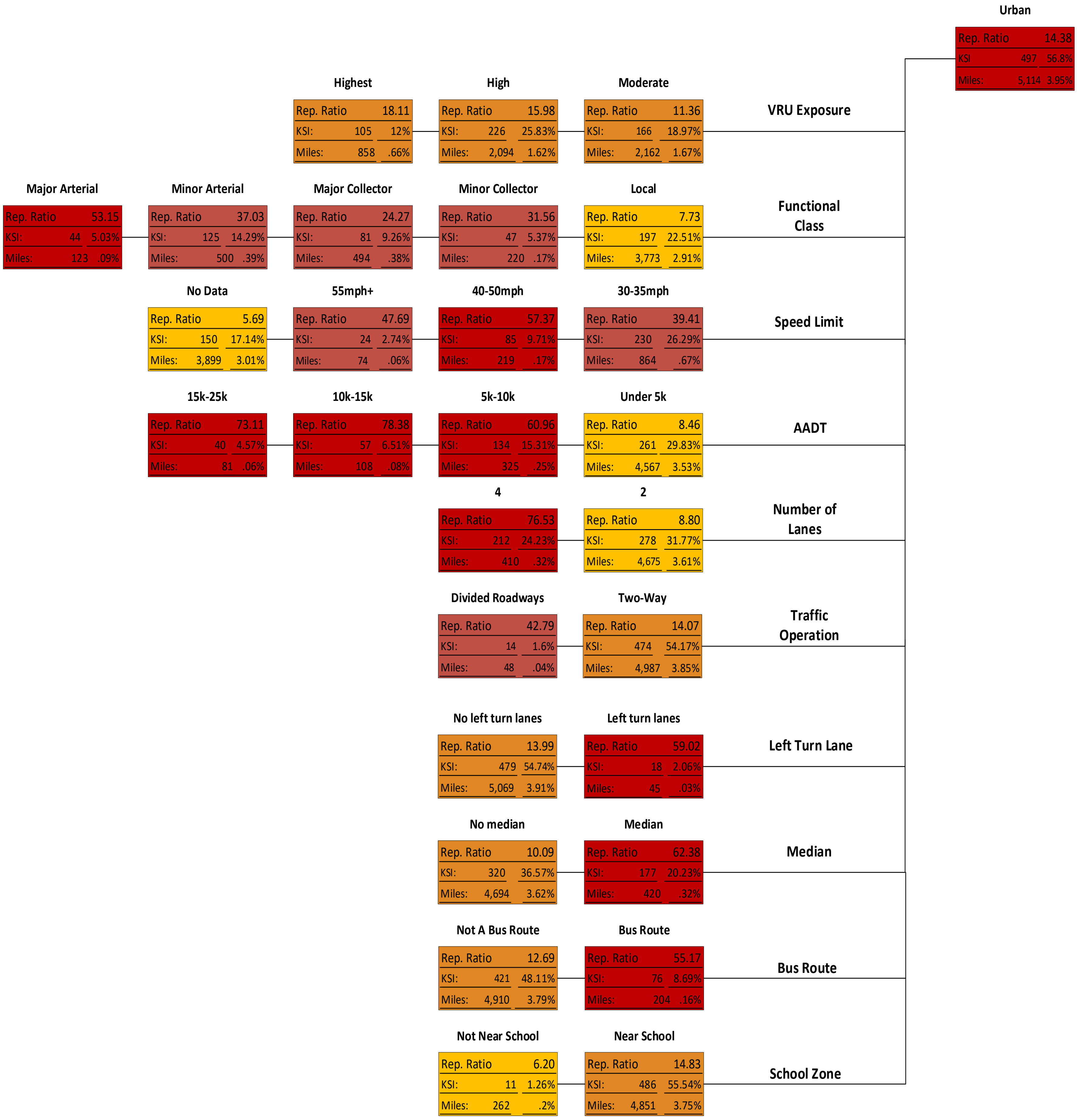


Figure 43: KA Crashes on Urban Local Roads

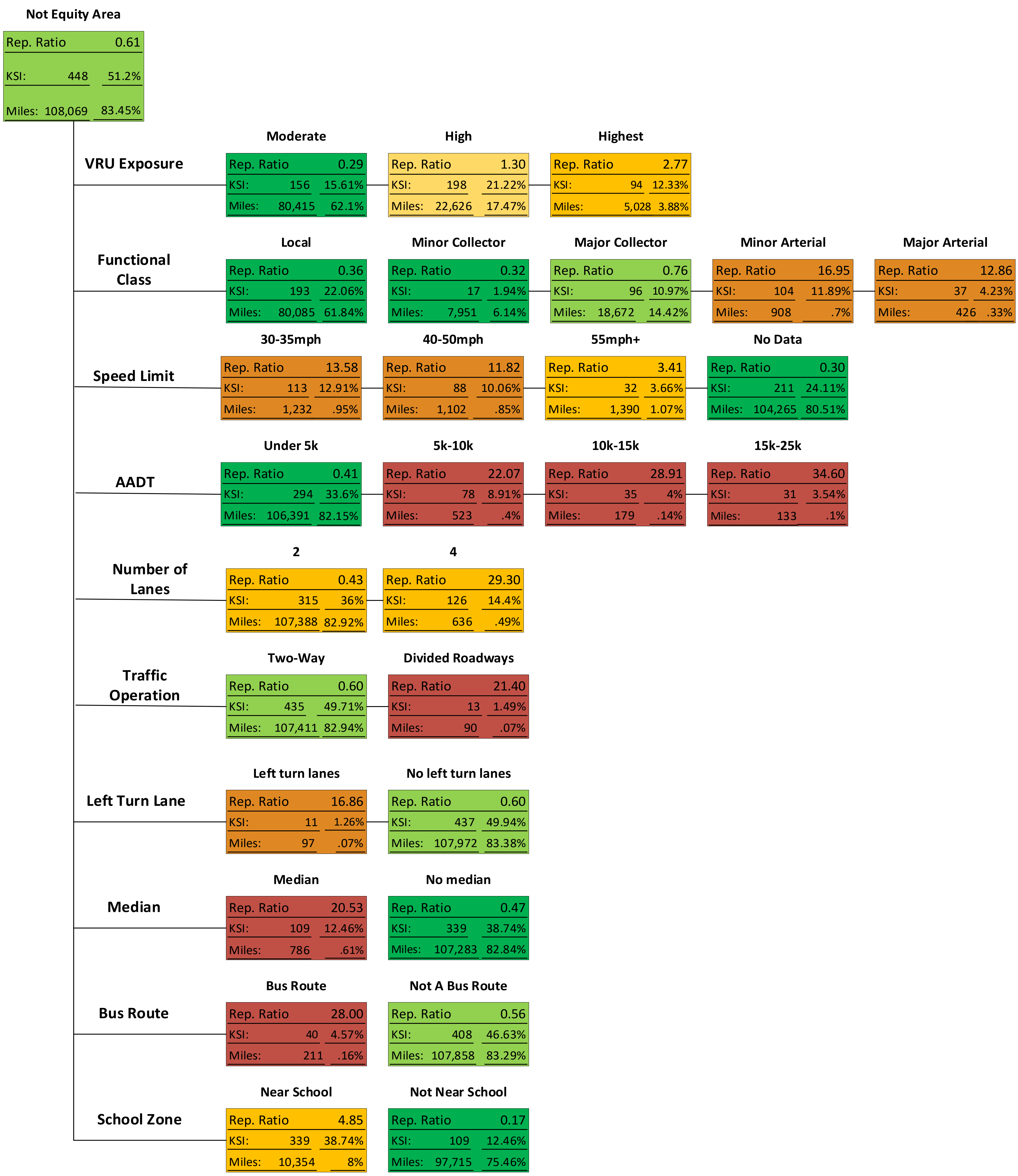


Figure 44: Local Road KA VRU Crashes Not in Disadvantaged Census Tract

Equity Area

Rep. Ratio	2.95
KSI:	427 | 48.8%
Miles:	21,431 | 16.55%

VRU Exposure

	Moderate	High	Highest
Rep. Ratio	1.33	6.29	11.07
KSI:	142 | 16.23%	183 | 20.91%	102 | 11.66%
Miles:	15,762 | 12.17%	4,305 | 3.32%	1,364 | 1.05%

Functional Class

	Local	Minor Collector	Major Collector	Minor Arterial	Major Arterial
Rep. Ratio	1.53	3.62	3.15	31.46	40.77
KSI:	157 | 17.94%	42 | 4.8%	82 | 9.37%	103 | 11.77%	39 | 4.46%
Miles:	15,223 | 11.76%	1,718 | 1.33%	3,855 | 2.98%	485 | .37%	142 | .11%

Speed Limit

	30-35mph	40-50mph	55mph+	No Data
Rep. Ratio	37.11	36.48	13.55	0.93
KSI:	190 | 21.71%	74 | 8.46%	30 | 3.43%	126 | 14.4%
Miles:	758 | .59%	300 | .23%	328 | .25%	20,015 | 15.46%

AADT

	Under 5k	5k-10k	10k-15k	15k-25k
Rep. Ratio	1.59	59.85	84.26	83.42
KSI:	224 | 25.6%	115 | 13.14%	55 | 6.29%	28 | 3.2%
Miles:	20,870 | 16.12%	284 | .22%	97 | .07%	50 | .04%

Number of Lanes

	2	4
Rep. Ratio	1.69	70.37
KSI:	240 | 27.43%	182 | 20.8%
Miles:	21,021 | 16.23%	383 | .3%

Traffic Operation

	Two-Way	Divided Roadways
Rep. Ratio	2.76	48.69
KSI:	396 | 45.26%	22 | 2.51%
Miles:	21,236 | 16.4%	67 | .05%

Left Turn Lane

	Left turn lanes	No left turn lanes
Rep. Ratio	58.81	2.77
KSI:	27 | 3.09%	400 | 45.71%
Miles:	68 | .05%	21,363 | 16.5%

Median

	Median	No median
Rep. Ratio	58.33	1.89
KSI:	159 | 18.17%	268 | 30.63%
Miles:	403 | .31%	21,028 | 16.24%

Bus Route

	Bus Route	Not A Bus Route
Rep. Ratio	57.86	2.51
KSI:	66 | 7.54%	361 | 41.26%
Miles:	169 | .13%	21,263 | 16.42%

School Zone

	Near School	Not Near School
Rep. Ratio	14.04	0.29
KSI:	393 | 44.91%	34 | 3.89%
Miles:	4,144 | 3.2%	17,288 | 13.35%

Figure 45: Local Road KA VRU Crashes in Disadvantaged Census Tracts

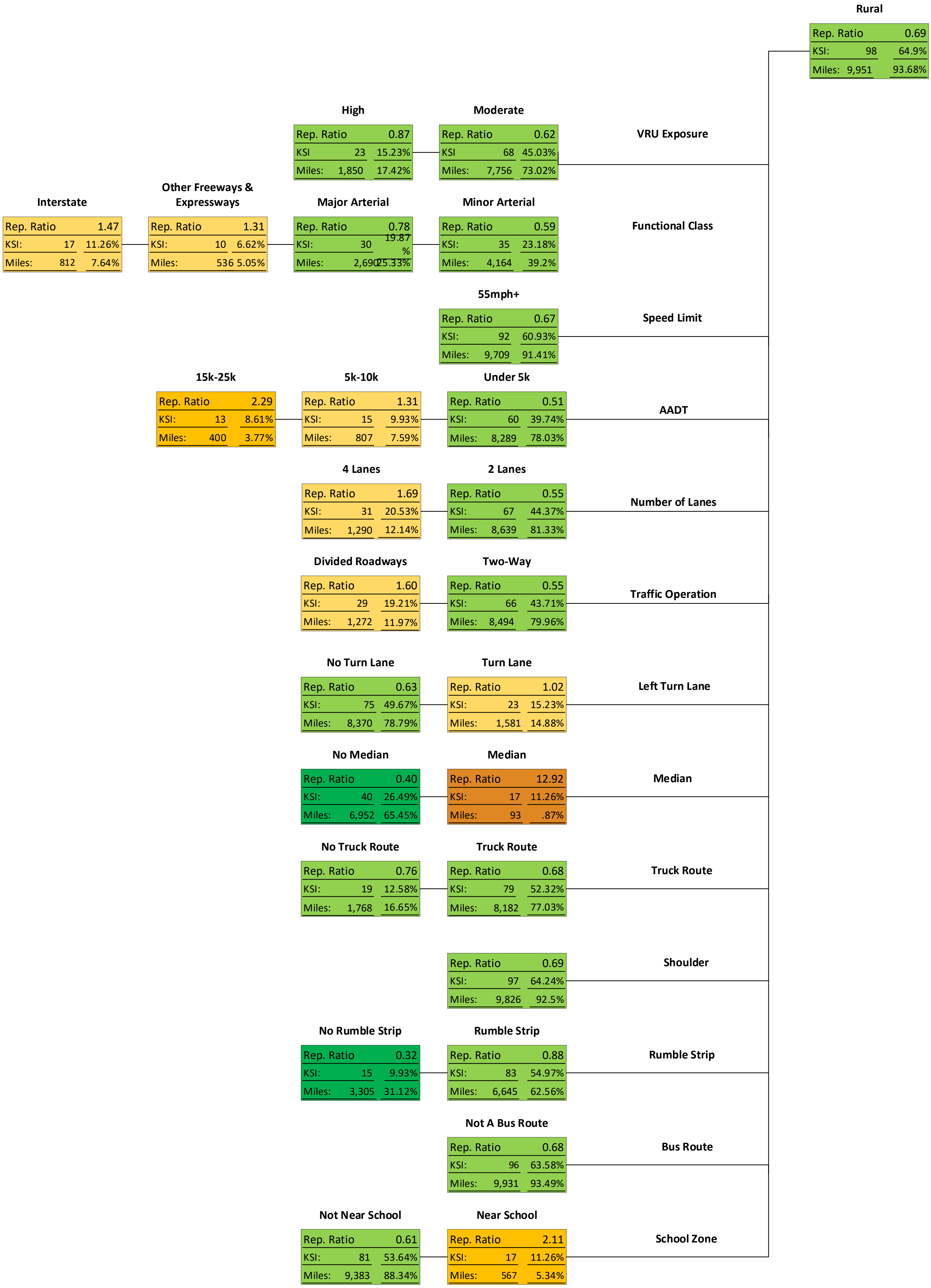


Figure 46: KA Crashes on Rural State Roads

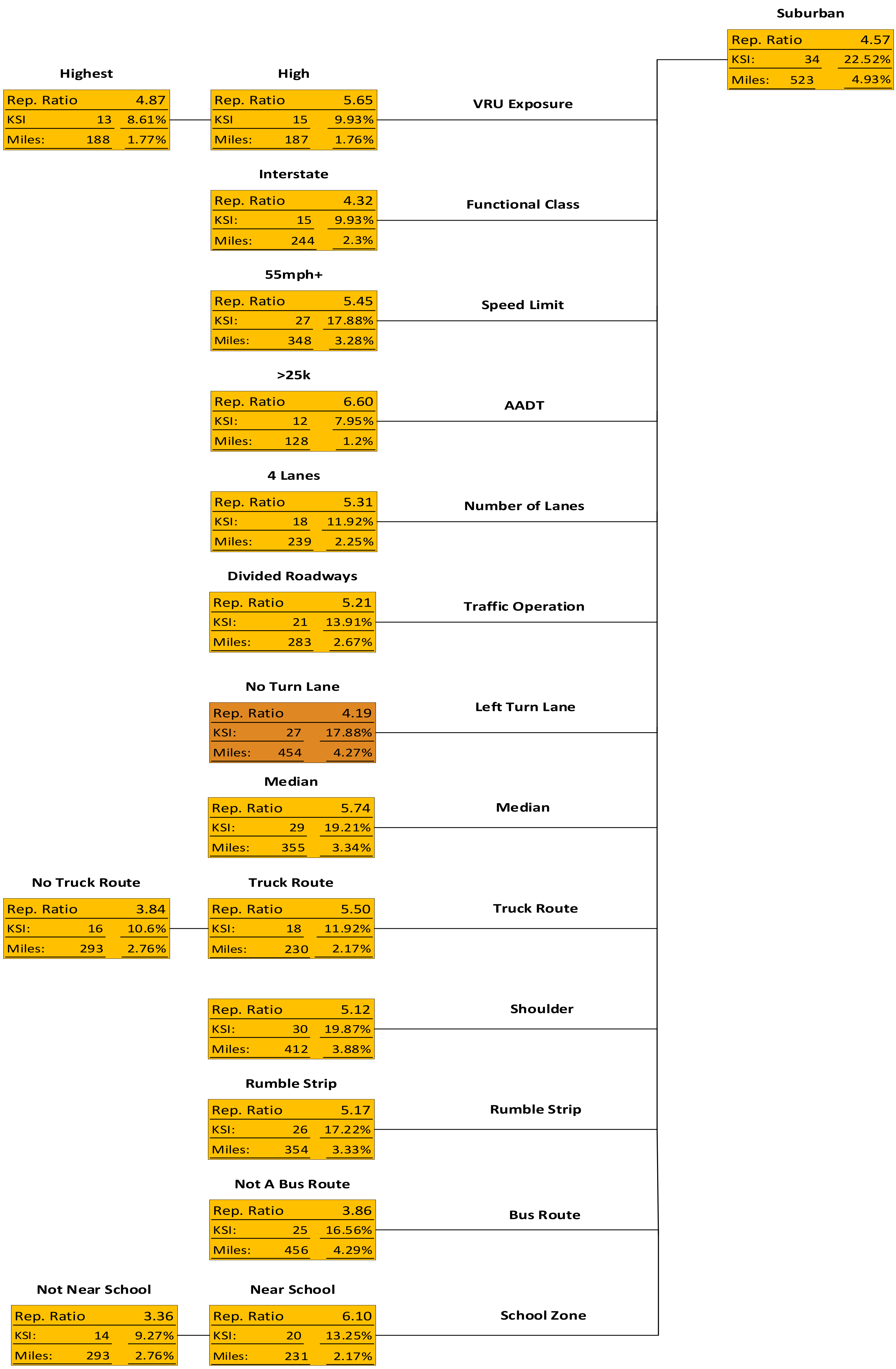


Figure 47: KA VRU Crashes Suburban State Roads

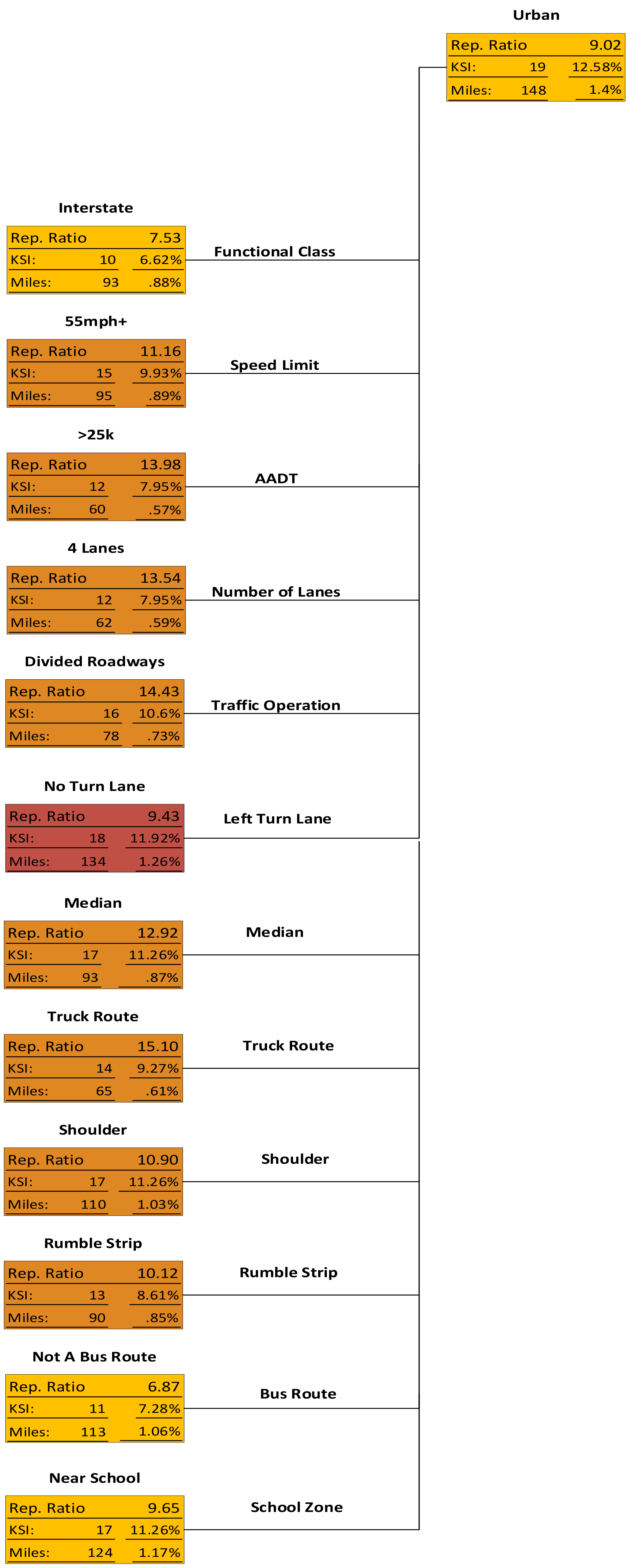


Figure 48: KA VRU Crashes Urban State Roads

Attribute	Category	Rep. Ratio	KSI	KSI %	Miles	Miles %
Not Equity Area	Not Equity Area	0.86	105	69.54%	8,620	81.15%
VRU Exposure	Moderate	0.67	61	40.4%	6,414	60.38%
VRU Exposure	High	0.99	25	16.56%	1,768	16.65%
VRU Exposure	Highest	3.06	19	12.58%	437	4.12%
Functional Class	Minor Arterial	0.66	33	21.85%	3,528	33.21%
Functional Class	Major Arterial	0.93	29	19.21%	2,200	20.71%
Functional Class	Other Freeways & Expressways	2.04	17	11.26%	585	5.51%
Functional Class	Interstate	1.65	22	14.57%	939	8.84%
Speed Limit	55mph+	0.80	94	62.25%	8,262	77.78%
AADT	Under 5k	0.55	54	35.76%	6,913	65.08%
AADT	5k-10k	1.36	13	8.61%	670	6.31%
AADT	15k-25k	2.67	17	11.26%	448	4.22%
AADT	>25k	6.27	15	9.93%	168	1.58%
Number of Lanes	2	0.59	61	40.4%	7,218	67.96%
Number of Lanes	4	2.22	42	27.81%	1,333	12.55%
Traffic Operation	Two-Way	0.61	61	40.4%	6,985	65.76%
Traffic Operation	Divided Roadways	1.99	38	25.17%	1,343	12.64%
Left Turn Lane	Left turn lanes	1.33	26	17.22%	1,371	12.91%
Left Turn Lane	No left turn lanes	0.77	79	52.32%	7,249	68.24%
Median	Median	1.71	67	44.37%	2,750	25.89%
Median	No Median	0.46	38	25.17%	5,870	55.26%
Truck Route	Truck Route	0.82	80	52.98%	6,880	64.77%
Truck Route	No Truck Route	1.01	25	16.56%	1,739	16.38%
Shoulder	Shoulder	0.84	101	66.89%	8,408	79.16%
Rumble Strip	Rumble Strip	1.06	88	58.28%	5,849	55.06%
Rumble Strip	No Rumble Strip	0.43	17	11.26%	2,771	26.09%
Bus Route	Not A Bus Route	0.79	96	63.58%	8,531	80.31%
School Zone	Near School	3.27	30	19.87%	646	6.08%
School Zone	Not Near School	0.66	75	49.67%	7,974	75.07%

Figure 49: State Road KA VRU Crashes Not in Disadvantaged Census Tract

Equity Area

Equity Area		Rep. Ratio 1.62	KSI: 46	30.46%	Miles: 2,002	18.85%
VRU Exposure	Moderate	Rep. Ratio 0.86	KSI: 19	12.58%	Miles: 1,548	14.57%
VRU Exposure	High	Rep. Ratio 4.52	KSI: 21	13.91%	Miles: 326	3.07%
Functional Class	Major Arterial	Rep. Ratio 1.65	KSI: 14	9.27%	Miles: 598	5.63%
Functional Class	Interstate	Rep. Ratio 6.69	KSI: 20	13.25%	Miles: 210	1.98%
Speed Limit	55mph+	Rep. Ratio 1.49	KSI: 40	26.49%	Miles: 1,890	17.79%
AADT	Under 5k	Rep. Ratio 0.54	KSI: 12	7.95%	Miles: 1,557	14.66%
AADT	>25k	Rep. Ratio 12.81	KSI: 14	9.27%	Miles: 77	.72%
Number of Lanes	2	Rep. Ratio 0.70	KSI: 17	11.26%	Miles: 1,706	16.06%
Number of Lanes	4	Rep. Ratio 5.19	KSI: 19	12.58%	Miles: 257	2.42%
Traffic Operation	Two-Way	Rep. Ratio 0.61	KSI: 14	9.27%	Miles: 1,617	15.22%
Traffic Operation	Divided Roadways	Rep. Ratio 6.79	KSI: 28	18.54%	Miles: 290	2.73%
Left Turn Lane	No left turn lanes	Rep. Ratio 1.69	KSI: 41	27.15%	Miles: 1,709	16.08%
Median	Median	Rep. Ratio 3.74	KSI: 37	24.5%	Miles: 696	6.55%
Truck Route	Truck Route	Rep. Ratio 1.37	KSI: 31	20.53%	Miles: 1,597	15.04%
Truck Route	No Truck Route	Rep. Ratio 2.61	KSI: 15	9.93%	Miles: 405	3.81%
Shoulder	Shoulder	Rep. Ratio 1.56	KSI: 43	28.48%	Miles: 1,939	18.26%
Rumble Strip	Rumble Strip	Rep. Ratio 1.93	KSI: 34	22.52%	Miles: 1,241	11.68%
Rumble Strip	No Rumble Strip	Rep. Ratio 1.11	KSI: 12	7.95%	Miles: 761	7.17%
Bus Route	Not A Bus Route	Rep. Ratio 1.29	KSI: 36	23.84%	Miles: 1,968	18.52%
School Zone	Near School	Rep. Ratio 6.11	KSI: 24	15.89%	Miles: 276	2.6%
School Zone	Not Near School	Rep. Ratio 0.90	KSI: 22	14.57%	Miles: 1,726	16.25%

Figure 50: State Road KA VRU Crashes in Disadvantaged Census Tract

2.6 Contributing Circumstances

Contributing circumstances are the immediately identifiable causes of a crash, as noted by the reporting law enforcement officer, and can include behavior, weather, and pavement conditions. A review of crash reports identified common contributing circumstances to VRU KA crashes. Analysis of these features identifies specific users, context, and behavior factors that contribute to these crashes.

Elements providing key insights included user factors such as the race/ethnicity of users (Figure 51 and Figure 52), the age of users (Figure 53 and Figure 54), and the sex of users (Figure 55). Key elements also included context factors, including whether crashes were intersection related or not (Figure 56) and the lighting conditions (Figure 57 and Figure 58). A final set of key elements included behavioral factors such as intoxication (Figure 59) and pedestrian and cyclist behaviors (Figure 60 and Figure 61).

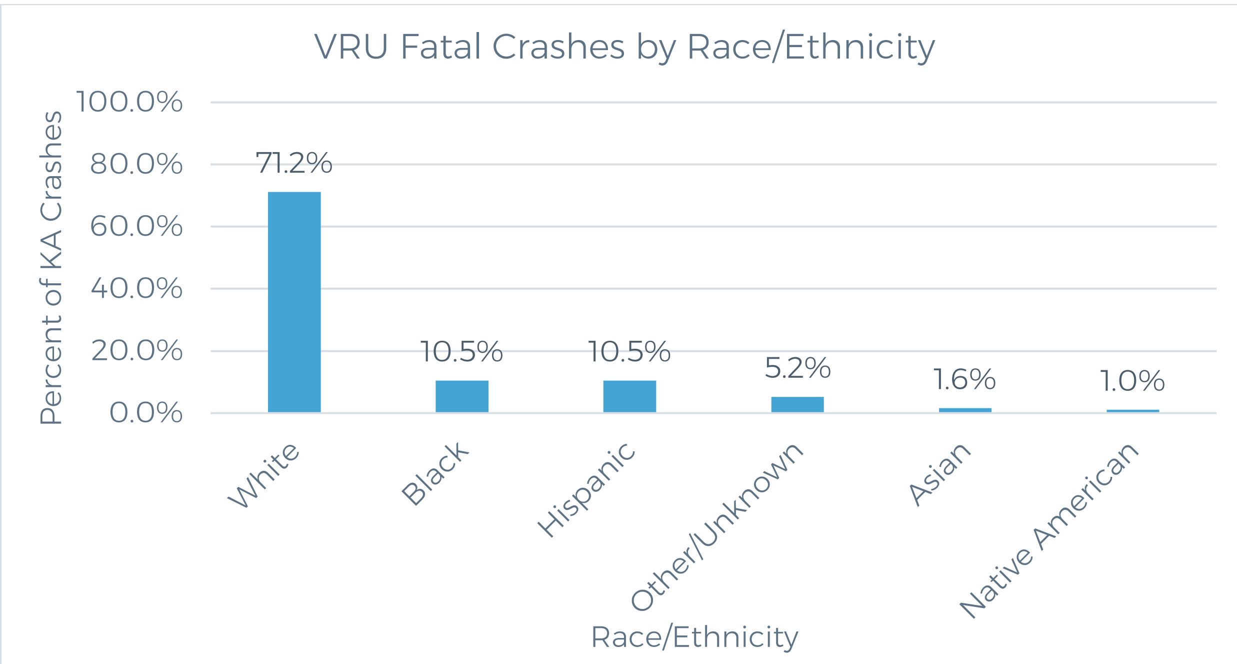
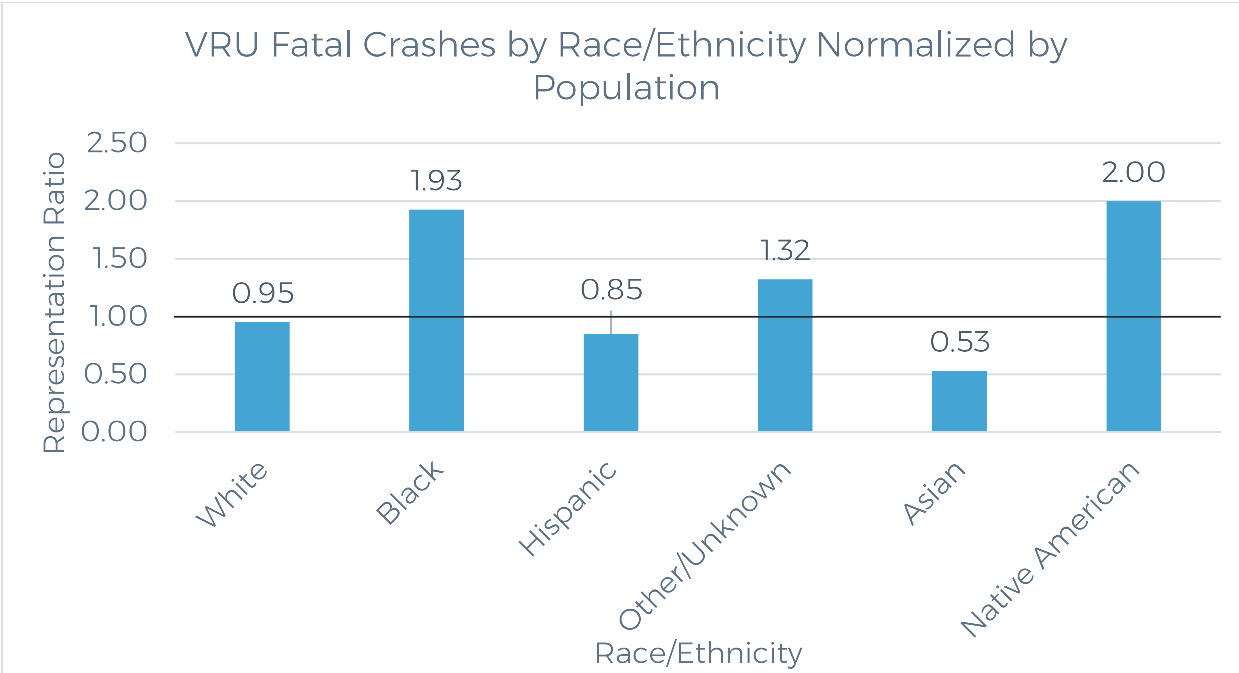


Figure 51: VRU Fatal Crashes by Race/Ethnicity (2017–2021)



*Other/unknown includes people who identify as Pacific Islander, mixed race, etc.

Figure 52: VRU Fatal Crashes by Race/Ethnicity Normalized by Population (2017–2021)

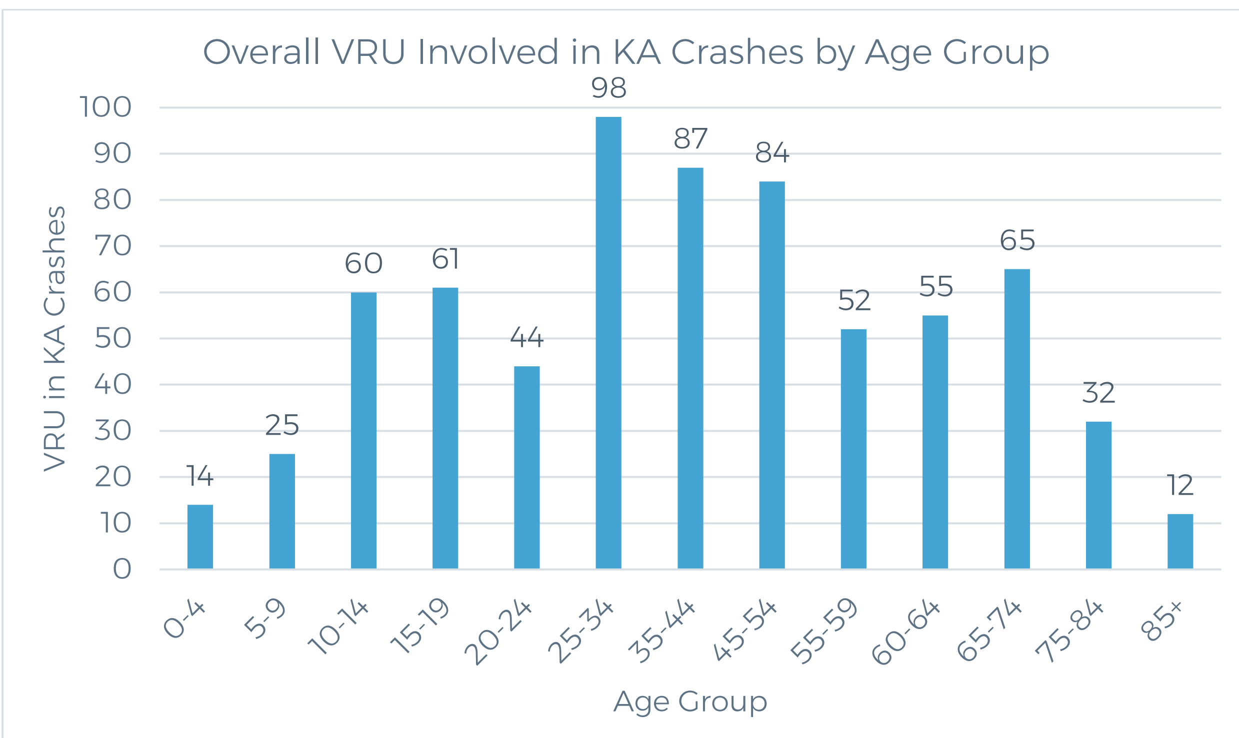


Figure 53: VRU Involved in KA Crashes by Age Group (2017–2021)

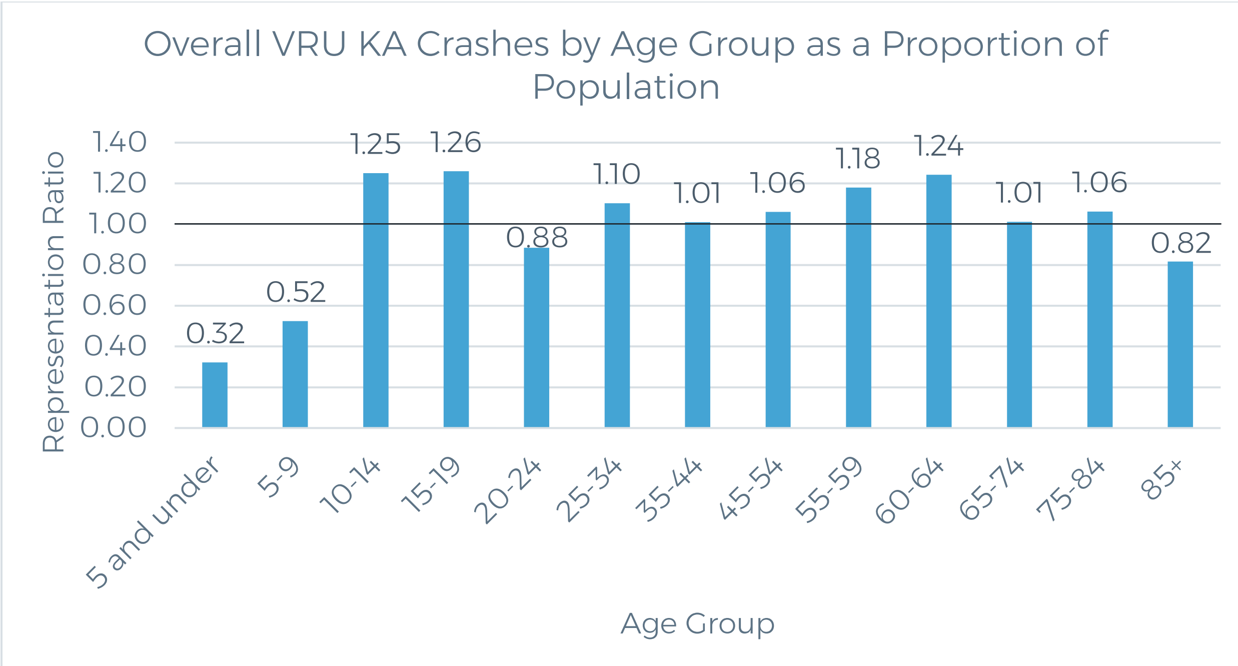


Figure 54: VRUs Involved in KA Crashes by Age Group as a Representation of Population (2017–2021)

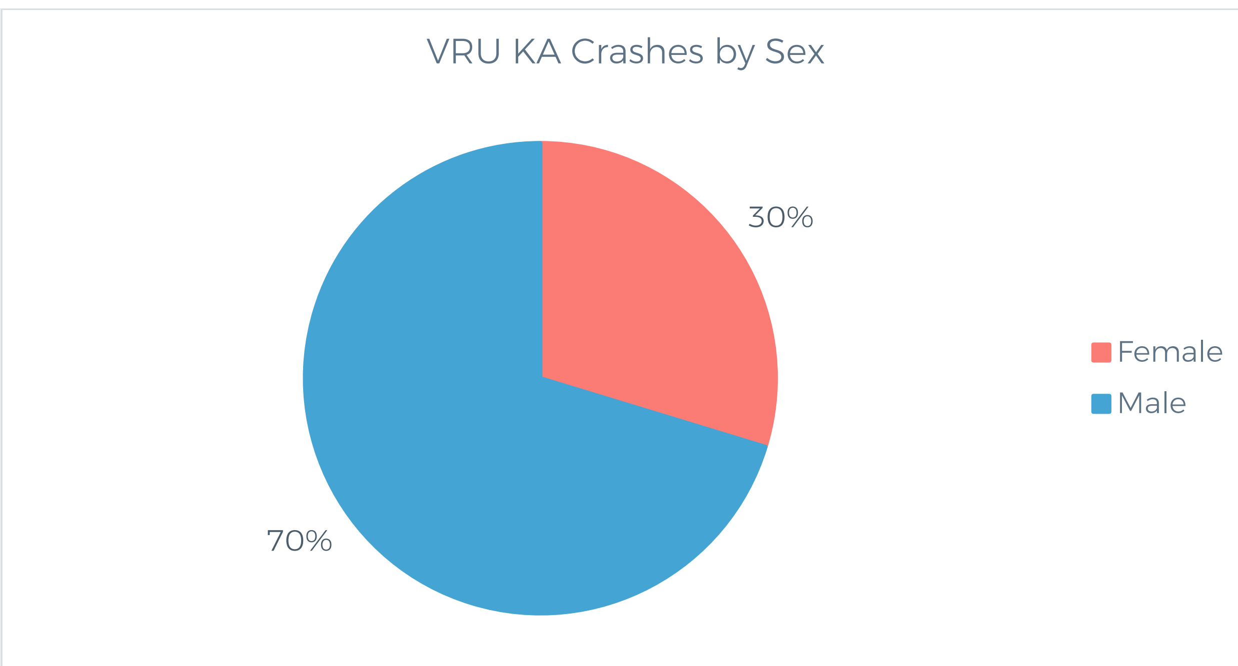


Figure 55: VRUs Involved in KA Crashes by Sex (2017–2021)

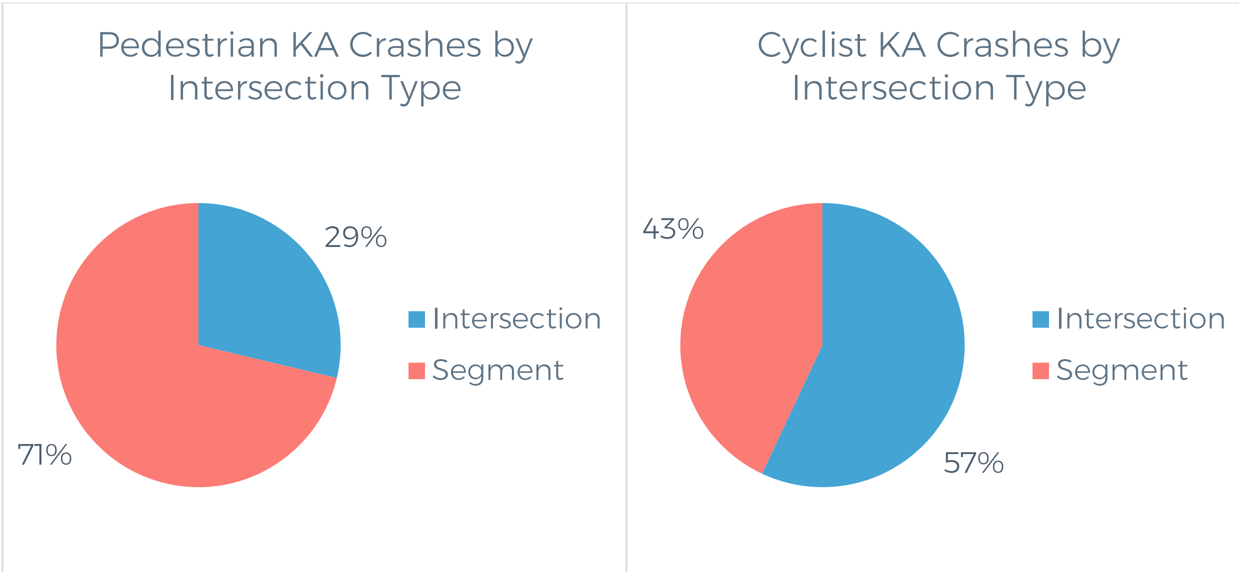


Figure 56: Pedestrian and Cyclist KA Crashes by Intersection Type (2017–2021)

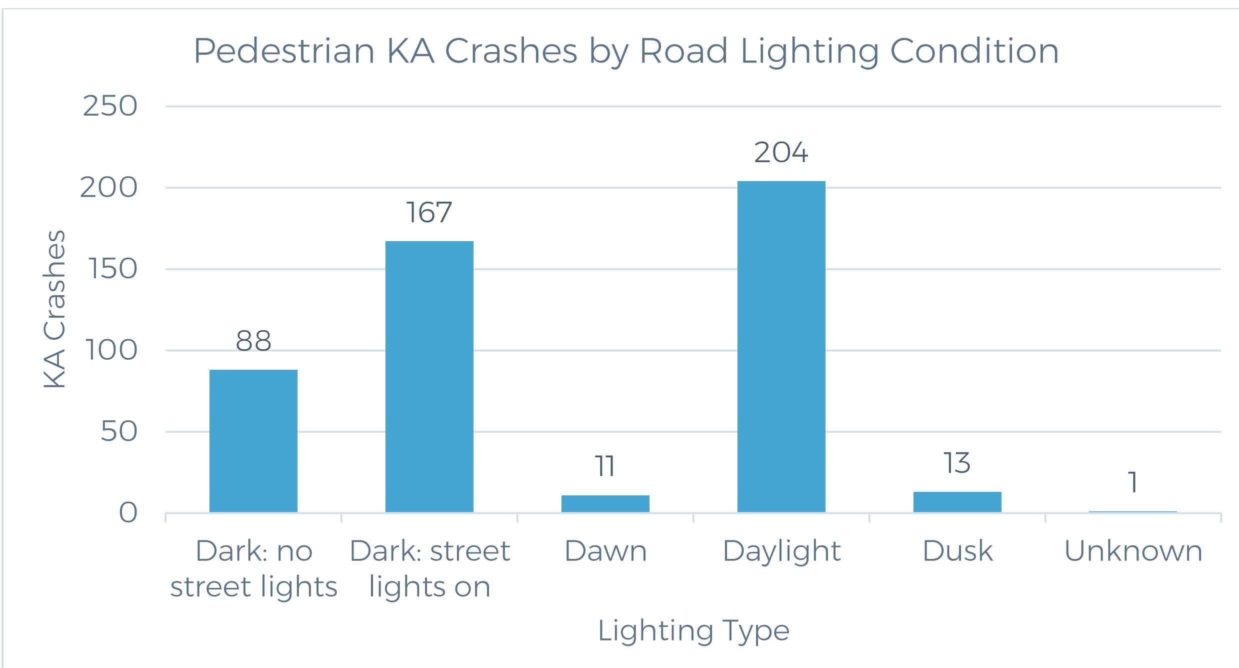


Figure 57: Pedestrian VRU KA Crashes by Road Lighting Condition (2017–2021)

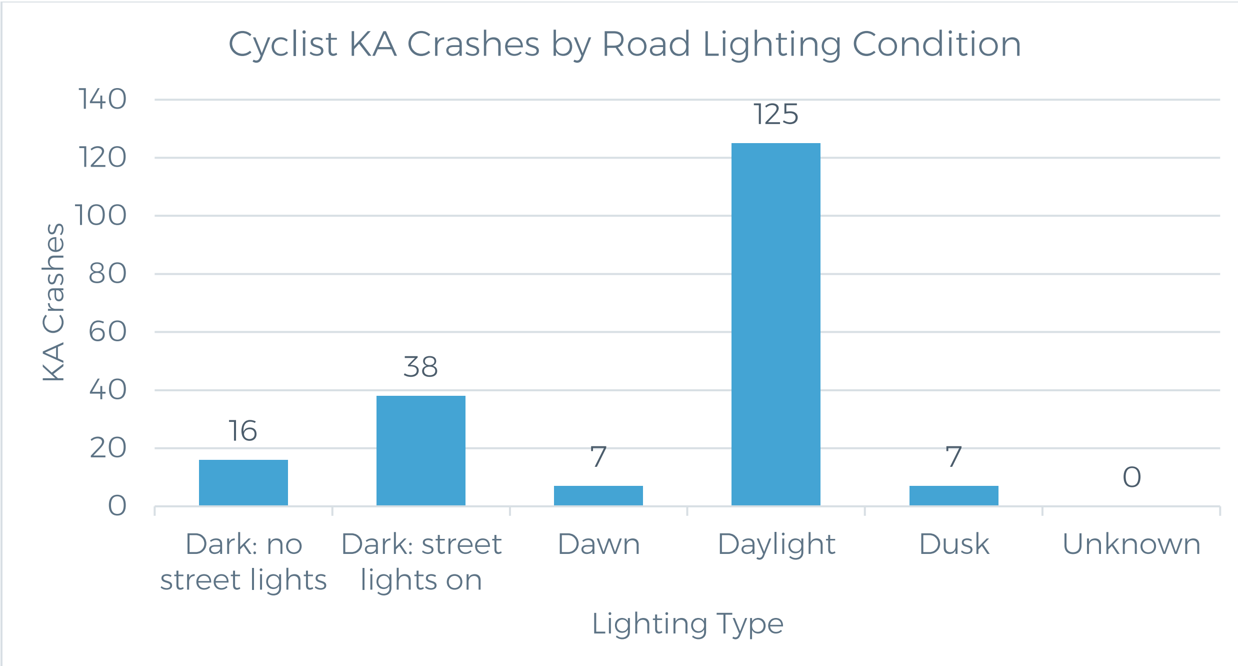


Figure 58: Cyclist VRU KA Crashes by Road Lighting Condition (2017–2021)

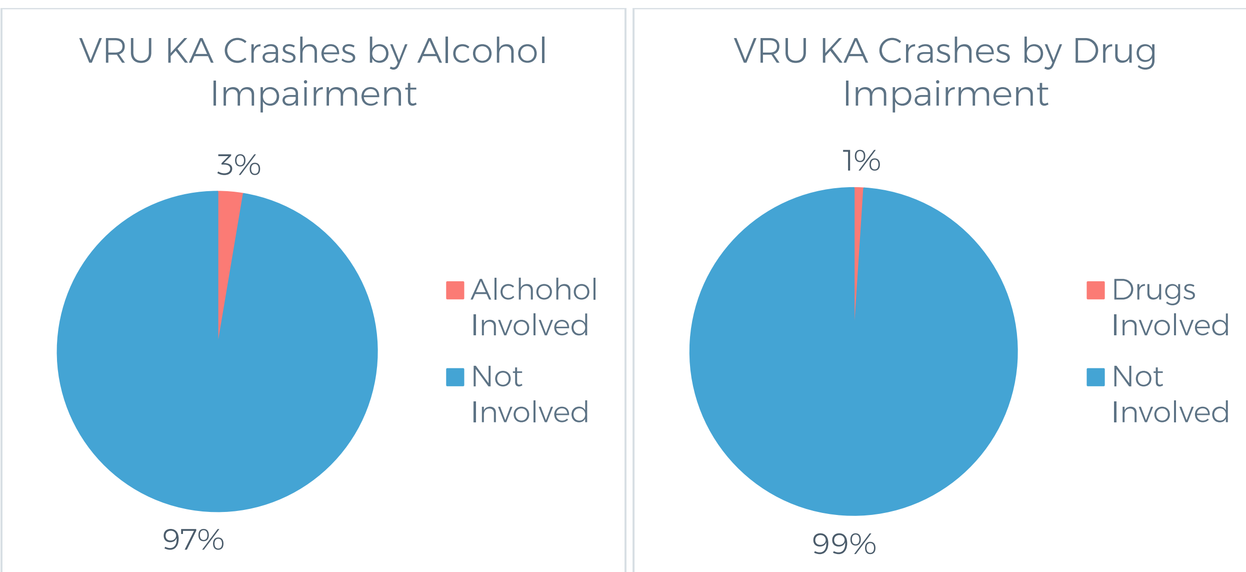


Figure 59: VRU KA Crashes by Alcohol and Drug Impairment (2017–2021)

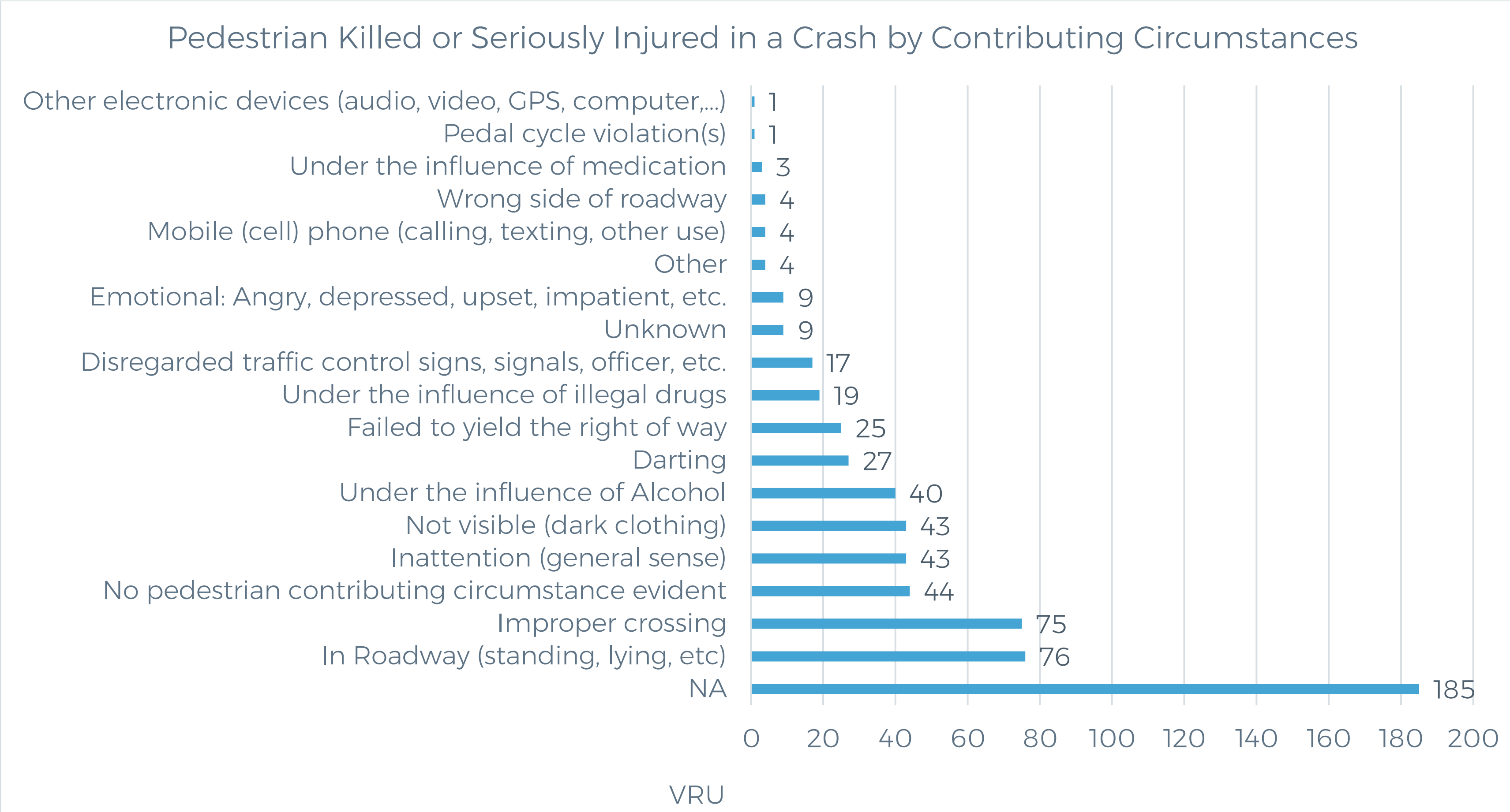


Figure 60: Pedestrian Killed or Seriously Injured in a Crash by Contributing Circumstances (2017–2021)

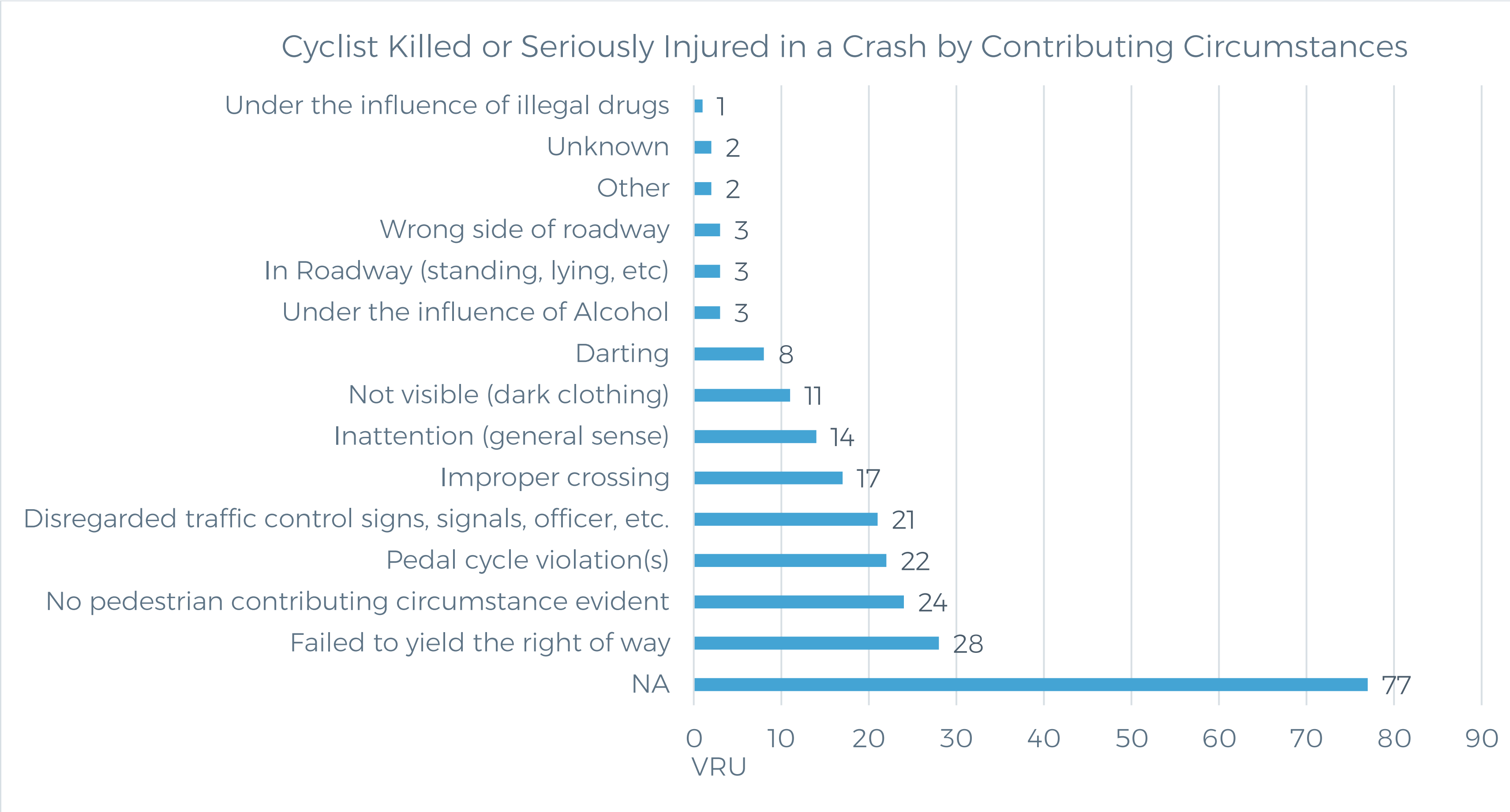


Figure 61: Cyclists Killed or Seriously Injured in a Crash by Contributing Circumstances (2017–2021)

2.7 Priority Corridor Summary Statistics

Priority Corridors quantify roadways and communities that have the most pressing safety opportunities. Priority Corridors combine the aspects of both the High-Injury Network and the High Risk Network. The selected Priority Corridors in this analysis exhibit a historical pattern of fatalities or severe injuries among VRUs, combined with road attributes that contribute to an elevated risk of crashes for those users. This approach is intended to pinpoint roadways where safety countermeasures may result in optimal social and economic benefits.

Based on HIN and HRN designations seen in Table 17, Priority Corridors are identified and classified into four levels:

- Priority 1 = Corridors on the HIN (any level) and the HRN (any level)
- Priority 2 = Corridors on the HIN (highest) but not on the HRN OR corridors on the HRN (highest) but not on the HIN
- Priority 3 = Corridors on the HRN (moderate – higher) but not on the HIN
- Priority 4 = Corridors on the HIN (moderate – higher) but not on the HRN

Table 17: Priority Corridor Designation

<table>
<tr><th rowspan="2">HIN Designation</th><th colspan="4">HRN Designation</th></tr>
<tr><th>Highest</th><th>Higher</th><th>Moderate</th><th>Not on HRN</th></tr>
<tr><td>Highest</td><td colspan="3" rowspan="3">Priority 1</td><td>Priority 2</td></tr>
<tr><td>Higher</td><td rowspan="2">Priority 4</td></tr>
<tr><td>Moderate</td></tr>
<tr><td>Not on HIN</td><td>Priority 2</td><td colspan="2">Priority 3</td><td>Not Prioritized</td></tr>
</table>

Table 18 and Table 19 show priority corridors throughout the state by KA crashes, centerline miles, and DAC miles for state roads and local roads, respectively. Table 20 through Table 31 further break down these categories for the six KDOT districts for state roads and local roads, respectively. The combined priority corridors for state roads and local roads are visualized for the six KDOT districts in Figure 62 through Figure 67.

The statewide Priority Corridor can be viewed online.[7]

Table 18: Statewide VRU Priority Corridors Local Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC Miles	
	Total	%	Total	%	Total	%
Priority 1	252	31%	70	55%	70	55%
Priority 2	134	17%	100	66%	100	66%
Priority 3	58	7%	1251	20%	1251	20%
Priority 4	233	29%	86	52%	86	52%
All Priority Corridor	677	84%	1508	22%	1508	22%
Statewide Total	803	100%	21594	17%	21594	17%

Table 19: Statewide VRU Priority Corridors State Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC Miles	
	Total	%	Total	%	Total	%
Priority 1	52	26%	29	0.3%	19	66%
Priority 2	23	12%	164	1.5%	66	40%
Priority 3	27	14%	392	3.5%	134	34%
Priority 4	43	22%	41	0.4%	14	35%
All Priority Corridor	145	74%	626	5.6%	233	37%
Statewide Total	197	100%	11147	100.0%	2179	20%

[7] KDOT. No date. VRU Priority Corridor Map. https://wspgeo.maps.arcgis.com/apps/mapviewer/index.html?webmap=31b795470f1a4f23a32419e9d1acfcb9.

KDOT VRU District 1 Priority Corridor Map

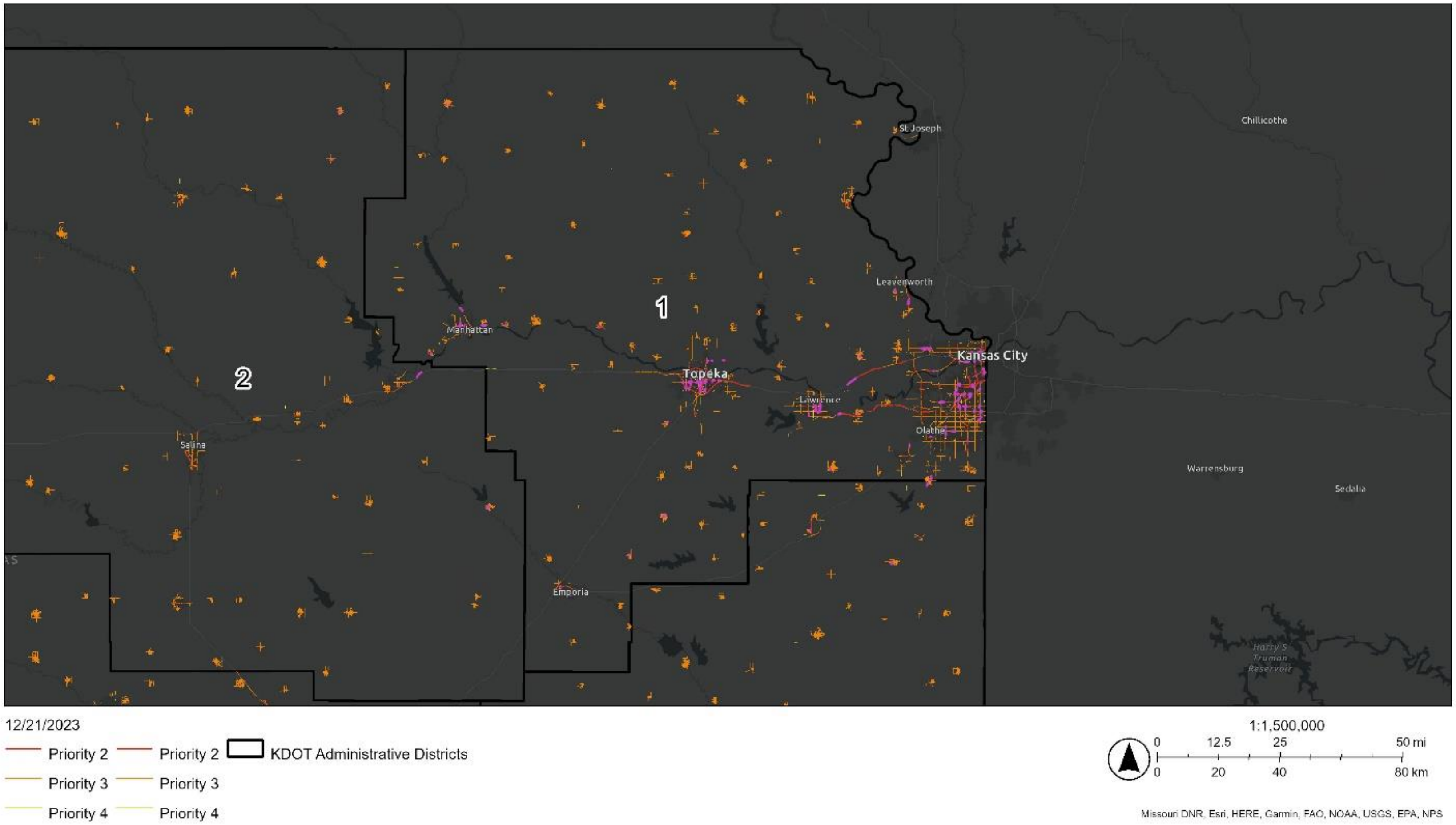


Figure 62: District 1 Priority Corridors

Table 20: District 1 - Priority Corridors State Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	34	43%	16	0.7%	10	63%
Priority 2	14	18%	80	3.5%	19	24%
Priority 3	10	13%	155	6.8%	60	39%
Priority 4	17	22%	19	0.8%	9	46%
All Priority Corridor	75	95%	270	11.8%	98	36%
District Total	79	100%	2283	100.0%	560	25%

Table 21: District 1 - VRU Priority Corridors Local Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	69	20%	34	0.2%	14	41%
Priority 2	68	20%	49	0.2%	29	60%
Priority 3	28	8%	1482	6.6%	243	16%
Priority 4	114	33%	86	0.4%	43	50%
All Priority Corridor	279	81%	1651	7.3%	329	20%
Statewide Total	346	100%	22559	100.0%	4087	18%

KDOT VRU District 2 Priority Corridor Map

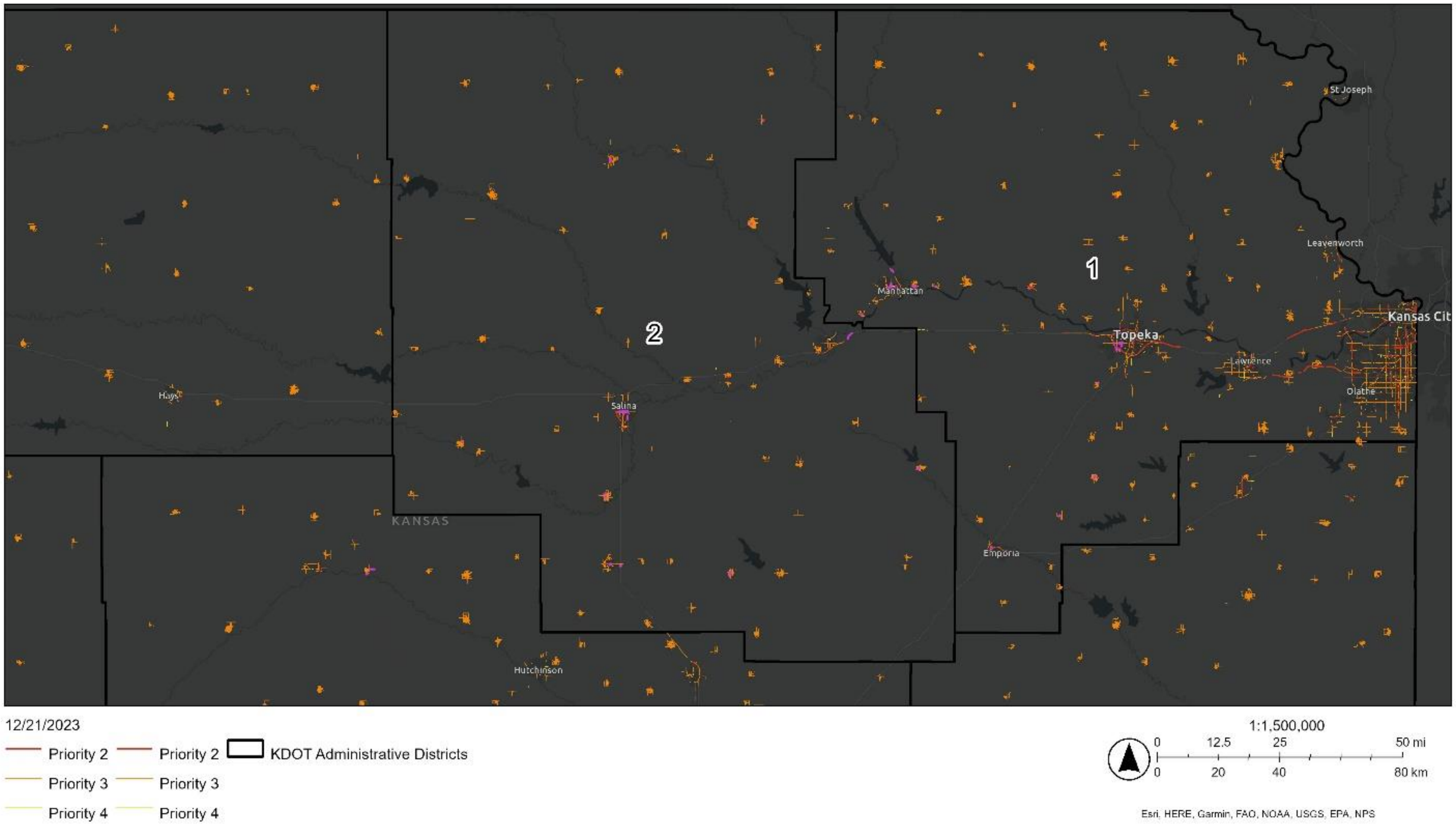


Figure 63: District 2 Priority Corridors

Table 22: District 2 - Priority Corridors State Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	4	17%	2	0.1%	1	69%
Priority 2	1	4%	6	0.3%	4	72%
Priority 3	3	12%	41	2.4%	6	13%
Priority 4	3	12%	3	0.2%	1	47%
All Priority Corridor	11	46%	52	3.1%	12	24%
District Total	24	100%	1687	100.0%	268	16%

Table 23: District 2 - VRU Priority Corridors Local Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	19	32%	8	0.0%	2	30%
Priority 2	13	22%	7	0.0%	3	36%
Priority 3	7	12%	848	4.3%	93	11%
Priority 4	10	17%	8	0.0%	4	42%
All Priority Corridor	49	82%	872	4.4%	102	12%
Statewide Total	60	100%	19970	100.0%	3091	15%

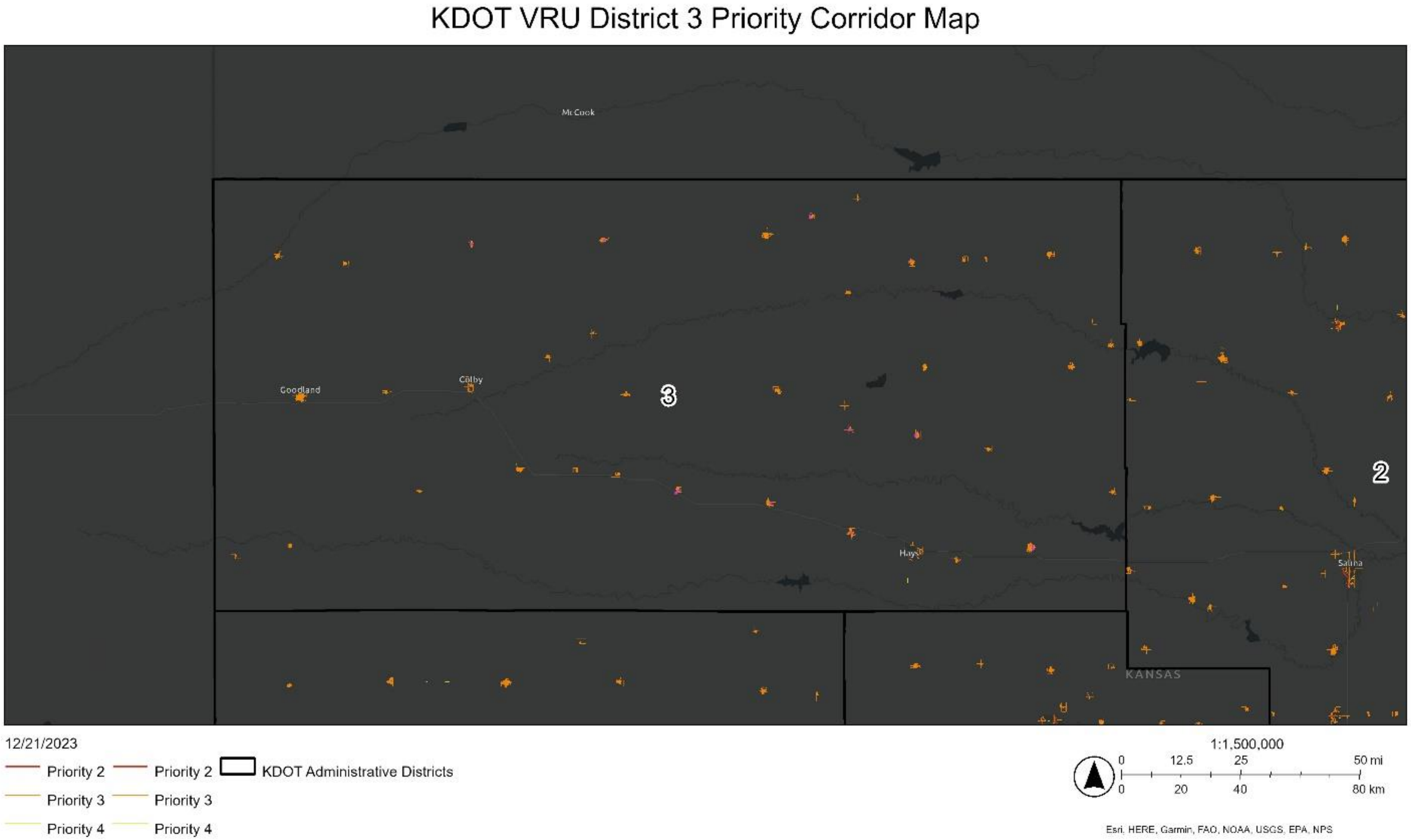


Figure 64: District 3 Priority Corridors

Table 24: District 3 - Priority Corridors State Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	0	0%	0	0.0%	0	0%
Priority 2	0	0%	0	0.0%	0	0%
Priority 3	0	0%	18	1.1%	0	0%
Priority 4	2	50%	2	0.1%	0	0%
All Priority Corridor	2	50%	20	1.2%	0	0%
District Total	4	100%	1648	100.0%	0	0%

Table 25: District 3 - VRU Priority Corridors Local Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	9	64%	4	0.0%	0	0%
Priority 2	0	0%	1	0.0%	0	0%
Priority 3	1	7%	657	3.0%	0	0%
Priority 4	2	14%	1	0.0%	0	0%
All Priority Corridor	12	86%	663	3.0%	0	0%
Statewide Total	14	100%	22034	100.0%	0	0%

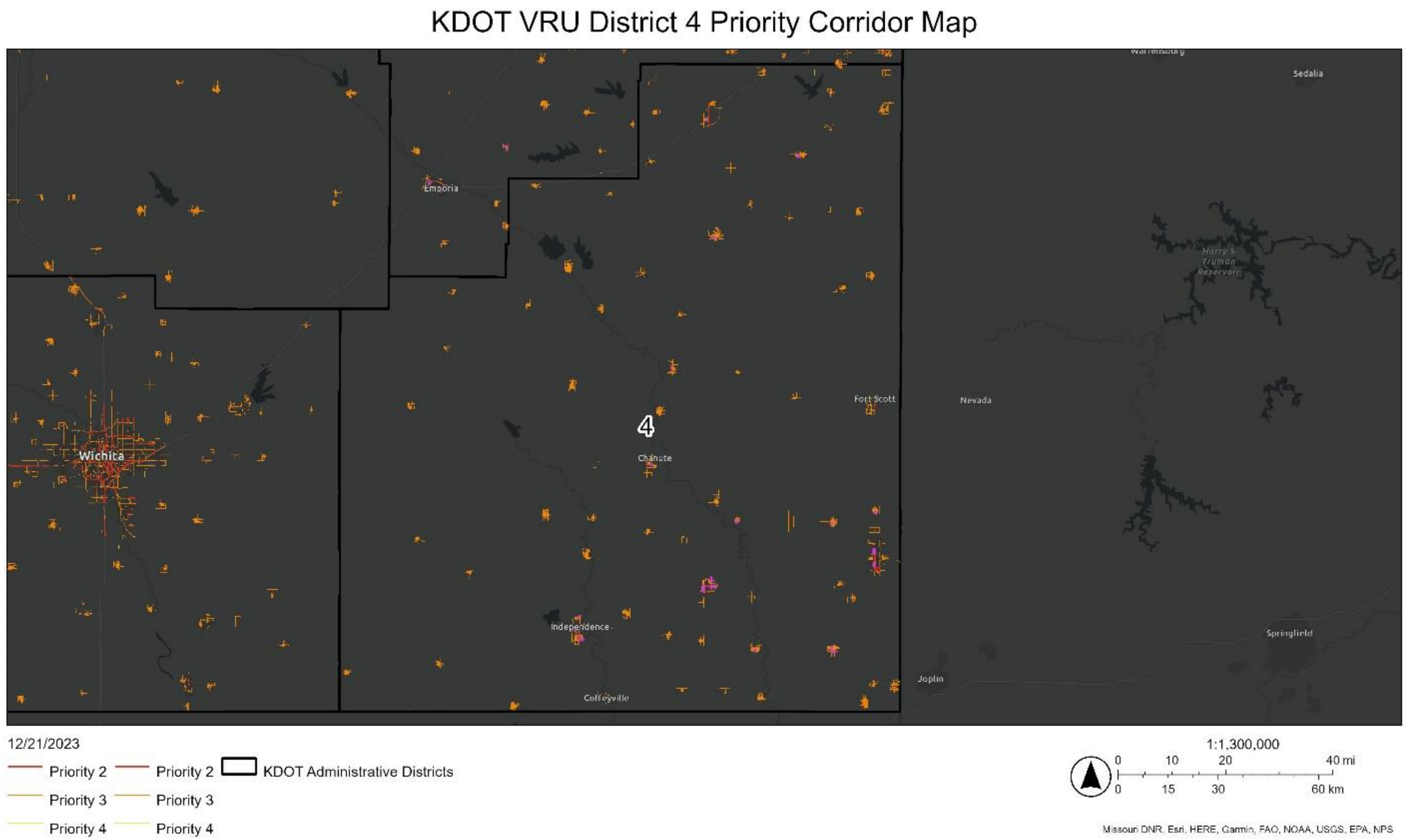


Figure 65: District 4 Priority Corridors

Table 26: District 4 - Priority Corridors State Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	6	21%	5	0.3%	4	68%
Priority 2	3	10%	5	0.3%	5	93%
Priority 3	2	7%	39	2.2%	23	60%
Priority 4	9	31%	6	0.4%	3	45%
All Priority Corridor	20	69%	56	3.2%	35	62%
District Total	29	100%	1747	100.0%	1050	60%

Table 27: District 4 - VRU Priority Corridors Local Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	13	34%	6	0.0%	3	57%
Priority 2	1	3%	18	0.1%	15	84%
Priority 3	1	3%	1217	6.5%	641	53%
Priority 4	12	32%	7	0.0%	3	37%
All Priority Corridor	27	71%	1248	6.7%	662	53%
Statewide Total	38	100%	18697	100.0%	10850	58%

KDOT VRU District 5 Priority Corridor Map

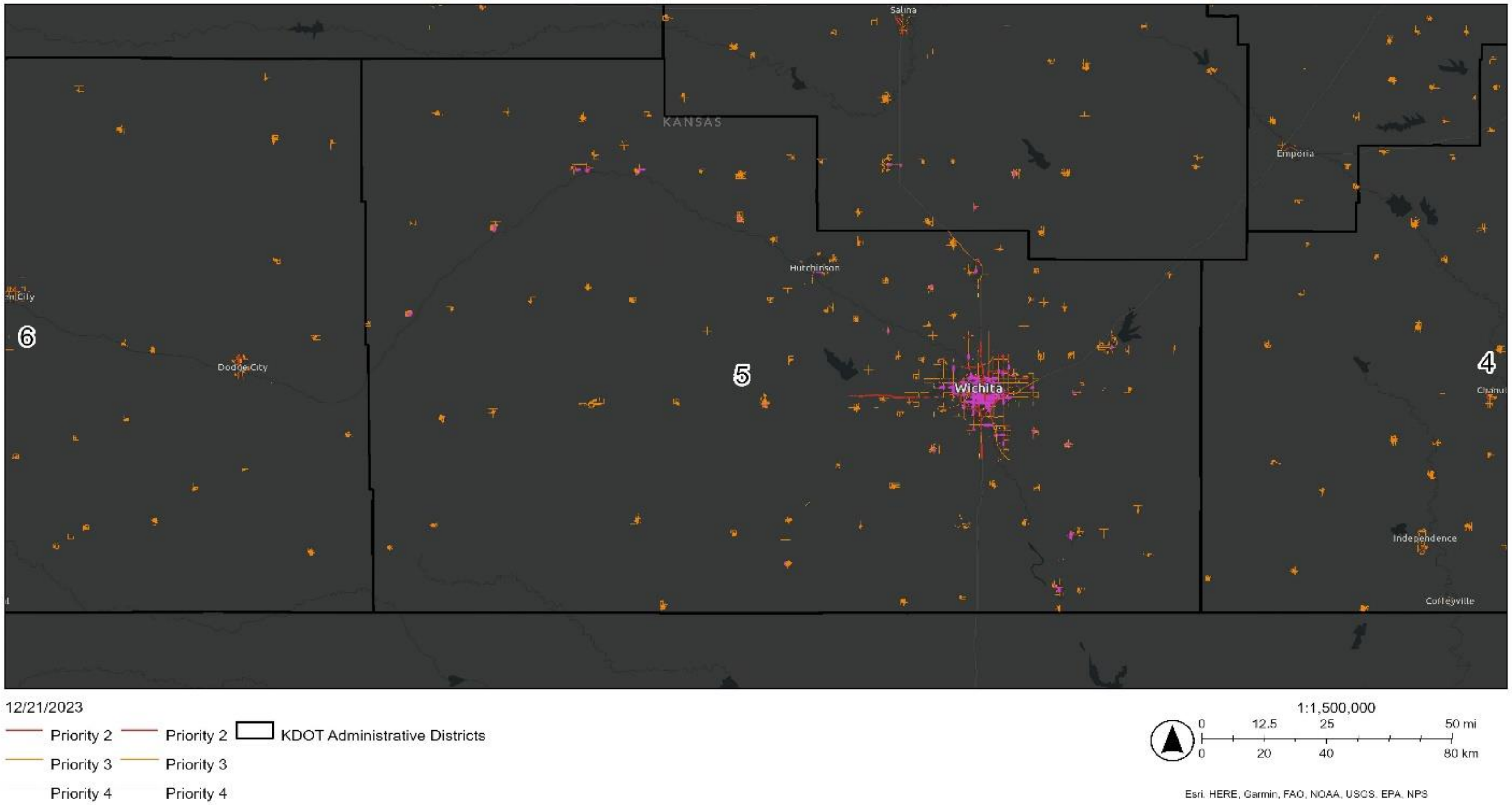


Figure 66: District 5 Priority Corridors

Table 28: District 5 - Priority Corridors State Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	7	17%	5	0.2%	4	79%
Priority 2	4	10%	71	3.3%	37	53%
Priority 3	8	20%	114	5.3%	37	33%
Priority 4	8	20%	8	0.4%	1	17%
All Priority Corridor	27	66%	198	9.1%	80	40%
District Total	41	100%	2164	100.0%	277	13%

Table 29: District 5 - VRU Priority Corridors Local Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	135	43%	71	0.2%	49	69%
Priority 2	46	15%	65	0.2%	50	76%
Priority 3	15	5%	1543	5.3%	252	16%
Priority 4	89	28%	60	0.2%	36	60%
All Priority Corridor	285	91%	1738	6.0%	386	22%
Statewide Total	314	100%	29193	100.0%	3385	12%

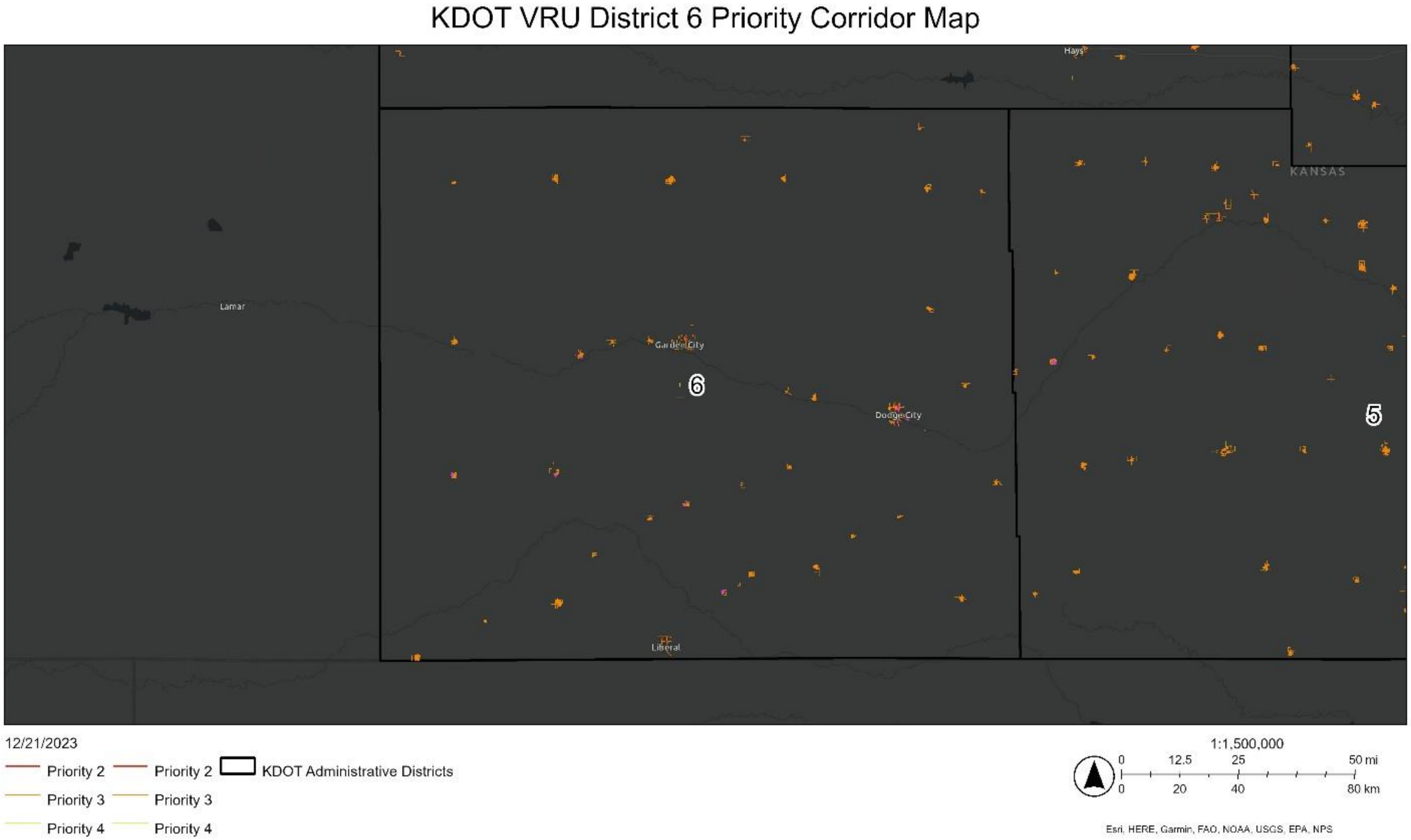


Figure 67: District 6 Priority Corridors

Table 30: District 6 - Priority Corridors State Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	1	5%	0	0.0%	0	0%
Priority 2	1	5%	1	0.1%	1	47%
Priority 3	4	20%	25	1.6%	8	32%
Priority 4	4	20%	3	0.2%	0	0%
All Priority Corridor	10	50%	31	1.9%	9	29%
District Total	20	100%	1619	100.00%	24	1%

Table 31: District 6 - VRU Priority Corridors Local Roads

Corridor Priority	KA Crashes		Centerline Miles		DAC miles	
	Total	%	Total	%	Total	%
Priority 1	7	23%	3	0.0%	1	29%
Priority 2	6	19%	11	0.1%	3	28%
Priority 3	6	19%	622	3.6%	23	4%
Priority 4	6	19%	4	0.0%	1	34%
All Priority Corridor	25	81%	641	3.7%	29	4%
Statewide Total	31	100%	17405	100.00%	180	1%

2.8 Additional Crash Statistics

2.8.1 VRU Killed or Seriously Injured Data Statistics

Fatalities and serious injuries in Kansas have increased from 2014 to 2021. VRU in KA crashes have increased by 66%, and fatal crashes have increased by 76%. The number of serious injuries involving VRUs increased by 63% between 2014 and 2019. Fatal and serious injury crash trends from 2014 to 2021 are shown in Figure 68, Figure 69, and Figure 70.

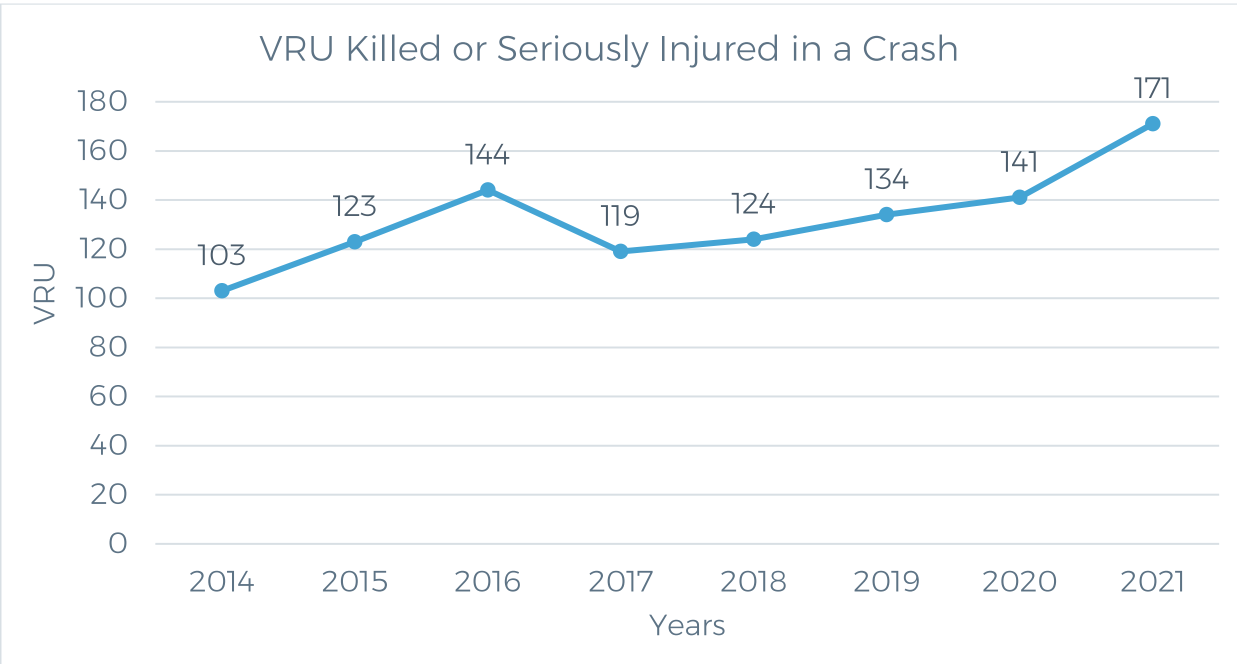


Figure 68: VRU Killed or Seriously Injured in a Crash 2014–2021)

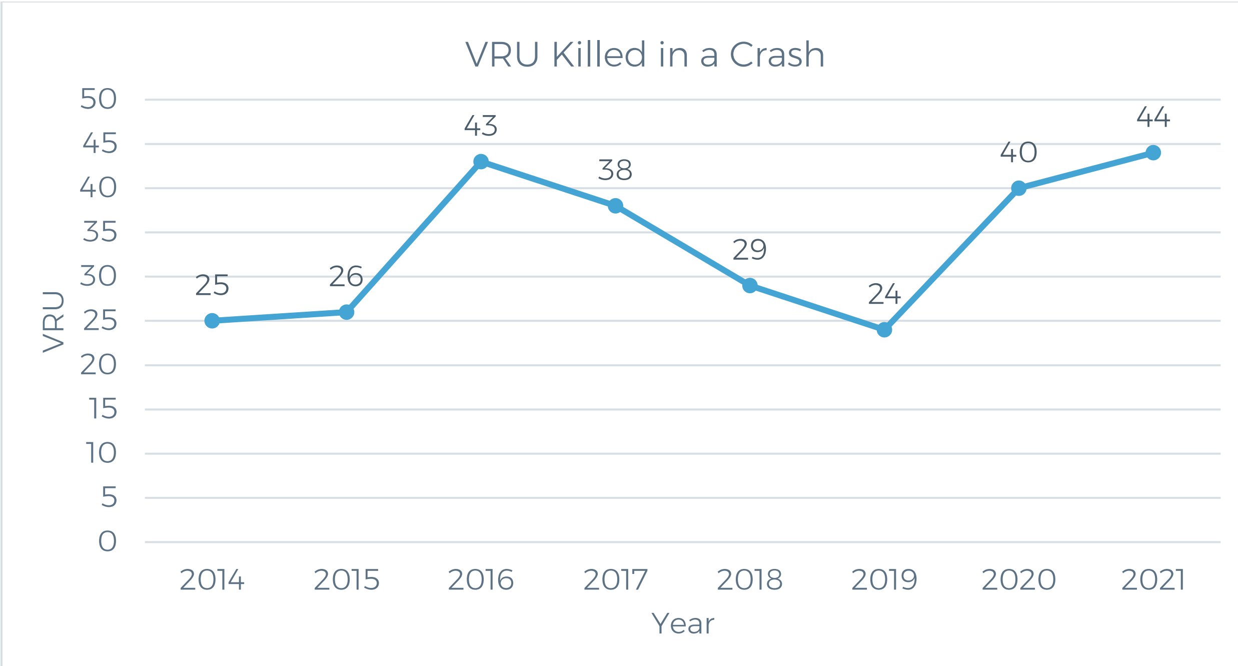


Figure 69: VRU Killed in a Crash (2014–2021)

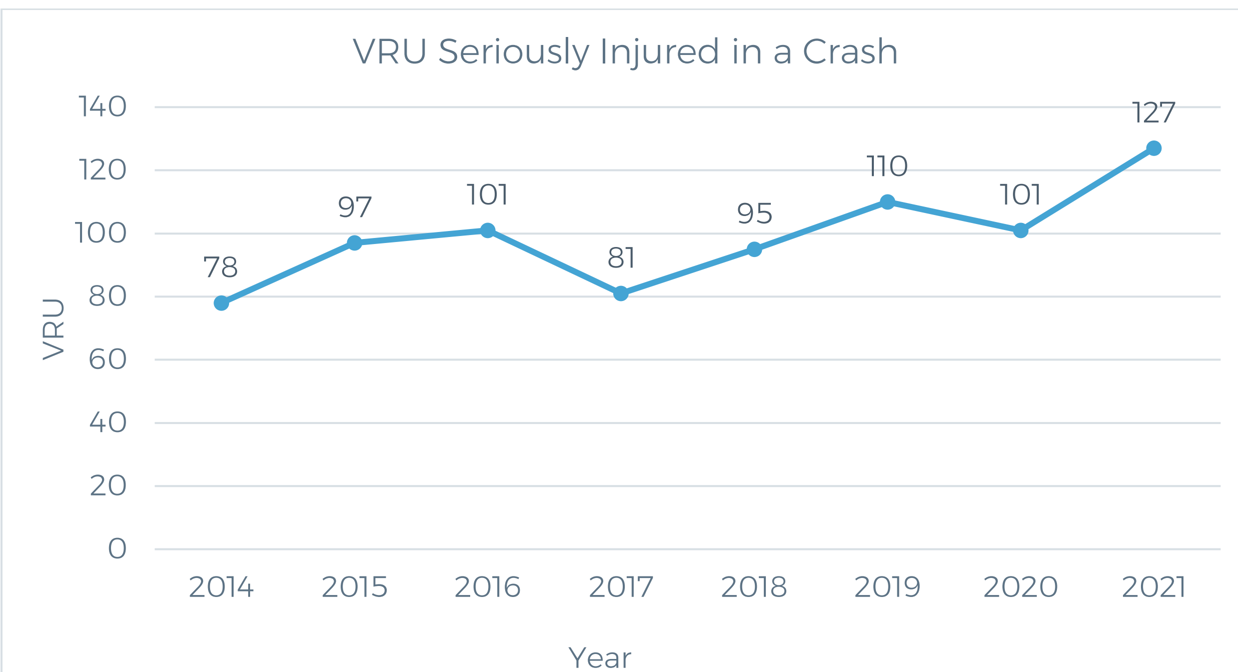


Figure 70: VRU Seriously Injured in a Crash (2014–2021)

2.8.1.1 Pedestrians and Cyclists

The overall breakdown in KA crashes by mode share is seen in Figure 71. Pedestrian KA crashes have increased by 60%, and bicycle crashes have increased by 69%, as seen in Figure 72.

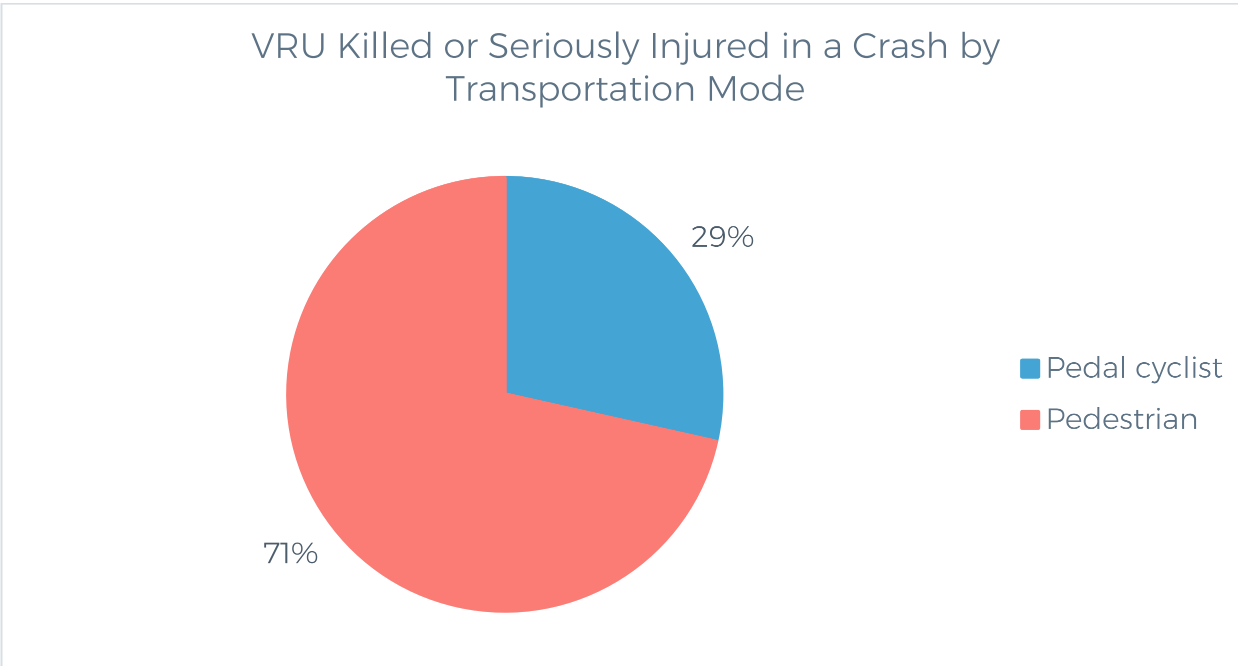


Figure 71: VRU Killed or Seriously Injured in a Crash by Transportation Mode (2017–2021)

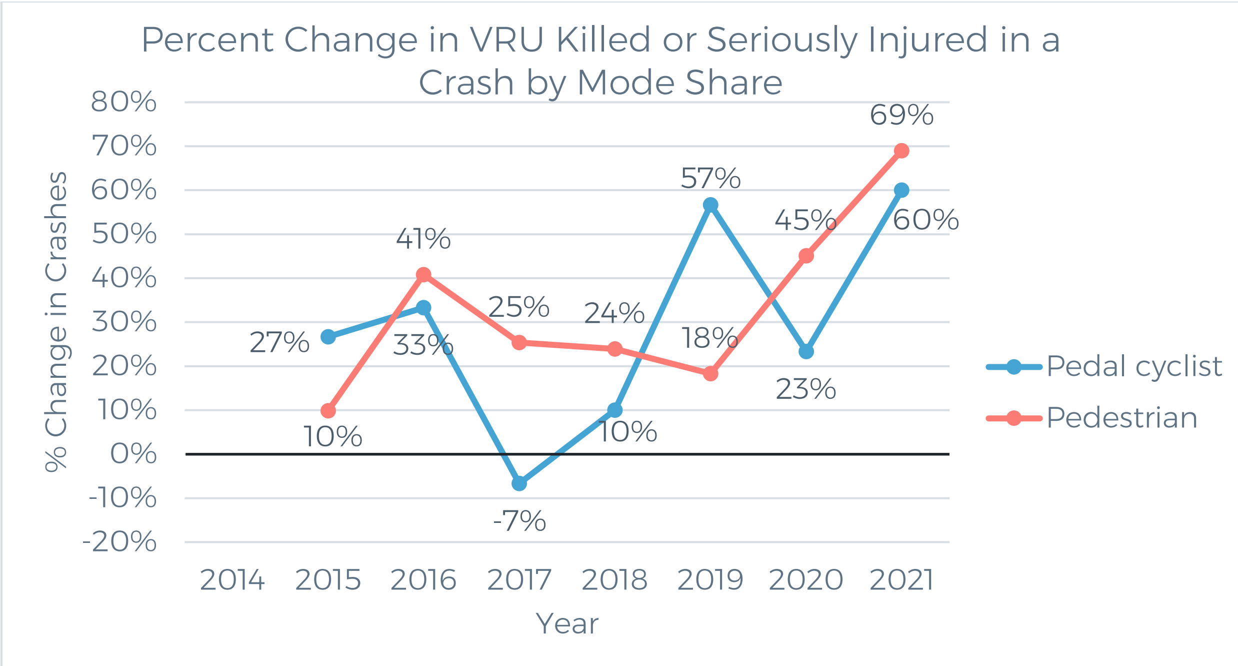


Figure 72: Percent Change in VRU Killed or Seriously Injured in a Crash by Mode Share Type (2014 Base Year)

2.8.1.2 Equity and Demographics

KDOT staff also examined DACs for KA crashes. Forty-seven percent (Figure 73) of all crashes occur in DAC census tracts. Figure 74 shows KA fatalities broken down by ethnicity, and Figure 75 shows that crashes do not happen equally among all demographic groups, with Black and Native American populations being nearly twice as overrepresented.

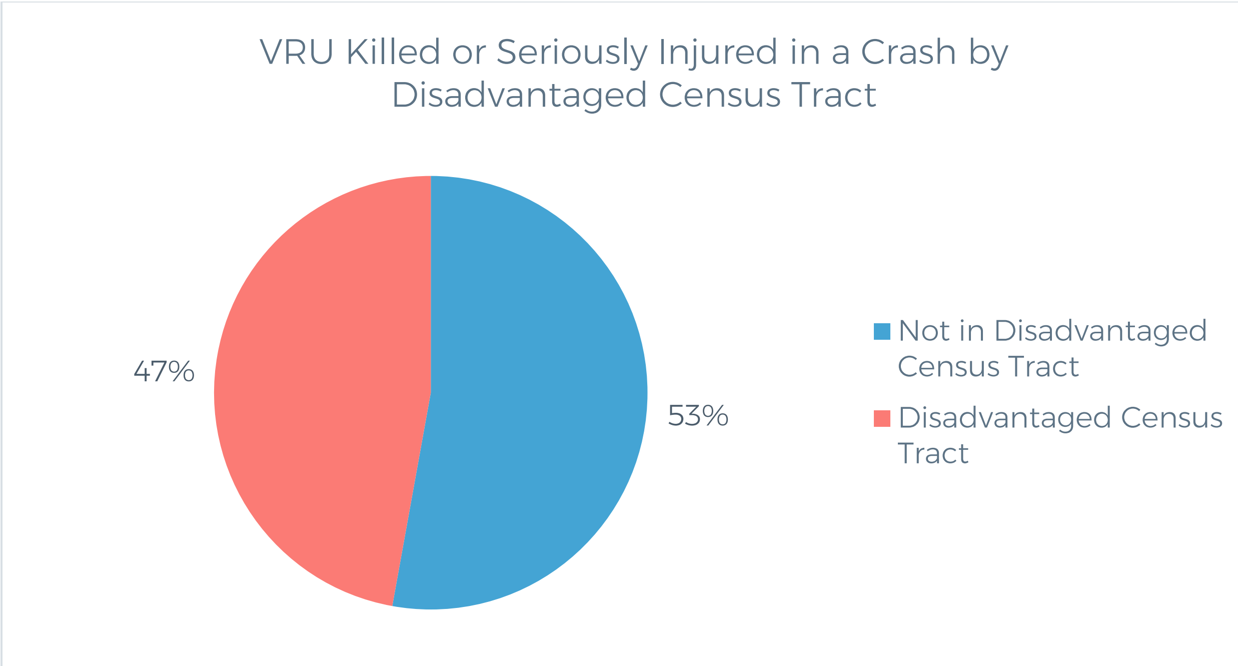


Figure 73: VRU Killed or Seriously Injured in a Crash by DAC (2017–2021)

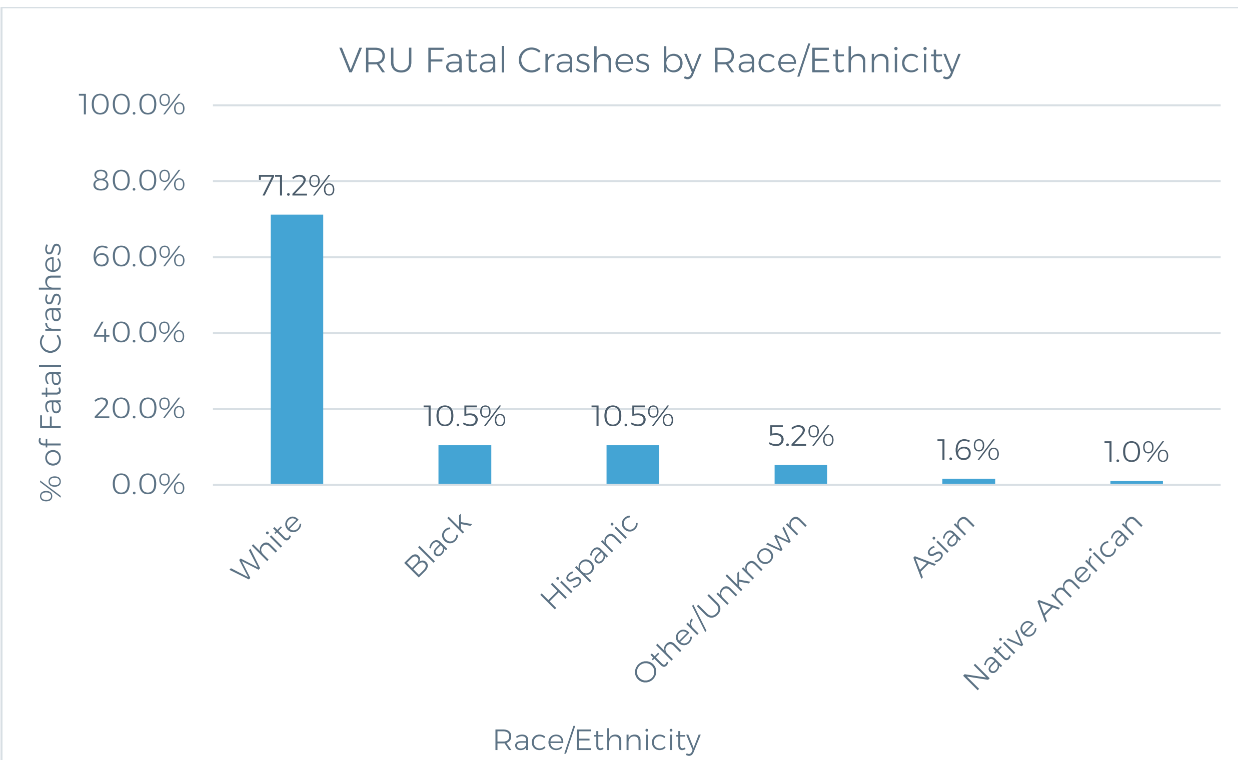


Figure 74: VRU Fatal Crashes by Ethnicity (2017–2021)

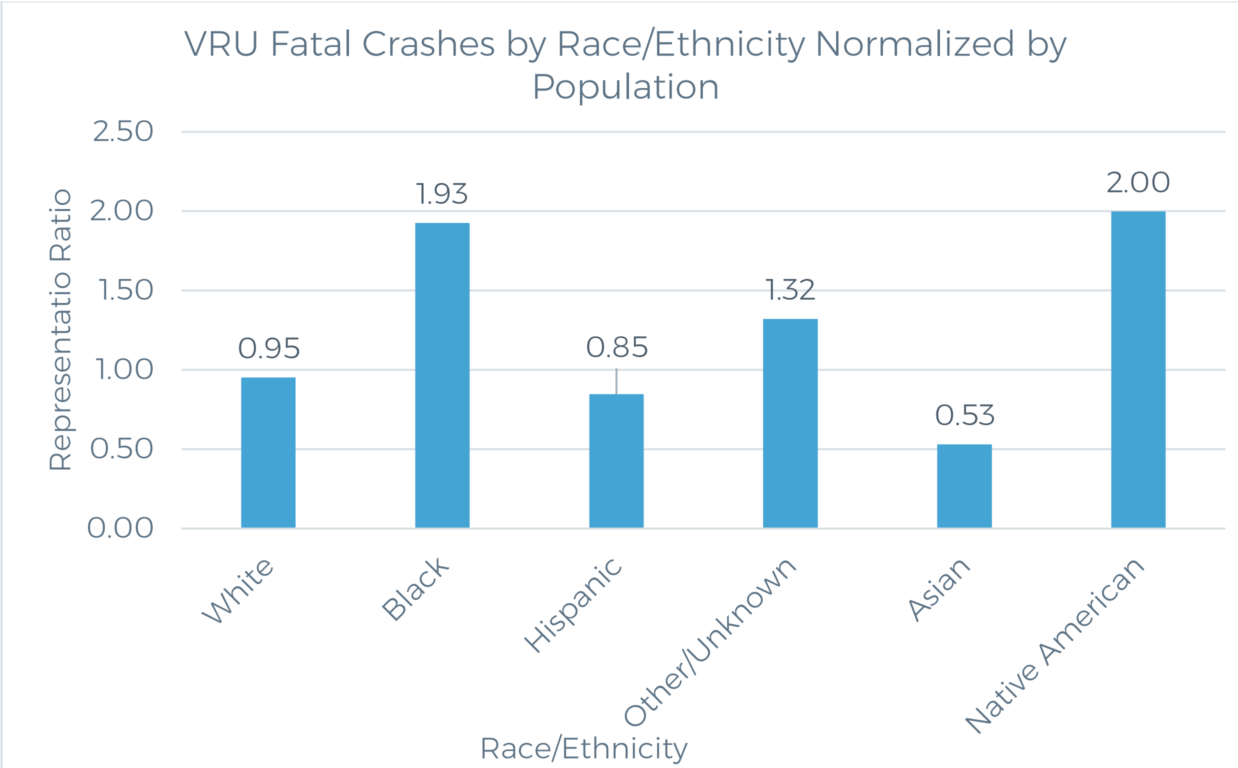


Figure 75: VRU Fatal Crashes by Race/ Ethnicity Normalized by Population (2017–2021)

2.8.1.2.1 Vulnerable Road User by Age

VRU who were killed or seriously injured in a crash are not evenly represented across age groups. The age group that accounted for the largest number were those in their late 20s or early 30s, with 25- to 34-year-olds accounting for 98 KA crashes (Figure 76); however, as the data source of the age cohorts for the state of Kansas is not evenly distributed across age ranges and populations, normalization is needed to gain a better understanding of the data. Normalizing for population, users in their teens are highly overrepresented; users between the ages of 15 and 19 are 1.26 times more likely to be involved in a KA crash than the average VRU, as seen in Figure 77.

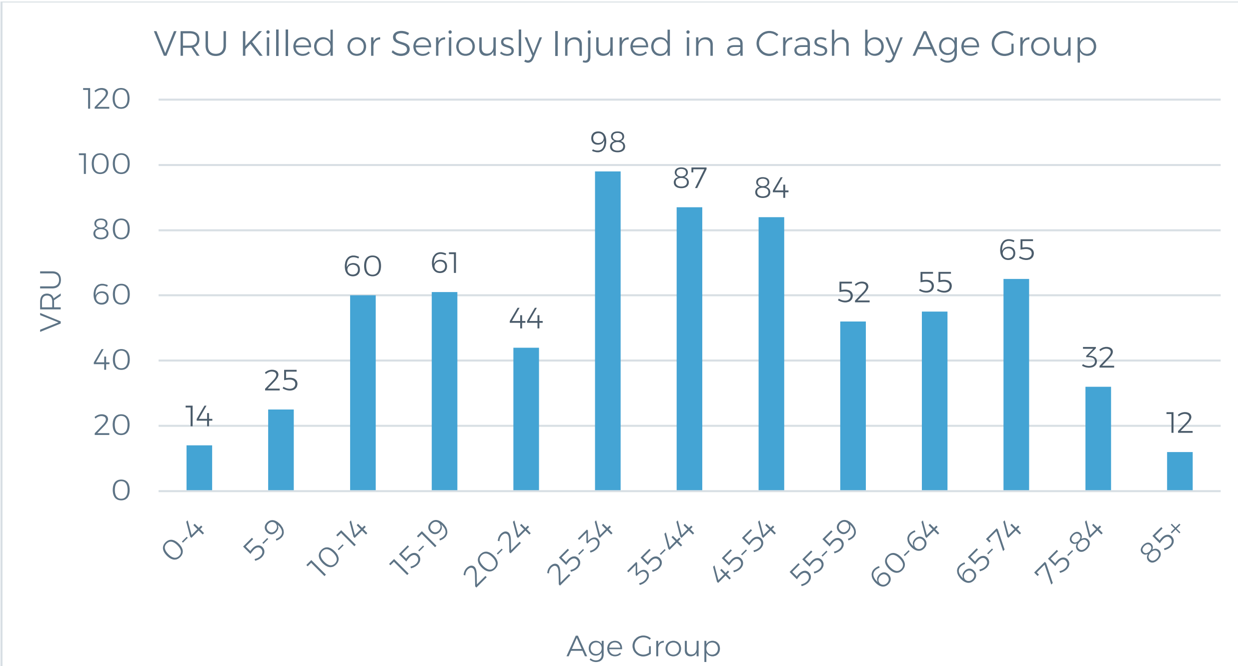


Figure 76: VRUs Killed or Seriously Injured in a Crash by Age Group (2017–2021)

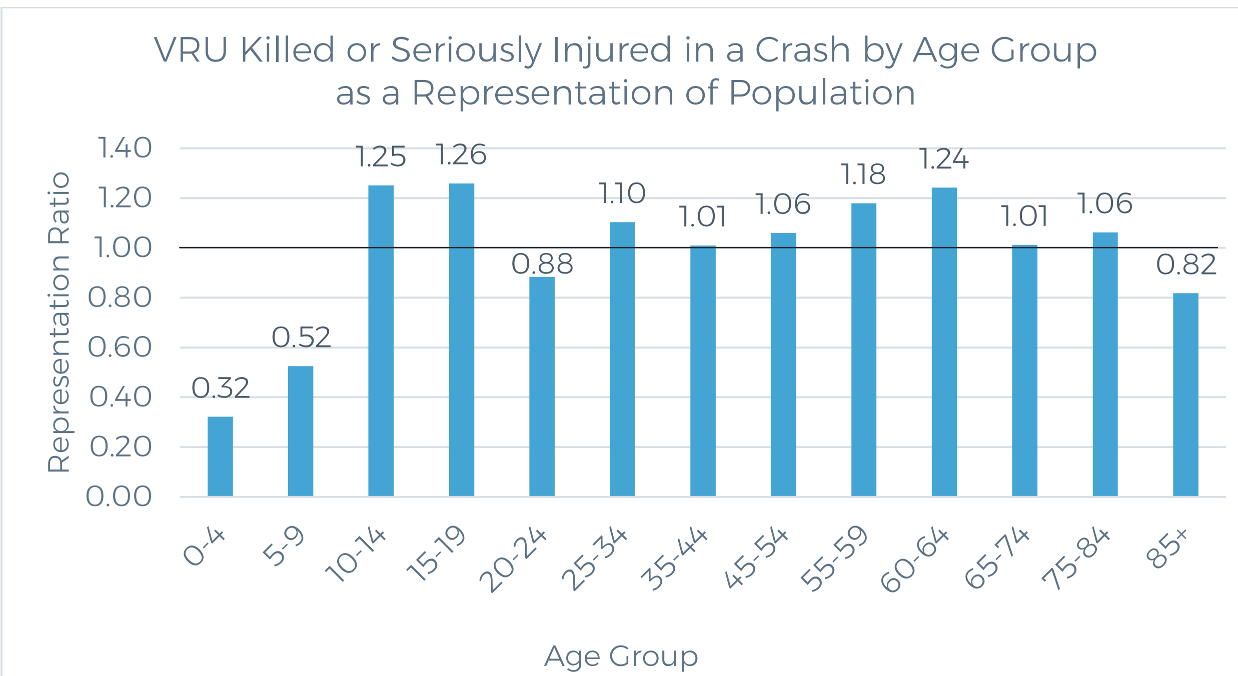


Figure 77: VRUs Killed or Seriously Injured in a Crash by Age Group as a Representation of Population (>1.0 = Overrepresentation) (2017–2021)

2.8.1.2.2 Vulnerable Road Users by Sex

Males currently account for 69% of crashes and are nearly 2.4 times as likely to be killed or seriously injured in a crash compared to females, as shown in Figure 78. Figure 79 provides a general trendline.

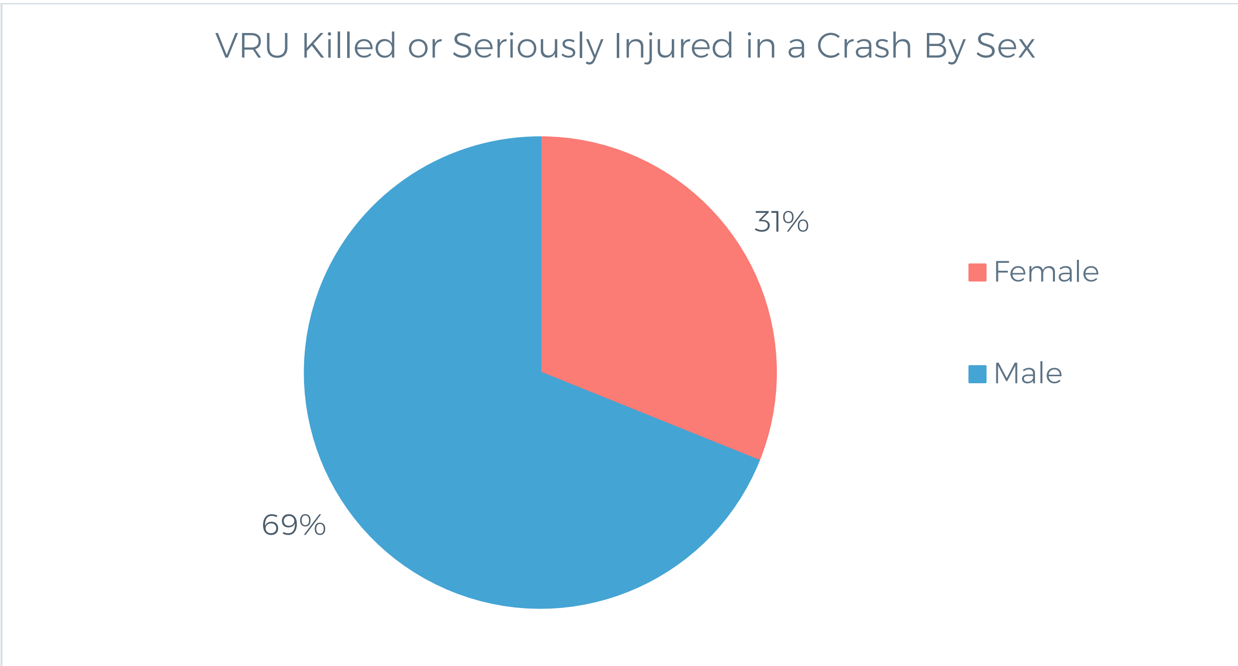


Figure 78: VRUs Killed or Seriously Injured in a Crash by Sex (2017–2021)

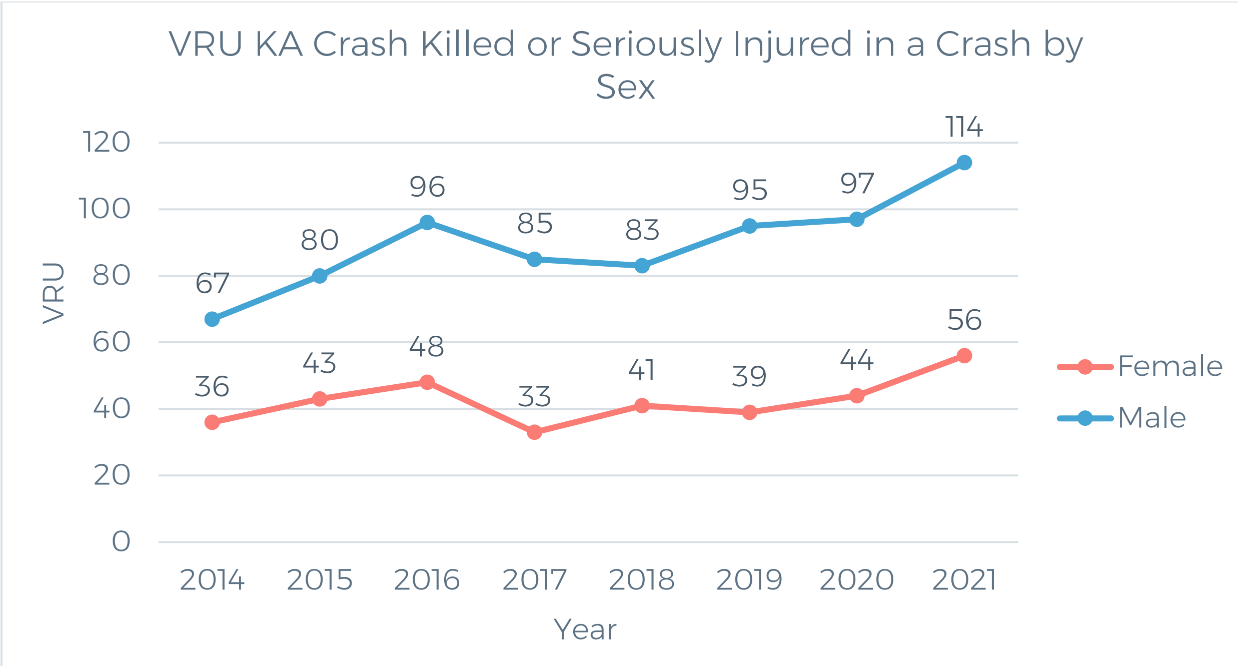


Figure 79: VRUs Killed or Seriously Injured in a Crash by Sex (2014–2021)

2.8.1.3 Distance from Trauma Center

The distance from medical attention is often a factor in the outcome of crashes. The closer an injury crash occurs to a trauma center, the quicker the person injured can be transported there, if needed. Figure 80 shows that as the density in each area increases and the distance from the nearest trauma center decreases, the survivability of a crash increases. Rural areas often have few hospitals that are spread much farther apart than in urban areas, and those factors are reflected in the trendline in Figure 81.

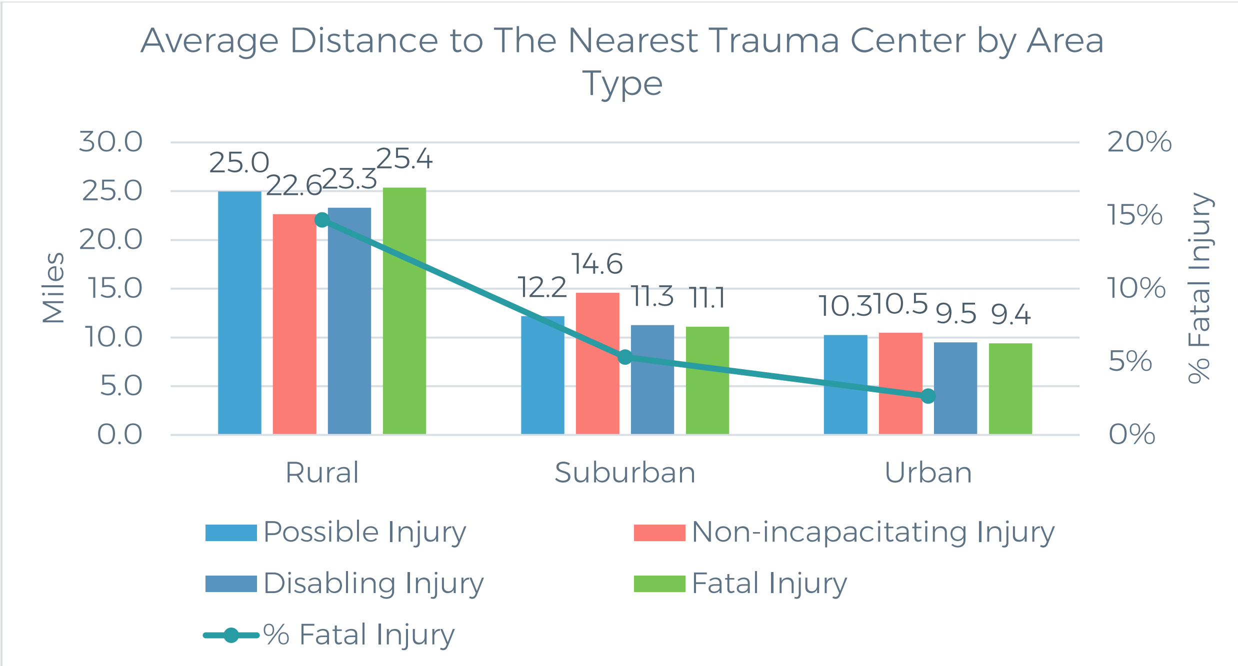


Figure 80: Proximity to Trauma Center by Area Type and Severity of VRU Crash (2017–2021)

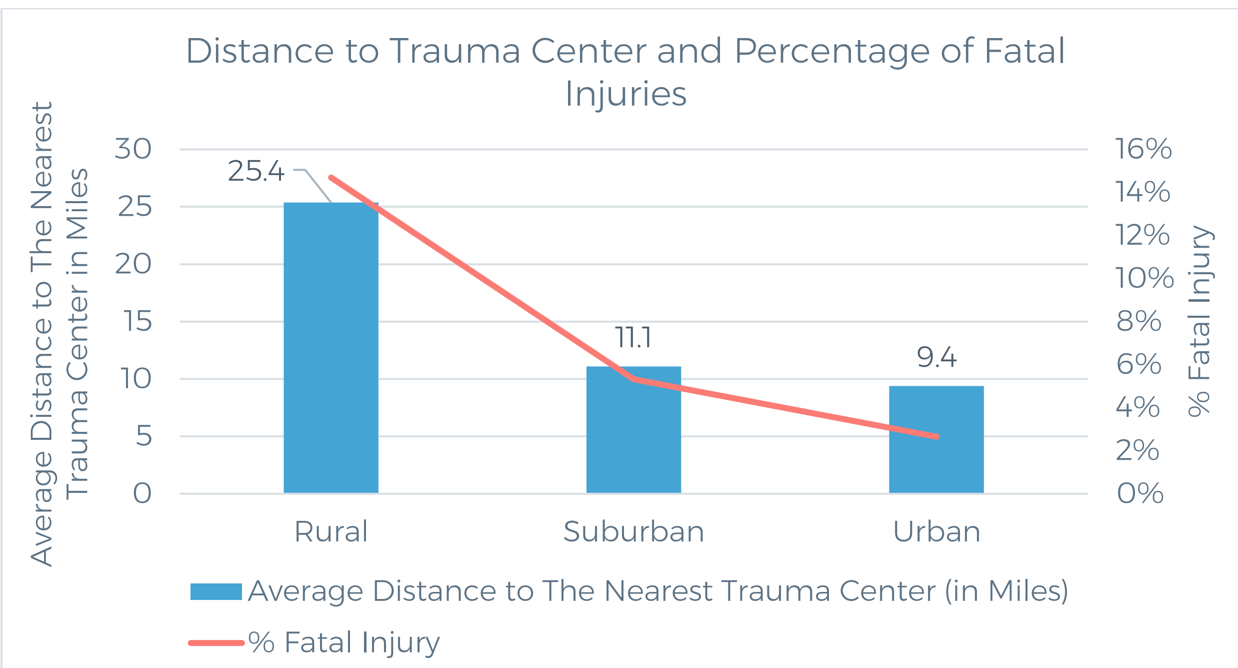


Figure 81: Average Distance to Nearest Trauma Center by Area Type with Percentage of Fatal Injuries (2017–2021)

2.8.1.4 Location on Roadway

Most KA crashes involving VRUs occurred at intersections, with most occurring at or in intersections where no bikeway or crosswalk is present or at or in intersections but not in crosswalks or bikeways. Figure 82 shows that intersection locations account for 69% of the crashes since 2017. This trend is increasing—VRUs have increasingly been killed or seriously injured at these locations between 2014 and 2021, as seen in Figure 83. A breakdown of the percentage of cyclists and pedestrians is provided in Figure 84 and Figure 85.

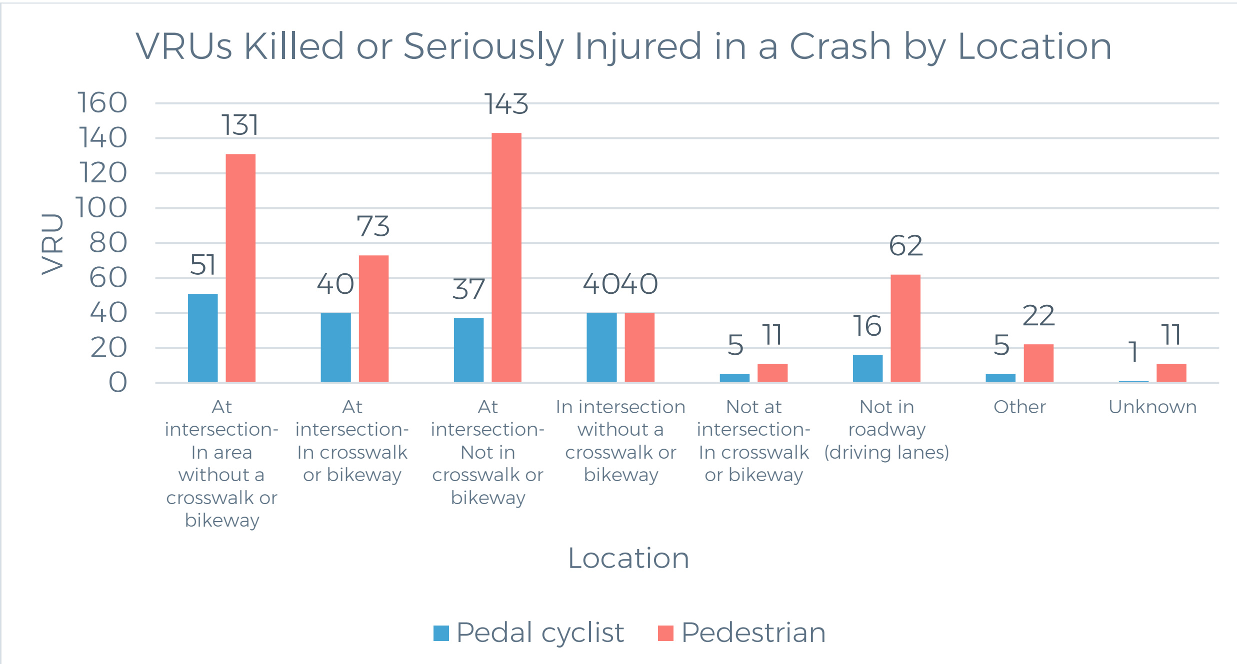


Figure 82: VRUs Killed or Seriously Injured in a Crash by Location (2017–2021)

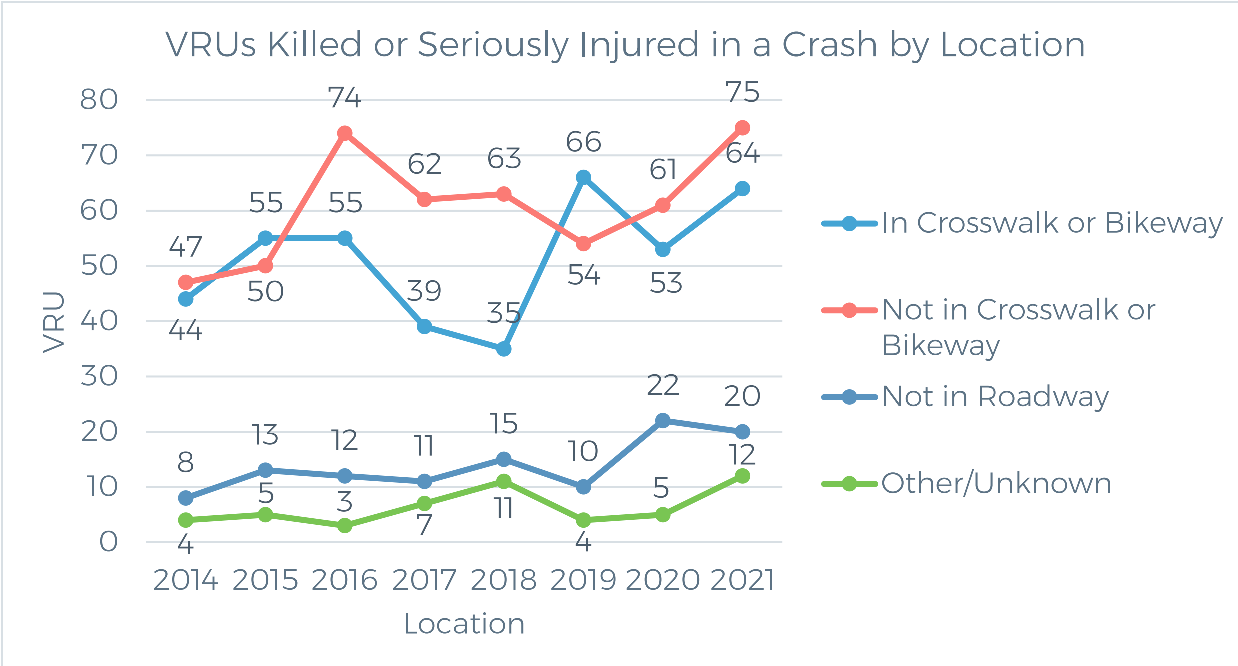


Figure 83: VRUs Killed or Seriously Injured in a Crash by Location (2014–2021)

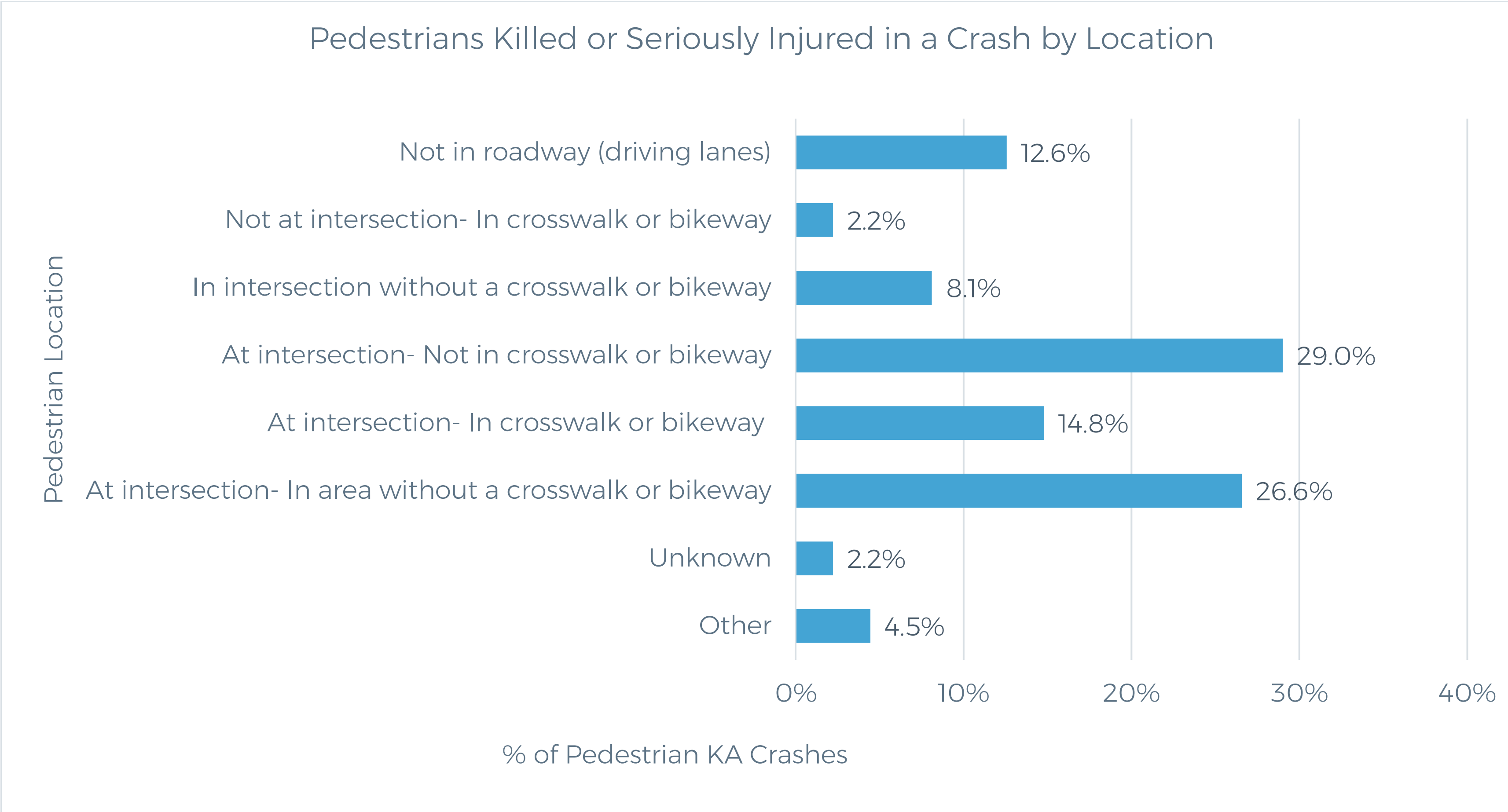


Figure 84: Pedestrians Killed or Seriously Injured in Crash by Location (2017–2021)

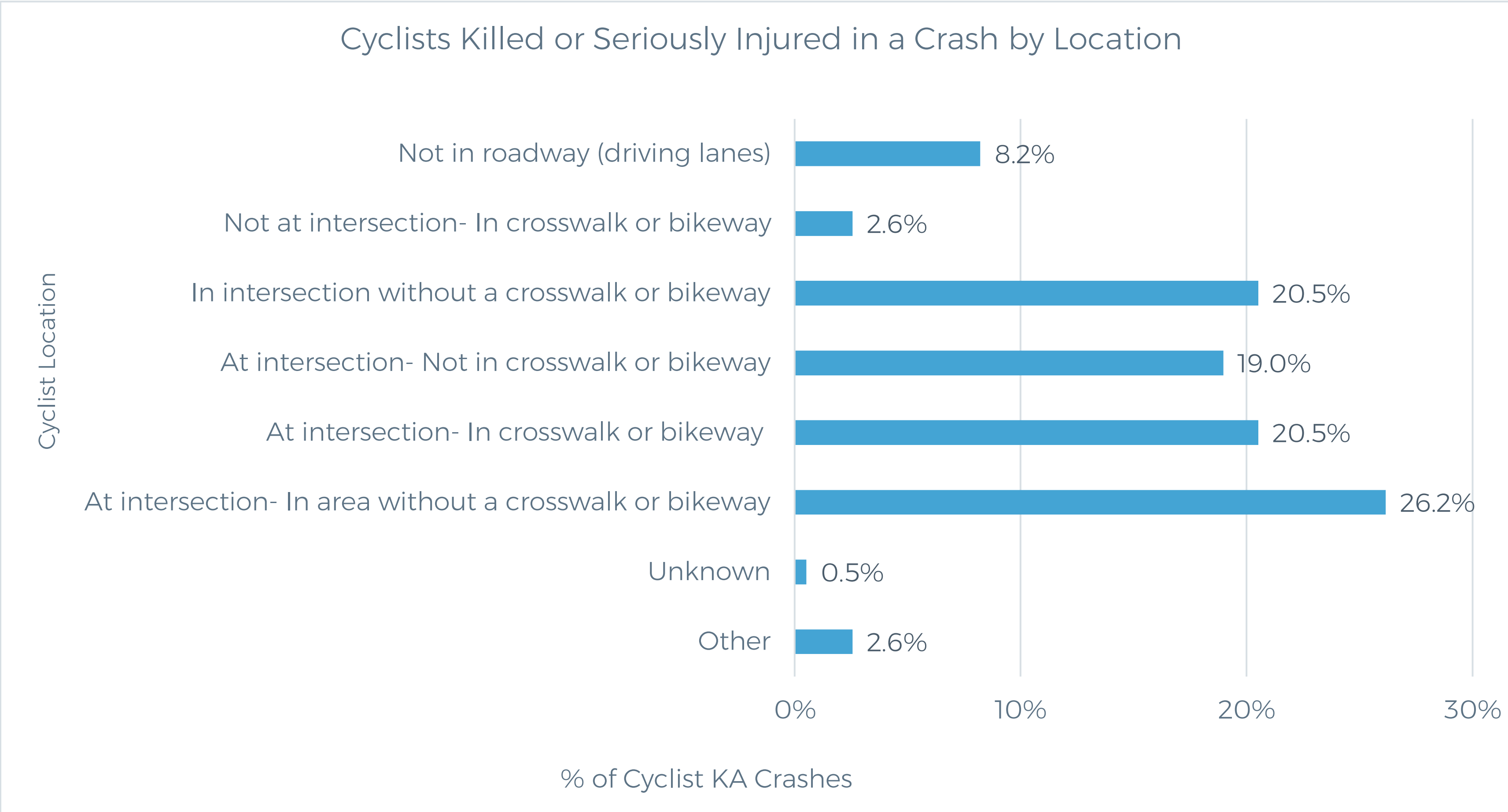


Figure 85: Cyclist Killed or Seriously Injured in a Crash by Location (2017–2021)

2.8.1.5 Contributing Circumstances

Figure 86 shows VRU KA crashes by contributing circumstances. The most cited circumstances include "improper crossing" (68), "presence in the roadway" (57), and "failure to yield the right of way" (37). However, the single most common circumstance is "N/A (not available)" (263), followed by "no pedestrian contributing circumstance evident" (68). Together, these statistics suggest that the circumstances contributing to a VRU being involved in a crash were outside of their control. Breakdowns for Figure 87 and Figure 88 show the contributing factors for cyclists and pedestrians.

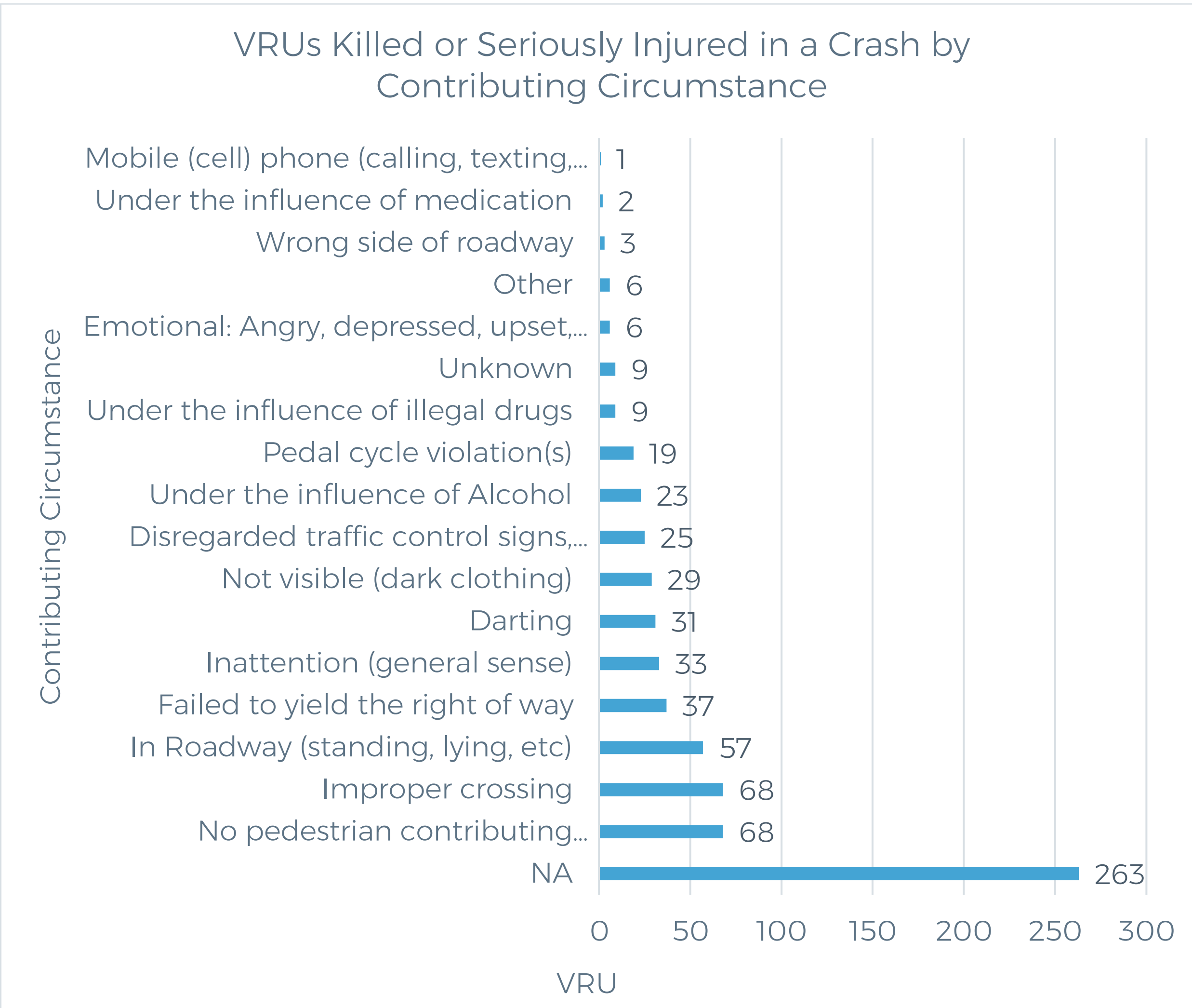


Figure 86: VURs Killed or Seriously Injured in a Crash by Contributing Circumstance (2017–2021)

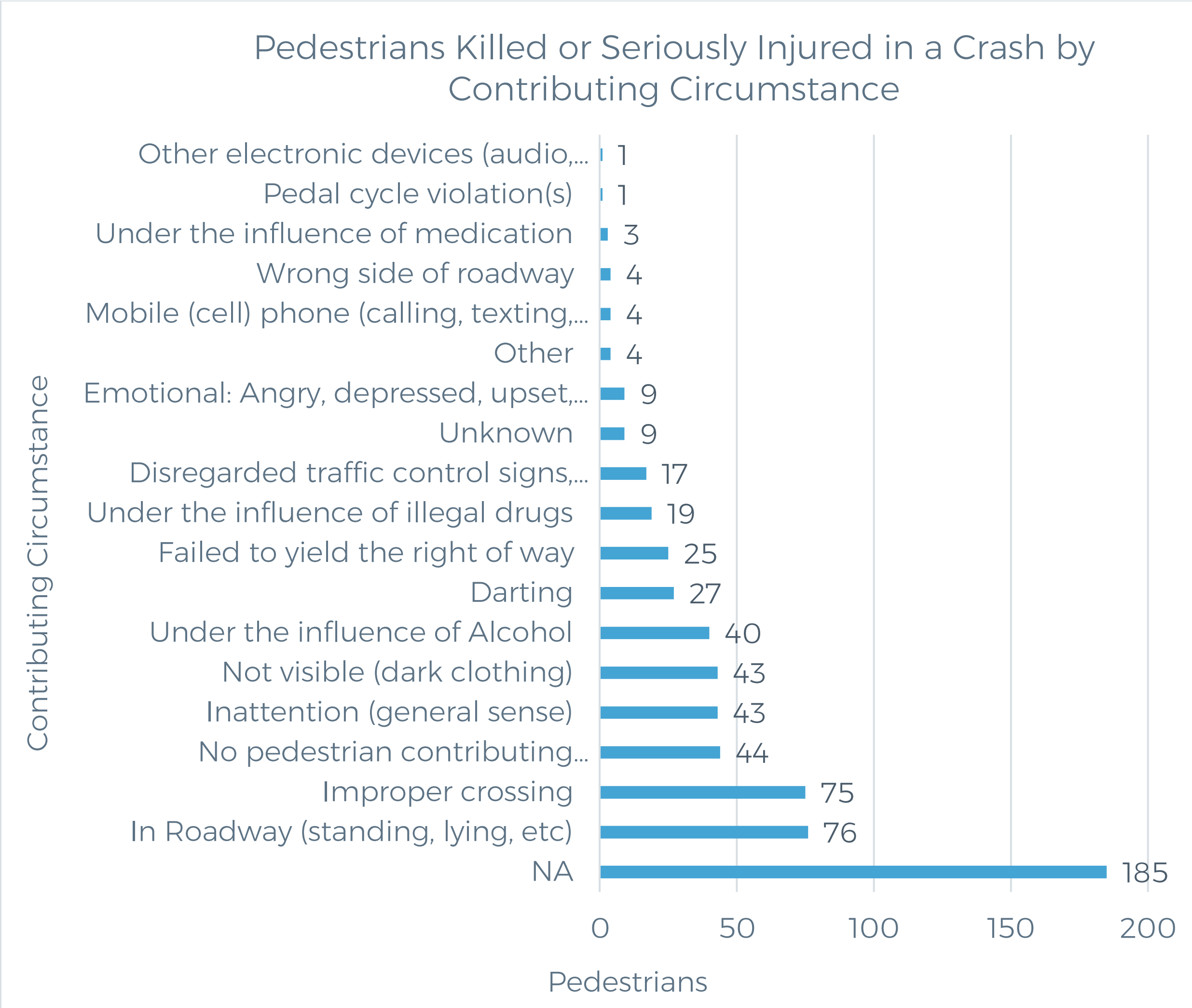


Figure 87: Pedestrians Killed or Seriously Injured in a Crash by Contributing Circumstance (2017–2021)

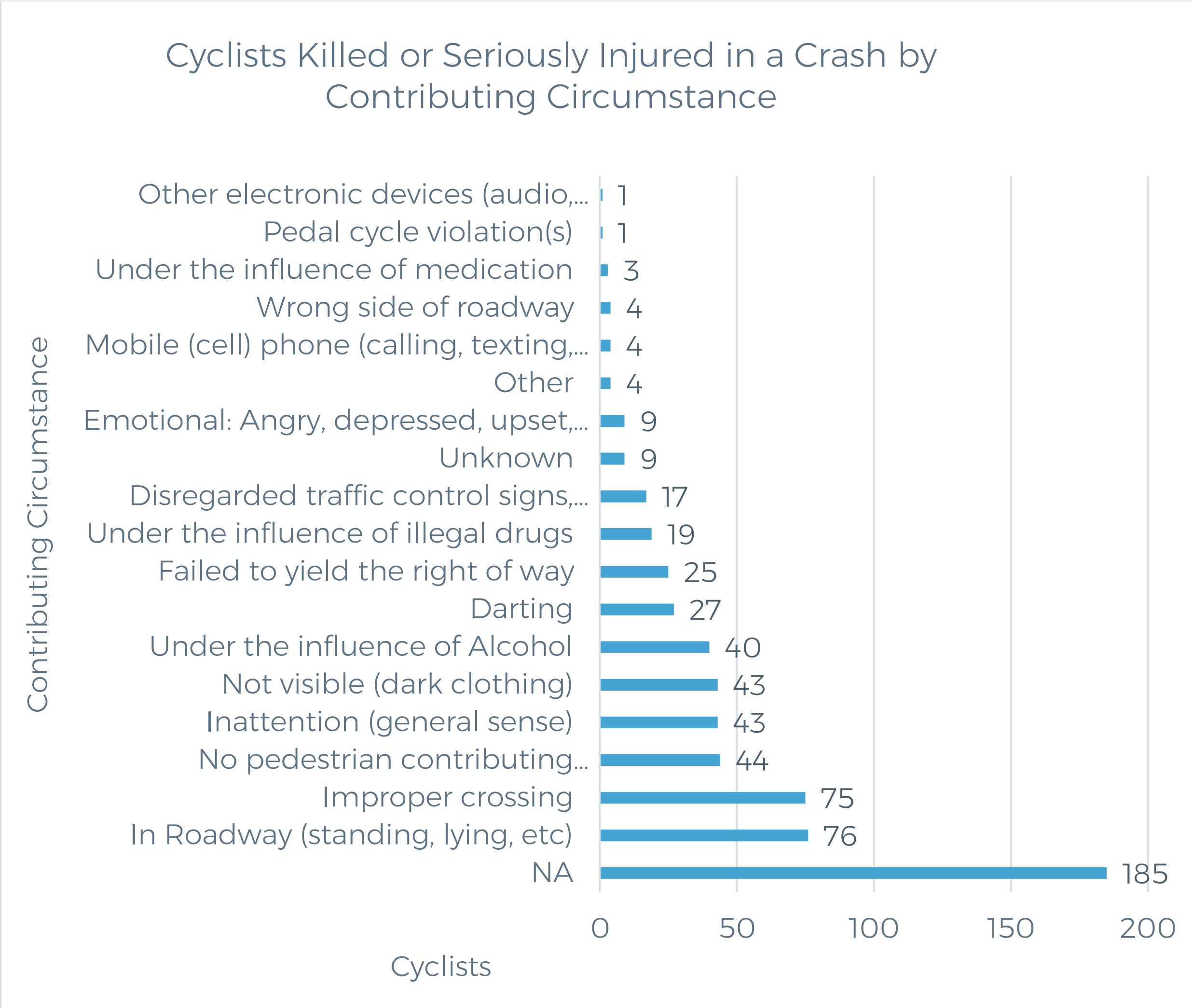


Figure 88: Cyclists Killed or Seriously Injured in a Crash by Contributing Circumstance (2017–2021)

2.8.1.5.1 Signal Presence

Based on reports, nearly 78% of KA crashes were found to occur in locations with no pedestrian signal, or the presence of a signal was not applicable. An overall chart can be seen in Figure 89, with breakdowns for pedestrians and cyclists in Figure 90 and Figure 91 below.

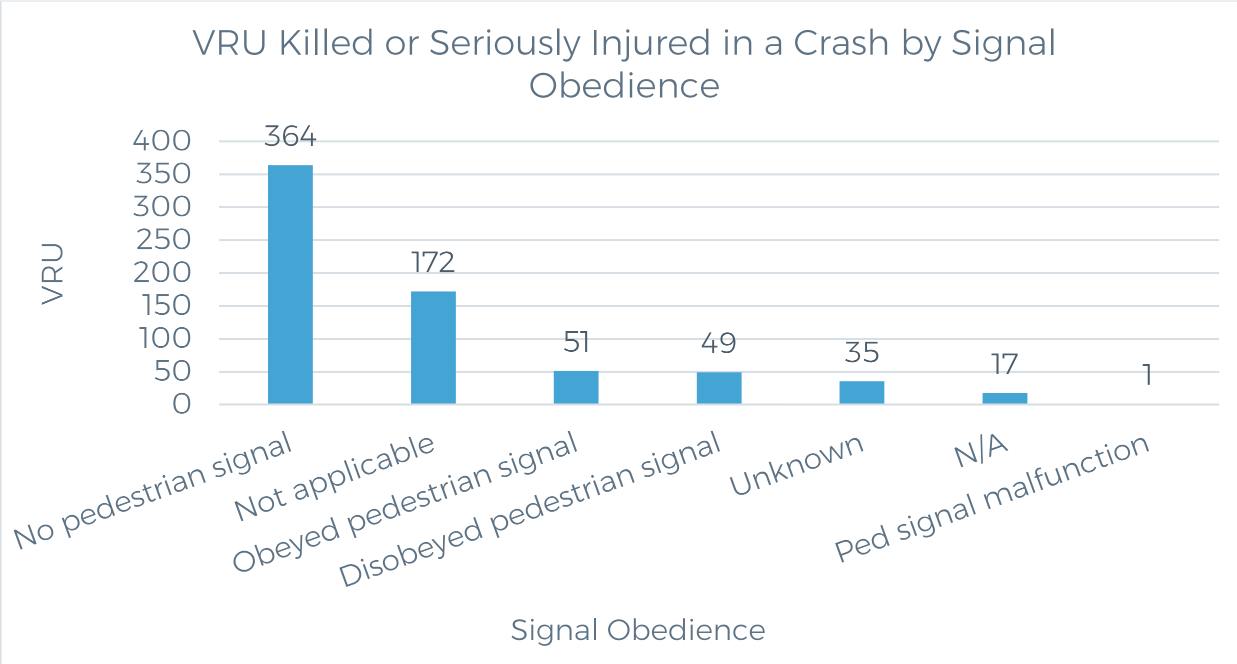


Figure 89: VRUs Killed or Seriously Injured in a Crash by Signal Obedience (2017–2021)

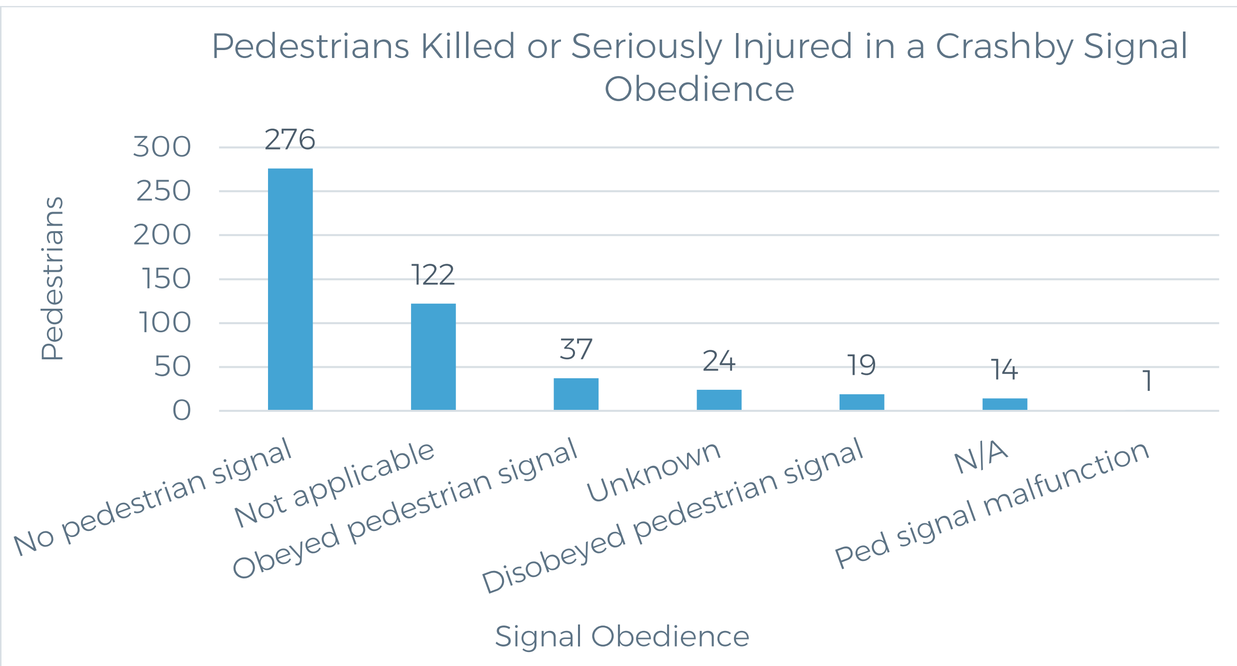


Figure 90: Pedestrians Killed or Seriously Injured in a Crash by Signal Obedience (2017–2021)

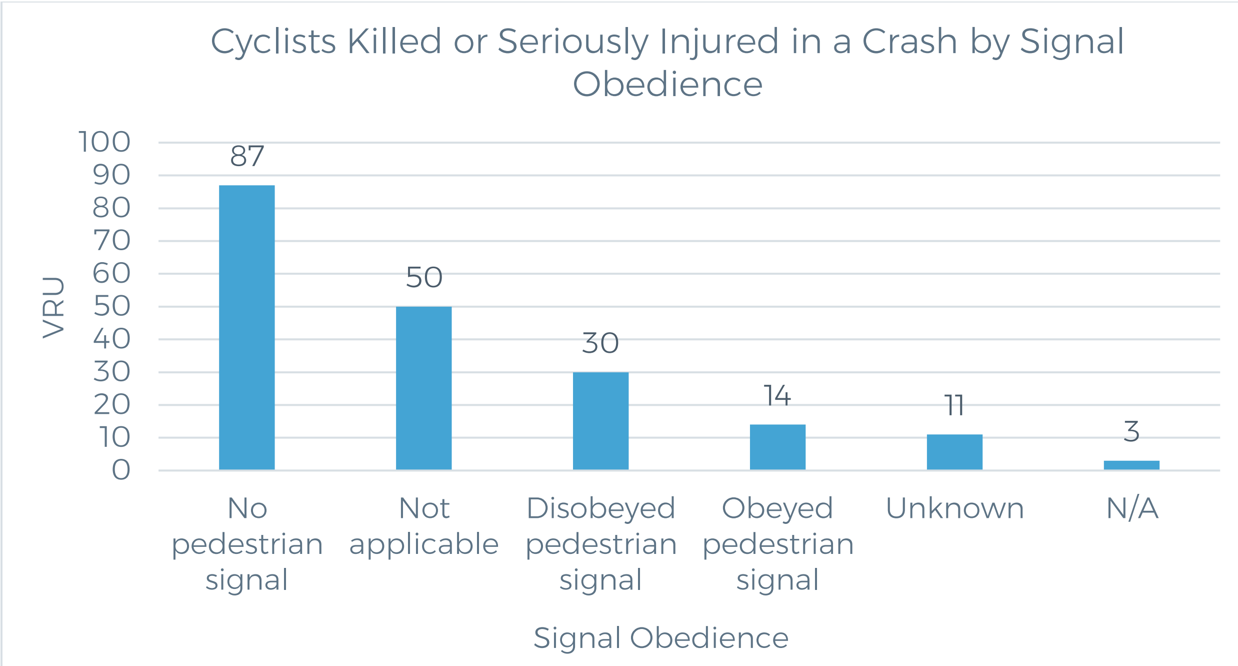


Figure 91: Cyclists Killed or Seriously Injured in a Crash by Signal Obedience (2017–2021)

2.8.1.5.2 Protective Equipment for Vulnerable Road Users

Safety equipment was not used in most KA crashes involving pedestrians (Figure 92). Among cyclists involved in a VRU KA crash, most were not wearing a helmet for protection (Figure 93). Wearing proper equipment is essential for safety on roadways; however, it is a only one component of keeping cyclists safe on roadways. Systemic changes to road designs with a Complete Streets approach are needed (refer to 4.3.3 Complete Streets Policies for additional information).

Figure 92: Pedestrians Killed or Seriously Injured in a Crash by Safety Equipment Used (2017–2021)

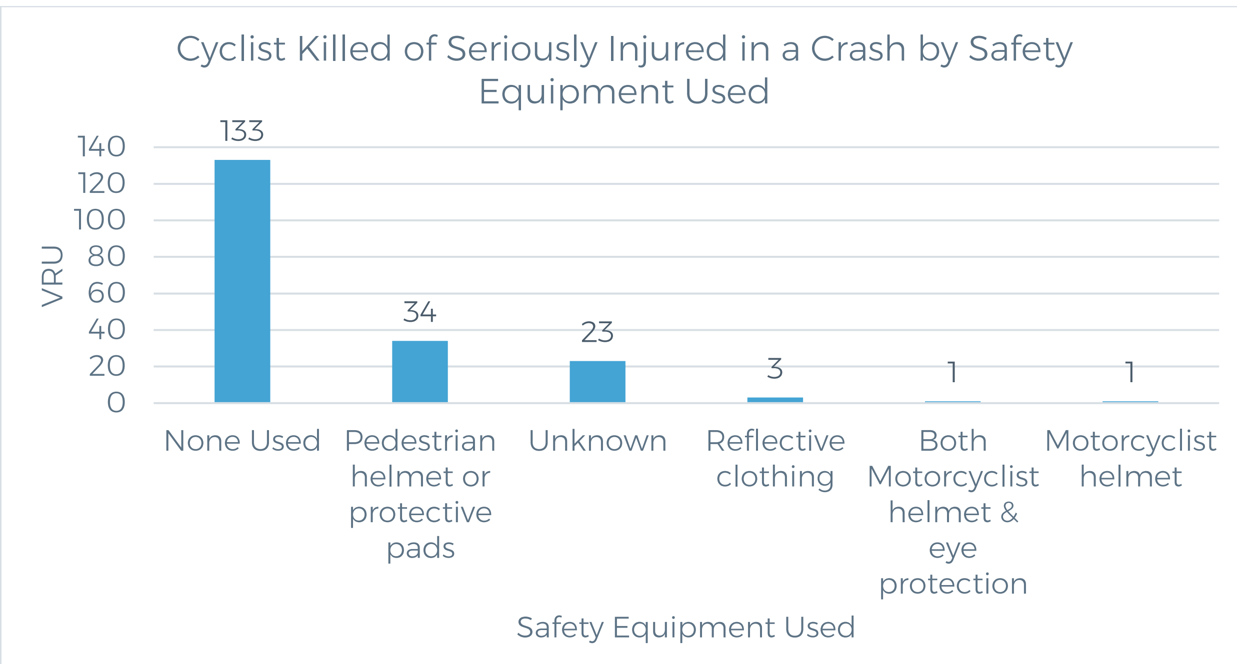


Figure 93: Cyclist Killed or Seriously Injured in a Crash by Safety Equipment Used (2017–2021)

2.8.1.5.3 Suspected Impairment

Suspected impairment is often thought of as the reason for VRU KA crashes. However, the data show that 12% of pedestrians and 2% of bicyclists involved in KA crashes had any suspicion of alcohol (Figure 94). It should be noted that this is denoted in the crash report; however, the officer does not always perform a breathalyzer or blood alcohol reading to confirm impairment. Often, crash data are not updated to remove the suspicion flag if the VRU who was injured was found not to be impairment.

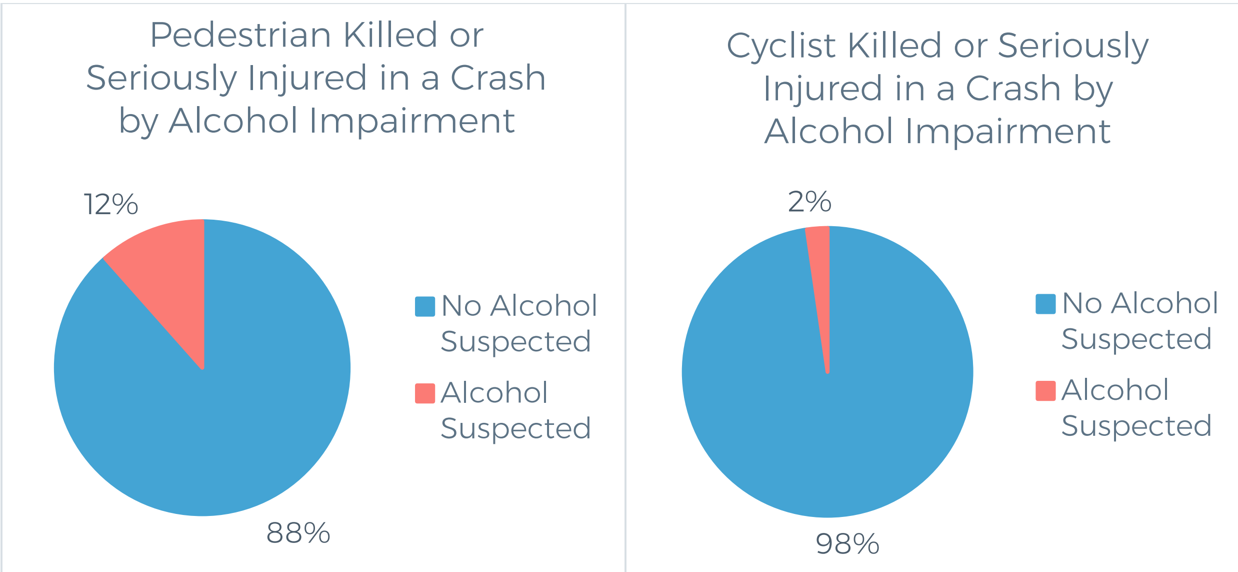


Figure 94: VRUs Killed or Seriously Injured in a Crash by Alcohol Impairment (2017–2021)

2.8.2 Crash Incident Statistics

In Kansas, crashes are also summarized at both the VRU level and the collision level. The following section summarizes the statistics for the VRU crashes at the incident-related level.

2.8.2.1 Crash Incident-Level Trends

Fatal and serious injury crash trends from 2010 to 2019 are shown in Figure 95, Figure 96, and Figure 97 for VRU crashes. Similar to the tables showing individual VRUs who were killed and seriously injured in a crash, crashes have been increasing over the study period.

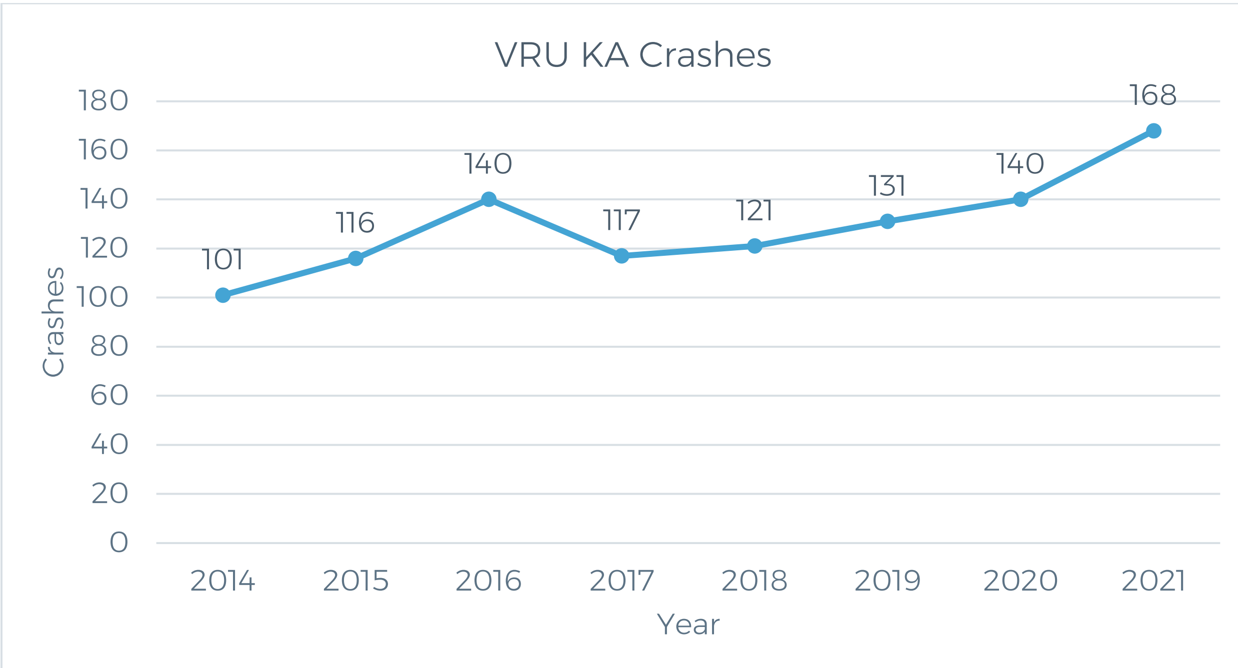


Figure 95: VRU KA Crashes (2014–2021)

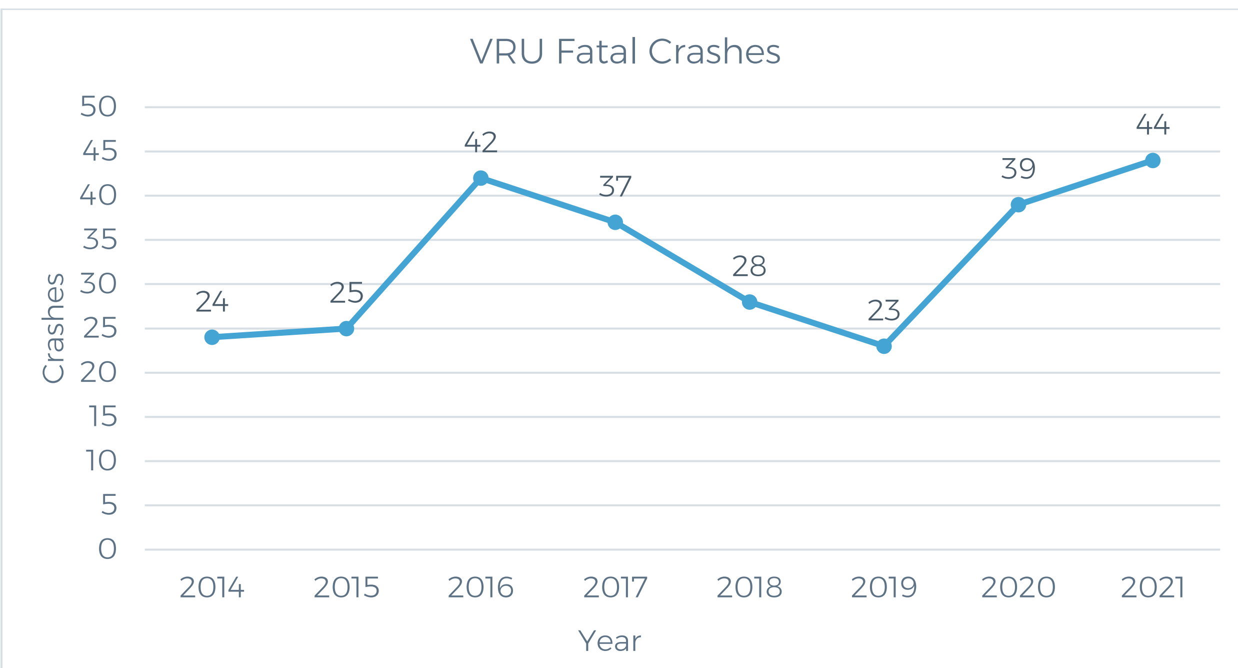


Figure 96: VRU Fatal Crashes (2014–2021)

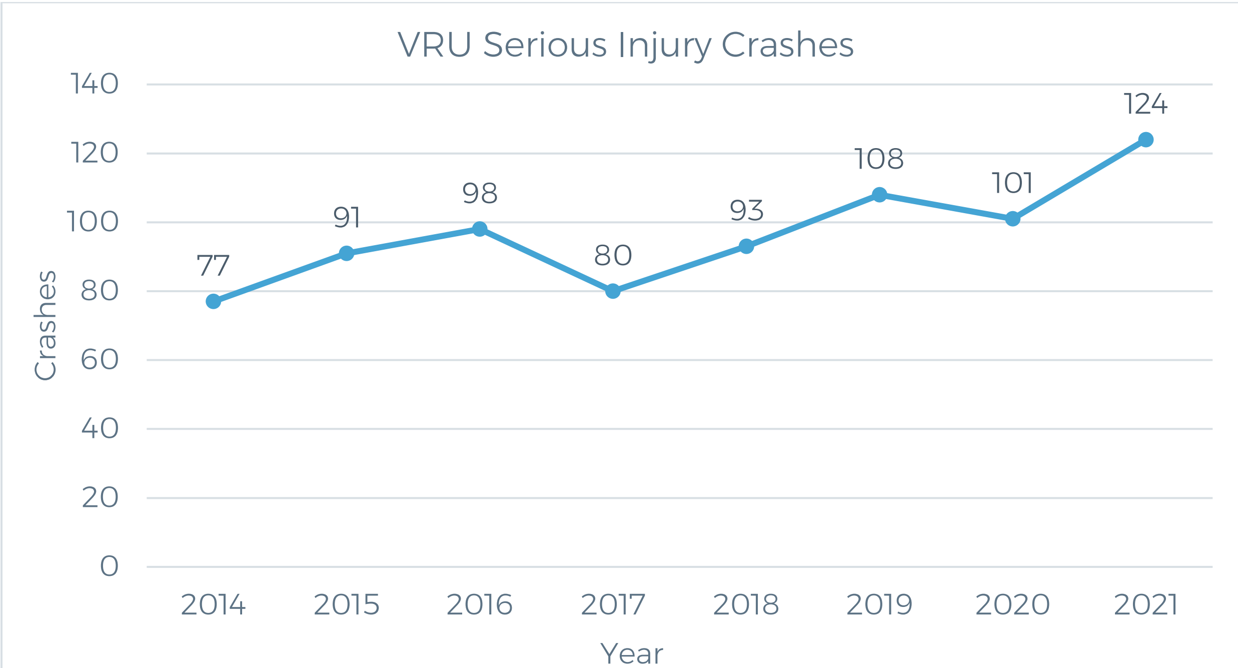


Figure 97: VRU Serious Injury Crashes (2014–2021)

2.8.2.2 Frequency of Vulnerable Road User Crashes by Crash Class

In terms of mode of crashes, VRU pedestrians and cyclists have seen a steady rise, as shown in Figure 98 and Figure 99. Figure 100 shows the frequency of VRU incidents over the years, with 2021 having 69% more pedestrian crashes compared to 2014 and 60% more cyclist crashes.

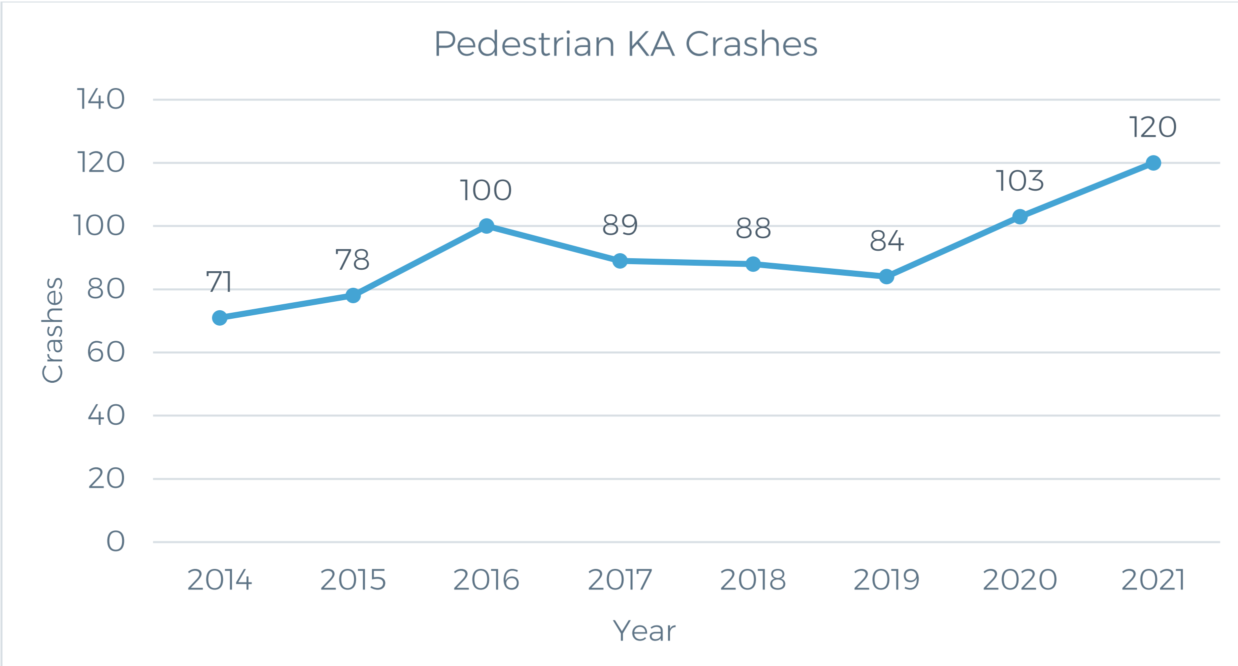


Figure 98: Pedestrian KA Crashes (2014–2021)

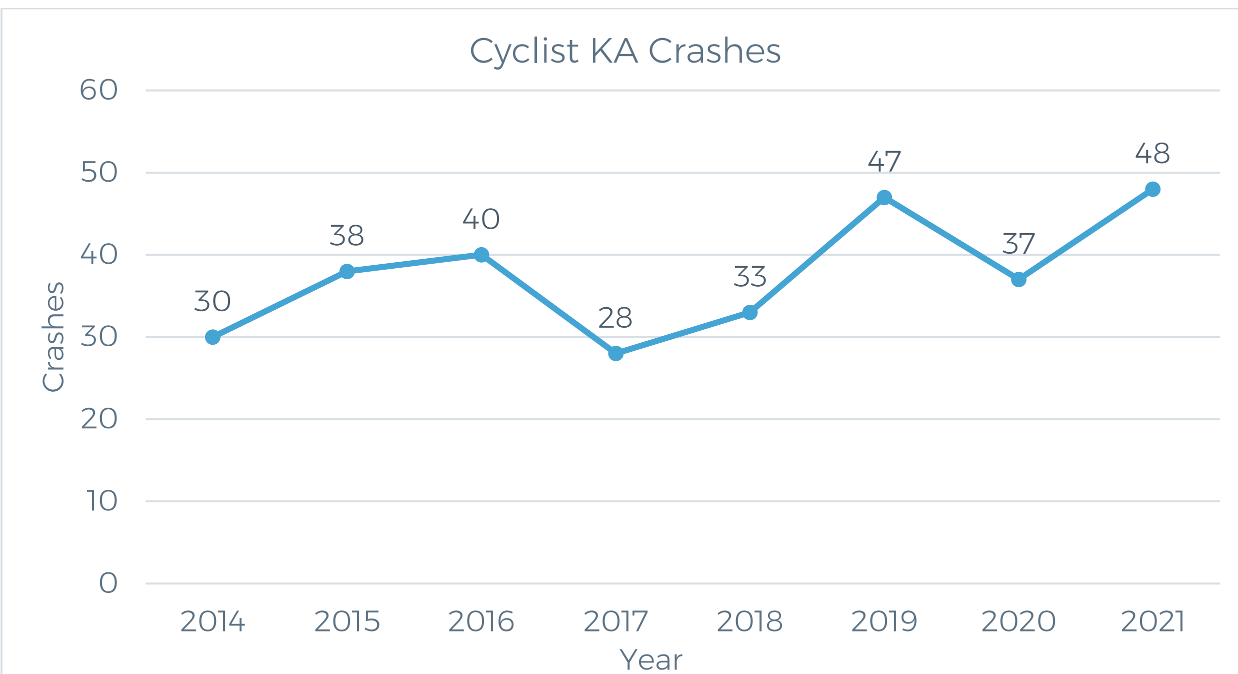


Figure 99: Cyclist KA Crashes (2014–2021)

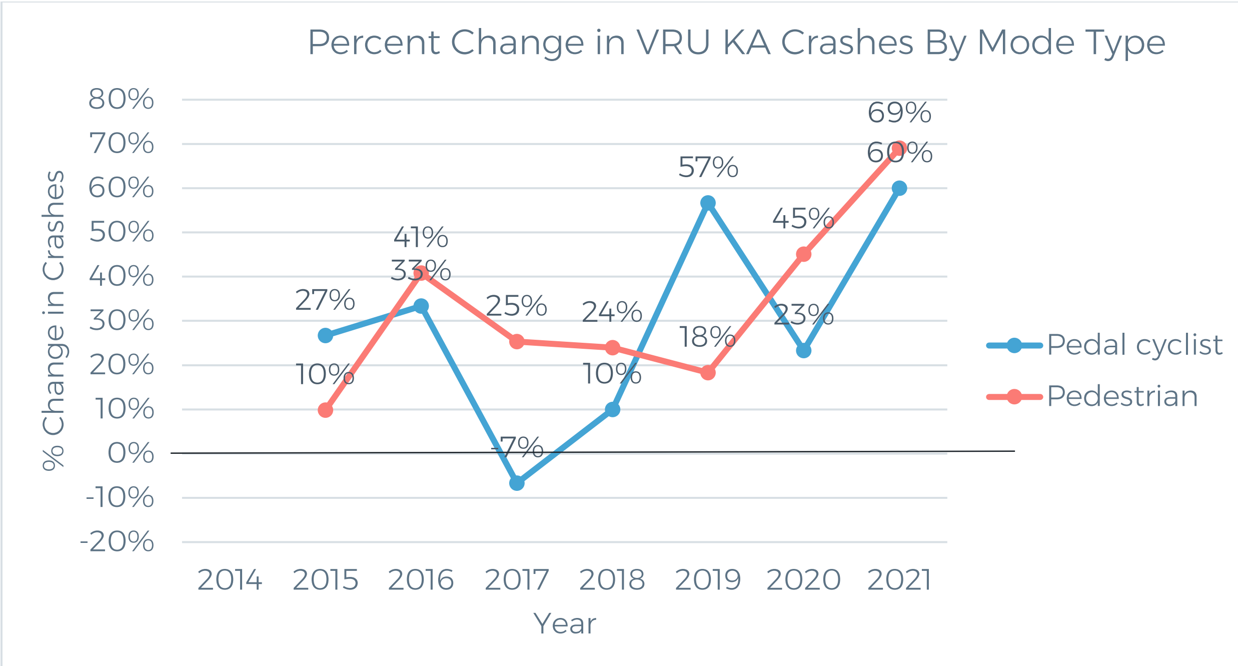


Figure 100: Percent Change in VRU KA Crashes by Mode Type (2014 Base Year)

2.8.2.3 Vulnerable Users and Disadvantaged Communities

As seen in the network maps, DACs account for a geographically small portion of Kansas. These areas are of special focus because roadway safety issues disproportionately affect them. Forty-four percent (Figure 101) of all VRU crashes occur in DACs.

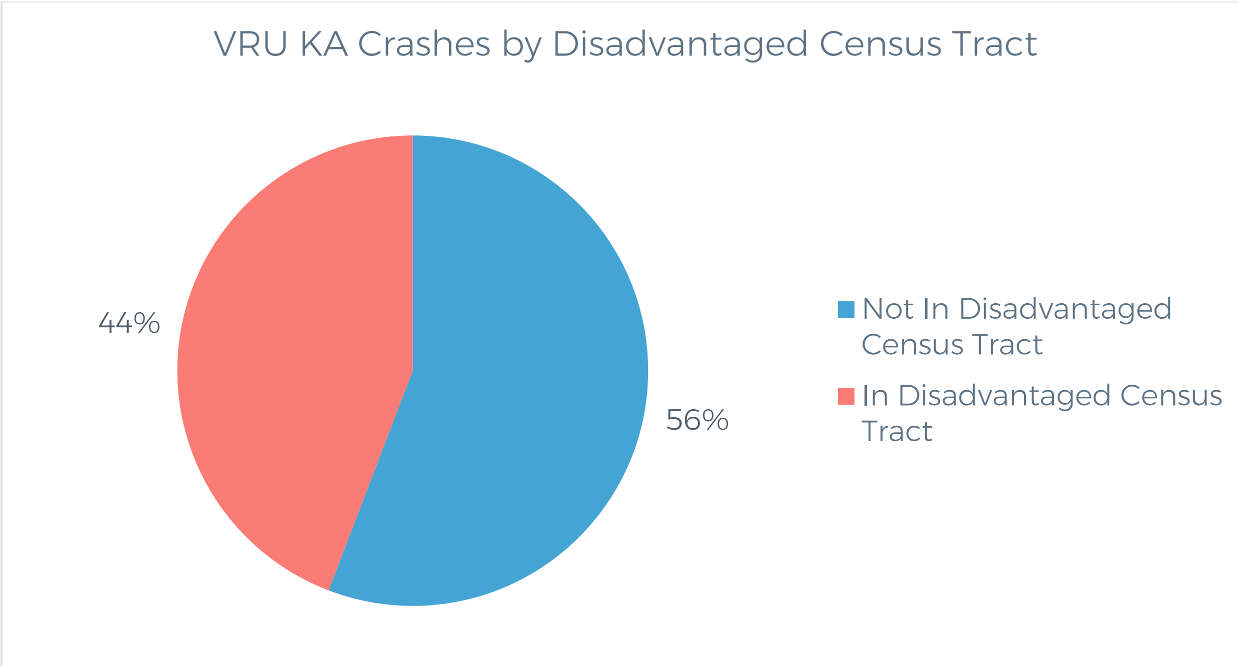


Figure 101: VRU KA Crashes by Disadvantaged Census Tract (2017–2021)

2.8.2.4 Contributing Circumstances

2.8.2.4.1 Speed Limit of Roadway

Speed limits play a role in the survivability of a crash. Figure 102 and Figure 103 show this relation among collisions with pedestrians; as the speed increases, the percentage of fatalities also increases. A similar relationship can be observed in Figure 104 and Figure 105 for crashes with cyclists.

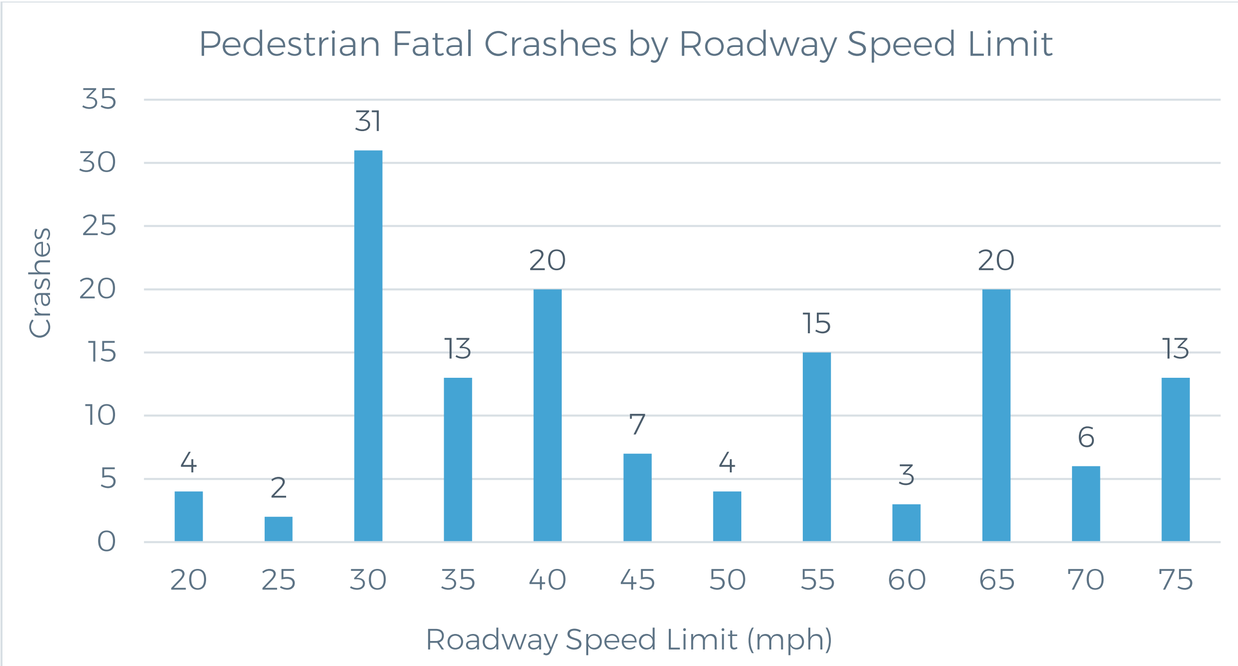


Figure 102: Fatal Pedestrian Crashes by Roadway Speed Limit (2017–2021)

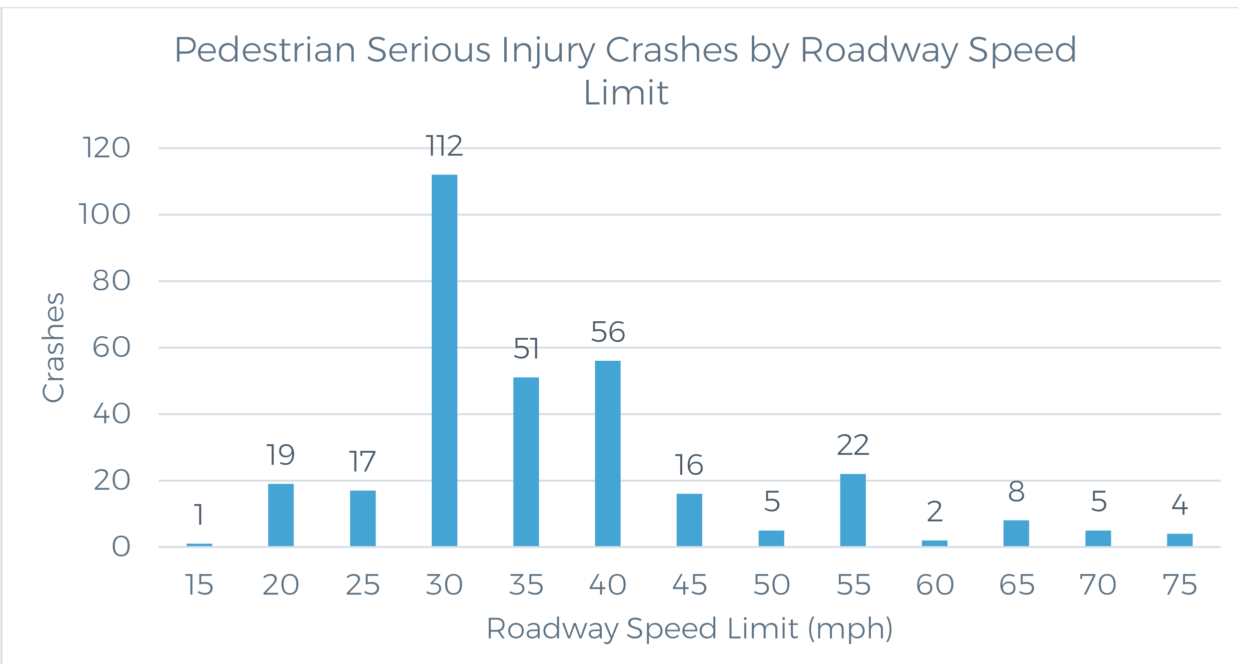


Figure 103: Pedestrian Serious Injury Crashes by Roadway Speed Limit (2017–2021)

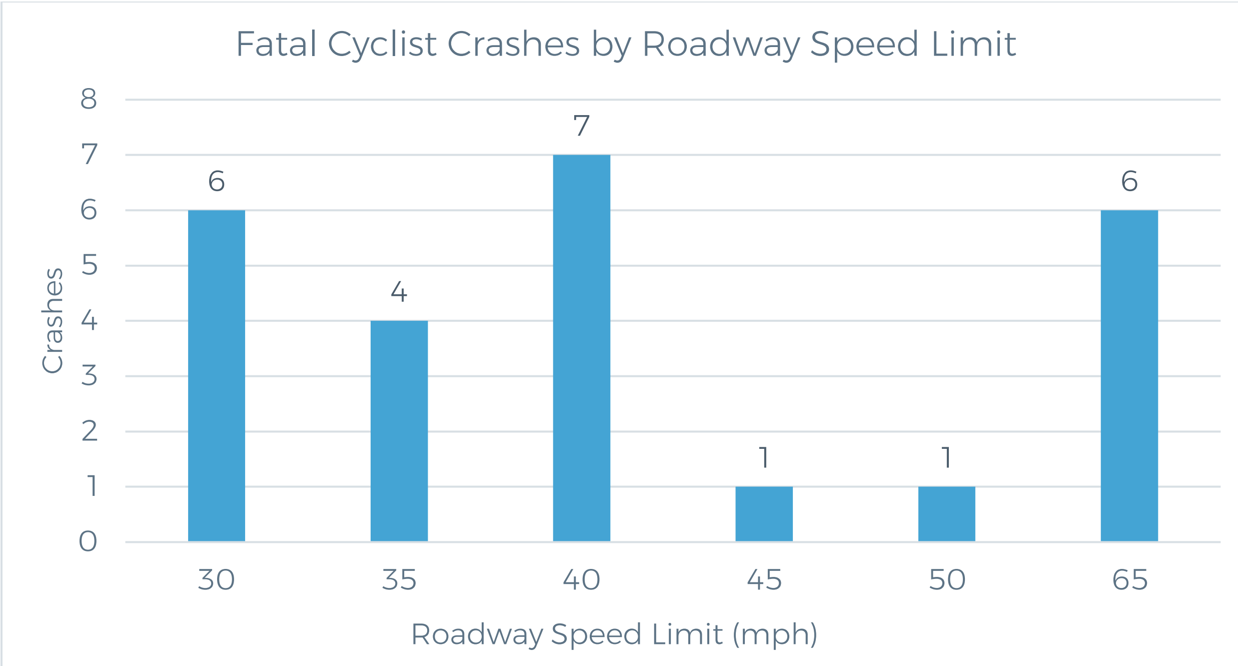


Figure 104: Fatal Cyclist Crashes by Roadway Speed Limit (2017–2021)

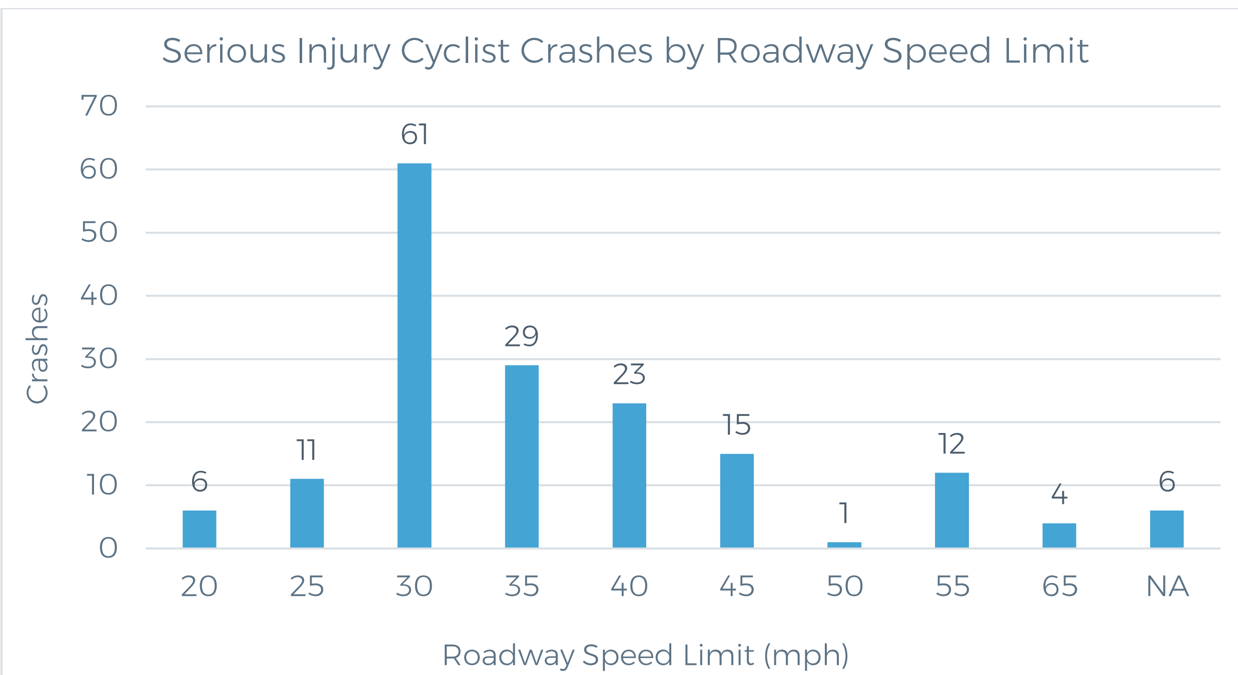


Figure 105: Serious Injury Cyclist Crashes by Roadway Speed Limit (2017–2021)

2.8.2.4.2 Roadway Surface Conditions

Most fatal (89%) and serious injury crashes (89%) of VRUs occur in dry conditions. Adverse weather contributes relatively little to overall KA crash risk, as seen in Figure 106.

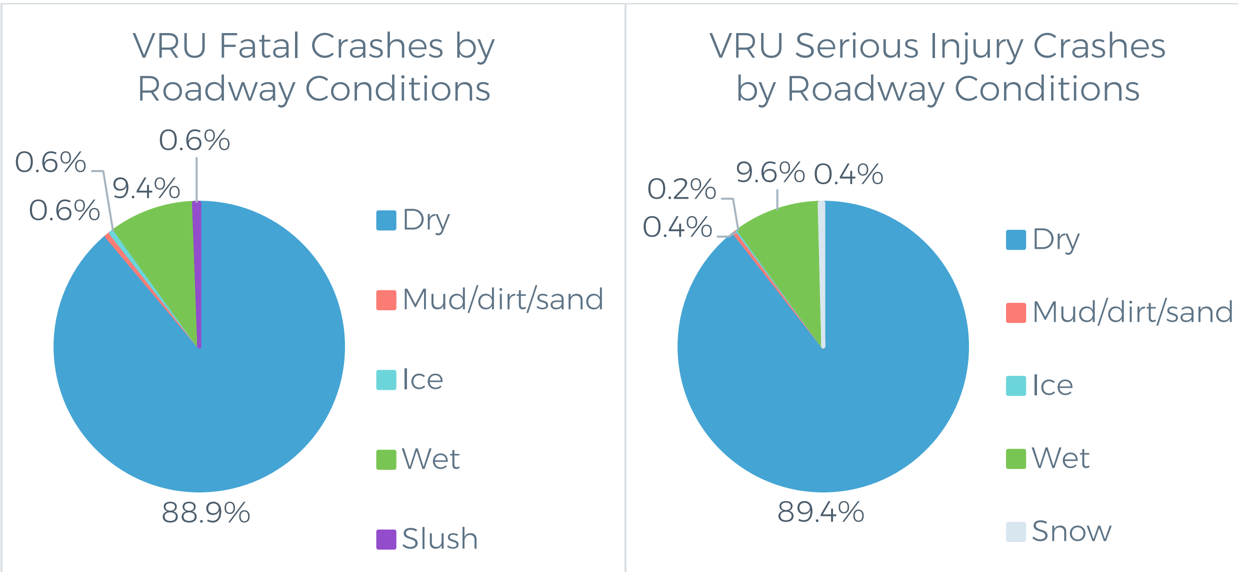


Figure 106: VRU KA by Roadway Conditions (2017–2021)

2.8.2.4.3 Lighting Conditions

The roadway lighting conditions for VRU fatal crashes by mode are shown in Figure 107; lighting for serious injury crashes is shown in Figure 108. Generally, most bicycle crashes occurred during daylight. However, the majority of pedestrian crashes occur in low-light conditions.

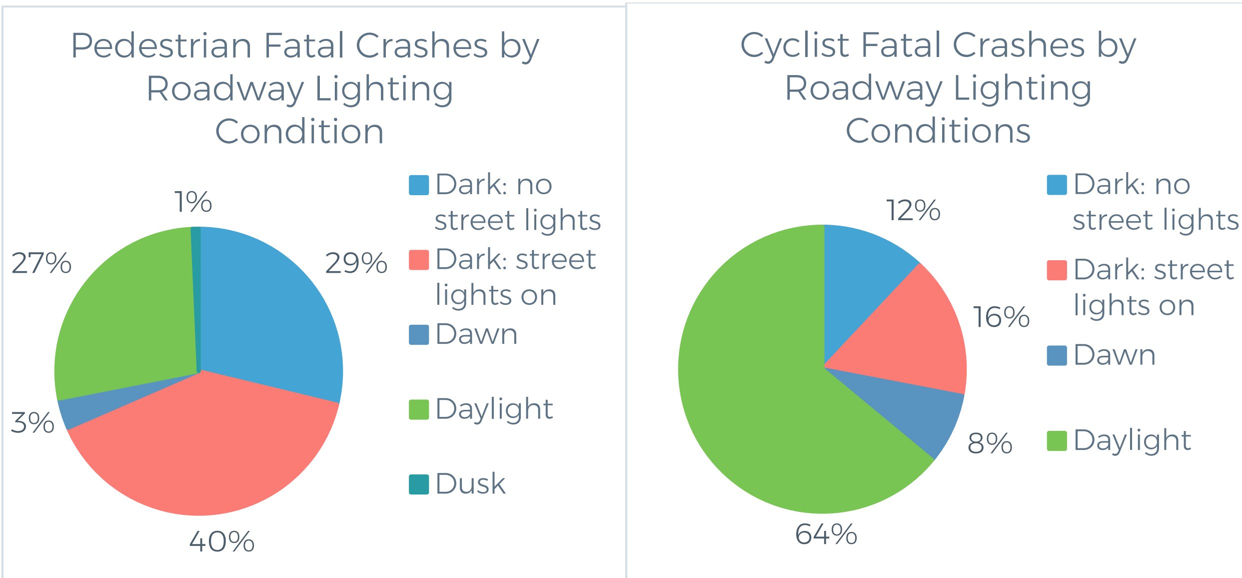


Figure 107: VRU Fatal Crashes by Roadway Lighting Conditions (2017–2021)

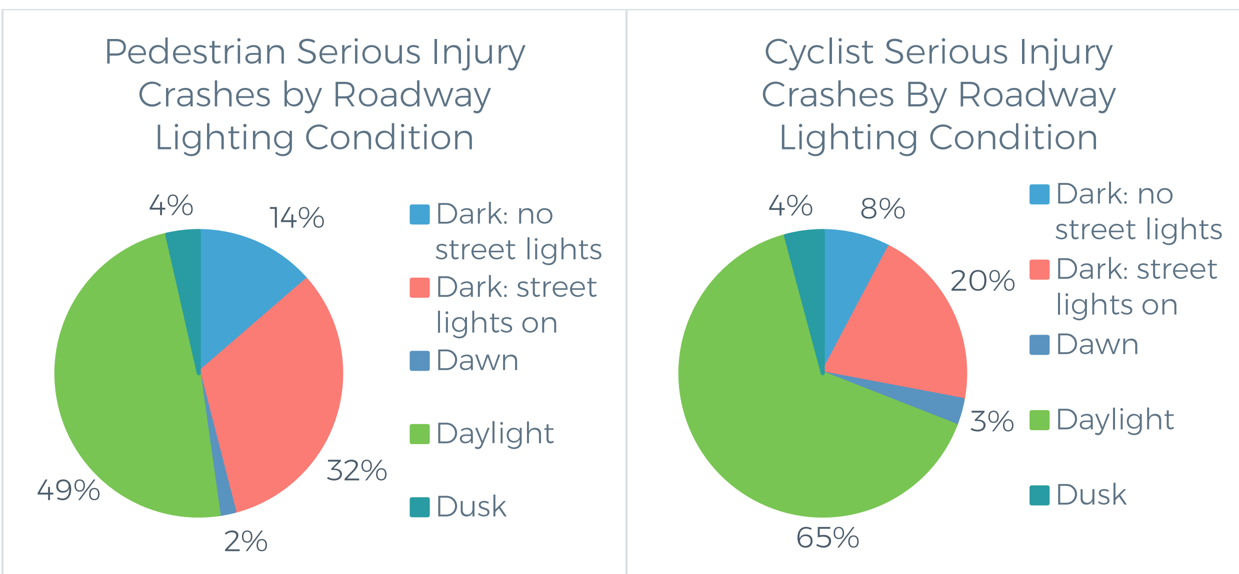


Figure 108: VRU Serious Injury Crashes by Roadway Lighting Conditions (2017–2021)

2.8.2.4.4 Suspected Impairment

The majority of KA crashes with pedestrians and cyclists involve neither alcohol nor drugs, as shown in Figure 109 and Figure 110. Figure 111 and Figure 112 show that this trend has remained constant over the study period.

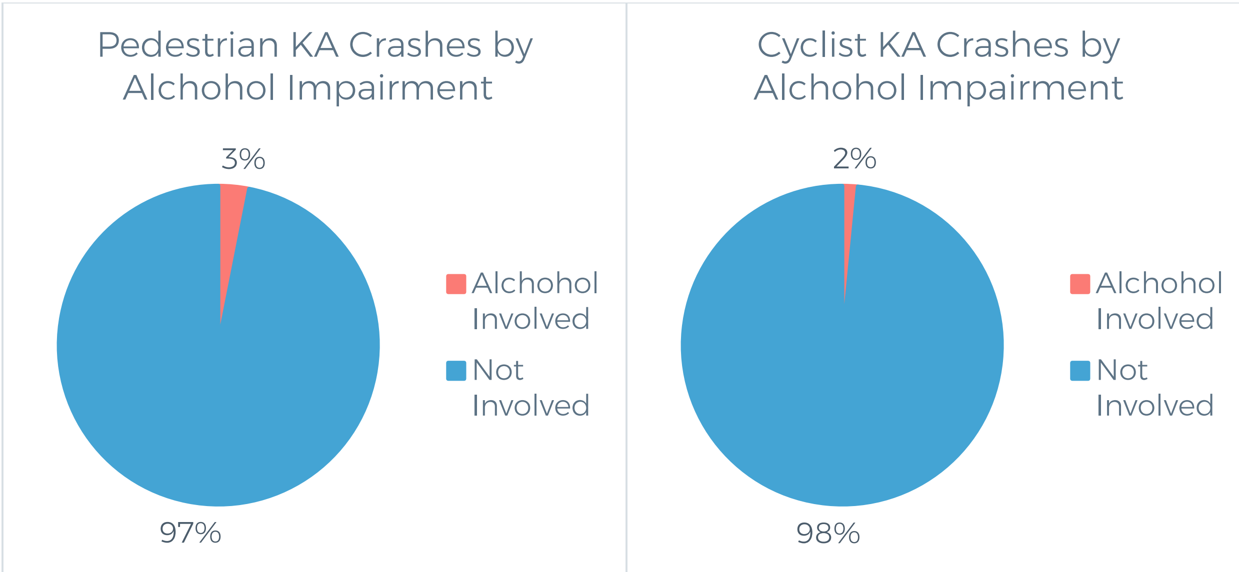


Figure 109: KA VRU Crashes by Alchohol Impairment (2017–2021)

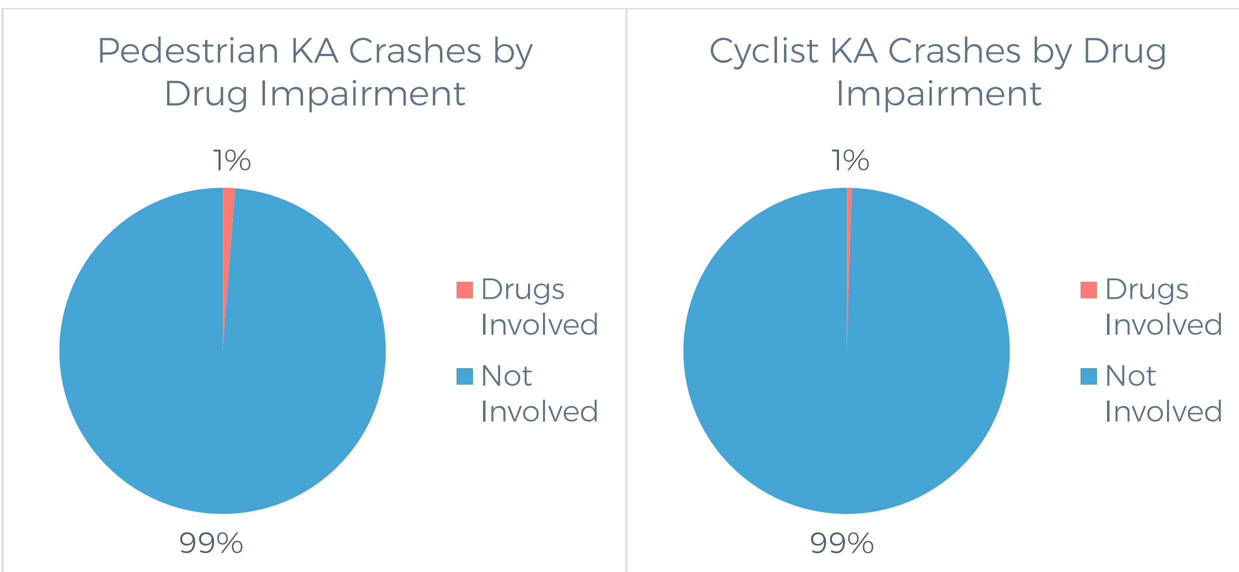


Figure 110: VRU KA Crashes by Drug Impairment (2017–2021)

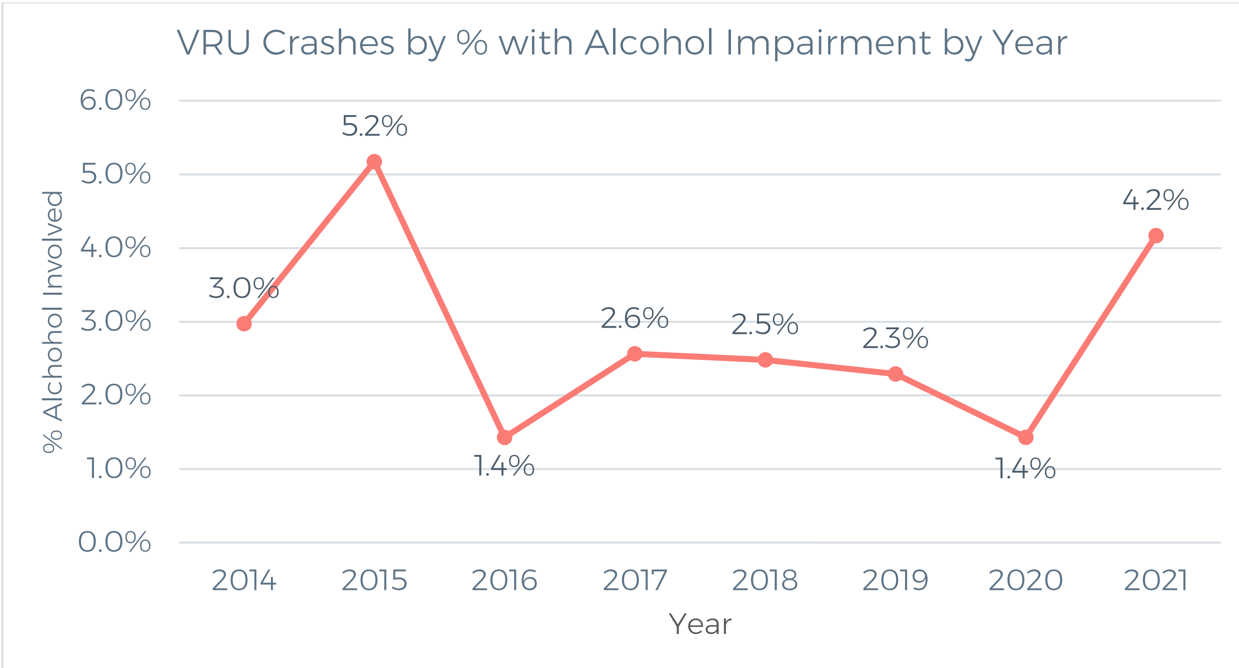


Figure 111: VRU Crashes by Percentage with Alcohol Intoxication by Year (2014–2021)

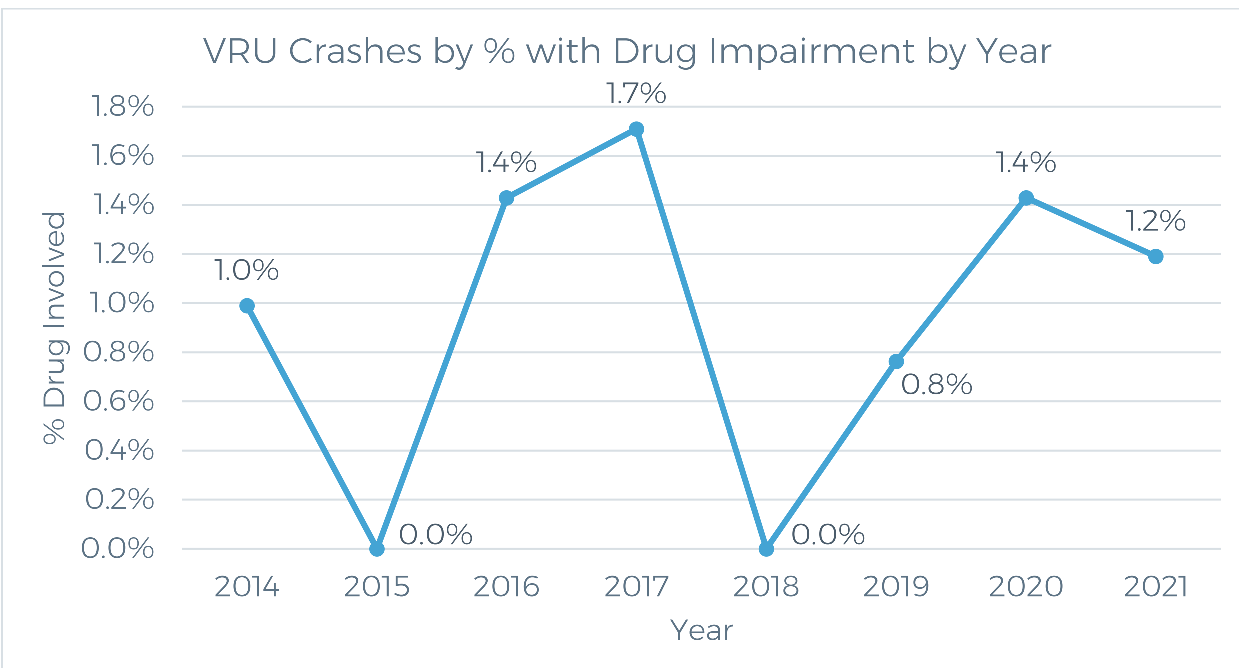


Figure 112: VRU Crashes by Percentage with Drug Impairment by Year (2014–2021)

2.8.3 State Roads Crash Statistics

2.8.3.1 Trends

The number of VRUs in KA crashes has increased on state roads from 2014 to 2021. Crashes involving fatalities and serious injury have increased drastically, as shown in Figure 113 The uptick in serious injury crashes between 2018 and 2019 may be due to the FHWA's 2019 update to how serious injuries are reported, as this update established a single, national definition for States to report serious injuries.[8] Figure 114 and Figure 115 show that both VRU fatalities and serious injuries on state roads have been increasing since 2014. Figure 116 shows that crashes on state roads have been increasing at a similar rate compared to non-state roads.

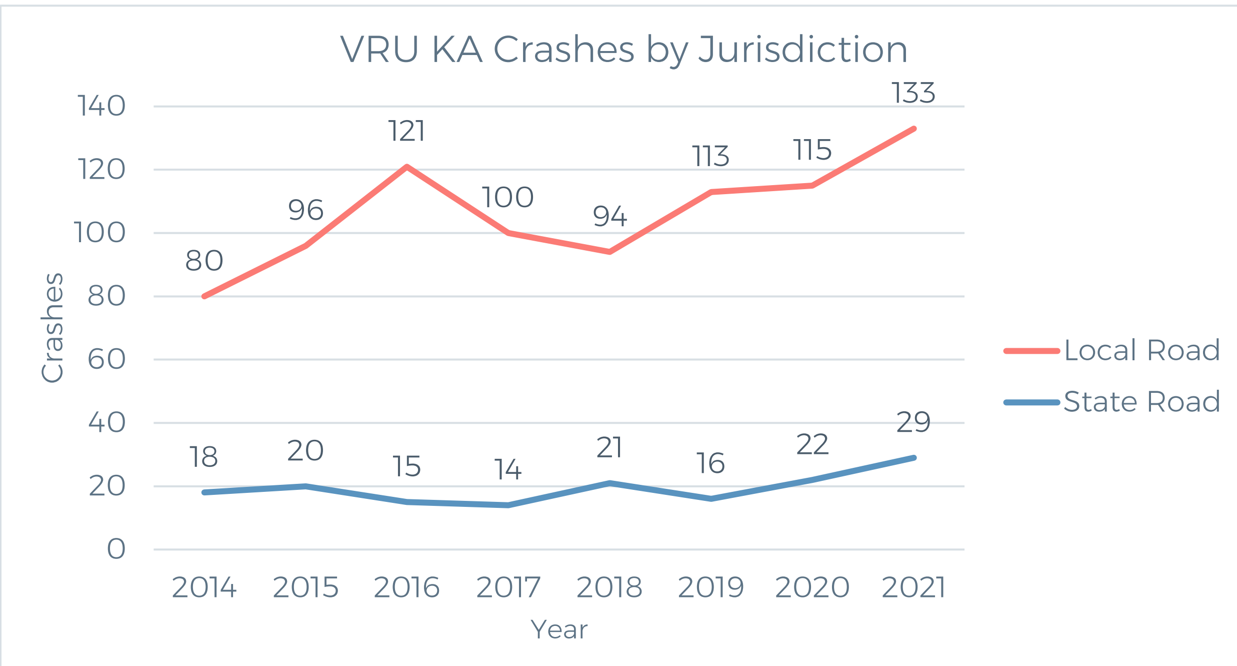


Figure 113: VRU KA Crashes by Jurisdiction (2014–2021)

[8] [Serious Injury Reporting | US Department of Transportation]

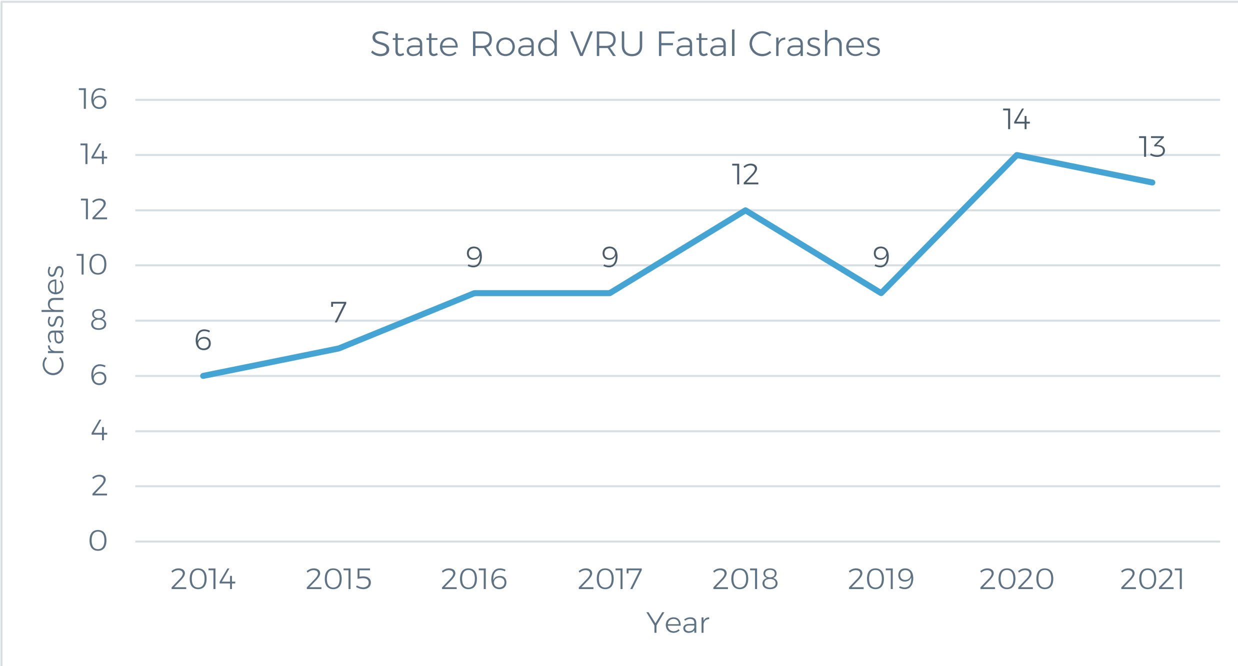


Figure 114: State Road VRU Fatal Crashes (2014–2021)

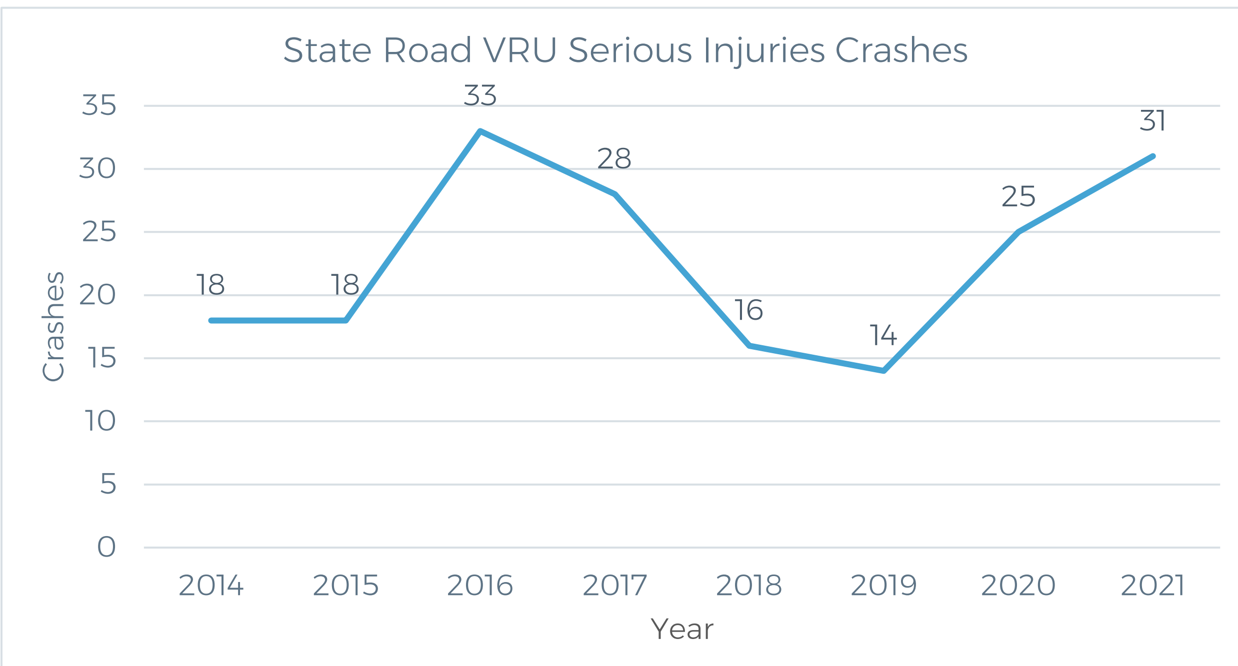


Figure 115: State Road VRU Fatal Crashes (2014–2021)

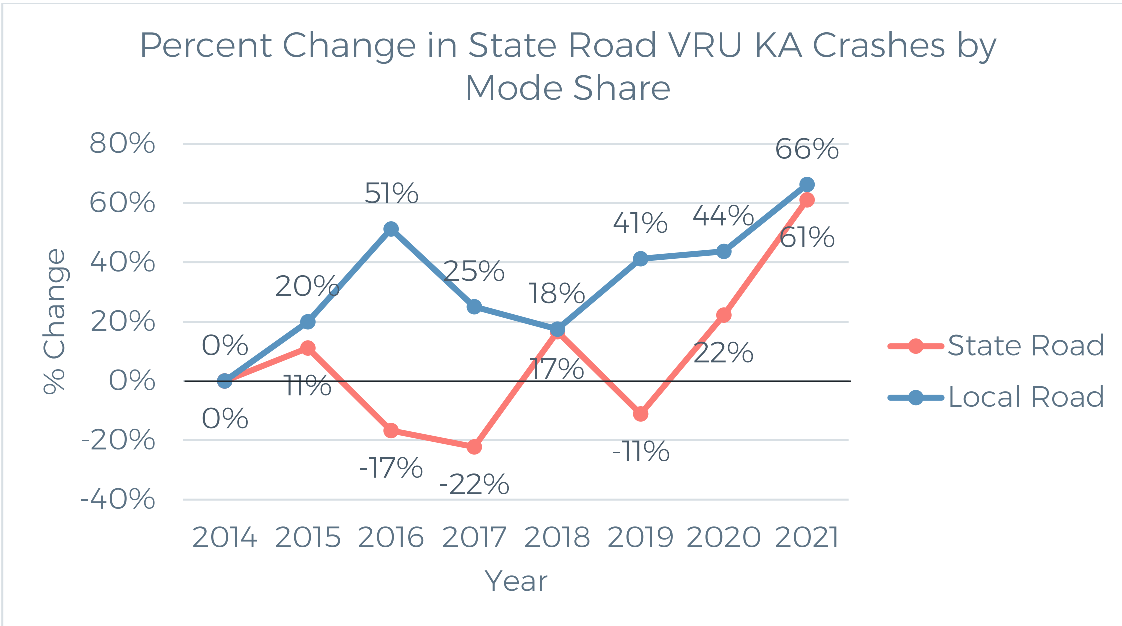


Figure 116: Percent Change in State Road VRU KA Crashes by Mode Share (2014–2021)

2.8.3.2 Pedestrians and Cyclists

State roads experience high percentages of pedestrian VRUs (82%) involved in KA crashes compared to cyclists (18%), as shown in Figure 117.

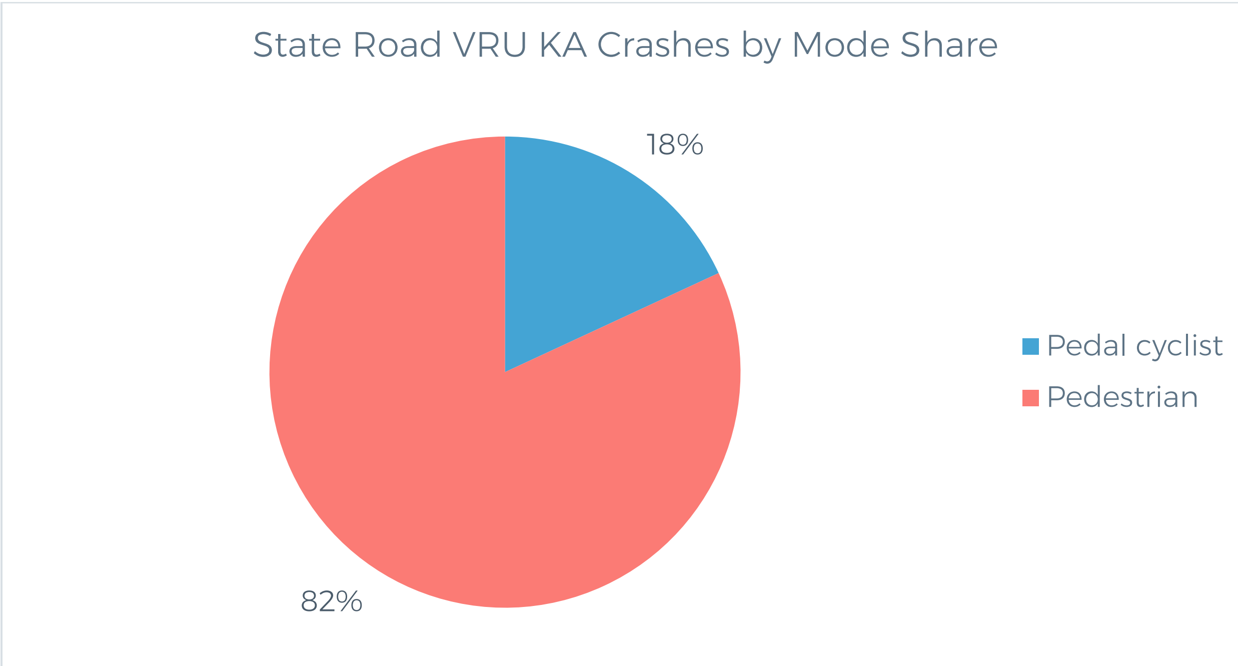


Figure 117: State Roads VRU KA Crashes by Mode Share (2017–2021)

2.8.3.3 User Demographics and Equity

In terms of equity, KA crashes on state roads are relatively equal in terms of those VRUs that are killed or seriously injured in a crash, likely due to low overall volume. Figure 118 shows that 32% of VRU KA crashes on state roads occurred in a DAC, while 68% of VRU KA crashes on state roads did not occur in a DAC.

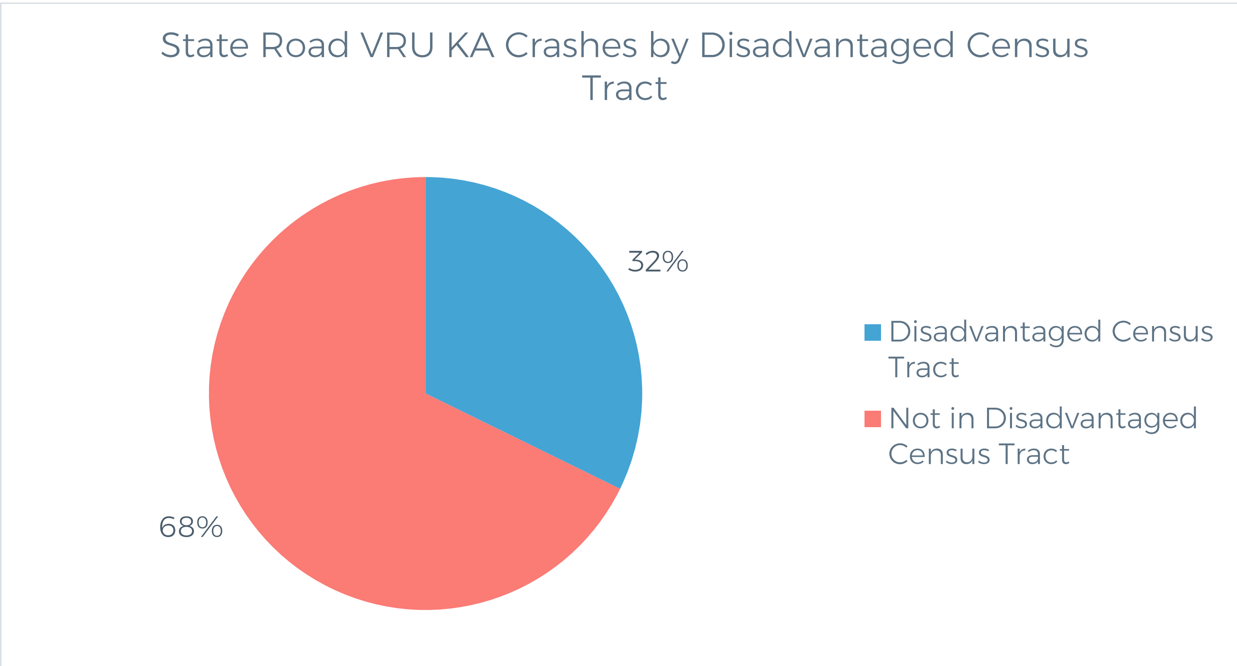


Figure 118: State Road VRU KA Crashes by Disadvantaged Census Tract (2017–2021)

2.8.3.3.1 Age of User

Crashes on state roads do not occur evenly across age groups. Figure 119 shows the overall number of VRU KA crashes on state roads over the most recent five years of data. Individuals between 45 and 54 account for 20 KA crashes, and those between 35 and 44 account for 19 KA crashes. When normalized by population, Figure 120 shows that those in the 20 to 24 age group are the likeliest to be involved in a VRU crash.

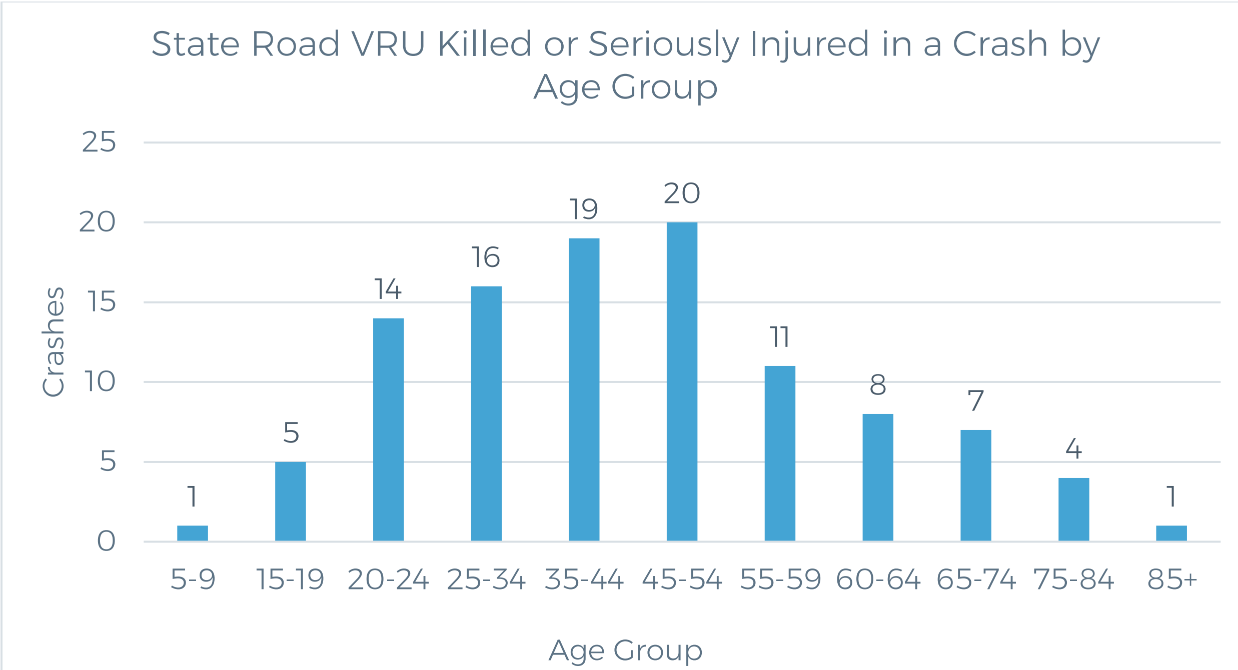


Figure 119: State Road VRU Killed or Seriously Injured in a Crash by Age Group (2017–2021)

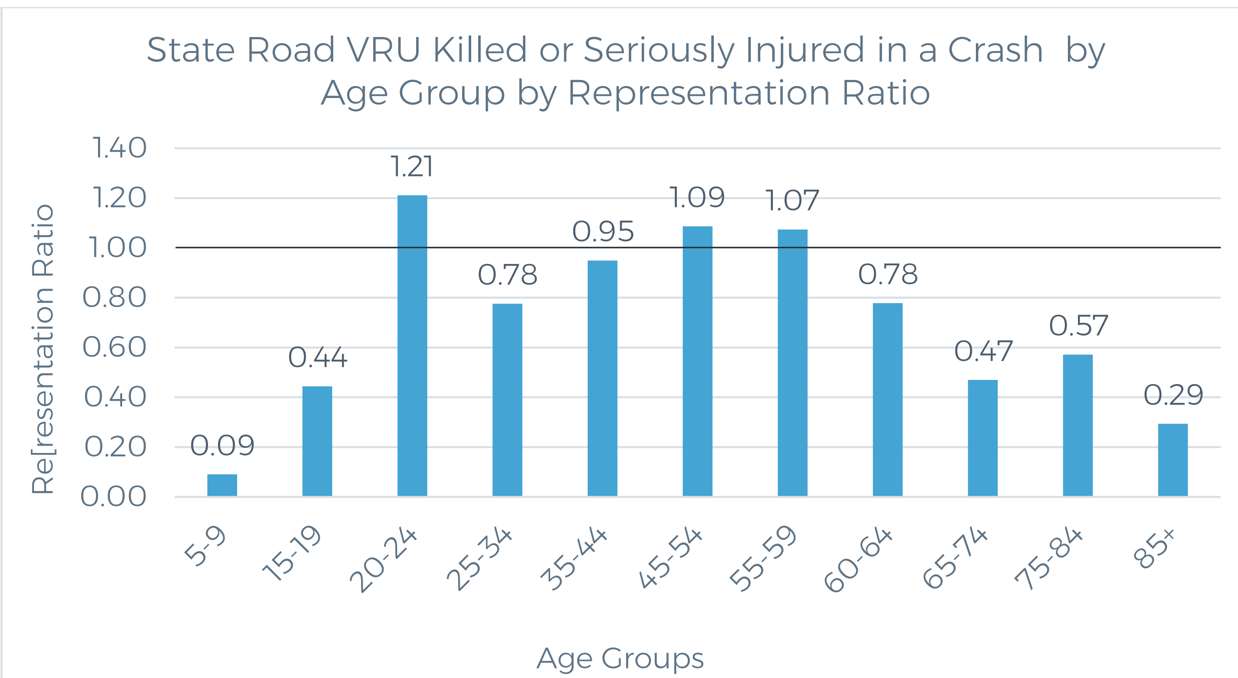


Figure 120: State Road VRU Killed or Seriously Injured in a Crash by Age Group as a Proportion of Population; >1.0 = Overrepresentation (2017–2021)

2.8.3.3.2 Sex of Road User

Males currently account for 76% of VRUs killed or seriously injured on state roads (Figure 121). Overall, the proportion of male VRUs in a KA crash has been steadily increasing, while the proportion of women remained mostly level with a sudden increase in 2021 (Figure 122).

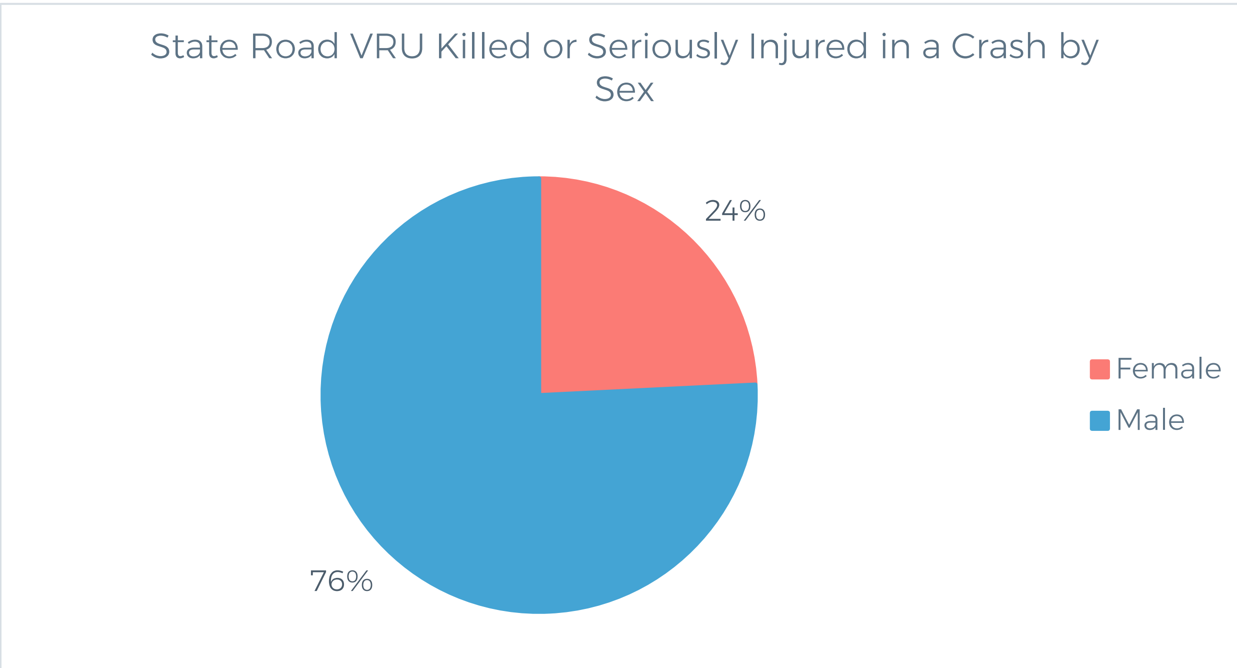


Figure 121: State Road VRU Killed or Seriously Injured in a Crash by Sex (2017–2021)

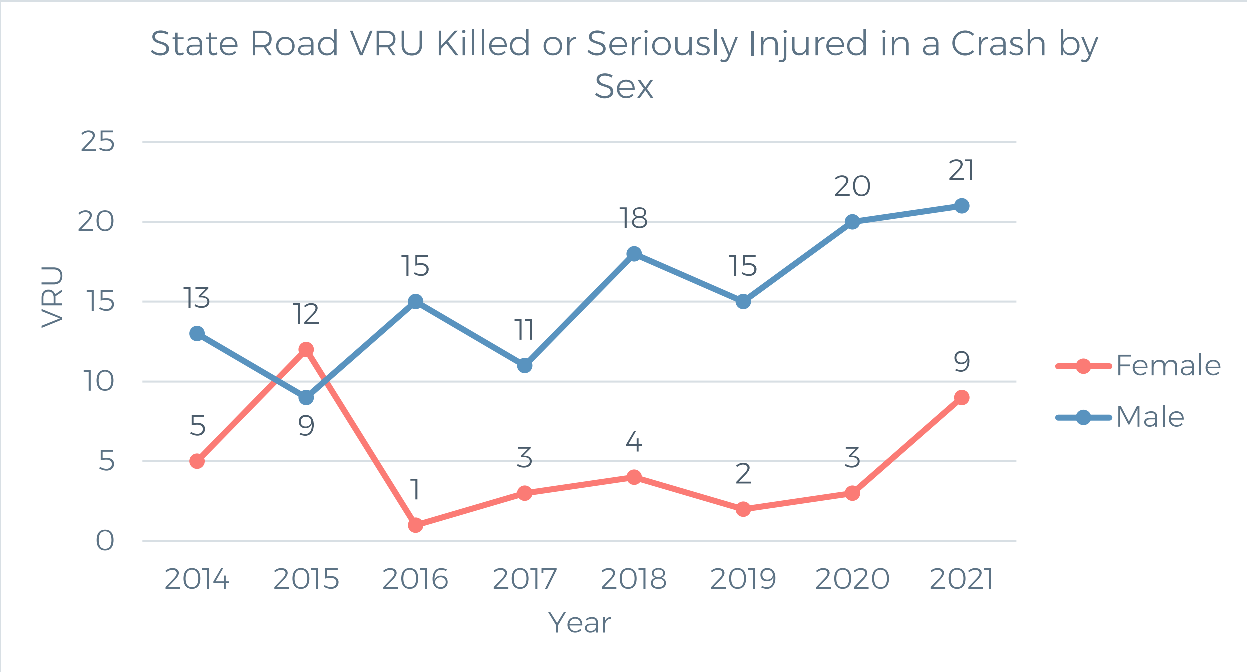


Figure 122: State Road VRU KA Killed or Seriously Injured in a Crash by Sex (2014–2021)

2.8.3.4 Crash Location and Type

2.8.3.4.1 Intersection vs. Segment

Pedestrian and cyclist VRUs on state roads are more likely to be involved in a KA crash along roadway segments rather than at intersection locations (Figure 123). Pedestrians are more likely (71%) to be in a KA crash on a roadway segment compared to an intersection location in rural areas. In contrast, cyclists are more evenly distributed but much more likely (57%) to be killed at an intersection. Overall, the ratio of segment compared to intersection KA has remained mostly the same, as seen in Figure 124, which shows the relative percentage by mode share.

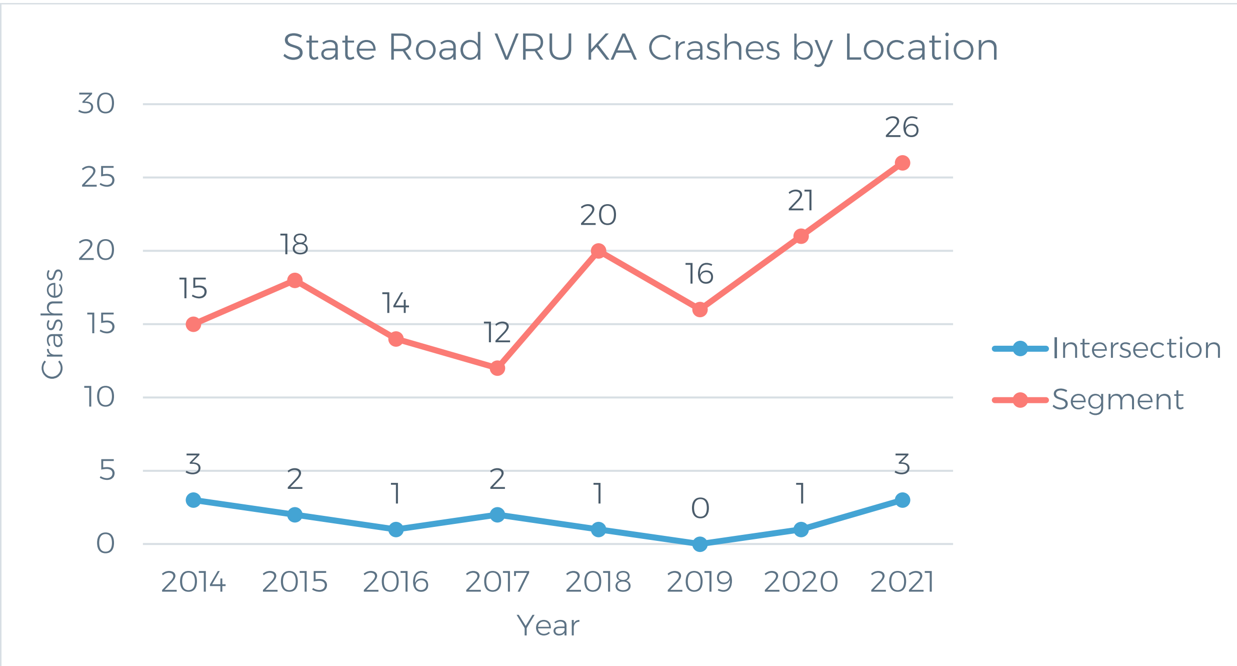


Figure 123: State Road VRU KA Crashes by Location (2014–2021)

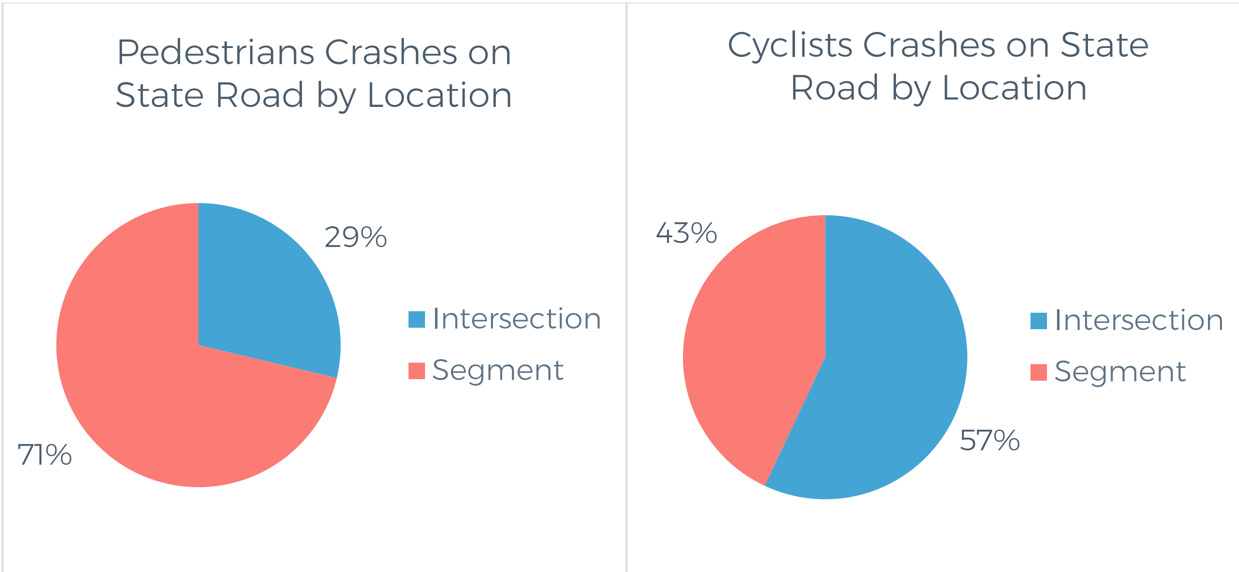


Figure 124: State VRU KA Crashes by Location (2017–2021)

2.8.3.5 Contributing Circumstances

The contributing circumstances for VRUs killed or seriously injured in crashes are determined by the reporting law enforcement officer and are shown in Figure 125 and Figure 126. The number one cause for both pedestrians and cyclists is "N/A (not available)"; the largest known contributing circumstance for pedestrians is "in roadway," and the largest known contributing circumstance for cyclists is "pedal cycle violation(s)."

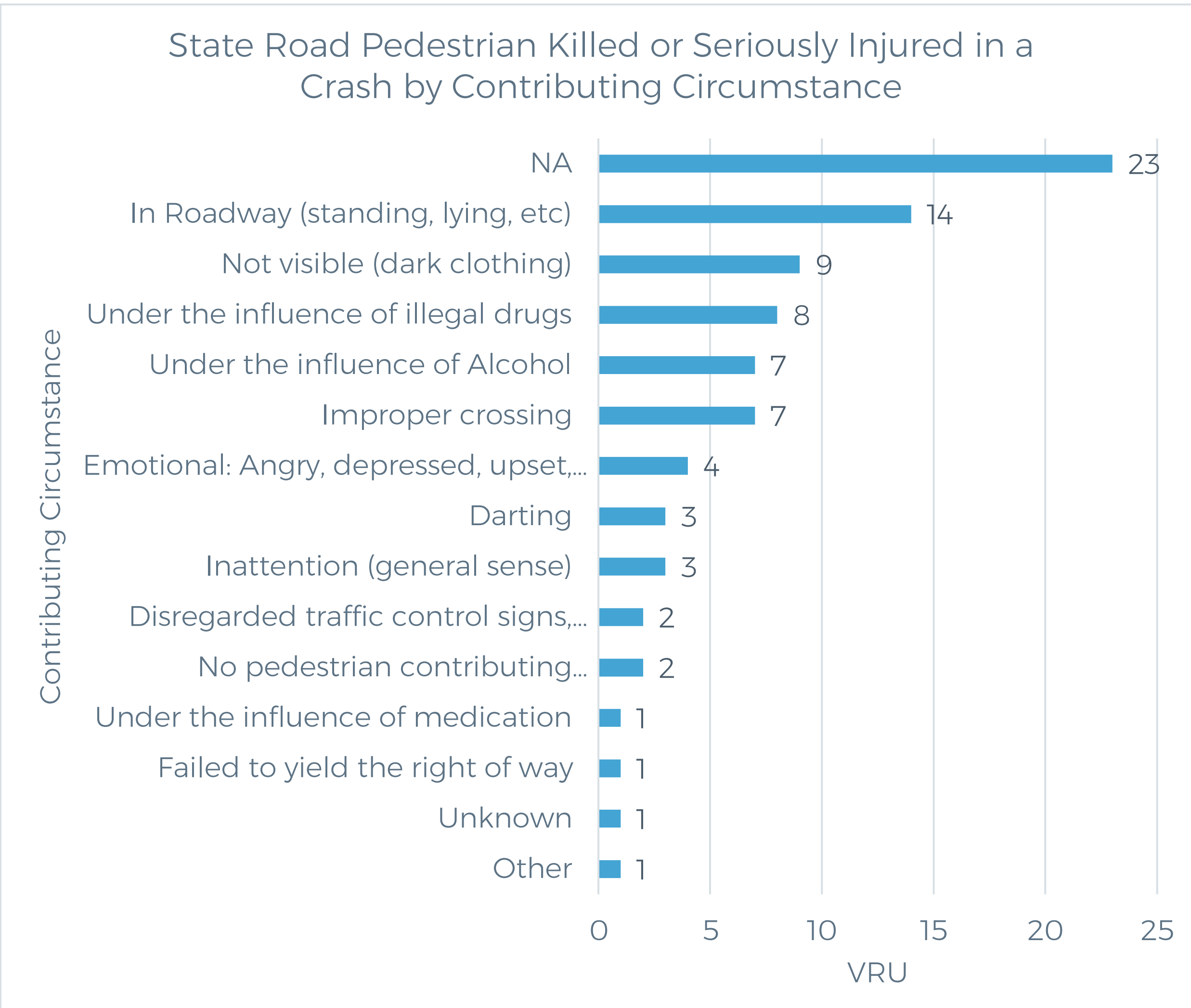


Figure 125: State Road Pedestrian Killed or Seriously Injured in a Crash by Contributing Circumstance (2017–2021)

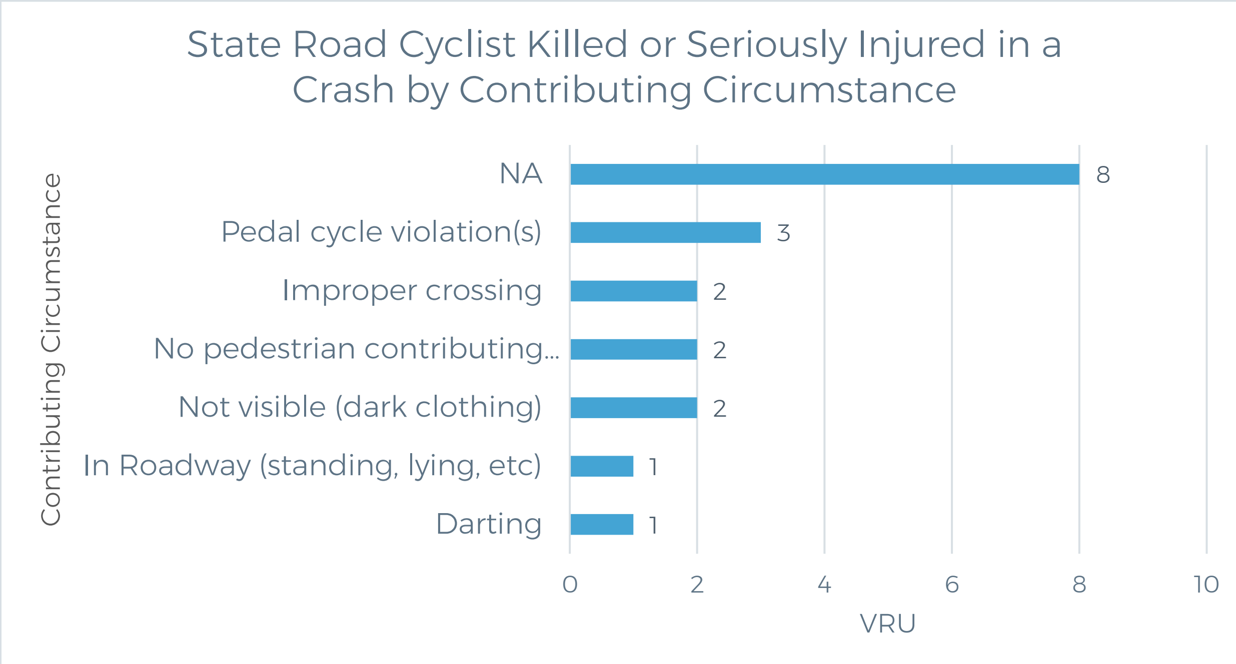


Figure 126: State Road Cyclist Killed or Seriously Injured in a Crash by Contributing Circumstance (2017–2021)

2.8.3.5.1 Speed Limit of Roadway

State roadways often have higher speed limits, which lead to higher traveling speeds, and this impacts crash risk for VRUs. Figure 127 and Figure 128 show KA crashes by the roadway speed limit. For pedestrians, roadway traveling speeds of 65 and 75 mph were the largest contributors to KA crashes. Speeds above 55 mph accounted for most KA crashes. The relationship between increased speeds and increased mortality is well known, and state roadways are no exception. Similarly, cyclists were most likely to be involved in KA crashes on roadways with speeds of 65 mph.

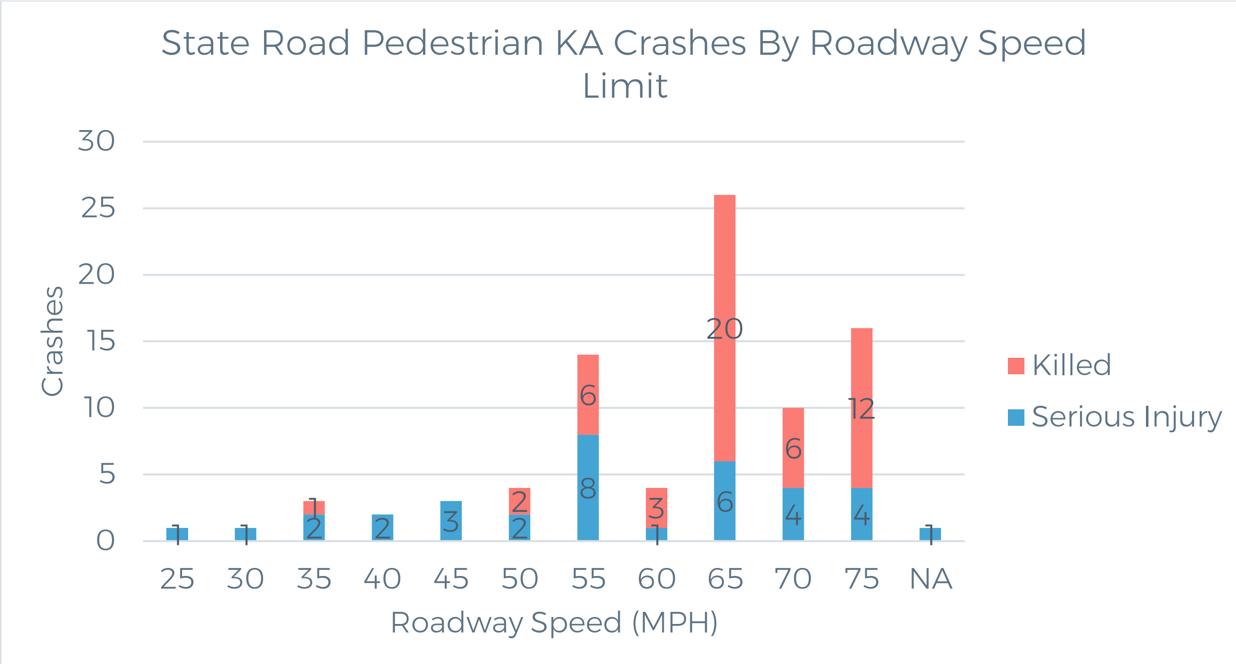


Figure 127: State Road Pedestrian KA Crashes by Roadway Speed Limit (2017–2021)

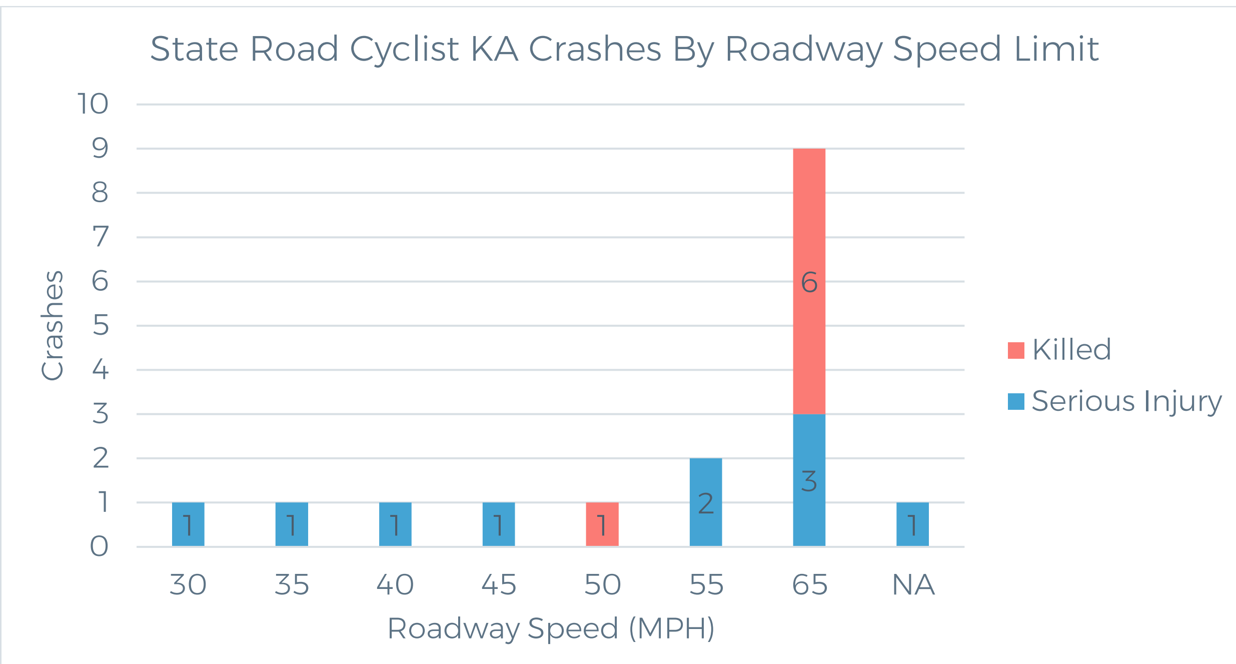


Figure 128: State Road Cyclist KA Crashes by Roadway Speed Limit (2017–2021)

2.8.3.5.2 Roadway Surface Conditions

Most pedestrians (88%) and cyclists (94%) KA crashes on state roads occurred on dry pavement. Adverse weather contributed relatively little to overall KA crashes, as shown in Figure 129.

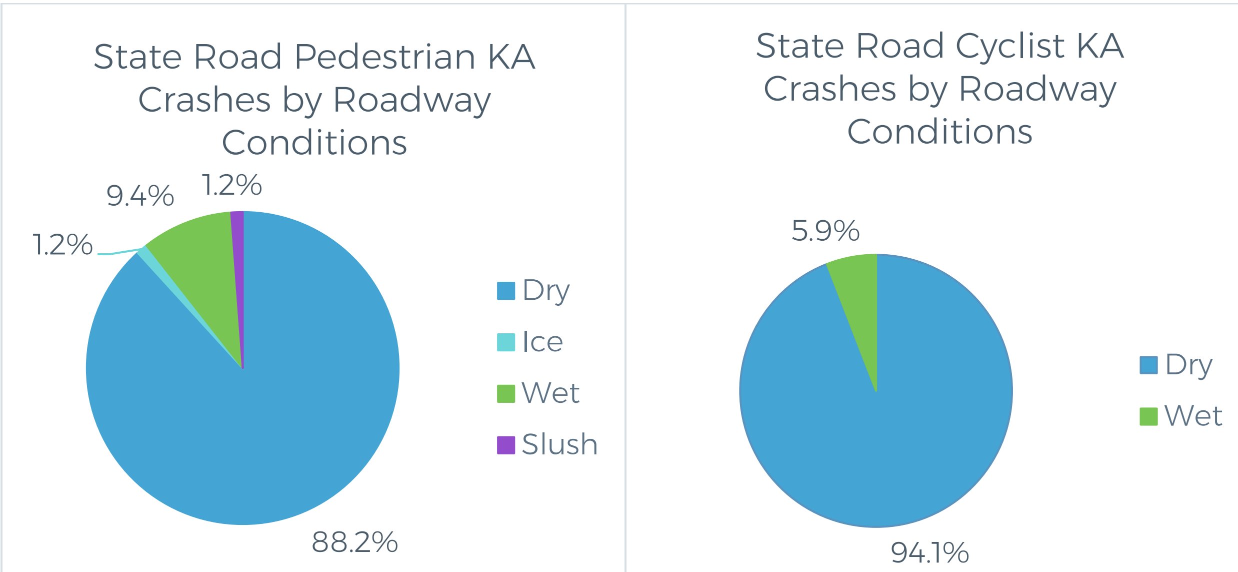


Figure 129: State Road VRU KA Crashes by Roadway Condition (2017–2021)

2.8.3.5.3 Roadway Surface Conditions

Figure 130 shows that most KA crashes involving pedestrians occurred at nighttime; 47% of crashes occurred on roads with no streetlights. Most KA crashes involving cyclists occurred during daylight hours (53%).

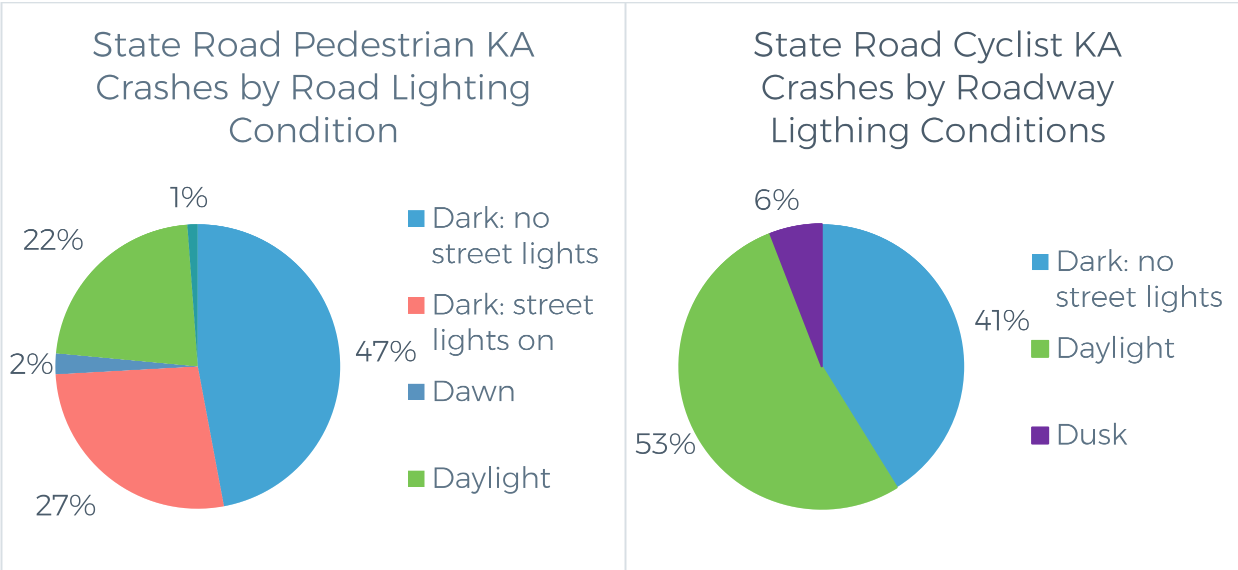
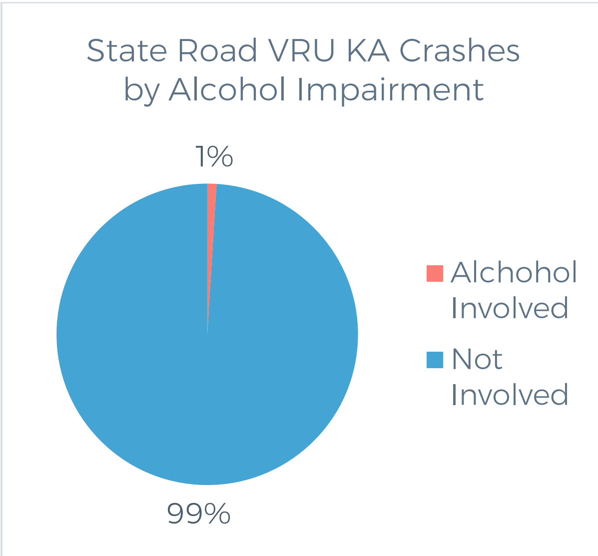


Figure 130: State Road VRU KA Crashes by Roadway Lighting Conditions (2017–2021)

2.8.3.5.4 Suspected Impairment

Impairment is commonly cited as an important contributing circumstance. However, the data show that only 1% of VRUs involved in KA crashes on state roads involved alcohol, and only 2% involved drugs (Figure 131).



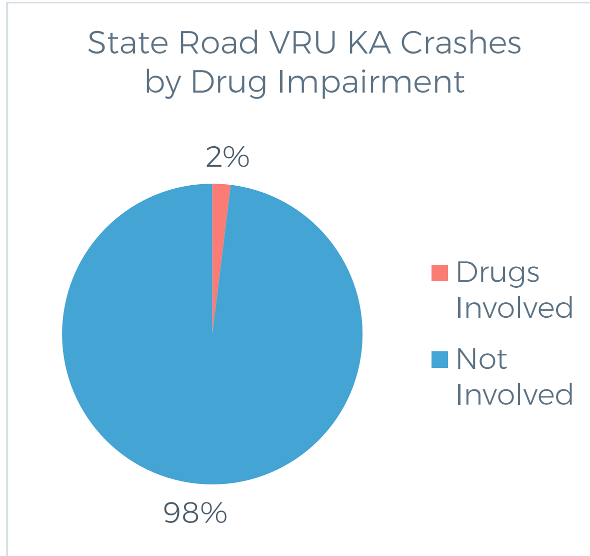


Figure 131: State Road VRU KA Crashes by Alcohol and Drug Impairment (2017–2021)

2.8.3.6 Road Classification Type

Crashes with VRUs do not occur evenly across roadway types, as illustrated in Figure 132, Figure 133, and Figure 134. In many cases, data are unavailable for the roadway class in the crash reports, which leads to N/A being the most cited roadway type for all KA crashes with VRUs (202). The next most common recorded types were local roads (174) and minor arterials (135 recorded crashes). For pedestrians, this pattern remains: with N/A having 176 recorded crashes, local roads having 115, and minor arterials having 88. Cyclists were similar, but local roads were the overall most common road class for crashes with 65, followed by minor arterials with 47, and 39 having no data.

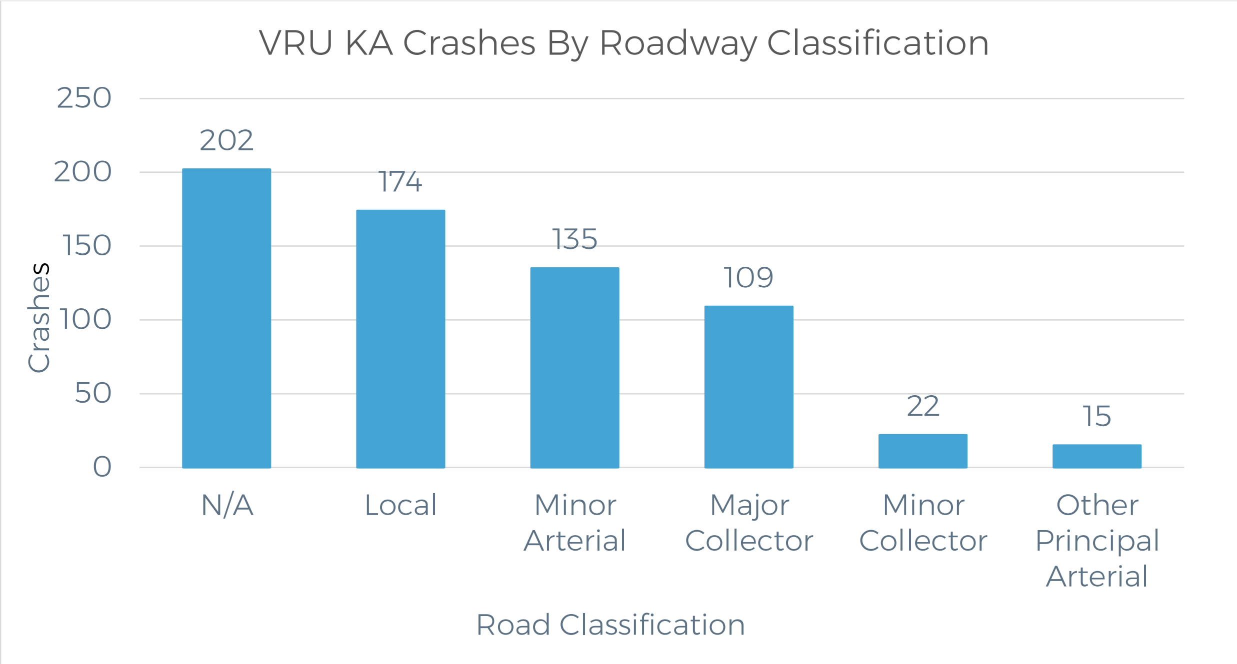


Figure 132: VRU KA Crashes by Roadway Classification (2017-2021)

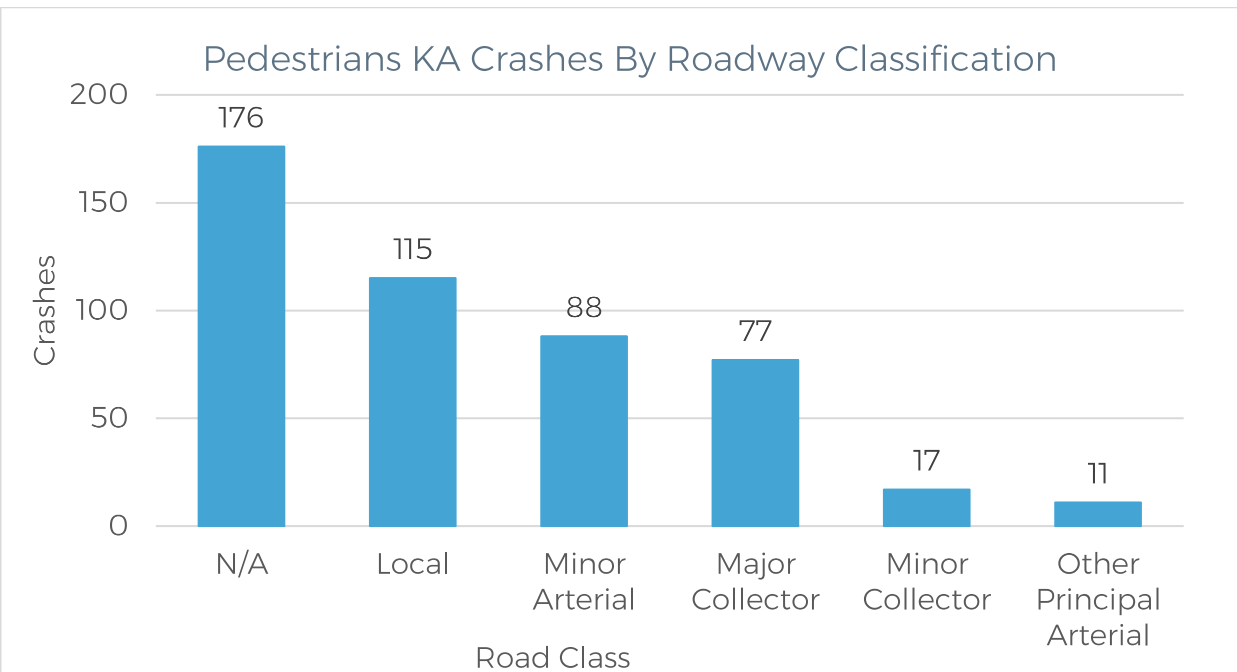


Figure 133: Pedestrian KA Crashes by Roadway Classification (2017–2021)

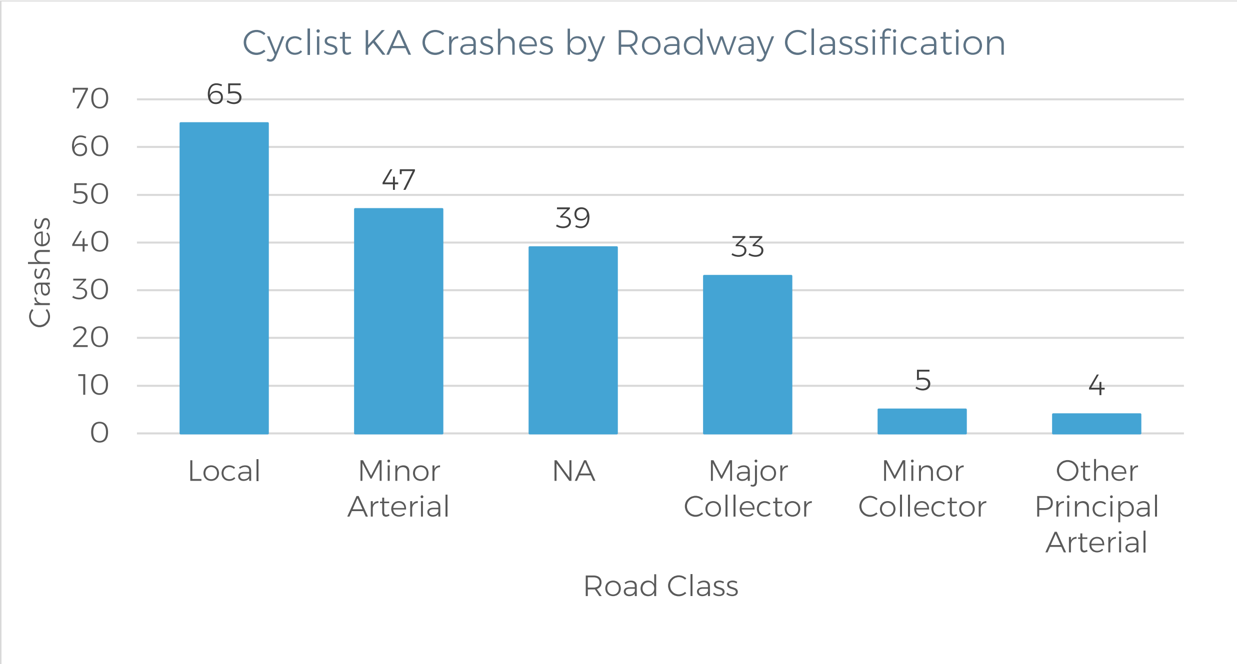


Figure 134: Cyclist KA Crashes by Roadway Classification (2017–2021)

2.8.3.6.1 Number of Lanes

One important factor to consider in roadway design is the number of lanes on a roadway. Most KA collisions with pedestrians and cyclists occurred on two- and four-lane roads, as seen in Figure 135 and Figure 136.

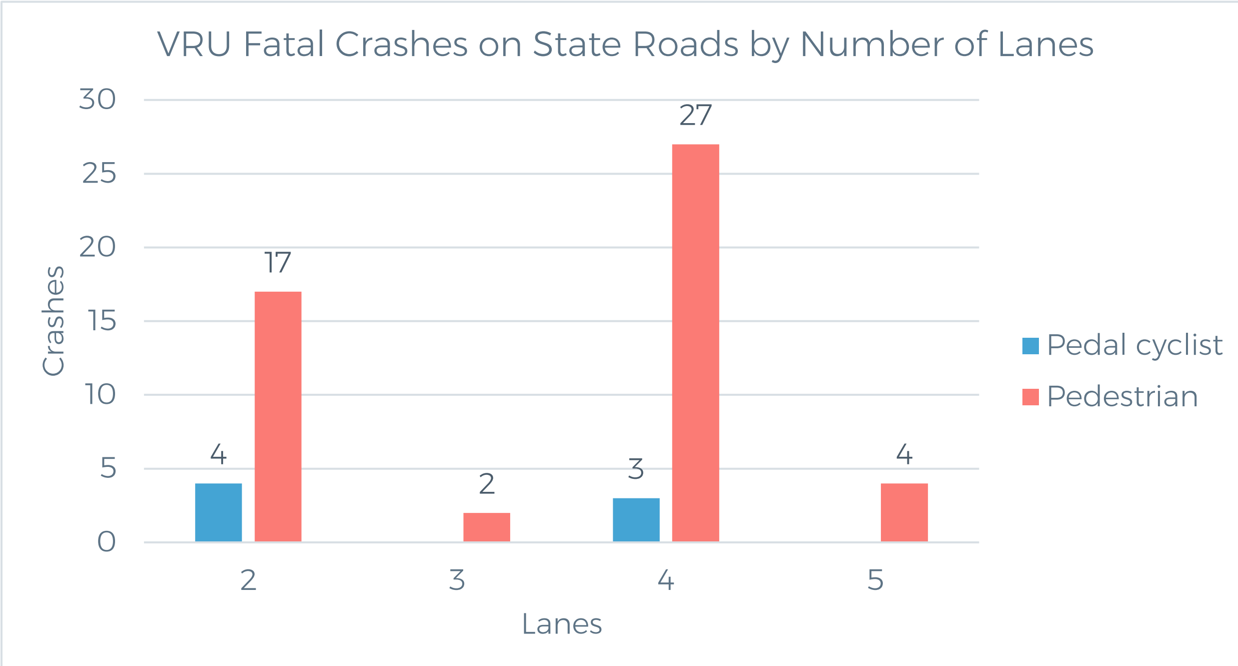


Figure 135: VRU Fatal Crashes on State Roads by Number of Lanes (2017–2021)

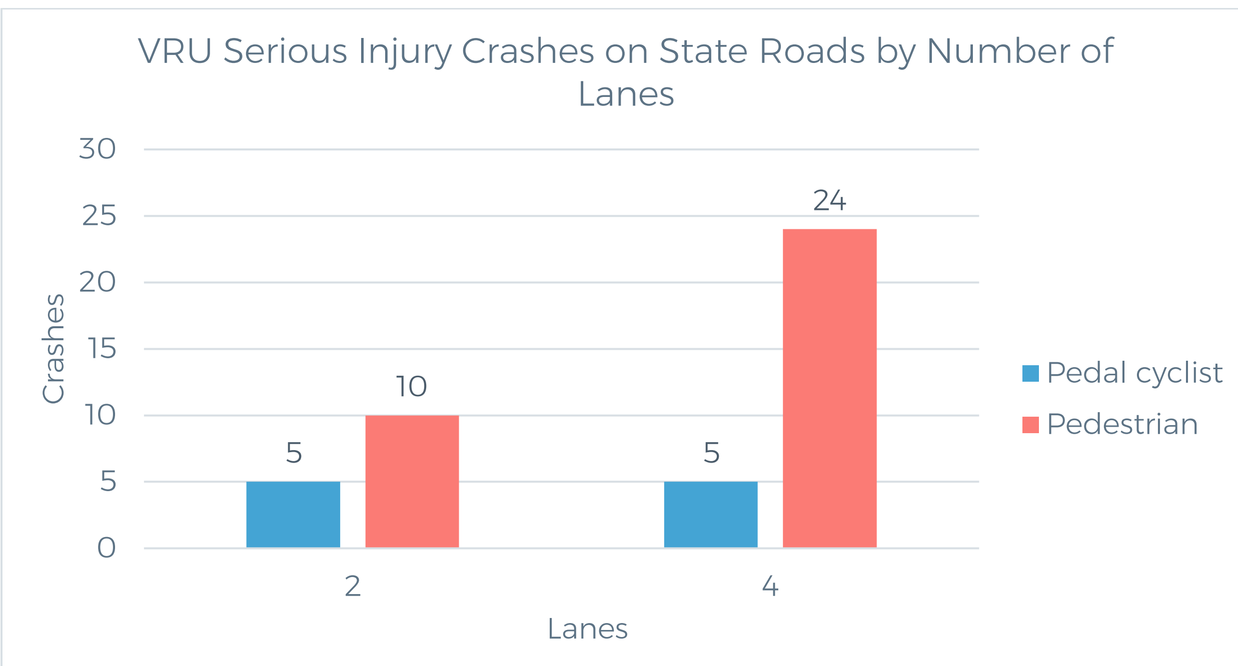


Figure 136: VRU Serious Injury Crashes on State Roads by Number of Lanes (2017–2021)

2.8.4 Disadvantaged Communities Crash Statistics

2.8.4.1 Vulnerable Road User Mode

Figure 137 shows the increasing number of KA crashes inside and outside of DACs; crashes in DACs surpassed the number of crashes outside of DACs in 2021. Figure 138 and Figure 139 show increasing fatalities and serious injuries for VRUs, respectively, with a sharp increase in fatalities between 2020 and 2021. Figure 140 highlights the percent change in VRU crashes from 2014; there has been a 53% increase in pedal cyclist crashes and a 94% increase in pedestrian crashes.

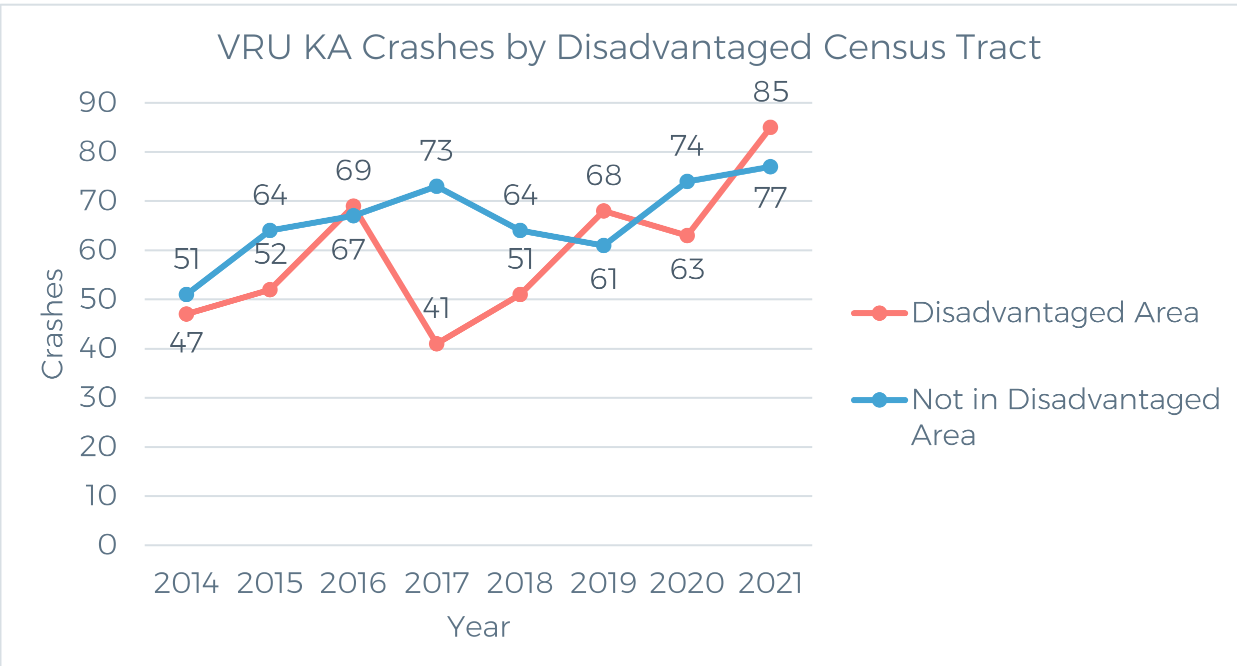


Figure 137: VRU KA Crashes by Disadvantaged Census Tract (2014–2021)

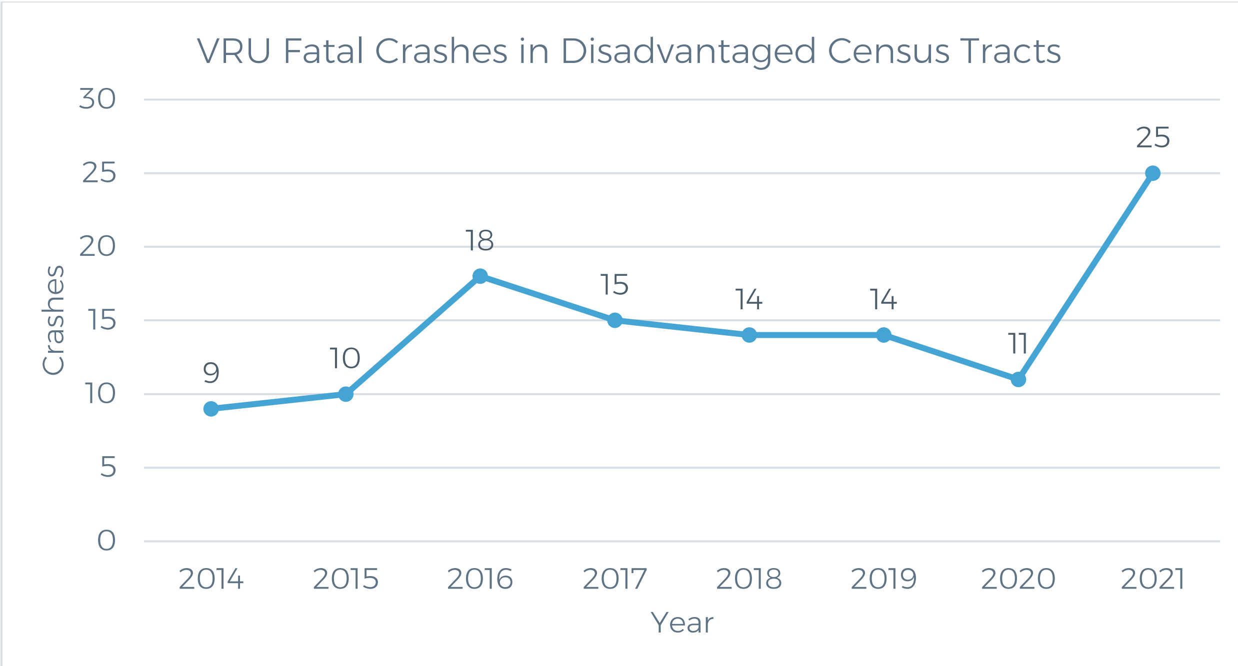


Figure 138: VRU Fatal Crashes in DAC (2014–2021)

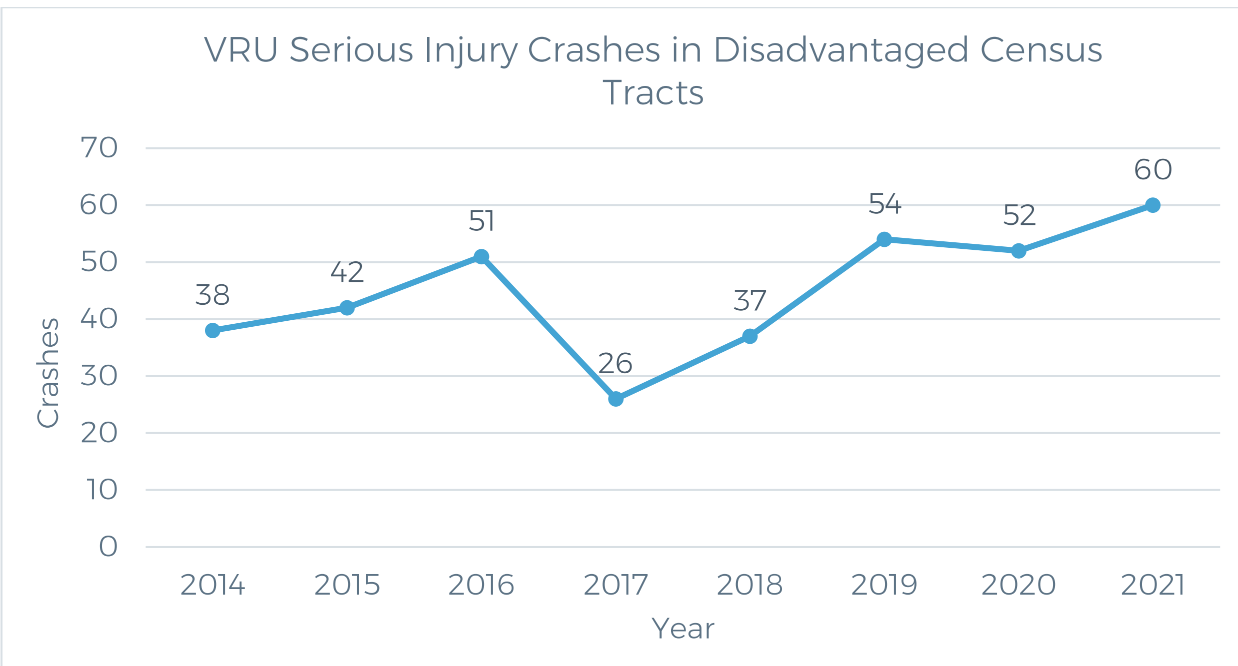


Figure 139: VRU Serious Injury Crashes in DAC (2014–2021)

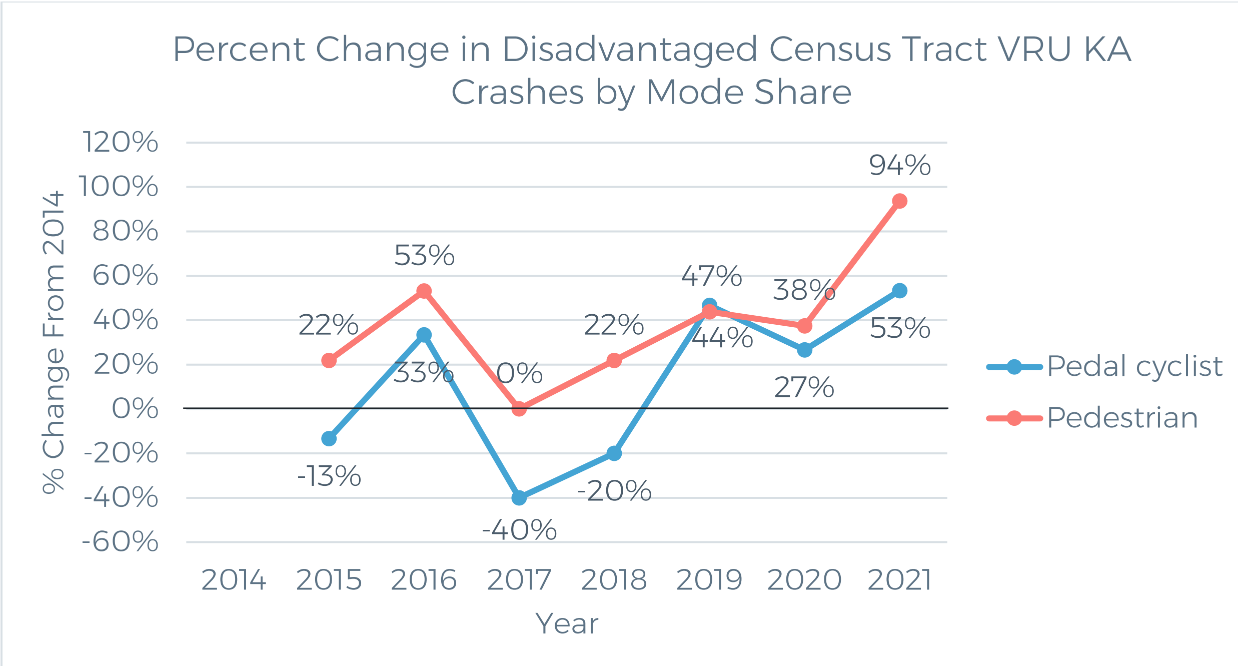


Figure 140: Percent Change in DAC VRU KA Crashes by Mode Share (2014-2021)

2.8.4.2 User Demographics and Equity

Overall, VRU KA crashes were almost evenly split between DAC census tracts (47%) and areas outside of DAC census tracts (53%) (Figure 141). However, it should be noted that roadways in DAC census tracts account for only 16% of total centerlines in Kansas.

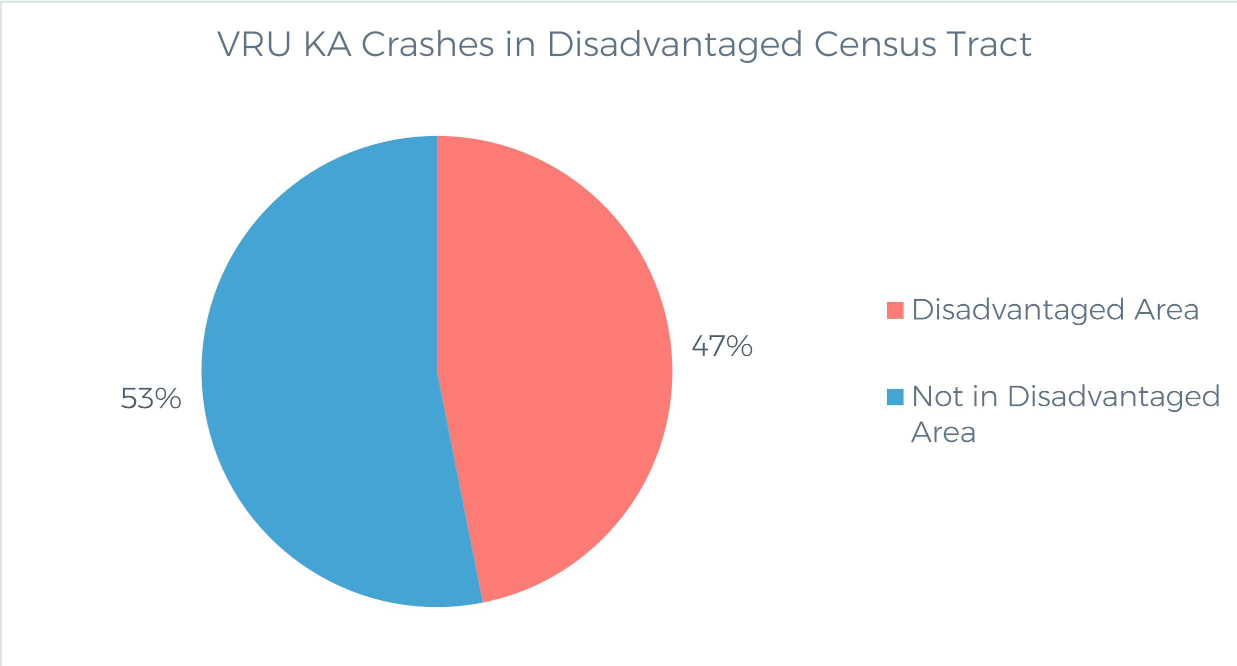


Figure 141: VRU KA Crashes in Disadvantaged Census Tract (2017–2021)

2.8.4.2.1 Age of User

Crashes in DAC census tracts do not occur evenly across age groups. Representation ratios show the percentage that a certain age group makes up relative to the ages of all VRU in KA crashes. Figure 142 shows VRUs involved in KA crashes grouped by age; Figure 143 normalizes this data via representation ratios to account for distribution in the population. Several age groups are overrepresented in crashes, with most being adults between the ages of 55 and 59, followed by teens between the ages of 15 and 19.

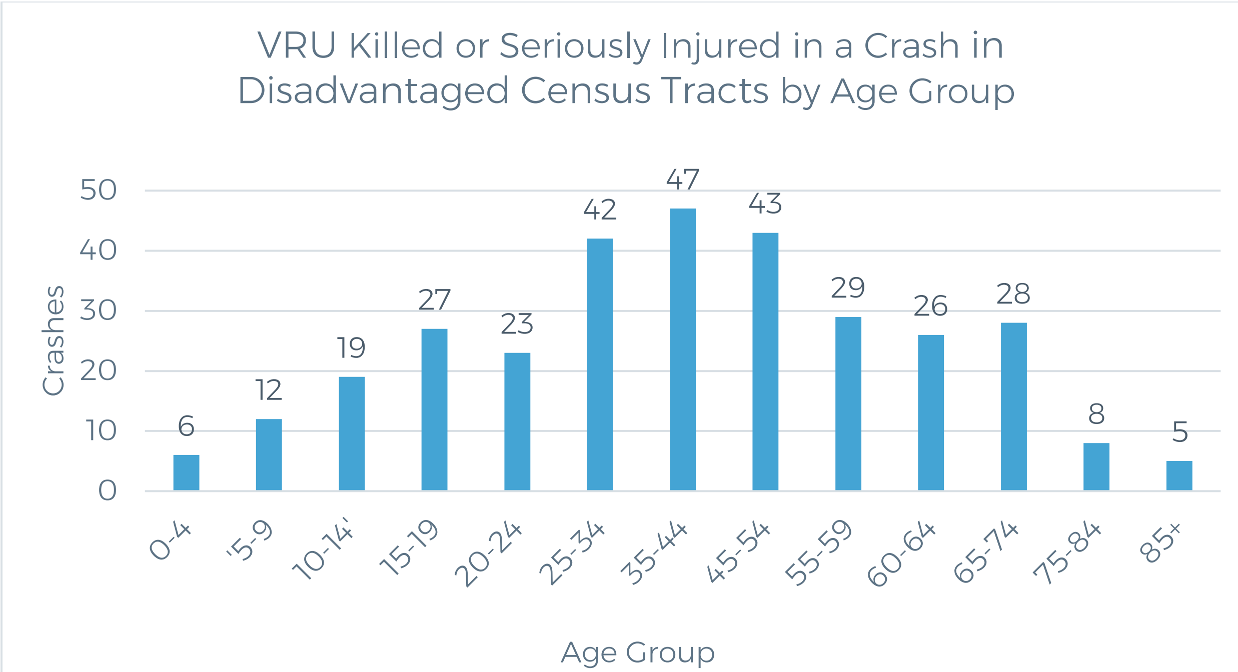


Figure 142: VRU Killed or Seriously Injured in a Crash in DAC Census Tract by Age Group (2017–2021)

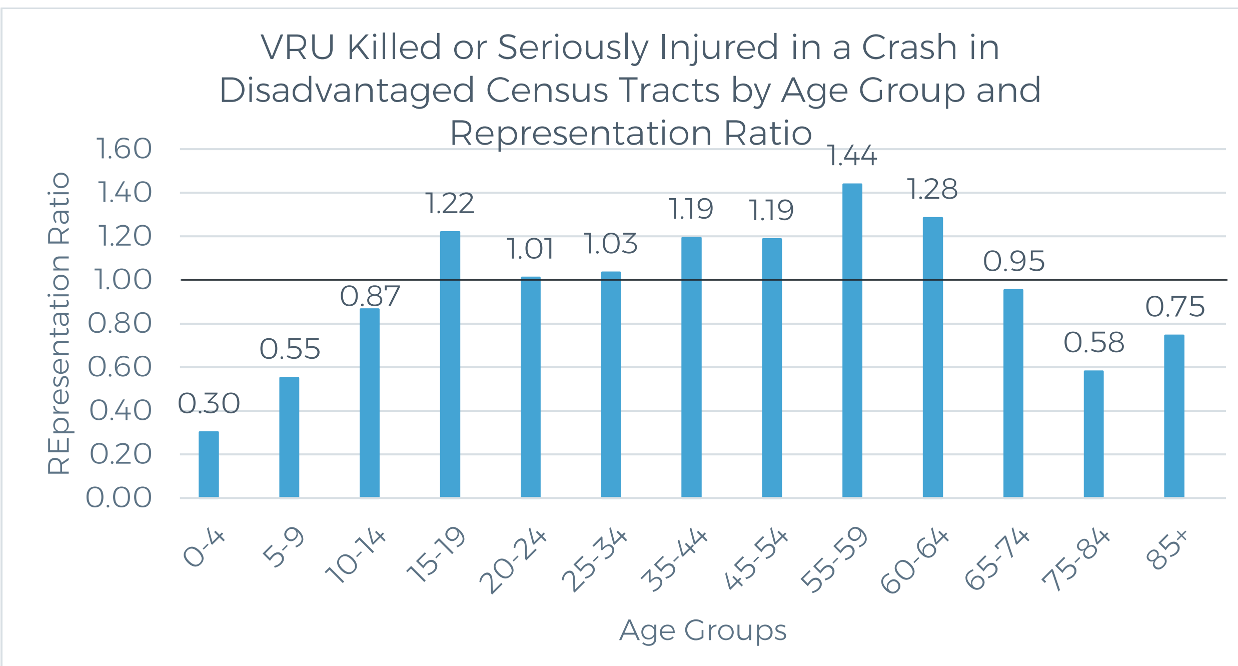


Figure 143: VRU Killed or Seriously Injured in a Crash in DAC Census Tract by Age Group and Representation Ratio (2017–2021)

2.8.4.2.2 Sex of User

Males accounted for 73% of the killed or seriously injured in a crash of fatal VRU crashes and 66% of serious injury crashes in DAC census tracts (Figure 144). Figure 145 shows the general trend for the study period.

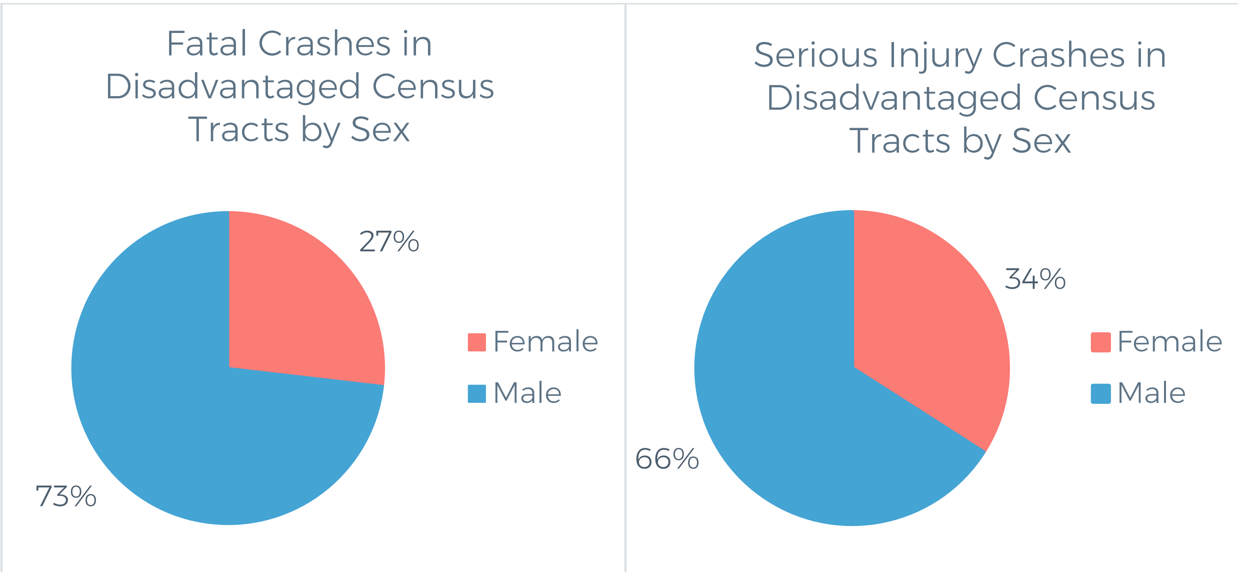


Figure 144: VRUs Killed or Seriously Injured in a Crash in DAC Census Tracts by Sex (2017–2021)

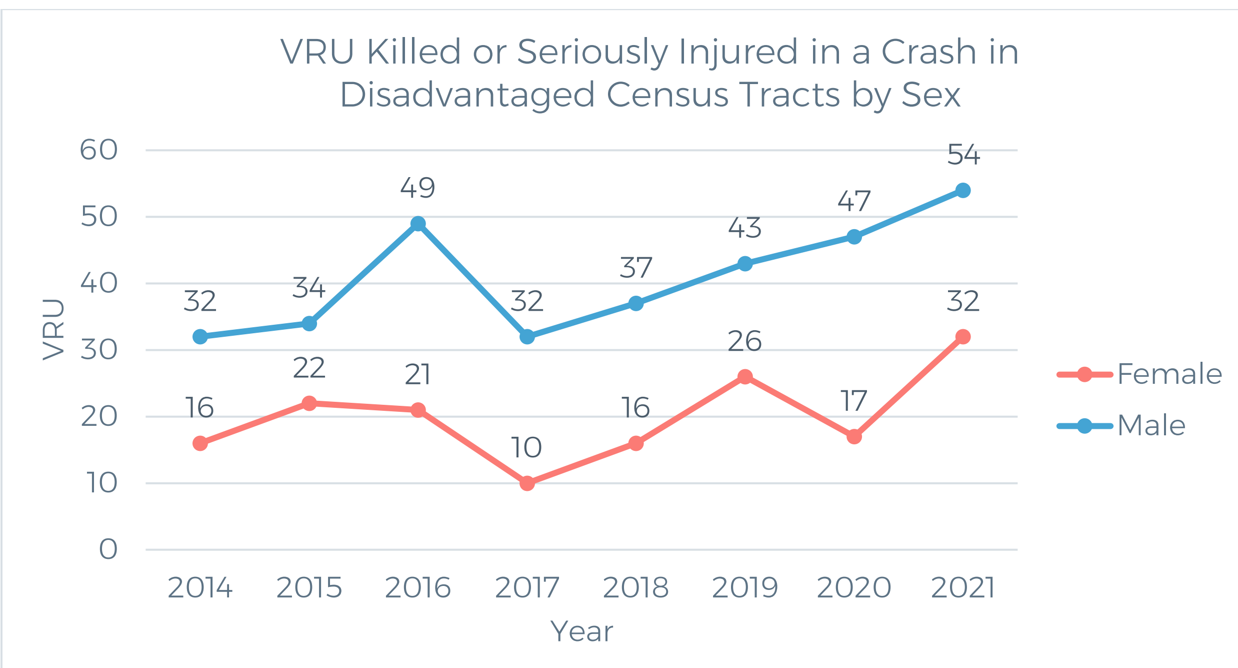


Figure 145: VRUs Killed or Seriously Injured in a Crash in DAC Census Tracts by Sex (2014–2021)

2.8.4.3 Crash Location and Type

2.8.4.3.1 Intersections

Figure 146 and Figure 147 show that the location of the VRUs involved in fatal and serious injury crashes in DAC census tracts was most often an intersection outside of crosswalks or bikeways.

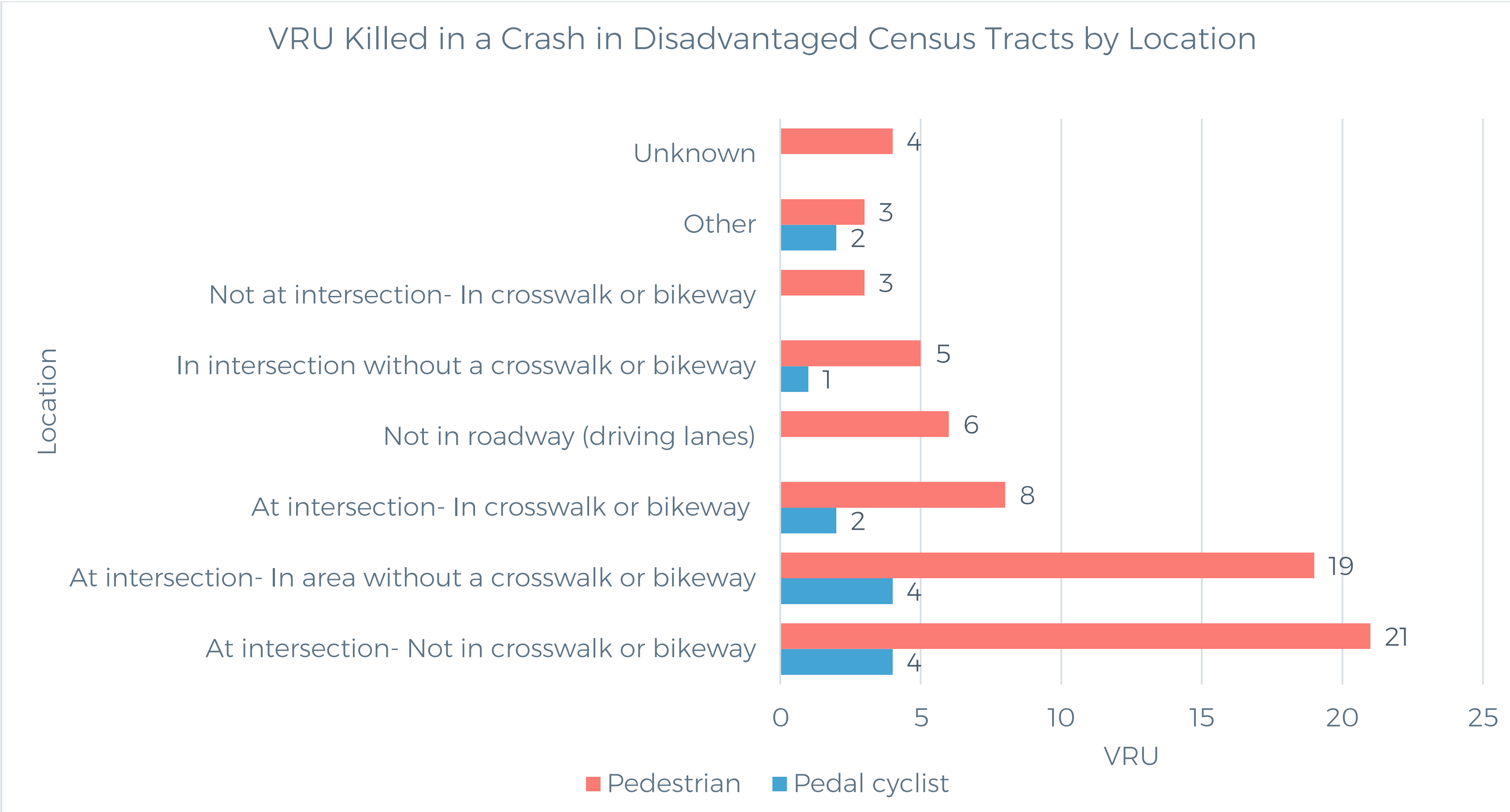


Figure 146: VRU Killed in a Crash in DAC Census Tracts by Location (2017–2021)

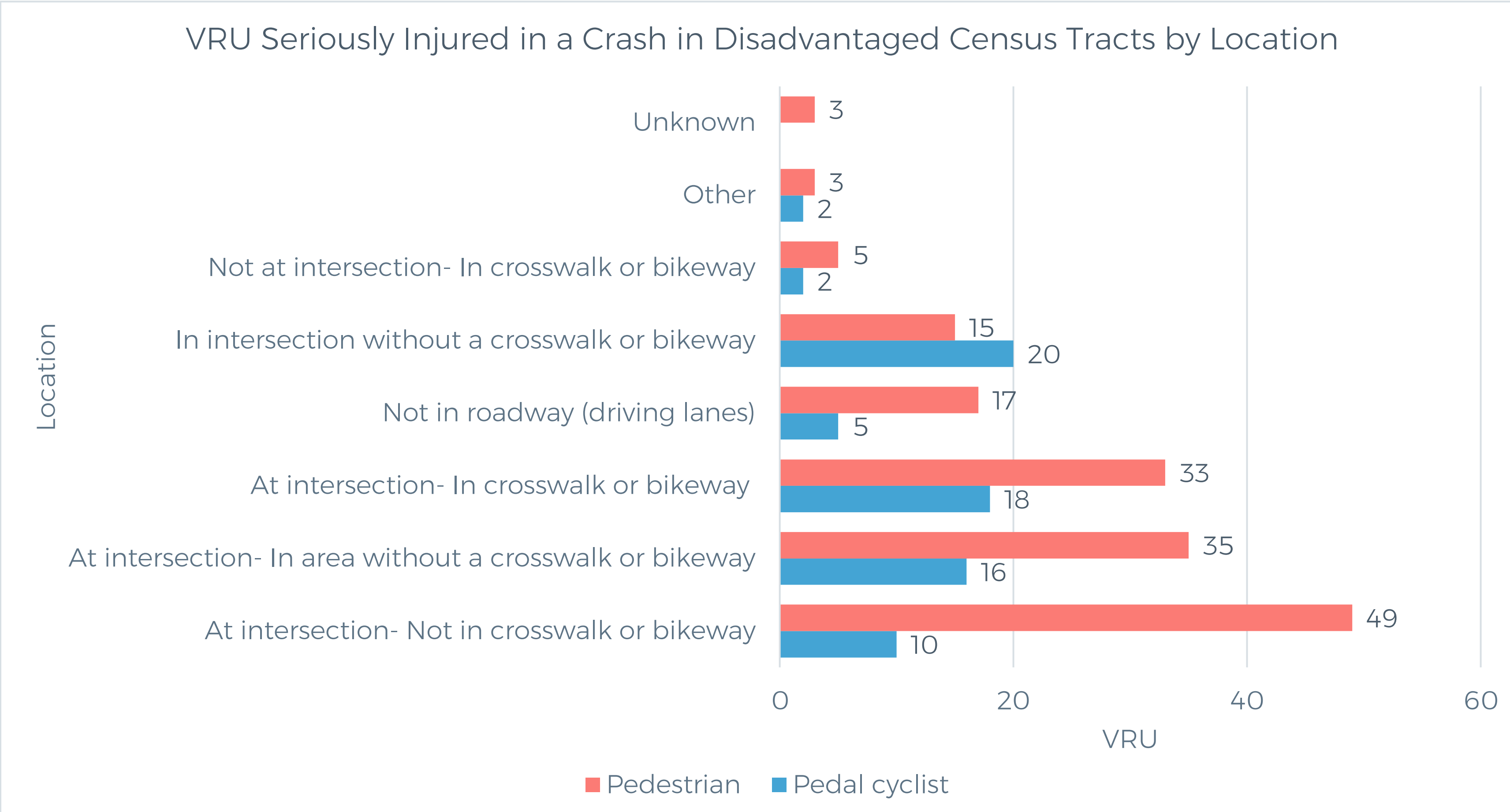


Figure 147: VRU Seriously Injured in a Crash in DAC Census Tracts by Location (2017–2021)

2.8.4.3.2 Road Classification Type

For crashes with available data, in DACs, the most common road types for VRU KA crashes were minor arterial streets, followed by local roads and major collector streets (Figure 148 and Figure 149). It should be noted that local roadways account for 68% of all Kansas roads, so the arterials and collectors account for an overrepresented number of crashes.

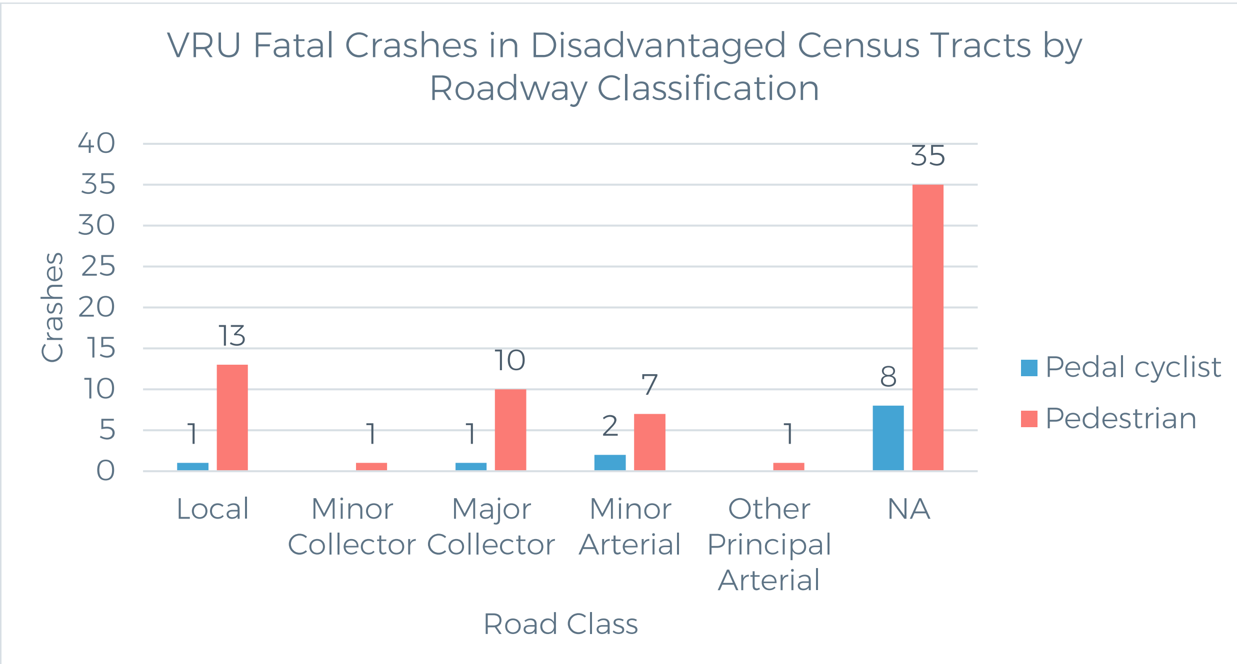


Figure 148: VRU Fatal Crashes in DACs by Roadway Classification (2017–2021)

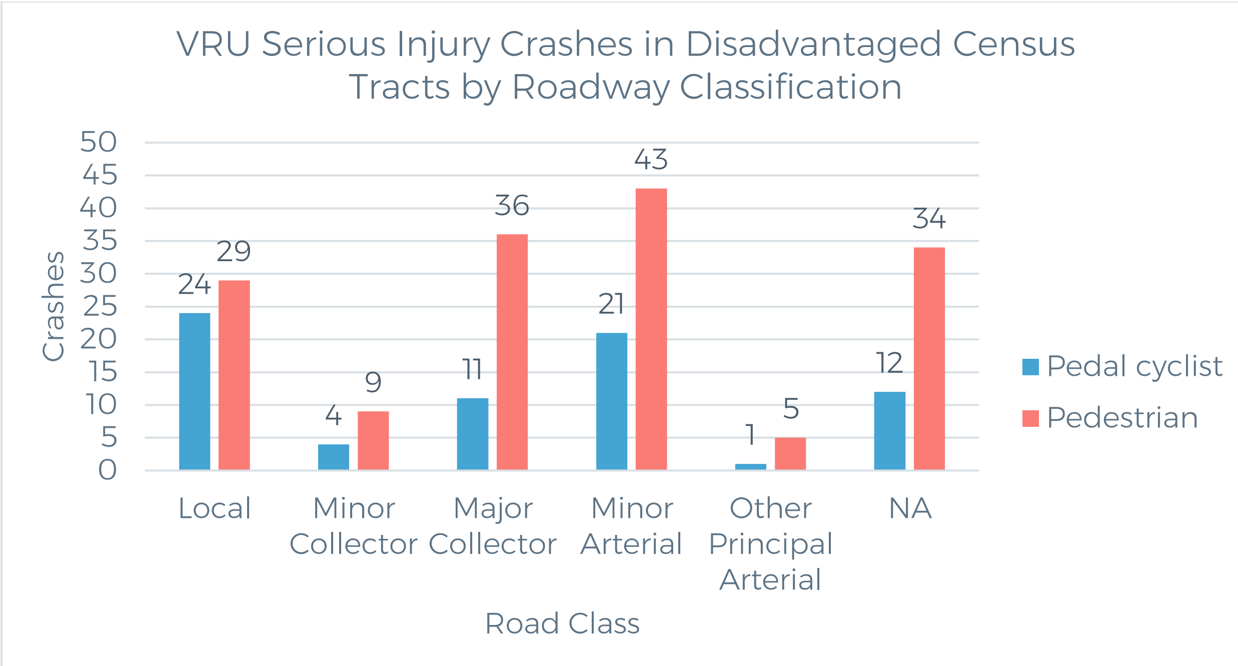


Figure 149: VRU Serious Injury Crashes in DACs by Roadway Classification (2017-2021)

2.8.4.4 Contributing Circumstances

The reporting law enforcement officer determines contributing circumstances for all VRU killed or seriously injured in DACs, shown in Figure 150. Overall, officers determined that there was no evident cause for VRUs killed and seriously injured. Additionally, no discernible cause was reported for pedestrians and cyclists who were killed or seriously injured in a crash in a DAC census tract, as shown in Figure 151.

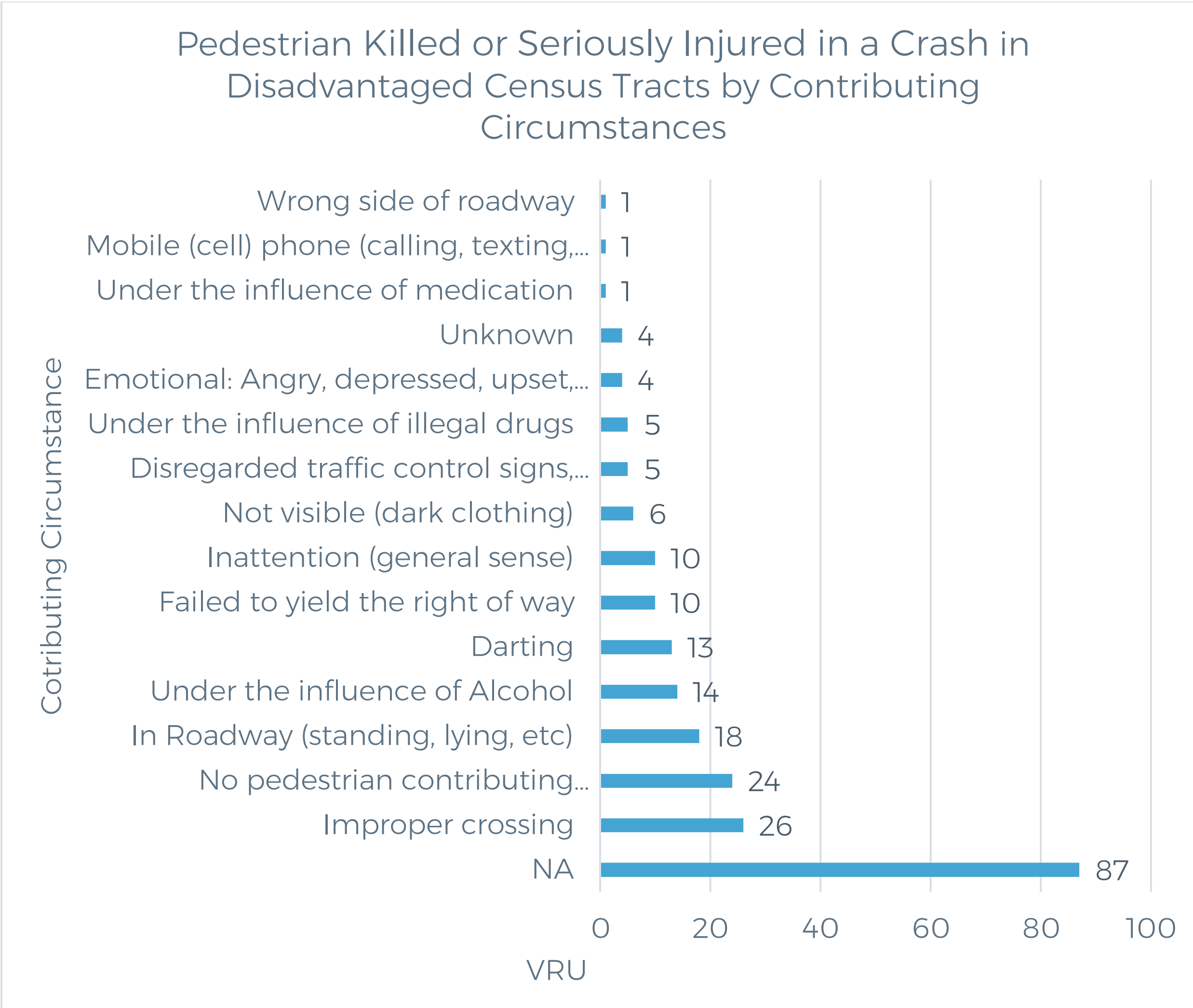


Figure 150: Pedestrian Killed or Seriously Injured in a Crash in DAC Census Tracts by Contributing Circumstances (2017–2021)

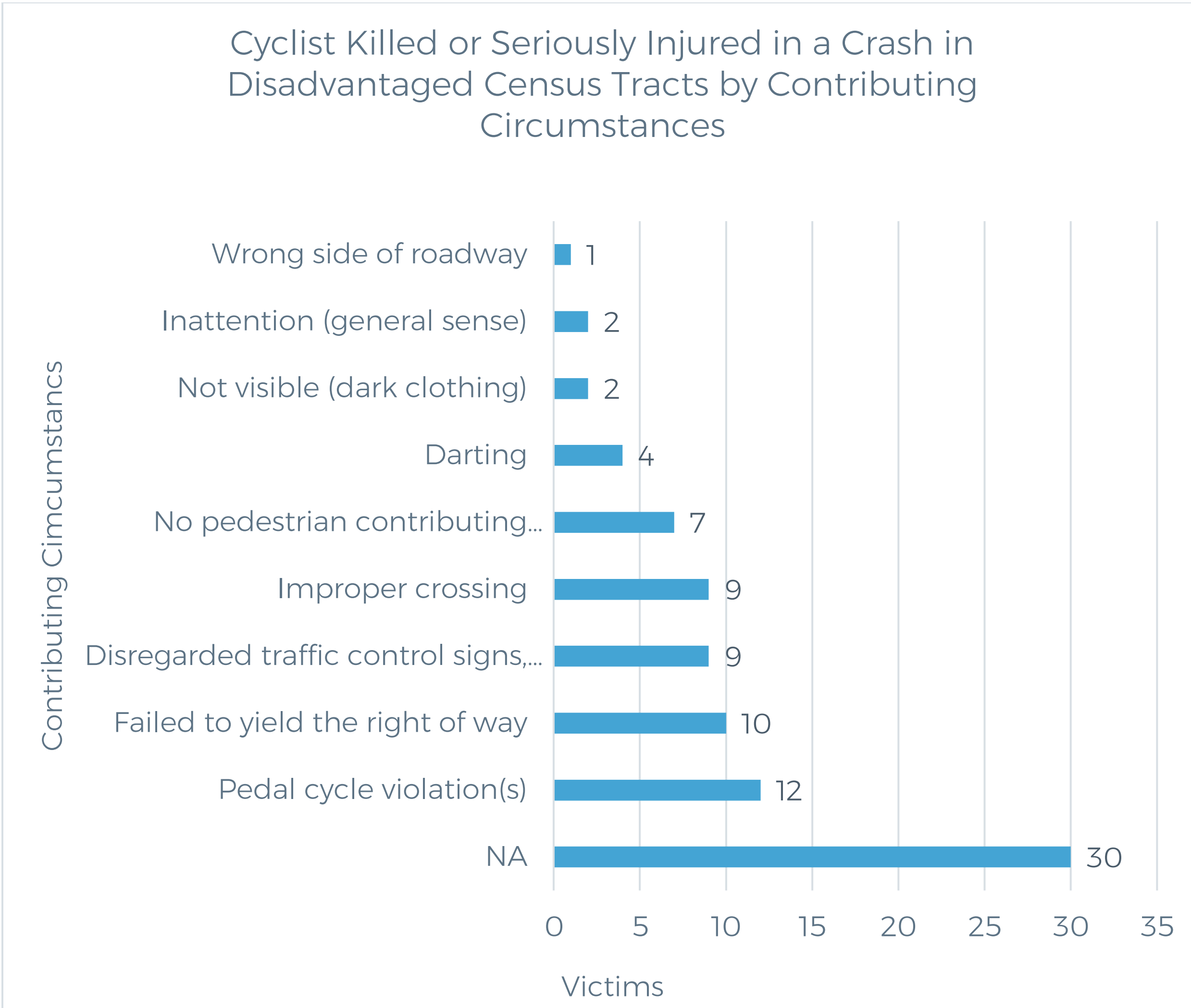


Figure 151: Cyclist Killed or Seriously Injured in a Crash in DAC Census Tracts by Contributing Circumstances (2017–2021)

2.8.4.4.1 Speed Limit of Roadway

Speed limits affect the survivability of a crash. Figure 152 and Figure 153 show a general trend that indicates that for KA collisions in DACs, as speed increases, the likelihood of survival decreases. It is important to note that the largest number of serious injuries (64) and fatalities (23) in DACs occur at 30 mph, which is generally considered a safe traveling speed.

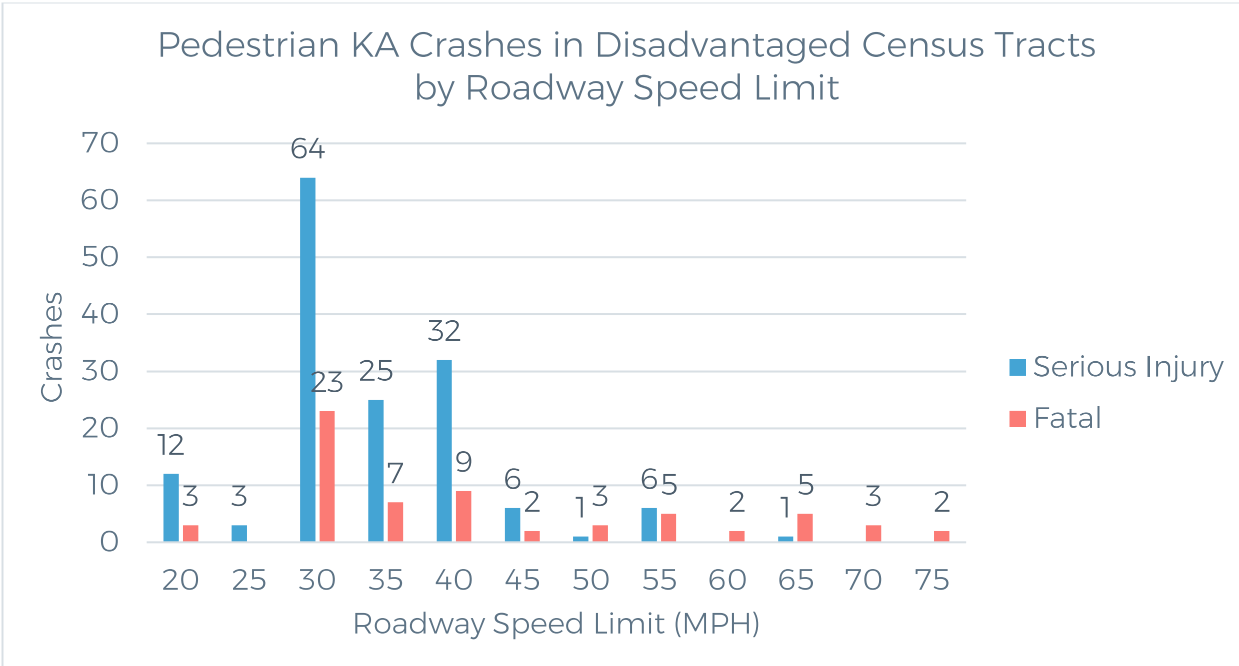


Figure 152: Pedestrian KA Crashes in DAC Census Tracts by Roadway Speed Limit (2017–2021)

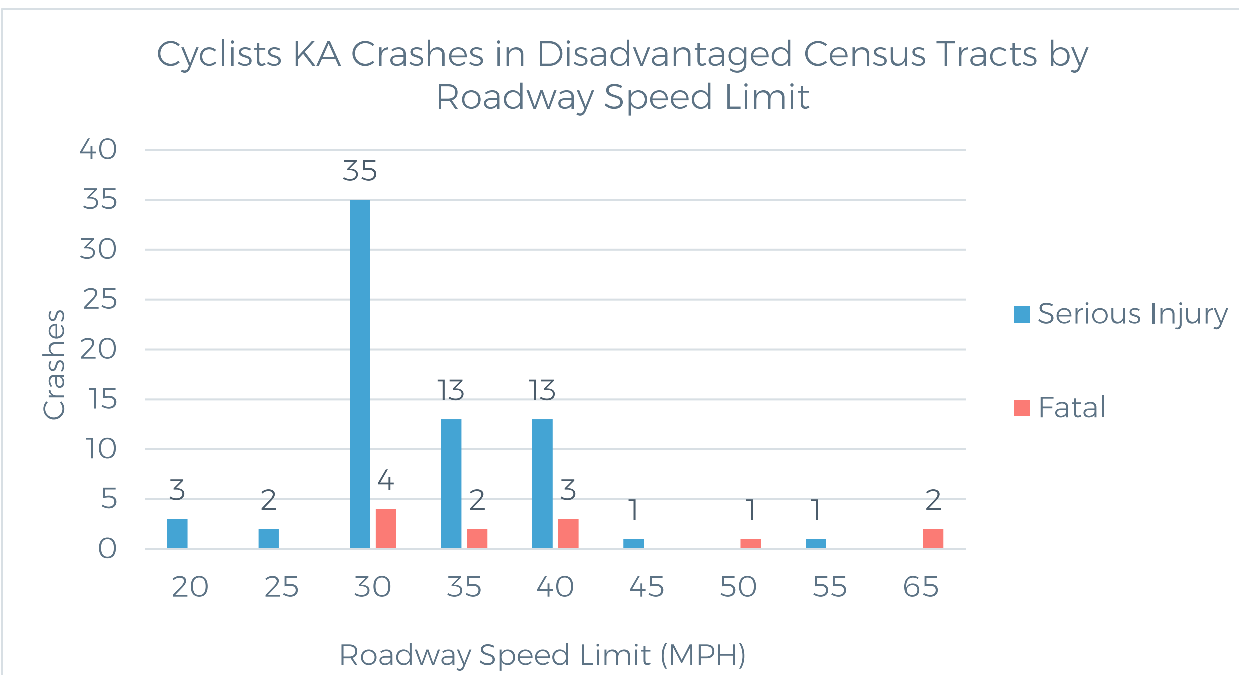


Figure 153: Cyclists KA Crashes in DAC Census Tracts by Roadway Speed Limit (2017–2021)

2.8.4.4.2 Environmental Conditions

Crashes with wet, snowy, or icy road conditions were more likely to occur in DAC census tracts than outside them, as seen in Figure 154. Figure 155 shows that the most common road condition present for collisions with VRUs in DACs was a dry road for all mode shares, although 11% of pedestrian crashes in DACs occurred under wet conditions. Hazardous conditions include conditions other than a dry roadway.

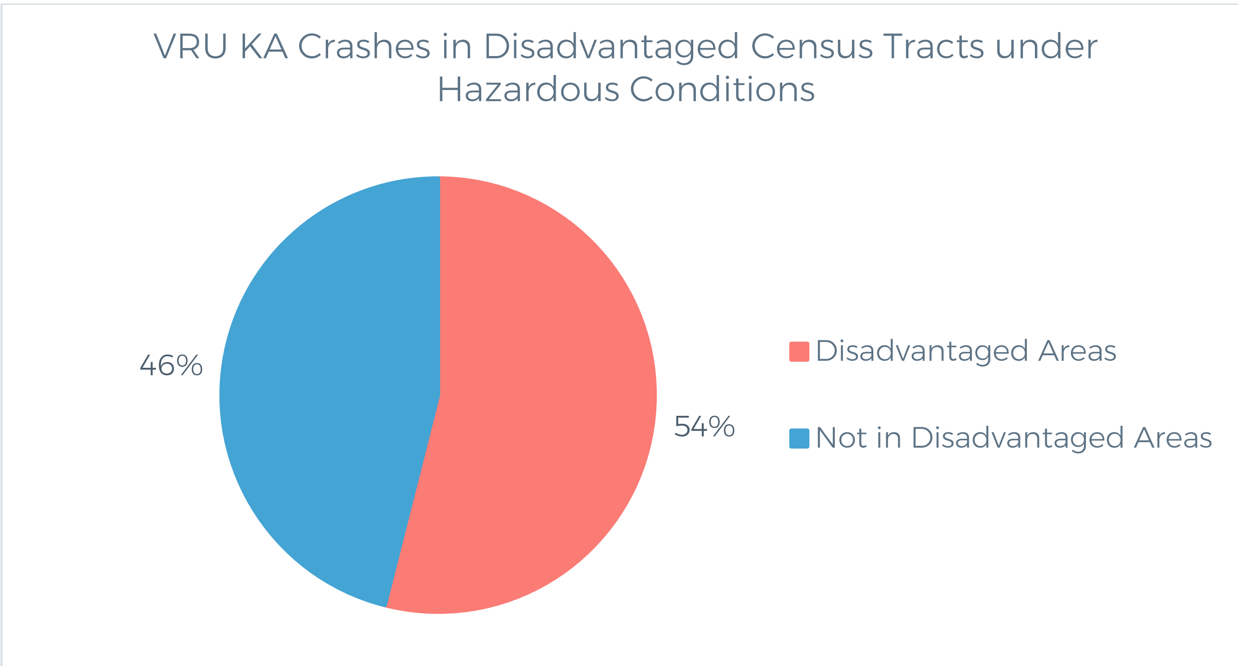


Figure 154: VRU KA Crashes in DAC Census Tracts under Hazardous Conditions (2017–2021)

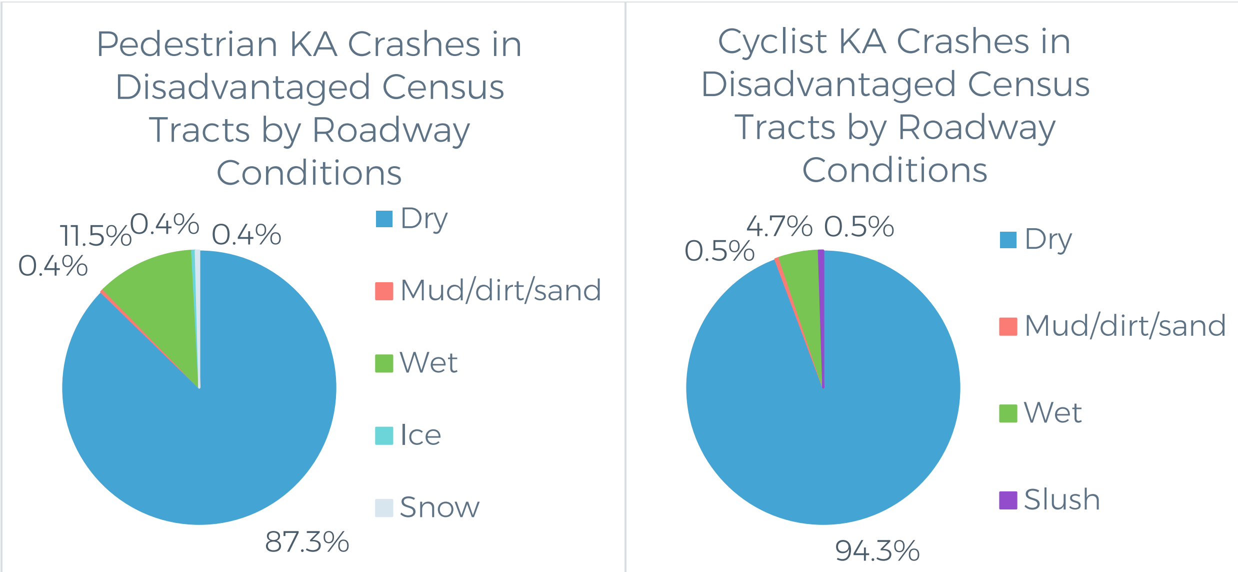


Figure 155: VRU KA Crashes in DAC Census Tracts by Roadway Conditions (2017–2021)

2.8.4.4.3 Lighting Conditions

Among KA collisions with pedestrians in DAC census tracts, most occurred at nighttime, with streetlights on or during daylight hours (Figure 156). Figure 157 shows a similar pattern for KA collisions with cyclists.

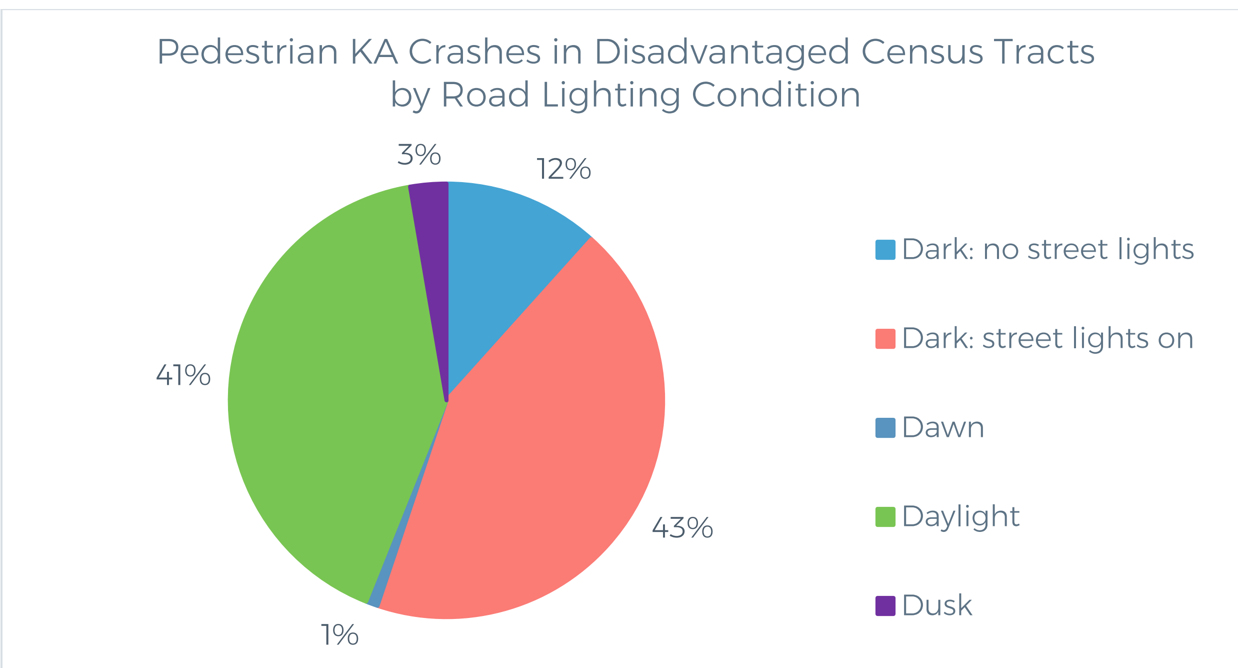


Figure 156: Pedestrian KA Crashes in DAC Census Tracts by Roadway Lighting Conditions (2017–2021)

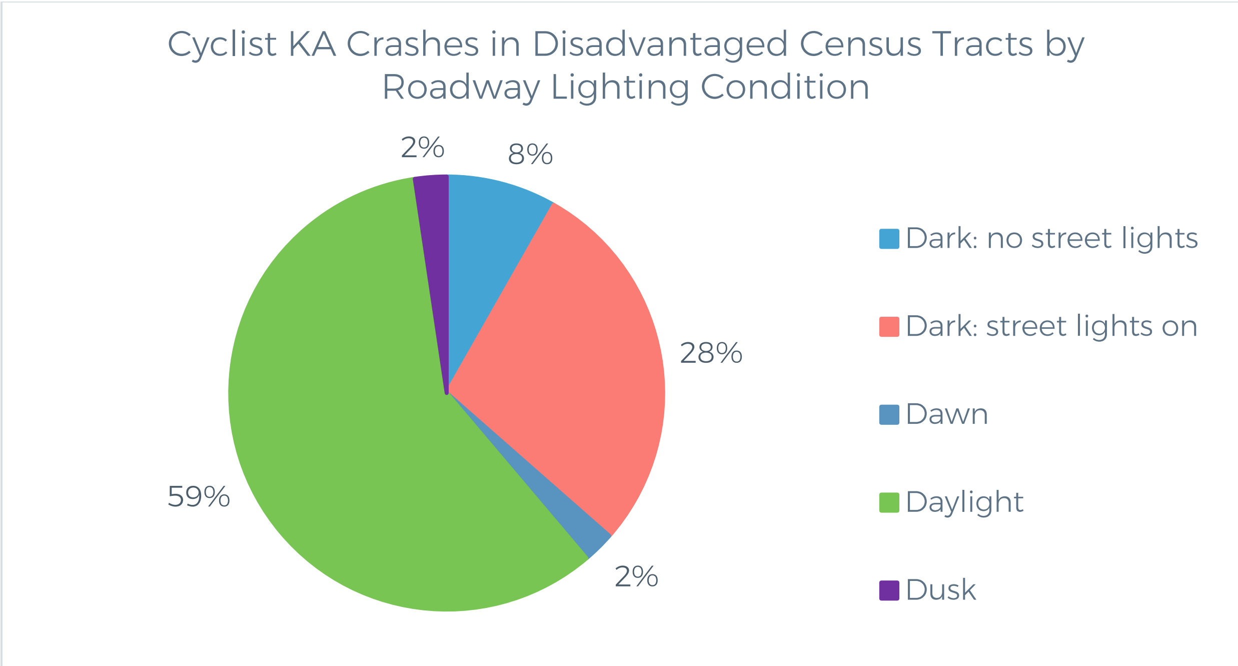


Figure 157: Cyclist KA Crashes in DAC Census Tracts by Roadway Lighting Conditions (2017–2021)

2.8.4.4.4 Suspected Impairment

Most KA crashes with pedestrians and cyclists in DAC census tracts did not involve alcohol or drugs, as shown in Figure 158.

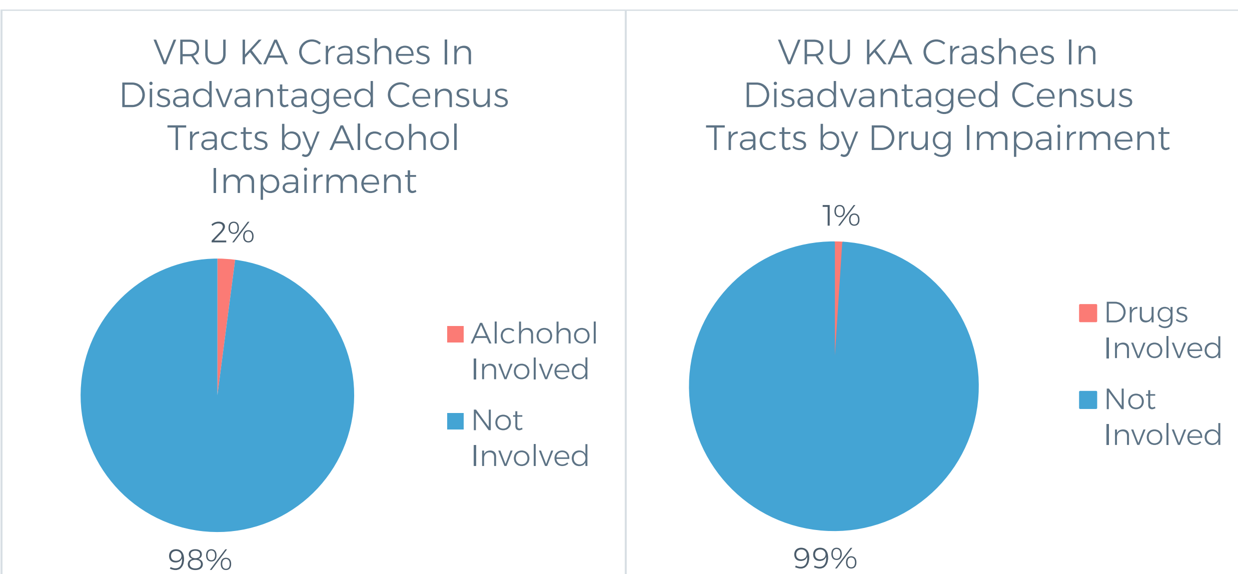


Figure 158: VRU KA Crashes in DAC Census Tracts by Alcohol and Drug Impairment (2017–2021)

2.8.5 Subarea Type Crash Statistics

VRU crashes have different causes and require different countermeasures to address the safety issues depending on the area. To account for these differences, a subarea analysis was conducted based on place and equity typologies. Three typology levels, based on population and job density, were used:

- Rural
- Suburban
- Urban

The equity typologies were determined based on locations designated as either DACs or not DACs. The following sections provide information for each specific subarea. Figure 159 and Figure 160 show the general KA trends by area type. The number of rural crashes has remained relatively constant, seeing only an 11% change between 2014 and 2021. Suburban crashes have fluctuated, with a sharp increase in crashes between 2020 and 2021. Urban crashes are the most noteworthy, as more than half of VRU KA crashes happen in urban areas and have been steadily increasing since 2014.

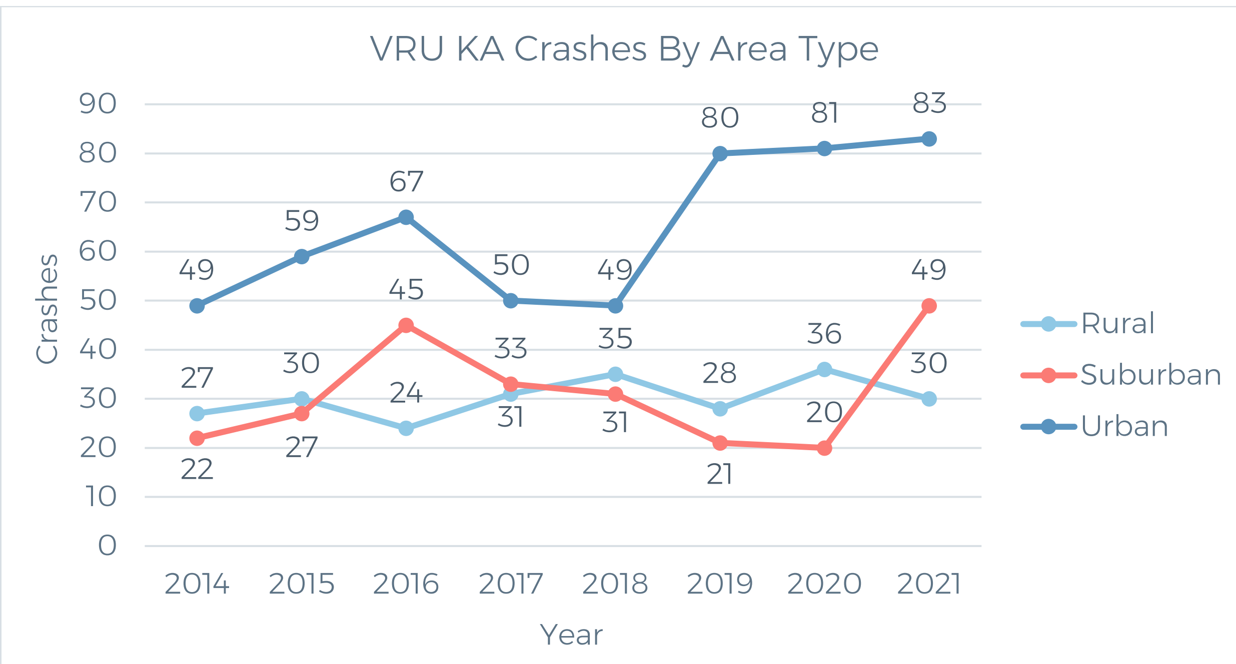


Figure 159: VRU Killed or Seriously Injured in a Crash by Area Type (2014–2021)

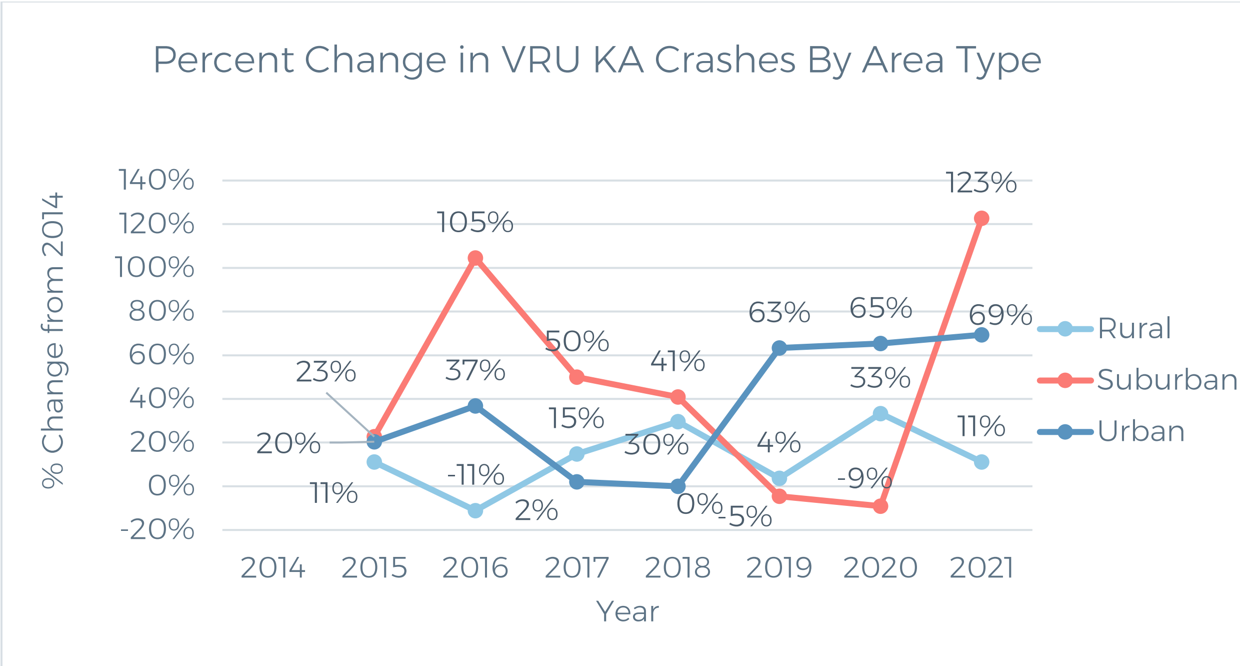


Figure 160: Percent Change in VRU Killed or Seriously Injured in a Crash by Area Type (2014 Base Year)

2.8.5.1 Rural Area Types Crash Statistics

2.8.5.1.1 Trends

The number of VRUs killed or seriously injured in a crash of KA crashes on rural roads in Kansas has increased between 2014 and 2021, with the leading contributor being serious injury crashes. Fatal and serious injury crash trends from 2014 to 2021 are shown in Figure 161; they are separated by fatal and serious injury in Figure 162 and Figure 163, respectively. Overall, KA collisions increased from 27 to 30 over the study period. On a population basis, people in rural areas were marginally less likely to be involved in a KA crash, as seen in Figure 164.

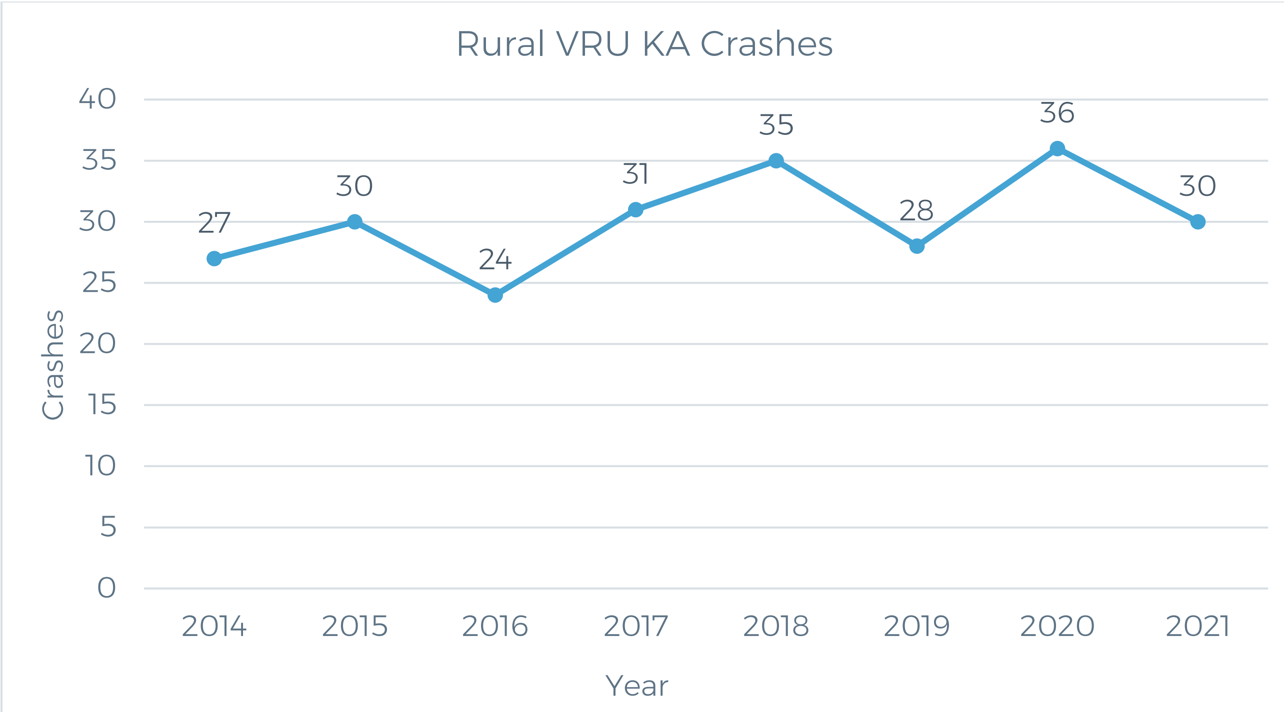


Figure 161: Rural VRU KA Crashes (2014–2021)

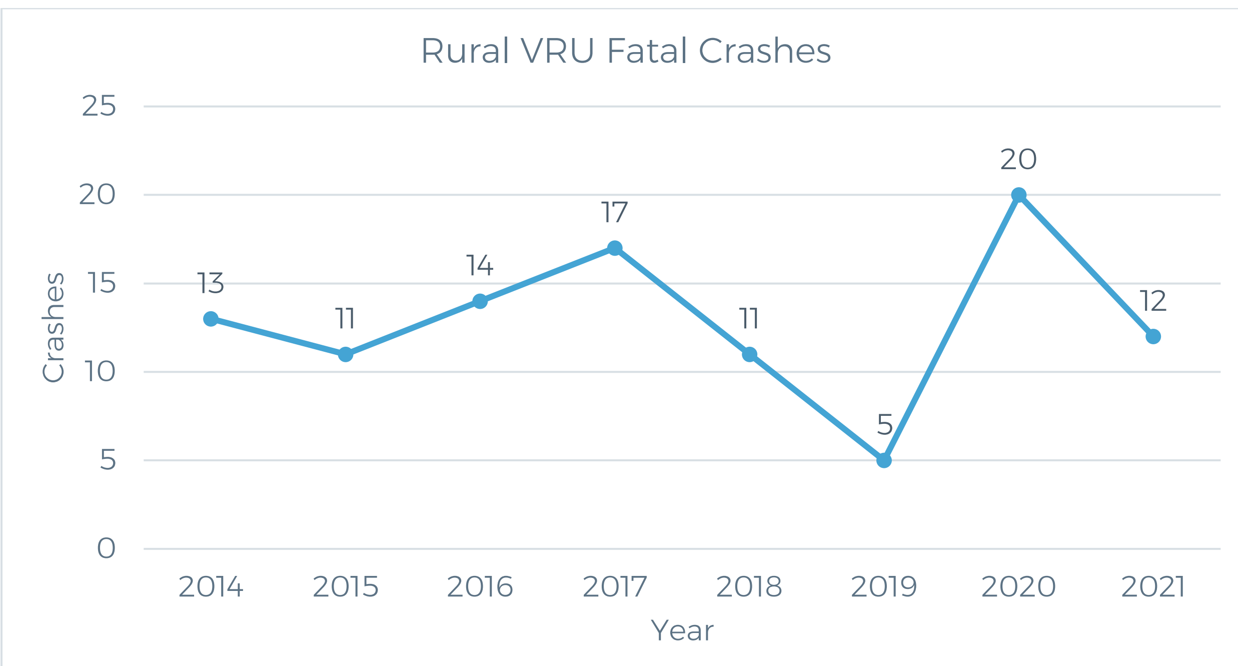


Figure 162: Rural VRU Fatal Crashes (2014–2021)

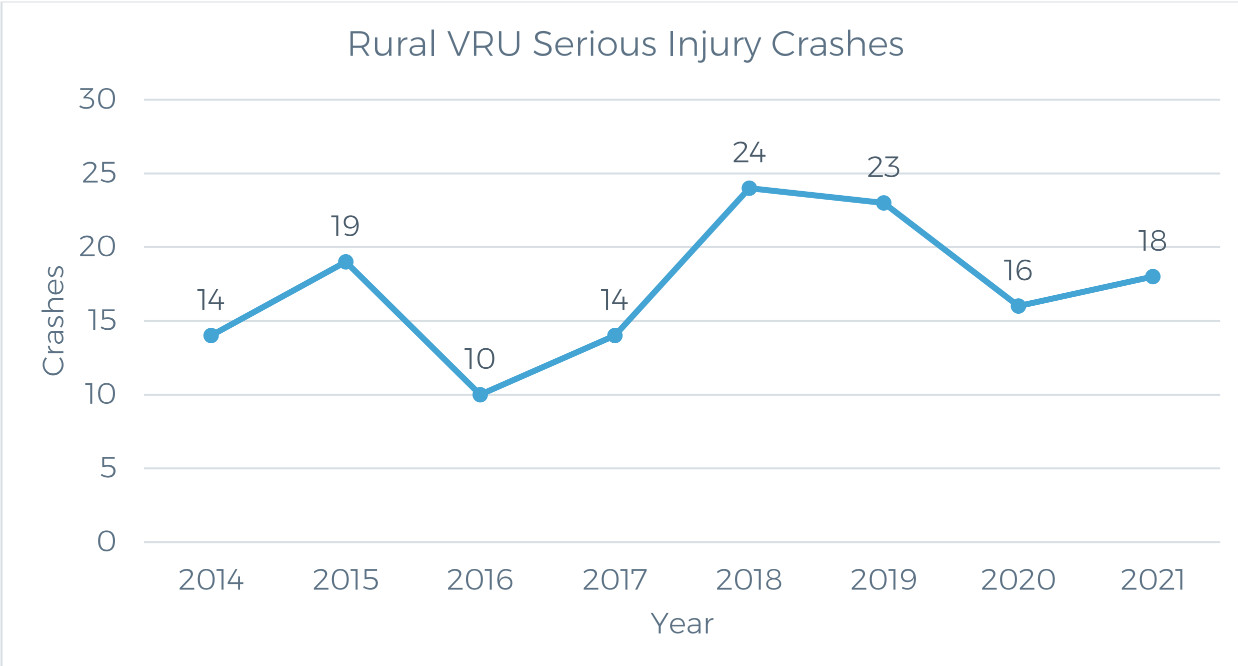


Figure 163: Rural VRU Serious Injury Crashes (2014–2021)

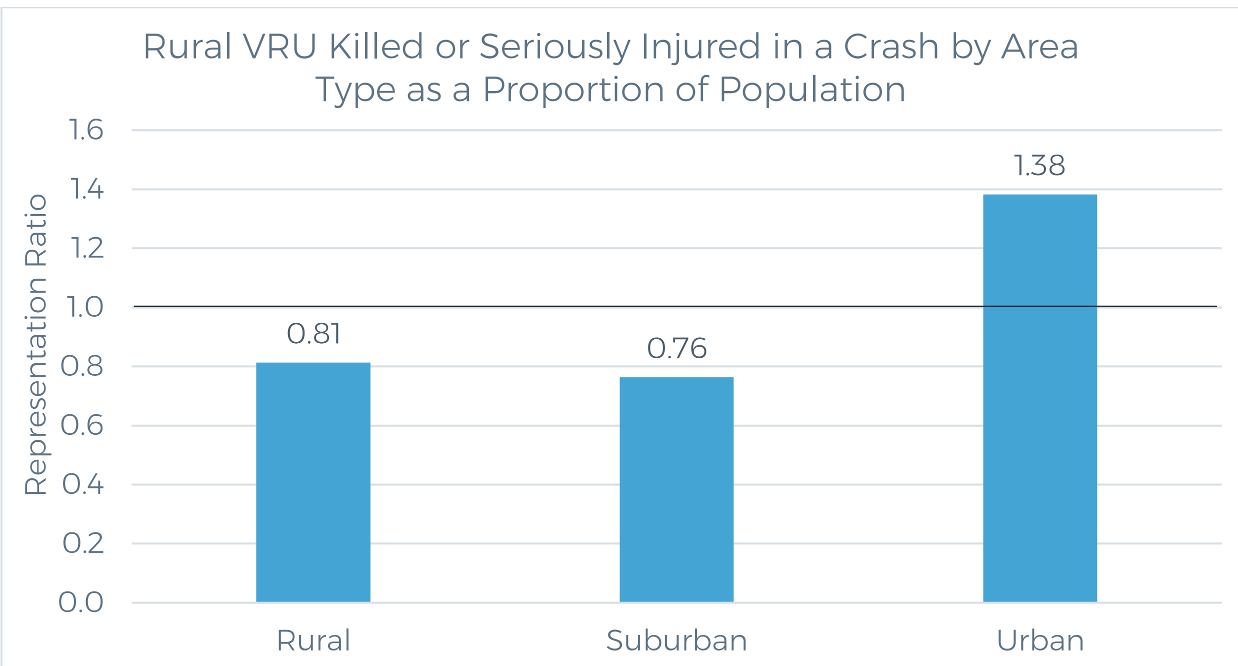


Figure 164: Rural VRU Killed or Seriously Injured in a Crash by Representation Ratio as a Proportion of Population; >1=Over Represented (2017–2021)

2.8.5.1.2 Pedestrians and Cyclists

Pedestrians constituted the largest proportion of VRU crashes that resulted in a KA crash in rural areas, as seen in Figure 165. Figure 166 shows that pedestrian VRU KA crashes have increased; there were 15% more VRUs killed or seriously injured in a crash in 2021 than in 2014.

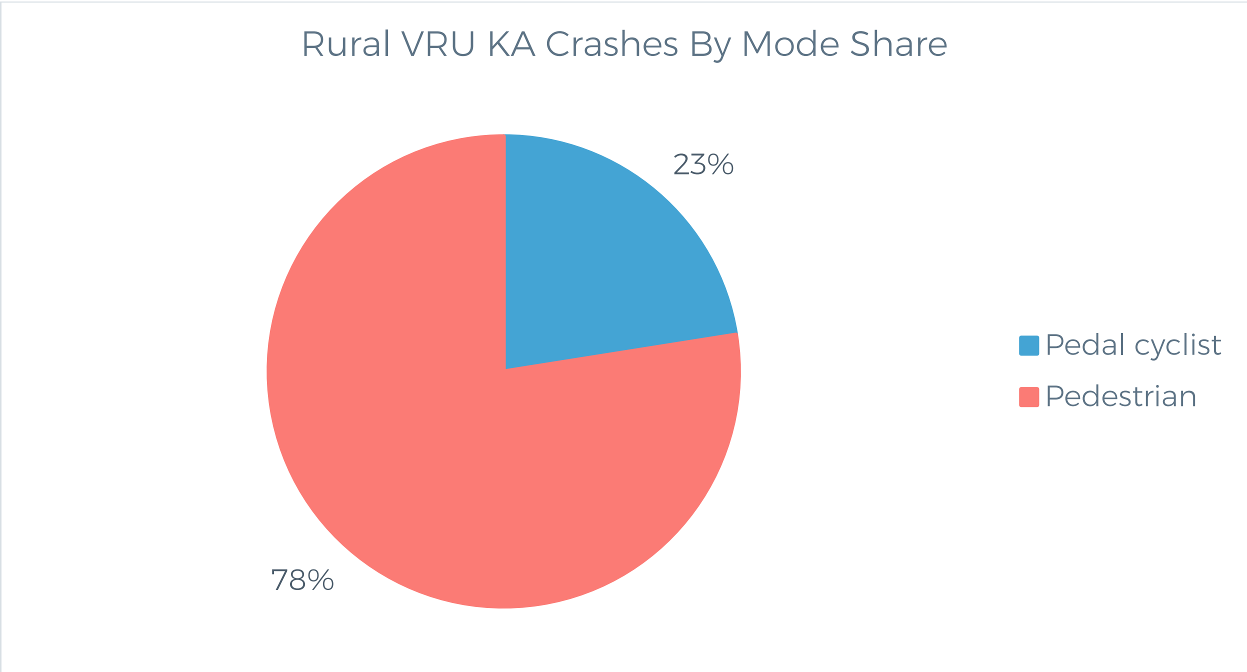


Figure 165: Rural VRU KA Crashes by Mode Share (2017-2021)

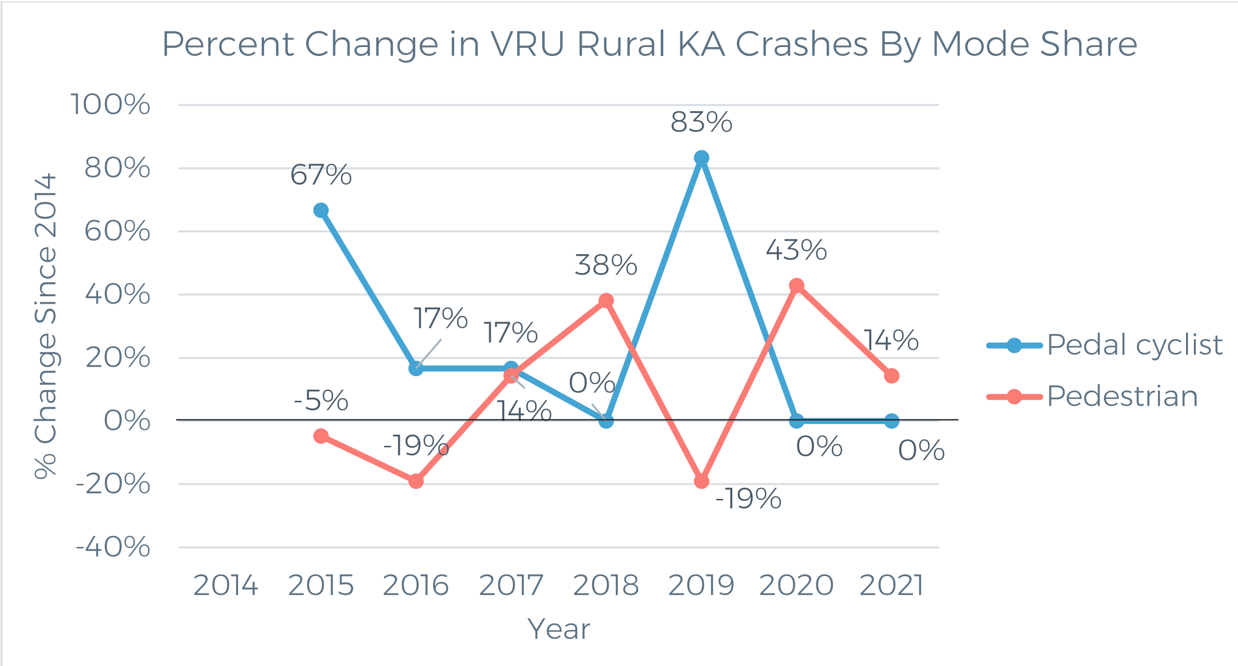


Figure 166: Percent Change in Rural VRU KA Crashes by Mode Share (2014 Base Year)

2.8.5.1.3 User Demographics and Equity

In terms of equity, rural areas are relatively more equal in terms of VRUs who were killed or seriously injured in a crash. Figure 167 and Figure 168 show overall numbers of VRU KA crashes in rural areas by mode share, illustrating that pedestrians were nearly seven times more likely to be killed outside of a DAC census tract, while cyclists were eight times more likely.

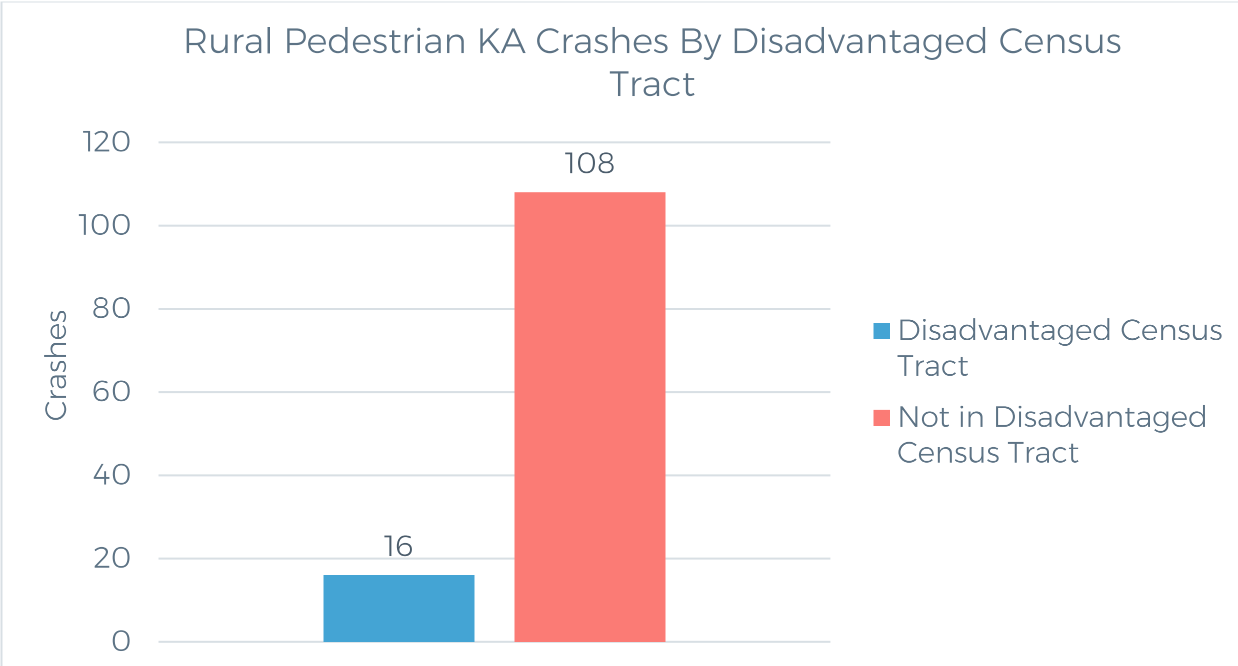


Figure 167: Rural Pedestrian KA Crashes by DACs (2017–2021)

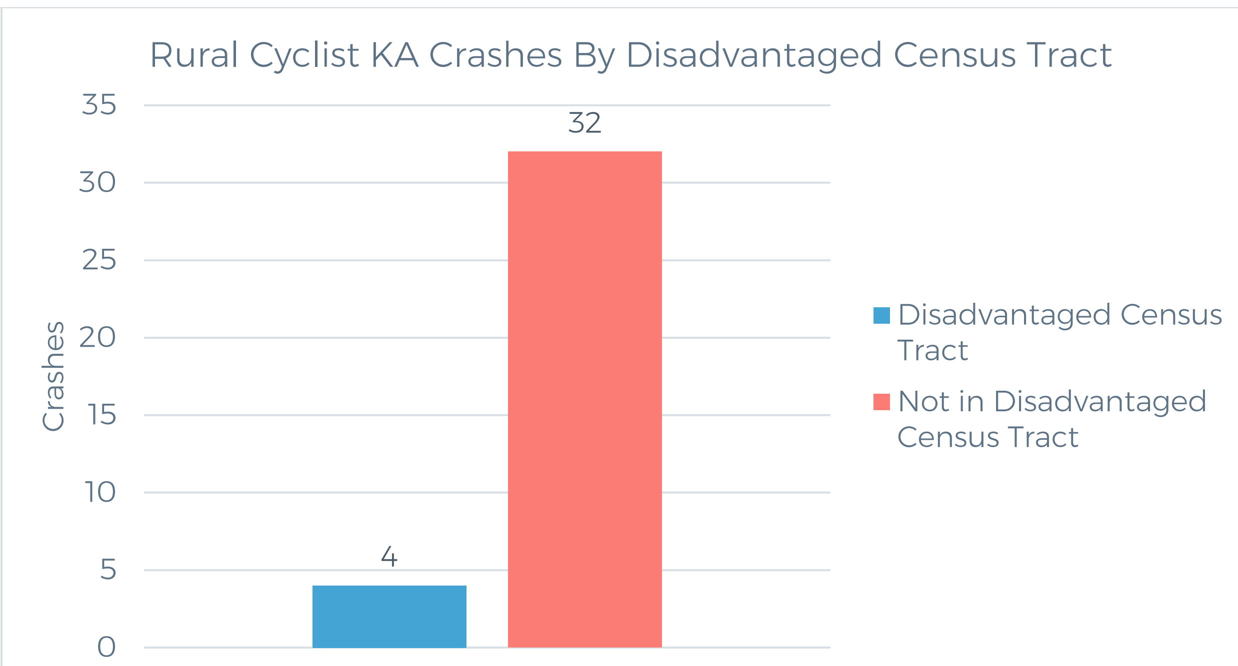


Figure 168: Rural Cyclist KA Crashes By DACs (2017–2021)

2.8.5.1.3.1 Age of User

Crashes in rural areas did not occur evenly across all age groups. Figure 169 shows the overall number of VRUs involved in KA crashes over the most recent five years of data. The age groups that account for the largest number of crashes are VRUs in the mid-20s to mid-50s. Normalizing for population, Figure 170 shows that the elderly ages 75 and up are the most overrepresented group, followed by adults between 35 and 54 and children and teens between 10 and 14.

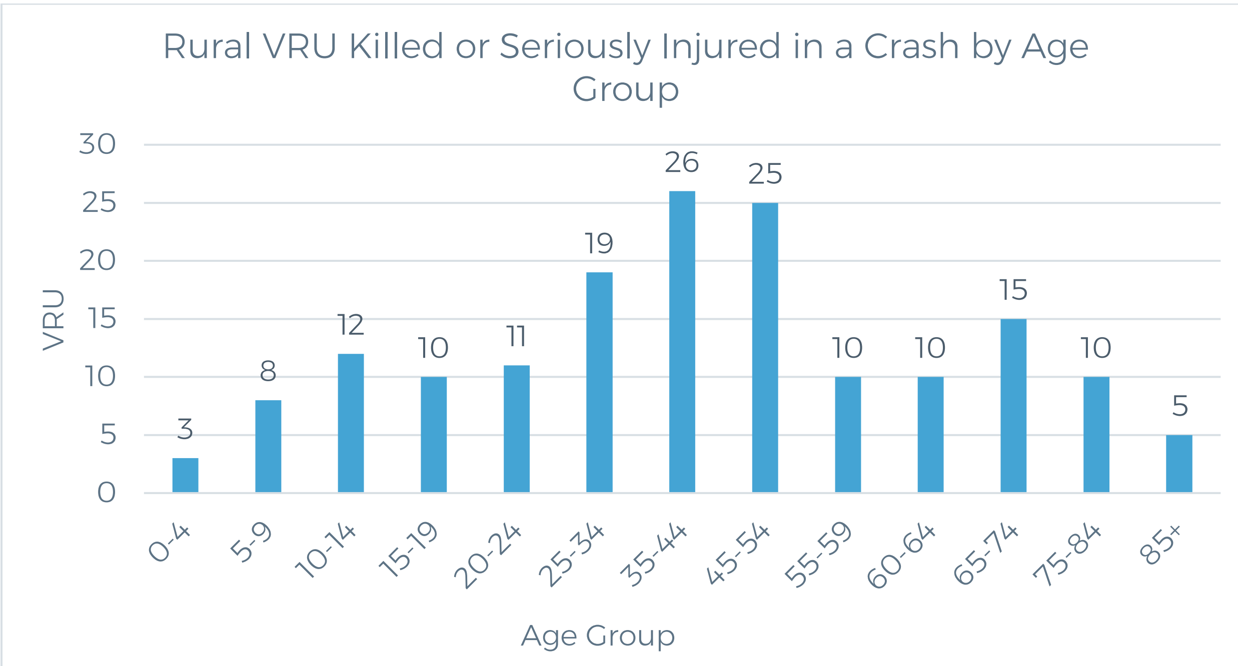


Figure 169: Rural VRU Killed or Seriously Injured in a Crash by Age Group (2017–2021)

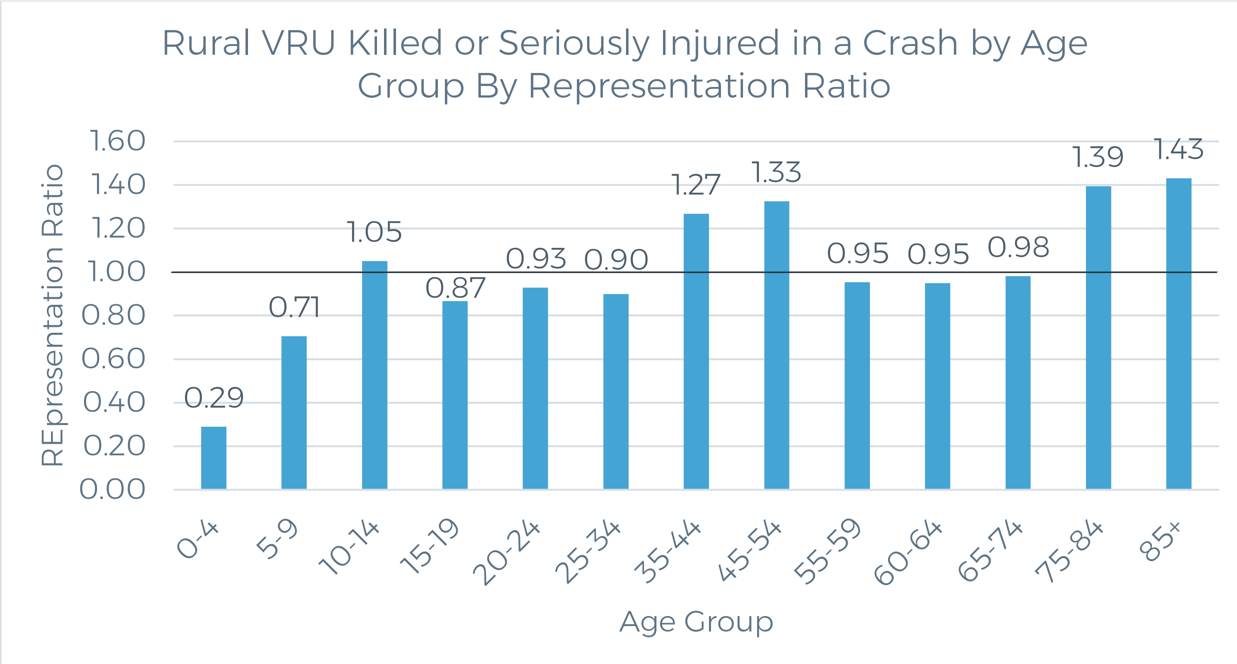


Figure 170: Rural VRU Killed or Seriously Injured in a Crash by Age Group by Representation Ratio; >1.0 = Overrepresentation (2017–2021)

2.8.5.1.3.2 Sex of User

Males accounted for 73% of pedestrians killed or seriously injured in a crash and 92% of cyclists in rural areas (Figure 171). Overall, the proportion of male VRUs killed or seriously injured in a crash has steadily increased, as shown in Figure 172.

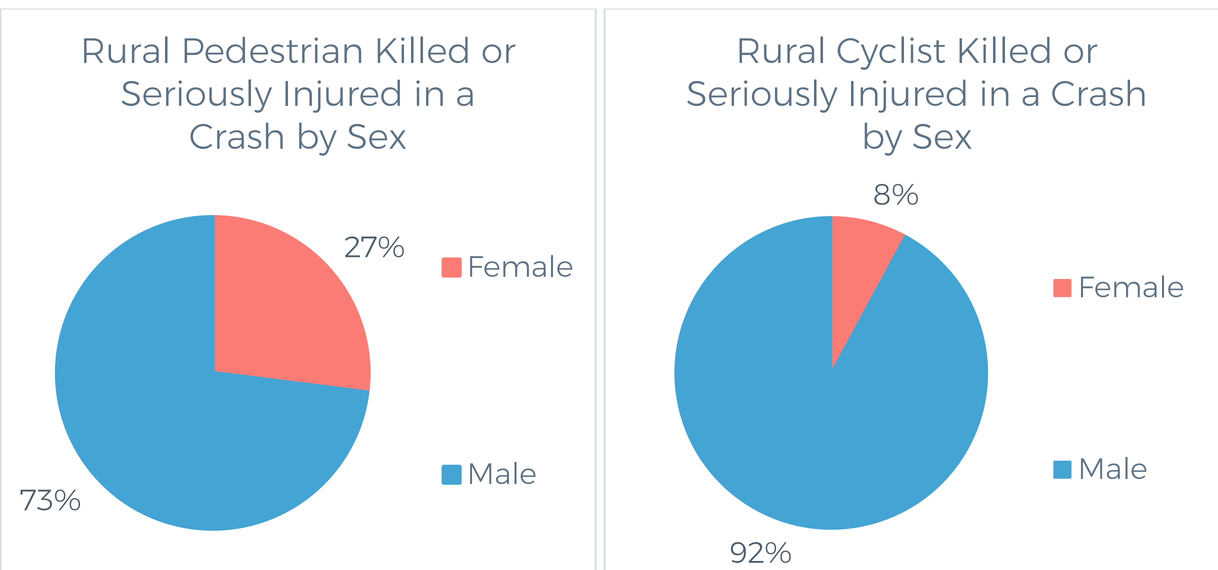


Figure 171: Rural VRU Killed or Seriously Injured in a Crash by Sex (2017–2021)

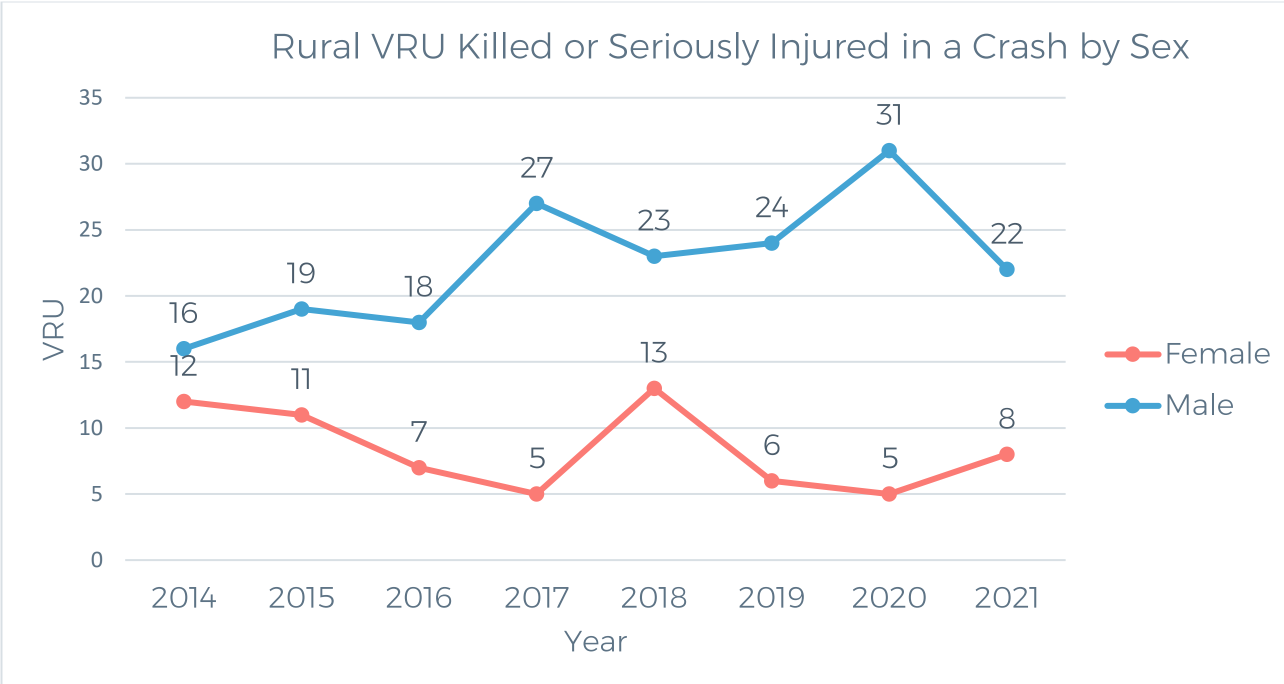


Figure 172: Rural VRU Killed or Seriously Injured in a Crash by Sex (2014–2021)

2.8.5.1.4 Crash Location and Type

2.8.5.1.4.1 Intersection

In rural areas, most fatal and serious injury crashes among VRUs occurred in intersections. Figure 173 and Figure 174 show rural fatalities and serious injuries by location, respectively. There were 73 overall VRU KA crashes in intersections without a crosswalk and 41 in intersections that were not in the crosswalk.

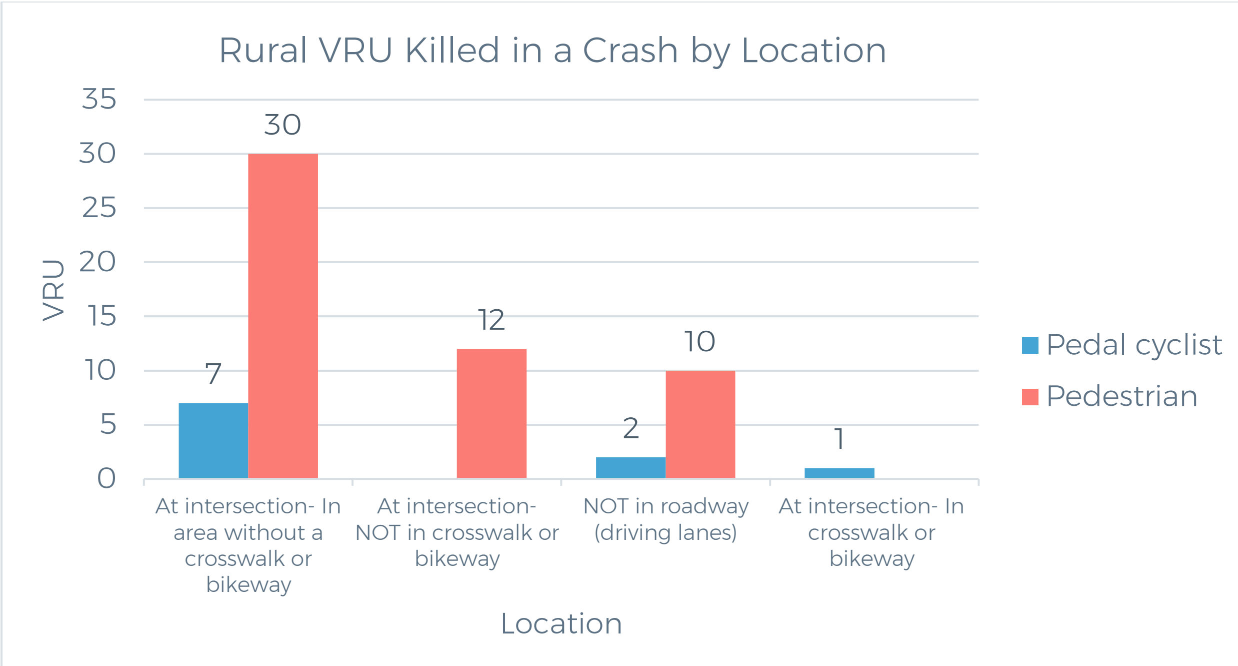


Figure 173: Rural VRU Killed in a Crash by Location (2017–2021)

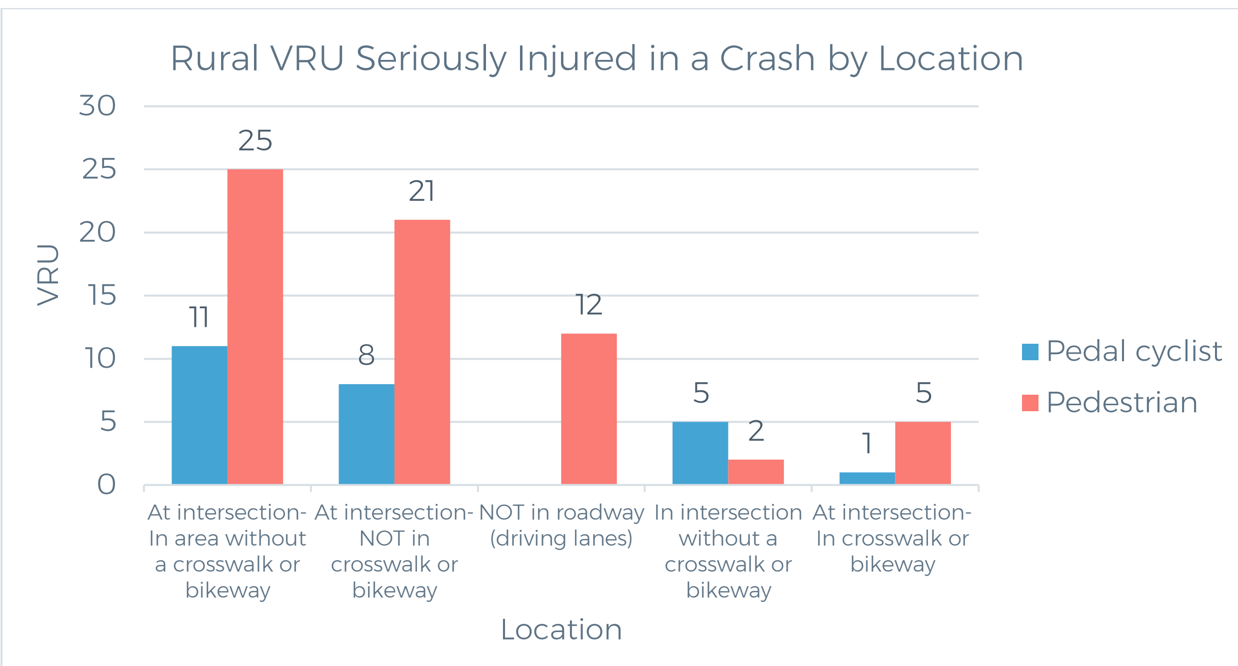


Figure 174: Rural VRU Seriously Injured in a Crash by Location (2017–2021)

2.8.5.1.4.2 Road Classification Type

The data were not able to provide a fully comprehensive analysis of rural VRU crashes by roadway type; Figure 175 and Figure 176 show 83 crashes with "N/A" as the roadway classification. Where data specifying the roadway type were available, the most common road type in rural areas where KA crashes occurred were local roads (39). These local roads predominate in rural areas with lower AADTs.

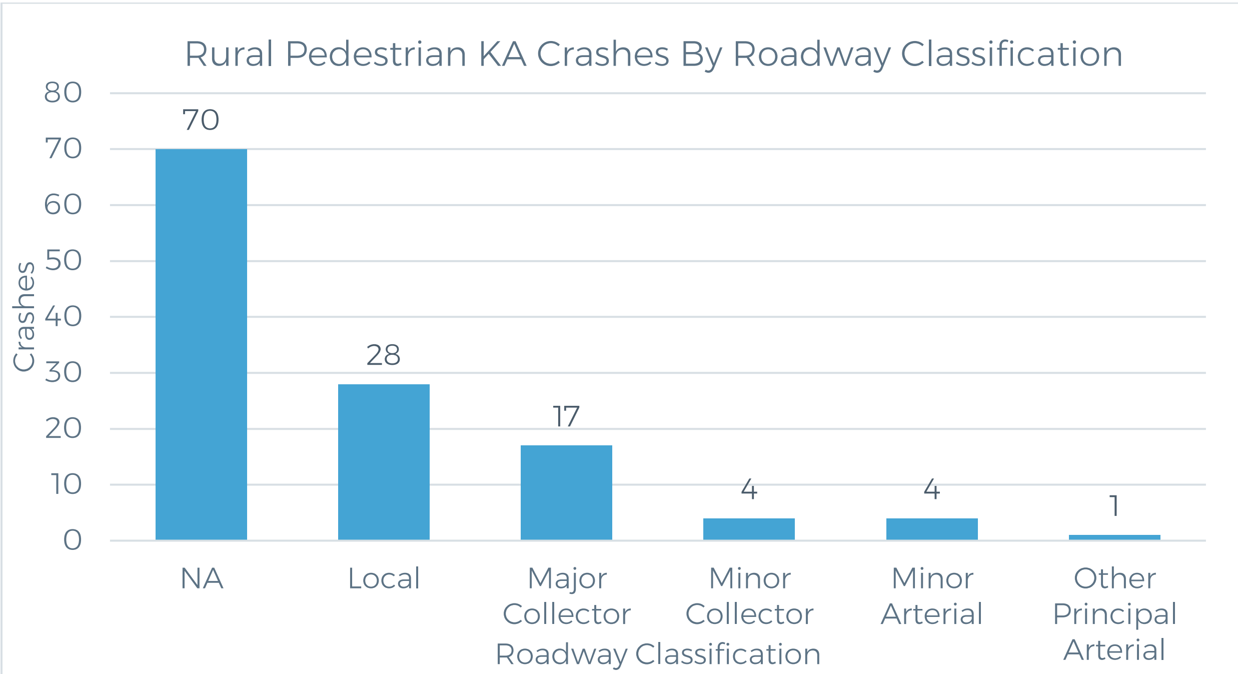


Figure 175: Rural Pedestrian KA Crashes by Roadway Classification (2017–2021)

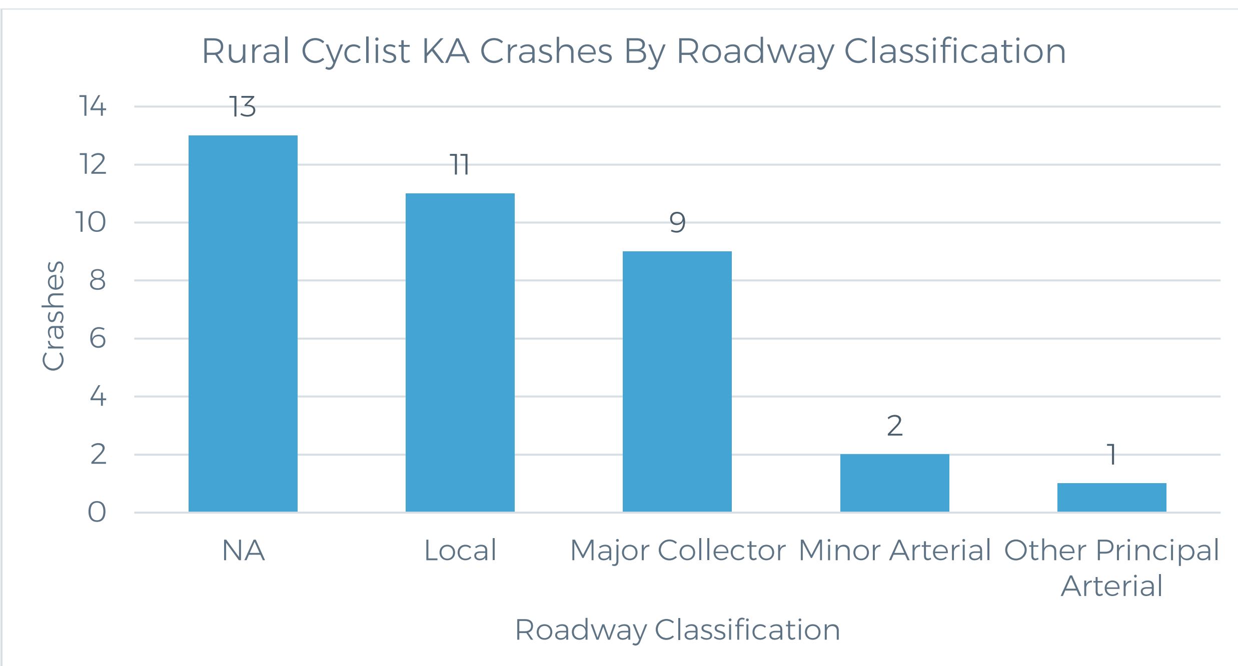


Figure 176: Rural Cyclist KA Crashes by Roadway Classification (2017–2021)

2.8.5.1.5 Contributing Circumstances

The reporting law enforcement officer determines the contributing circumstances, which are provided in Figure 177 and Figure 178 for VRU killed or seriously injured in a crash of a KA crash. Most pedestrian and cyclist crashes do not cite a contributing circumstance (68). For pedestrians and cyclists that do cite a contributing circumstance, the largest contributing circumstance for pedestrian crashes was “in the roadway” (21). In contrast, the largest contributing circumstance for cyclist crashes was pedal cycle violations (6).

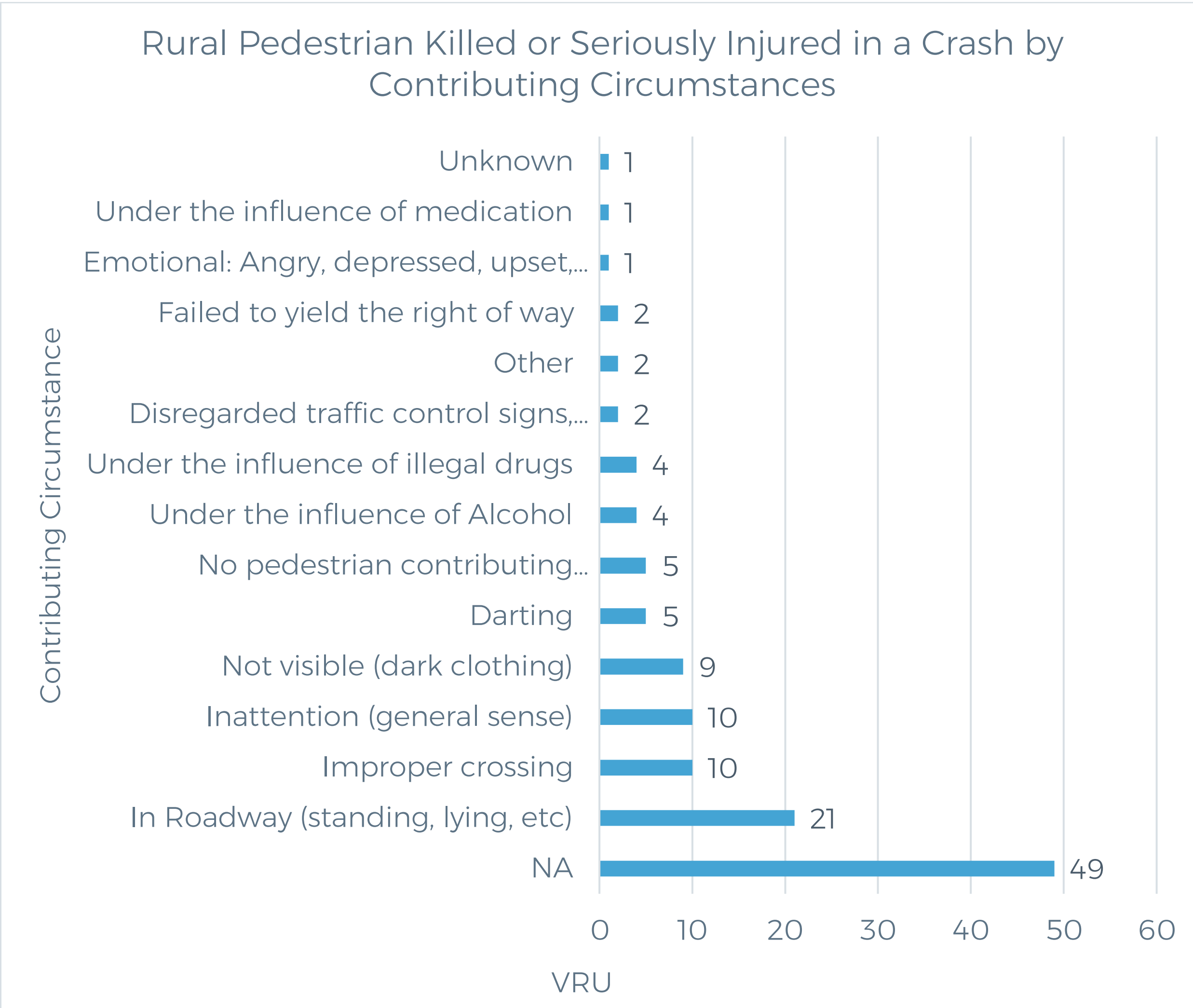


Figure 177: Rural Pedestrian Killed or Seriously Injured in a Crash by Contributing Circumstances (2017–2021)

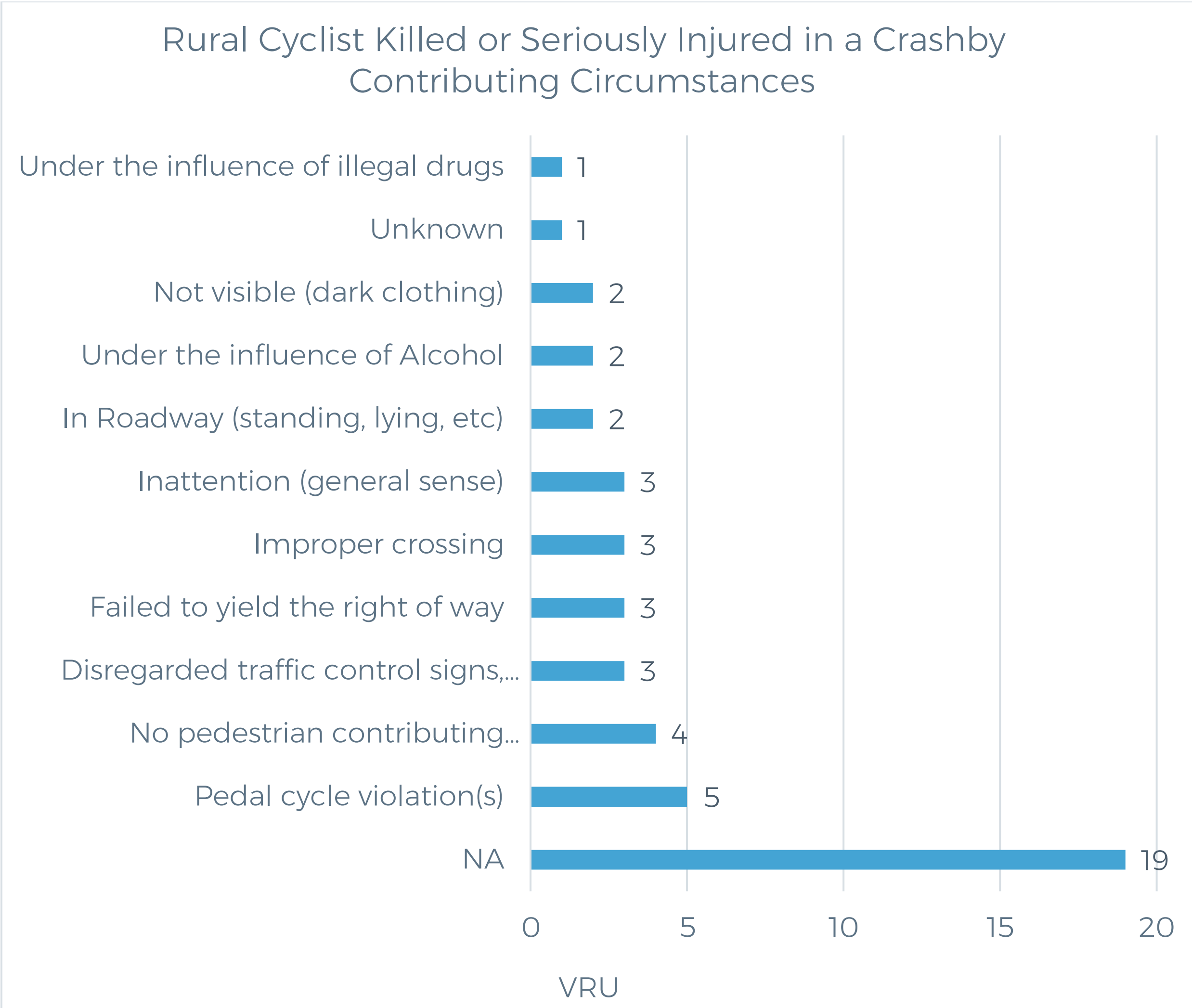


Figure 178: Rural Cyclist Killed or Seriously Injured in a Crash by Contributing Circumstances (2017–2021)

2.8.5.1.5.1 Speed Limit of Roadway

Figure 179 and Figure 180 provide information about the pedestrian and cyclist VRU in KA crashes by the roadway speed limit. For pedestrians, roadways with speeds between 30 and 55 mph were the largest contributors to KA crashes. Similarly, cyclists were most likely to be involved in KA crashes on roadways of 65 mph.

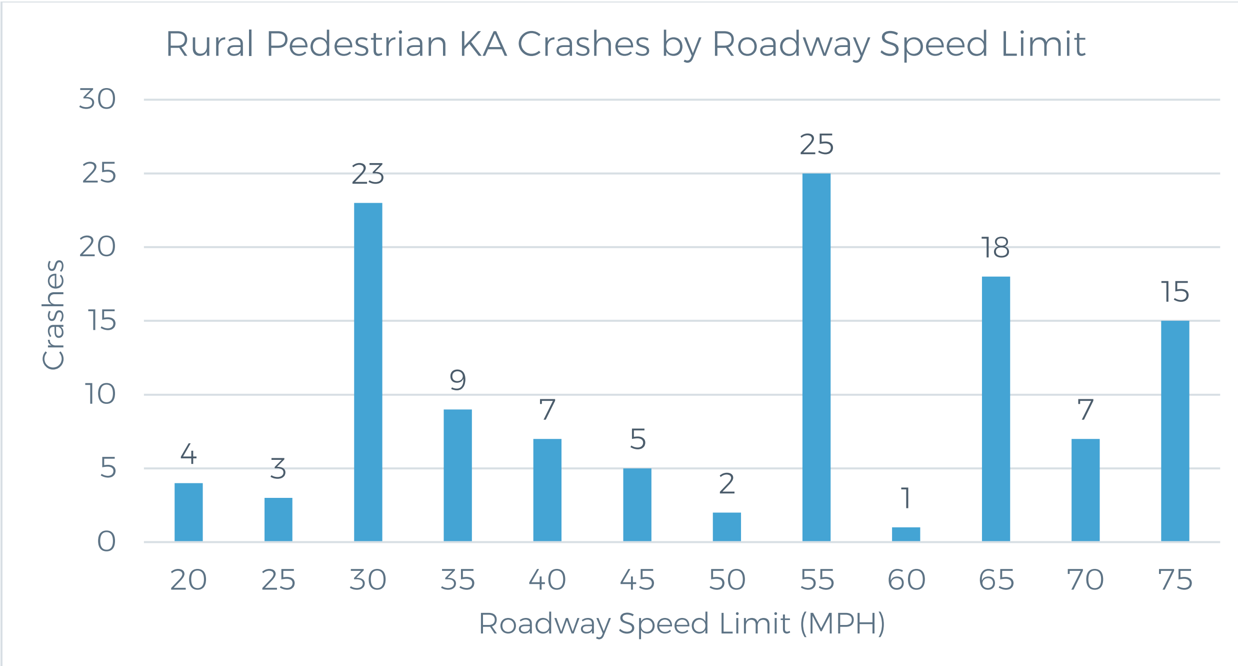


Figure 179: Rural Pedestrian KA Crashes by Roadway Speed Limit (2017–2021)

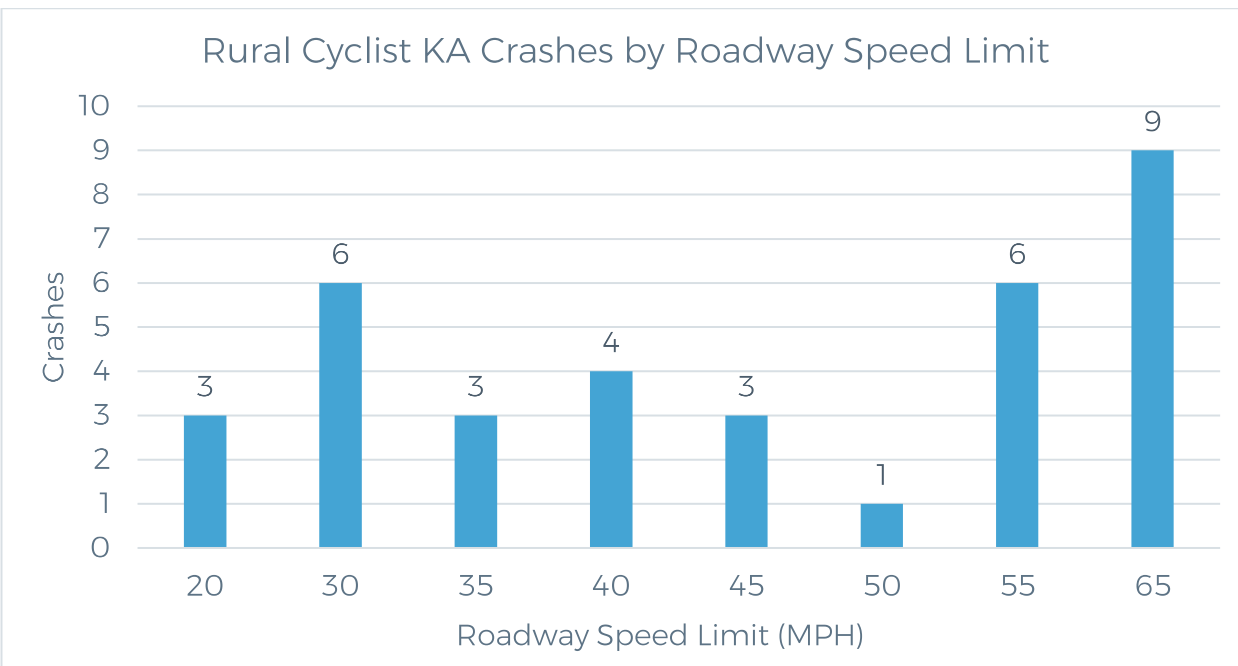


Figure 180: Rural Cyclist KA Crashes by Roadway Speed Limit (2017–2021)

2.8.5.1.5.2 Roadway Surface Conditions

Most pedestrian (86%) rural KA crashes and all cyclist rural KA crashes occurred on dry pavement. Adverse weather contributed relatively little to overall KA crash risk, as shown in Figure 181.

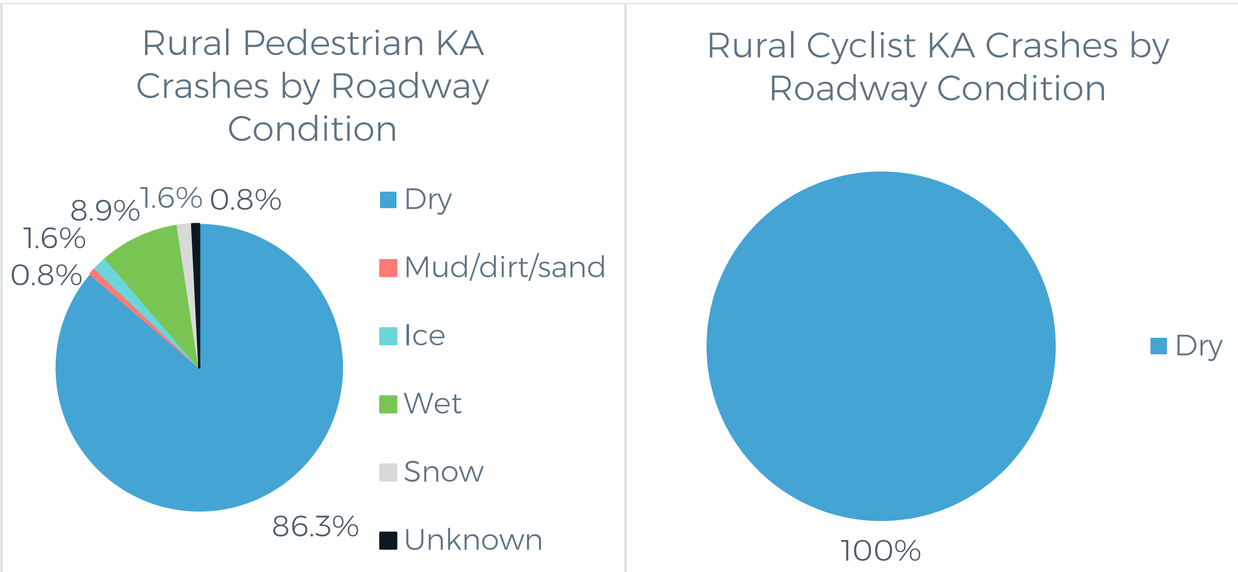


Figure 181: Rural VRU KA Crashes by Roadway Conditions (2017–2021)

2.8.5.1.5.3 Lighting Conditions

Most KA crashes among pedestrians occurred at night under dark conditions, with the largest share (46%) occurring in the dark in areas with no streetlights (Figure 182). Cyclists, on the other hand, were overwhelmingly involved in KA crashes during daylight hours (67%), as shown in Figure 182.

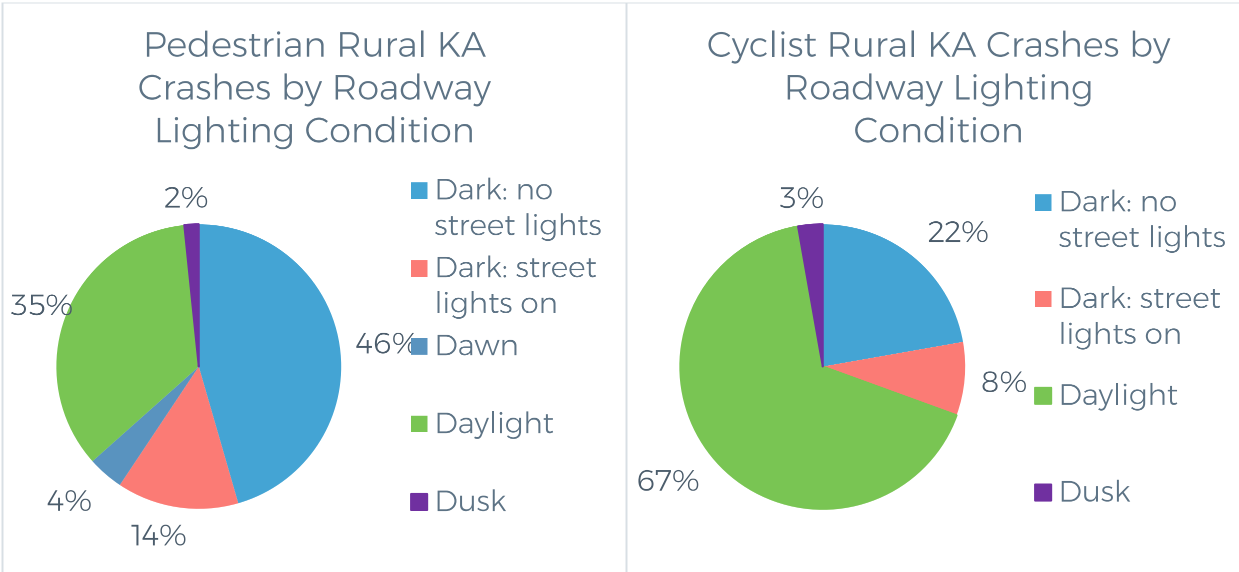


Figure 182: Rural VRU KA Crashes by Roadway Lighting Condition (2017–2021)

2.8.5.1.5.4 Suspected Impairment

The data show that only 2% of VRU KA crashes on rural roads involved alcohol, and only 1% involved drugs, as shown in Figure 183.

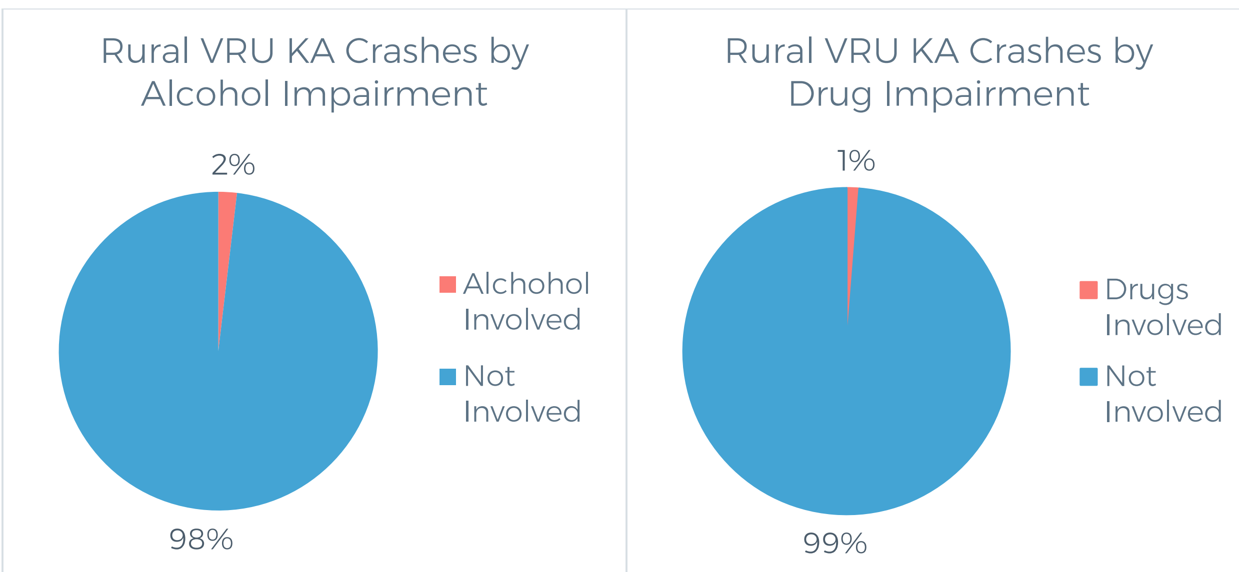


Figure 183: Rural VRU KA Crashes by Alcohol and Drug Impairment (2017–2021)

2.8.5.2 Suburban Area Types Crash Statistics

2.8.5.2.1 Trends

VRU in KA crashes on suburban roads in Kansas have increased from 2014 to 2021, with sharp increases in the wake of COVID-19. KA crash trends from 2014 to 2021 are shown in Figure 184. These trends are broken down by fatal and serious injury in Figure 185 and Figure 186. Overall, suburban areas are slightly less likely on a population basis to be involved in a KA crash, as shown in Figure 187.

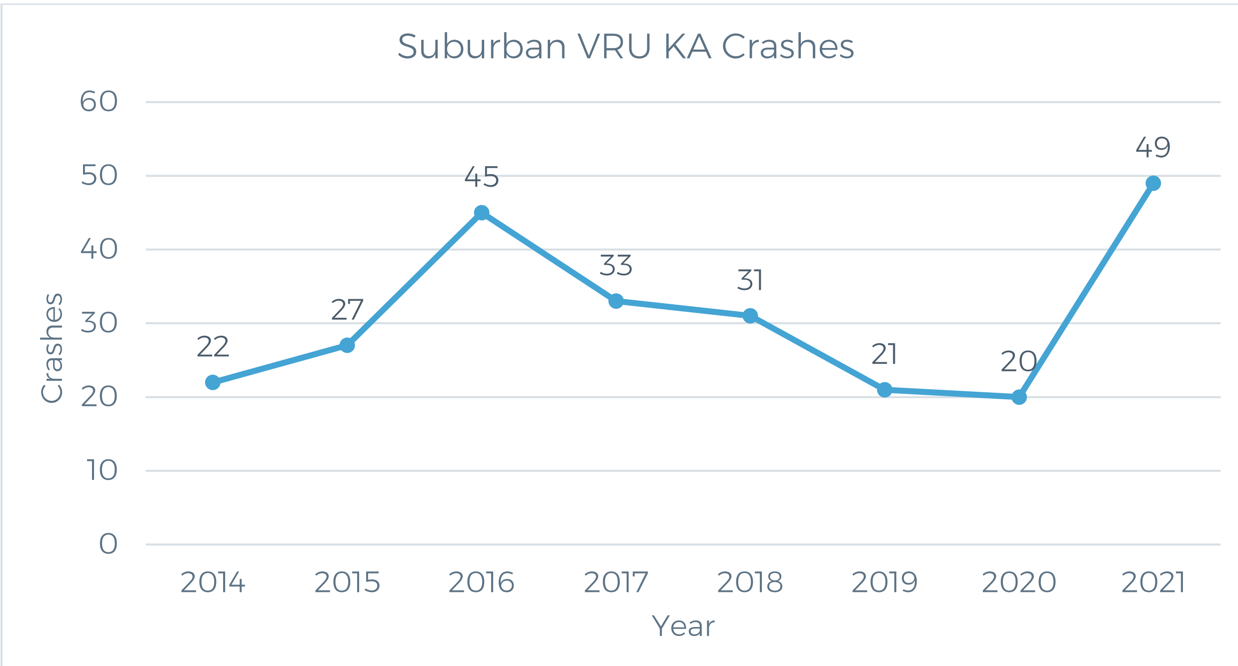


Figure 184: Suburban VRU KA Crashes (2014–2021)

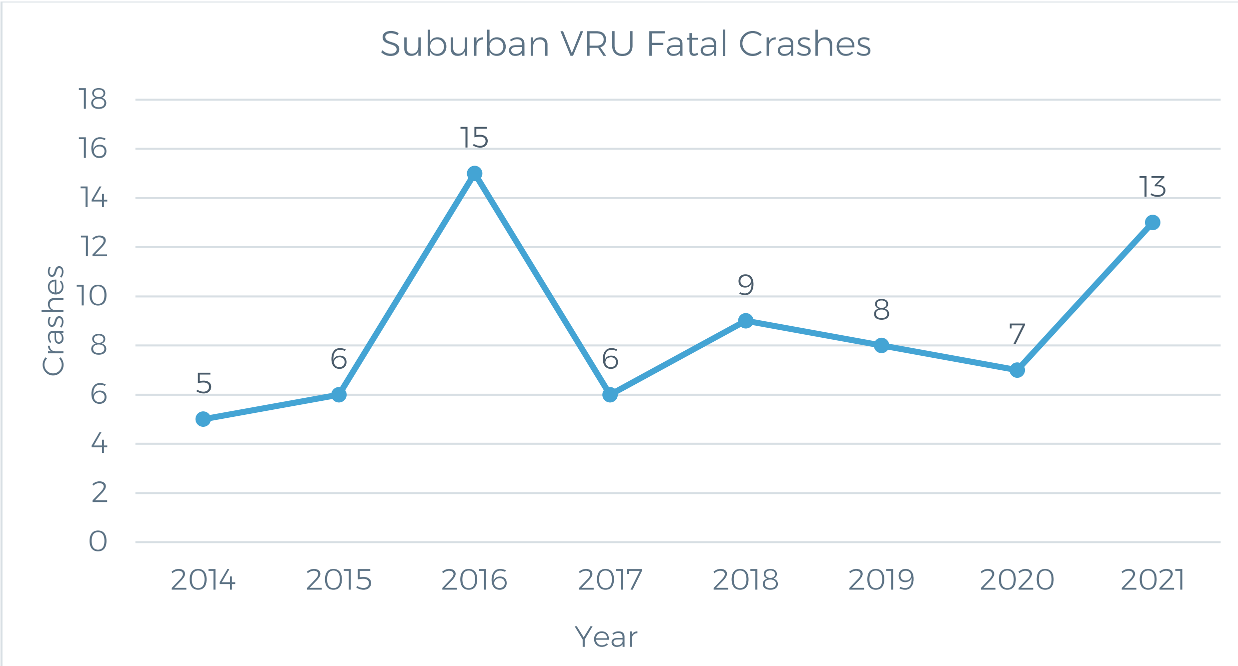


Figure 185: Suburban VRU Fatal Crashes (2014–2021)

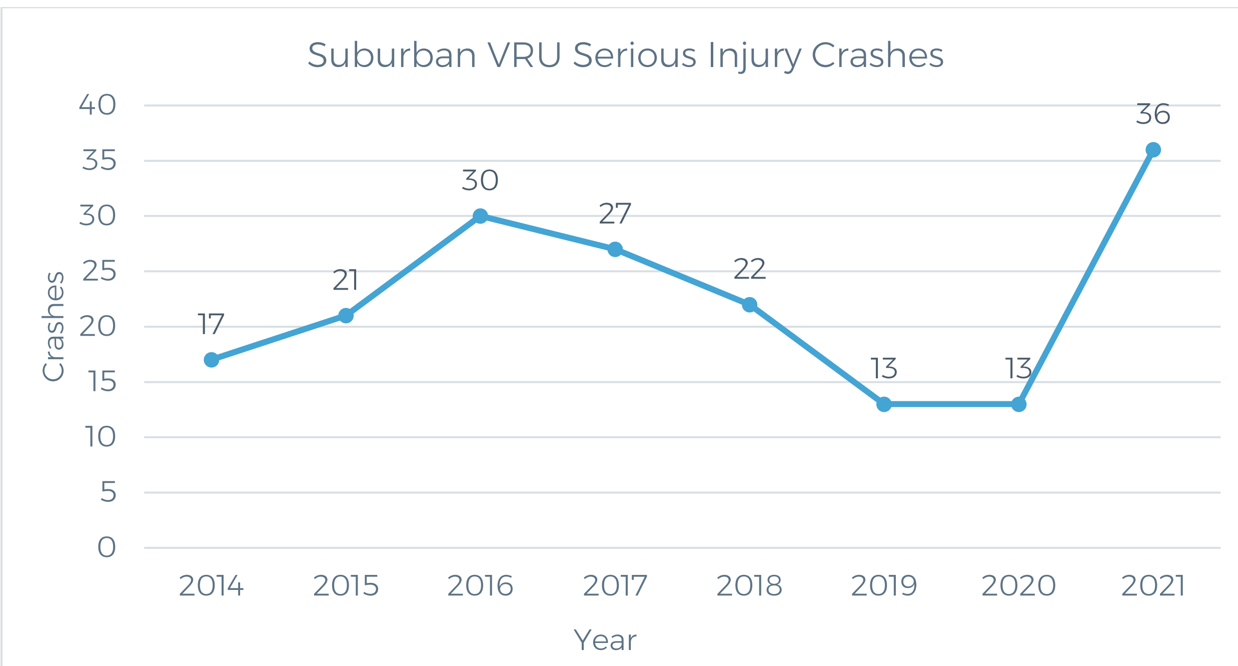


Figure 186: Suburban VRU Serious Injury Crashes (2014–2021)

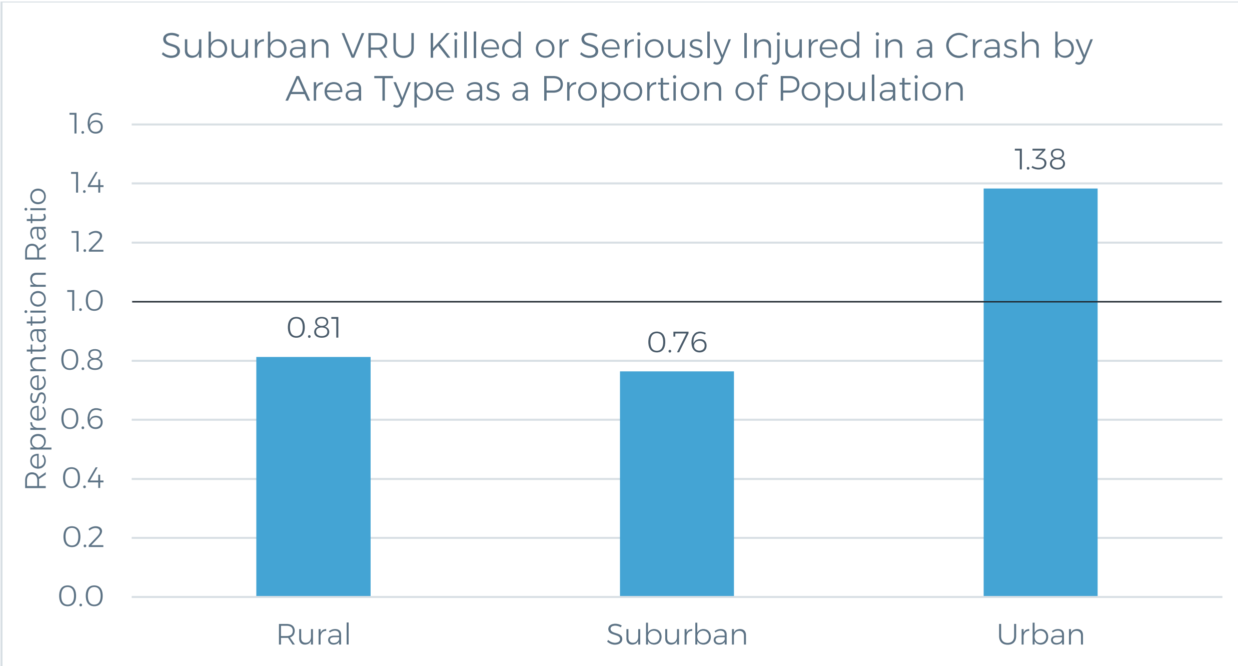


Figure 187: Suburban VRU Killed or Seriously Injured in a Crash by Representation Ratio as a Proportion of Population >1 = Overrepresentation (2017–2021)

2.8.5.2.2 Pedestrians and Cyclists

Figure 188 shows the breakdown in KA crashes among VRUs in suburban areas by mode share: 68% of KA crashes involve pedestrians, and 32% involve cyclists. Percent changes in KA crashes among VRU are shown in Figure 189. Pedestrians in KA crashes have increased, and today there are nearly 100% more than in 2014 and over 200% more cyclists.

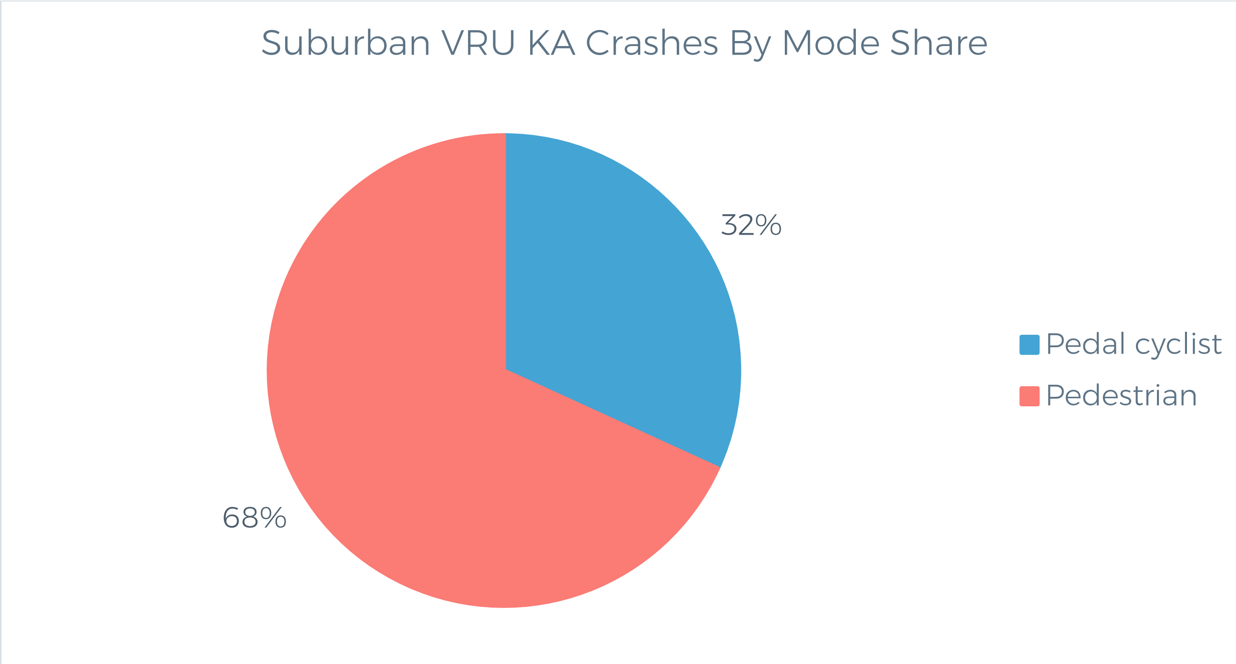


Figure 188: Suburban VRU KA Crashes by Mode Share (2017–2021)

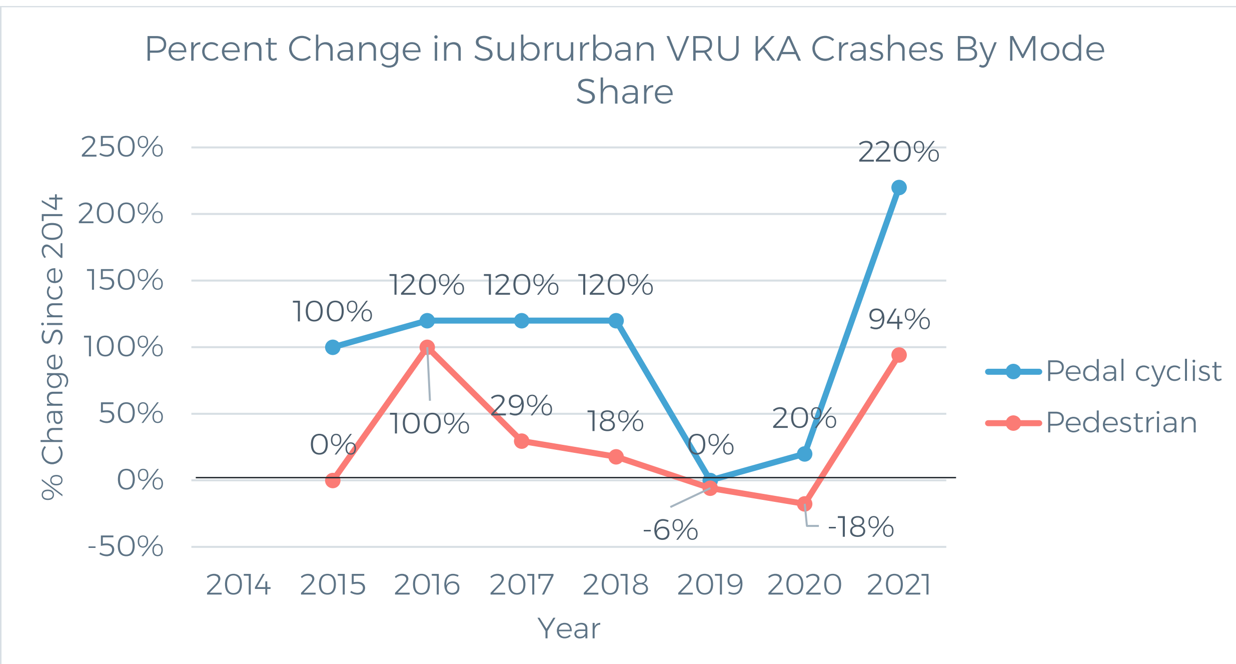


Figure 189: Percent Change in the Yearly Suburban VRU KA Crashes by Mode Type (2014 Base Year)

2.8.5.2.3 Users and Equity

KA crashes in suburban areas are stratified depending on whether the crash occurred in a DAC or not. Figure 190 and Figure 191 show crashes by location in a DAC by pedestrians and bicyclists, respectively. Pedestrians are 1.2 times as likely to experience a KA crash in a DAC than outside a DAC, while bicyclists are 4.5 times as likely to experience a crash in a DAC than outside a DAC.

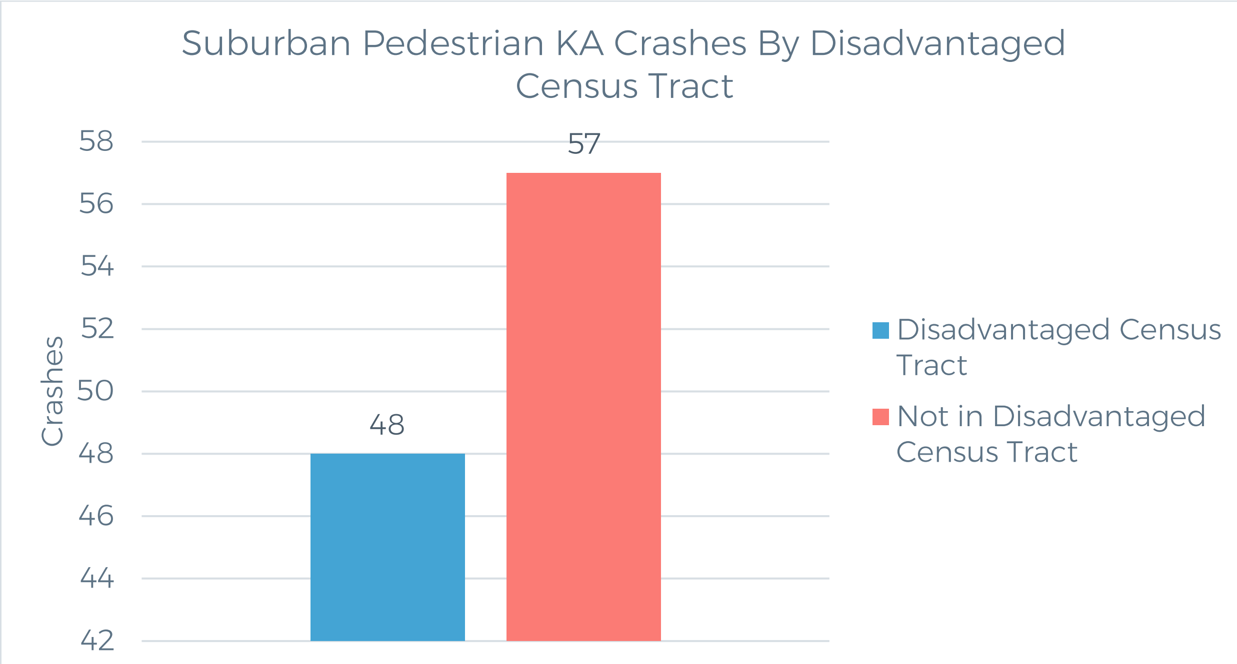


Figure 190: Suburban Pedestrian KA Crashes by DAC (2017–2021)

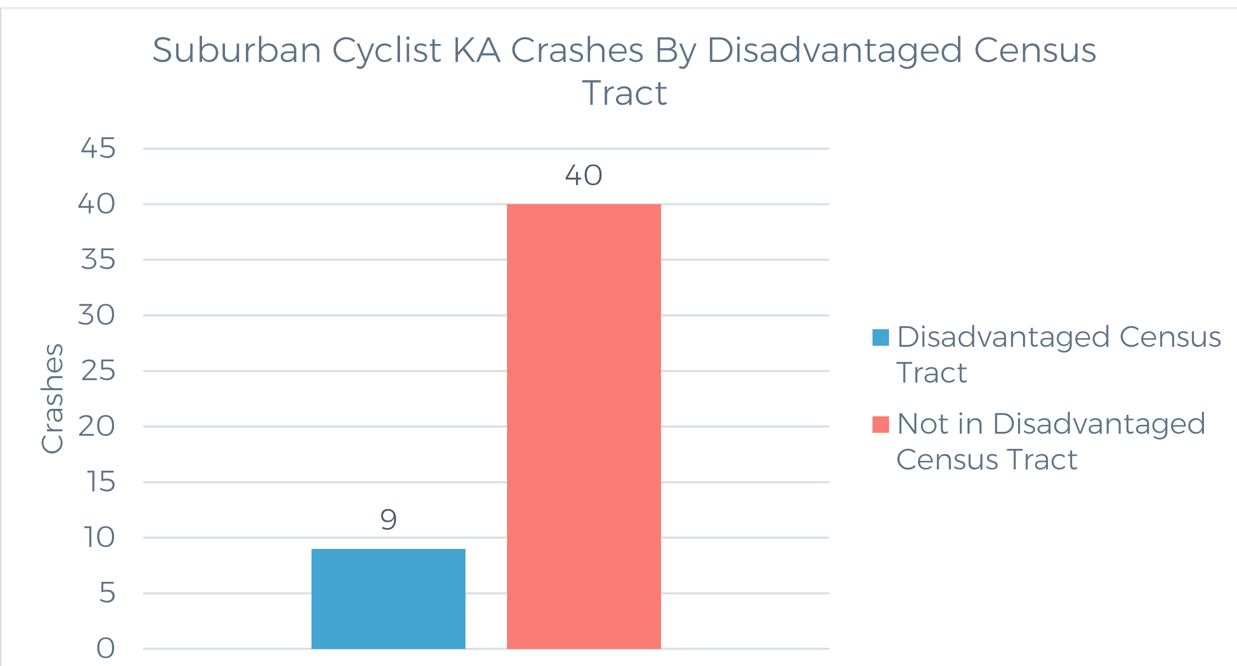


Figure 191: Suburban Cyclist KA Crashes by DAC (2017–2021)

2.8.5.2.3.1 Age of User

Crashes in suburban areas do not occur evenly across age groups. Figure 192 shows the overall number of VRUs involved in KA crashes over the most recent five years of data. The age groups that account for the largest number of crashes are VRUs in the mid-20s to mid-30s. Normalizing for population, it can be seen in Figure 193 that children and teens between the ages of 10 and 19 are the most overrepresented group, followed by adults between 25 and 34 and by older adults between the ages of 60 and 84.

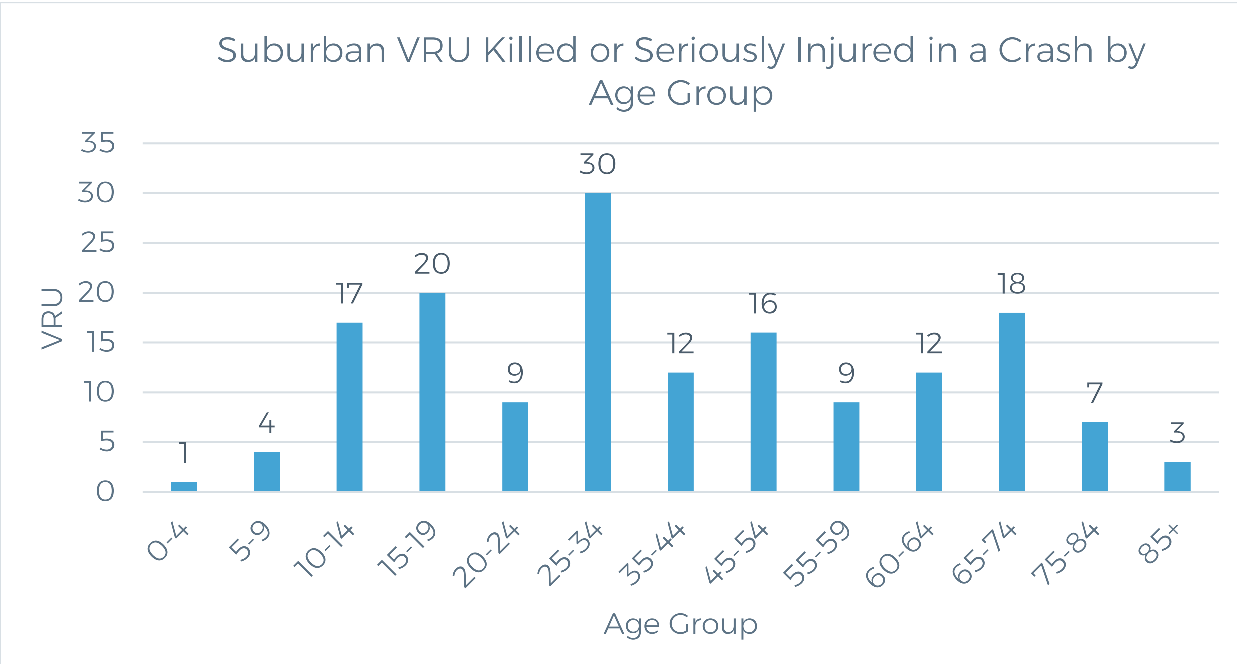


Figure 192: Suburban VRU KA Crash Killed or Seriously Injured in a Crash by Age Group (2017–2021)

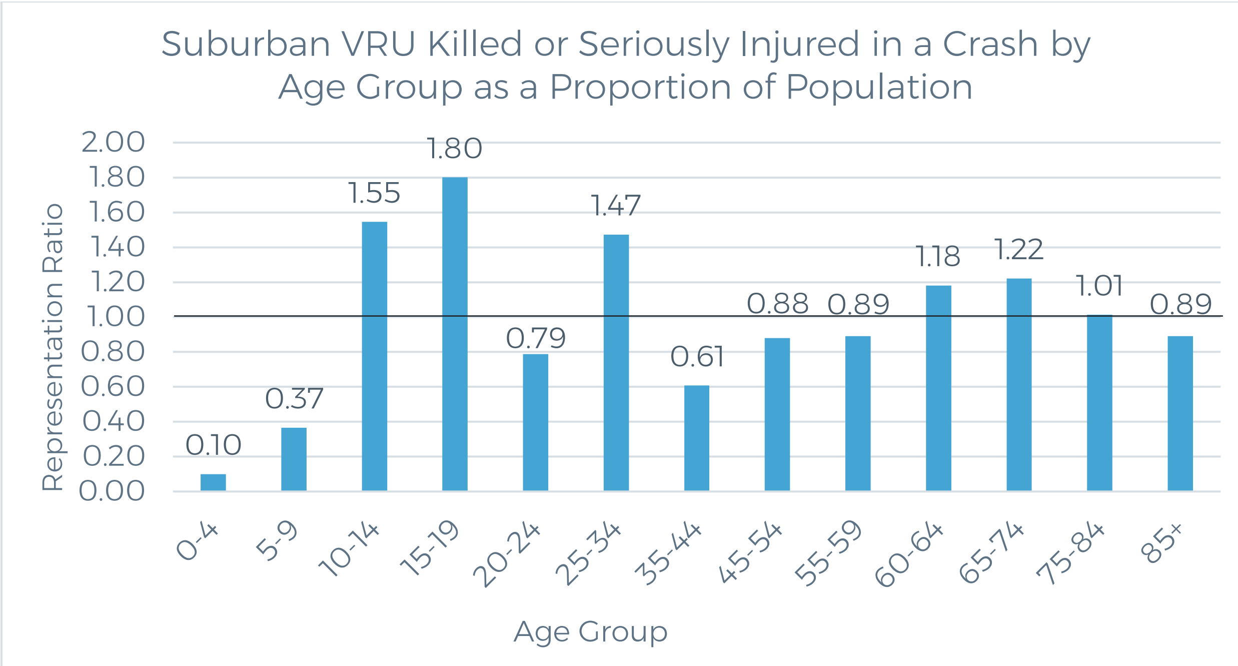


Figure 193: Suburban VRU Killed or Seriously Injured in a Crash by Age Group by Representation Ratio (>1.0 = Overrepresentation) (2017–2021)

2.8.5.2.3.2 Sex of User

Males currently account for 60% of VRU pedestrians who were killed or seriously injured in a crash and 76% of cyclists in suburban areas (Figure 194). Overall, the number of both male and female VRUs in a KA crash has increased, as shown in Figure 195.

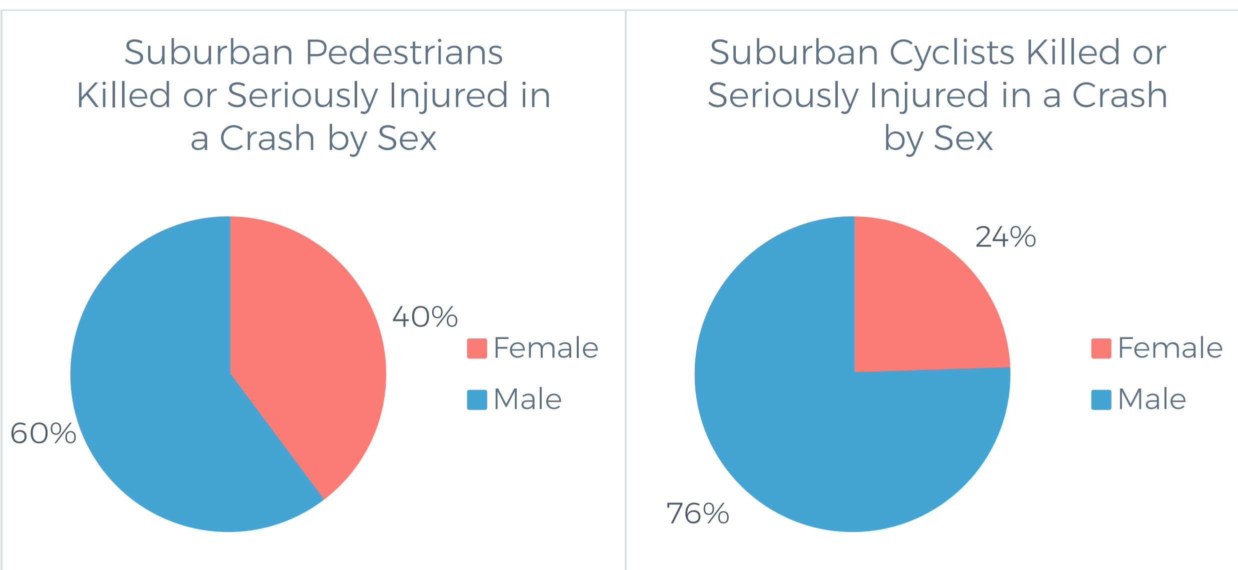


Figure 194: Suburban VRU Killed or Seriously Injured in a Crash by Sex (2017–2021)

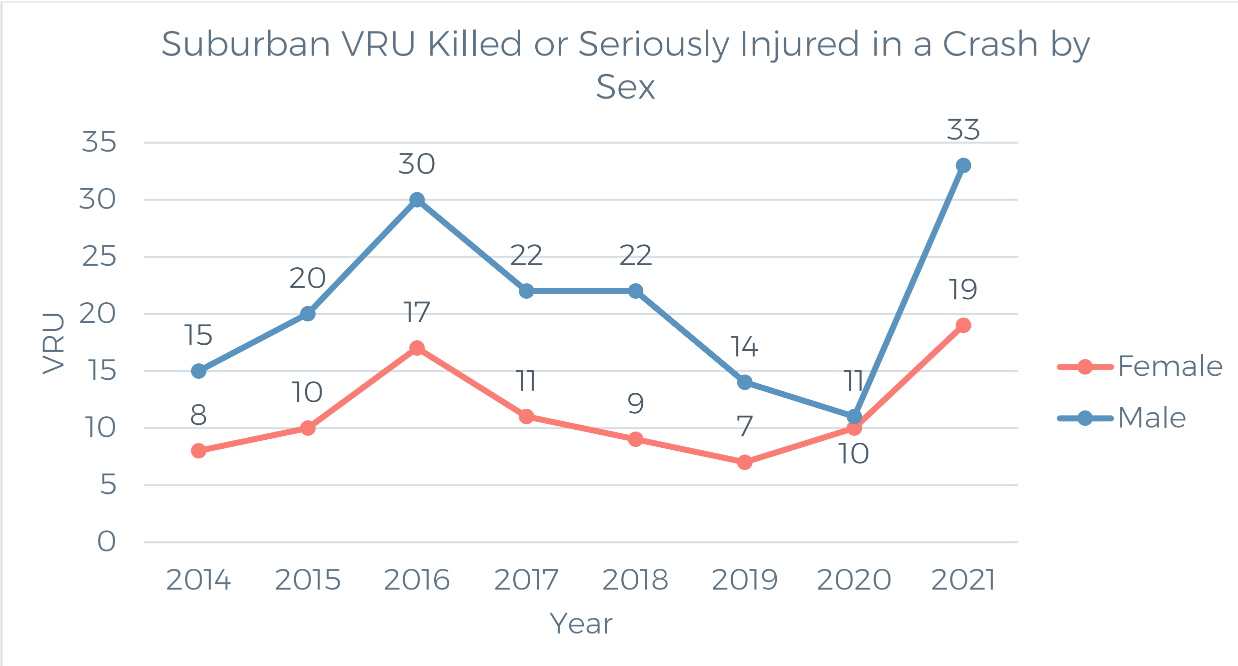


Figure 195: Suburban VRU Killed or Seriously Injured in a Crash by Sex (2014–2021)

2.8.5.2.4 Crash Location and Types

2.8.5.2.4.1 Intersections

In suburban areas, most fatal crashes occurred at intersections without crosswalks or bikeways (Figure 196), whereas most serious injury crashes occurred outside a crosswalk or in the bikeway of an intersection (Figure 197).

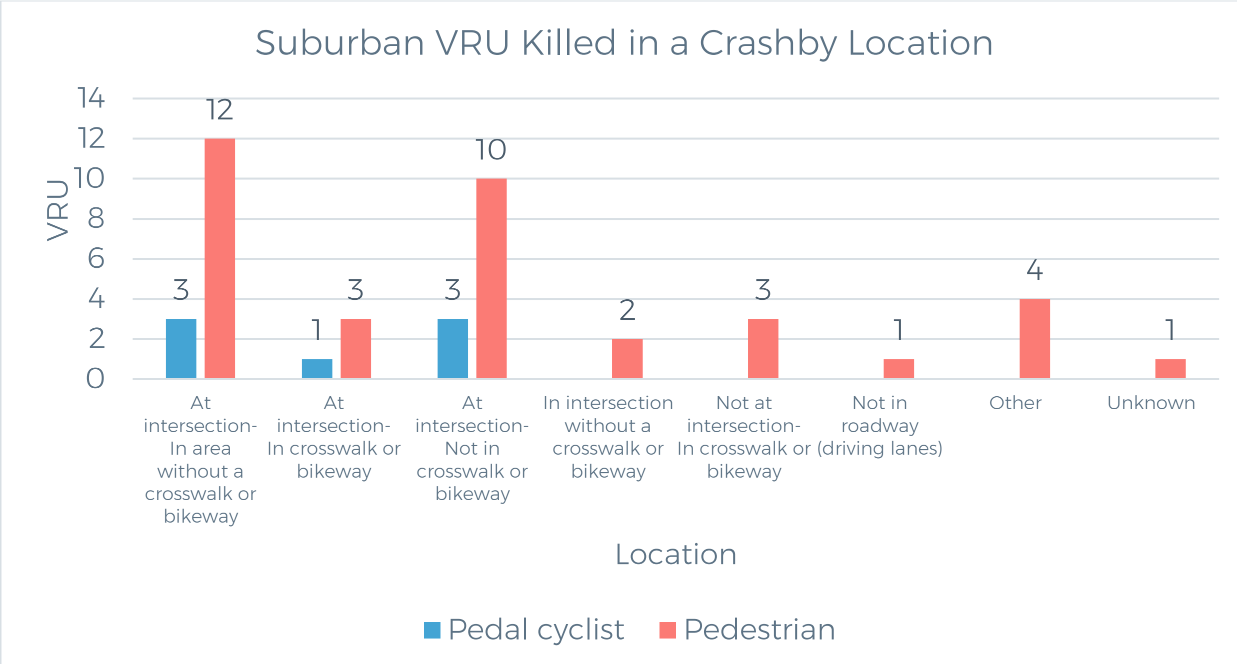


Figure 196: Suburban VRU Killed in a Crash by Location (2017–2021)

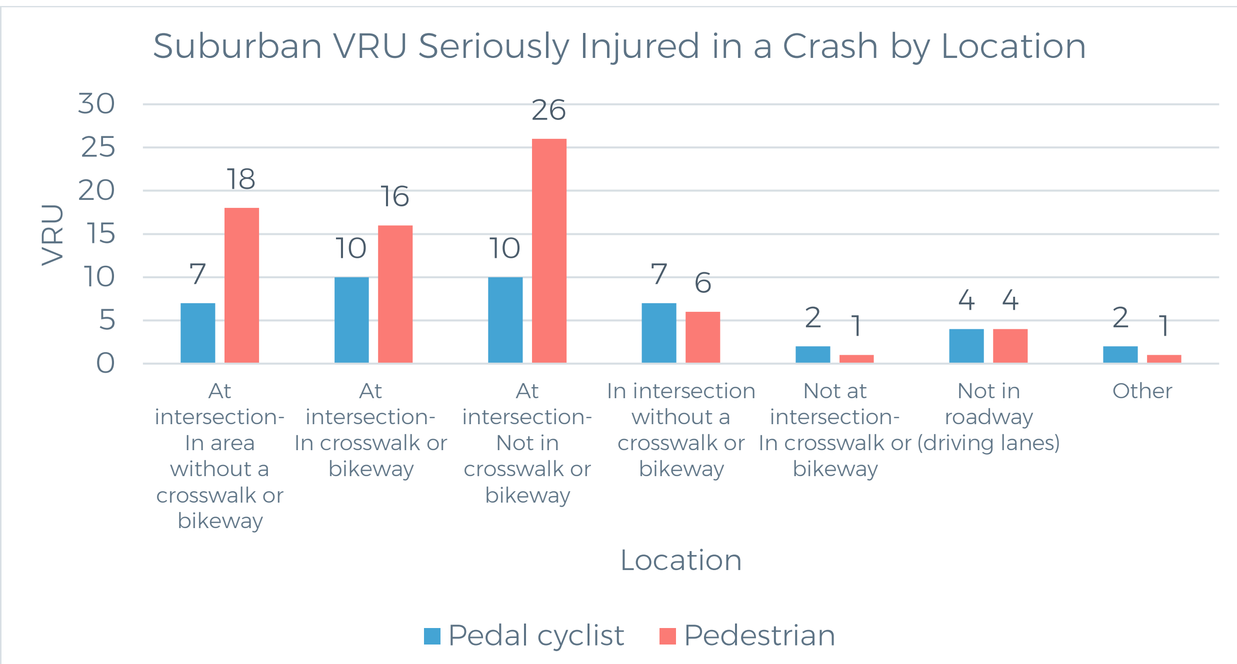


Figure 197: Suburban VRU Seriously Injured in a Crash by Location (2017–2021)

2.8.5.2.4.2 Road Classification Type

The most common road type in suburban areas where VRUs experienced KA crashes were local roads. The collected data often were not able to provide a comprehensive analysis of the roadway type—many of the crashes were labeled as N/A for roadway class. For crashes with specified roadway classes, Figure 198 and Figure 199 show that VRUs experience crashes most on local and minor collector streets.

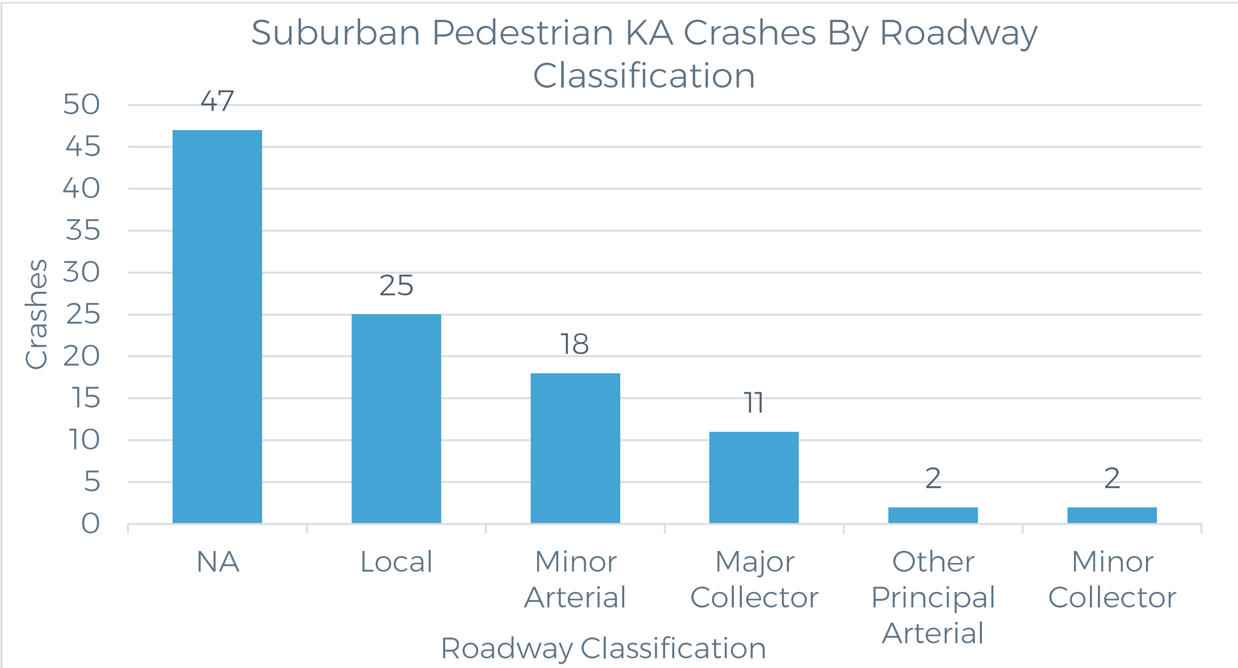


Figure 198: Suburban Pedestrian KA Crashes by Roadway Classification (2017–2021)

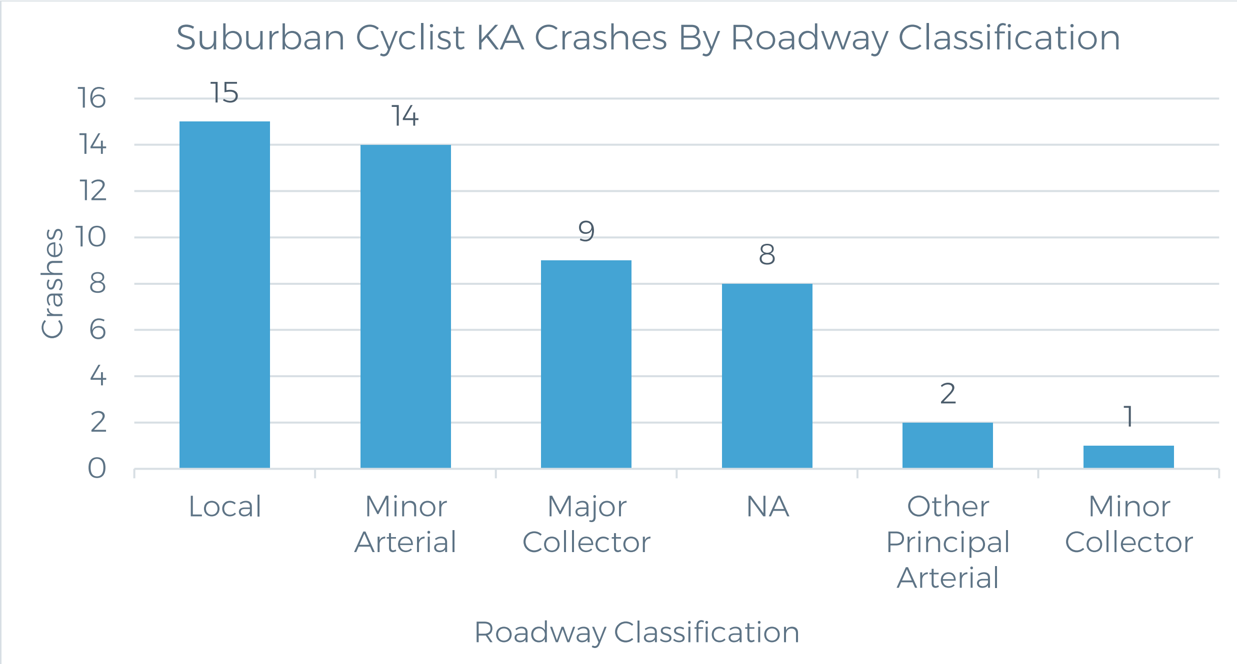


Figure 199: Suburban Cyclist KA Crashes by Roadway Classification (2017–2021)

2.8.5.2.5 Contributing Circumstances

The reporting law enforcement officer determines the contributing circumstances, which are provided in Figure 200 and Figure 201 for KA VRUs involved in suburban area crashes. Most pedestrian and cyclist crashes are cited as "Not Available." For pedestrians and cyclists that do cite a contributing circumstance, the largest listed contributing circumstance for pedestrian crashes was improper crossing. In contrast, the largest contributing circumstance for cyclist crashes was no pedestrian contributing circumstance and failed to yield the right-of-way.

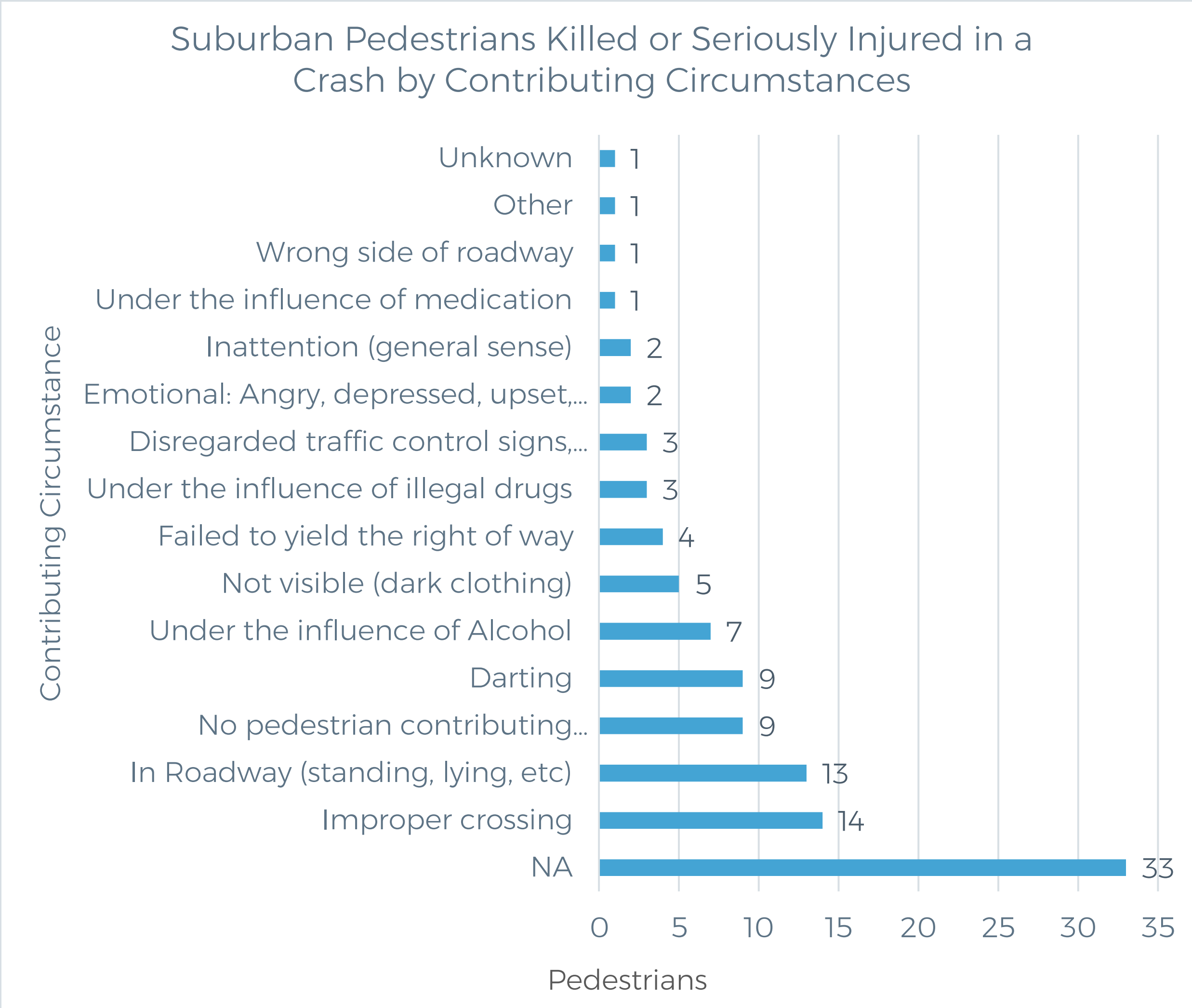


Figure 200: Suburban Pedestrian Killed or Seriously Injured in a Crash by Contributing Circumstances (2017–2021)

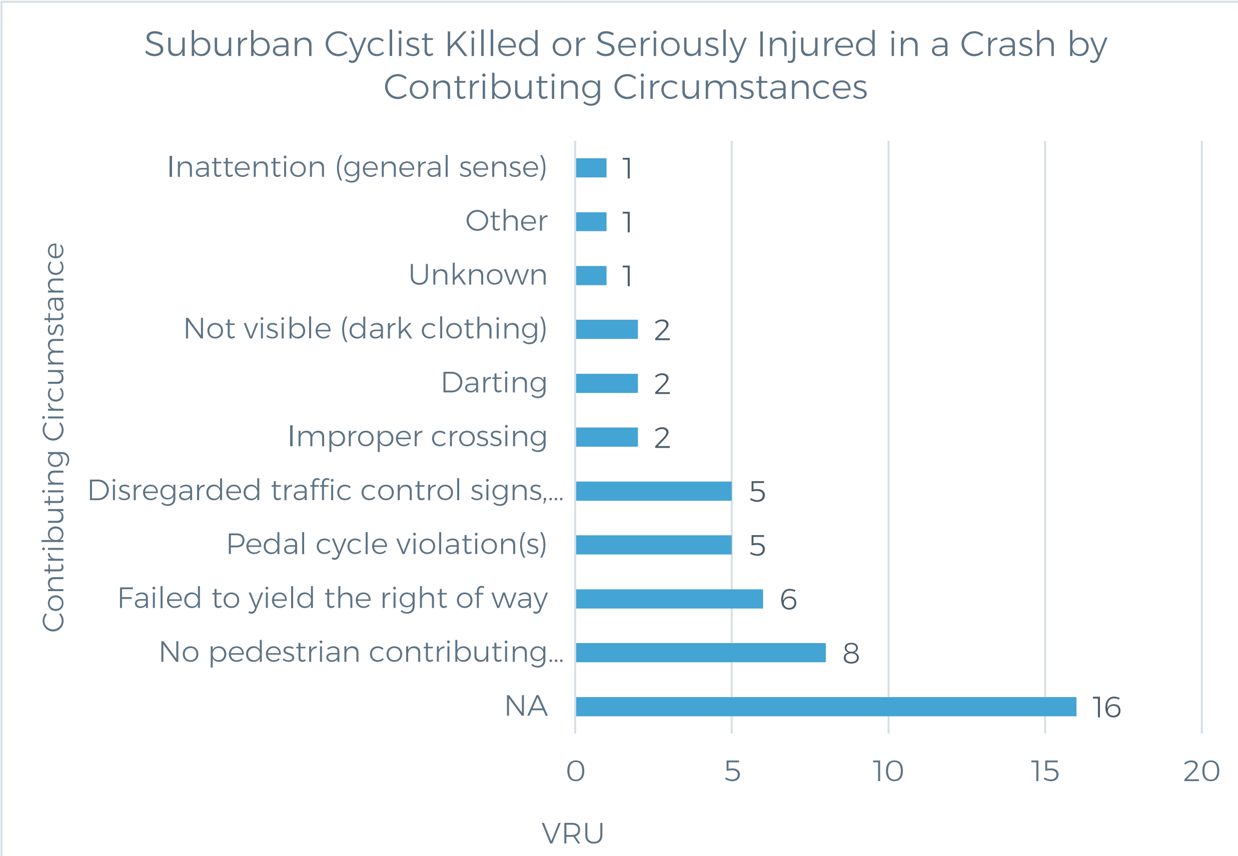


Figure 201: Suburban Cyclist Killed or Seriously Injured in a Crash by Contributing Circumstances (2017–2021)

2.8.5.2.5.1 Speed Limit of Roadway

Figure 202 and Figure 203 show the pedestrian and cyclist KA crashes by roadway speed limit. For pedestrians, most KA crashes occur on roadways with speeds of 35 and 40 mph. Cyclists are most likely to be involved in KA crashes on roadways with speeds of 45 mph.

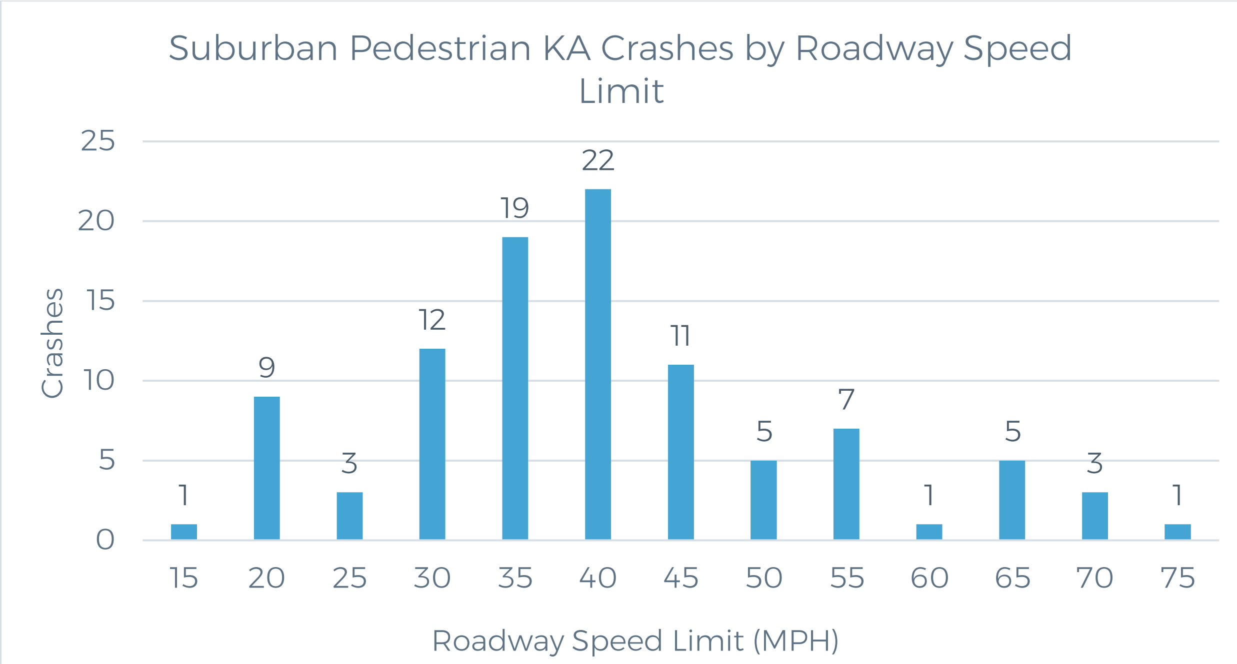


Figure 202: Suburban Pedestrian KA Crashes by Roadway Speed Limit (2017–2021)

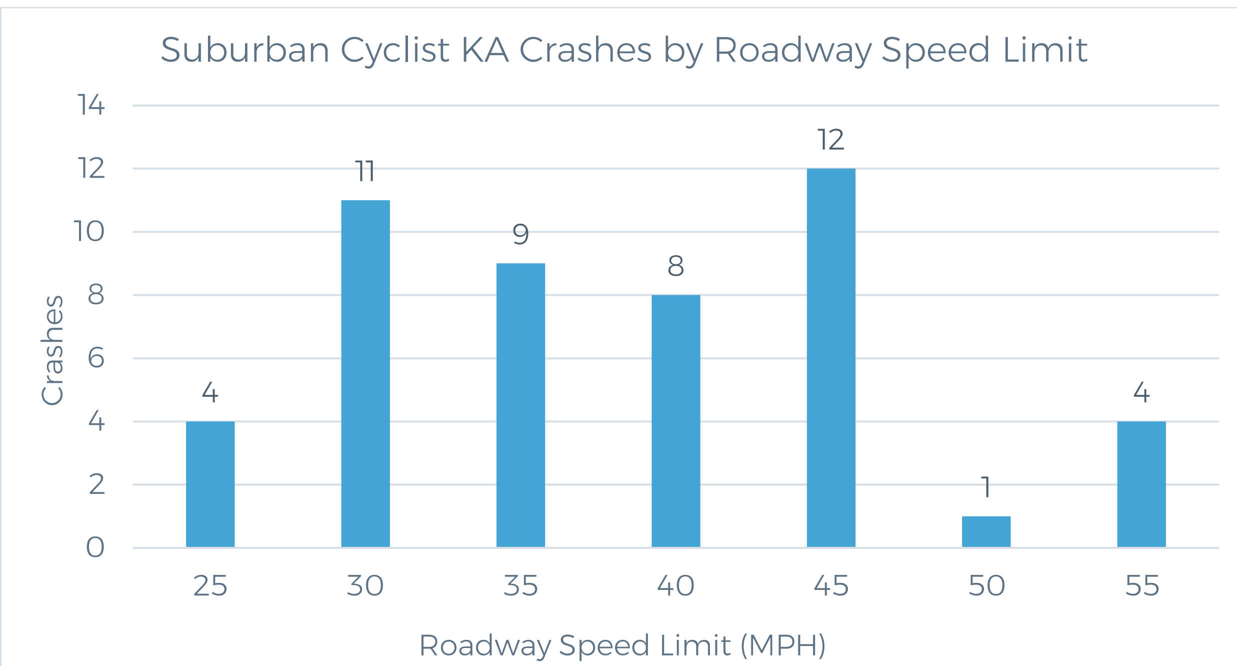


Figure 203: Suburban Cyclist KA Crashes by Roadway Speed Limit (2017–2021)

2.8.5.2.5.2 Environmental Conditions

Most pedestrians (89%) and (96%) cyclists of suburban KA crashes occurred on dry pavement. Adverse weather contributed relatively little to overall KA crash risk, as shown in Figure 204.

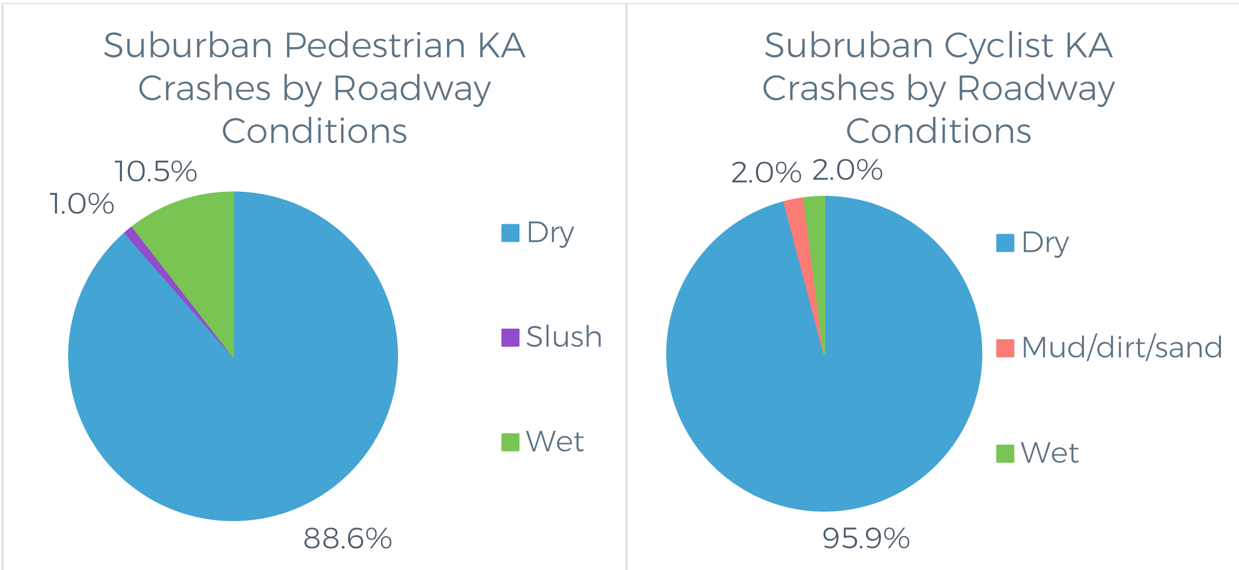


Figure 204: Suburban VRU KA Crashes by Roadway Condition (2017–2021)

2.8.5.2.5.3 Lighting Conditions

Most KA crashes among both mode shares occurred during daylight and under streetlights at nighttime, as shown in Figure 205.

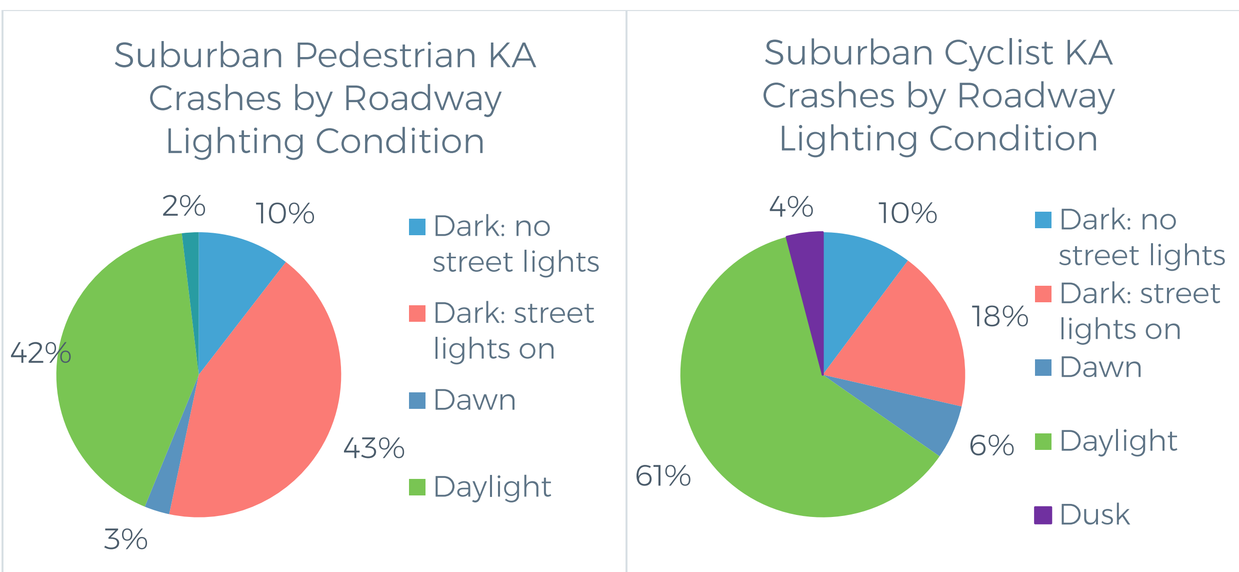


Figure 205: Suburban VRU KA Crashes by Roadway Lighting Condition (2017–2021)

2.8.5.2.5.4 Suspected Impairment
The data show that only 2% of VRU KA crashes on suburban roads involved alcohol or drugs, as shown in Figure 206.

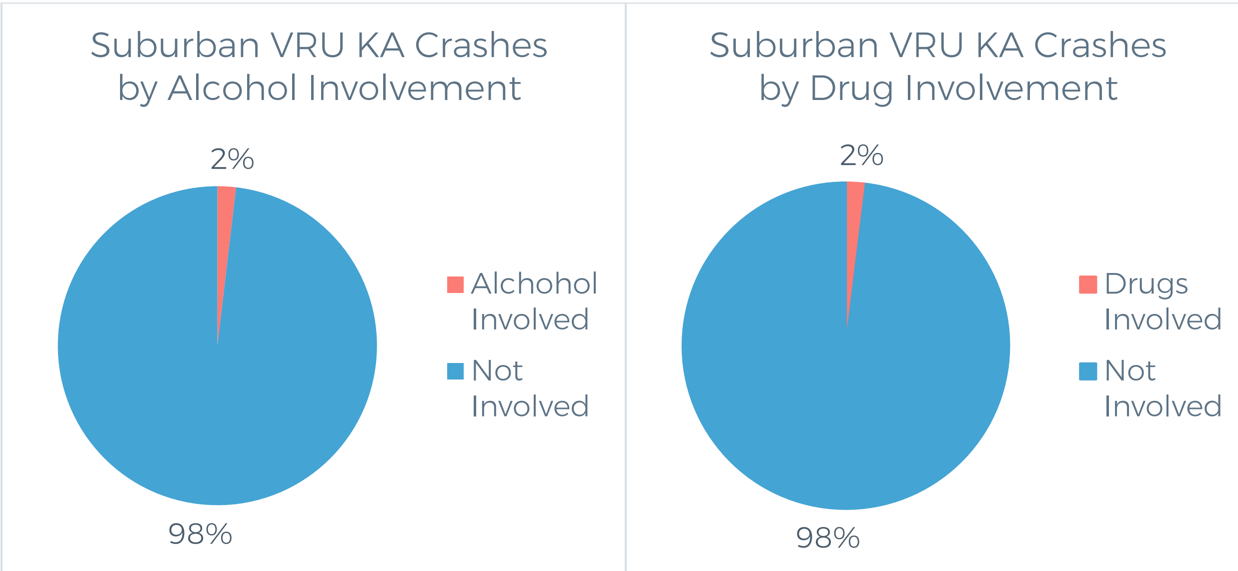


Figure 206: Suburban VRU KA Crashes by Alcohol Intoxication and Drug Involvement (2017–2021)

2.8.5.3 Urban Area Types Crash Statistics

2.8.5.3.1 Trends

VRUs who are killed or seriously injured in a crash on urban roads in Kansas have increased from 2014 to 2021. KA crash trends from 2014 to 2021 are shown in Figure 207 and are broken down by fatal and serious injury in Figure 208 and Figure 209. Urban areas are also more likely to be involved in a KA crash (on a population basis), as shown in Figure 210.

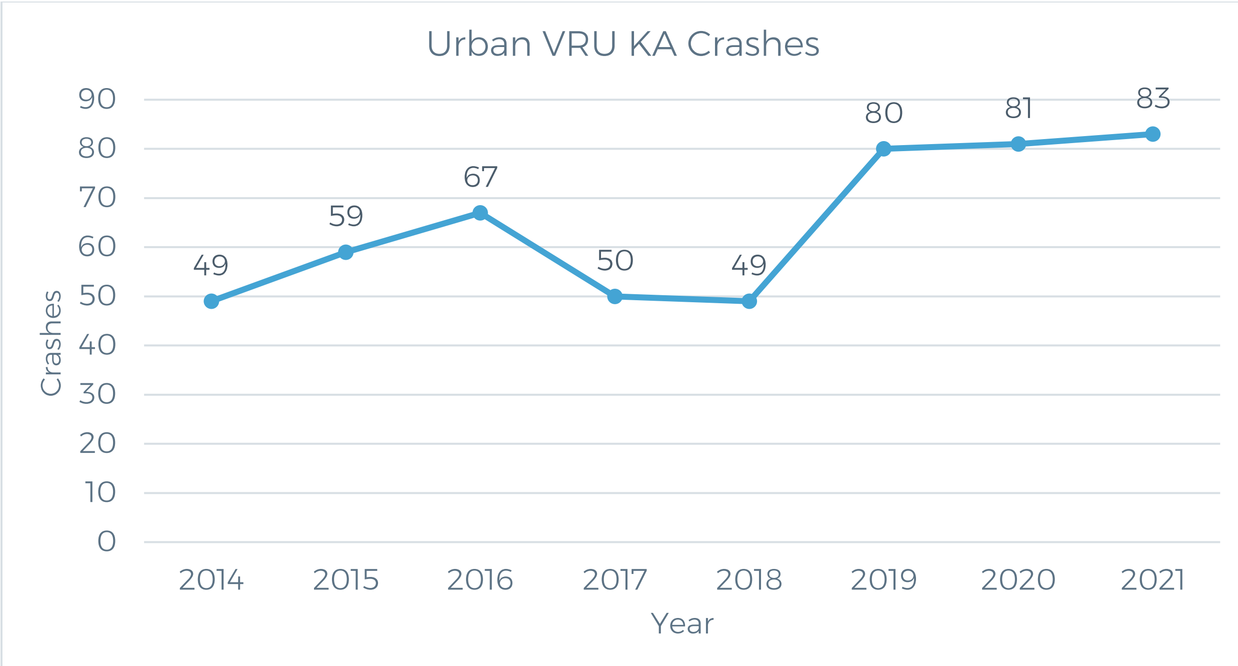


Figure 207: Urban VRU KA Crashes (2014–2021)

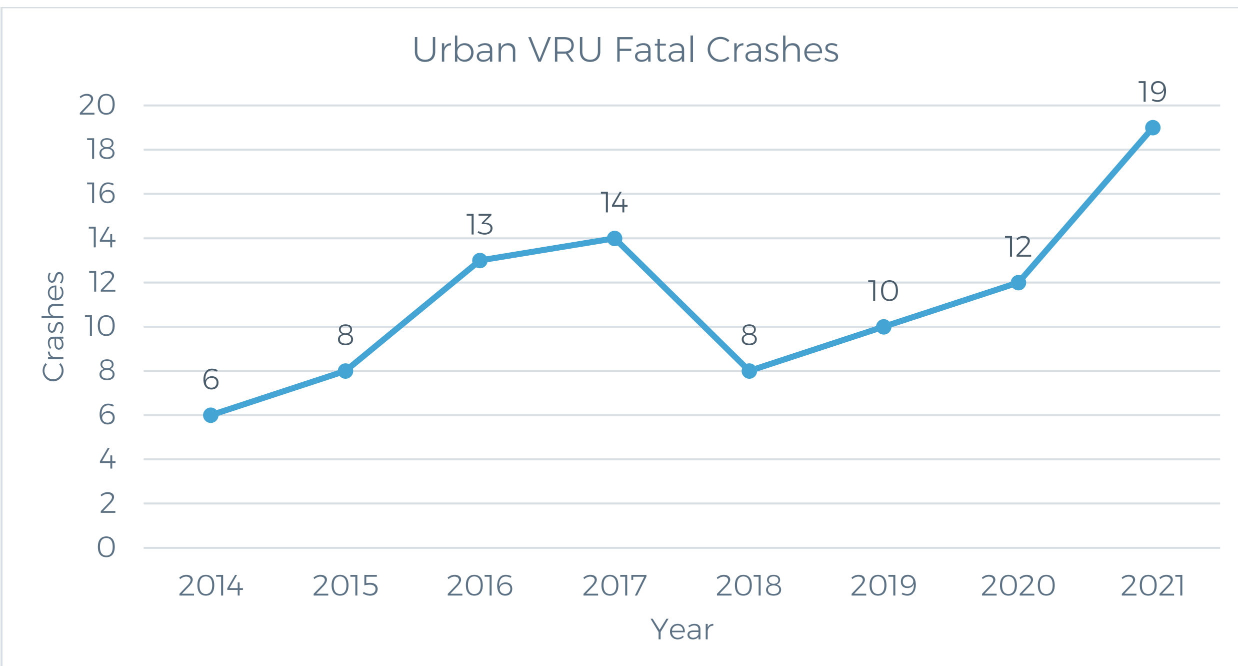


Figure 208: Urban VRU Fatal Crashes (2014–2021)

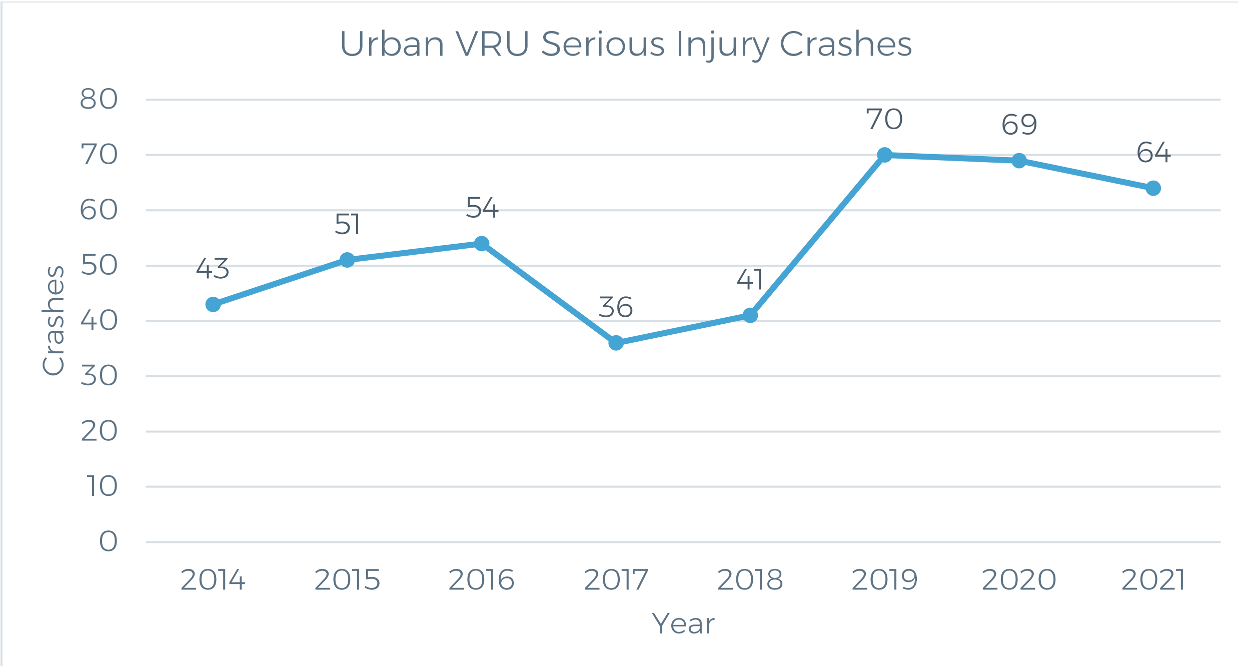


Figure 209: Urban VRU Serious Injury Crashes (2014–2021)

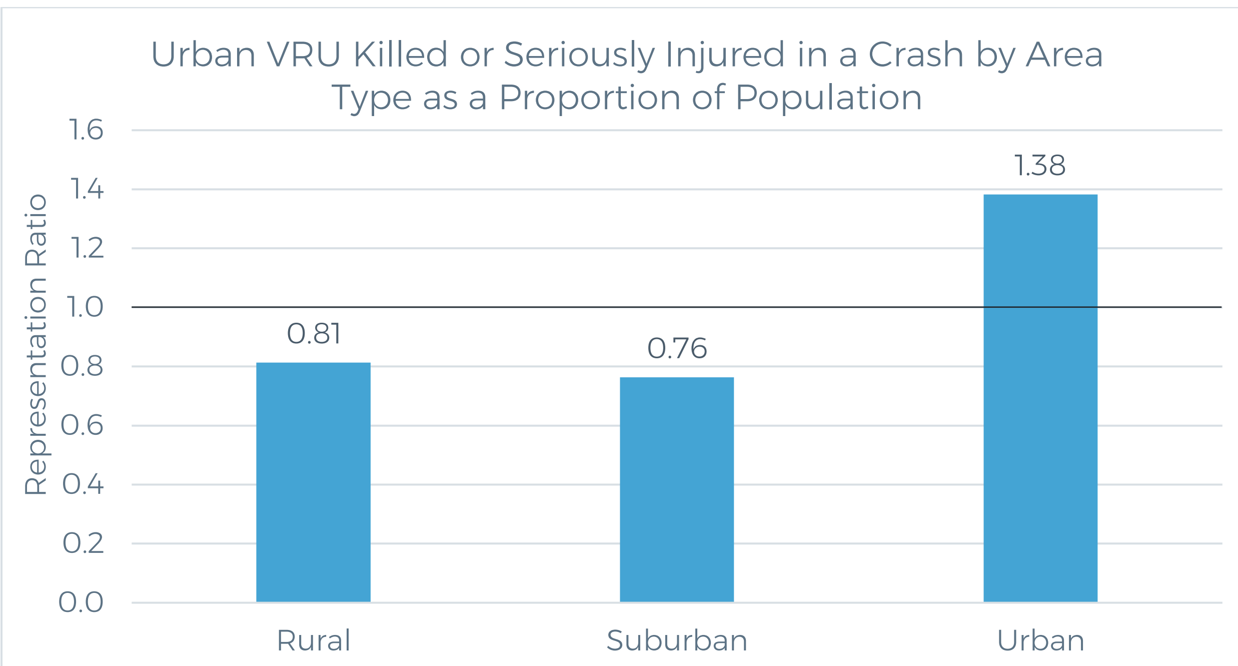


Figure 210: Urban VRU Killed or Seriously Injured in a Crash by Representation Ratio as a Proportion of Population; >1=Over Represented (2017–2021)

2.8.5.3.2 Pedestrians and Cyclists

Figure 211 shows the breakdown of VRU KA crashes in urban areas by mode share, with 70% of crashes involving pedestrians and 30% involving cyclists. Figure 212 shows the percent change in VRU crashes since 2014. Between 2014 and 2021, crashes involving pedestrians and bicyclists have both increased; crashes involving pedestrians have increased by 84%, while crashes involving bicyclists have increased by 41%.

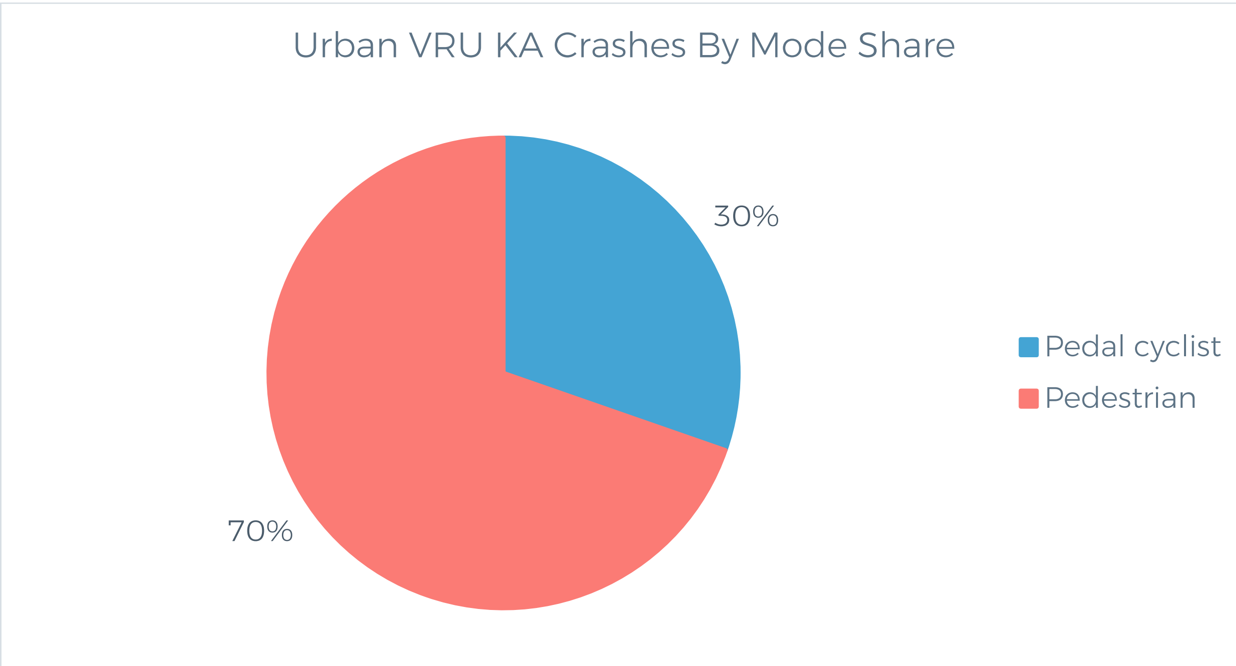


Figure 211: Urban VRU KA Crashes by Mode Share (2017–2021)

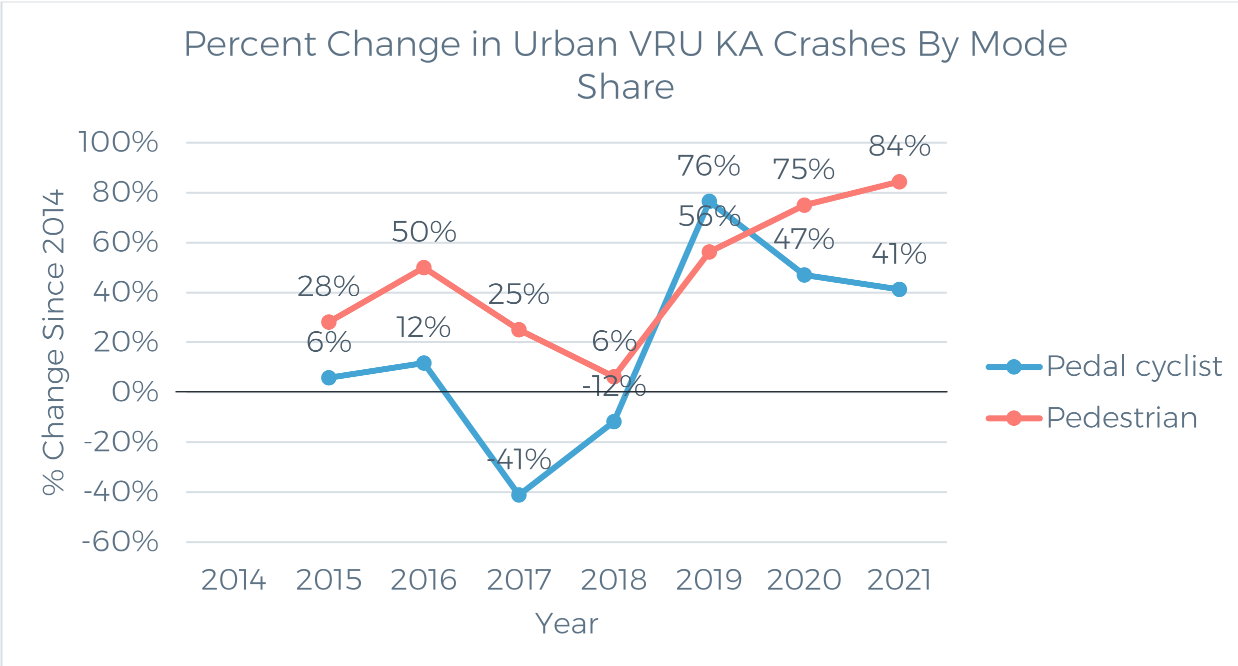


Figure 212: Percent Change in Urban VRU KA Crashes By Mode Share (2014 Base Year)

2.8.5.3.3 Users and Equity

DACs within urban areas experience the highest proportion of crashes. Figure 213 and Figure 214 show the overall numbers of VRUs killed or seriously injured in a crash in urban areas by mode share. DACs are the only subarea for both mode shares to have a higher number of VRU crashes occurring within than outside: crashes involving pedestrians inside of DACs are nearly double that of non-DAC areas. In contrast, crashes involving cyclists inside of DACs are more than double that of non-DAC areas.

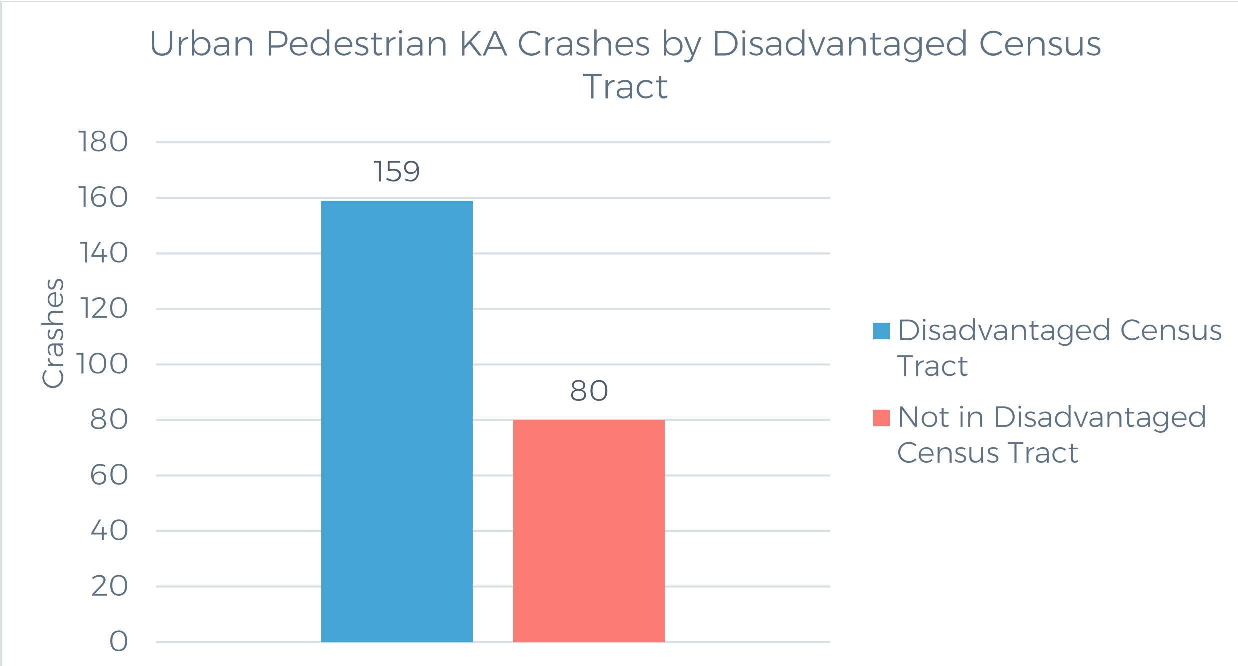


Figure 213: Urban Pedestrian KA Crashes By DAC (2017–2021)

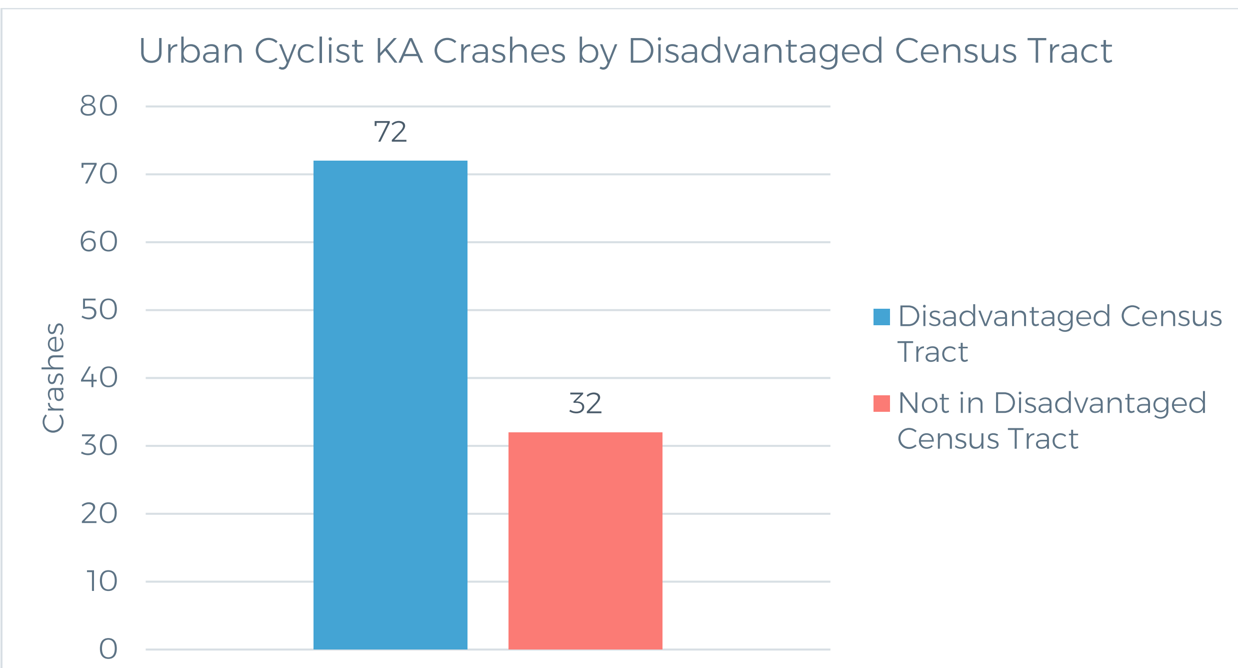


Figure 214: Urban Cyclist KA Crashes By DAC (2017–2021)

2.8.5.3.3.1 Age of User

Crashes in urban areas do not occur evenly across age groups; Figure 215 shows the overall numbers of VRUs involved in KA crashes over the most recent five years of data. The age groups that account for the largest number of crashes are VRUs in the mid-20s to mid-50s. Normalizing for population, it can be seen in Figure 216 that older adults between the ages of 55 and 64 are the most overrepresented group, followed by children and teens between 10 and 19.

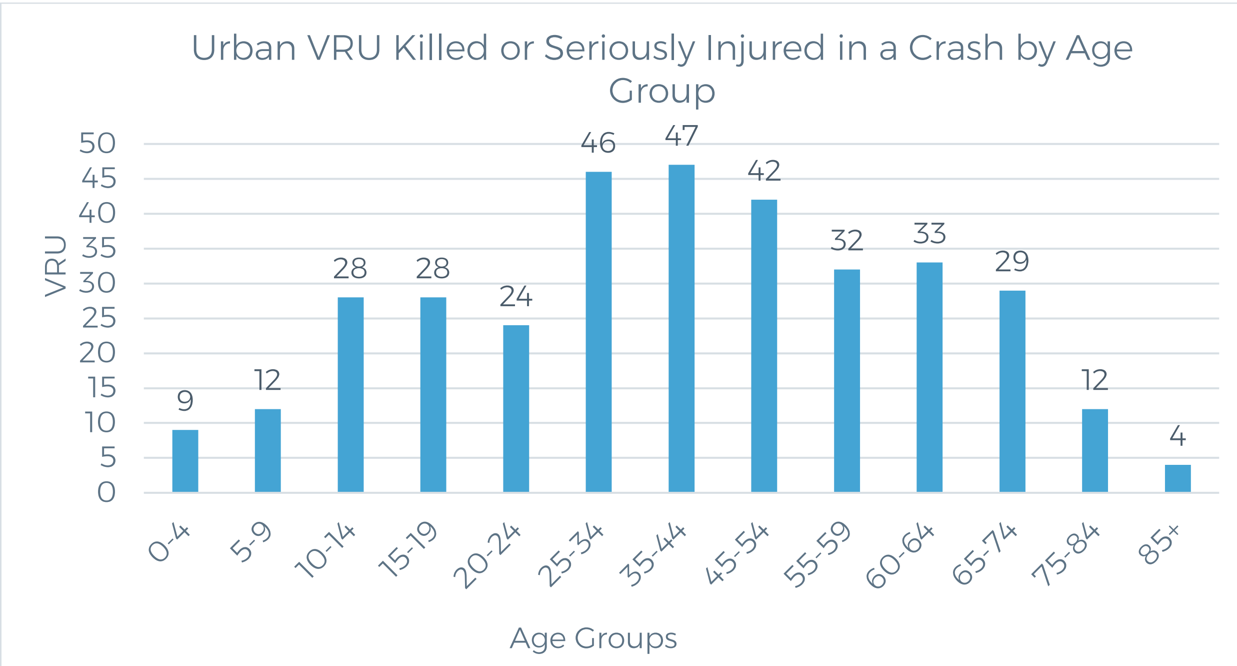


Figure 215: Urban VRU Killed or Seriously Injured in a Crash by Age Group (2017–2021)

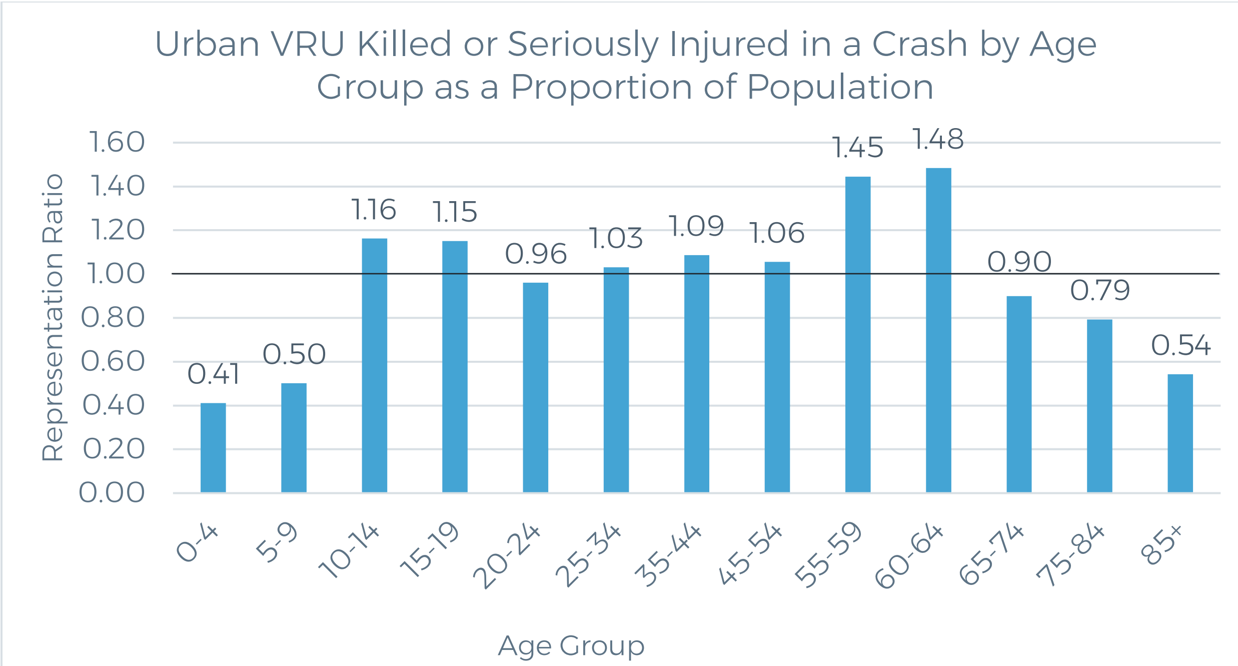


Figure 216: Urban VRU Killed or Seriously Injured in a Crash by Age Group by Representation Ratio (>1.0 = Overrepresentation) (2017–2021)

2.8.5.3.3.2 Sex of User

Males accounted for 61% of VRU pedestrians killed or seriously injured and 80% of the cyclists in urban areas (Figure 217). Overall, the proportion of men and women VRUs who were in KA crashes has steadily increased, as shown in Figure 218.

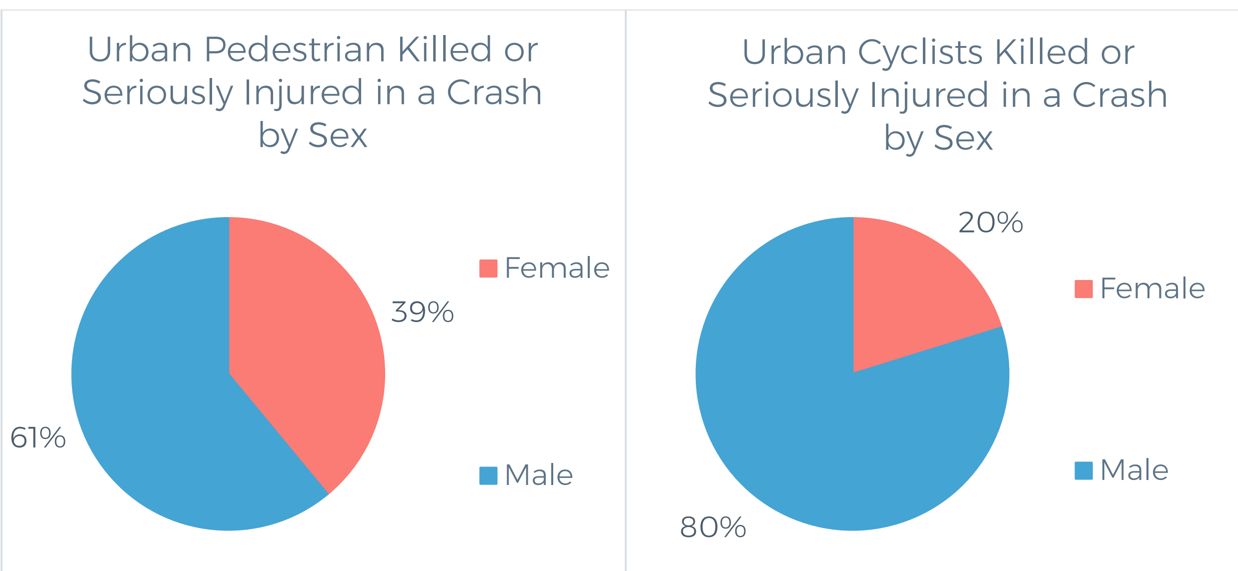


Figure 217: Urban VRU Killed or Seriously Injured in a Crash by Sex (2017–2021)

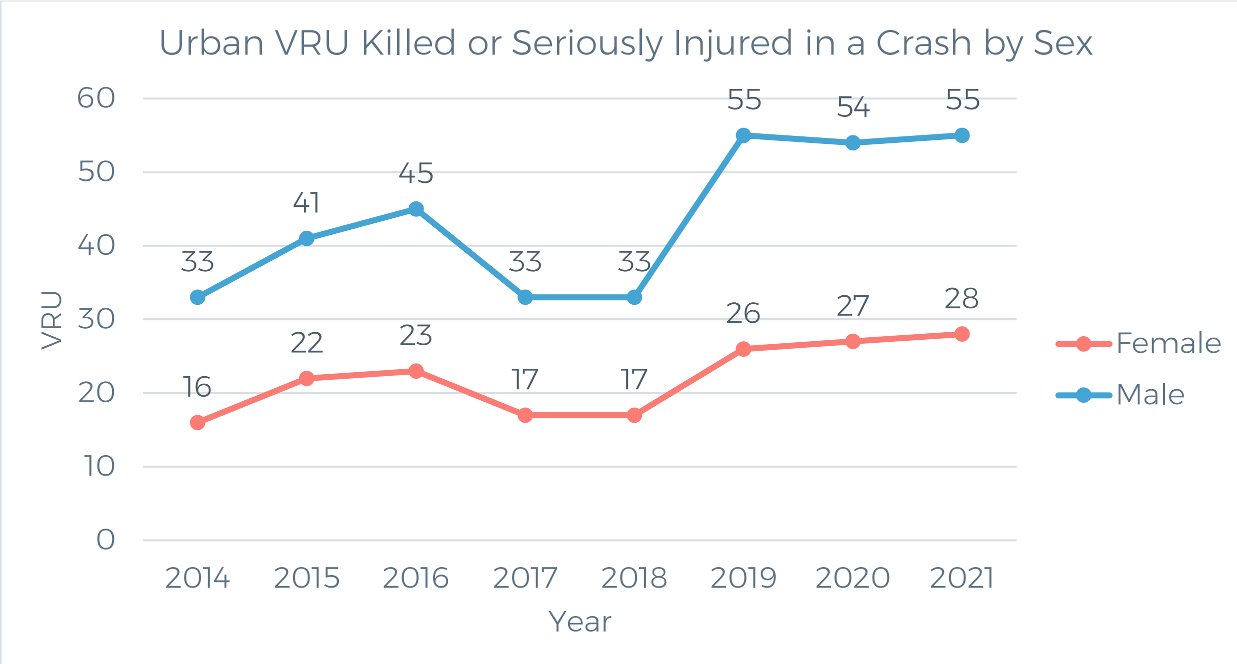


Figure 218: Urban VRU Killed or Seriously Injured in a Crash (2014–2021)

2.8.5.3.4 Crash Location and Type

2.8.5.3.4.1 Intersections

In urban areas, the location where most fatal and serious injury crashes occurred for both fatal and serious injury crashes was outside of bikeways and crosswalks in intersections (Figure 219 and Figure 220). At these locations, 110 fatal or serious injury crashes occurred.

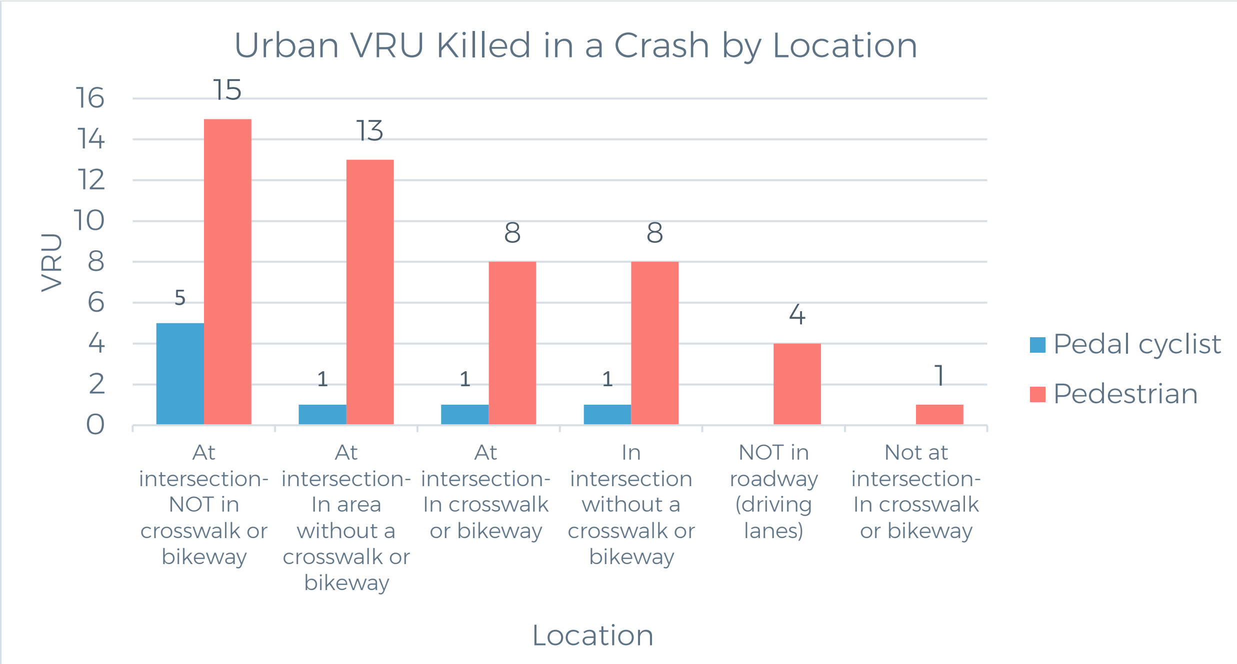


Figure 219: Urban VRU Killed in a Crash Crashes by Location (2017–2021)

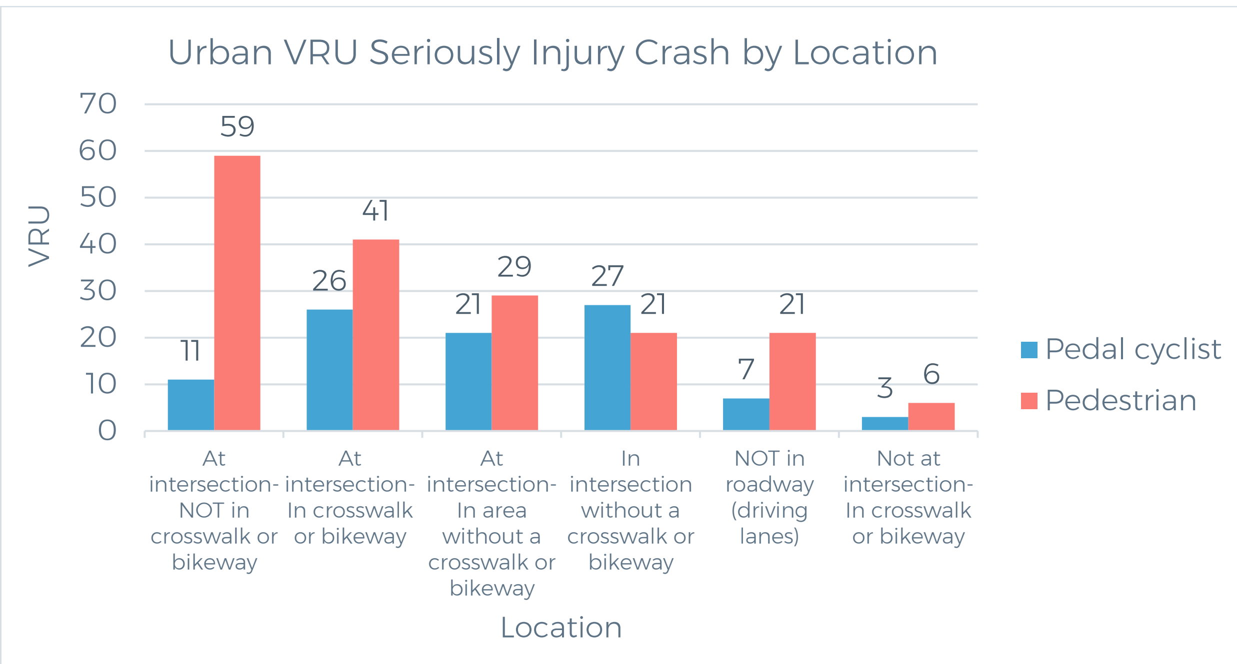


Figure 220: Urban VRU Seriously Injured in a Crash by Location (2017–2021)

2.8.5.3.4.2 Road Type

The most common road types in urban areas where VRUs experienced KA crashes were local roads and minor arterials (Figure 221 and Figure 222); 97 crashes involving both pedestrians and bicyclists occurred on minor arterials, while 95 crashes occurred on local roads.

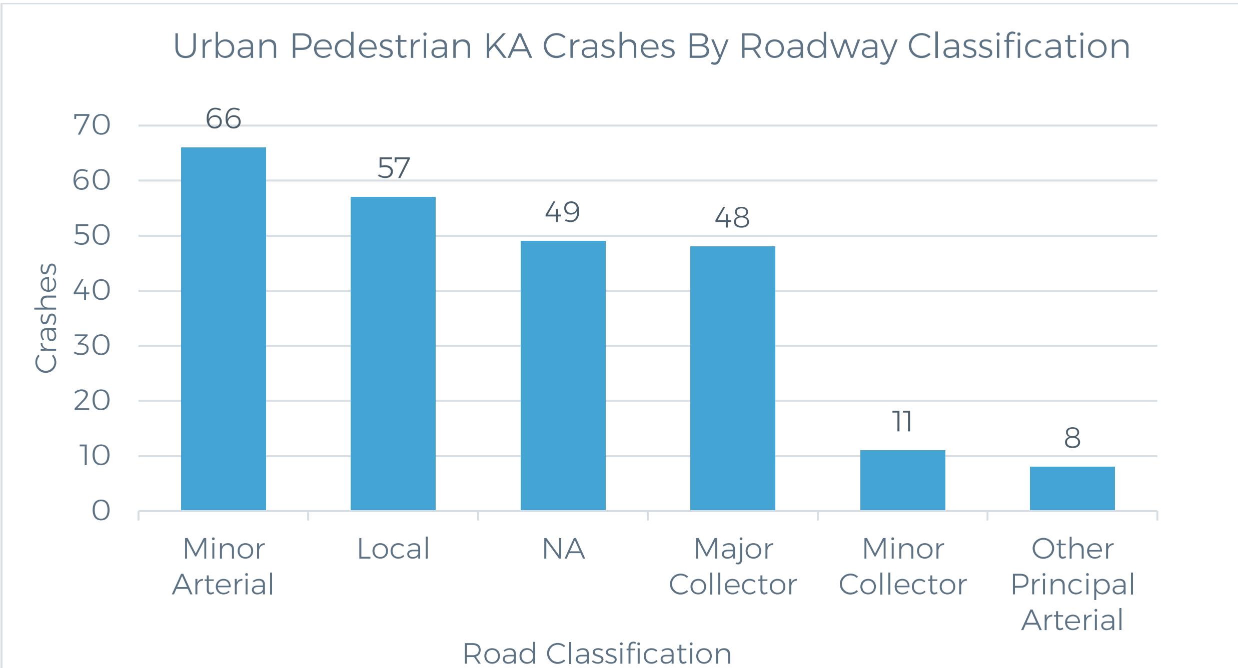


Figure 221: Urban Pedestrian KA Crashes by Roadway Classification (2017–2021)

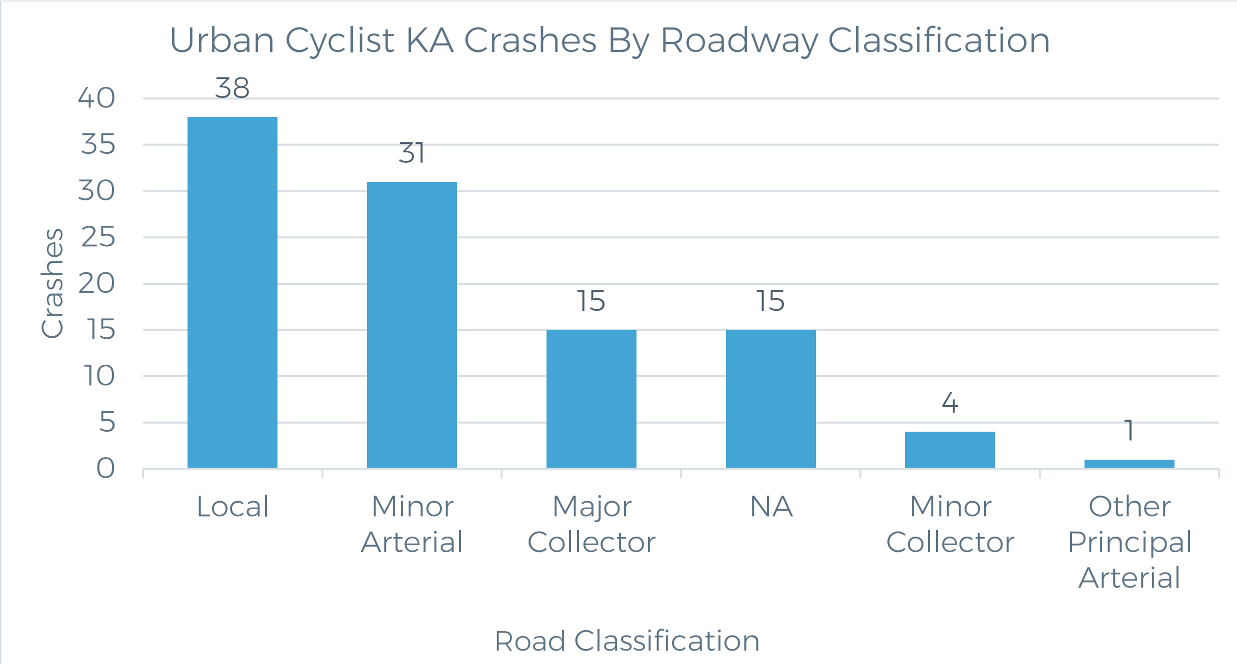


Figure 222: Urban Cyclist KA Crashes By Roadway Classification (2017–2021)

2.8.5.3.5 Contributing Circumstances

The reporting law enforcement officer determines the contributing circumstances, which are provided in Figure 223 and Figure 224 for VRUs involved in urban area KA crashes. Most pedestrian and cyclist crashes do not cite a contributing circumstance (136). For pedestrians and cyclists that do cite a contributing circumstance, the largest contributing circumstance for pedestrian crashes was improper crossing (30). In contrast, the largest contributing circumstance to cyclist crashes was a failure to yield the right-of-way (13).

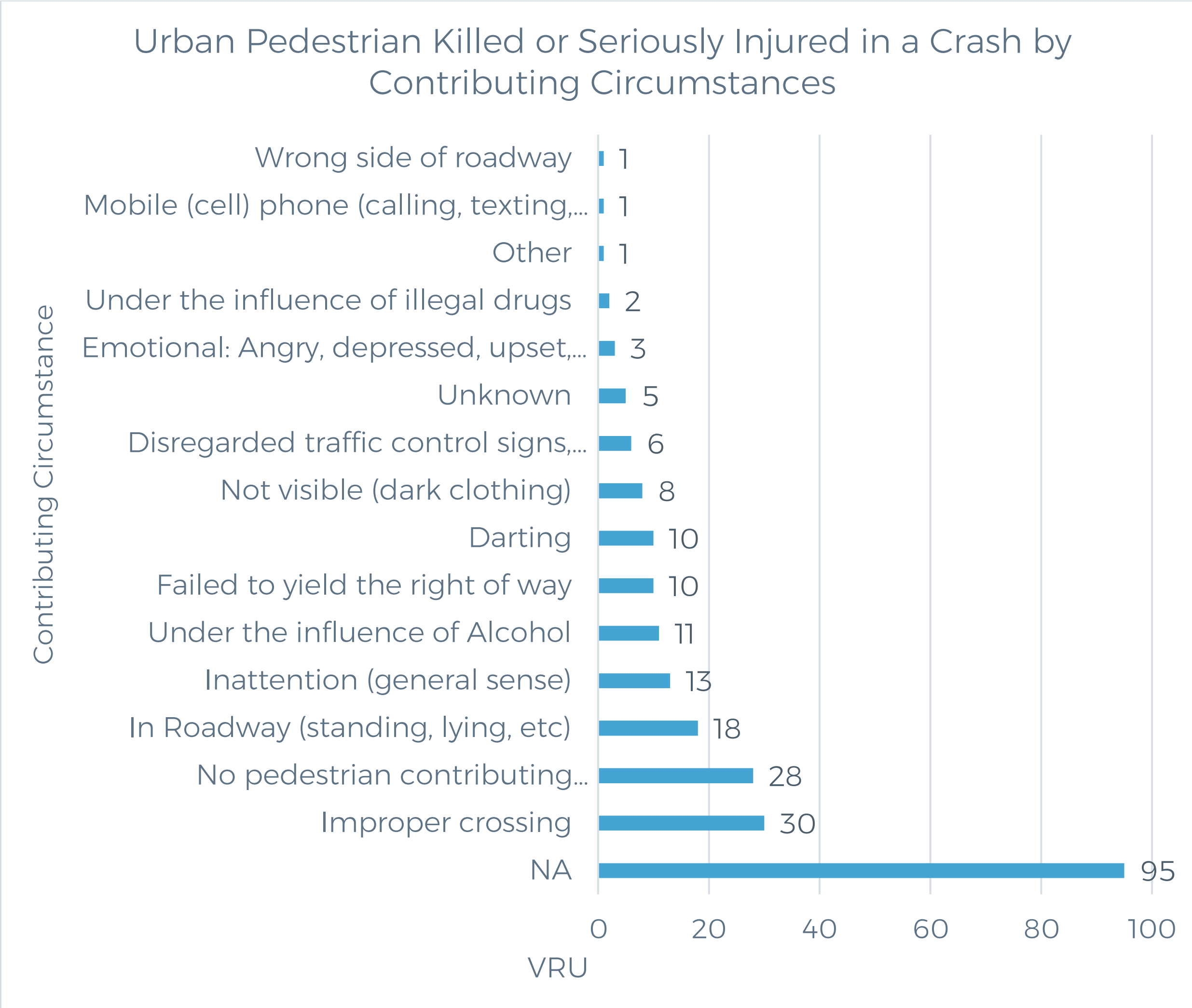


Figure 223: Urban Pedestrian Killed or Seriously Injured in a Crash by Contributing Circumstances (2017–2021)

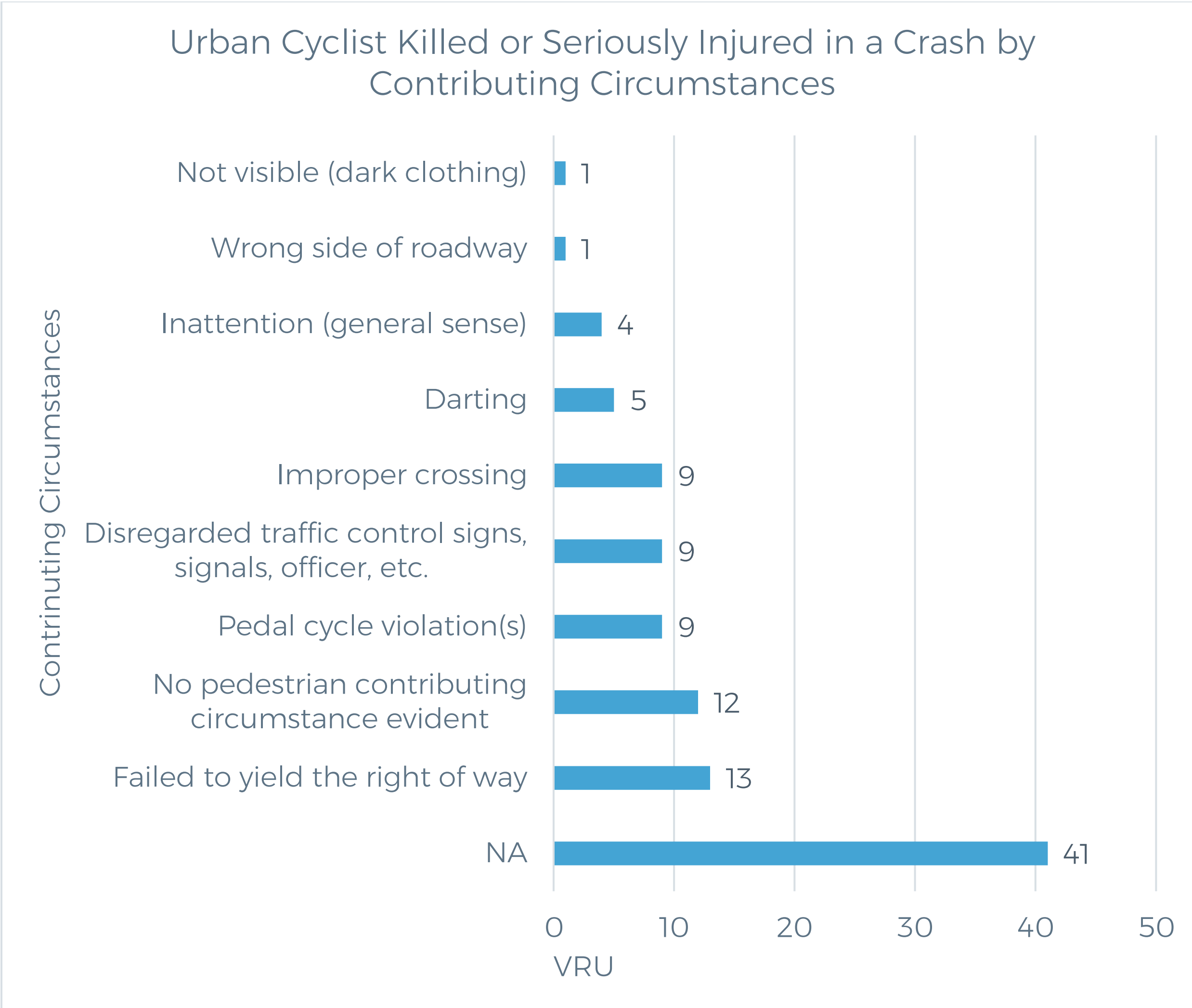


Figure 224: Urban Cyclist KA Crash Killed or Seriously Injured in a Crash by Contributing Circumstance (2017–2021)

2.8.5.3.5.1 Speed Limit of Roadway

KA crashes for VRUs in these areas occurred at slightly slower speeds than other subarea types. Figure 225 and Figure 226 show the numbers of pedestrians and cyclists who were killed or seriously in crashes by roadway speed limit. For pedestrians and cyclists, KA crashes occurred most often on roadways with speed limits of 30 mph.

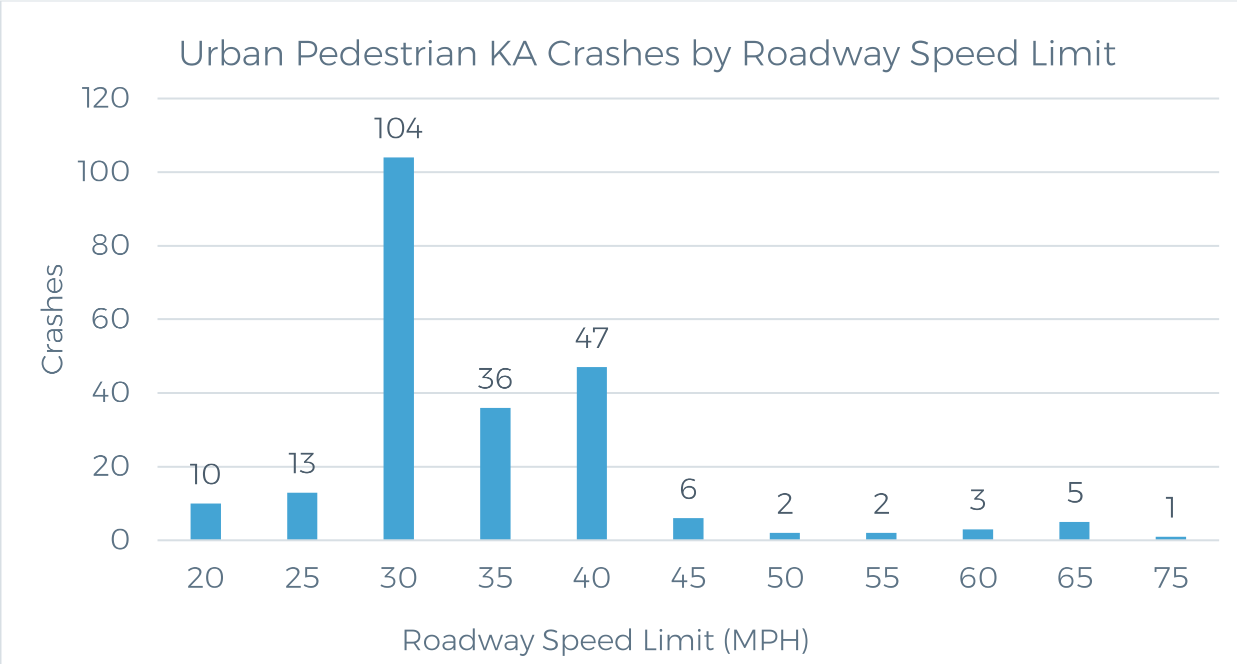


Figure 225: Urban Pedestrian KA Crashes by Roadway Speed Limit (2017–2021)

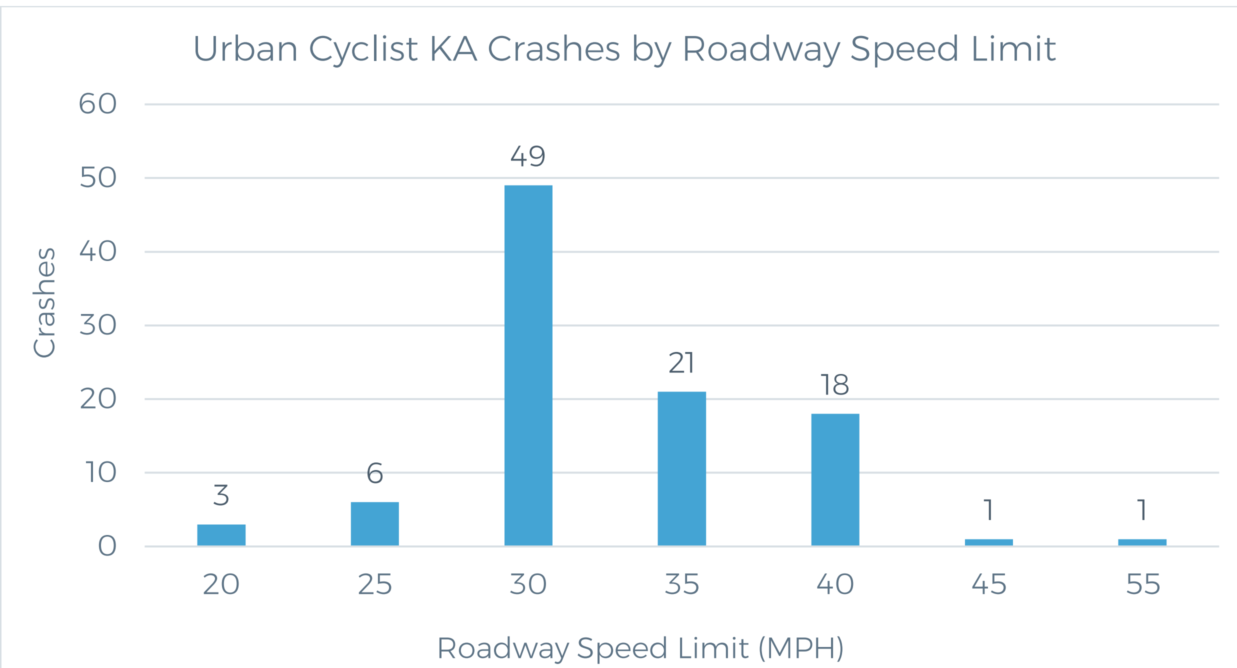


Figure 226: Urban Cyclist KA Crashes by Roadway Speed Limit (2017–2021)

2.8.5.3.5.2 Environmental Conditions

Most pedestrians (85%) and cyclist (91%) KA crashes in urban areas occurred on dry pavement. Adverse weather contributed relatively little to overall KA crash risk, as shown in Figure 227.

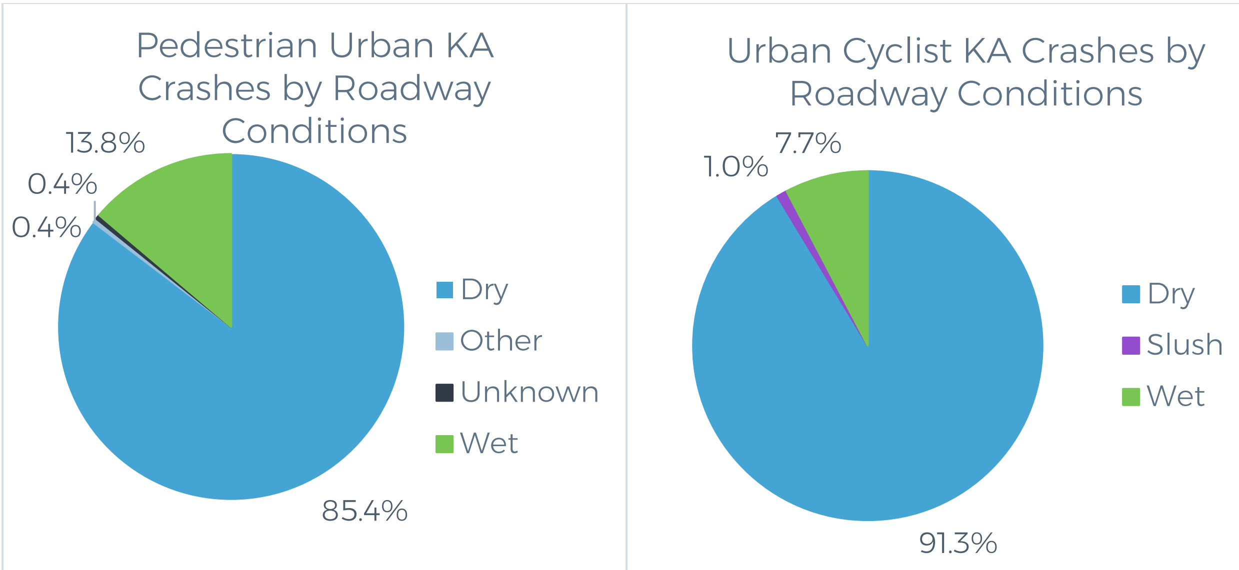


Figure 227: Urban VRU KA Crashes by Roadway Conditions (2017–2021)

2.8.5.3.5.3 Lighting Conditions

Most KA crashes among both mode shares occurred during daylight or in the dark with streetlights on, as shown in Figure 228.

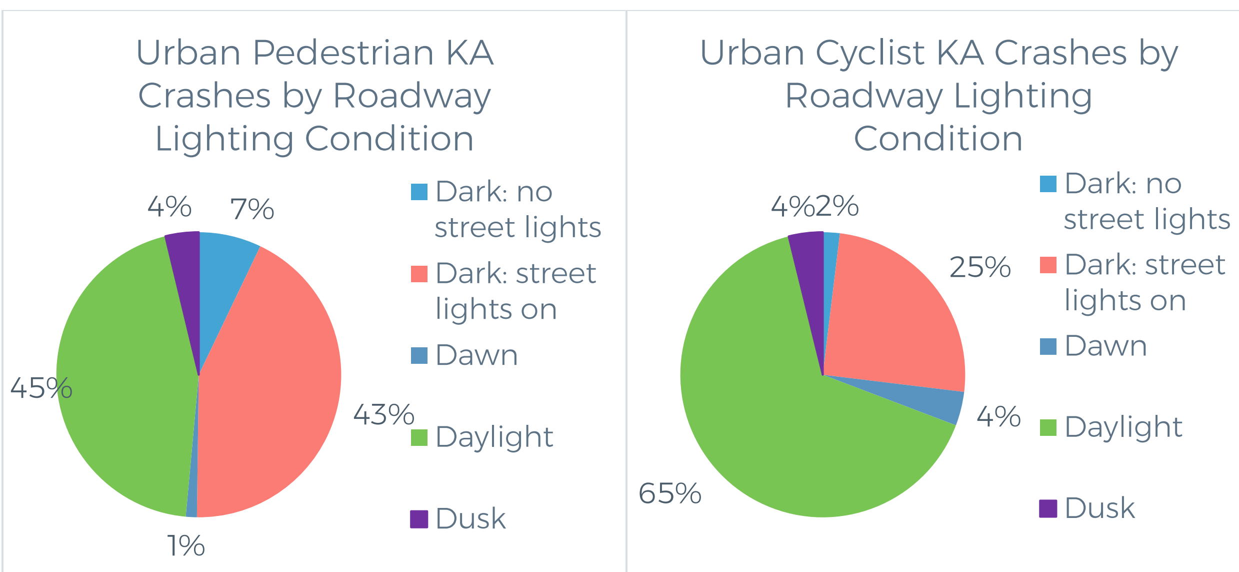


Figure 228: Urban VRU KA Crashes by Roadway Lighting Condition (2017–2021)

2.8.5.3.5.4 Suspected Impairment

The data shows that only 3% of VRU KA crashes on urban roads involved alcohol, and only 1% involved drugs, as shown in Figure 229.

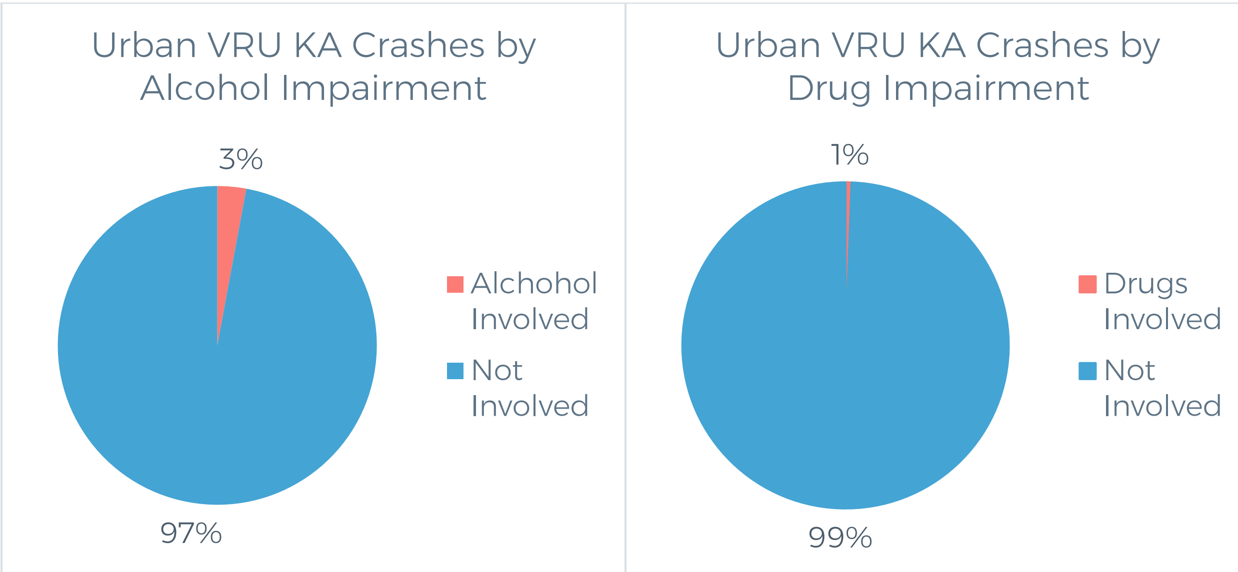


Figure 229: Urban VRU KA Crashes by Alcohol and Drug Impairment (2017–2021)

Kansas Vulnerable Road User Safety Assessment

3. Stakeholder Engagement

3.1 Stakeholder Engagement Introduction

KDOT hosted two rounds of statewide stakeholder engagement. The first round of statewide safety workshops was a listening tour across the state, which included nine half-day, in-person workshops and one virtual workshop for representatives of counties, cities, MPOs, Tribal governments, transit agencies, and KDOT staff. In the first round of workshops, KDOT shared the VRU safety data analysis with local agencies and gathered feedback on VRU safety issues relevant to local communities in Kansas.

The second round of areas of higher-risk and areas of lower-risk city workshops involved one workshop for each of the five areas of higher risk cities (Hutchinson, Kansas City, Topeka, Salina, and Wichita) and one workshop for the six areas of lower-risk cities (Augusta, Gardner, Hays, Manhattan City, Ottawa, and Pittsburg). The workshops with the areas of higher-risk cities focused on the data that put their city in this category; all five areas of higher-risk cities attended this workshop. The workshops with the areas of lower-risk focused on best practices that showed the VRU safety achievements; three areas of lower-risk cities (Hays, Pittsburg, and Newton) attended this workshop, and Ottawa provided comments after the workshop.

3.2 Statewide Safety Workshops

These workshops aimed to share recent data analysis findings and to identify additional challenges that are difficult to understand without local expertise. These workshops also aimed to discuss potential countermeasures, strategies, and policies that are appropriate to the context of local jurisdictions. This chapter summarizes the complete workshop feedback from 16 different workshops across the state; details pertaining to the planning and organization of the workshops are covered in the VRUSA.

3.3 Workshops Attendance

Representatives from 45 counties, 38 cities, and 4 MPOs from Kansas attended workshops, representing 77% of the Kansas population, according to 2020 U.S. Census data. The agencies represented can be found in the list below, and a map of the agency locations is included in Figure 230.

- Atchison County
- Allen County
- Barber County
- Barton County
- Bourbon County
- Brown County
- Butler County
- Cherokee County
- Cloud County
- Coffey County
- Cowley County
- Crawford County
- Dickinson County
- Ellis County
- Finney County
- Franklin County
- Geary County
- Grant County
- Gray County
- Hamilton County
- Harvey County
- Hodgeman County
- Jefferson County
- Kearny County
- Kingsman County
- Leavenworth County
- Lyon County
- Marion County
- McPherson County
- Meade County
- Miami County
- Montgomery County
- Morris County
- Neosho County
- Osage County
- Pottawatomie County
- Rice County
- Riley County
- Saline County
- Sedgwick County
- Seward County
- Stafford County
- Sumner County
- Wabaunsee County
- Wallace County
- City of Abilene
- City of Andover
- City of Baldwin
- City of Bonner Springs
- City of Cimarron
- City of Concordia
- City of Dodge City
- City of Emporia
- City of Eudora
- City of Eureka
- City of Fredonia
- City of Goodland
- City of Hays
- City of Hiawatha
- City of Junction City
- City of Lawrence
- City of Leavenworth
- City of Leawood
- City of Lenexa
- City of Lindsborg
- City of Maize
- City of Medicine Lodge
- City of Merriam
- City of Ness
- City of Newton
- City of Ogden
- City of Olathe
- City of Overland Park
- City of Osawatomie
- City of Ottawa
- City of Pittsburg
- City of Salina
- City of Shawnee
- City of Topeka
- City of Washington
- City of Wathena
- City of Wichita
- City of Winfield
- Flint Hills MPO
- Lawrence-Douglas County MPO
- St. Joseph MPO
- Wichita MPO
- Prairie Band Potawatomi Nation
- Unified Government of Wyandotte County and Kansas City, Kansas
- FHWA
- Kansas Department of Health and Environment
- Kansas Department of Transportation
- Liberal City Bus
- Nebraska Department of Roads
- National Highway Traffic Safety Administration
- Reno County Area Transit
- Solomon Valley Transportation
- Topeka Metro

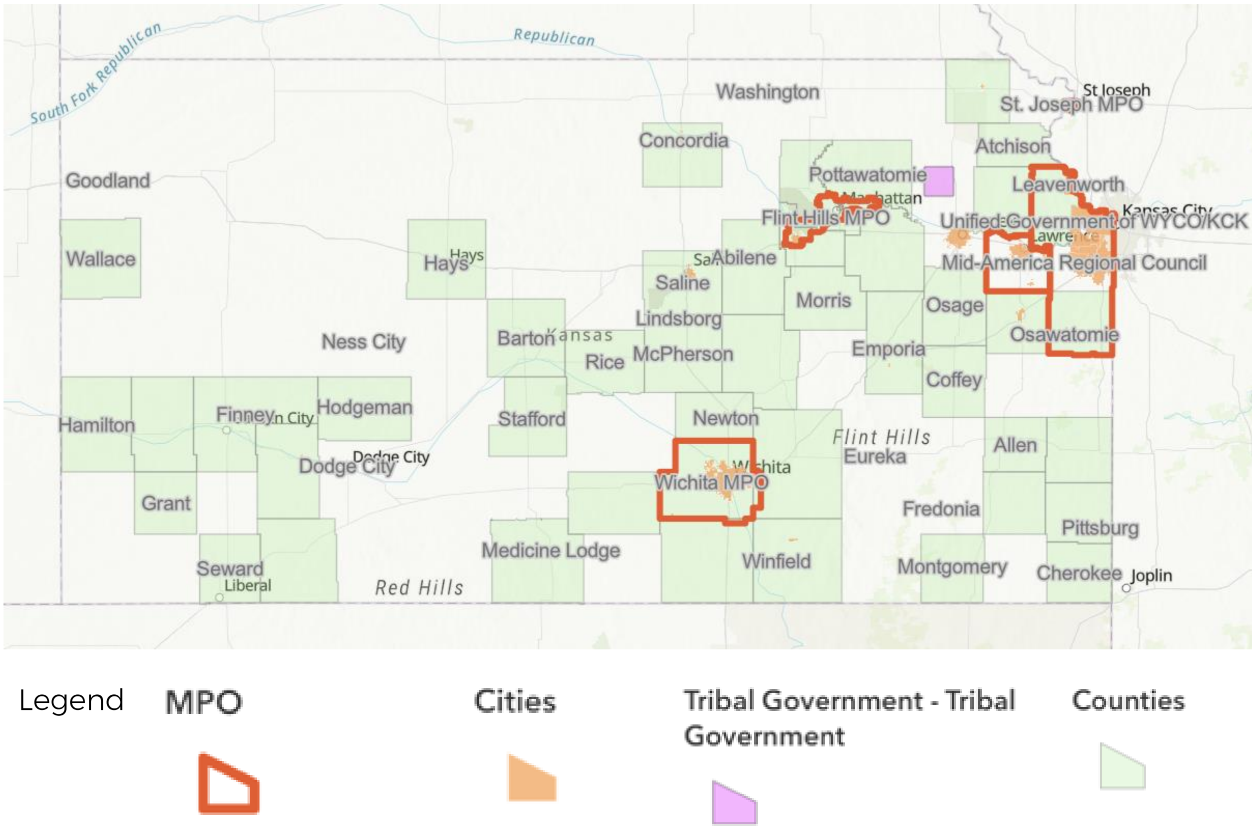


Figure 230: Map of Agencies Engaged at Workshops

3.4 Workshop Memos

KDOT emailed the following memoranda to local agency partner contacts from KDOT outreach lists for MPOs, city municipalities, counties, and Tribal governments and included methods to reply. Figure 231 is the memo sent out to MPOS, Tribal governements, and government agencies regarding two (2) half-day workshops, while Figure 232 is the memo sent out to city and county representatives regarding six (6) half-day workshops. The location of the District 3 Workshop was changed from Norton to Hays because of scheduling conflicts after the memoranda were distributed, so prospective attendees were alerted of the new meeting location through follow-up emails and phone calls.

MEMO

Kansas
Department of Transportation

DATE: March 28, 2023
TO: KDOT Local Agency Partners
FROM: Vanessa Spartan, KDOT Bureau Chief of Transportation Safety
CC: Carla Anderson, KDOT State Highway Safety Engineer
Maggie Wilcox, KDOT Transportation Safety Planner
Jay Aber, WSP, Project Manager
RE: **Vulnerable Road User (VRU) Safety Assessment – Invitation to VRU Local Agency Meetings**

Eisenhower State Office Building
700 S.W. Harrison Street
Topeka, KS 66603-3745
kdot#publicinfo@ks.gov
https://www.ksdot.gov

The Kansas Department of Transportation (KDOT) is developing a **Vulnerable Road User (VRU) Safety Assessment** to plan for improved safety for people walking and biking on all public roads in Kansas. This assessment will be conducted in compliance with the Federal Highway Administration (FHWA) guidance memorandum dated October 21, 2022, which states:

> The purpose of this memorandum is to provide background and guidance to clarify the requirements for the Vulnerable Road User Safety Assessment as described in 23 U.S.C. 148(l), as amended by the Infrastructure Investment and Jobs Act (IIJA) (Pub. L. 117-58, also known as the "Bipartisan Infrastructure Law" (BIL)). All States are required to develop a Vulnerable Road User Safety Assessment as part of their Highway Safety Improvement Program (HSIP) in accordance with 23 U.S.C. 148(l).

PURPOSE: KDOT is hosting two (2) half-day, in-person workshops for relevant representatives of MPOs, Tribal governments, and transit agencies. These workshops will improve KDOT's understanding of VRU safety issues and to distribute information related to the VRU Safety Assessment. During these initial workshops, the project team is seeking feedback on VRU safety issues relevant to your local community or area. The primary purpose of these workshops is to discuss recent data analysis findings and to identify additional issues that are challenging to understand without local expertise. These issues may be related to VRU access, typical usage, contributing circumstances in VRU crashes, areas that may have safety issues but are being avoided by VRUs because of safety concerns and thus not apparent in crash data, and other related issues. The second purpose of these workshops is to discuss potential countermeasures, strategies, and policies that are appropriate to the context of your jurisdiction. The final purpose of these workshops is to determine if your agency has already undertaken bicycle and pedestrian facility project development.

KDOT would like to invite one representative from your agency or Tribe that is familiar with VRU safety issues to attend one of the workshops. The following are the days, times, and locations for the two (2) MPO, Tribal Governments, and Transit Agencies workshops. You may choose to attend any of the following workshops that is convenient for you:

- **Workshop in Lawrence:** 9:00 a.m. to 12:00 p.m. on Fri., April 14, 2023
  at KU Innovation Park, Chamber Room #109 at 2029 Becker Drive, Lawrence, KS 66047
- **Workshop in Wichita:** 1:00 to 4:00 p.m. on Wed., April 26, 2023
  at the Hyatt Regency Wichita, Birch Room at 400 Waterman Street, Wichita, KS 67202

Please RSVP by April 7, 2023, to Ingrid Vandervort (Ingrid.vandervort@ks.gov) indicating which workshop you will attend.

Figure 231: KDOT Memo Invitation to VRU Local Agency Meetings to MPOs, Tribal Governements, and Government Agencies

MEMO

Kansas Department of Transportation

DATE: March 28, 2023
TO: KDOT Local Agency Partners
FROM: Vanessa Spartan, KDOT Bureau Chief of Transportation Safety
CC: Carla Anderson, KDOT State Highway Safety Engineer
Maggie Wilcox, KDOT Transportation Safety Planner
Jay Aber, WSP, Project Manager
RE: **Vulnerable Road User (VRU) Safety Assessment – Invitation to VRU Local Agency Meetings**

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kdot#publicinfo@ks.gov
https://www.ksdot.gov

The Kansas Department of Transportation (KDOT) is developing a **Vulnerable Road User (VRU) Safety Assessment** to plan for improved safety for people walking and biking on all public roads in Kansas. This assessment will be conducted in compliance with the Federal Highway Administration (FHWA) guidance memorandum dated October 21, 2022, which states:

> The purpose of this memorandum is to provide background and guidance to clarify the requirements for the Vulnerable Road User Safety Assessment as described in 23 U.S.C. 148(l), as amended by the Infrastructure Investment and Jobs Act (IIJA) (Pub. L. 117-58, also known as the "Bipartisan Infrastructure Law" (BIL)). All States are required to develop a Vulnerable Road User Safety Assessment as part of their Highway Safety Improvement Program (HSIP) in accordance with 23 U.S.C. 148(l).

PURPOSE: KDOT is hosting six (6) half-day, in-person workshops for relevant representatives of counties and cities. These workshops will improve KDOT's understanding of VRU safety issues and to distribute information related to the VRU Safety Assessment. During these initial workshops, the project team is seeking feedback on VRU safety issues relevant to your local community or area. The primary purpose of these workshops is to discuss recent data analysis findings and to identify additional issues that are challenging to understand without local expertise. These issues may be related to VRU access, typical usage, contributing circumstances in VRU crashes, areas that may have safety issues but are being avoided by VRUs because of safety concerns and thus not apparent in crash data, and other related issues. The second purpose of these workshops is to discuss potential countermeasures, strategies, and policies that are appropriate to the context of your jurisdiction. The final purpose of these workshops is to determine if local agencies have already undertaken bicycle and pedestrian facility project development.

KDOT would like to invite one representative from your city or county that is familiar with VRU safety issues to attend one of the workshops. You may choose to attend any of the following workshops that is convenient for you:

- **District 2 Workshop (North Central Kansas):** 1:00 to 4:00 p.m. on Mon., April 17, 2023 in the KDOT District 2 Conference Room, 1006 N. Third Street, Salina, KS 67401
- **District 3 Workshop (Northwest Kansas):** 1:00 to 4:00 p.m. on Tues., April 18, 2023 in the KDOT District 3 Conference Room, 312 S. Second, Norton, KS 67654
- **District 6 Workshop (Southwest Kansas):** 1:00 to 4:00 p.m. on Wed., April 19, 2023 in the Dodge City Public Library, Lois Flanagan Room, 1001 N. 2nd Avene, Dodge City, KS 67801
- **District 5 Workshop (South Central Kansas):** 1:00 to 4:00 p.m. on Thurs., April 20, 2023 In the KDOT District 5 Conference Room, 500 N. Hendricks, Hutchinson, KS 67501
- **District 4 Workshop (Southeast Kansas):** 1:00 to 4:00 p.m. on Mon., April 24, 2023 in the KDOT District 4 Conference Room, 411 West Fourteenth, Chanute, KS 66720
- **District 1 Workshop (Northeast Kansas):** 9:00 a.m. to 12:00 p.m. on Fri., April 28, 2023 in the KDOT District 1 Conference Room, 121 SW 21st Street, Topeka, KS 66612

Please RSVP by April 7, 2023, to Ingrid Vandervort (Ingrid.vandervort@ks.gov) indicating which workshop you will attend.

Figure 232: KDOT Memo Invitation to VRU Local Agency Meetings to City and County Representatives

3.5 Workshops Schedule

For the first round of workshops, KDOT held on-site meetings for six administrative districts, two for MPOs public transit agencies, tribal leaders, etc., and one for KDOT staff, along with a virtual meeting for those unable to attend in person. The virtual meeting was not advertised in the memo as to encourage people to participate in person; however, people who expressed interest but could not attend due to schedule conflicts were made aware of the opportunity The KDOT's second round of virtual workshops included one meeting with the six areas of lower-risk cities and individual meetings with each of the five areas of higher-risk cities in Kansas based on current VRU safety data. Table 32 shows the workshop schedule in detail, and Figure 233 shows a map of the workshop locations.

Table 32: Vulnerable Road User Assessment Workshop Schedule

Date	Time	Location	Facility	District/MPO/City
April 14, 2023	9:00 a.m. – 12:00 p.m.	Lawrence	University of Kansas Innovation Park, Chamber Room	MPOs/Tribal governments/ transit agencies
April 17, 2023	1:00 – 4:00 p.m.	Salina	KDOT District 2 Conference Room	District 2
April 18, 2023	1:00 – 4:00 p.m.	Hays	KDOT District 3 Conference Room	District 3
April 19, 2023	1:00 – 4:00 p.m.	Dodge City	Dodge City Public Library	District 6
April 20, 2023	1:00 – 4:00 p.m.	Hutchinson	KDOT District 5 Conference Room	District 5
April 24, 2023	1:00 – 4:00 p.m.	Chanute	KDOT District 4 Conference Room	District 4
April 26, 2023	1:00 – 4:00 p.m.	Wichita	Hyatt Regency Wichita Birch Room	MPOs/Tribal governments/ transit agencies
April 28, 2023	9:00 a.m. – 12:00 p.m.	Topeka	KDOT District 1 Conference Room	District 1
May 15, 2023	1:00 – 4:00 p.m.	Topeka	KDOT Headquarters Conference Room	KDOT staff
May 30, 2023	9:00 a.m. – 12:00 p.m.	Virtual	Microsoft Teams Meeting	All
August 23, 2023	8:30 – 11:00 a.m.	Virtual	Microsoft Teams Meeting	Areas of lower-risk cities
August 24, 2023	1:30 – 4:00 p.m.	Virtual	Microsoft Teams Meeting	Kansas City
August 25, 2023	1:30 – 4:00 p.m.	Virtual	Microsoft Teams Meeting	Wichita
August 29, 2023	8:30 – 11:00 a.m.	Virtual	Microsoft Teams Meeting	Hutchinson
August 31, 2023	8:30 – 11:00 a.m.	Virtual	Microsoft Teams Meeting	Salina
September 1, 2023	8:30 – 11:00 a.m.	Virtual	Microsoft Teams Meeting	Topeka

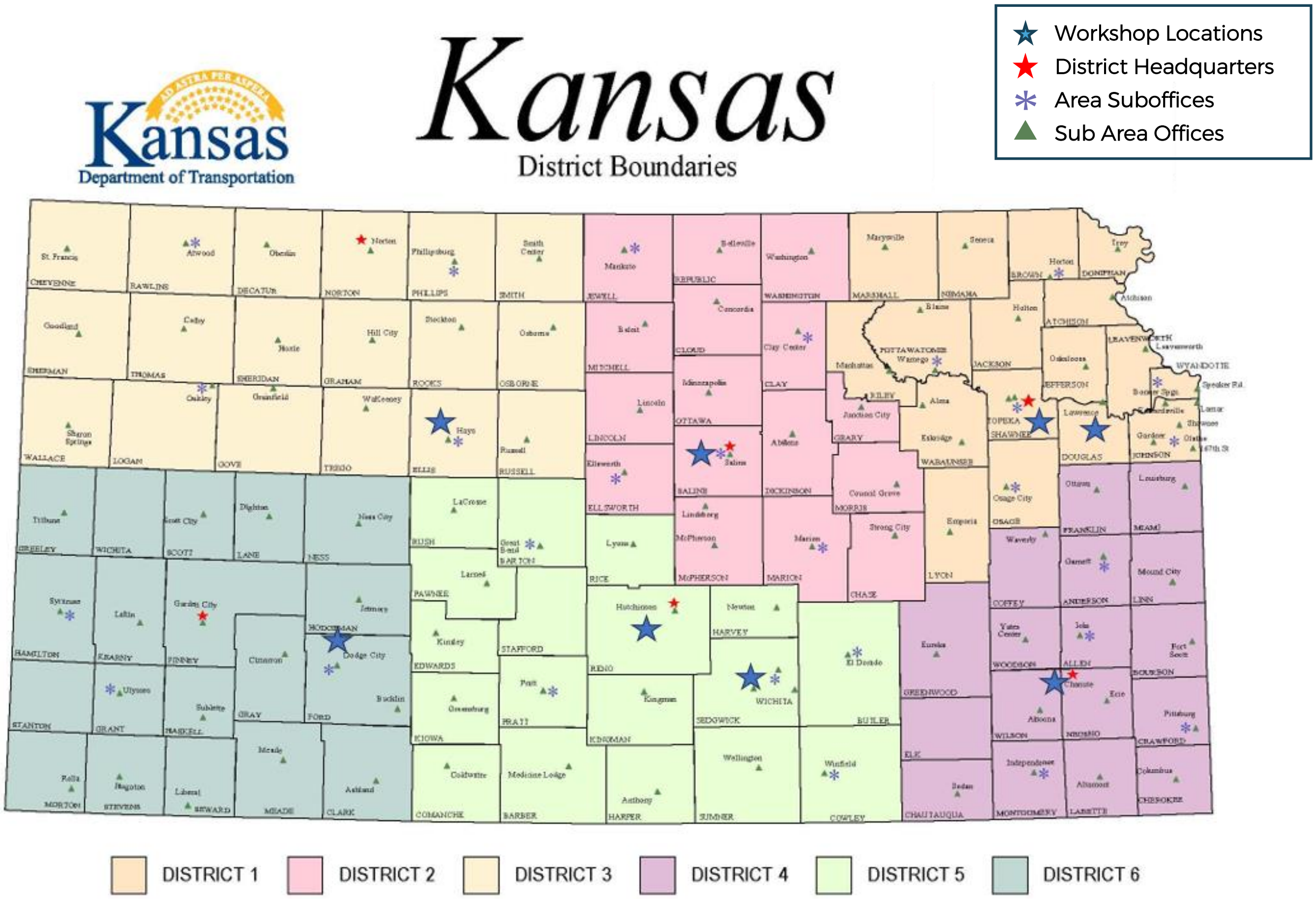


Figure 233: Map of Workshop Locations

3.5.1 Safety Experience Breakout Groups

The first breakout group discussion focused on the safety experience in Kansas. Questions prompted attendees to share the safety issues that their area experiences, the focus areas they think should be included in the study and the risk factors that should be used for the HRN. Table 33, Table 34, and Table 35. summarizes the responses from attendees. For each of the following discussion questions, participants were asked to consider urban, suburban, and rural areas:

- What safety issues is your area experiencing? Does the safety data analysis reflect these issues? Are there other issues not shown in the safety analysis?
- What focus areas should we include in the study?
- What risk factors do you think should be used for the high-risk network?

Table 33: Items Noted by Attendees for Safety Focus Areas that should be included in the Study

Focus Area	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
Areas around schools	--	X	X	X	X	X	X	X	X
Areas without dedicated VRU facilities	X	X	X	X	X	--	X	X	--
Challenges planning VRU facilities near high-speed roadways	X	--	X	--	X	X	X	X	X
Sidewalk system maintenance and connectivity	X	--	--	X	X	X	X	X	--
Narrow shoulders	--	X	--	X	X	X	--	--	X
People walking to work on farm-to-market roads and highways in rural areas	--	X	--	X	X	X	--	--	X
Compatibility between zoning and roadway contexts	--	--	--	X	X	--	--	X	X
Developers not being required to provide VRU infrastructure	X	--	X	--	X	--	--	X	--
Need for more education	X	--	--	--	--	--	X	X	X

Table 34: Focus Areas for Safety/Culture Elements for Safety Assessment Noted by Attendees

Focus Area	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
Finding VRU connectivity opportunities	--	X	X	X	X	X	X	X	X
Safe Routes to Schools (SRTS)	--	--	X	X	X	X	X	X	X
Gaps in sidewalk infrastructure	X	--	--	X	X	--	X	X	X
Education of elected officials	--	X	X	X	--	--	--	X	X
Mixed traffic areas	X	X	X	--	--	--	X	--	X
Improving low-light areas	--	--	--	X	X	--	X	X	X
Dedicated VRU facilities	X	--	--	X	X	--	--	--	X
Incorporating VRUs in new development planning	X	--	--	--	X	--	--	X	X
Shared streets campaigns	--	--	--	--	--	X	X	X	X

Table 35: Risk Factors Noted by Attendees

Risk Factor	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
Land use patterns	X	--	--	--	X	--	X	X	X
Areas with gaps in pedestrian-oriented lighting	--	X	--	--	X	--	X	X	--
Funding VRU facilities lower priority	--	X	--	X	--	--	X	X	--
Low staffing	--	X	--	X	--	--	X	X	--
Areas around schools	--	X	--	X	--	X	--	X	--
Electric vehicles quieter/harder to detect	--	--	X	--	X	--	X	--	--
Inconsistent bike/scooter protocols	X	--	X	--	--	--	--	--	--
Areas with gaps in sidewalk infrastructure	--	--	X	--	X	--	--	--	--
Areas with prevalent speeding	--	--	--	X	--	--	X	--	--
Transit stops	X	--	--	--	--	--	X	--	--

3.5.2 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures to improve VRU safety. Questions were provided to initiate a discussion about countermeasures that have been employed in the area, countermeasures attendees would like to see more of, and the resources needed to deploy these countermeasures more easily. The attendees were also asked about the challenges faced when addressing VRU safety and how KDOT could support their efforts. The responses from attendees are summarized in Table 36, Table 37, and Table 38. The discussion questions were:

- What types of countermeasures have you employed in the past?
    - What has worked well for you? In urban areas? In suburban areas? In rural areas?
- What countermeasures would you like to see more of in Kansas?
    - In urban areas? In suburban areas? In rural areas?
- What do we need to more easily deploy these countermeasures?
    - E.g., policy, planning/design assistance, funding, etc.

Table 36: Successful Countermeasures Noted by Attendees

Countermeasure	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
Actuated VRU warning beacons/ signals (RRFB, PHB, signals)	X	X	X	X	X	X	X	X	X
Traffic-calming techniques	X	X	X	X	--	--	--	X	X
Speed-reduction measures	X	X	X	--	--	X	X	X	--
Edge line striping/ green paint in bike lanes	--	--	X	X	X	--	X	X	X
Lane reduction opportunities	X	--	X	--	--	X	X	X	X
Dedicated/ Separated VRU facilities	--	--	X	X	X	X	X	--	--
Key: RRFB = Rectangular Rapid Flashing Beacon; PHB = Pedestrian Hybrid Beacon									

Table 37: Countermeasures Attendees Expressed Desire to See More

Countermeasure	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
Education	X	X	X	X	X	X	--	X	--
Actuated VRU warning beacons/ signals (RRFB, PHB, signals)	X	X	X	X	--	--	--	--	X
Updated operation and maintenance policies	X	--	--	--	--	X	--	X	X
Enforcement based on data	X	X	--	X	--	X	--	--	--
Sharing of best practices	X	--	X	--	--	X	--	X	--
Better communication between invested groups/elected leaders/planners	X	--	--	--	--	X	X	X	--
Protected VRU facilities	--	--	--	--	X	X	X	X	--
Key: RRFB = Rectangular Rapid Flashing Beacon; PHB = Pedestrian Hybrid Beacon									

Table 38: Elements Noted by Attendees that Would Support Implementation of Countermeasures

Element	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
State funding for VRU projects	X	X	X	X	X	X	X	X	--
Education	X	X	--	X	X	X	X	X	--
Require developers to complete impact studies for VRUs	X	X	X	--	X	--	--	X	--
Update policies so developments fund sidewalks	--	--	--	X	X	--	X	X	--
Public buy-in	--	X	--	X	--	--	X	X	--

3.5.3 Agency Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to serve VRUs better and safely. The attendees were also asked how KDOT could support their efforts. The responses from attendees are summarized in Table 39 and Table 40.

Table 39: Challenges Noted by Attendees when Addressing VRU Safety

Challenge	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
Funding	X	X	X	X	X	X	X	--	--
Less priority for VRU countermeasures	X	--	--	X	--	--	X	X	--
Building public support	--	X	--	X	--	--	--	X	--
Car-centric societies resistant to change	--	X	--	--	--	--	X	X	--
Access to studies and recommendations	--	--	--	--	X	--	--	X	--
VRU infrastructure affecting parking	--	--	--	--	--	--	X	X	--
Need for public information about VRUs	--	--	--	X	--	X	--	--	--

Table 40: Elements Noted by Attendees on How KDOT Could Support Local Agencies

Element	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	MPO 1	MPO 2	Virtual
Education	--	X	--	X	X	X	X	X	--
Safety campaign materials	X	X	--	X	X	--	X	X	--
Funding	--	X	--	--	X	X	X	X	--
Sharing of best practices	X	--	X	--	X	X	--	X	--
Resources for grant writing	X	X	--	--	X	--	--	--	--
Policies that prioritize safety	X	--	--	--	--	--	X	X	--
VRU safety campaign materials	X	--	--	X	X	--	--	--	--

3.6 Areas of Lower-Risk and Areas of Higher-Risk City Workshops

KDOT hosted an areas of lower-risk city workshop focusing on six cities identified in the assessment data. The workshop goal was to gather lessons learned from the areas of lower-risk communities and see if their experiences with VRU safety can be generalized across the state.

The areas of higher-risk city workshops focused on city-specific data analysis, maps of the HIN and HRN segments in the communities, and an overview of the statewide systemic analysis as it pertains to the communities. Additionally, a review of relevant city planning documents was conducted, looking for opportunities to synchronize data analysis results to potential VRU projects for the community. The goal is to develop programming recommendations for the areas of higher-risk communities that address VRU safety features and identify context-appropriate countermeasures, strategies, and policies using the SSA.

3.7 Complete Workshop Feedback

This section contains the feedback received from workshop participants at all workshops conducted for the project. The feedback is separated by individual workshops. All workshops times are listed in Central Standard Time unless specifically stated otherwise.

3.7.1 Workshop #1: Metropolitan Planning Organization/Tribal Government/Transit Agencies #1

The first workshop occurred on April 14, 2023, from 9:00 a.m. to 12:00 p.m. at the University of Kansas Innovation Park in Lawrence, Kansas.

Photographs from Workshop #1

3.7.1.1 Attendees

- Lawrence-Douglas County MPO
- St. Joseph MPO
- KDOT
- Mid-America Regional Council
- Osage County Public Transportation
- Prairie Band Potawatomi Nation

3.7.1.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. Responses from the attendees of Workshop #1 are summarized below.

What safety issues is **your area** experiencing?

Location-Based Safety Issues

- School routes
- Transit stops

Infrastructure/Environment-Based Safety Issues

- High traffic speeds
- Dedicated VRU facilities
- Sidewalk system connectivity
- VRU construction detours
- Urban infrastructure
    - Downtown areas with aging VRU facilities
- Rural infrastructure
    - Distance to trauma centers

Policy/Culture-Based Safety Issues

- Limited Education
- Priority of vehicle infrastructure over VRU infrastructure
- Funding going to recreational trails vs. HIN locations
- Unclear VRU crash report data
    - E.g., lack of VRU data across K-10 on Church Street in Eudora
- VRU facilities near high-speed roadways

What **focus areas** should we include in the study?

Location-Based Focus Areas

- Safe Routes to Schools (SRTS)

Infrastructure/Environment-Based Focus Areas

- Improving low-light areas
- Gaps in sidewalk infrastructure
- Roadway maintenance
- Lead pedestrian interval signals
- Americans with Disabilities (ADA) access
- Intelligent transportation system elements
- Multimodal traffic

Policy/Culture-Based Focus Areas

- Finding VRU connectivity opportunities
- Community engagement
- Shared streets campaigns
- School consolidations
- Updated operation and maintenance policies

What **risk factors** do you think should be used for the high-risk network?

Location-Based Risk Factors
• Transit stops
• Schools
• Underrepresented areas
    o Race
    o Socioeconomic
    o Transportation insecurity
    o Environmental burdens
    o Health vulnerability
    o Climate and disaster risk burden
Infrastructure/Environment-Based Risk Factors
• Gaps in pedestrian-oriented lighting
• Lane reduction opportunities
• Posted limits vs. actual speeds driven
• Oversized farm equipment
Policy/Culture-Based Risk Factors
• Funding priority
• Land use patterns

3.7.1.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety in Kansas. It provided prompts for attendees to share information about the countermeasures that have been employed in their area, the countermeasures they would like to see more of, and the resources they need to deploy these countermeasures more easily. The attendees were also asked what challenges they face when addressing VRU safety. Responses from the attendees of Workshop #1 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?

Infrastructure/Environment-Based Countermeasures

- Sensor-triggering technology
- Speed reduction measures
- Edge line striping/green paint in bike lanes
- Lane reduction opportunities
- Separate VRU facilities

Policy/Culture-Based Countermeasures

- Neighborhood traffic management plans
- Pilot programs: neighborhood association proposal submittals
- Adding sidewalks to existing rehab projects
- Demonstration projects
- Enforcement

What countermeasures would you like to **see more of** in Kansas?

Location-Based Countermeasures

- Infrastructure around schools

Infrastructure/Environment-Based Countermeasures

- Protected VRU facilities
- Lower speeds
- Sensor-triggering technology
- Lane reduction opportunities

Policy/Culture-Based Countermeasures

- Safety culture awareness
- Better communication between invested groups/elected leaders/planners
- Human-centered environment
- Before and after studies to guide future planning
- Funding
- Tactical urbanism
- Implementing adult crossing guards

What do we need to **more easily deploy** these countermeasures?
• State funding for VRU projects • VRU representation in planning/design • Tactical urbanism • Focus on safety when prioritizing projects • Update policies so developers fund sidewalks • Evaluations on levels of traffic stress • Public buy-in • Education • Shared streets culture

What **challenges** do you face when addressing VRU safety?
• Stand-alone projects that may not reflect VRU needs based on data and use • Funding • Prioritizing VRU countermeasures • Car-centric societies resistant to change • VRU infrastructure affecting parking

3.7.1.4 Local Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. The attendees were also asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?
• Provide education • Provide funding • Publish safety campaign materials • Adopt policies that prioritize safety

3.7.2 Workshop #2: Kansas Department of Transportation District 2

Workshop #2 occurred on April 17, 2023, from 1:00 p.m. to 4:00 p.m. in the KDOT District 2 Conference Room in Salina, Kansas.

Photographs from Workshop #2

3.7.2.1 Attendees

- Cloud County
- Dickinson County
- Geary County
- Marion County
- McPherson County
- Morris County
- Osage County
- Saline County
- City of Abilene
- City of Junction City
- City of Salina
- City of Washington
- KDOT District

3.7.2.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues that their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. The responses from Workshop #2 are summarized below.

What safety issues is **your area** experiencing?

Location-Based Safety Issues

- School routes

Infrastructure/Environment-Based Safety Issues

- Dedicated VRU facilities
- ROW
- Shoulders
- Rural infrastructure
  - Horse and buggies
  - People walking to work on farm-to-market roads or highways

Policy/Culture-Based Safety Issues

- Priority of vehicle infrastructure over VRU infrastructure
- Local funding limitations
- VRU funding sources
- Low staffing

What **focus areas** should we include in the study?

Location-Based Focus Areas

- Railroad crossings

Infrastructure/Environment-Based Focus Areas

- Lead pedestrian intervals
- Multimodal traffic

Policy/Culture-Based Focus Areas

- Improving VRU planning/design
- Finding VRU connectivity opportunities
- Including the bike community in planning
- Community engagement
- Partnering with economic development groups
- Enforcement
- Education
- Retroreflective clothing

What **risk factors** do you think should be used for the high-risk network?
Location-Based Risk Factors • Railroad crossings • Schools **Infrastructure/Environment-Based Risk Factors** • Gaps in pedestrian-oriented lighting • Infrastructure on rural roads **Policy/Culture-Based Risk Factors** • Funding priority • Low staffing

3.7.2.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety in Kansas and provided prompts for attendees to share information about countermeasures that have been employed in their area, countermeasures they would like to see more of, and the resources they need to deploy these countermeasures more easily. Attendees were also asked about the challenges they face when addressing VRU safety. Responses from the attendees of Workshop #2 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?
Infrastructure/Environment-Based Countermeasures • Traffic-calming techniques • Sensor-triggering technology • Speed-reduction measures • Signage in high-risk areas • Wayfinding signs **Policy/Culture-Based Countermeasures** • Adding sidewalks to existing rehabilitation projects • Emergency medical service (EMS) transport equipment

What countermeasures would you like to **see more of** in Kansas?

Location-Based Countermeasures

- Infrastructure around schools
- Infrastructure at railroad crossings

Infrastructure/Environment-Based Countermeasures

- Shared-use signage (words and symbols)
- Pedestrian-activated crossings/signals
- Lane reduction opportunities
- Wider shoulders on rural roads

Policy/Culture-Based Countermeasures

- Demonstration projects
- Education
- Enforcement based on data
- Funding

What do we need to **more easily deploy** these countermeasures?

- State funding for VRU projects
- Require developers to complete impact studies for VRUs
- Enforcement
- Create/use ATPs
- Grant writing assistance
- Awareness from all road users
- Funding to restripe/resurface local roads
- Shared streets culture
- Public buy-in
- Education

What **challenges** do you face when addressing VRU safety?

- Funding
- Car-centric societies resistant to change
- Building public support

3.7.2.4 Your Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. Attendees were also asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?
• Provide resources for grant writing • Develop demonstration projects • Provide education • Publish safety campaign materials • Provide funding

3.7.3 Workshop #3: Kansas Department of Transportation District 3

Workshop #3 occurred on April 18, 2023, from 1:00 p.m. to 4:00 p.m. at the KDOT District 3 Conference Room in Hays, KS. The workshop was focused on District 3 VRU safety.

Photographs from Workshop #3

3.7.3.1 Attendees

- Ellis County
- Wallace County
- City of Goodland
- City of Hays
- KDOT District 3
- Nebraska Department of Roads

3.7.3.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. The responses from the attendees of Workshop #3 are summarized below.

What safety issues is **your area** experiencing?

Location-Based Safety Issues
• Schools
• Churches
• Bike race routes
Infrastructure/Environment-Based Safety Issues
• Dedicated VRU facilities
• Long pedestrian crossings
• Shared-use signage
• Rural infrastructure
  o Trailer parks along the highway
  o E.g., US-40 in Ellis County
Policy/Culture-Based Safety Issues
• VRU facilities near high-speed roadways

What **focus areas** should we include in the study?
Location-Based • SRTS • Landmark/tourist locations (example: Fort Hays) Infrastructure/Environment-Based • Retroreflective signage/striping • Sensor-triggering technology • Multimodal traffic Policy/Culture-Based • Finding VRU connectivity opportunities • Clearer scooter policies • Community engagement • Education • Local match funding

What **risk factors** do you think should be used for the high-risk network?
Location-Based Risk Factors • School routes • Churches Infrastructure/Environment-Based Risk Factors • Electric vehicles are quieter/harder to detect • Gaps in sidewalk infrastructure • Availability of shared-use paths Policy/Culture-Based Risk Factors • Inconsistent bike/scooter protocols

3.7.3.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety in Kansas and provided prompts for attendees to share information about the countermeasures that have been employed in their areas, countermeasures they would like to see more of, and the resources they need to more easily deploy these countermeasures. Attendees were also asked about the challenges they face when addressing VRU safety. Responses from the attendees of Workshop #3 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?
Location-Based Countermeasures • Good planning for pickup and drop-off at schools Infrastructure/Environment-Based Countermeasures • Traffic-calming techniques • Sensor-triggering technology • Speed-reduction measures • Edge line striping/green paint in bike lanes • Lane reduction opportunities • Separate VRU facilities Policy/Culture-Based Countermeasures • Adding recreational trails • Demonstration projects

What countermeasures would you like to **see more of** in Kansas?

Infrastructure/Environment-Based Countermeasures

- Sensor-triggering technology
- Pedestrian-activated crossings/signals
- Traffic-calming measures
- Risk awareness (active and passive)

Policy/Culture-Based Countermeasures

- Better functional classification of roads
- City and bike plans with phased improvements
- Safety culture awareness
- Demonstration projects
- Education
- Sharing of best practices
- Public involvement
- New developments, including VRU facility planning
- Human-centered environment

What do we need to **more easily deploy** these countermeasures?

- State funding for VRU projects
- Require developers to complete impact studies for VRUs
- Awareness from all road users

What **challenges** do you face when addressing VRU safety?

- Funding

3.7.3.4 Your Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. Attendees were also asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?

- Share best practices
- Hire on-call pavement marking installation contractors

3.7.4 Workshop #4: Kansas Department of Transportation District 6

Workshop #4 occurred on April 19, 2023, from 1:00 p.m. to 4:00 p.m. at the Dodge City Public Library in Dodge City, Kansas. The workshop was focused on District 6 viewpoints.

Photographs from Workshop #4

3.7.4.1 Attendees

- Finney County
- Grant County
- Gray County
- Hamilton County
- Hodgeman County
- Kearny County
- Meade County
- Seward County
- City of Cimmaron
- City of Dodge City
- City of Ness
- KDOT District 6

3.7.4.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. The responses from the attendees of Workshop #4 are summarized below.

What safety issues is **your area** experiencing?

Location-Based Safety Issues

- Schools
- Shift change times at large employers
- Churches
- Rural to urban environment shifts
- Bike race routes

Infrastructure/Environment-Based Safety Issues

- Shoulders
- Sidewalk system connectivity
- Long pedestrian crossings
- Rural infrastructure
    - Lane increases entering rural towns can cause aggressive vehicle passing
    - Wind turbines freighted through towns
    - People walking to work on farm-to-market roads and highways
    - Long crossing distances near services on undivided highways
    - High winds

Policy/Culture-Based Safety Issues

- ADA access
- VRU facilities near high-speed roadways
- Road users without vehicles walking to work

What **focus areas** should we include in the study?

Location-Based Focus Areas

- SRTS

Infrastructure/Environment-Based Focus Areas

- Lane reduction opportunities
- Traffic-calming techniques
- Improving crossings for citizens with mobility needs

Policy/Culture-Based Focus Areas

- finding connectivity opportunities for VRU use
- more integration of the bike community in planning
- shared streets campaigns
- retroreflective clothing
- safety corridor studies adding VRU data

What **risk factors** do you think should be used for the high-risk network?

Infrastructure/Environment-Based Risk Factors

- Operation and maintenance policies
- Semi-truck unloading

Policy/Culture-Based Risk Factors

- Low staffing

3.7.4.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety and provided prompts for attendees to share information about the countermeasures that have been employed in their area, countermeasures they would like to see more of, and the resources they need to more easily deploy these countermeasures. Attendees were also asked what challenges they face when addressing VRU safety. The responses from the attendees of Workshop #4 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?

Infrastructure/Environment-Based Countermeasures

- Sensor-triggering technology
- Speed-reduction measures
- Watering gravel roads
- Radar trailers
- Lane reduction opportunities
- Separate VRU facilities
- Adding passing lanes on highways before entering rural towns

Policy/Culture-Based Countermeasures

- Enforcement

What countermeasures would you like to **see more of** in Kansas?

Location-Based Countermeasures

- Infrastructure around schools

Infrastructure/Environment-Based Countermeasures

- Shared-use signage (words and symbols)
- Pull-off areas for cyclists
- Protected VRU facilities
- ADA-compliant networks
- Sensor-triggering technology
- More multiuse paths
- High-visibility striping and crossing treatments
- Wider shoulders on rural roads

Policy/Culture-Based Countermeasures

- Safety culture awareness
- Education
- Enforcement based on data
- Sharing of best practices
- Clarity of expectations/standards for VRU safety with new traffic design and technology
- Updated operation and maintenance policies
- Better city/county cooperation
- Better communication between invested groups/elected leaders/planners
- Funding

What do we need to deploy these countermeasures?
• State funding for VRU projects • Separate VRU facilities • Grant writing assistance • Awareness from all road users • Shared streets culture • Education • More training for rural areas • Better communication between cities/counties/KDOT • Training/equipment for local EMS responders • VRU planning and design assistance

What **challenges** do you face when addressing VRU safety?
• Funding • Need for public information about VRUs

3.7.4.4 Your Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. Attendees were also asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?
• Share best practices • Provide education • Provide funding

3.7.5 Workshop #5: Kansas Department of Transportation District 5

Workshop #5 occurred on April 20, 2023, from 1:00 p.m. to 4:00 p.m. at the KDOT District 5 Conference Room in Hutchinson, Kansas. The workshop was focused on District 5 viewpoints.

Photographs from Workshop #5

3.7.5.1 Attendees

- Barber County
- Barton County
- Cowley County
- Harvey County
- Kingsman County
- Rice County
- Sedgwick County
- Stafford County
- Sumner County
- City of Andover
- City of Maize
- City of Medicine Lodge
- City of Newton
- City of Winfield
- Barber County United

3.7.5.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. The responses from the attendees of Workshop #5 are summarized below.

What safety issues is **your area** experiencing?

Location-Based Safety Issues

- Schools

Infrastructure/Environment-Based Safety Issues

- High traffic speeds
- Dedicated VRU facilities
- Shoulders
- Sidewalk system connectivity
- Bridges without VRU crossings
- Maintenance
- Shared-use signage
- Suburban infrastructure
    - People walking to new shopping centers, such as Walmart, and Dollar General, without sidewalks
- Rural infrastructure
    - People walking to work on farm-to-market roads or highways
    - Cattle drives

Policy/Culture-Based Safety Issues

- VRU facilities near high-speed roadways
- Developers not required to provide VRU infrastructure
- Zoning/policies/ordinances

What **focus areas** should we include in the study?

Location-Based Focus Areas

- SRTS

Infrastructure/Environment-Based Focus Areas

- Improving low-light areas
- Dedicated VRU facilities
- Gaps in sidewalk infrastructure

Policy/Culture-Based Focus Areas

- Improving VRU planning / design
- Finding VRU connectivity opportunities
- Incorporating vrus in new development planning
- Include bike community in planning
- Focused risk assessments
- Local match funding

What **risk factors** do you think should be used for the high-risk network?
Infrastructure/Environment-Based Risk Factors • Gaps in pedestrian-oriented lighting • Gaps in sidewalk infrastructure • Electric vehicles quieter/harder to detect **Policy/Culture-Based Risk Factors** • Driver awareness of VRUs • Land use patterns

3.7.5.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety and provided prompts for attendees to share information about the countermeasures that have been employed in their area, countermeasures they would like to see more of, and the resources they need to more easily deploy these countermeasures. Attendees were also asked what challenges they face when addressing VRU safety. Responses from the attendees of Workshop #5 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?
Infrastructure/Environment-Based Countermeasures • Edge line striping/green paint in bike lanes • Signage in high-risk areas • Radar trailers • Separate VRU facilities **Policy/Culture-Based Countermeasures** • Private/public partnerships

What countermeasures would you like to **see more of** in Kansas?

Infrastructure/Environment-Based Countermeasures

- Protected VRU facilities

Policy/Culture-Based Countermeasures

- Education
- Education campaigns for areas with volunteer EMS
- Clarity of expectations/standards for VRU safety with new traffic design and technology
- Public involvement
- Resources like public transportation/hike/bike trail maps
- Giveaways of personal protective equipment

What do we need to **more easily deploy** these countermeasures?

- State funding for VRU projects
- VRU representation in planning/design
- Update policies so developers fund sidewalks
- Require developers to complete impact studies for VRUs
- Education
- More training for rural areas
- Training/equipment for local EMS responders
- VRU planning and design assistance

What **challenges** do you face when addressing VRU safety?

- Funding
- Access to studies and recommendations

3.7.5.4 Your Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. Attendees were also asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?
• Share best practices • Provide resources for grant writing • Publish safety campaign materials • Compile data to provide to elected officials • Provide education • Provide funding

3.7.6 Workshop #6: Kansas Department of Transportation District 4

Photographs from Workshop #6

Workshop #6 occurred on April 24, 2023, from 1:00 p.m. to 4:00 p.m. at the KDOT District 4 Conference Room in Chanute, Kansas. The workshop was focused on District 4 viewpoints.

3.7.6.1 Attendees

- Allen County
- Bourbon County
- Butler County
- Cherokee County
- Coffey County
- Crawford County
- Franklin County
- Miami County
- Montgomery County
- Neosho County
- City of Eureka
- City of Fredonia
- City of Ottawa
- City of Pittsburg
- KDOT District 4

3.7.6.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. The responses from the attendees of Workshop #6 are summarized below.

What safety issues is **your area** experiencing?

Location-Based Safety Issues
• Schools
• Rural to urban environment shifts
• Special event/tourist locations
• Bike race routes
Infrastructure/Environment-Based Safety Issues
• Dedicated VRU facilities
• Shoulders
• Sidewalk system connectivity
• Rural infrastructure
  o Trailer parks along the highway
  o People walking to work on farm-to-market roads or highways
Policy/Culture-Based Safety Issues
• Zoning/policies/ordinances

What **focus areas** should we include in the study?
Location-Based Focus Areas • Rural to urban environment shifts • SRTS **Infrastructure/Environment-Based Focus Areas** • Improving low-light areas • Dedicated VRU facilities • Gaps in sidewalk infrastructure • ADA access **Policy/Culture-Based Focus Areas** • Finding VRU connectivity opportunities • Education • Retroreflective clothing • Local match funding

What **risk factors** do you think should be used for the high-risk network?
Infrastructure/Environment-Based Risk Factors • Sight distance • Posted speed limits vs. actual speeds drivens **Policy/Culture-Based Risk Factors** • Funding priority • Low staffing • Inconsistent bike/scooter protocols

3.7.6.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety and provided prompts for attendees to share information about countermeasures that have been employed in their area, countermeasures they would like to see more of, and the resources they need to more easily deploy these countermeasures. Attendees were also asked what challenges they face when addressing VRU safety. Responses from the attendees of Workshop #6 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?

Infrastructure/Environment-Based Countermeasures

- Traffic calming techniques
- Sensor-triggering technology
- Crossing signals with timed countdown
- Edge line striping/green paint in bike lanes
- Separate VRU facilities
- Advanced warning signals for yellow lights

Policy/Culture-Based Countermeasures

- Local Road Safety Plans
- Complete Streets projects

What countermeasures would you like to **see more of** in Kansas?

Infrastructure/Environment-Based Countermeasures

- Shared-use signage (words and symbols)
- Pedestrian-activated crossings/signals
- Traffic calming measures
- Lane reduction opportunities

Policy/Culture-Based Countermeasures

- Education
- Enforcement based on data
- City/county cooperation
- Clarity of expectations/standards for VRU safety with new traffic design and technology

What do we need to **more easily deploy** these countermeasures?

- State funding for VRU projects
- Update policies so developments fund sidewalks
- Enforcement
- Create/use Active Transportation Plans (ATPs)
- Public buy-In
- Education
- Grant writing assistance

What **challenges** do you face when addressing VRU safety?
• Funding • Prioritizing VRU countermeasures • Building public support • Need for public information about VRUs

3.7.6.4 Your Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. Attendees were also asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?
• Publish safety campaign materials • Provide education

3.7.7 Workshop #7: Metropolitan Planning Organization/Tribal Government/Transit Agencies #2

Workshop #7 occurred on April 26, 2023, from 1:00 p.m. to 4:00 p.m. at the Hyatt Regency Birch Room in Wichita, Kansas. This workshop directly followed the Transportation Safety Conference, which allowed some attendees from that conference to attend the workshop.

Photographs from Workshop #7

3.7.7.1 Attendees

- City of Wichita
- Flint Hills MPO
- Wichita Area MPO
- FHWA
- Kansas Department of Health and Environment
- KDOT Headquarters
- Reno County Area Transit
- Solomon Valley Transportation

3.7.7.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. Responses from the attendees of Workshop #7 are summarized below.

What safety issues is **your area** experiencing?

Location-Based Safety Issues
• Transit stops
• Shift change times at large employers
• Rural to urban environment shifts
Infrastructure/Environment-Based Safety Issues
• High traffic speeds
• Dedicated VRU facilities
• Sidewalk system connectivity
• Visibility
• VRU construction detours
• Urban infrastructure
  o Downtown areas with aging VRU infrastructure
• Rural infrastructure
  o Farm machinery
Policy/Culture-Based Safety Issues
• Education
• Attitudes between drivers and VRUs
• VRU facilities near high-speed roadways
• Zoning/policies/ordinances
• Developers not required to provide VRU infrastructure

What **focus areas** should we include in the study?
Location-Based Focus Areas • SRTS **Infrastructure/Environment-Based Focus Areas** • Improving low-light areas • Distance between crossings • Gaps in sidewalk infrastructure **Policy/Culture-Based Focus Areas** • Finding VRU connectivity opportunities • Incorporate VRUs in new development planning • Enforcement • Education • Shared streets campaigns

What **risk factors** do you think should be used for the high-risk network?
Infrastructure/Environment-Based Risk Factors • Gaps in pedestrian-oriented lighting **Policy/Culture-Based Risk Factors** • Funding priority • Low staffing • Land use patterns • On-street parking tradeoffs

3.7.7.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety in Kansas and provided prompts for attendees to share information about countermeasures that have been employed in their area, countermeasures they would like to see more of, and the resources they need to more easily deploy countermeasures. Attendees were also asked what challenges they face when addressing VRU safety. Responses from the attendees of Workshop #7 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?

Infrastructure/Environment-Based Countermeasures

- Traffic calming techniques
- Sensor-triggering technology
- Speed reduction measures
- Edge line striping/green paint in bike lanes
- Lane reduction opportunities
- Separate VRU facilities

Policy/Culture-Based Countermeasures

- Demonstration projects
    - Safe Travel Every Pedestrian (STEP) Program from Flint Hills MPO
- Education
- VRU connections to health care/shopping/attractions

What countermeasures would you like to **see more of** in Kansas?

Infrastructure/Environment-Based Countermeasures

- Protected VRU facilities
- Block crosswalk markings
- Raised tables
- Updating legacy infrastructure

Policy/Culture-Based Countermeasures

- Better functional classification of roads
- Education
- Sharing of best practices
- Resources like public transportation/hike/bike trail maps
- Updated operation and maintenance policies
- Reduction of on-street parking
- Monitoring density and development of cities/counties
- Information development for mobile applications/social media/community campaigns
- New developments, including VRU facility planning
- Better communication between invested groups/elected leaders/planners
- Demonstration projects

What do we need to **more easily deploy** these countermeasures?
• State funding for VRU projects • Update policies so developments fund sidewalks • Require developers to complete impact studies for VRUs • Separate VRU facilities • Shared streets culture • Public buy-in • Education

What **challenges** do you face when addressing VRU safety?
• Access to studies and recommendations • Prioritizing VRU countermeasures • Building public support • Car-centric societies resistant to change • VRU infrastructure affecting parking

3.7.7.4 Your Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. Attendees were asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?
• Share best practices • Publish safety campaign materials • Provide education • Provide funding • Adopt policies that prioritize safety

3.7.8 Workshop #8: Kansas Department of Transportation District 1

Workshop #8 occurred on April 28, 2023, from 9:00 a.m. to 12:00 p.m. at the KDOT District 1 Conference Room in Topeka, Kansas. The workshop was focused on District 1 viewpoints.

Photographs from Workshop #8

3.7.8.1 Attendees

- Atchison County
- Brown County
- Jefferson County
- Leavenworth County
- Lyon County
- Riley County
- Pottawatomie County
- Wabaunsee County
- City of Bonner Springs
- City of Emporia
- City of Hiawatha
- City of Lawrence
- City of Leavenworth
- City of Leawood
- City of Merriam
- City of Olathe
- City of Overland Park
- City of Osawatomie
- City of Shawnee
- City of Topeka
- City of Wathena
- KDOT District 1
- Prairie Band Potawatomi Nation
- Topeka Metro
- Unified Government of Wyandotte County/Kansas City, Kansas

3.7.8.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. Responses from the attendees of Workshop #8 are summarized below.

What safety issues is your area experiencing?

Location-Based Safety Issues

- Schools
- Transit stops

Infrastructure/Environment-Based Safety Issues

- Dedicated VRU facilities
- Sidewalk system connectivity
- Bridges without VRU crossings
- Legal right turns on red
- Audible detectable beacons
- Shared-use signage
- Suburban infrastructure
  - People walking to shopping centers with no sidewalks

Policy/Culture-Based Safety Issues

- Education
- VRU facilities near high-speed roadways
- Developers are not required to provide VRU infrastructure

What focus areas should we include in the study?

Infrastructure/Environment-Based Focus Areas

- Dedicated VRU facilities
- Distance between crossings
- Gaps in sidewalk infrastructure
- Multimodal traffic

Policy/Culture-Based Focus Areas

- Incorporate VRUs in new development planning

What **risk factors** do you think should be used for the high-risk network?
Location-Based Risk Factors • Transit stops **Policy/Culture-Based Risk Factors** • Land use patterns • Inconsistent bike/scooter protocols • Access to engineering resources

3.7.8.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety and provided prompts for attendees to share information about countermeasures they have employed in their area, countermeasures they would like to see more of, and the resources they need to more easily deploy countermeasures. Attendees were also asked what challenges they face when addressing VRU safety. Responses from the attendees of Workshop #8 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?
Infrastructure/Environment-Based Countermeasures • Traffic calming techniques • Sensor-triggering technology • Speed reduction measures • Signage in high-risk areas • Radar trailers • Lane reduction opportunities **Policy/Culture-Based Countermeasures** • Adding sidewalks to existing rehab projects • Inclusive and future-ready planning • Live video footage from intersections for data

What countermeasures would you like to **see more of** in Kansas?
• **Infrastructure/Environment-Based Countermeasures** Pedestrian-activated crossings/signals • Lead pedestrian intervals • Traffic calming measures **Policy/Culture-Based Countermeasures** • Education • Enforcement based on data • Sharing of best practices • Updated operation and maintenance policies • State policies/ordinances/guidelines for VRU infrastructure • Complete streets as a policy • New developments, including VRU facility planning • Better communication between invested groups/elected leaders/planners • Inclusive and future-ready planning

What do we need to **more easily deploy** these countermeasures?
• State funding for VRU projects • Focus on safety when prioritizing projects • Enforcement • Grant writing assistance • Education • Require developers to complete impact studies for VRUs

What **challenges** do you face when addressing VRU safety?
• Funding • Prioritizing VRU countermeasures

3.7.8.4 Your Needs

The third activity was a full group discussion that asked for any final feedback and focused on the needs of local agencies to better serve VRUs safely. Attendees were also asked how KDOT could support their efforts. Responses are summarized below.

How can KDOT support you?
• Share best practices • Provide resources for grant writing • Publish VRU safety campaign materials • Develop demonstration projects • Compile data to provide to elected officials • Adopt policies that prioritize safety

3.7.9 Workshop #9: Kansas Department of Transportation Staff

Workshop #9 occurred on May 15, 2023, from 1:00 p.m. to 4:00 p.m. at the KDOT Headquarters Conference Room in Topeka, Kansas. The workshop was focused on how KDOT can address VRU safety issues on state and local roads when answering breakout group discussion questions.

3.7.9.1 Attendees

- Bureau of Fiscal Services
- Bureau of Innovative Technologies
- Bureau of Maintenance
- Bureau of Multimodal Transportation
- Bureau of Traffic Engineering
- Bureau of Transportation Safety
- Bureau of Trasnportation Planning
- State Bicycle and Pedestrian Coordinator
- Office of Chief Counsel
- District 1 KDOT Staff

3.7.9.2 State of Safety Breakout Groups

The breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share how they think KDOT can help improve VRU safety. This workshop was structured differently, as attendees answered questions from their perspective (e.g., what actions can KDOT take to improve VRU safety). Responses from the attendees of Workshop #9 are summarized below.

What actions can KDOT take to improve VRU safety?	
Local	• Involve KDOT in early design phases • Empower local governments • Support through education

What actions can KDOT take to improve VRU safety?	
	• Include VRU data in traffic analysis • Create checklists • Look at transit solutions • Remove barriers to funding and grant writing expertise • Provide coordination for VRU project opportunities • Provide education for local elected officials

State	• Update highway signage policies
	    o Replace pedestrian and school signs/markings
	• Provide education on:
	    o Unwarranted signals
	    o Requesting signals for pedestrian safety
	• Use VRU HIN to make decisions
	• Use safety data dashboards to make decisions
	• Invest in technologies to obtain new VRU datasets
	    o Fill in crash data report cells with better accuracy
	    o Use geographic information system mapping to identify inaccurate reports
	• Prioritize VRU infrastructure when selecting projects
	    o Balance of funding/benefits
	• Provide more education about VRUs
	    o School events
	    o Drivers' education

3.7.10 Workshop #10: Virtual

Workshop #10 occurred on May 30, 2023, from 9:00 a.m. to 12:00 p.m. on Microsoft Teams. The workshop was open to any local or state representatives unable to attend an in-person workshop.

3.7.10.1 Attendees

- Montgomery County
- City of Baldwin
- City of Concordia
- City of Eudora
- City of Goodland
- City of Lenexa
- City of Lindsborg
- City of Ogden
- Burns and McDonnell
- Garver
- KDOT Headquarters

- Liberal City Bus
- National Highway Traffic Safety Administration
- Toole Design

3.7.10.2 State of Safety Breakout Groups

The first breakout group discussion focused on the state of safety in Kansas. It provided prompts for attendees to share information about the safety issues their areas are experiencing, the focus areas they think should be included in the study, and which risk factors should be used for the HRN. Responses from the attendees of Workshop #10 are summarized below.

What safety issues is **your area** experiencing?
Location-Based Safety Issues • Schools • Work zones • Churches • Rural to urban environment shifts **Infrastructure/Environment-Based Safety Issues** • Shoulders • Rural infrastructure   o People walking to work on farm-to-market roads or highways **Policy/Culture-Based Safety Issues** • Education • Attitudes between drivers and VRUs • Zoning/policies/ordinances • VRU facilities near high-speed roadways • Move-over laws

What **focus areas** should we include in the study?
Location-Based Focus Areas • SRTS **Infrastructure/Environment-Based Focus Areas** • Sensor-triggering technology • Low-light areas • Dedicated VRU facilities • Distance between crossings • Gaps in sidewalk infrastructure • Multimodal traffic • Legal right turns on red **Policy/Culture-Based Focus Areas** • Improving VRU planning/design • Finding VRU connectivity opportunities • Incorporate VRUs in new development planning • Partnering with economic development groups • Education • Shared streets campaigns

What **risk factors** do you think should be used for the high-risk network?
Policy/Culture-Based • Land use patterns • Economic impacts of moving high-speed traffic

3.7.10.3 Countermeasures Breakout Groups

The second breakout group discussion focused on the countermeasures for VRU safety in Kansas and provided prompts for attendees to share information about the countermeasures that have been employed in their area, the countermeasures they would like to see more of, and the resources they need to more easily deploy these countermeasures. Attendees were also asked about the challenges they face when addressing VRU safety. Responses from the attendees of Workshop #10 are summarized below.

What types of **countermeasures have you employed** in the past? What has **worked well** for you?

Infrastructure/Environment-Based Countermeasures

- Traffic-calming techniques
- Sensor-triggering technology
- Edge line striping/green paint in bike lanes
- Signage in high-risk areas
- Wayfinding signs
- Lane reduction opportunities
- Prohibiting right turn on red
- Lead pedestrian intervals

Policy/Culture-Based Countermeasures

- walking with stakeholders to identify VRU countermeasure opportunities

What countermeasures would you like to **see more of** in Kansas?

Location-Based Countermeasures

- Infrastructure at railroad crossings

Infrastructure/Environment-Based Countermeasures

- Buffered bike lanes
- Lower speeds
- ADA-compliant networks
- Pedestrian-activated crossings/signals
- Updating legacy infrastructure

Policy/Culture-Based Countermeasures

- Better functional classification of roads
- Clarity of expectations/standards for VRU safety with new traffic design and technology
- Updated operation and maintenance policies
- State policies/ordinances/guidelines for VRU Infrastructure
- Complete Streets as a policy
- Inclusive and future-ready planning

What do we need to **more easily deploy** these countermeasures?
• Separate VRU facilities • Development review processes

3.7.11 Workshop #11: Areas of Lower-Risk Cities

Workshop #11 occurred on August 23, 2023, from 8:30 a.m. to 11:00 a.m. on Microsoft Teams. The workshop was open to representatives of the six areas of lower-risk cities in Kansas to gather lessons learned from their communities and see if their experiences with VRU safety can be generalized across the state.

3.7.11.1 Attendees

- City of Hays
- City of Newton
- City of Pittsburg
- City of Ottawa (Note: feedback provided as follow up email, not as workshop attendee)

3.7.11.2 Breakout Groups

The breakout group discussion focused on the state of safety in Kansas and successes in the areas of lower-risk cities that could be shared with other communities in Kansas.

What success have your communities employed to improve VRU safety?

• Used police officer narratives along with crash data reporting to get a full picture of factors leading to VRU-involved accidents.
• Implemented improvements for dark hours.
  ○ Opened up tree canopies so that streetlights are not blocked
  ○ Added reflective pavement markings
    ▪ KDOT pavement marking program is a state road system
    ▪ High Risk Rural Road program allows for off-system marking
    ▪ City Connecting Link agreement is a hurdle because it is difficult to use program funding for these spot projects.
• Gave away safety vest and retroreflective clothing.
• Upgrading signal systems to be more pedestrian-friendly has been a priority.
  ○ Highway Safety Improvement Program (HSIP) funding can be difficult to get for these updates because they require a benefit-cost ratio greater than 1.0.
• Planned ADA parking so that the ADA user exits their vehicle straight to a curb ramp instead of having to go around the vehicle in traffic.
• Implemented road diets, which are one of the best tools for VRU safety improvements.
  ○ Initial feedback is often negative toward road diets, but data show they improve safety for all road users.
• Partnered with KDOT over the last decade to make improvements.
  ○ Testimonials from cities with successes could be used with an educational campaign across the state.

3.7.12 Workshop #12: Areas of Higher-Risk Cities – Kansas City

Workshop #12 occurred on August 24, 2023, from 1:30 p.m. to 4:00 p.m. on Microsoft Teams. The workshop was open to representatives of Kansas City to discuss city-specific data analysis, maps of HIN and HRN segments in their community, and an overview of the statewide systemic analysis as it pertains to Kansas City. The goal of the workshop was to develop a program of projects that address VRU safety features and identify context-appropriate countermeasures, strategies, and policies using the SSA.

3.7.12.1 Breakout Groups

The breakout group discussion focused on the state of safety in Kansas City and asked the following questions:

1. What is the most pressing VRU safety need in your city?
    a. Who is being impacted?
    b. Where are the issues?
    c. What are the contributing circumstances?
2. What types of countermeasures have you employed in the past?
    a. What has worked well for you?
    b. Has anything not worked well?
    c. Were there any barriers to implementation?
3. What infrastructure projects should be prioritized?
    a. What non-infrastructure projects should be prioritized?
    b. Are there any barriers to implementation?
4. What can KDOT do to help drive success?

What is the most pressing VRU safety need in your city?
Transit • Transit-dependent or carless households • Transit stops without pedestrian crossings directly at the stop • One-hour headways for traffic • No electric vehicle infrastructure **Equity** • Huge equity issue east of I-635 **Facilities** • Connectivity • Trip hazards on existing sidewalks • No signage or wayfinding • Incomplete sidewalk networks • Limited bike facilities • Inadequate signal timings

What types of countermeasures have you employed in the past?

Successes

- Sidewalk construction via a 50-50 cost share match program
- Combining safety projects with stormwater projects
- Defining walkability as a public health issue
- SRTS program for building new sidewalks
- Rectangular rapid flashing beacons (RRFBs) around the Kansas University Medical School facilities and Piper High School
- Speed radar sign installation at Mission Road and 39th Avenue
- Merriam Lane Corridor rehabilitation
- Streets for People ordinance is starting to activate commercial corridors that are not doing streetscape improvements (e.g., Central Avenue street tree program)

Barriers

- Societal bias against VRUs
- Generations of prioritizing the automobile over VRUs
- Difficulties providing local match, even when federal funds are available
- Staff capacity and labor shortages
- Funding
- Loss of institutional knowledge
- Lack of regional collaboration
- KDOT's focus on freeways
- Gaining consensus of many groups with differing opinions on improvements
- Mid-America Regional Council funding for SRTS requires utility construction that is not covered in funding
- Projects are often maintenance focused and funds do not cover VRU improvements

Success and Barrier:

- Requiring developments to piecemeal sidewalk and trail network
    - Some get built, but the city still has to fill in gaps

What infrastructure projects should be prioritized?

- In a rural state, urban areas are often not prioritized in legislation
    - Designated urban funding for alternative transportation initiative

What can KDOT do to help drive success?
• Provide support for local match • Capitalize on historic Bipartisan Infrastructure Law funding • Discover how to use federal safety dollars for operation and maintenance projects • Explore HSIP intersection project funding • Provide public education on roadway safety • Develop public campaigns to promote transportation alternatives • Provide funding to balance automobile and people-centric projects • Change project prioritization away from traffic capacity • Push Complete Streets message from the top down (USDOT and KDOT) • Investigate equity disparities in KDOT districts

3.7.13 Workshop #13: Areas of Higher-Risk Cities – Wichita

Workshop #13 occurred on August 25, 2023, from 1:30 p.m. to 4:00 p.m. on Microsoft Teams. The workshop was open to representatives of Wichita to discuss city-specific data analysis, maps of HIN and HRN segments in their community, and an overview of the statewide systemic analysis as it pertains to Wichita. The goal of the workshop was to develop a program of projects that address VRU safety features and identify context-appropriate countermeasures, strategies, and policies using the SSA.

3.7.13.1 Breakout Groups

The breakout group discussion focused on the state of safety in Wichita and asked the same questions as Workshop #12.

What is the most pressing VRU safety need in your city?

User Factors

- Many reports from the police department indicate that intoxication, emotional state, and impaired decision-making are common factors in VRU accidents
- Homelessness
- Lack of awareness from drivers toward VRUs
- Distracted driving

Speed

- Speeds driven vs. posted speed limits

Facilities

- Lack of sidewalks
- Focus on improving four-lane roads
- Right turn on red and right turn slip lanes
- High-speed roads need high-visibility crosswalks

What types of countermeasures have you employed in the past?

Successes

- Traffic calming measures
  - Speed tables, bulb outs
- Speeds
  - Reducing speed limits using factors beyond the 85 percentile KDOT criteria
  - Residential speed limits of 20 mph
  - Enforcement
- Pedestrian crossings
  - Bridges for arterials
  - Median refuge islands
  - Adding crosswalks between arterial intersections
  - Raised crossings
  - HAWK signals
  - Raised crosswalks and intersections (e.g., Old Town and McCain Street in front of Riverfront Stadium)
- Road reconfigurations
  - On-street bike lanes
  - Off-street trails
  - Build three-lane roads with medians instead of four- or five-lane roads

What types of countermeasures have you employed in the past?

Barriers

- Speed bumps with old design
- Older bike lanes with constrained ROW space
- Pilot projects not well thought out

What infrastructure projects should be prioritized?

Infrastructure

- Road diets on HIN roadways
- Expand policies for private developers to build VRU infrastructure
- Develop zoning policies so developers build VRU facilities at the micro level that can connect to the macro level system
- Focus on VRU infrastructure in commercial/entertainment districts

Non-Infrastructure

- Address mental health and intoxication issues of citizens
- Focus on areas near QuikTrips and other social service providers
- Educational campaigns
- Enforcement strategies

What can KDOT do to help drive success?

- Commitment to VRU project prioritization, partnerships, and development strategies
- Allocate a greater percentage of funding to VRU projects
- Keep VRU study as a living document with updates
- Provide recommendations and examples of VRU project successes in Kansas
- Provide support for current VRU planning for MPOs
- Leverage federal dollars
    - Program HSIP funds for VRUs
    - Regional project development
    - Assistance with the local match

3.7.14 Workshop #14: Areas of Higher-Risk Cities – Hutchinson

Workshop #14 occurred on August 29, 2023, from 8:30 a.m. to 11:00 a.m. on Microsoft Teams. The workshop was open to representatives of Hutchinson to discuss city-specific data analysis, maps of the HIN and HRN segments in their community, and an overview of the statewide systemic analysis as it pertains to Hutchinson. The goal of the workshop was to develop a program of projects that address VRU safety features and identify context-appropriate countermeasures, strategies, and policies using the SSA.T

Breakout Groups

The breakout group discussion focused on the state of safety in Hutchinson and asked the same questions as Workshop #12.

What is the most pressing VRU safety need in your city?
Facilities • Main Street around the library and state fairgrounds • Lack of pedestrian access to Walmart and other destinations across K-61 • Lack of sidewalks on arterial streets • VRU facilities are not part of new developments in the northeast part of the city, where schools, medical facilities, and housing are being developed • Four-lane undivided streets **Other Factors** • Lack of staff to address issues

What types of countermeasures have you employed in the past?

Successes

- Bicycle boulevard on Washington Street
- Bicycle trail on Main Street through the Fairgrounds
- Safe Sidewalks Program with city/property owner cost share
- Removing unwarranted signal on Avenue A
- Road diets
- City Council education and workshops
- Adding HAWK signals on 11th Street and Plum Street
- Roundabouts on Avenue A and Woodie Seat Freeway

Barriers

- Lack of knowledge about Complete Streets designs in the community
- Lack of staff
- Lack of political support when neighborhoods oppose VRU projects

What infrastructure projects should be prioritized?

Infrastructure

- Road diets on HIN roadways
- K-61 crossings and sidewalk infrastructure accessing new developments
- Expanding sidewalk system and connections
- Adding streetlights on HIN streets
- Road diets
- Connecting existing trail system to on-street facilities (e.g., Jim Martinez Trail to downtown)
- Downtown Streetscape and Complete Streets projects (e.g., Main Street from railroad tracks to Avenue B and Santa Fe Street Improvements)
- Areas around community colleges

Non-Infrastructure

- Implementing Bike Walk Master Plan
- Bike Walk Hutch Advocacy group involvement
- Find advocates inside of city staff for VRU projects

Barriers

- Finding ways to implement road diets while still accounting for state-fair traffic
- Moving curbs and drainage for VRU facilities can be costly.

What can KDOT do to help drive success?
• Use Traffic Engineering Assistance Program studies to help identify VRU projects • Find ways for HSIP funds to cover VRU projects • Provide local match funding assistance   ○ Local match funding timing is difficult when projects are not in a committed budget • Proactive project identification and prioritization

3.7.15 Workshop #15: Areas of Higher-Risk Cities – Salina

Workshop #15 occurred on August 31, 2023, from 8:30 a.m. to 11:00 a.m. on Microsoft Teams. The workshop was open to representatives of Salina to discuss city-specific data analysis, maps of HIN and HRN segments in their community, and an overview of the statewide systemic analysis as it pertains to Salina. The goal of the workshop was to develop a program of projects that address VRU safety features and identify context-appropriate countermeasures, strategies, and policies using the SSA.

Breakout Groups

The breakout group discussion focused on the state of safety in Salina and asked the same questions as Workshop #12.

What is the most pressing VRU safety need in your city?

Infrastructure
• Road diets
• Mid-clock crossings
• Medians
• Improved traffic signals and timings
• Area surrounding Oakdale Park
• Area surrounding Kansas Wesleyan College
• Crawford Street
    o Salina Central High School
    o Narrow ROW
    o Four-lane undivided road
Behavioral/Demographic Factors
• Compare VRU accidents with police department data on intoxication / speeding
• Investigate the cause of the spike in crashes from 2018 to 2021
• Examine the effects of low transit user numbers since COVID

What types of countermeasures have you employed in the past?
• Installed retroreflective backplates on all signals • Signal timing improvements for red/yellow light clearance • Roundabouts • RRFBs in high crash areas (e.g., Oakdale Park) • Created a sidewalk gap matrix • Road diets • Speed reduction measures

What infrastructure projects should be prioritized?
• RRFBs • HAWK signals • Systemic pedestrian crossing pavement marking upgrades • Refuge islands on three- and four-lane roads • Crosswalks between arterial intersections • Pedestrian countdown timers at traffic signals • Improving lighting • Improving signal coordination (examples: Ohio and 9th Street, along Crawford Street) • Road diets (e.g., South Broadway) • Protected bicycle lanes (none in the city currently)

What can KDOT do to help drive success?
• Prioritize funding for HIN roads • Provide local match funding assistance • Present VRU Safety Assessment findings and recommendations to city elected leaders • Engage in public involvement to increase VRU awareness • Provide education for youth and college students • Use crash dashboards to identify and prioritize projects • Educate public and elected officials about roundabouts • Distribute data from the VRU Safety Assessment

3.7.16 Workshop #16: Areas of Higher-Risk Cities – Topeka

Workshop #16 occurred on September 1, 2023, from 8:30 a.m. to 11:00 a.m. on Microsoft Teams. The workshop was open to representatives of Topeka to discuss city-specific data analysis, maps of the HIN and HRN segments in their community, and an overview of the statewide systemic analysis as pertains to Topeka. The goal for the workshop was to develop a program of projects that address VRU safety features and identify context-appropriate countermeasures, strategies, and policies using the SSA.

Breakout Groups

The breakout group discussion focused on the state of safety in Topeka and asked the same questions as Workshop #12.

What is the most pressing VRU safety need in your city?
• Traffic calming techniques • Speed reduction measures • Gaps in sidewalk infrastructure (e.g., 17th Street at Gage Street) • ADA accessibility • Dedicated bike lanes • Children walking to school with no sidewalk routes • Safety at school pickup and drop-off areas • Adding crossings between arterial intersections   o Areas with residential homes on one side of an arterial road with commercial use on the other leads to people crossing the street without a crossing • Community and elected leader education • Complete Streets training for city staff and consultants • VRU facility costs increasing with inflation

What types of countermeasures have you employed in the past?

Sidewalks, Trails, and Bike Lanes

- Sidewalk Infill Program
- Integrating bike lanes into bulb-outs
- Six-foot (or wider) sidewalks
- Bike boxes (e.g., Quincy from 6th Street to 10th Street)
- SRTS sidewalk projects

Roadways

- Solar-powered streetlight pilot projects
- Adaptive signals
- Roundabouts
- Removing unwarranted traffic signals
- Road diets
- Dedicated bicycle lanes
- Complete Streets
    - California Street
    - Quincy Street from 6th Street to 8th Street and 8th Street to 10th Street
    - North Tyler sidewalks and multiuse paths
- Neighborhood traffic calming
    - Bulb outs and chicanes
    - Exploring Chronic Disease Risk Reduction funding from Kansas Department of Health and Environment (KDHE)

Barriers

- Neighborhood associations do not want to add sidewalks in neighborhoods
- Funding for sidewalks and trails
- VRU facilities are seen as “extras” in a larger project
- Inflation in construction costs

What infrastructure projects should be prioritized?

Infrastructure

- 6th Street's high speeds and failing joints

Non-Infrastructure

- Funding for trees on streets
- Update Pedestrian Master Plan to coordinate with SRTS plan
- Include equity in the prioritization process
- Prioritize VRU safety and access projects in East Topeka
- Include concept plans in corridor studies and get more stakeholder feedback
- Every Day Counts 7 could potentially help with street lighting
- Education and training for staff and consultants on VRU design and standards
- Education for the public and elected officials on VRU safety and Complete Streets

Barriers

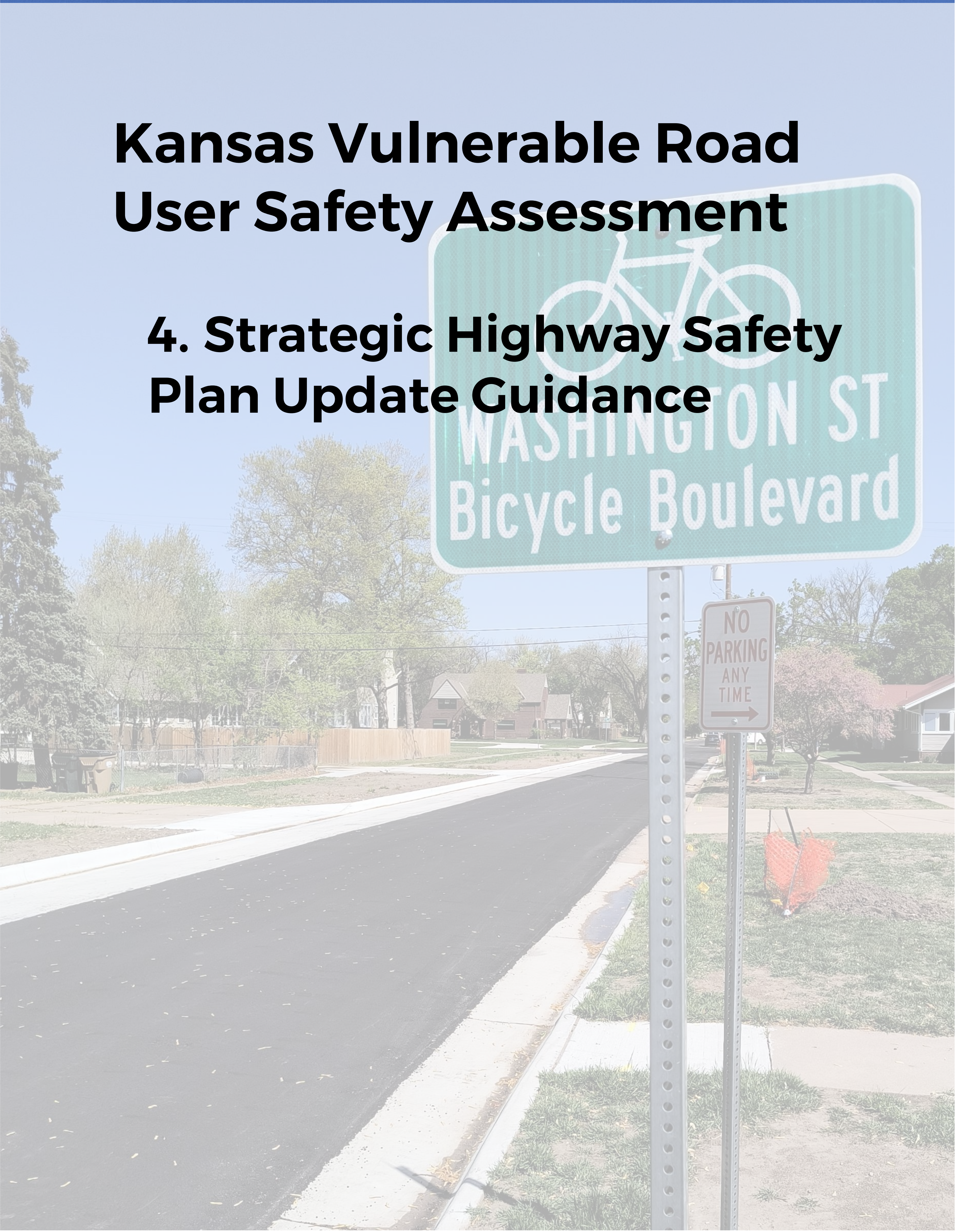
- Funding for VRU facilities and safety measures
- City Council moving to end individual programs and make decisions project-based
    - Projects not at the Capital Improvement Program level will be harder to fund (e.g., neighborhood traffic calming)
    - More challenging to provide match funding from MPOs
    - Complete Streets funds are sunsetting and could affect Complete Streets elements in ongoing projects

What can KDOT do to help drive success?

- Funding for VRU facilities
- Transportation enhancement and cost share grants
- KDOT purchasing and providing equipment (for example: retroreflective backplates or signal heads)
- Assistance applying for funding
- Expand HSIP funding opportunities for intersections and road diets
- KDOT VRU safety campaign
- Present to Complete Streets Advisory Committee
- KDOT workshop for governing bodies

Kansas Vulnerable Road User Safety Assessment

4. Strategic Highway Safety Plan Update Guidance



4.1 Introduction

This chapter reviews the 2020–2024 Kansas Strategic Highway Safety Plan (SHSP) strategies and implementation action plans related to the Pedestrians and Cyclists Emphasis Area Team (PC EAT). This chapter includes an outline of the benefits of the SSA approach and provides guidance related to how KDOT can incorporate SSA concepts into their ongoing implementation efforts in creating a safe transportation and mobility network for all road users, particularly VRUs.

4.2 Planning Activity Review

Staff reviewed the Kansas ATP and other relevant plans developed by KDOT, assessed their alignment with the SHSP, and then developed a set of recommendations based on the data analysis and local/regional consultations; these recommendations were included in the VRUSA as an addendum to the current SHSP. KDOT staff reviewed the following plans:

- KDOT 2020–2024 SHSP
- PC EAT Action Plan
- Kansas ATP

4.2.1 KDOT 2020-2024 SHSP Findings

The mission of the Kansas 2020–2024 SHSP is to drive strategic investments that reduce traffic injuries and deaths on Kansas roadways. The plan used the 4E's approach to traffic safety: education, enforcement, engineering, and EMS. The 2025-2030 SHSP will use the SSA as its guiding principle. FHWA requires that all states have an SHSP that includes an emphasis area for VRUs.

4.2.1.1 PC EAT Action Plan Findings

The Drive to Zero Coalition, formerly the Executive Safety Council, champions transportation safety on public roads in Kansas by developing and maintaining the SHSP. Eight Emphasis Area Teams, or EATs, and the Data and Legislative Support Teams, report to the DTZ Coalition. The EATS develop action plans for prioritized strategies to implement the SHSP (Figure 234).

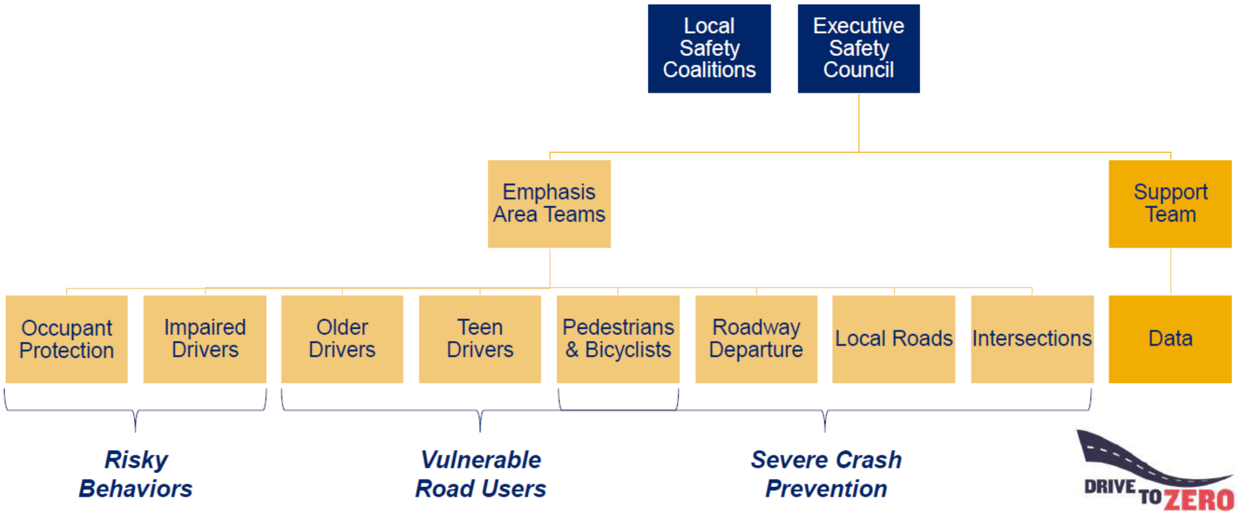


Figure 234: Emphasis Area Teams (EATs) and Support Team Structure

4.2.2 Pedestrians and Cyclists Emphasis Area Team Action Plan

KDOT convened the first PC EAT for the 2020–2024 SHSP. KDOT added this EAT to respond to a rise in VRU fatal crashes. Although many of the crashes are in the urban areas of Kansas City, Wichita, Topeka, Lawrence, and Salina, rural Kansas communities are also experiencing these types of crashes.

To respond to the VRU challenges, the 2020–2024 Kansas SHSP identified four strategies to reduce PC fatal and serious injury crashes (Table 41):

- PC1: Improve nonmotorized data collection and analysis.
- PC2: Identify and promote the use of best practices when planning and designing transportation facilities for nonmotorized modes of transportation.
- PC3: Improve safety of pedestrian and bicycle facilities.
- PC4: Improve public awareness of nonmotorized road users.

Table 41: Pedestrians and Cyclists EAT Strategies in the KDOT SHSP

#	Strategy	Update
PC1	Improve nonmotorized data collection and analysis.	Progress – Strategy prioritized for FY24; began action plan writing August 2023; scheduled to present to Drive To Zero Coalition (DTZC) November 2023; Vulnerable Road User (VRU) Safety Assessment underway; began exploring options for pedestrian/cyclist counting equipment vendors for the Kansas Department of Transportation (KDOT) and, potentially, local community use; began exploring options for big data providers (e.g., Strava, Streetlight, Numina, etc.).
PC2	Identify and promote the use of best practices when planning and designing transportation facilities for nonmotorized modes of transportation.	Progress – Strategy prioritized for fiscal year 24; action plan writing to begin July 2023; scheduled to present Action Plan to DTZC in August 2023; developed 2022 KDOT Crosswalk Guidance & Guide to Crosswalk Countermeasures; Safe Transportation for Every Pedestrian (STEP) Projects (Louisburg, Hugoton, Lola, Russell, Liberal) received State Transportation Innovation Councils funding to develop a STEP Countermeasures Guide and How-To Demonstration Projects for Safe Streets; Kansas State University through the Kansas Transportation Research and New-Developments (K-TRAN) Program is studying the real-world performance of low-cost proven safety countermeasures on driver compliance for pedestrian crosswalk enhancements - final report expected July 2023.; new American Association of State Highway and Transportation Officials Bicycle Facilities Guidance added to the agenda for Walk Bike Roll Kansas Summit 2023.
PC3	Improve safety of pedestrian and bicycle facilities.*	Progress – Safety Countermeasures in Construction Projects: DTZC-approved Action Plan in May 2023; VRU Safety Assessment underway; prioritizing projects that focus on safety improvement; prioritizing funding for safety countermeasures identified in the STEP guidance; increasing technical assistance to communities for improved efficiency and success on project delivery; prioritizing funding for sidewalks, side paths, multiuse trails, crossings, on-and off-street bike facilities, etc.; began developing a Priority and

Table 41: Pedestrians and Cyclists EAT Strategies in the KDOT SHSP

#	Strategy	Update
		Designated Bicycle Routes Layer to better identify overlap with future highway projects.
		Progress – RSA Training Program: DTZC-approved Action Plan in May 2023; established program goals, estimated program cost, secured funding source; University of Kansas Transportation Center Local Technical Assistance Program to execute the program beginning Spring 2024.
PC4	Improve public awareness of nonmotorized road users.	Progress – Walk Bike Roll Kansas Virtual Series and in-person Summit (May – December 2023); Kansas Active Transportation Plan Video Series; VRU Workshops; social media outreach.

** Strategy language was modified from the original wording in the SHSP to be more safety-focused. The original language read, "Improve network connectivity of pedestrian and bicycle facilities."*

The implementation phase of the PC EAT Action Plan focused on PC3.PC1, PC2, and PC4 will be executed in subsequent years. The PC3 strategy has two components:

1. **Engineering: 3.1.1 –** Invest in construction projects that promote proven safety countermeasures for nonmotorized road users. (Note: Safety countermeasures would be considered at the design phase of a project.)
2. **Education: 3.2.1 –** Develop local training program for community-led Road Safety Audits (RSA).

The PC3 and actionable sub-strategies relate to the 2022 Statewide ATP and support the SSA in terms of safety for all users. Education and engineering are strategy drivers and correlate with the 4 Es method.

To inform the development of the key emphasis areas from Table 41, the PC3 reflects technical, economic, financial, political, and administrative areas to guide implementation and overcome obstacles, including factors such as safety countermeasures in construction projects and the RSA training program.

Several action steps were identified, including target schedules and oversight agencies to promote and implement the strategies. For example, an ongoing action step is to prioritize funding for projects with countermeasures identified in RSAs (see Table 42 and Table 43).

There are several action steps to develop a local training program for community-led RSAs, to assist local governments in the development of RSAs. Action steps include launching the new program and conducting in-person training to establish performance metrics and monitor progress.

4.2.3 Alignment with Strategic Highway Safety Plan

The data analysis in Chapter 9 of the 2020–2024 KDOT SHSP identified challenges for pedestrians and cyclists. It highlights a correlation between non-motorist fatalities and a lack of active transportation infrastructure; it points out that fatalities and serious injuries involving non-motorists are expected to increase, as well as the cost of nonmotorized crashes. The SHSP strategies coincide with the goals of the ATP. Collaboration with stakeholders is an important component of action planning needed for the success of action items and strategy implementation. To implement the strategy, the action plan identifies agencies and individuals to assist in the successful execution of PC3 (see Table 42 and Table 43). Table 44 discusses existing strategy collaborations.

Table 42: Strategy Action Schedule

Invest in construction projects that promote proven safety countermeasures for nonmotorized road users				
Action Step	Target Start Date	Target Completion Date	Action Leaders*	Notes & Considerations
Prioritize projects through the federally funded Transportation Alternatives program that focus on safety improvement project.	Ongoing	Ongoing	KDOT Bureau of Multimodal Transportation (BMT)	

Table 42: Strategy Action Schedule

Invest in construction projects that promote proven safety countermeasures for nonmotorized road users				
Action Step	**Target Start Date**	**Target Completion Date**	**Action Leaders***	**Notes & Considerations**
Expand the Safe Routes to School (SRTS) Program by hiring an SRTS Coordinator, using state funds, coordinating with RSAs, increasing technical assistance, etc.	Fall 2023	Ongoing	KDOT-BMT, Kansas Active Transportation Enhancement (KATE) Program Partners	
Conduct a Vulnerable Road User (VRU) Safety Assessment.	Currently underway	Nov. 2023	KDOT-BTS	Per the Infrastructure Investment and Jobs Act, all states are required to complete an initial VRU assessment by 11/15/23.
Follow up with local agencies to determine interest in projects and systemwide solutions resulting from VRU Safety Assessment findings.	Jan. 2024	April 2024	KDOT-BMT, KDOT-BTS	
Prioritize funding for projects with countermeasures identified in RSAs.	Fall 2023	Ongoing	KDOT-BMT, KATE Program Partners	

Table 42: Strategy Action Schedule

Invest in construction projects that promote proven safety countermeasures for nonmotorized road users

Action Step	Target Start Date	Target Completion Date	Action Leaders*	Notes & Considerations
Include Active Transportation at Local Consult.	Oct. 2023	Oct. 2023	KDOT-BMT, KDOT Secretary's office	
Create a project review and selection team for HSIP-funded projects.	Winter 2024	Ongoing	KDOT-BTS, KDOT-BMT	
Create/develop design guidelines for temporary/semi-permanent interventions for local communities.	Fall 2023	Winter 2023	KDOT-BMT, KATE Program Partners	
Prioritize funding for crossing safety countermeasures identified in Safe Transportation for Every Pedestrian (STEP) guidance.	Currently underway	Ongoing	KDOT-BMT, KDOT-BTS, KATE Program Partners, Metropolitan Planning Organizations (MPOs), Local Public Agencies (LPAs)	Through Transportation Alternatives (TA) and KATE programs.

Table 42: Strategy Action Schedule

Invest in construction projects that promote proven safety countermeasures for nonmotorized road users				
Action Step	Target Start Date	Target Completion Date	Action Leaders*	Notes & Considerations
Increase technical assistance to communities for improved efficiency and success on project delivery.	Currently underway	Ongoing	KDOT-BMT, KATE Program Partners	RSA, active transportation planning, traffic studies, cost estimates, grant writing, project execution, etc.
Prioritize funding for sidewalks, side paths, multiuse trails, crossings, on- and off-street bike facilities, etc.	Currently underway	Ongoing	KDOT-BMT, KDOT Bureau of Local Projects, LPAs, KATE Program Partners	Through TA and KATE programs.
Develop and maintain a Priority and Designated Bicycle Routes Layer to better identify overlap with future highway projects.	Currently underway	Ongoing	KDOT-BMT, KDOT Bureau of Transportation Planning	For use mostly by KDOT engineers and Program Management Consultants especially as it relates to Rumble Strip Policy and the Eisenhower Legacy Transportation Program IKE Program project planning (local consult).

Table 43: Strategy Action Schedule

Develop local training program for community-led Road Safety Audits (RSA)				
Action Step	**Target Start Date**	**Target Completion Date**	**Action Leaders***	**Notes & Considerations**
Determine the Vision and Goals of this program through a Workshop w EAT leadership and KDOT staff	March 2023	Complete	Consultant team, KDOT-Bureau of Transportation Safety (BTS), KDOT- BMT, University of Kansas Transportation Center (KUTC)	Discuss training program management agency, funding source, structure, and staff
Estimate program cost	March 2023	Complete	KUTC	KUTC to provide estimate
Determine funding source	March 2023	Complete	KDOT- BMT, KDOT-BTS, Kansas Department of Health and Environment (KDHE), FHWA	Possible sources include HSIP, state funds, Transportation Alternatives (TA) federal funding, KDHE
Execute KDOT/KUTC contract	June 2023	Aug. 2023	KUTC, KDOT-BMT	
Coordinate with other EATs on curriculum and outreach	Aug. 2023	April 2024	EAT Committee	Curriculum development; outreach

Table 43: Strategy Action Schedule

Develop local training program for community-led Road Safety Audits (RSA)				
Action Step	Target Start Date	Target Completion Date	Action Leaders*	Notes & Considerations
Conduct best practices research on RSA training programs	Oct. 2023	Dec. 2023	KUTC, KDOT-BMT	On similar RSA Training Programs conducted in other states, other resources
Develop program scope, structure, schedule, locations, and other program details	Nov. 2023	Dec. 2023	KUTC, KDOT-BTS, KDOT-BMT	KUTC to share guidance; consider underserved and rural communities that may be more likely to lack resources and staff
Determine policies and procedures	Nov. 2023	Dec. 2023	KUTC, KDOT-BMT, KDOT-BTS	E.g., local agency/participant course eligibility
Design and develop program curriculum	Nov. 2023	Jan. 2024	KUTC, KDOT-BMT, KDOT-BTS	E.g., concepts, topics, course levels, etc.
Develop program training materials and resources	Nov. 2023	April 2024	KUTC, KDOT-BMT	E.g., guides, checklists, refresher video
Conduct program outreach	Nov. 2023	Feb. 2024	KUTC, EAT membership, KDHE	May also consider advocacy groups, Bike Walk Kansas, etc.

Table 43: Strategy Action Schedule

Develop local training program for community-led Road Safety Audits (RSA)				
Action Step	**Target Start Date**	**Target Completion Date**	**Action Leaders***	**Notes & Considerations**
Create incentives for participation	Nov. 2023	March 2024	KDOT-BMT	For example, are there points awarded to TA funding applicants who have participated in the training and/or conducted an RSA?
Finalize training logistics for each course	Jan. 2024	Feb. 2024	KUTC	E.g., meeting spaces, dates and times, audio/visual needs, etc.
Launch and conduct in-person trainings	March 2024	April 2024	KUTC	Try to avoid snowy season
Establish performance metrics and monitor progress	March 2024	Ongoing	KUTC, KDOT-BMT	See suggested performance metrics below

Table 44: Strategy Collaborations

Collaborator	Purpose	Schedule	Coalition Role
Intersections EAT	Many nonmotorized road user crashes occur in intersections	Quarterly	
Local Roads EAT	Most nonmotorized road user crashes occur on the local system	Quarterly	
KUTC	RSA development and implementation	Biweekly or as needed during program development and execution	Promotion of RSA Training Program
KDOT Design and Engineering	Incorporate nonmotorized users' safety countermeasures into project designs	As needed	
KS ATP Core Team	Implementation of the KS ATP Safety Strategies	As needed	Promotion and Implementation of the KS ATP; Coordinate with KDOT Safety on overlapping SHSP Strategies
KDHE and Blue Cross Blue Shield of Kansas Pathways	Public health and transportation	Quarterly	Intersection of transportation and public health

4.2.4 Kansas Active Transportation Plan (2023)

In February 2023, KDOT released its ATP to encourage "health, safety, and mobility options for accessing recreation, jobs, and amenities." The plan focuses on the safety and health of active transportation users, the environment, and the economy. Additionally, the purpose of the ATP is to:

- Promote equity among communities and transportation infrastructure.
- Increase and normalize the use of active transportation modes.
- Maintain the longevity of such systems.

Performance measures are based on these goals and the related community effects. Performance measures include, but are not limited to:

- Reduction of active transportation-related crashes.
- Active transportation trip count (exposure data).
- Accessibility and connectivity of the active transportation network.

This embodies several components of the SSA, especially prioritizing safer people, safer roads, and safer speeds.

4.3 Review of Best Practices for Vulnerable Road User Safety

This section aims to provide national best practice guidance on the planning processes required for agencies to reduce VRU crashes with actionable steps for departments of transportation, MPOs, and cities. As this program evolves, this section will aide future planning by providing a comparison on strategies implemented across the nation.

4.3.1 Traffic Safety Culture

The USDOT Safety Council, FHWA's Joint Safety Strategic Plan, and The National Toward Zero Deaths Safety Initiative have identified growing safety culture as a core strategy.

A positive traffic safety culture supports traffic safety goals by reducing risky behaviors and increasing protective behaviors; it also increases public acceptance of other effective traffic safety programs. Traffic safety culture is defined as the values andbelief systems shared among road users that determine their behavior choices and affect traffic safety. Critical stakeholders may include state departments of transportation, state offices of public safety, public health officials, law enforcement leaders, elected officials, and business leaders.

The decision to drive safely as a road user (e.g., obey the speed limit) or to take action as a stakeholder (e.g., increase funding for speed enforcement) is often a deliberate choice. Our belief systems influence our choice of behavior. These belief systems emerge from our membership in groups that are important to our self-identity. The culture that defines these groups becomes part of our belief system.

By changing culture to align with the desired behavior, it creates a social motivation to engage and sustain that behavior. Behavior change without culture change may only be temporary. For example, introducing speed bumps may “force” drivers to slow down, but because their attitudes about speeding have not changed, they may speed up again after leaving the speed bumps.

For this reason, the goal of using traffic safety culture as a framework for traffic safety strategies is to create a society that not only prioritizes safety for oneself, but for everyone. Establishing this “prosocial” traffic safety culture would encourage individuals to take actions that not only ensure their own safety but also the safety of everyone else. A prosocial traffic safety culture would also include the desire for others (e.g., the government) to help individuals be safer.

This prosocial behavior is especially critical for VRUs. Humans are fragile and lack the protection, such as airbags, seatbelts, and crumple zones, afforded by most vehicles. Drivers need to operate with a commitment to keeping VRUs safe, and VRUs need to cycle and walk in a way that will keep them safe. In addition to these behaviors, system designers, elected officials, and others must recognize the elevated safety risks for VRUs and commit to strategies that can create safe operating environments for them.

4.3.1.1 Noteworthy Practice

In 2015, the Montana Department of Transportation initiated a five-year transportation pooled-fund program on traffic safety culture, partnering with the Center for Health and Safety Culture at Montana State University as the principal research entity. This program began as a cooperative effort among participating state DOTs and both traditional and nontraditional stakeholder organizations sharing a vested interest in the role of traffic safety culture to achieve the Toward Zero Deaths vision. The total budget was $1,204,000 with support from 14 state DOTs, including California, Connecticut, Idaho, Illinois, Indiana, Iowa, Louisiana, Nevada, New Hampshire, Texas, Utah, Vermont, and Washington. Projects in this first funding period examined the role of culture in impaired driving, distracted driving, law enforcement, and intervening to prevent risky driving. Completed projects include the following:

- An Assessment of Traffic Safety Culture Related to Driving After Cannabis Use
- An Assessment of Traffic Safety Culture Related to Engagement in Efforts to Improve Traffic Safety
- Traffic Safety Cultures and the SSA (an international technology transfer project)

Active projects include the following:

1. Key Information for Effective Driving Under the Influence of Cannabis Policy
2. Traffic Safety Citizenship Communication Tools
3. Traffic Safety Culture Primer Pending projects to be completed under the Phase 2 pooled-fund program, TPF-5(309), include the following:
    a. Evaluation of Traffic Safety Culture Strategies.
    b. Guidance on Cultural-Based Strategies to Grow Engaged Driving.
    c. Guidance on Messaging to Avoid Reactance and Address Morel Disengagement. The program is producing several tools, including primers, an online video, and webinars on key topics relevant to traffic safety culture, including tools to facilitate the implementation of research results. Given the success of the current pooled-fund program, the members unanimously recommend the continuation of another five-year cycle.

Since the start of this pooled program, additional states have committed to funding to the pooled-fund program; as of March 31, 2023, states that have committed are Connecticut, Georgia, Iowa, Idaho, Illinois, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Montana, Nevada, Texas, Utah, Vermont, and Washington. The participating states in the program have committed $1,430,000 in funds over the five years. The commitments by organization can be found at https://www.pooledfund.org/Details/Study/668.

4.3.2 Safe System Approach

The SSA aims to eliminate serious injuries and deaths in the transportation system. The approach includes the tenets to both avoid crashes and reduce the severity of crashes through a comprehensive safety framework. It acknowledges that building safety redundancy into the transportation system is key. The approach is founded on the concept of shared responsibility: all people involved in the transportation system planning, design, construction, and usage play a role in eliminating deaths and serious injuries. The SSA principles and objectives are depicted in Figure 235.[9]

Figure 235: SSA Principles and Objectives

The SSA promotes planning, design, and operations to accept and anticipate human mistakes and lessen impact forces to reduce the severity of crashes and save lives. To

[9] U.S. Department of Transportation. 2022. "What Is a Safe System Approach?" https://www.transportation.gov/NRSS/SafeSystem.

enable this, the SSA advocates for informed, data-driven decision-making and seeks to integrate a wide array of factors into its strategies.

Safe System Principles:

- Death/Serious Injury is Unacceptable
- Humans Make Mistakes
- Humans are Vulnerable
- Responsibility is Shared
- Redundancy is Crucial

Safe System Objectives:

- Safer Road Users
- Safer Vehicles
- Safer Speeds
- Safer Roads
- Post-Crash Care

The transportation community has embraced the SSA as an effective way to address and mitigate the risks inherent in our enormous and complex transportation system. It builds and reinforces multiple layers of protection to both prevent crashes from happening in the first place and minimize the harm caused when crashes do occur. It is a holistic and comprehensive approach that provides a guiding framework to make places safer for people.[10]

Rather than relying on a single strategy that may not fully protect every user, multiple strategies across the system provide redundant layers of protection against crash fatalities. Consequently, creating a safe system requires that safety improvement strategies be made for all the contributing system components. In this case, such improvements may include education about impaired driving, increased enforcement of speed limits, vehicle technology to detect impaired driving or limit speeding, redesigning the road curvature, adding crash barriers, and expanding post-crash care. Because these different system components and associated improvements are the responsibility of different stakeholders, creating a safe system requires the collaboration of all relevant stakeholders with a shared responsibility for a common goal.

As summarized in Figure 236, there is a continuum of collaborative effort among system stakeholders. To be effective, the SSA requires that stakeholders either collaborate or integrate.

[10] Ibid.

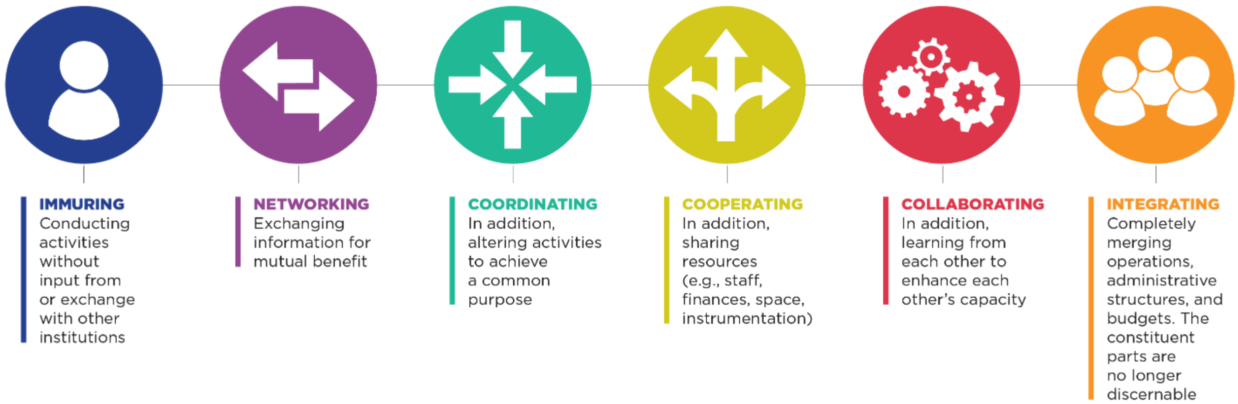


Figure 236: Continuum of Stakeholder Collaboration

Collaboration requires sharing communication, leveraging resources, coordinating actions, and engaging together in "evaluative thinking" to learn from our collaborative experience. According to the *Guidance For Evaluating Traffic Safety Culture Strategies, "Evaluative thinking is a form of problem solving that extends beyond the collection of evidence to include learning lessons from that evidence, then integrating this knowledge into processes that make our strategies more effective in the future."*[11]

The ultimate form of collaboration is "stakeholder integration," in which stakeholders merge within a unifying organization with shared administration and operational functions such as a formal commission (e.g., Washington Traffic Safety Commission) or voluntary consortium (e.g., Minnesota Toward Zero Deaths). This is similar to Kansas' Drive to Zero Coalition.

An important step to support stakeholder collaboration (Figure 236) is to identify, document, and review the different strategies these stakeholders are operating individually. Often, stakeholders are unaware of each other's strategies and their respective effectiveness. Therefore, one challenge may be unnecessary duplication or unforeseen gaps in the strategies that are applied to an emphasis area, such as VRU safety. By reviewing strategies across groups; stakeholders can reallocate resources from duplicate or ineffective strategies and further develop more effective strategies.

[11] Austin, Eric, Jay Otto, Kelly Green, Nicholas Ward, Holly Watson, and Katherine Dively. 2021. Guidance For Evaluating Traffic Safety Culture Strategies. Prepared for the Montana Department of Transportation, the U.S. Department of Transportation, and the Federal Highway Administration. https://www.mdt.mt.gov/other/webdata/external/research/docs/research_proj/tsc/EVALUATION/FINAL_REPORT.pdf.

4.3.2.1 Noteworthy Practice

Figure 237 shows a "Portfolio Mapping" exercise for alcohol-related crashes. Strategies are categorized as either targeting individuals who have already engaged the risky behavior (Indicated), have risk factors that predispose them to engage in risky behavior (Selective), or focus on the general population (University). In this example, strategies are shown that are implemented in different areas of the social environment, including families, workplaces, and communities. To accomplish this, the Haddon's Matrix is commonly used to approach safety analysis at a site in a systematic fashion to document strategies within the distinct parts of the safe system, namely, safer road users, safer roads, safer vehicles, safer speeds, and post-crash care.

	Individual Programs or strategies designed to impact the individual like specific curricula, programs or interventions. These seek to change knowledge, attitudes, beliefs, skills and behaviors.	**Family** Programs or strategies designed to impact the family like parent training, family therapy or family education. Outcomes of these programs might be family rules or guidelines.	**School/ Workplace** Programs or strategies designed to impact the school like school-wide policies, school-wide discipline programs or training programs for all teachers.	**Community** Programs or strategies designed to impact the community like ordinances, laws, taxes or policies.
Indicated These strategies are for those who are known to exhibit the behavior you're seeking to address	- *Alcohol ignition interlocks* - ***Alcohol treatment***	- Guiding Good Choices - Strengthening Families Program	- Employee Assistance Programs - School Policies that address counseling or brief interventions for students who violate the Student Alcohol Policy or receive a legal charge such as Minor in Possession (MIP)	- *Vehicle and license plate sanctions* - *DWI offender monitoring* - *Lower BAC limit for repeat offenders* - *Administrative License Revocation or Suspension (ALR or ALS)* - *BAC Test Refusal Penalties* - *DWI courts* - *Sanctions*
Selective Those programs are for those who are at-risk for exhibiting the behavior – they already possess a known risk factor	- *Alcohol problem assessment/evaluation*	- Guiding Good Choices - Strengthening Families Program	- Schools Curriculum to support youth (i.e. dropout prevention, Life Skills, substance use, etc.)	- *Open Container Laws* - *Court monitoring* - *Limits on diversion and plea agreements* - *Preliminary Breath Test Devices (PBTs)* - *Passive Alcohol Sensors (PAS)*

Universal
These are programs aimed at the general focus audience that you are trying to serve
	- **Driving Simulator**
	- **Rollover Simulator**
	- **Child Passenger Res Ctr**
	- **Defensive Driving**
	- **Parent Ed – Driver's Ed**
	- *Alcohol screening and brief intervention*
	- *Alternative transportation options*
	- *Designated drivers*
	- *Youth programs*
	  - **Project Northland (Middle School_**
	  - **Class Action (High School)**
	- *Mass Media Campaigns*
		- Guiding Good Choices
		- Strengthening Families Program
		- Family rules about driving after drinking alcohol
		- Monitoring youth
		- **Post Prom Assembly – distracted/impaired driving demo's**
		- **Victim Impact Panel**
			- ***Responsible beverage service***
			- ***Alcohol vendor compliance checks***
			- School/Workplace Policies that address driving after drinking
				- *Minimum drinking age 21 laws*
				- *Zero-tolerance law enforcement*
				- *"Use and Lose" Laws*
				- *Keg Registration Laws*
				- *Underage Drinking Tipline*
				- ***Social Host Liability***
				- *Alcohol-Impaired Driving Law Review*
				- *Publicized Sobriety Checkpoints*
				- *High Visibility Saturation Patrols*
				- *Integrated Enforcement*

Figure 237: Example of "Portfolio Mapping" Template[12]

4.3.3 Complete Streets Policies

Complete Streets is an approach to transportation planning and design that guides the development of a safe, connected, and equitable transportation network for everyone. Complete Streets is a way of designing and building roadways that focuses

[12] Goodwin, A., L. Thomas, B. Kirley, W. Hall, N. O'Brien, and K. Hill. 2015. *Countermeasures that work: A highway safety countermeasure guide for State highway safety offices.* Eighth ed. Report No. DOT HS 812 202. Washington, DC: National Highway Traffic Safety Administration.

on creating a safe and welcoming experience for all people, regardless of their age, ability, income, race, ethnicity, or mode of travel.

FHWA recommends that states use a Complete Streets Design Model on roadways where adjacent land use suggests that varied modes could serve trips and to achieve complete travel networks for a variety of road users.

The National Complete Streets Coalition provides resources to help communities develop and implement context-sensitive policies to achieve safety for all road users. The organization developed a model of ten elements that should be included when developing the Complete Streets policy. The model is a helpful resource for all forms of government in developing a Complete Streets policy.

Kansas currently does not have a Complete Streets Policy; however, many of the local and regional agencies have adopted a policy or developed plans to support Complete Streets. A Complete Street policy at the state level could both support the state system's complete street goals and help align local projects and efforts to enable safe streets for all. One of the PC EAT's prioritized strategies is to adopt a Complete Streets policy.

4.3.3.1 Kansas Complete Street Communities

Table 45 below outlines each of the cities, counties, and regions in Kansas that have adopted some form of Complete Streets Policy as of June 16, 2023 (in alphabetical order).

Table 45: Kansas Communities Complete Streets Policy Adoption (Source: Smart Growth America)

Agency	Policy	Area	Year	Update Year	Population
Hutchison	Complete Streets Policy	City	2012		40,006
Iola	Complete Streets Policy	City	2016		5,396
Johnson County,	Resolution No. 041-11	County	2011		609,863
Unified Government of Wyandotte County	Resolution R-22-11	County	2011		167,046
Lawrence-Douglas County MPO	Resolution	Region	2011		94,934

Agency	Policy	Area	Year	Update Year	Population
Lawrence	Resolution No, 7271	City	2012	2018	94,934
Leawood	Resolution No. 3592	City	2011		33,902
Lenexa	Complete Street Plan	City	2019		57,434
Merriam	Complete Street Policy	City	2022		11,098
Overland Park	Resolution No. 4085	City	2012	2013	197,238
Roeland Parks	Resolution No. 611	City	2011	2021	6,871
Roeland Park	Complete Streets Policy	City	2021		6,871
Topeka	Resolution No, 20436	City	2009		126,587
Westwood	Resolution No. 85-2020	City	2020		1,750
Wichita	Multimodal Accommodation Policy and Street	City	2014		397,532
Wichita	Resolution No. 14-341	City	2014		397,532
Wyandotte County	Complete Streets Ordinance	County	2020		169,245

Lawrence, Kansas, has been active in Complete Street planning. The Lawrence-Douglas MPO adopted a Complete Street resolution in 2011, with the adoption in 2012 and an update in 2018. These policies were advanced through a campaign called Lawrence Complete Streets, which sought to educate citizens on policy measures that could advance a safe road network for all users.

4.3.4 Roadway Safety Audits

An RSA program is a comprehensive and systematic approach to assess and improve the safety of public roads and highways within a specific state. KDOT is currently exploring the establishment of an RSA program. The primary goal of such a program is to identify potential hazards, deficiencies, and risk factors on roadways and to propose effective countermeasures to reduce the occurrence and severity of crashes and other safety-related incidents. RSAs can be focused on community districts or roadway corridors. An RSA program should consider the following factors:

1. **Multidisciplinary Teams:** Ensure a comprehensive assessment of roadway safety issues by engaging a diverse team of experts.
2. **Data Analysis:** Analyze incidents and available exposure data to identify high-risk locations and patterns of incidents.
3. **Field Assessments:** Find safety hazards and crash-prone areas through field assessments. Field assessments can establish standards for sight distance, driveway spacing, maximum pedestrian crossing distance, and cyclist accommodation path.
4. **Stakeholder Engagement:** Engage with local communities and authorities to uncover unique safety concerns.
5. **Development of Safety Recommendations:** Propose comprehensive safety solutions tailored to each location.
6. **Implementation and Monitoring:** Implement approved measures and monitor for effectiveness.
7. **Continuous Improvement:** Learn from audits and crash data to drive ongoing strategy adjustments.

4.3.5 Road Diets

A road diet is a reduction in the number of lanes on a roadway. Also called a four-lane to three-lane roadway conversion, these treatments reallocate space to calm traffic (Figure 238). The conversion reduces the amount of conflict points on a roadway. It can provide additional space for active transportation, medians, or other buffer areas that create a safer environment for all road users. Road diets are highly effective for VRU safety. The data analysis of this study shows that four-lane roads are approximately 40 times more likely to have a severe KA crash than a two-lane road in the state.

Figure 238: Before and After Road Diet (Source: FHWA)

A recent example of a road diet in Kansas is the Mt. Vernon Bike Lane project (Figure 239). The project spans Oliver and Woodlawn and sets an example for road diets in Wichita. The reconfiguration established dedicated bicycle lanes, reduced traffic speed, and lowered crash risk on this 1-mile stretch. Previously, the over-built four-lane road encouraged speeding; the new design with three traffic lanes added dedicated bicycle lanes on each side to improve traffic flow and safety, defying the conventional notion that four-lane roads are more efficient.

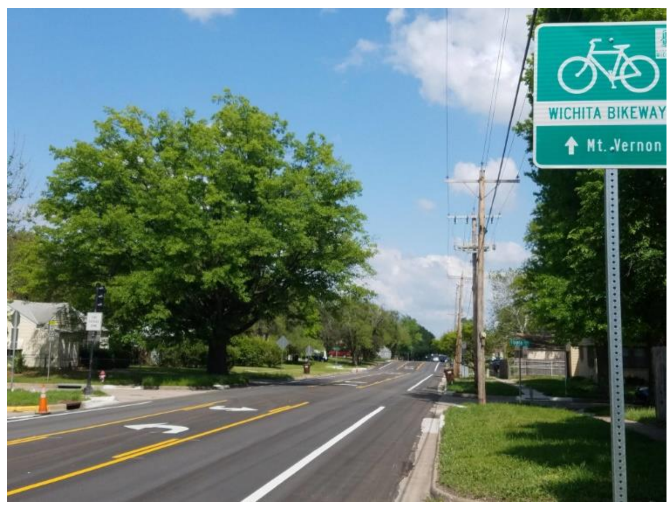


Figure 239: Mt. Vernon Road Diet Wichita

5. Conclusion

This document serves as a technical resource to the KDOT Vulnerable Road Users Safety Assessment. This is a living document; in future updates, the data analysis methodology can be replicated and expanded upon as new data becomes available. The engagement process should continue to expand to incorporate key stakeholders considering a variety of methods, especially those who have been historically disengaged. The review of best practices can help to inform the possible opportunities to develop programs that reduce risk. This will aide future planners and decision makers in crafting policies and programs promoting the safety and mobility of vulnerable road users.