TPB REGIONAL ROADWAY SAFETY STUDY UPDATE - DRAFT

Final Report

TPB Technical Committee
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National Capital Region
Transportation Planning Board

MWCOG REGIONAL ROADWAY SAFETY STUDY
Prepared by X Committee on behalf of Y Committee
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ABOUT THE TPB

The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 24 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

CREDITS

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PROJECT PARTNERS

The project team coordinated regularly with Metropolitan Washington Council of Government (COG) and National Capital Region Transportation Planning Board (TPB) staff throughout the course of the study. The TPB Transportation Safety Subcommittee, the TPB Technical Committee, and the TPB reviewed this document and provided input.

GLOSSARY OF TERMS

Crash Category – Combination of crash types based on common characteristics.
Crash Type – Crashes are defined based on nature of collision. Each crash has a uniques crash type.
Fatal Crash – Crash contributing to at least one fatality.
Fatality – Death within 30 days of the crash.
Focus Area - Involved factors that have a disproportionate impact on crash severity.
Involved Factor – A factor that contributes to a crash. Each crash can have multiple involved factors.
Linear Regression Trendline – Straight line that illustrates the overall direction or pattern of the data represented by a bar chart.
Maryland Automated Crash Reporting System – Maryland law enforcement agencies report crash data to the Department of State Police through the Automated Crash Reporting System (ACRS).
Non-Collision Crash – Crash type that refers to a crash where the primary event causing damage or injury is not a collision between two or more vehicles or a vehicle and a fixed object. Instead, it could involve a single vehicle experiencing an event like an overturn or fire.
Parked Vehicle Crash – Crash type that refers to a crash between a moving vehicle and a vehicle that is stationary (parked).
Ran Off Roadway/Fixed Object Crash – Crash type that refers to a vehicle leaving the paved or designated travel portion of a road, potentially leading to a collision with roadside objects or a rollover.
Safe System Approach – A Safe System Approach prioritizes the elimination of crashes that result in death and serious injuries.
Serious Injury – Disabling or incapacitating injuries that prevents normal activity.
Serious Injury Crash – Crash contributing to at least one serious injury.
Vision Zero – Vision Zero is the idea that no one should die or suffer serious injury in road traffic crashes.
Zero Death Goal – The Zero Death Goal is a transportation safety policy and planning approach that aims to eliminate all traffic-related fatalities on roadways.

ACRONYMS

BMC – Baltimore Metropolitan Council.
BUILD – Better Utilizing Investments to Leverage Development.
COG – Metropolitan Washington Council of Governments.
COVID-19 – Coronavirus Disease 2019.
DDOT – District Department of Transportation.
DOT – Department of Transportation.
FHWA – Federal Highway Administration.
HSIP – Highway Safety Improvement Program.
MARC – Mid-America Regional Council.
MHSO – Maryland Highway Safety Office.
MPO – Metropolitan Planning Organization.
NCR – National Capital Region.
NHTSA – National Highway Traffic Safety Administration.

1

Introduction

1. Introduction

Safety of all modes of transportation has long been a priority of the National Capital Region (NCR). Safety permeates all elements of the regional transportation planning process and is a top concern for member jurisdictions of the National Capital Region Transportation Planning Board (TPB). However, in recent years, crash trends have remained at unacceptable levels above established thresholds which runs counter to the goals and vision of the TPB.

The TPB has undertaken this study to identify the factors involved in fatal and serious injury crashes across the region, and to recommend projects, programs, and policies that could be prioritized to improve safety outcomes. This study is a follow-up to a 2020 TPB study that analyzed crash data from 2013-2017.[1] This study evaluates crash statistics from 2019 to 2023. Although 2018 data is included at a high level, the detailed analysis was for the 2019–2023 period for several reasons: (a) using a five-year analysis timeframe ensures consistency with the previous study and makes comparisons simpler; (b) this study window incorporates the latest available data (2023); and (c) this study window captures the return to normal data post-pandemic by including 2023 data.

1.1 STUDY PURPOSE

The purpose of this safety study is to understand the factors contributing to fatal and serious injury crashes across the region, to uncover deeper understanding of these trends from a quantitative and qualitative perspective, and to provide recommendations to significantly improve safety for users of the regional transportation network. The study approach was tailored to this purpose as follows:

1. **Conduct quantitative crash data analysis to identify safety trends by:**
    - Understanding the region's safety profile (i.e., regional roadway safety performance, trends, crash characteristics, and involved factors).
    - Providing insights into the nature, frequency, and location of fatal and serious injury crashes.

2. **Conduct qualitative analysis to provide a more complete understanding of safety issues by:**
    - Conducting a literature review of safety research and analysis in the region and beyond.
    - Administering a jurisdictional questionnaire of staff involved in traffic safety practices throughout the region and evaluating their responses.

3. **Provide recommendations to improve road safety by:**
    - Providing an evaluation of crash-related focus areas (characteristics, frequency, and involved factors).
    - Reviewing the safety countermeasures and strategies included in TPB Resolution R3-2021 and suggesting updates.

[1] https://www.mwcog.org/transportation/planning-areas/management-operations-and-safety/roadway-safety/.

1.2 STUDY APPROACH

As shown on **Figure 1**, the study approach is comprised of five main steps, including collecting and analyzing road safety data from 2019 to 2023 to develop safety profiles for the COG region, conducting a literature review to identify systemic involved factors in roadway crashes and to identify best practices from member jurisdictions, administering a member jurisdiction questionnaire to identify traffic safety challenges, trends, and ongoing efforts, identifying recommendations, and drafting and publishing the final report.

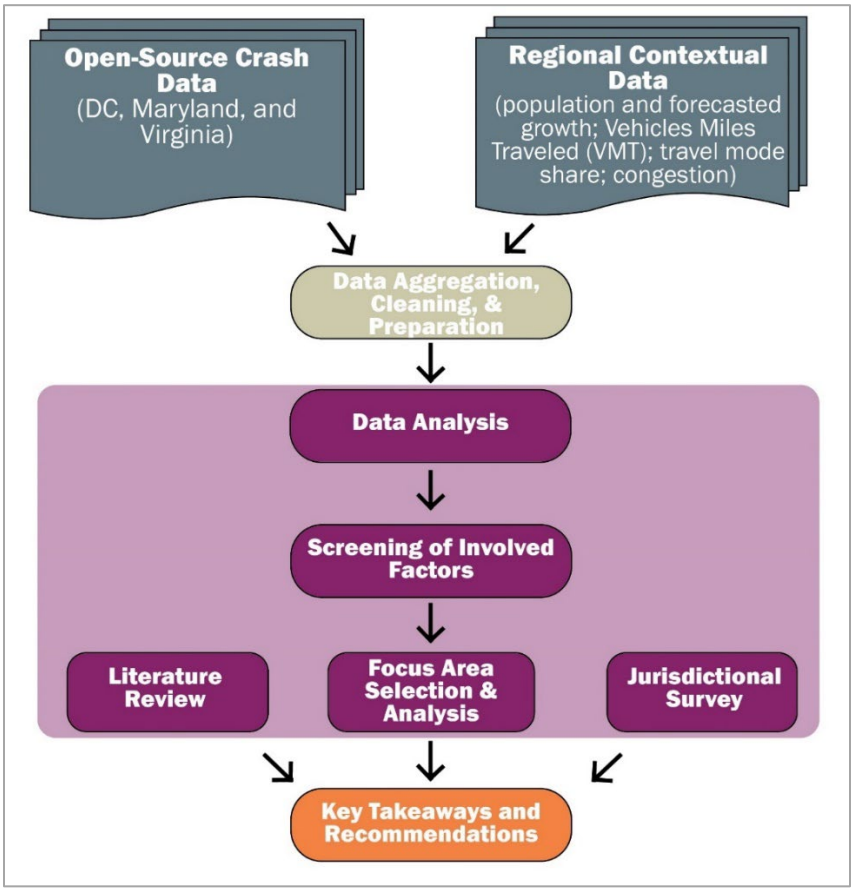


Figure 1: Roadway Safety Study Methodology

DATA AGGREGATION, DATA CLEANING & PREPARATION

- The timeframe for the crash data analysis is from the beginning of 2019 to the end of 2023. The study relies on crash data as well as demographic and economic data to understand the context within which crashes occur. **Table 1** shows the data sources used in the analysis for this report.
- The team developed safety profiles and identified involved factors and areas of safety concern.
- To account for differences in the way crashes are reported at the jurisdictional level, data harmonization was necessary to ensure regional consistency. This involved ensuring consistent verbiage related to crash types and involved road users across jurisdictions for proper aggregation of data throughout the region.

Table 1: Data Sources

DATA	SOURCES AND LINKS
VEHICLE MILES TRAVELED (VMT)	DATA RECEIVED FROM COG STAFF (2013-2023).
POPULATION	2019-2023 AMERICAN COMMUNITY SURVEY 5-YEAR ESTIMATES: TABLE DP05 – ACS DEMOGRAPHIC AND HOUSING ESTIMATES.
PER CAPITA PERSONAL INCOME	BUREAU OF ECONOMIC ANALYSIS, CAINC1 COUNTY AND MSA PERSONAL INCOME, POPULATION, PER CAPITA PERSONAL INCOME 2017—2023. LAST UPDATED: NOVEMBER 14, 2024.
EMPLOYMENT	BUREAU OF LABOR STATISTICS, QUARTERLY CENSUS OF EMPLOYMENT & WAGES—QCEW. DATA EXTRACTED: FEBRUARY 12, 2025.
EQUITY EMPHASIS AREAS	EXPORTED FROM: MWCOG OPEN DATA. LAST UPDATED: MAY 30, 2025.
DISTRICT OF COLUMBIA CRASH DATA	RECEIVED 2019-2023 DATA FROM DISTRICT DEPARTMENT OF TRANSPORTATION (DDOT) ON MAY 20, 2024, AND JULY 17, 2024. UPDATES FOR 2023 DATA WERE EXTRACTING IN MAY 2025 USING: DC OPEN DATA.
VIRGINIA CRASH DATA	EXPORTED 2019 TO 2023 FROM: VDOT CRASH ANALYSIS TOOL.
MARYLAND CRASH DATA	EXPORTED 2019-2023 DATA FROM: MD AUTOMATED CRASH REPORTING SYSTEM.

LITERATURE REVIEW

- The literature review identified and analyzed systemic involved factors such as unemployment, land use, legislation, vehicle size, population growth, and investment in non-automobile transportation modes.
- The team incorporated lessons learned from successful frameworks (such as Safe System Approach) and best practices in developing recommendations and identifying next steps to improve regional road safety.

JURISDICTIONAL QUESTIONNAIRE

- The team administered a jurisdictional questionnaire to gather perspectives of staff at TPB member jurisdictions to complement quantitative data analysis. The questionnaire responses provided insights into several topics including local traffic safety challenges and trends, as well as ongoing efforts to improve safety.

FOCUS AREA SELECTION & ANALYSIS

- The team integrated qualitative information from the literature review and jurisdictional survey with quantitative data looking at safety profiles and involved factors to identify focus areas for improvement. The different involved factors included behavioral factors (such as distracted driving, impaired driving, speeding, not wearing a seatbelt), driver age (such as

young and old drivers), and vulnerable road users (such as pedestrians or bicyclists hit by a vehicle), among others.

RECOMMENDATIONS AND NEXT STEPS

- The team suggested updates to the safety countermeasures identified in TPB Resolution R3-2021 and developed recommendations for member jurisdictions to improve road safety regionally.

1.3 ONGOING TPB SAFETY EFFORTS

The National Capital Region Transportation Planning Board (TPB) has long acknowledged roadway safety as an essential element of the region's livability and is committed to improving road safety across the region. The TPB safety planning program helps to advance roadway safety in the region by highlighting it as a policy priority and providing resources to support the safety efforts of member jurisdictions.

In addition to convening local safety experts through its Transportation Safety Subcommittee, setting annual highway safety targets, and sponsoring the Street Smart safety education campaign, the TPB has increased efforts in recent years to address roadway safety. In 2021, the TPB adopted Safety Resolution R3-2021, to establish a regional roadway safety policy. The policy urges member jurisdictions to reaffirm road safety as a top priority and to prioritize the implementation of projects, programs, and policies that strive to reduce the number of fatal and serious injury crashes on the region's roads. The resolution provides a set of specific actions that can be taken by jurisdictions to improve road safety and establishes a technical assistance program for local roadway safety projects, the Regional Roadway Safety Program.

In 2024, TPB held a Regional Roadway Safety Summit to explore transportation safety issues affecting the region and offer a forum to discuss a comprehensive approach to lower traffic-related injuries and fatalities in our communities.

This study seeks to build upon these efforts by analyzing and sharing crash data to identify recommended actions for the future.

2

Setting the Context: Regional Trends

2. Setting the Context: Regional Trends

Crashes are not random - they result from a system of intersecting influences, including demographic shifts, travel behavior, economic activity, land use, and roadway design. Understanding some of these systemic factors helps ensure that safety solutions are preventative, not just reactive.

This section provides some context for the regional safety profile by showing regional trends that influence roadway safety. This context is important to better understand the crash analysis discussed in subsequent chapters.

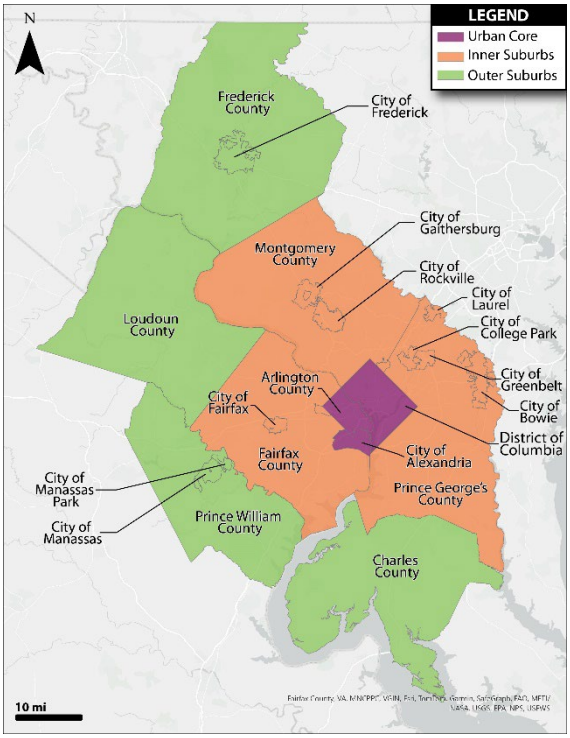


Figure 2: MWCOG TPB Region Zones

2.1 THE TRANSPORTATION PLANNING BOARD (TPB) REGION

The National Capital Region Transportation Planning Board (TPB) is the federally designated Metropolitan Planning Organization (MPO) for the region and plays an important role as the regional forum for transportation planning. The TPB prepares transportation plans and programs to ensure that federal transportation funds flow to the Washington region.

The TPB region is comprised of the District of Columbia and select jurisdictions in suburban Maryland and Northern Virginia. The region is divided into three subregions: Urban Core, Inner Suburbs, and Outer Suburbs (**Figure 2**) and 20 jurisdictions (**Table 2**).

Table 2: TPB Region Zones

URBAN CORE	INNER SUBURBS	OUTER SUBURBS
DISTRICT OF COLUMBIA	MONTGOMERY COUNTY	CHARLES COUNTY
ARLINGTON COUNTY	PRINCE GEORGE'S COUNTY	FREDERICK COUNTY
CITY OF ALEXANDRIA	FAIRFAX COUNTY	LOUDOUN COUNTY
	CITY OF FAIRFAX	PRINCE WILLIAM COUNTY
	CITY OF FALLS CHURCH	CITY OF MANASSAS
	CITY OF ROCKVILLE	CITY OF MANASSAS PARK
	CITY OF GAITHERSBURG	CITY OF FREDERICK
	CITY OF BOWIE	
	CITY OF LAUREL	
	CITY OF COLLEGE PARK	

2.2 POPULATION AND ECONOMIC GROWTH

Population, income, and employment have an impact on the level of activity on a region's transportation system. The level of activity can be a proxy for an individual's potential exposure to crash risk and impacts of transportation safety. Reviewing and understanding these overall regional trends provides context for the crash information in the subsequent sections of this report.

Overall, the population in the TPB region has increased (2.9 percent) from 2019 to 2023. Most of the growth was seen in the Outer Suburbs (Charles and Frederick Counties in Maryland and Loudoun and Prince William Counties in Virginia). The Inner Suburbs experienced modest growth, while the population in the Urban Core decreased. See **Appendix A** for details on population growth by jurisdiction from 2019, and **Figure 3** for overall population growth since 2013.

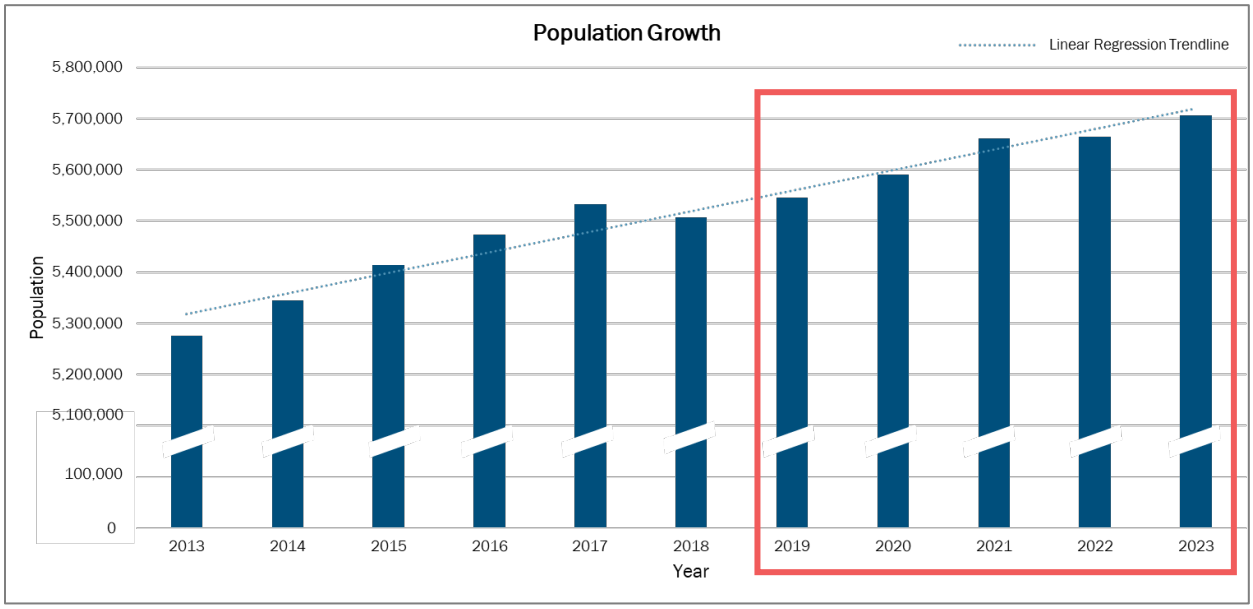


Figure 3: Overall Population Growth in the TPB Region, 2013-2023
[**Source**: 2019-2023 American Community Survey 5-Year Estimates: Table DP05 – ACS Demographic and Housing Estimates.]

Per capita income exerts a strong influence on travel behavior (the amount and mode of travel). It impacts the level of participation in outside activities (working, shopping, conducting personal business, recreation, etc.), which is the underlying source of the demand for travel. Per capita income also impacts access to personal vehicles, which may impact the mode of travel (non-motorized, transit, personal vehicle or shared ride).[2] **Figure 4** shows per capita personal income in the COG region from 2013 to 2023, showing a progressive year-over-year increase.

[2] https://www.fhwa.dot.gov/policyinformation/tables/vmt/vmt_model_dev.cfm#doc514670596.

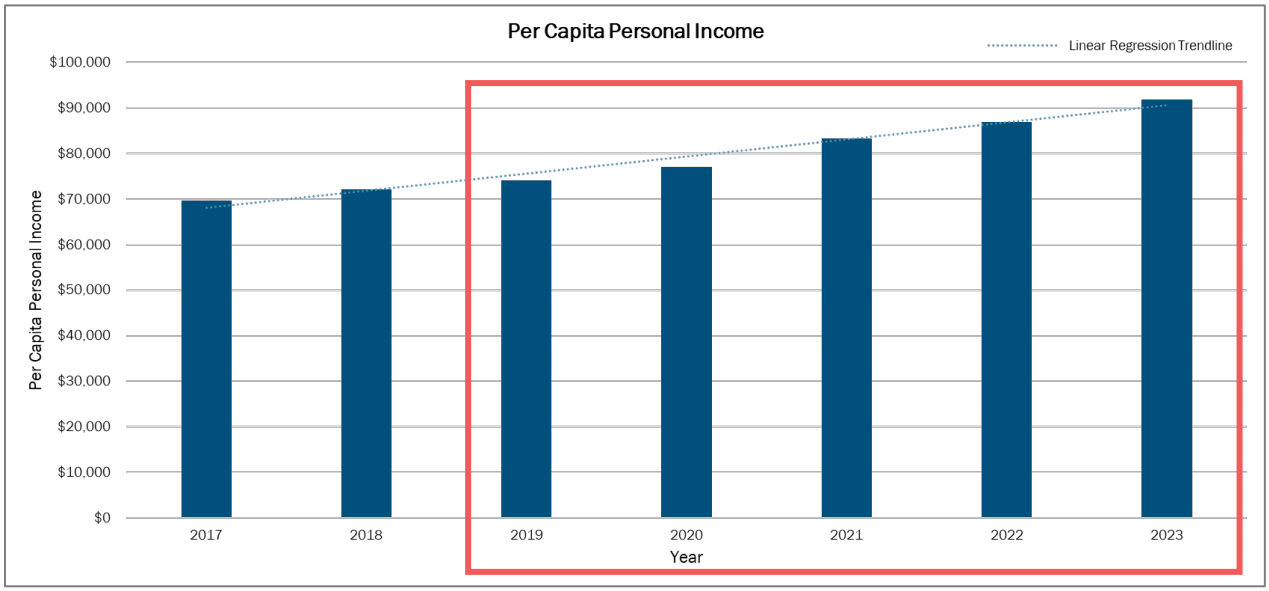


Figure 4: Per Capita Personal Income in the COG Region, 2017-2023
[**Source**: Bureau of Economic Analysis, CAINC1 County and MSA Personal Income, Population, Per Capita Personal Income 2017—2023, Last updated: November 14, 2024.]

Figure 5 shows the number of employees in the COG region from 2013 to 2023, reflecting growth until the COVID-19 pandemic. In 2023, total job numbers seem to be returning to pre-pandemic levels. Employment is another proxy for travel demand. Employment centers are major travel destinations; consequently, employment is a primary input to any travel demand estimation process.[3]

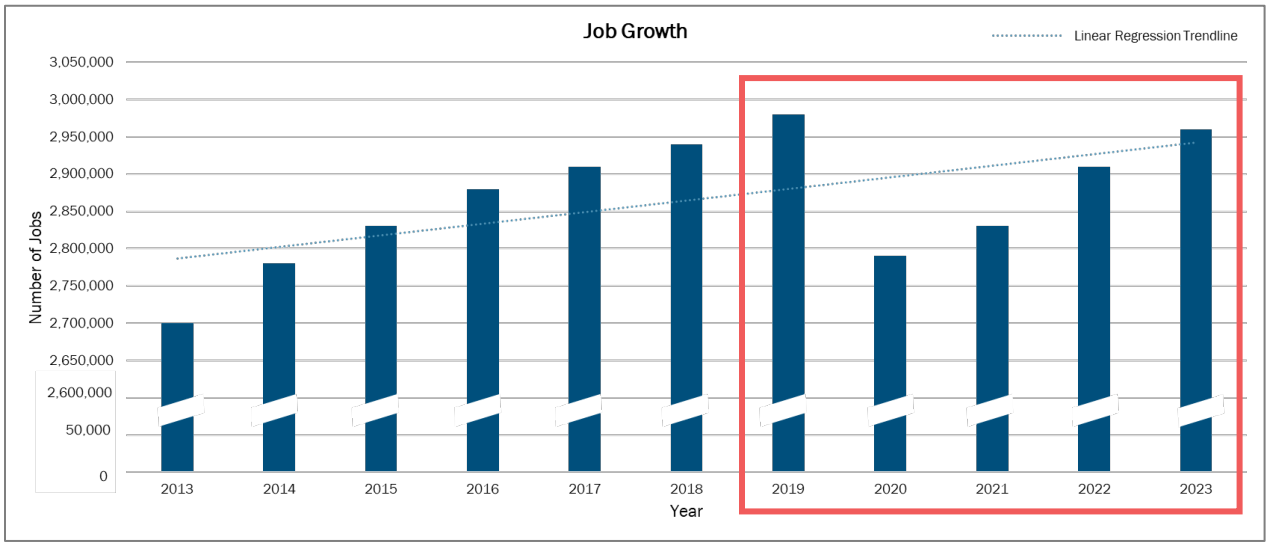


Figure 5: Jobs in the COG Region, 2013-2023
[**Source**: Bureau of Labor Statistics, Quarterly Census of Employment & Wages—QCEW, All Employees in Total Covered Total, All establishment sizes, All Employees, Data extracted on: February 12, 2025.]

[3] https://www.mwcog.org/transportation/data-and-tools/modeling/inputs-outputs/.

2.3 AVERAGE WEEKDAY VEHICLE MILES TRAVELED (VMT)

VMT is a measure of travel activity. There is a strong positive correlation between VMT and traffic crashes. Essentially, if all other factors remain the same, as the amount of driving (VMT) increases, the number of crashes also tends to increase. This is because increased driving means more exposure to potential accidents. Overall, VMT across the region fell by three percent from 2019 to 2023, which may be a result of the substantial COVID-19 pandemic-related reduction in activity seen in 2020 and 2021.

As seen in **Appendix B**, the highest average VMT in the TPB region is in suburban Maryland. However, suburban Maryland, Northern Virginia and the District of Columbia all experienced a decrease in VMT. On average, DC had the largest decrease in VMT, at nearly six percent over the five-year period of analysis. Significant changes can be observed across the counties starting 2020. Factors such as the initial travel restrictions at the onset of COVID in 2020, growth in work-from-home policies, and a shift to multimodal commuting patterns could be responsible for this change in travel behavior.

Figure 6 shows the overall average weekday VMT since 2013. Despite significant population growth and income increases throughout the region, VMT levels have remained stable overall. This may be related to increased multi-modal transportation options such as public transit and active transportation throughout the region.

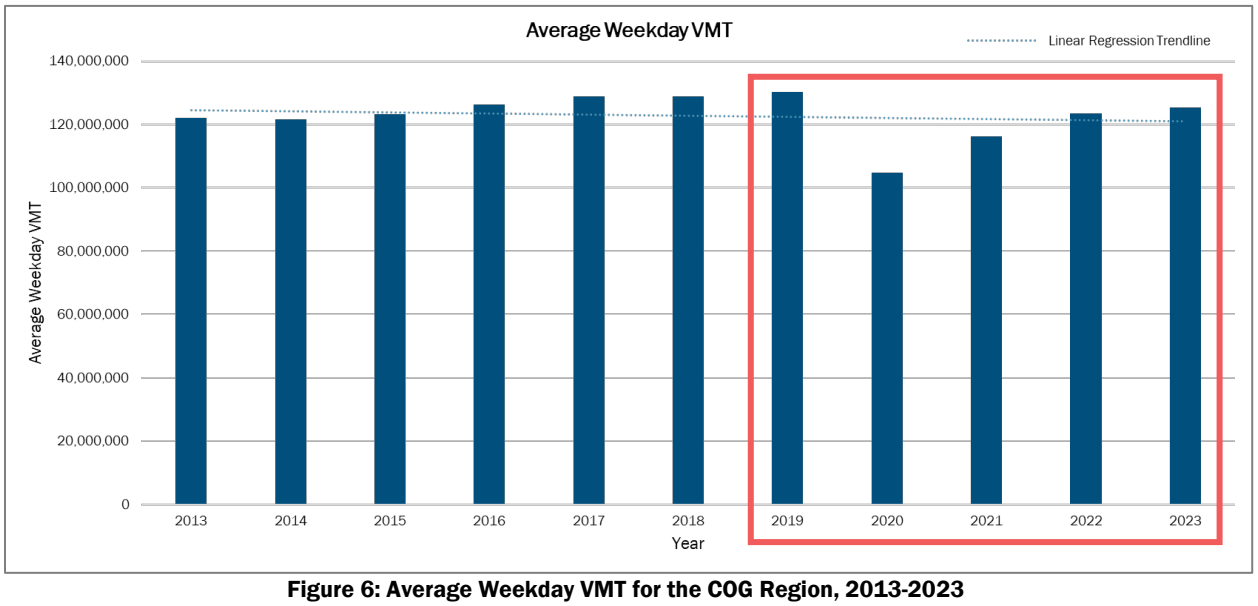


Figure 6: Average Weekday VMT for the COG Region, 2013-2023
[**Source**: Metropolitan Washington Council of Governments (MWCOG), 2013-2023]

2.4 TRAVEL MODE SHARE AND ACTIVE TRANSPORTATION

The TPB's once-in-a-decade Regional Travel Survey (RTS) helps paint a detailed picture of residents' daily travel patterns. Conducted approximately every ten years since 1968, the survey collects demographic and travel information from a randomly selected representative sample of households in the region and adjacent areas.

The 2017/2018 travel survey shows an increase in bicycle commute trips (from 1.1 percent to 2.5 percent) and walking trips (2.7 percent to 3.8 percent) throughout the region. There were significant increases in bus transit, rail transit, and taxi/ride-hail commute trips in the region, while vehicle trips decreased (**Table 3**). **This shift towards multimodal travel is most pronounced in the Urban Core.** While the travel survey was last updated before the study period, additional evidence (such as the Capital Bikeshare data discussed below) suggests that these trends continued or have even increased from 2019 through 2023. **Increased use of transit, which itself increases pedestrian exposure, along with an increase in non-motorized modes of travel leading to higher levels of pedestrian activity, thereby increasing exposure to potential crashes.**

Table 3: Change in Mode Share of Commute Trips by Region and Zone (%)

MODE	TPB REGION 07/08	TPB REGION 17/18	CORE 07/08	CORE 17/18	INNER SUBURB 07/08	INNER SUBURB 17/18	OUTER SUBURB 07/08	OUTER SUBURB 17/18
DRIVE ALONE	66.7	64.9	46.9	34.6	69.1	70.1	78.3	82.3
DRIVER WITH OTHERS	11.4	7.4	7.8	4.1	11.9	7.4	13.2	11
RAIL TRANSIT	14.2	15.5	25	29.8	13.9	14.6	4.9	3.2
BUS TRANSIT	3.3	4.3	7.7	9.1	2.4	3.2	1.7	2.2
WALK	**2.7**	**3.8**	**8.5**	**10.8**	**1.3**	**2.3**	**1**	**0.5**
BICYCLE	**1.1**	**2.5**	**2.9**	**7.6**	**0.8**	**1.3**	**0.3**	**0.4**
TAXI/RIDE-HAIL	0.3	1.3	0.7	3.4	0.3	1	0	0.1
OTHER	0.4	0.3	0.5	0.7	0.2	0.2	0.7	0.2

[**Source**: Metropolitan Washington Council of Governments, Regional Travel Survey]

Capital Bikeshare is metropolitan DC's bikeshare service, offering more than 5,000 bikes and 600 stations across seven jurisdictions in the COG region. Bikeshare is an integral part of the region's bike infrastructure network and plays an important role in increasing access to active transportation. **Figure 7** shows an overall increase in Capital Bikeshare ridership across the region, apart from a significant decrease in 2020 due to the COVID-19 pandemic.[4] Ridership levels have returned to pre-pandemic levels, with the highest ridership numbers occurring in 2023.

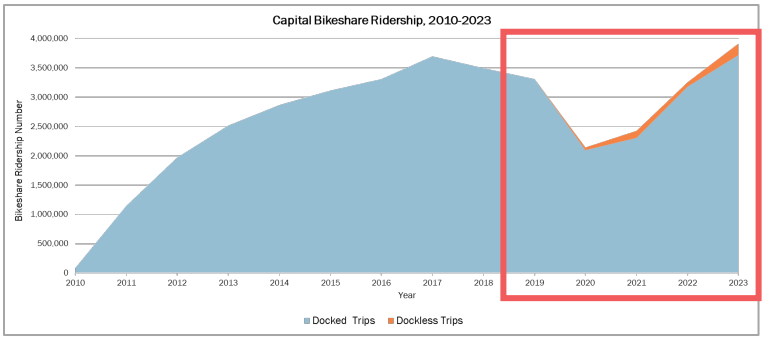


Figure 7: Capital Bikeshare Ridership, 2010-2023

[**Source**: Bureau of Transportation Statistics (BTS), Bikeshare and E-Scooter Systems in the U.S.]

[4] https://data.bts.gov/stories/s/Bikeshare-and-e-scooters-in-the-U-S-/fwcs-jprj/#:~:text=As%20of%20June%2030%2C%202024,number%20of%20stations%20to%208%2C838.

2.5 CONGESTION

The analysis of regional congestion trends from 2010 to 2023 highlights substantial fluctuations in traffic congestion, notably influenced by the COVID-19 pandemic. The congestion intensity, as measured by the Travel Time Index (TTI) from a traveler's perspective, decreased during the pandemic and reached a historic low TTI of 1.17 in 2020.

TTI quantifies the impact of congestion on travel time and is calculated by dividing the average travel time during the peak period by the free-flow travel time. For example, in 2023 the COG region had a TTI of just above 1.3 for interstates, which means that travel speeds on interstates are 30 percent slower than free flow.

Although the TTI rebounded in 2023, it remained below pre-pandemic levels. As shown in **Figure 8**, Interstates exhibit higher TTI values than other road types, emphasizing the need for effective traffic management. **Lower levels of congestion may increase a driver's propensity for speeding.**

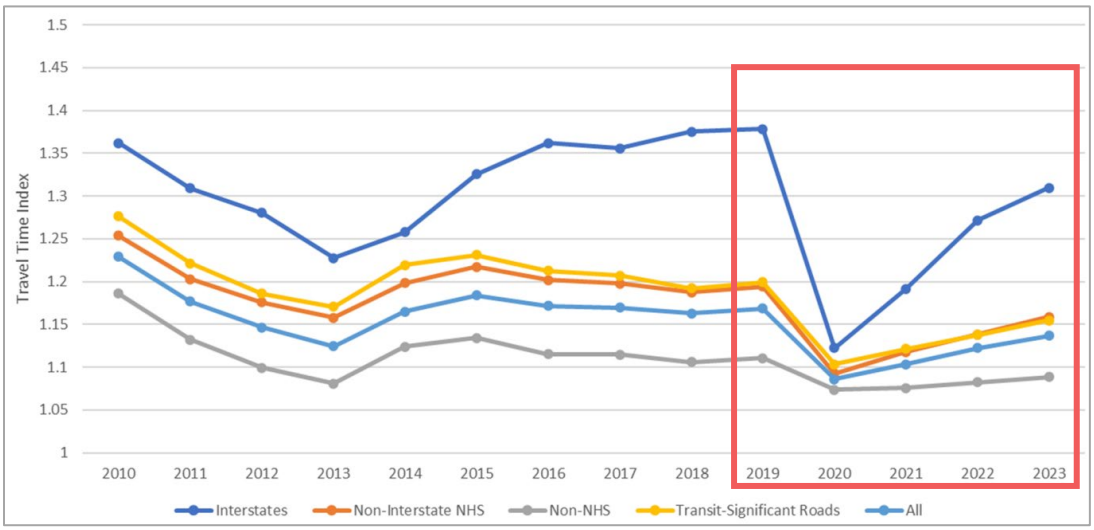


Figure 8: Annual Average Travel Time Index by Highway Category - Total AM and PM Peaks, 2010-2023
[**Source**: Metropolitan Washington Council of Governments (MWCOG), Congestion Management Process (CMP) Technical Report]

2.6 COOPERATIVE FORECASTS: EMPLOYMENT, POPULATION, AND HOUSEHOLD FORECASTS

Long-range forecasts provide the data necessary for analyzing the effects of growth, developing policy responses to regional issues, ensuring air quality conformity of transportation plans, and determining the demand for public facilities. COG provides regularly updated population, household, and employment forecasts for use in its planning and modeling activities as well as by the TPB and other state, regional, and local agencies. The latest forecast was published in 2023, as seen in **Figure 9**. The forecasts indicate approximately 25 percent growth in population and over 30 percent growth in employment and households between 2020 to 2050. As discussed before, these three factors are the principal drivers of travel demand. Therefore, the region is expected to experience a corresponding increase in VMT leading to increased crash exposure and must proactively address roadway safety to meet the safety challenges.

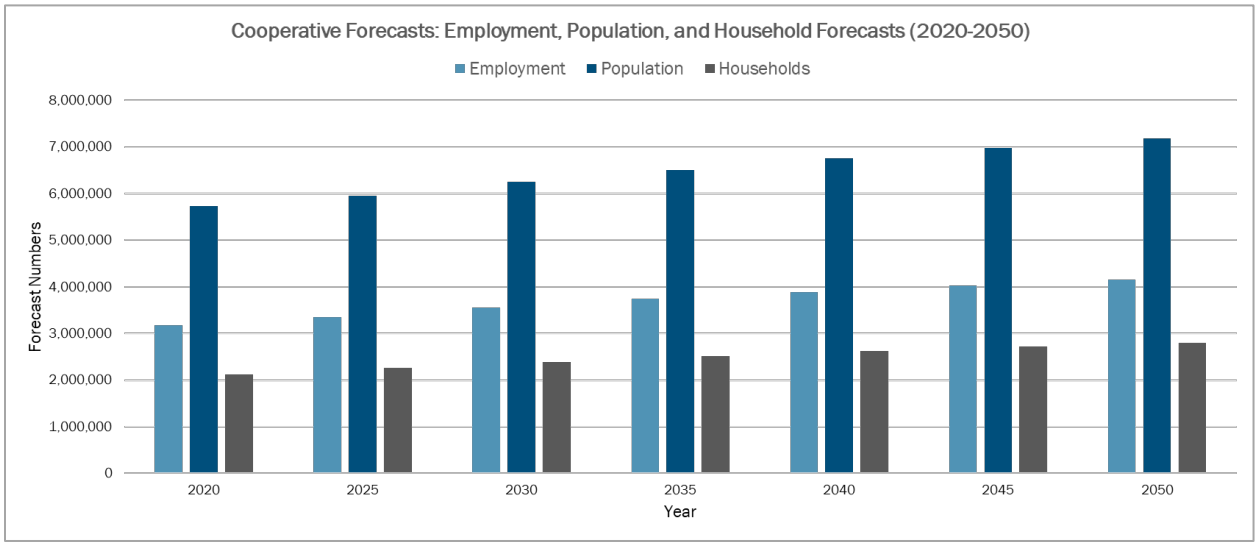


Figure 9: Employment, Population, and Household Forecasts in the COG Region, 2020-2050
[**Source**: Metropolitan Washington Council of Governments (MWCOG), Cooperative Forecast]

The forecasted data is consistent with past trends. The region has grown and is expected to continue growing, spurring further transportation demand. TPB member jurisdictions must continue to "*think regionally, act locally*" to develop innovative approaches to improving safety for all modes.

2.7 REGIONAL TRENDS SUMMARY

Regional population, economic, and transportation trends between 2019 and 2023 increased the exposure for vulnerable road users to crashes on the region's roads. Some key findings from the regional analysis include:

Population and economic growth are driving transportation demand:

- The TPB region saw a 2.9 percent population increase from 2019-2023, led by rapid growth in the Outer Suburbs (e.g., Charles, Frederick, Loudoun, Prince William Counties).
- Although personal income increased steadily, employment dropped significantly in 2020 due to COVID. It has since begun to rebound but remains below 2019 levels.
- Future planning should account for continued growth through 2050 as the population is projected to exceed seven million, increasing pressure on multimodal networks and safety systems.

Vehicles Miles Traveled (VMT) decreased, then rebounded:

- VMT dropped 4.1 percent from 2019-2023, most likely due to the pandemic. This reduction was seen most acutely in the District of Columbia, which saw a nearly six percent decrease.
- By 2023, VMT is trending back to pre-pandemic levels, particularly in suburban Maryland and Northern Virginia.

Active and multimodal transportation has increased in the region:

- Walking, biking, and transit trips have all increased (based on 2017/2018 data), especially in the Urban Core. Commuting by bicycle rose from 1.1 percent to 2.5 percent; commuting by foot increased from 2.7 percent to 3.8 percent; and commuting by car alone dropped regionally but increased in the Outer Suburbs, perhaps reflecting a growing automobile dependency in peripheral areas of the region.
- Capital Bikeshare usage rebounded post-pandemic, with 2023 marking the highest ridership ever. This suggests an increased demand for bicycle infrastructure.
- These shifts expand exposure for vulnerable road users and heighten the need for safer pedestrian and bicycle infrastructure, particularly where volumes have increased but safe infrastructure may not have.

Congestion patterns have shifted, perhaps enabling risky driving:

- The region experienced a historic low in congestion in 2020 due to the pandemic.
- Lower congestion can create a false sense of safety and increased speeding, especially in suburban areas with wide arterial roads.

3

Literature Review

3. Literature Review

The study team conducted a literature review to provide insights into fatal and severe crashes and their underlying causal factors, including by learning from leading communities in transportation safety. The following elements were included in the review:

- Non-infrastructure crash factors correlated with severe crashes.
- Regional safety initiatives practiced by peer metropolitan planning organizations (MPOs) and other cities.
- The importance of coordinating transportation safety goals and data collection.
- Strategic approaches to safety messaging.

It also highlighted best practices and lessons learned from cities and metropolitan planning organizations (MPOs) that have successfully employed Vision Zero and carried out extensive collaboration efforts with stakeholders. **Table 4** shows a summary of the peer jurisdictions reviewed.

Table 4: Summary of Peer Jurisdictions Reviewed

PEER JURISDICTION	TOPIC	LINKS
MARICOPA ASSOCIATION OF GOVERNMENTS (MAG), PHEONIX, ARIZONA	DATA ANALYSIS	• PEDESTRIAN SAFETY FORUM • MAG STRATEGIC TRANSPORTATION SAFETY PLAN 2020-2030 • MAG REGIONAL BICYCLE SAFETY ANALYSIS GUIDANCE DOCUMENT
EAST-WEST GATEWAY COUNCIL OF GOVERNMENTS (EWCOG), ST. LOUIS, MISSOURI	COMMUNITY ENGAGEMENT	• PUBLIC INVOLVEMENT PLAN • PUBLIC INVOLVEMENT PLAN ADVISORY COMMITTEE
NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY (NJTPA), NEW JERSEY	EDUCATION AND TECHNICAL ASSISTANCE	• LOCAL SAFETY ACTION PLANS • COMPLETE STREETS TECHNICAL ASSISTANCE PROGRAM • COMPLETE STREETS DEMONSTRATION LIBRARY
SAN DIEGO ASSOCIATION OF GOVERNMENTS (SANDAG), SAN DIEGO, CALIFORNIA	INTERREGIONAL COORDINATION AND COLLABORATION	• SANDAG - BORDERS COMMITTEE • SANDAG – NEIGHBORING COUNTIES • CALIFORNIA/BAJA CALIFORNIA PEDESTRIAN AND BICYCLE TRANSPORTATION ACCESS STUDY • SANDAG - MILITARY • MILITARY MULTIMODAL ACCESS STRATEGY
BALTIMORE METROPOLITAN COUNCIL (BMC)	MPO COLLABORATION OPPORTUNITIES	• CRASH DASHBOARD • IMPROVING MPO AND SHSO COORDINATION ON BEHAVIORAL TRAFFIC SAFETY: GUIDE AND TOOLKIT (2023) – NATIONAL ACADEMIES OF SCIENCES
MID-AMERICA REGIONAL COUNCIL (MARC)	MPO COLLABORATION OPPORTUNITIES	• TOGETHER TOWARD ZERO 2018-2022 – KANSAS CITY REGIONAL TRANSPORTATION SAFETY BLUEPRINT
HOBOKEN, NEW JERSEY	VISION ZERO	• IMPROVING TRAFFIC SAFETY: HOBOKEN, NJ • HOBOKEN ADOPTS VISION ZERO ACTION PLAN FOR SAFER STREETS

PEER JURISDICTION	TOPIC	LINKS
JERSEY CITY, NEW JERSEY	VISION ZERO	• VISION ZERO JERSEY CITY – 2023 ANNUAL REPORT
BOSTON REGION METROPOLITAN PLANNING ORGANIZATION	VISION ZERO	• REVIEW OF VISION ZERO STRATEGIES
ALABAMA DEPARTMENT OF TRANSPORTATION	COORDINATING TRANSPORTATION SAFETY DATA COLLECTION	• CRITICAL ANALYSIS REPORTING ENVIRONMENT (CARE)
OHIO DEPARTMENT OF TRANSPORTATION	COORDINATING TRANSPORTATION SAFETY DATA COLLECTION	• OHIO DOT GEOGRAPHIC CRASH ANALYSIS TOOL (GCAT)

3.1 KEY INSIGHTS

The literature review found that the development of safe transportation systems begins with the implementation of safety frameworks such as the Safe System Approach and Vision Zero. [5][6] One of the common denominators between both frameworks is to build consensus and to develop policies and safety projects that aim to mitigate the severity of crashes by believing crashes, especially fatal ones, are preventable. These frameworks are further supported through coordinated data collection efforts that facilitate efficient and accurate sharing of data between peer agencies, including state Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs), and local governments. Additional support for these efforts can be garnered through thought-provoking and impactful safety campaigns, which can also have measured success through their own performance metrics. Collaboration, education, and innovative policies can advance COG's approach to regional roadway safety and work towards reducing and eliminating crash fatalities.

The following highlight several key insights discussed:

- The Safe System Approach has led to reductions of 50-70 percent in fatal crashes within communities that adopt it.[7]
- Increased vehicle weight correlates with greater risk and severity of pedestrian injury, and recent trends show increases in vehicle horsepower and weight.
- Land use planning can improve traffic safety. For example, minimizing highway access points by limiting driveways can help promote internal parcel access within developments, which reduces the number of conflicts on the roadway network.
- Hoboken, New Jersey, has seen zero traffic-related fatalities since 2017 after implementing their Vision Zero initiative, which lowered speed limits, redesigned streets, and introduced traffic calming strategies.

[5] According to the U.S. Department of Transportation (USDOT), the Safe System Approach is a strategy to address and mitigate the risks of traffic violence by building and reinforcing multiple layers of protection to both prevent crashes from happening in the first place and minimize the harm caused to those involved when crashes do happen. For more information, visit: https://www.transportation.gov/safe-system-approach.

[6] According to the Vision Zero Network, Vizion Zero is a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. For more information, visit: https://visionzeronetwork.org/about/what-is-vision-zero/.

[7] https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-08/fhwasa2018.pdf.

- Jersey City's Action Plan outlines 77 specific actions to eliminate traffic fatalities and severe injuries by 2026, prioritizing improvements in low-income communities that lack resources.
- The Baltimore Metropolitan Council (BMC) and the Maryland Highway Safety Office (MHSO) collaborate to provide policy support at the local level, such as developing safety scoring criteria for transportation projects. This partnership also developed the Look Alive Safety Campaign in 2019 which leveraged social media to address safety for bicyclists and pedestrians in high-priority corridors.
- The Mid-America Regional Council (MARC) established the MARC Destination Safe Coalition to facilitate collaboration between bi-state stakeholders, share, and analyze data to identify common crash factors, and conduct education initiatives and enforcement campaigns.
- Tools such as Alabama Department of Transportation's CARE software and Ohio Department of Transportation's GCAT enhance data sharing and analytical capabilities, supporting evidence-based safety planning.

3.2 LITERATURE REVIEW SUMMARY

- **Safety frameworks such as the Safe System Approach and Vision Zero build consensus and develop policies and projects that aim to mitigate the severity of crashes by understanding that crashes, especially fatal ones, are preventable. Fatal crash reductions were found to be up to 70 percent in communities that adopt such frameworks.**
- **Vehicle size and weight, which are trending up, have a direct impact on the safety of vulnerable non-motorized road users. National Highway Traffic Safety Administration (NHTSA) data shows that as vehicle weight increases, so does the risk and severity of pedestrian injury. Land use planning, like limiting driveway access, can reduce crash risks.**
- **Coordinated data collection efforts facilitate efficient and accurate sharing of data between peer agencies, including state DOTs, MPOs, and local governments. Data coordination tools (such as CARE or GCAT) can improve safety analysis and planning.**
- **Case studies:**
  - **Hoboken, NJ has had zero traffic deaths since 2017 thanks to lower speed limits and traffic calming, among other initiatives.**
  - **Jersey City, NJ implemented an equity-focused plan with 77 actions to eliminate severe crashes by 2026.**
  - **In the Baltimore region, regional campaigns and project scoring tools help support local road safety.**
  - **The MARC coalition in Greater Kansas City is a multi-state collaboration on data, education, and enforcement.**

Overall, the literature review found that collaboration, data, design, and equity are key to reducing crash severity and saving lives.

4

Crash Data Analysis

4. Crash Data Analysis

4.1 OVERVIEW OF CRASH DATA

Although total crashes have decreased and serious injuries have significantly decreased since 2013, trends show that regionwide fatalities are trending upwards.

Figure 10 shows total crashes in the COG region from 2013 to 2023, highlighting an overall decline in crashes despite a resurgence in crashes since 2020. **Figure 11** shows total serious injuries from 2010 to 2023, and **Figure 12** shows total fatalities from 2013 to 2023. **Fatal crashes in the region have been steadily increasing since 2013, though total crashes and serious injury crashes have been steadily decreasing. Similar trends were observed for this study period (2019-2023).**

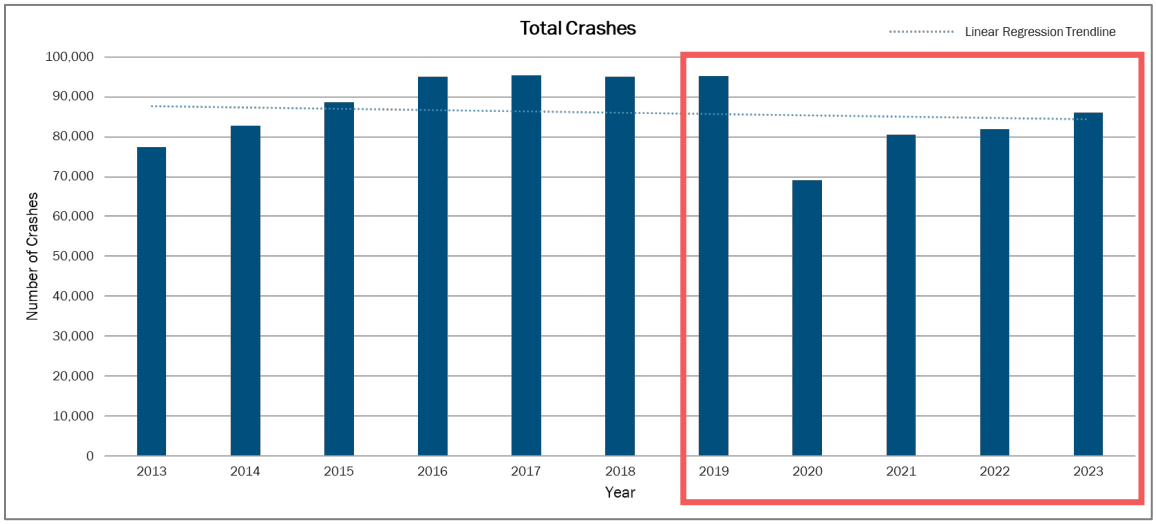


Figure 10: Total Crashes, 2013-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

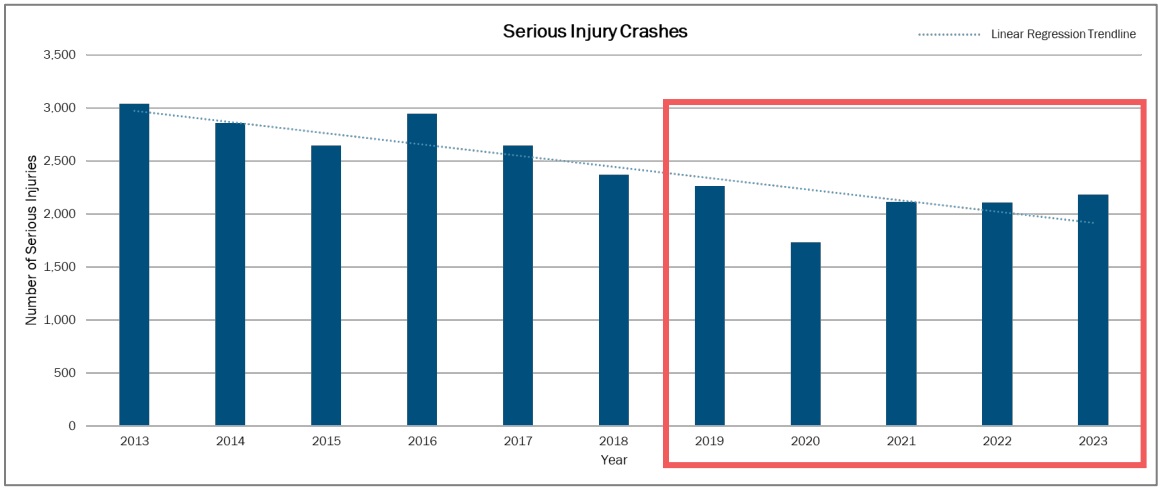


Figure 11: Serious Injuries, 2013-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

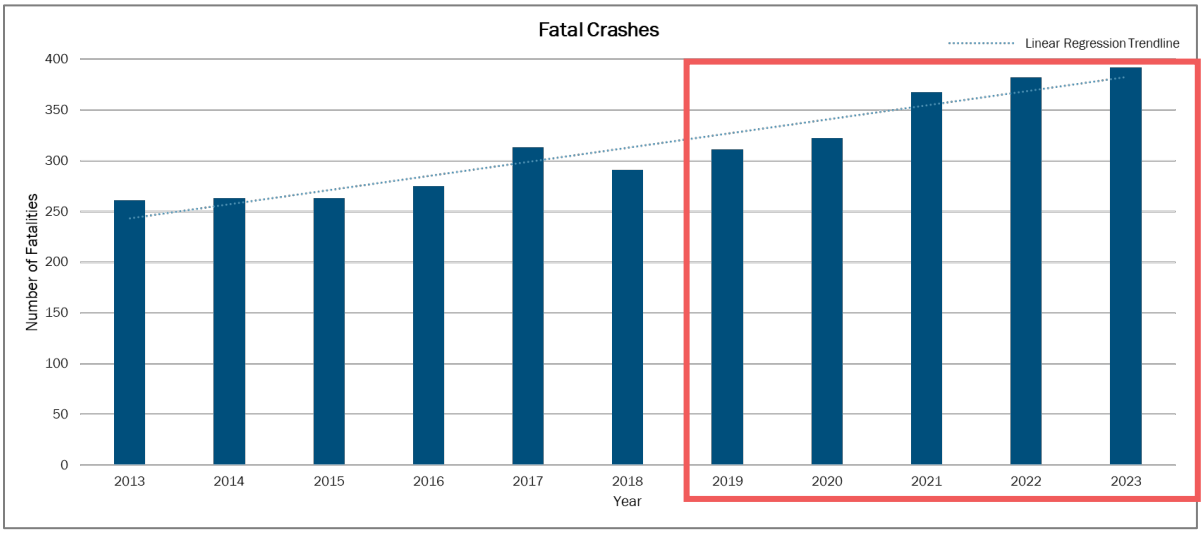


Figure 12: Fatal Crashes, 2013-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Figure 13 shows a comparison of fatalities and serious injuries by VMT between the previous study, conducted between 2013 and 2017, and the current analysis, conducted between 2019 and 2023.[8] The data shows that the fatality rate increased nearly 30 percent across the region, while the serious injury rate decreased 26 percent.

Between 2019–2023, the Inner Suburbs have the highest fatality rate per 100 million VMT (a departure from the previous study period where fatality rates were highest in the outer suburbs). The Urban Core has the highest serious injury rate per 100 million VMT for both study periods.

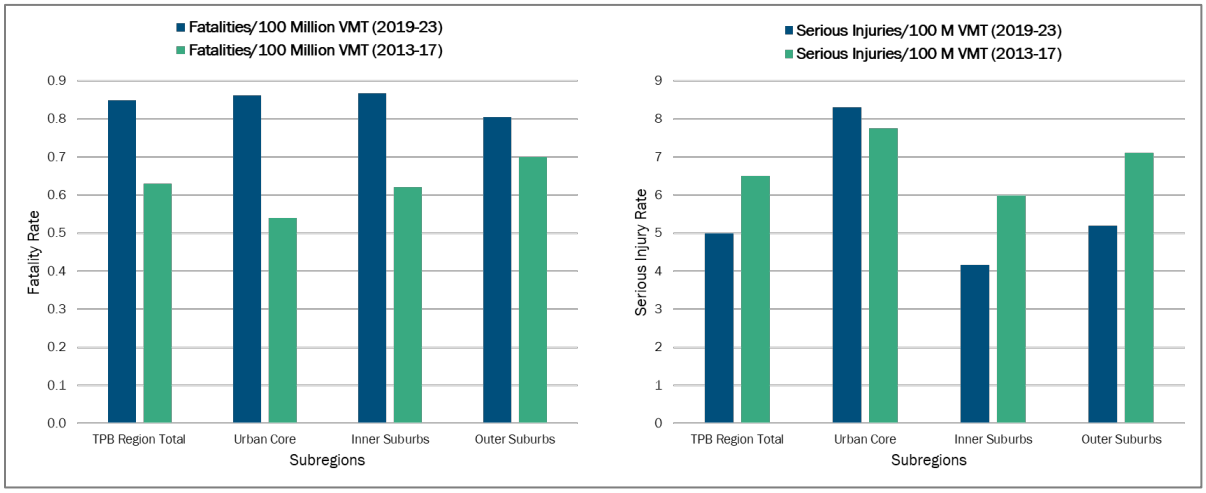


Figure 13: Comparative Analysis of Fatalities (left) and Serious Injuries (right), 2013-2017 and 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

[8] In 2018, the regional fatality rate per 100 Million VMT was 0.67 and the regional serious injury rate per 100 Million VMT was 5.29.

In terms of fatalities and serious injuries normalized by population, the Inner Suburbs have the highest fatality rate per 100,000 people, followed by the Outer Suburbs (6.88 and 6.01, respectively) (**Figure 14**), while the Urban Core has the highest rate of serious injuries.

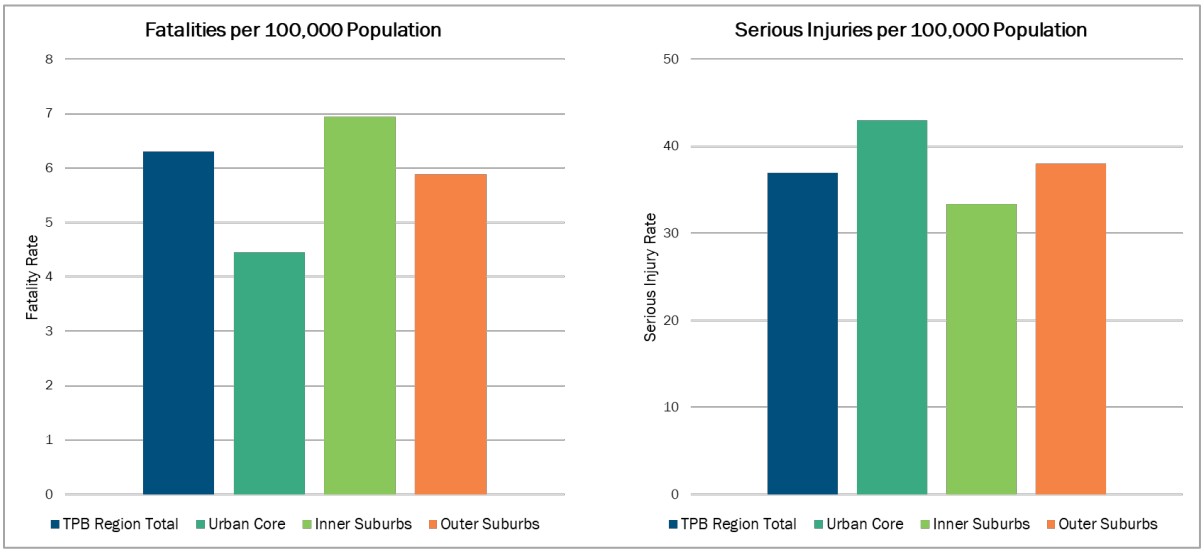


Figure 14: Fatality Rate by 100,000 People (left) and Serious Injury Rate by 100,000 People (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

While VMT and population are standard metrics for normalizing crashes, they do have certain limitations. For example, the daytime population in the District of Columbia nearly doubles during weekdays due to the influx of commuters. Therefore, population may not be an accurate normalizing factor, since it does not capture the exposure caused by the increase in daytime population. VMT is a better measure of exposure in this case. By the same token, VMT is not the best normalizing factor for pedestrian or bike crashes. VMT accounts for the level of vehicular activity but fails to account for the level of pedestrian or bicycle activity.

Figure 15 shows pedestrian fatalities as a percentage of total fatalities, highlighting an **increase over time in the proportion of fatal crashes that involve pedestrians in the COG region**. Particularly, 2022 sees a clear increase in the percentage of crashes that include pedestrians, at 34 percent. However, it is to be noted that the level of pedestrian activity increased regionally during this period, especially in the Urban Core (as discussed earlier in Section 2.4 and shown in Table 3).

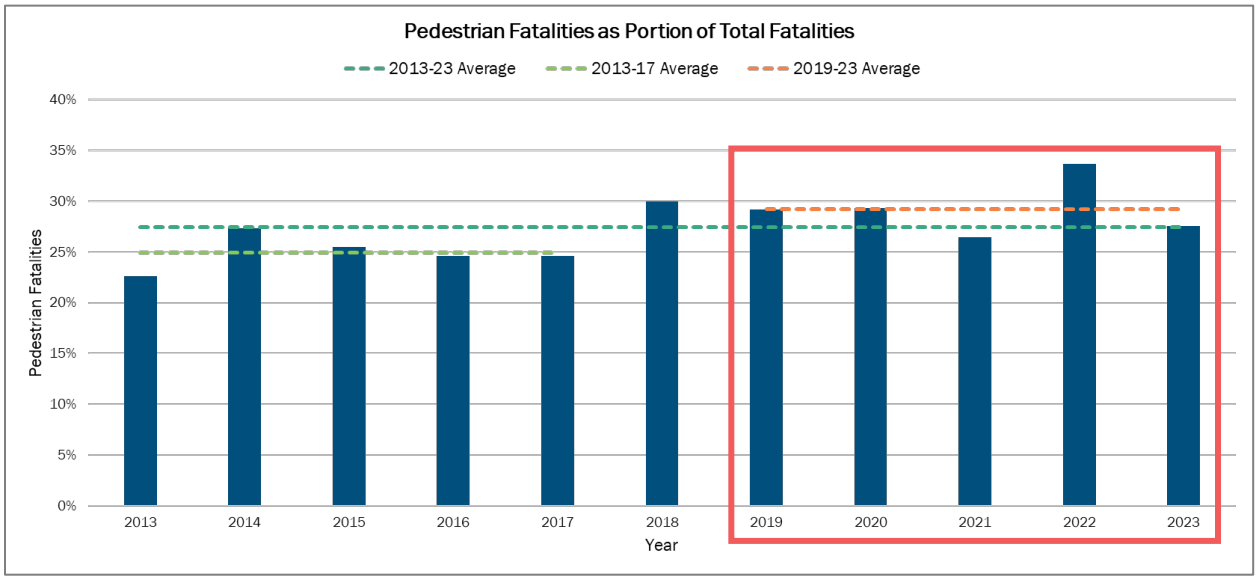


Figure 15: Pedestrian Fatalities as a Percentage of Total Fatalities, 2013-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

4.2 TPB SAFETY TARGETS

The TPB has adopted each year a set of highway safety targets for the National Capital Region (NCR) to reduce fatalities and serious injuries.[9] Currently, **the region is not meeting its stated safety targets.** As shown in **Table 5**, the 2019-2023 average number of fatalities is 33 percent higher than the established target resulting in a fatality rate (per 100 million VMT) of 0.85, which is 38 percent higher than the target. In addition, the 2019-2023 average number of serious injuries is 17 percent higher than the target, leading to a serious injury rate (per 100 million VMT) of 4.98, 29 percent higher than the target rate of 3.73. The number of non-motorist serious injuries and fatalities is also 9 percent higher than the target.

Table 5: NCR Annual Highway Safety Crash Data, 2019-2023

PERFORMANCE MEASURE (5-YEAR ROLLING AVERAGE)	2019-2023 ANNUAL AVERAGE TARGETS	2019-2023 ACTUAL ANNUAL AVERAGE	PERCENTAGE (%) ABOVE/BELOW
NUMBER OF FATALITIES	253	354	+ 33%
FATALITY RATE (PER 100 MILLION VMT)	0.58	0.85	+ 38%
NUMBER OF SERIOUS INJURIES	1,757	2,080	+ 17%

[9] Transportation Planning Board (TPB). Resolution to Adopt Annual Highway Safety Targets for the National Capital Region. 2023.

PERFORMANCE MEASURE (5-YEAR ROLLING AVERAGE)	2019-2023 ANNUAL AVERAGE TARGETS	2019-2023 ACTUAL ANNUAL AVERAGE	PERCENTAGE (%) ABOVE/BELOW
SERIOUS INJURY RATE (PER 100 MILLION VMT)	3.73	4.98	+ 29%
NUMBER OF NON-MOTORIST FATALITIES & SERIOUS INJURIES	487	534	+ 9%

[**Source**: Transportation Planning Board (TPB), Draft Annual Regional Transit and Highway Safety Targets]

4.3 CRASH TYPES

The following section discusses crashes by crash types[10]. A crash type category classifies a crash by the type of collision (i.e., rear end, head on, etc.). **It is important to note that each crash has a unique crash type.**

Table 6 shows crashes in three categories and eleven crash types. "Ran-off roadway" and "pedestrian/bike" crash types account for the highest number of fatalities and serious injuries.

Table 6: Fatalities and Serious Injuries by Crash Type, 2019-2023

CATEGORY	CRASH TYPE	FATALITIES	SERIOUS INJURIES	TOTAL FATALITIES + SERIOUS INJURIES
INTERSECTION/ACCESS MANAGEMENT	ANGLE	196	1,967	**4,473**
	REAR END	124	1,602	
	LEFT TURN	54	530	
	TOTAL	**374**	**4,099**	
LANE MANAGEMENT	RAN OFF ROADWAY/ FIXED OBJECT	540	2,073	**3,970**
	HEAD ON	131	761	
	SIDESWIPED	29	436	
	TOTAL	**700**	**3,270**	
NON-MOTORIST/OTHER	PEDESTRIAN	508	1,621	**3,734**
	BICYCLIST	27	264	
	OTHER/NON-COLLISION	155	1,009	
	BACKING	1	25	
	PARKED VEHICLE	9	115	
	TOTAL	**700**	**3,034**	
TOTAL		**1,774**	**10,403**	**12,177**

[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

[10] Crash types are defined in the glossary.

As shown on **Figure 16**, "lane departure" and "non-motorist" are the categories contributing the highest (40 percent) to fatalities, almost twice as much as the third highest crash type of "intersection and access management," which is the highest crash type for serious injuries (39 percent).

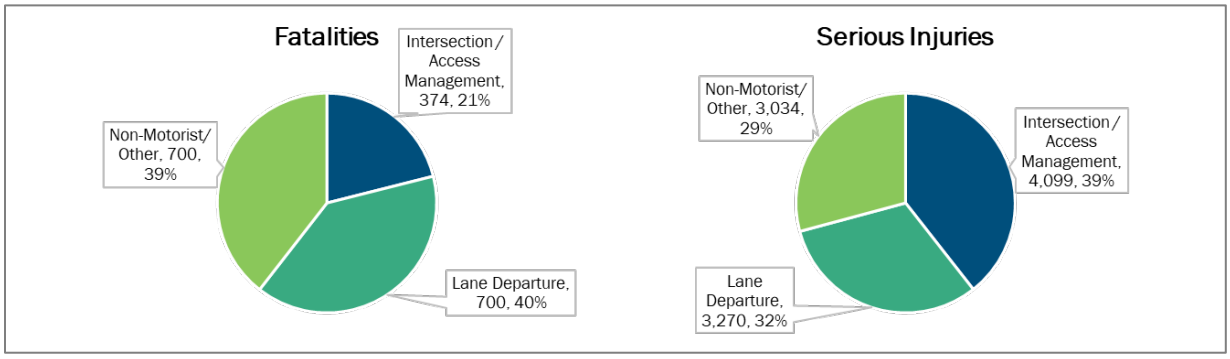


Figure 16: Crash Types as a Percentage of Fatalities (left) and Serious Injuries (Right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

4.4 CRASH DATA BY INVOLVED FACTORS

An involved factor identifies the specific actions, behaviors, or conditions that played a role in contributing to the crash's occurrence and severity. **It is important to note that each crash may have multiple involved factors.**

Figure 17 shows involved factors for fatal and serious injury crashes across the region. Most fatalities and serious injuries in the region included intersection as an involved factor. However, behavioral factors (such as speeding, not wearing a seat belt, distracted driving and impaired driving) contributed to a large percentage of fatalities and serious injuries.

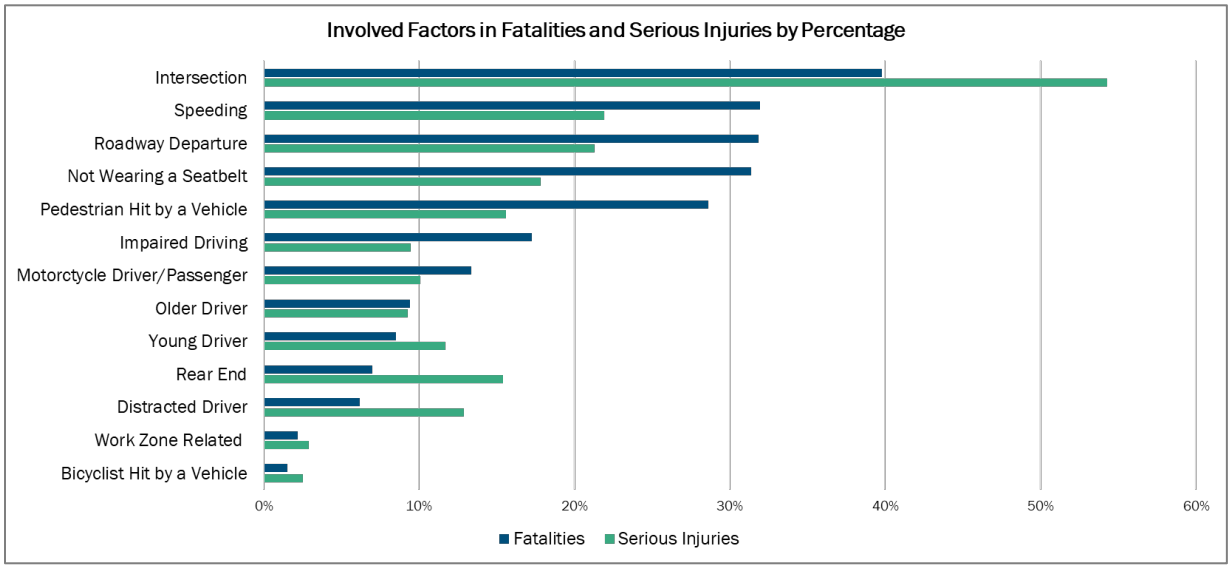


Figure 17: Involved Factors for Fatalities and Serious Injuries, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

4.5 CRASH DATA SUMMARY

Fatal crashes are increasing despite fewer overall crashes and serious injury crashes:

- From 2013 to 2023, total crashes declined, serious injury crashes declined, but fatal crashes rose steadily, a sign that while frequency is down, severity is worsening.
- Possible causes include higher speeds on less congested roads post-COVID; increased vulnerable road user exposure; and behavioral factors such as impaired driving, distracted driving, and not wearing seatbelts.
- Pedestrians make up 34 percent of total traffic fatalities (as of 2022), an increase compared to previous years.

Crash normalization shows an uneven safety landscape:

- The Inner Suburbs have the highest fatality rate per VMT and per capita, indicating a mismatch between infrastructure and current traffic volumes.
- The Urban Core has the highest serious injury rate per VMT and per capita, likely due to higher exposure of non-motorized users.
- VMT is an effective exposure metric for vehicle-based travel, but fails to capture bike and pedestrian exposure, a challenge for accurately assessing non-motorist risk.

The region is not currently meeting its safety targets:

- Fatalities are 33 percent above TPB's five-year annual average target, with a fatality rate 38 percent higher than the goal.
- Serious injuries exceed targets by 17 percent, with the injury rate 29 percent higher than the target rate (4.98 vs 3.22 per 100 million VMT).
- Non-motorist (pedestrians and cyclists) fatalities and serious injuries are also nine percent above target, underscoring systemic risk for vulnerable users.
- These gaps show that current interventions are falling short, and more systemic strategies are needed.

Crash types and categories reveal key patterns:

- Of the 12,177 fatal and serious injury crashes between 2019 and 2023:
    - Lane departure crashes (ran-off-road, head-on) account for 40 percent of fatalities, highlighting rural and arterial road risks.
    - Non-motorist crashes also account for 40 percent of fatalities, showing the severe impact on those outsides of vehicles.
    - Intersection crashes (especially angle and rear-end types) account for the majority of serious injury crashes (38 percent), indicating conflict points at junctions.

Involved factors emphasize behavioral and infrastructure failures:

- The most common contributors to fatal and serious injury crashes include: intersections (high conflict environments); roadway departures; and speeding, failure to use seatbelts, impaired driving, and pedestrians hit by a vehicle. Many crashes involve multiple compounding factors.

5

Focus Areas

5. Focus Areas

One of the goals of this study was to identify "focus areas," which are defined as involved factors that had a disproportionate impact on crash severity. Prioritizing safety strategies around focus areas may help move the needle on traffic safety.

5.1 IDENTIFYING FOCUS AREAS

To select focus areas for further analysis, this study examined the involved factors identified in the previous section. Additional involved factors were identified from other sources such as:

- 2021 TPB Regional Safety Study Report.
- Strategic Highway Safety Plans (SHSPs) for Maryland, District of Columbia, and Virginia.
- Federal sources such as the National Roadway Safety Strategy Report, and the Federal Highway Administration's (FHWA) Safety Strategy Report.

The involved factors were ranked using a set of qualitative and quantitative factors. The quantitative factor consisted of a ranking of the involved factor based on its contribution to fatalities. The qualitative factors included the TPB's ability to influence them (primary, secondary, and limited), regional priorities based on the jurisdictional questionnaire, and other anecdotal evidence.

Table 7 is organized by the involved factors categorized by behavior, vulnerable users (pedestrians and bicyclists), design, vehicles, and others. The table also highlights involved factors that are considered by the two states and the District of Columbia, Federal agencies, and local jurisdictions. The data ranking is based on the analysis conducted for this report, with 1 being the most prevalent factor involved. The TPB's ability to influence factors are abbreviated P for primary, S for secondary, and L for limited.[11] Highlighted in orange are the seven factors involved that met the highest number of criteria.

Table 7: Focus Area Selection Analysis

INVOLVED FACTORS	CATEGORY	2021 REPORT	MD SHSP	DC SHSP	VA SHSP	TPB INFLUENCE	REGIONAL PRIORITY	FEDERAL SOURCES	DATA (2019-2023)
Rear End	Behavior					P			8
Ped Hit by a Vehicle	Vulnerable Users	X	X	X	X	P	X	X	5
Bicyclist Hit by a Vehicle	Vulnerable Users		X	X	X	P	X	X	11
Roadway Departure	Behavior, Design				X	L		X	3
Intersections	Design	X			X	L		X	1
Young Driver	Age	X		X	X	P			10
Older Driver	Age				X	P			10

[11] Primary influence refers to areas where TPB has a high level of influence; secondary influence refers to areas where TPB has a medium level of influence; and limited influence refers to areas where TPB has a low level of influence.

INVOLVED FACTORS	CATEGORY	2021 REPORT	MD SHSP	DC SHSP	VA SHSP	TPB INFLUENCE	REGIONAL PRIORITY	FEDERAL SOURCES	DATA (2019-2023)
Distracted Drivers	Behavior		X	X		P			9
Speeding	Behavior		X		X	P	X	X	2
Aggressive Drivers	Behavior			X		P			
Motorcycle	Vehicle			X	X	S			7
Impaired Driving: Alcohol	Behavior		X	X	X	P	X		6
Impaired Driving: Drugs	Behavior		X	X	X	P	X		6
Work Zone Related	Behavior, Design					S			12
Not Wearing a Seatbelt	Behavior					P	X		4
Principal Arterials	Design	X				L			
Infrastructure	Design		X			L			
Occupant Protection	Behavior, Vehicle		X	X	X	P	X		4
Post-crash care	Other				X	L			
Data/analytics	Other			X	X	S			
Lighting	Design					L	X		
Heavy vehicles	Vehicle				X	L	X		
CAVs	Vehicle				X	L			

The seven identified involved factors were combined into six focus areas ("Impaired Driving: Alcohol" and "Impaired Driving: Drugs" were combined into one focus area called "Impaired Driving.")

The study recommends the following focus areas:

1) Pedestrians hit by a vehicle;
2) Bicyclists hit by a vehicle;
3) Intersections;
4) Speeding;
5) Impaired driving (drugs and alcohol); and
6) Principal arterials.

5.2 FOCUS AREA DEEP-DIVES

The following section will summarize the data analysis findings for each of the six proposed focus areas by the following categories: regional trends, geographic distribution, crash locations, and involved factors.

5.2.1 FOCUS AREA #1 – PEDESTRIANS

In the five-year study period (2019–2023), pedestrians were involved in two percent of crashes but accounted for 29 percent fatalities and 16 percent of serious injuries. This is particularly concerning given the region's emphasis on non-motorized and transit travel and the resulting increase in pedestrian activity.

Regional Trends: Regional trends show an increase in pedestrian fatalities and serious injuries since 2019 (**Figure 18**). A decrease in crashes was observed in 2020, likely due to the impact COVID-19 had on VMT and pedestrian traffic in general.

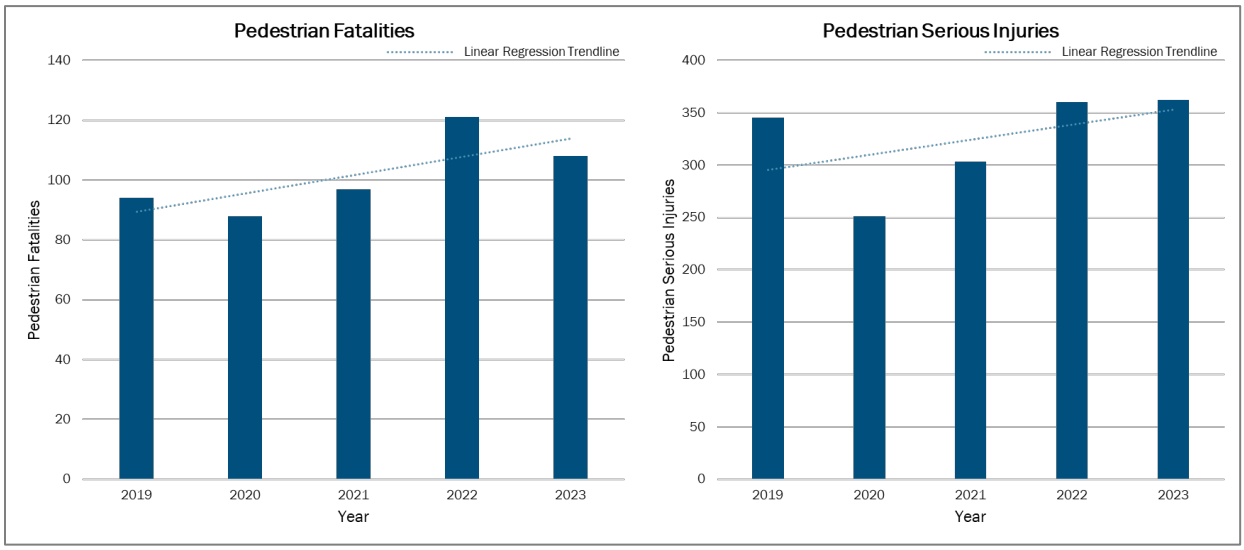


Figure 18: TPB Region Pedestrian Fatalities (left) and Serious Injuries (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Geographic Distribution: The Inner Suburbs have the highest number of pedestrian fatalities and serious injuries during the study period (**Figure 19**). When normalized by VMT, injury and fatality rates are highest in the Urban Core. However, the available data does not capture level of pedestrian activity. The discrepancy in fatality and serious injury rates between TPB region zones is most likely a function of higher pedestrian activity in urban areas, increasing the exposure and likelihood that pedestrians would be involved in crashes.

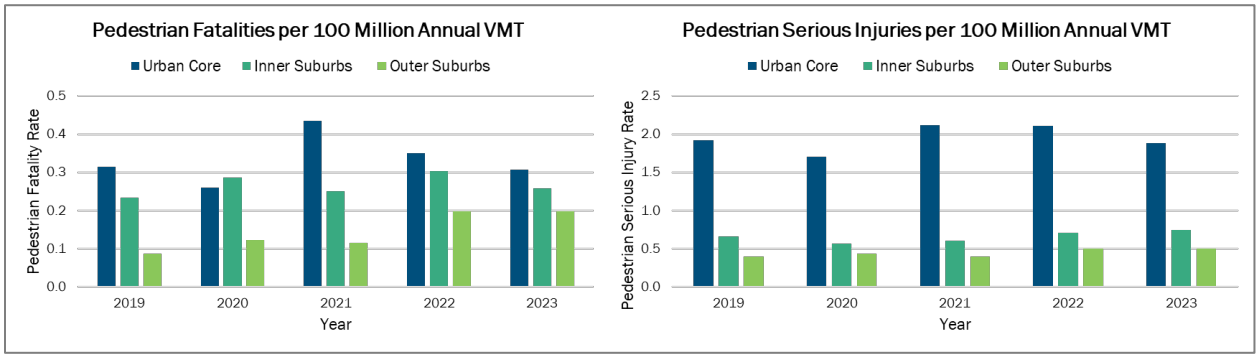


Figure 19: Pedestrian Fatalities by 100 Million Annual VMT (left) and Pedestrian Serious Injuries by 100 Million VMT (right) by Subregions, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Temporal Analysis: In terms of time of year, the October to December timeframe exhibits an uptick in the number of pedestrian fatalities and serious injuries (**Figure 20**). In terms of the day, pedestrian crashes are more likely to occur during the evening and late-night hours (**Figure 21**).

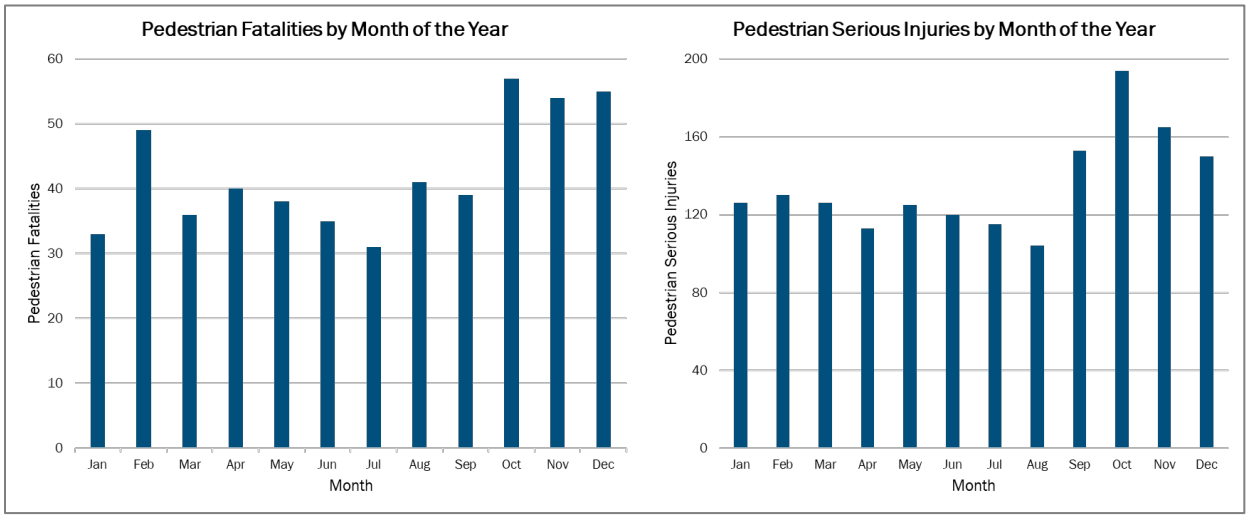


Figure 20: Pedestrian fatalities (left) and Serious Injuries (right) by Month of the Year, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

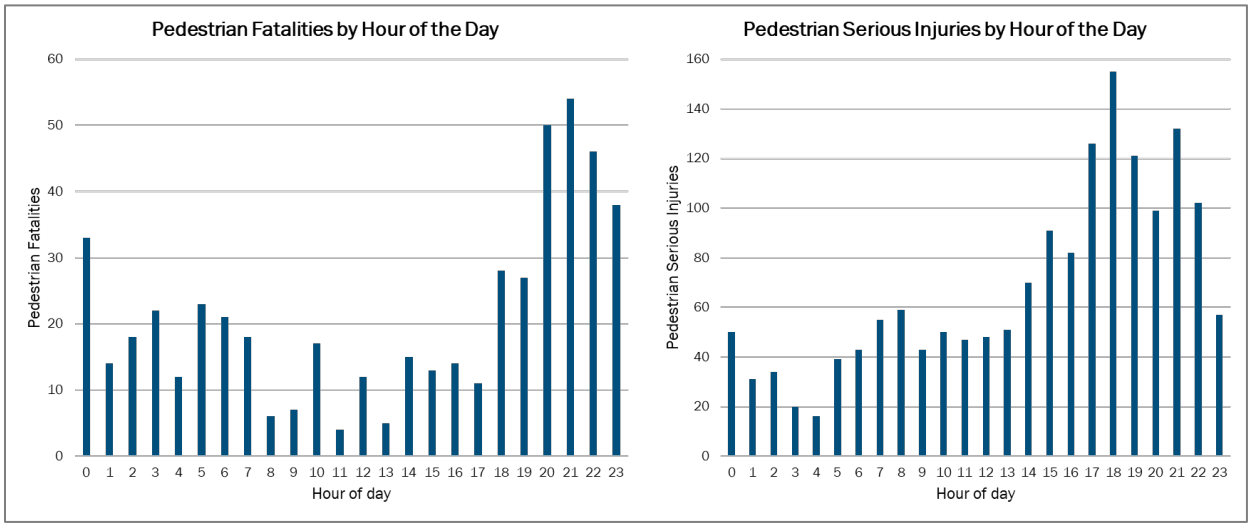


Figure 21: Pedestrian Fatalities (left) and Serious Injuries (right) by Hour of the Day, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Crash Location: While most pedestrian fatalities do not take place at intersections, the majority of pedestrian serious injuries do take place at intersections (**Figure 22**). This implies that intersection safety should continue to be an important component of the safety program and should incorporate a multimodal approach.

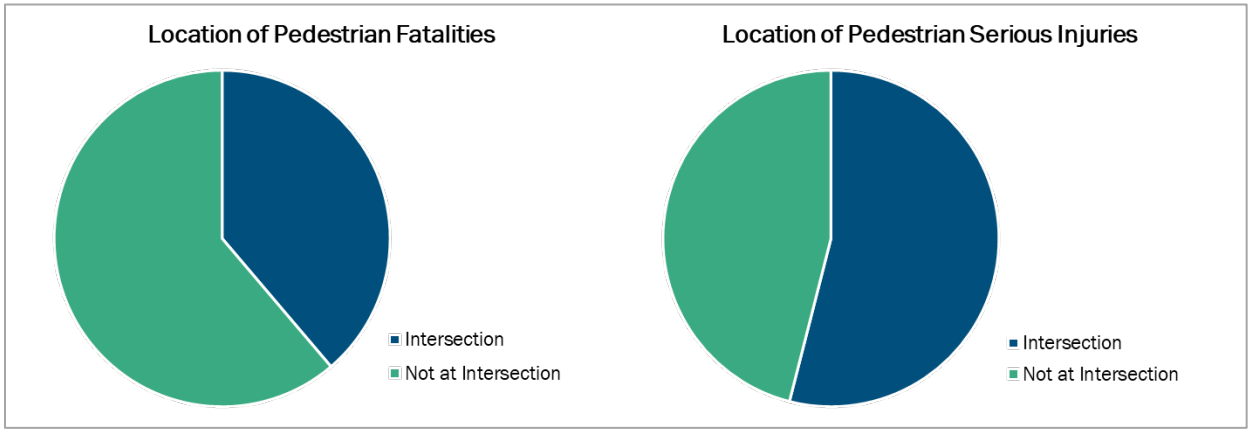


Figure 22: Location of Pedestrian Fatalities (left) and Serious Injuries (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Involved Factors: The top involved factors for pedestrian fatalities and serious injuries include: intersections, impaired driving, speeding, and distracted driving (**Figure 23**). Three of the top four involved factors for pedestrian crashes are behavioral factors. The cross-cutting analysis shows that these types of involved factors compound, leading to increased risk when multiple driver behavior-related factors are involved in the incident (for example, impaired driving and speeding, or impaired driving and distracted driving).

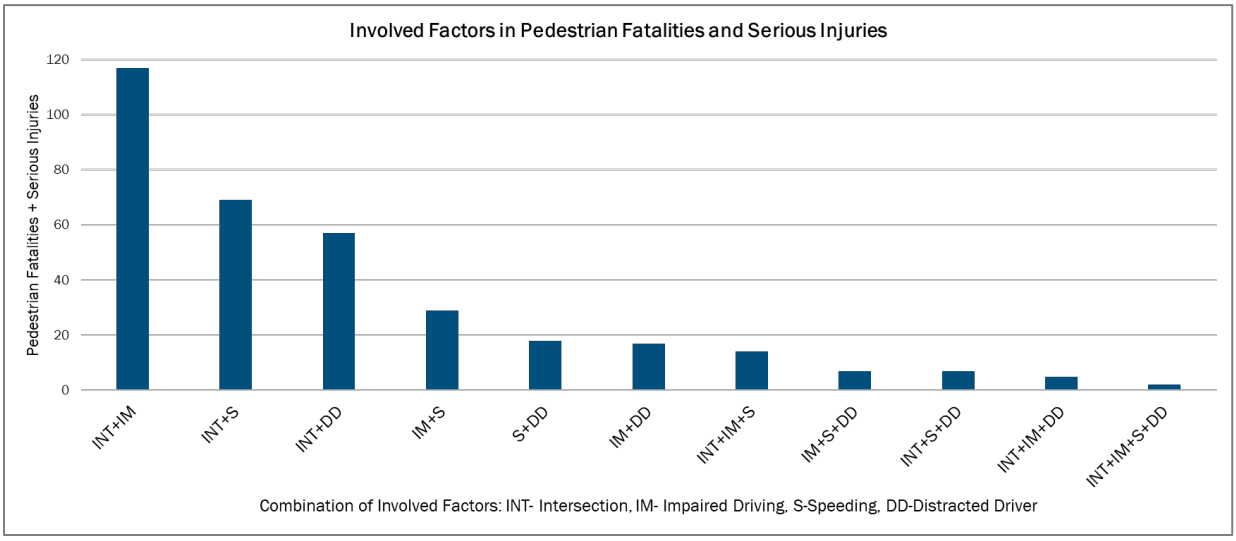


Figure 23: Pedestrian Fatalities and Serious Injuries with Multiple Involved Factors, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

5.2.2 FOCUS AREA #2 - BICYCLISTS

In the five-year study period (2019 – 2023), bicyclists were involved in 0.75 percent of crashes but accounted for 1.5 percent of fatalities and 2.5 percent of serious injuries. This is particularly concerning given the region's emphasis on non-motorized travel and the resulting increase in bicycle activity.

Regional Trends: Regional trends show an increase in bicyclist fatalities, and a decrease in serious injuries (**Figure 24**).

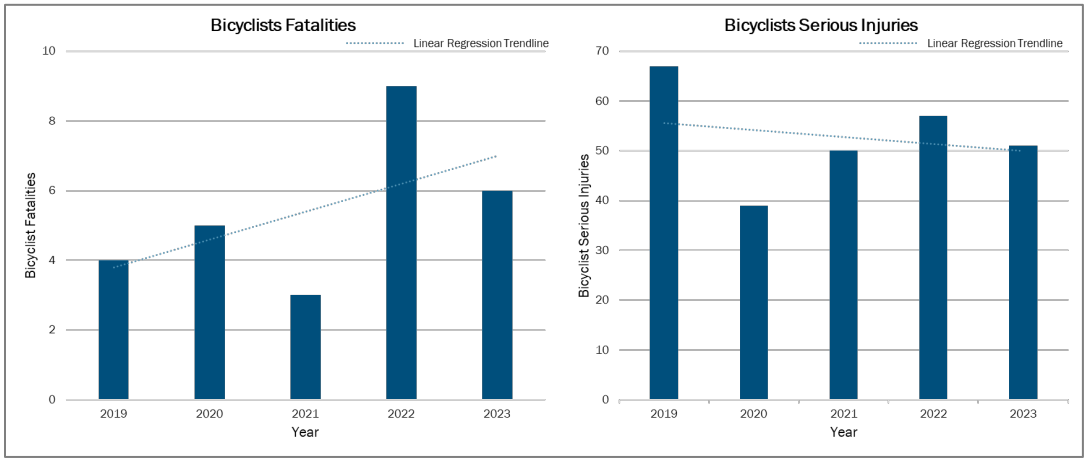


Figure 24: Bicyclists Fatalities (left) and Bicyclists Serious Injuries (right), 2019-2023
[Source: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Geographic Distribution: In terms of bicyclist fatalities and serious injuries, the Urban Core has both the greatest number of incidents and the highest rate of incidents during the study period (**Figure 25**). However, the data included in this study does not capture total bicyclist activity by subregion. The discrepancy between TPB regions may be a function of higher bicyclist activity in urban areas, increasing the exposure and likelihood that bicyclists would be involved in crashes.

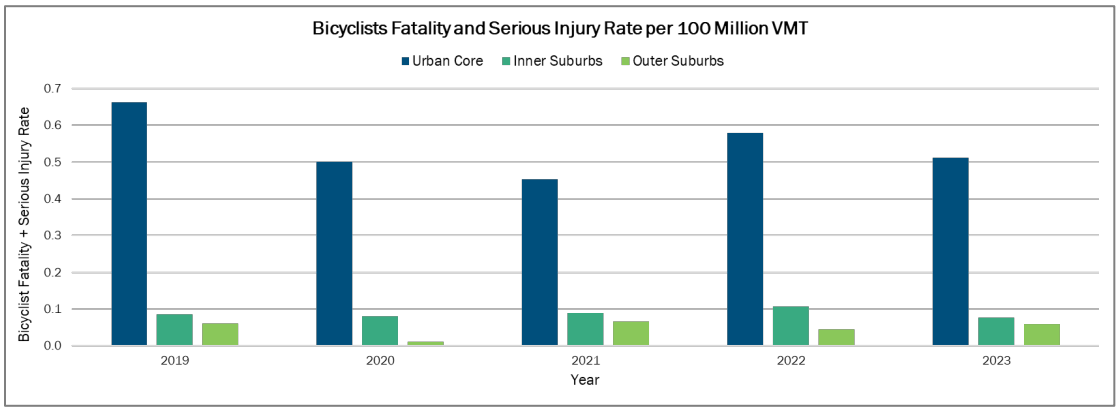


Figure 25: Bicyclists Fatalities and Serious Injuries per 100 Million Annual VMT by Subregion, 2019-2023
[Source: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Temporal Analysis: In terms of time of year, the summer months see an uptick in the number of bicyclist fatalities and serious injuries during the study period (**Figure 26**). Bicyclist crashes seem to be spread across the days of the week, with the highest number of crashes occurring on Saturdays. The distribution of bicycle-related fatalities and serious injuries appear to align with expected level of bicycle activity.

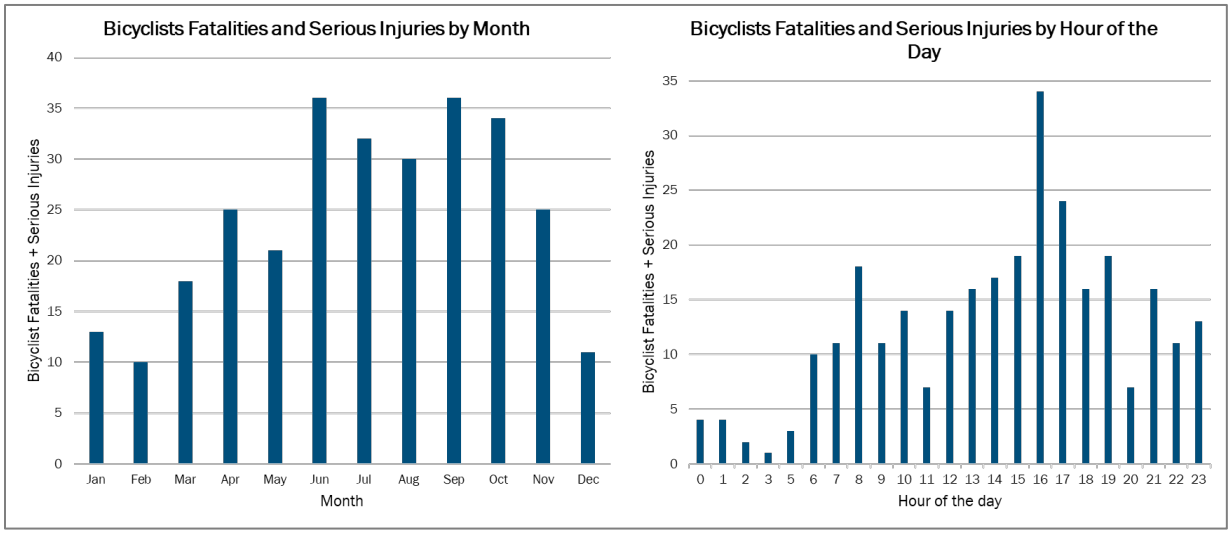


Figure 26: Bicyclists Fatalities and Serious Injuries by Month of the Year (left) and Hour of the Day (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Crash Location: The majority of bicyclist fatalities and serious injuries take place at intersections (63 percent). In terms of types of intersections, most crashes take place at four-way intersections.

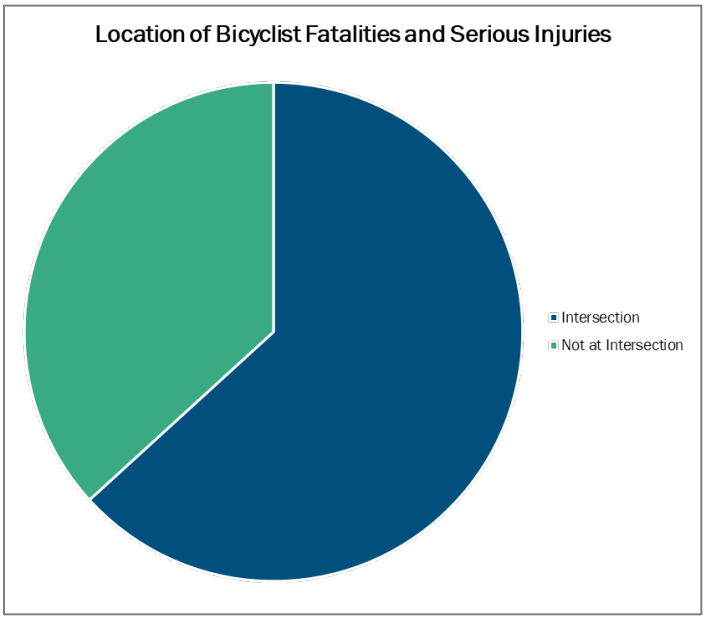


Figure 27: Bicyclist Fatalities and Serious Injuries Locations, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Involved Factors: Impacted by a smaller sample size than other focus areas, most involved factors in bicyclist fatalities and serious injuries were location-related, such as intersections and principal arterials. Impaired driving and driver age also came up as factors in a small number of incidents (**Figure 28**).

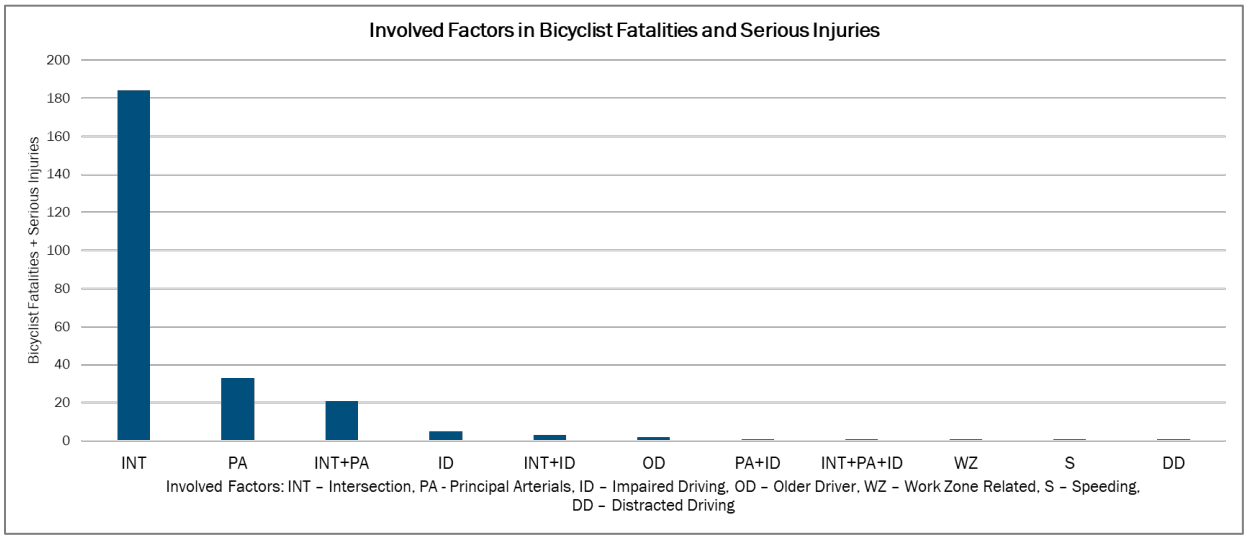


Figure 28: Multiple Involved Factors for Bicyclist Fatalities and Serious Injuries, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

5.2.3 FOCUS AREA #3 – INTERSECTIONS

In the five-year study period (2019–2023), 40 percent of fatalities and 53 percent of serious injuries occurred at intersections.

Regional Trends: Throughout the region, intersection crashes have been increasing for both fatalities and serious injuries during the study period (**Figure 29**).

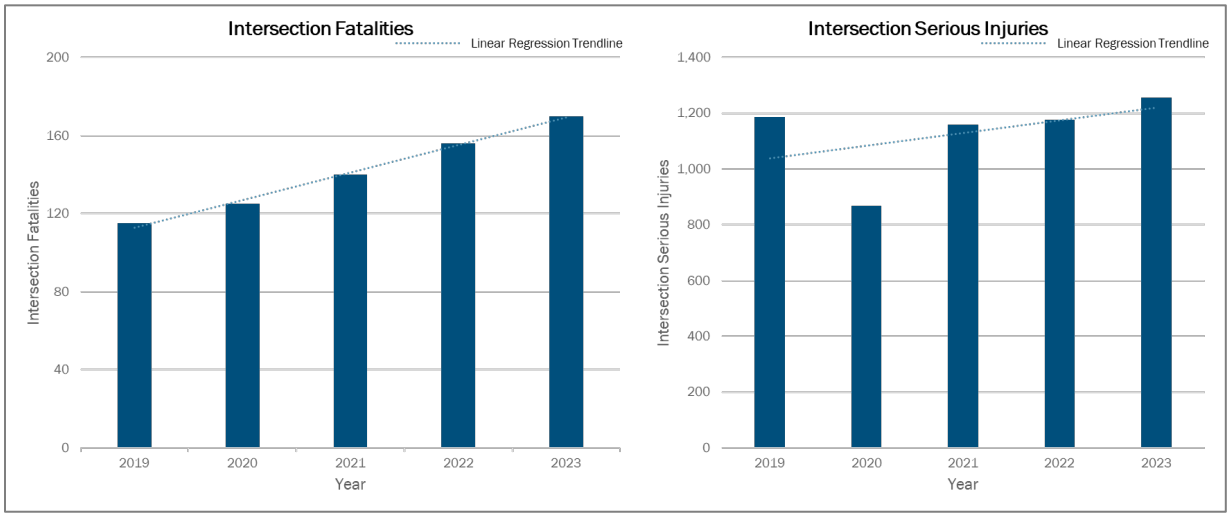


Figure 29: Intersection Fatalities (left) and Serious Injuries (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Geographic Distribution: The Urban Core has the highest rate of intersection crashes, followed by the Outer Suburbs and the Inner Suburbs (**Figure 30**).

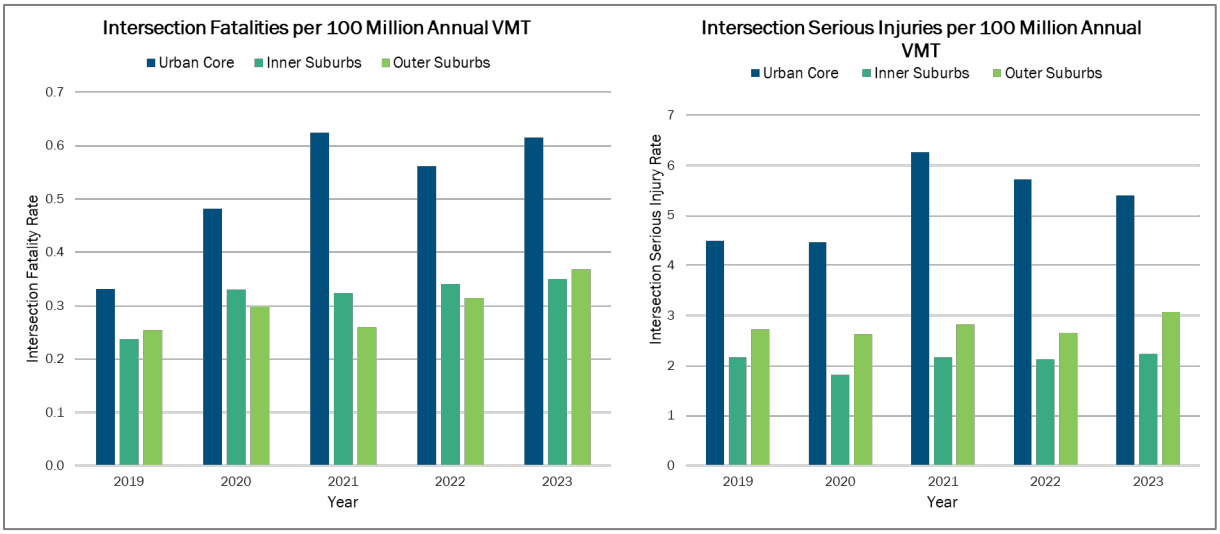


Figure 30: Intersection Fatalities (left) and Serious Injuries (right) by 100 Million Annual VMT per Subregion, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Temporal Analysis: Intersection fatalities happen more often during off-peak periods (6:00 PM-midnight), whereas serious injuries tend to occur during peak commute periods (3:00 PM-7:00 PM) (**Figure 31**).

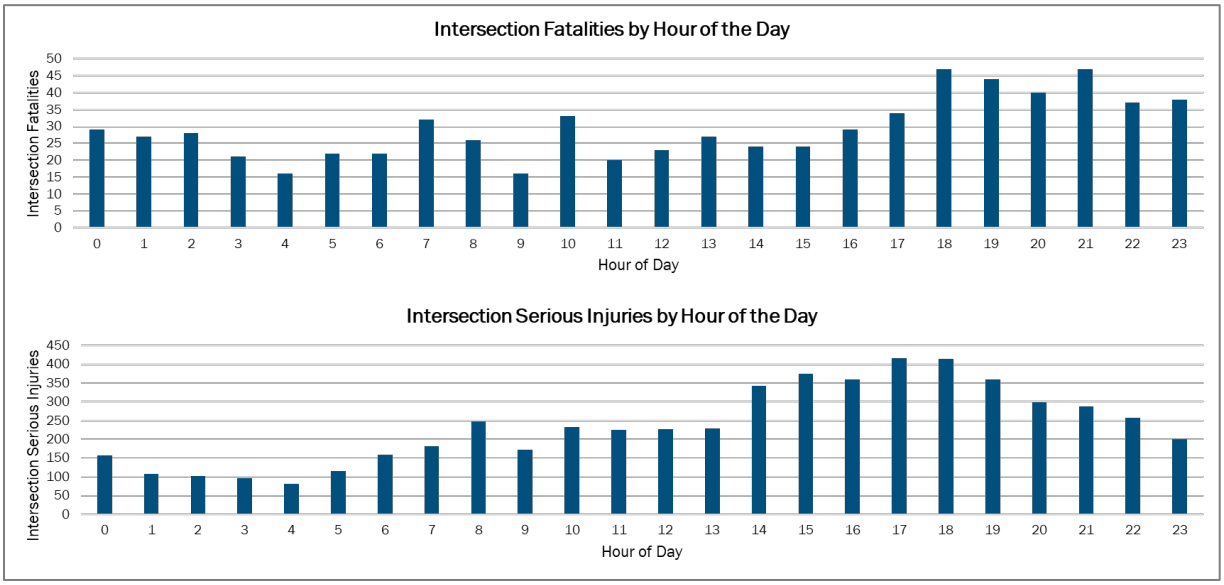


Figure 31: Intersection Fatalities (top) and Serious Injuries (bottom) by Hour of the Day, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Involved Factors: In terms of involved factors for intersection crashes, over 60 percent of the crashes included behavioral factors (speeding, distracted driving, impaired driving, and not wearing seatbelt) (**Figure 32**). The cross-cutting analysis highlights the following combination of factors for intersection crashes: speeding and rear end, speeding and not wearing a seat belt, rear end and not wearing a seat belt, and speeding and pedestrian hit by vehicle.

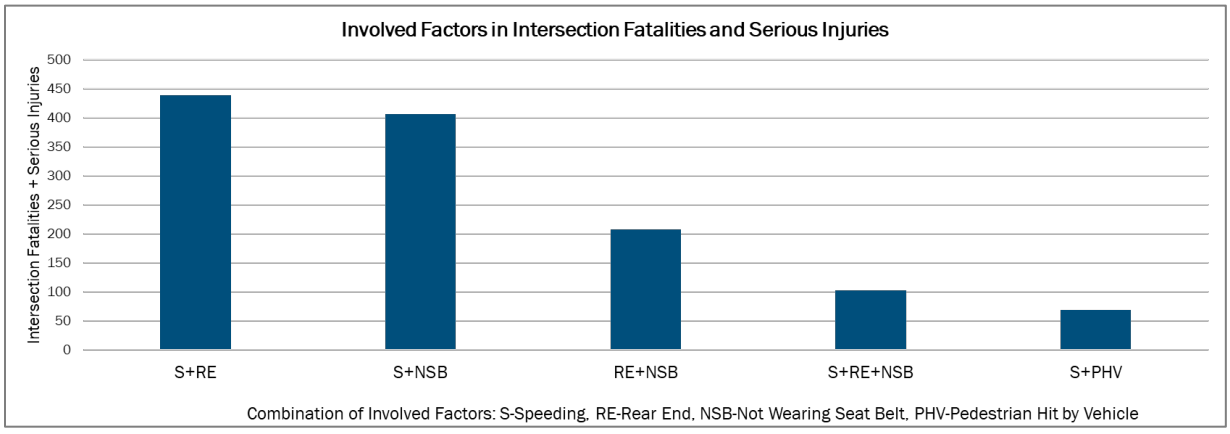


Figure 32: Multiple Involved Factors for Intersection Fatalities and Serious Injuries, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

5.2.4 FOCUS AREA #4 – SPEEDING

In the five-year study period (2019–2023) speeding was an involved factor in nine percent of total crashes which accounted for 32 percent of total fatalities and 22 percent of total serious injuries, demonstrating that speeding has a disproportionate impact on traffic violence in the region.

Regional Trends: Speed-related fatal crashes steadily climbed during the study period, while speed-related serious injuries decreased (**Figure 33**).

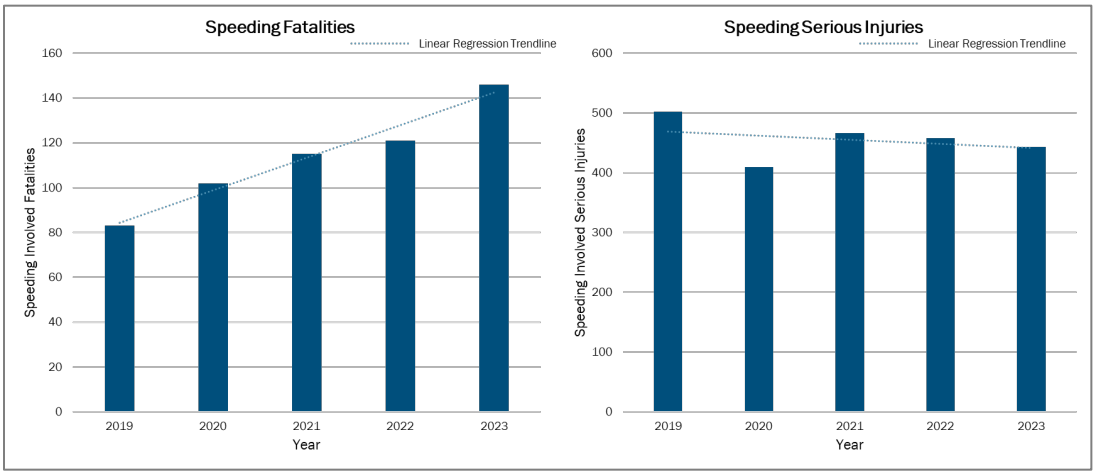


Figure 33: Speed-Related Fatalities (left) and Serious Injuries (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Geographic Distribution: Although speed-related crashes increased throughout the region, the Outer Suburbs have the serious injury rate (**Figure 34**).

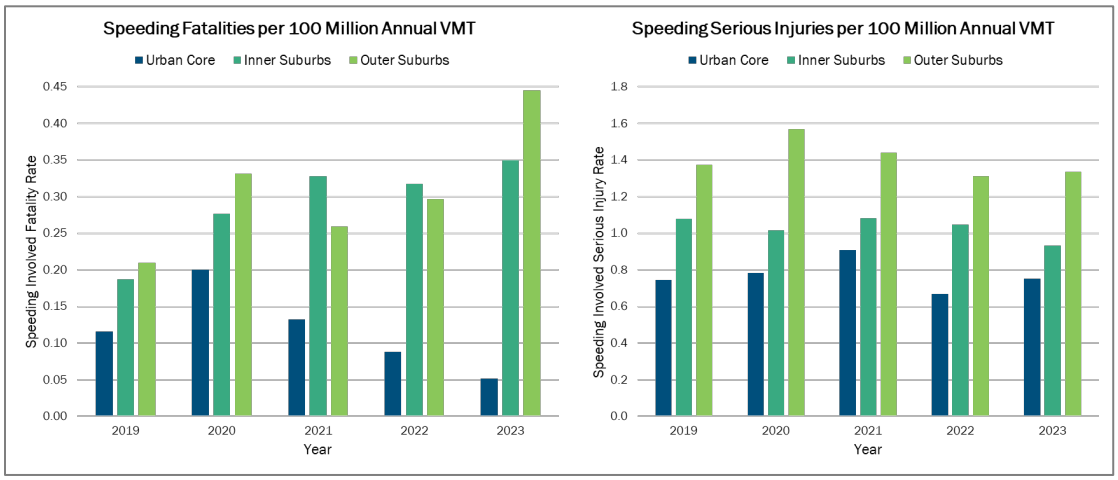


Figure 34: Speeding Fatalities (left) and Serious Injuries (right) per 100 Million VMT by Subregion, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Temporal Analysis: Speed-related fatalities tend to occur during late evening hours (10:00 PM - 11:00 PM) and early morning hours (1:00 AM). Speed-related serious injuries tend to occur around peak commute hours (5:00 PM-8:00 PM) (**Figure 35**).

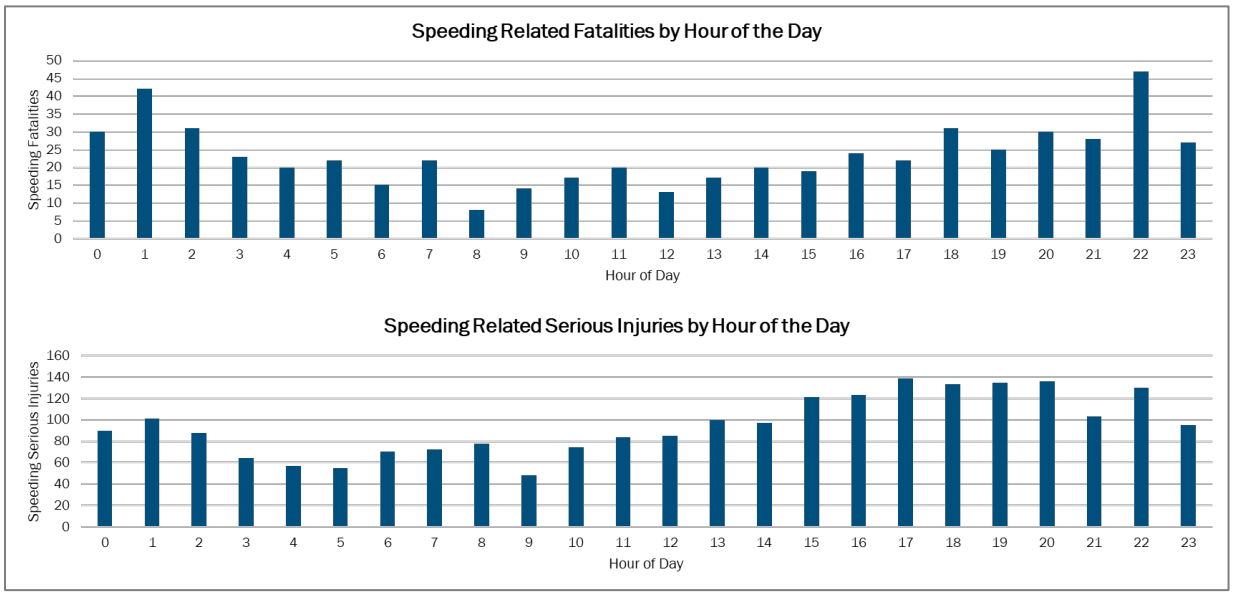


Figure 35: Intersection Fatalities (top) and Serious Injuries (bottom) by Hour of the Day, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Crash Location: Speed-related fatalities and serious injuries occur at both intersections and midblock (**Figure 36**).

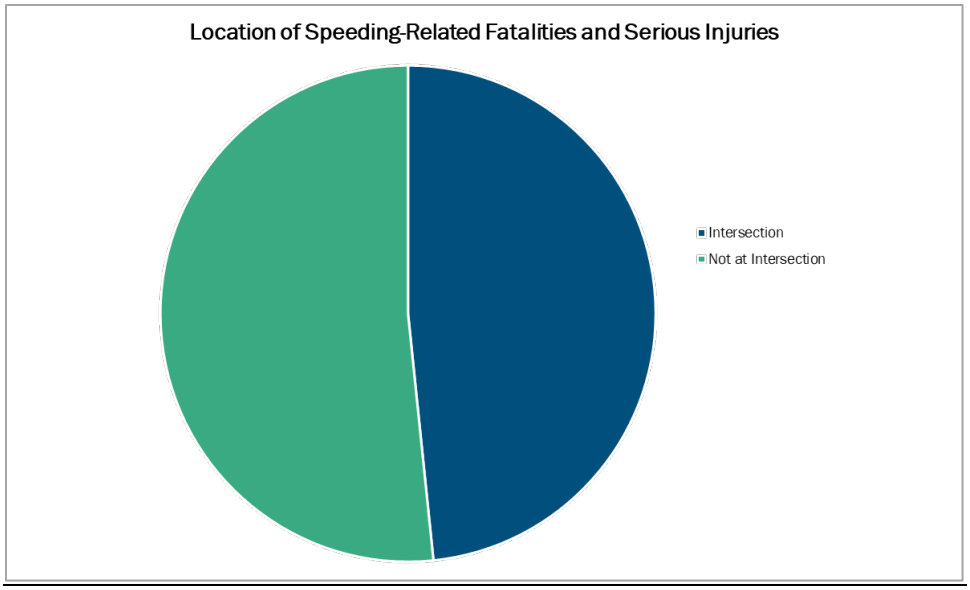


Figure 36: Speed-Related Fatalities and Serious Injuries Locations, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Involved Factors: In terms of speed-related crashes, the top cross-cutting involved factors included: intersections and rear-ends, roadway departure and not wearing a seatbelt, and intersections and not wearing a seat belt (**Figure 37**).

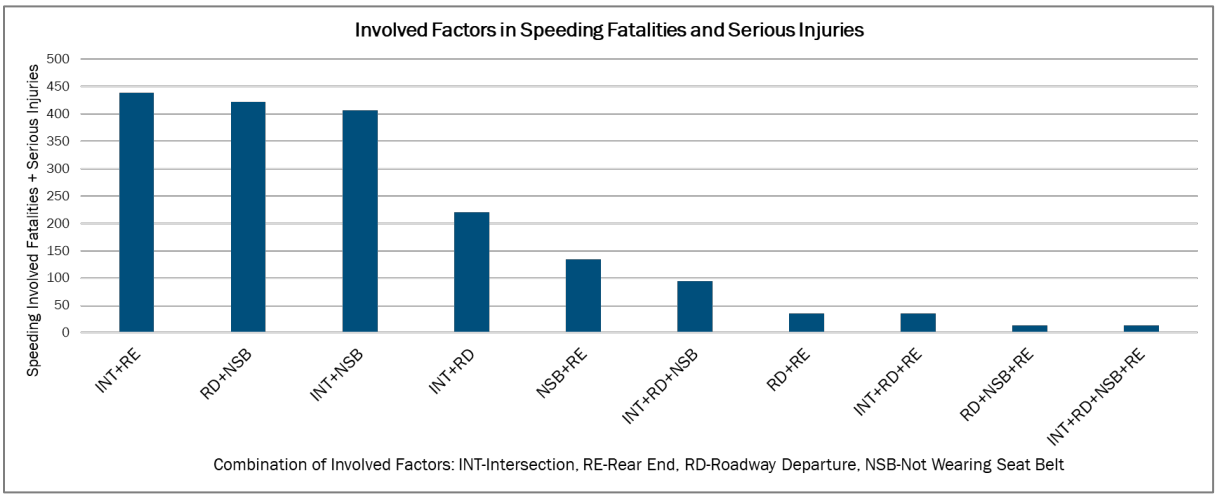


Figure 37: Multiple Involved Factors for Speed-Related Fatalities and Serious Injuries, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

5.2.5 FOCUS AREA #5 – IMPAIRED DRIVING

In the five-year study period (2019–2023), impaired driving was an involved factor in four percent of total crashes which accounted for 17 percent of total fatalities and 9 percent of total serious injuries.

Regional Trends: Impaired driving-related fatalities and serious injuries have increased during the study period (**Figure 38**).

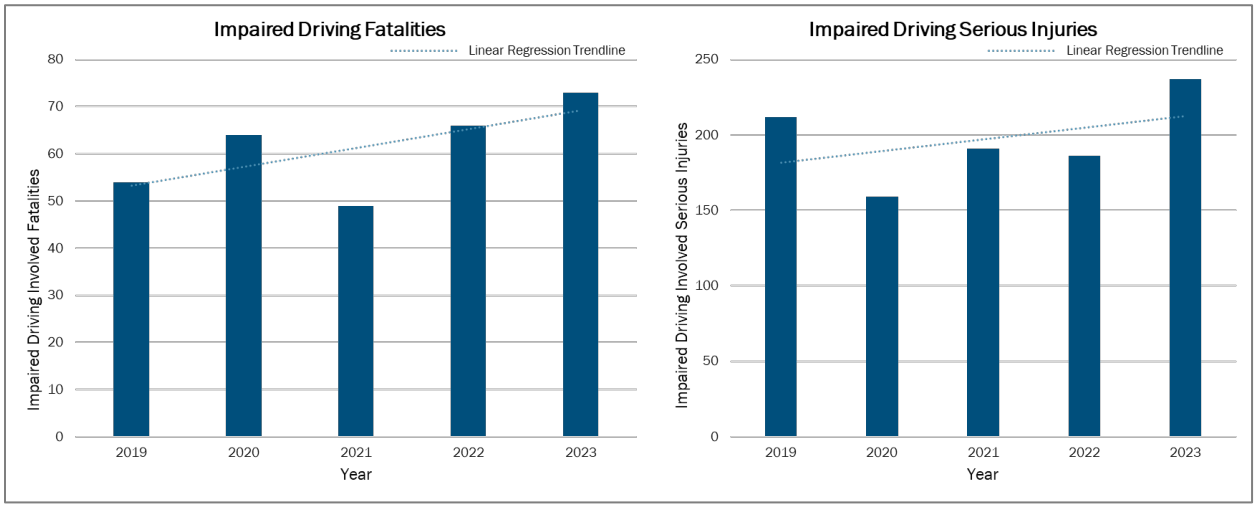


Figure 38: Impaired Driving Fatalities (left) and Serious Injuries (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Geographic Distribution: The Inner Suburbs consistently have the highest number of impaired driving-related incidents. When normalized by VMT, the Outer Suburbs and the Urban Core have higher rates of fatalities and serious injuries (**Figure 39**).

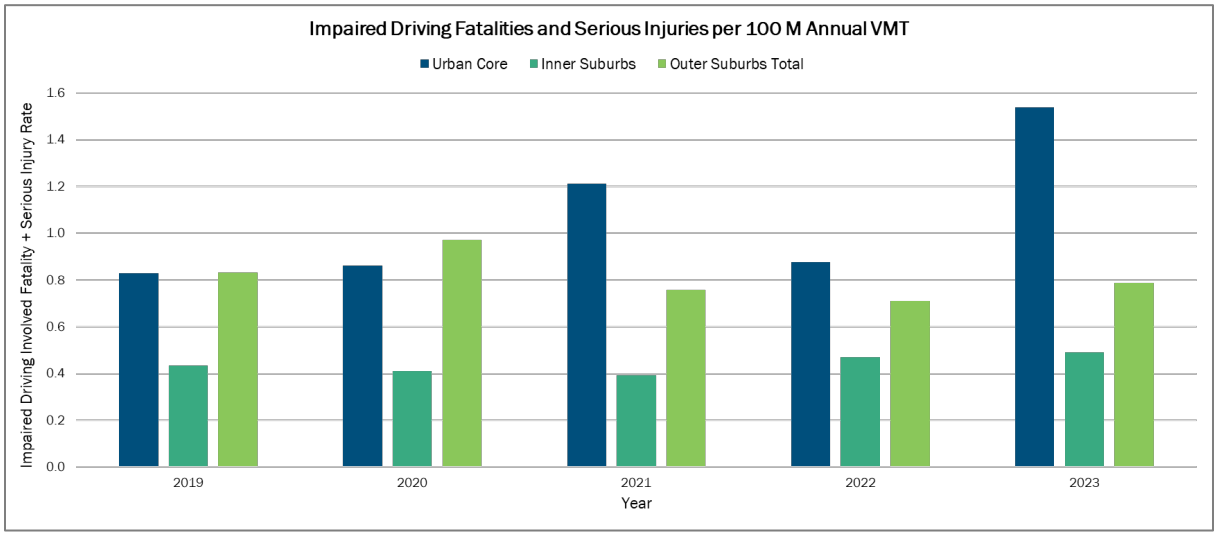


Figure 39: Impaired Driving Fatalities and Serious Injuries per 100 Million VMT by Subregion, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Temporal Analysis: The summer months see an increased number of impaired driving-related fatalities and serious injuries. In terms of day of the week, the weekends (Saturdays and Sundays) have the highest number of incidents (**Figure 40**). In addition, the majority of impaired driving fatalities and serious injuries take place during the late night and early morning hours of the day (**Figure 41**).

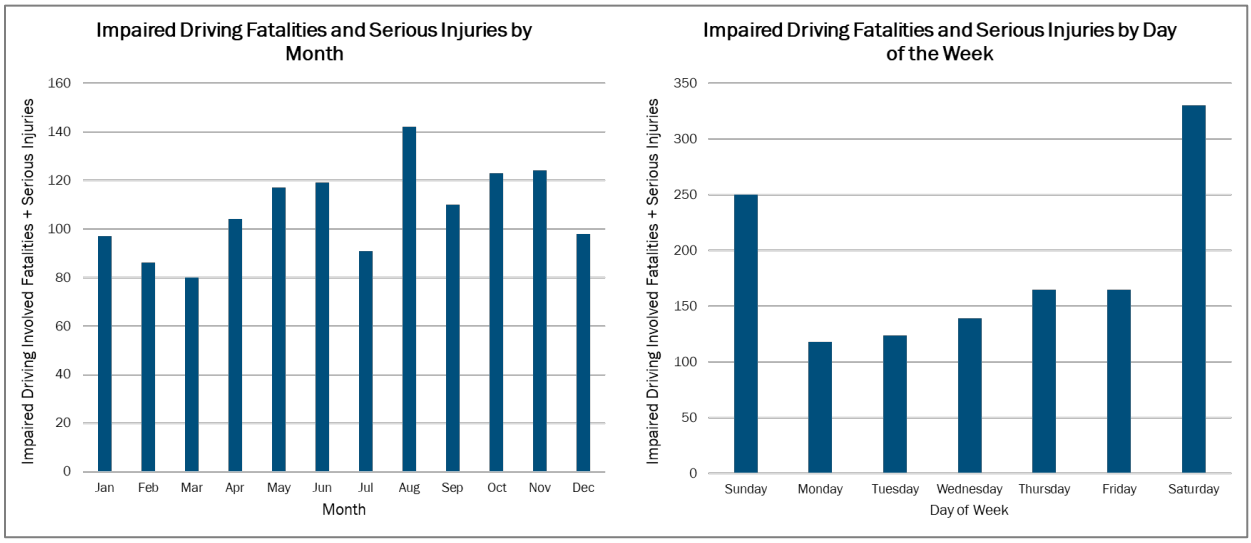


Figure 40: Impaired Driving Fatalities and Serious Injuries Month of the Year (left) and Day of the Week (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

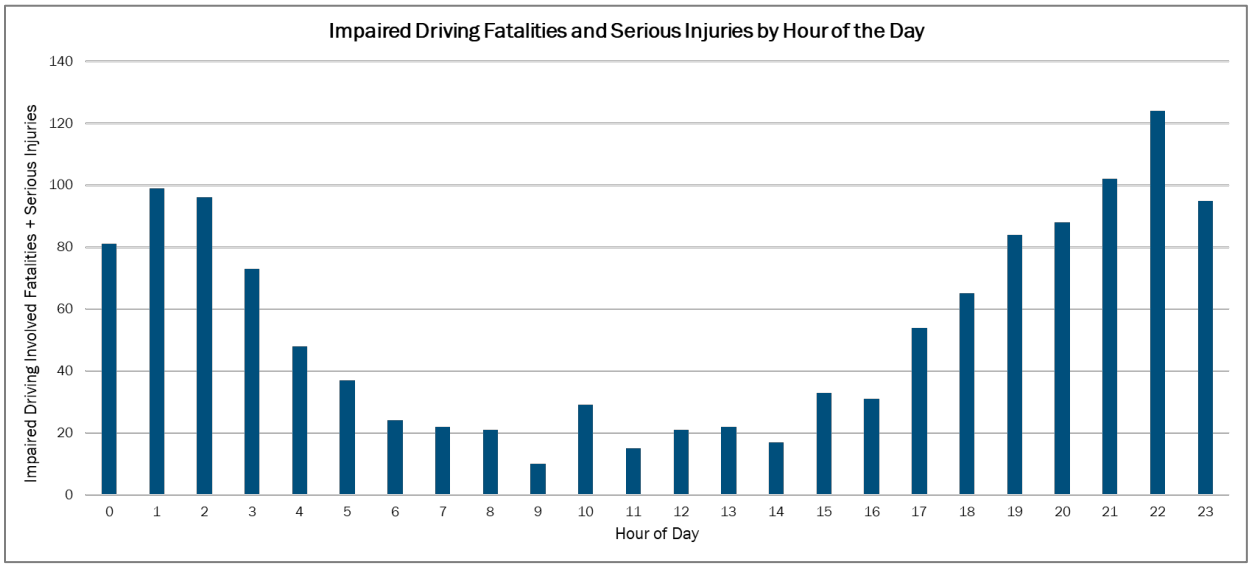


Figure 41: Impaired Driving Fatalities and Serious Injuries by Hour of the Day, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Crash Location: Impaired driving fatalities and serious injuries occur at both intersections and midblock (**Figure 42**).

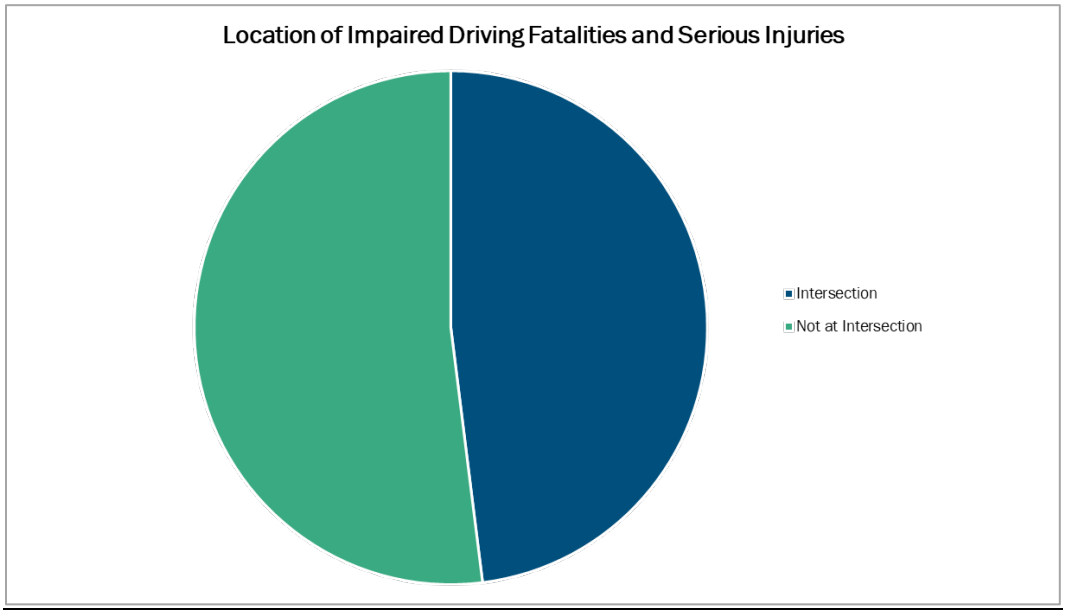


Figure 42: Impaired Driving Fatalities and Serious Injuries Locations, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Involved Factors: In terms of involved factors for impaired driving-related serious injuries and fatalities, many of the crashes also involved roadway departures and not wearing a seat belt, intersections and not wearing a seat belt and intersections, and intersections and pedestrians hit by a vehicle (**Figure 43**).

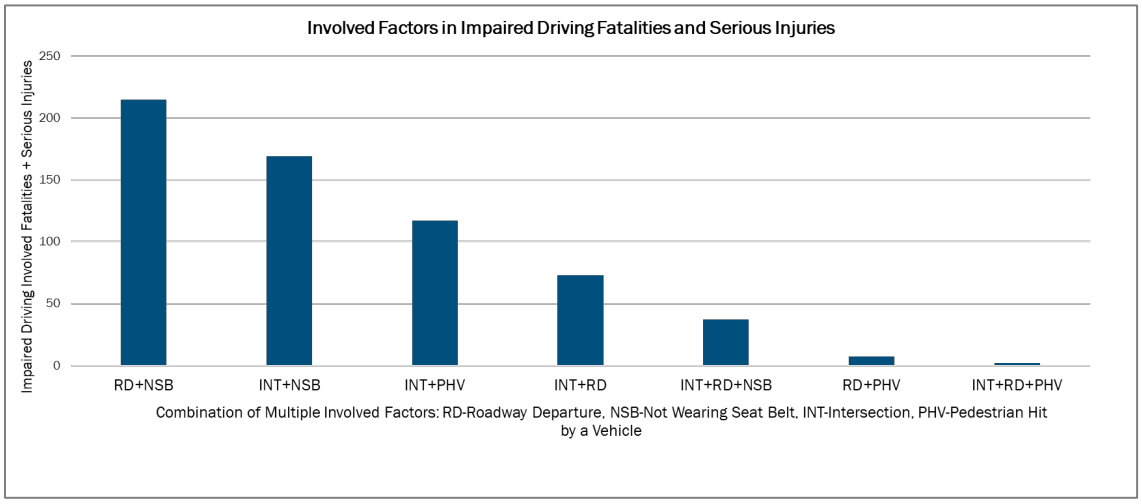


Figure 43: Multiple Involved Factors for Impaired Driving Fatalities and Serious Injuries, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

5.2.6 FOCUS AREA #6 – PRINCIPAL ARTERIALS

In the five-year study period (2019–2023), principal arterials were an involved factor in 19 percent of total fatalities and serious injuries.

Regional Trends: Throughout the study period, fatalities and serious injuries on principal arterials have been steadily increasing (**Figure 44**).

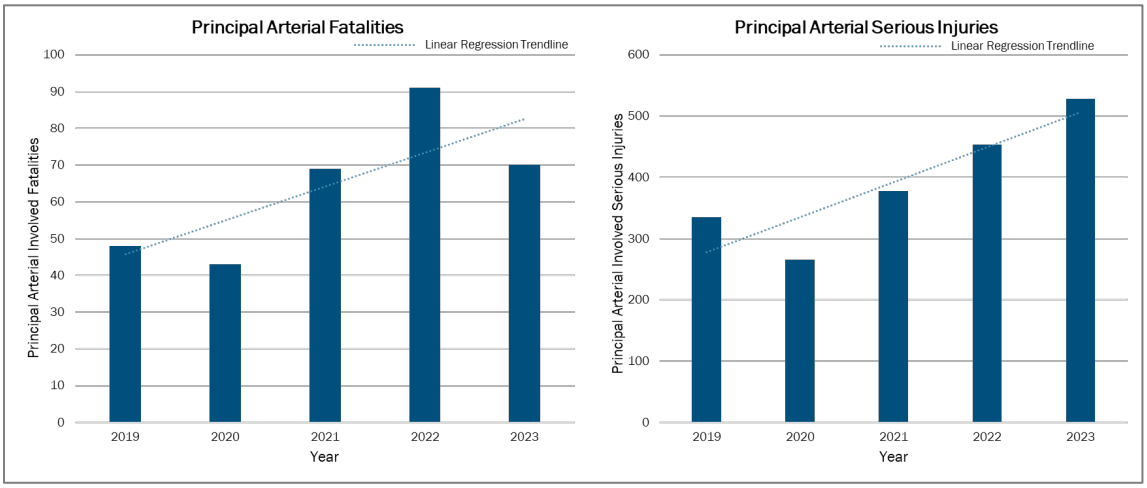


Figure 44: Principal Arterial Fatalities (left) and Serious Injuries (right), 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Geographic Distribution: In terms of total numbers of fatalities and serious injuries on principal arterials, the Inner Suburbs have the highest number of incidents throughout the study period. When normalized by annual VMT, the Urban Core has the highest rate in each year except for 2022, when the Inner Suburbs experienced the highest rate of fatalities (**Figure 45**).

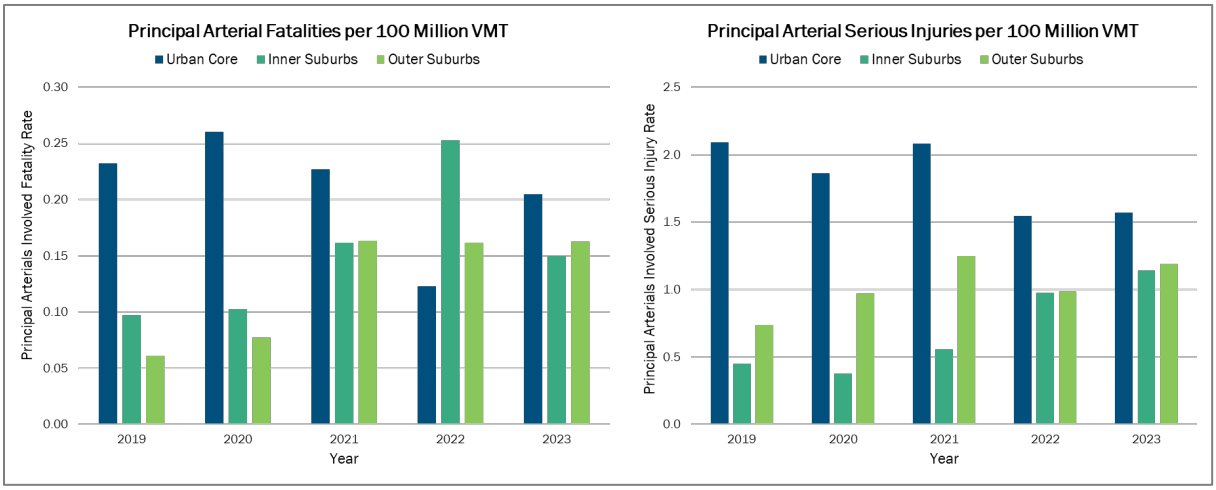


Figure 45: Principal Arterial Fatalities (left) and Serious Injuries (right) per 100 Million VMT by Subregion, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Temporal Analysis: In terms of time of year, principal arterial crashes are consistently spread throughout the entire year, with a slight decrease in incidents during the coldest months of the year (February and March). However, in terms of hours of the day, principal arterial crashes see a significant increase during peak commute hours (4:00 PM to 7:00 PM), and later in the evening (9:00 PM) (**Figure 46**).

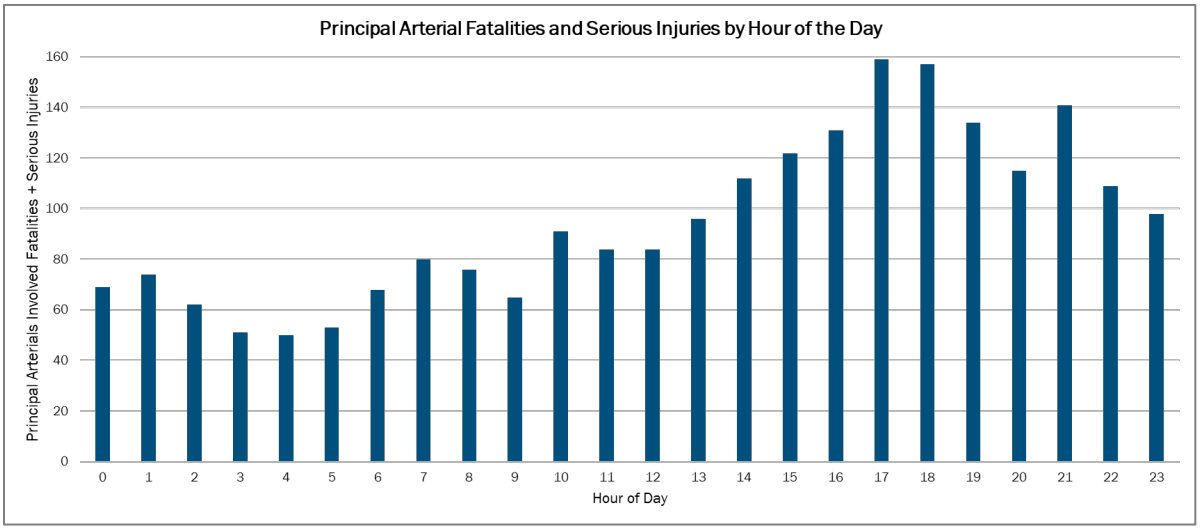


Figure 46: Principal Arterials Fatalities and Serious Injuries by Time of Day, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Crash Location: Principal arterial fatalities and serious injuries tend to occur more often at intersections (**Figure 47**).

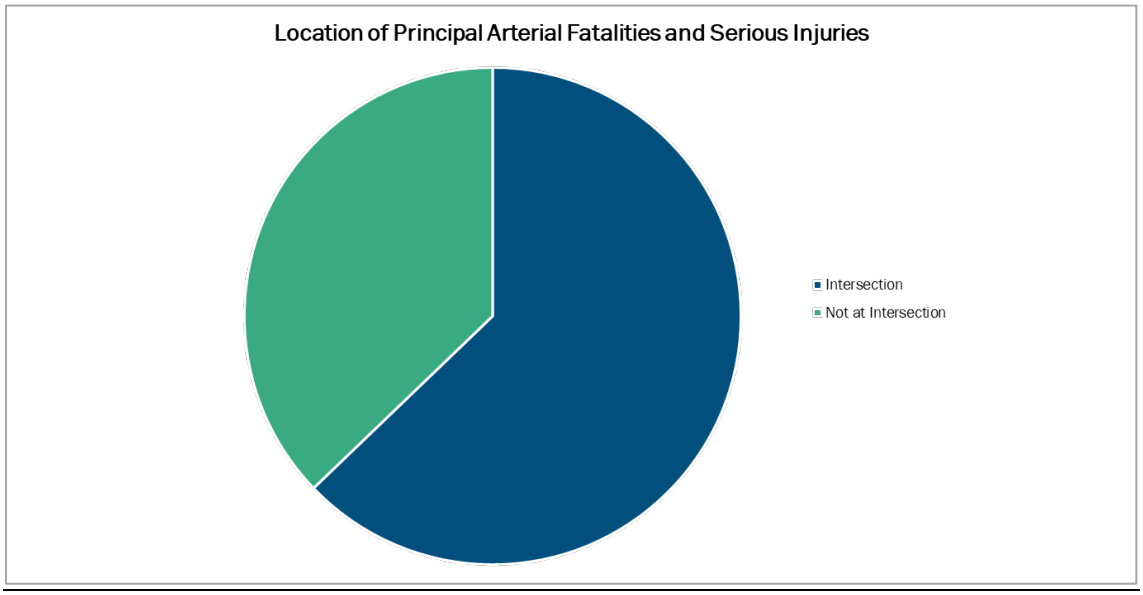


Figure 47: Principal Arterial Fatalities and Serious Injuries Locations, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Involved Factors: In terms of involved factors, a high number of principal arterial incidents also involve intersections and pedestrians, intersections and not wearing a seatbelt, and roadway departures and not wearing a seatbelt (**Figure 48**).

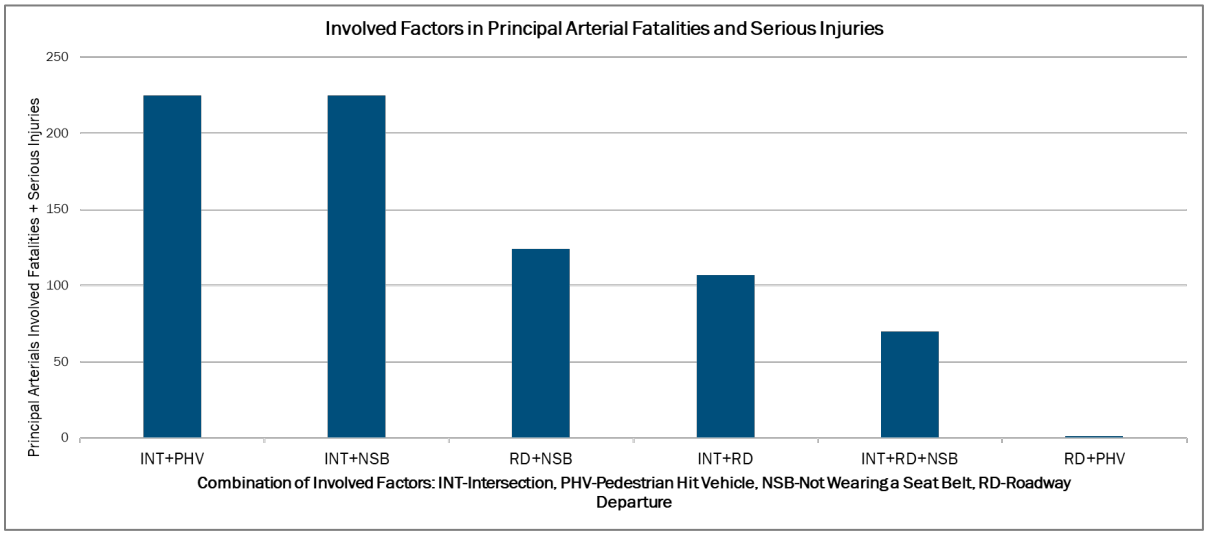


Figure 48: Multiple Involved Factors in Principal Arterials Fatalities and Serious Injuries, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

Table 8 shows the cross-cutting analysis broken down by the five categories presented above.

Table 8: Recommended Focus Areas - Cross-cutting Analysis

	Pedestrians	Bicyclists	Speeding	Impaired Driving	Intersections	Principal Arterials
Regional Trends	• Fatalities increasing. • Serious injuries increasing.	• Fatalities increasing. • Serious injuries decreasing. • Overall small number of incidents (5 percent & 15 percent of ped).	• Fatalities increasing. • Serious injuries decreasing.	• Fatalities increasing. • Serious injuries increasing.	• Fatalities increasing. • Serious injuries increasing.	• Fatalities increasing. • Serious injuries increasing.
Geographic Distribution	• Inner Suburbs have the highest number of incidents. • Urban Core has the highest rate. • VMT does not capture bike-ped activity.	• Urban Core has the highest number and rate of incidents.	• More pronounced problem in inner and Outer Suburbs. • Higher number of incidents in Inner Suburbs. • Higher rate in Outer Suburbs.	• Urban Core has the highest rate, but lowest number. • Inner Suburbs have highest number of crashes but the lowest rate.	• Inner Suburbs have the highest number of incidents. • Urban Core has the highest rate of incidents.	• Urban Core has a higher rate of fatalities and serious injuries.
Temporal Analysis	• Most risk during months of shorter daylight (Sep – Mar), and during darker hours (6 PM-6AM).	• Related to periods of high activity: • Highest during warmer months, PM commuting hours.	• Often during off-peak hours.	• Higher number of crashes at late night hours (9PM – 2 AM).	• Fatalities are the highest during peak and late evening. • Serious injuries are the highest during PM peak.	• Higher number of crashes during evening peak and nighttime (4pm - 12pm).
Crash Location	• Fatalities happen most often at midblock. • Serious injuries happen most often at intersections.	• Fatalities and serious injuries happen most often at intersections.	• Fatalities and serious injuries often happen at higher functional classes (interstate, arterials.)	• Fatalities and serious injuries happen most often at intersections.	• N/A	• Fatalities and serious injuries happen most often at intersections.

	Pedestrians	Bicyclists	Speeding	Impaired Driving	Intersections	Principal Arterials
Involved Factors	• Driver behavior factors, such as impaired driving, speeding, distracted driving, compound to create higher risk of pedestrian incidents.	• N/A	• Younger drivers have a higher propensity for speeding. • Other behavioral factors influence speeding (impaired and distracted driving).	• Intersection, roadway departure, not wearing seatbelt, pedestrian hit by vehicle.	• High proportion of crashes are due to behavioral factors (speeding, distracted driving, impaired driving).	• Intersection, roadway departure, pedestrian hit, no seat belt.

5.3 FOCUS AREA SUMMARY

Focus Area #1: Pedestrians:

- **Crash Burden:** Pedestrians are involved in two percent of crashes but represent 29 percent of fatalities and 16 percent of serious injuries. Most pedestrian fatalities occur midblock, while serious injuries tend to happen at intersections.
- **Geographic and Exposure Trends:** The Inner Suburbs have the highest number of pedestrian incidents, while the Urban Core has the highest rate per VMT. Exposure is likely driven by increased non-motorized travel in walkable areas in the Urban Core.
- **Temporal Patterns:** Crashes peak during winter months and dark hours, indicating risk related to visibility, lighting, and impaired night driving.
- **Involved Factors:** Speeding, distracted driving, and impaired driving are major drivers of pedestrian crashes. Crashes often involve multiple overlapping behaviors (e.g. a driver is both impaired and speeding). Intersection design and driver awareness of crosswalks also play a role.
- **Implications:** These trends point to the need for midblock crossing treatments and improved lighting, as well as increased enforcement on driver behavior.

Focus Area #2: Bicyclists:

- **Crash Burden:** Bicyclists are involved in less than one percent of crashes but represent2.5 percent of serious injuries and 1.5 percent of fatalities.
- **Geographic and Exposure Trends:** The Urban Core has both the highest number and rate of bicycle incidents. Data underrepresents exposure; bike trips are not captured in VMT.
- **Temporal Patterns:** Crashes involving bicyclists peak in summer and commute hours, suggesting greater risk during leisure and high-activity periods.
- **Involved Factors:** Intersections are the location of 63 percent of fatal or serious injury bicycle crashes.
- **Implications:** These trends point to the need to expand protected bike lanes and protected intersections, as well as increased enforcement on driver behavior.

Focus Area #3: Intersections

- **Crash Burden:** 53 percent of fatalities and serious injuries took place at an intersection. Intersections are the leading location for serious injuries.
- **Geographic and Exposure Trends:** The Urban Core has the highest intersection crash rate, but the Inner Suburbs have more incidents overall.

- **Temporal Patterns:** Fatalities at intersections occur more often during off-peak hours (6-9PM); serious injuries spike during PM peaks (3-6PM).
- **Involved Factors:** There is a high share of behavioral risk overlaps: speeding, no seat belt, distracted driving. These are often combined with rear-end, angle, and left-turn crash types.
- **Implications:** These trends point to the need for higher visibility, predictability, and protection at intersections. Implementing roundabouts, protected turns, and red-light camera enforcement could mitigate the risk of crashes at intersections.

Focus Area #4: Speeding:

- **Crash Burden:** Speeding is involved in nine percent of crashes, but 32 percent of fatalities and 22 percent of serious injuries, highlighting a disproportionate impact compared to its frequency.
- **Geographic and Exposure Trends:** The Outer Suburbs show the highest speed-related crash rate per VMT, which could be a function of longer distances, wider roads, and fewer enforcement points.
- **Involved Factors:** There is a common overlap with roadway departures, rear-end crashes, and intersection crashes. This may be because speeding reduces reaction time.
- **Implications:** Measures such as traffic calming, increased speed limit setting, and automated enforcement could mitigate the risk of crashes involving speeding.

Focus Area #5 - Impaired Driving:

- **Crash Burden:** Impaired driving accounts for four percent of total crashes but is responsible for 17 percent of fatalities and 9 percent of serious injuries and is a top contributor to late-night fatal crashes.
- **Geographic and Exposure Trends:** The Inner Suburbs have the most incidents; the Outer Suburbs and Urban Core have the highest rate per VMT.
- **Temporal Patterns:** Impaired driving incidents peak on weekends, summer months, and late-night/early morning hours.
- **Involved Factors**: Impaired driving fatal and serious injury crashes are often linked with roadway departures, intersections, and pedestrian crashes. Many crashes involve non-seatbelt use, compounding risk.
- **Implications:** Strengthening late-night driving under the influence (DUI) enforcement, promoting sober ride programs, and using ignition interlock policies could mitigate the risk of impaired driving crashes.

Focus Area #6 – Principal Arterials:

- **Crash Burden:** Principal arterials are involved in 19 percent of all fatalities and serious injuries. Fatal and serious injuries are steadily increasing on principal arterials.
- **Geographic and Exposure Trends:** The Inner Suburbs see the most incidents on principal arterials, while the Urban Core has the highest rate per VMT.
- **Temporal Patterns:** Principal arterial crashes occur throughout the year, with spikes during PM peak (4-7PM) and late evenings (after 9PM).
- **Involved Factors:** Principal arterial incidents are often paired with intersections, pedestrians, seat belt non-use, and roadway departure.
- **Implications:** Applying Complete Streets upgrades to principal arterials, such as enhanced crossings, median refuges, and reduced lane widths, could mitigate the risk of crashes on principal arterials.

6

COVID-19 Impacts on Crashes

6. COVID-19 Impacts on Crashes

Like other regions across the country, the COVID-19 pandemic had an impact on the operations and safety of the transportation networks in the COG region. Consistent with national guidance, Maryland, the District of Columbia, and Virginia declared COVID related health emergencies in March 2020, which imposed restrictions on travel and social gatherings (including shelter in place/stay at home orders), transitioned schools and workplaces to a hybrid environment, closed restaurant/bar dining rooms, and limited bus/rail service. As the pandemic progressed and vaccinations became available, some of the restrictions started easing (subject to social distancing norms and mask mandates). This was reflected in the level of travel activity (as shown in VMT trends) and crash patterns. **Table 9** summarizes the patterns which are highlighted in the discussion below.

Table 9: Summary of Regional Travel and Crash Patterns, 2019-2023

YEAR	VMT (IN MILLIONS)	YEAR OVER YEAR CHANGE IN VMT	CRASHES	YEAR OVER YEAR CHANGE IN CRASHES	FATALITIES	YEAR OVER YEAR CHANGE IN FATALITIES	FATALITY/ TOTAL CRASHES	YEAR OVER YEAR CHANGE IN FATALITIES /CRASHES	FATALITY RATE/100 MILLION VMT	YEAR OVER YEAR CHANGE IN FATALITY RATE
2019	**130.26**		95,158		311		0.33%		0.69	
2020	**104.87**	-19%	68,997	-27%	322	4%	0.47%	43%	0.88	29%
2021	**116.27**	11%	80,464	17%	367	15%	0.46%	-2%	0.91	3%
2022	**123.59**	6%	81,799	2%	382	4%	0.47%	2%	0.89	-2%
2023	**125.28**	1%	85,943	5%	392	3%	0.46%	-2%	0.90	1%
CHANGE 2019-2023		-3%		-10%						31%

[**Source**: Metropolitan Washington Council of Governments (MWCOG), District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

6.1 IMPACTS ON TRAVEL ACTIVITY

As expected, the impact of COVID-related travel restrictions was most pronounced in 2020, which saw a 19 percent reduction in VMT from 2019 levels. VMT started increasing from 2021 through 2023 but had not yet reached the pre-pandemic levels as of 2023. VMT in 2023 was still three percent lower than 2019, driven partly by the continued hybrid work environment carried over from the COVID years.

6.2 IMPACTS ON CRASHES

Reduced travel resulted in 27 percent fewer crashes in 2020 (compared to 2019). As VMT increased, total crashes increased; however, 2023 crashes were ten percent lower than 2019. Unfortunately, **the reduction in total crashes did not translate to a corresponding reduction in fatalities.** In fact, 2020 fatalities were higher than 2019. The year 2021 saw a 14 percent increase in fatalities over 2020 levels and the fatality numbers have been increasing through 2023. Fatalities accounted for nearly 0.46 percent of total crashes in 2020 (a 43 percent increase from 2019) and stayed at the higher rate through 2023. The fatality rate (per 100 million VMT) also jumped 29 percent between 2019 and 2020 and stayed at a high rate through 2023 (31 percent higher than 2019).

6.3 SHIFT IN BEHAVIORAL TRENDS

The crash statistics during the pandemic revealed some consistent but alarming behavioral trends:

- **Speeding related fatalities jumped in 2020 by 67 percent** (**Figure 49**). The percentage dropped in 2021 but stayed above 2019 levels through 2023. This can be attributed to an increase in speeding during the COVID. As an example, speeding-related violations in DC were higher in March and April of 2020, compared to the same months in 2019.[12] This phenomenon is consistent with national trends[13] and observations in other jurisdictions.[14] Lower traffic volumes during the pandemic enabled drivers to travel at speeds that had been precluded by congestion prior to the pandemic. Empirical research also suggests that decreased traffic volume is likely to result in impairments in drivers' ability to accurately perceive, and thus control, their own speed. Three primary processes are likely at play:[15]
    - First, in low traffic volume conditions drivers lack visual information that they would typically use to detect their own speed. Systematic underestimation of speed, and thus speeding, are possible results.
    - Second, drivers seek to balance levels of perceived risk. With fewer cars on the road, speeding is likely to be perceived as less risky, as any given driver's field of safe travel is expanded. If this is in fact the case, it would entail more speeding to maintain the desired or acceptable level of risk.
    - Finally, low traffic volume is associated with increased boredom. Drivers may adopt several strategies to deal with boredom. Many of these, such as speeding, aggressive driving, and phone use, are associated with increased risk.

- **Impaired drivers involved in fatal crashes jumped in 2020 by 50% over 2019 levels** (**Figure 49**). The percentage dropped in 2021 and increased again in 2022 and 2023 and stayed above 2019 levels. This is consistent with national trend and likely co-related with increased alcohol sales (increased 34 percent), marijuana sales, and alcohol related health issues.[16][17]

- **The percentage of drivers with no seat belts involved in fatal crashes jumped in 2020 by 36 percent** (**Figure 49**). The percentage dropped in 2021 but stayed above 2019 levels through 2023. This is consistent with national trends. Ejections from vehicles during crashes are a proxy measure of seat belt use because people using seat belts are less likely to be ejected. The National Highway Transportation Safety Administration (NHTSA) tracks the number and rate of ejections per emergency medical services (EMS) activation in response to motor vehicle crashes. The ejection rate by week for 2019 and 2020 shows an increase in the ejection rate in most of 2020 after week ten, when the COVID-19 public health emergency was declared.[18]
- **The percentage of young drivers involved in fatal crashes jumped in 2020 by 32 percent** (**Figure 49).** The percentage dropped in 2021 but stayed above 2019 levels through 2023. This may be

[12] https://ggwash.org/view/78645/dc-driving-violations-spike-and-crashes-descrease-during-the-early-stages-of-covid-19.
[13] 202407-AAAFTS-Impact-of-COVID.pdf.
[14] https://pmc.ncbi.nlm.nih.gov/articles/PMC9042805/.
[15] https://pmc.ncbi.nlm.nih.gov/articles/PMC9746225/.
[16] https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/traffic_safety_during_covid19_01062021_0.pdf.
[17] pmc.ncbi.nlm.nih.gov/articles/PMC10202895/#:~:text=Lockdowns%20and%20social%20distancing%20led,%2C%20%26%20Martins%2C%202021.
[18] https://rosap.ntl.bts.gov/view/dot/56125.

explained by observations at the national level that while most drivers reported doing less driving in the fall of 2020 than they did prior to the pandemic, a small subset (four percent) of the population reported driving more than they did before, and this group tended to be riskier on average both demographically (i.e., younger, higher proportion male) and behaviorally (e.g., higher prevalence of risky behaviors, even after accounting for demographic characteristics).[19]

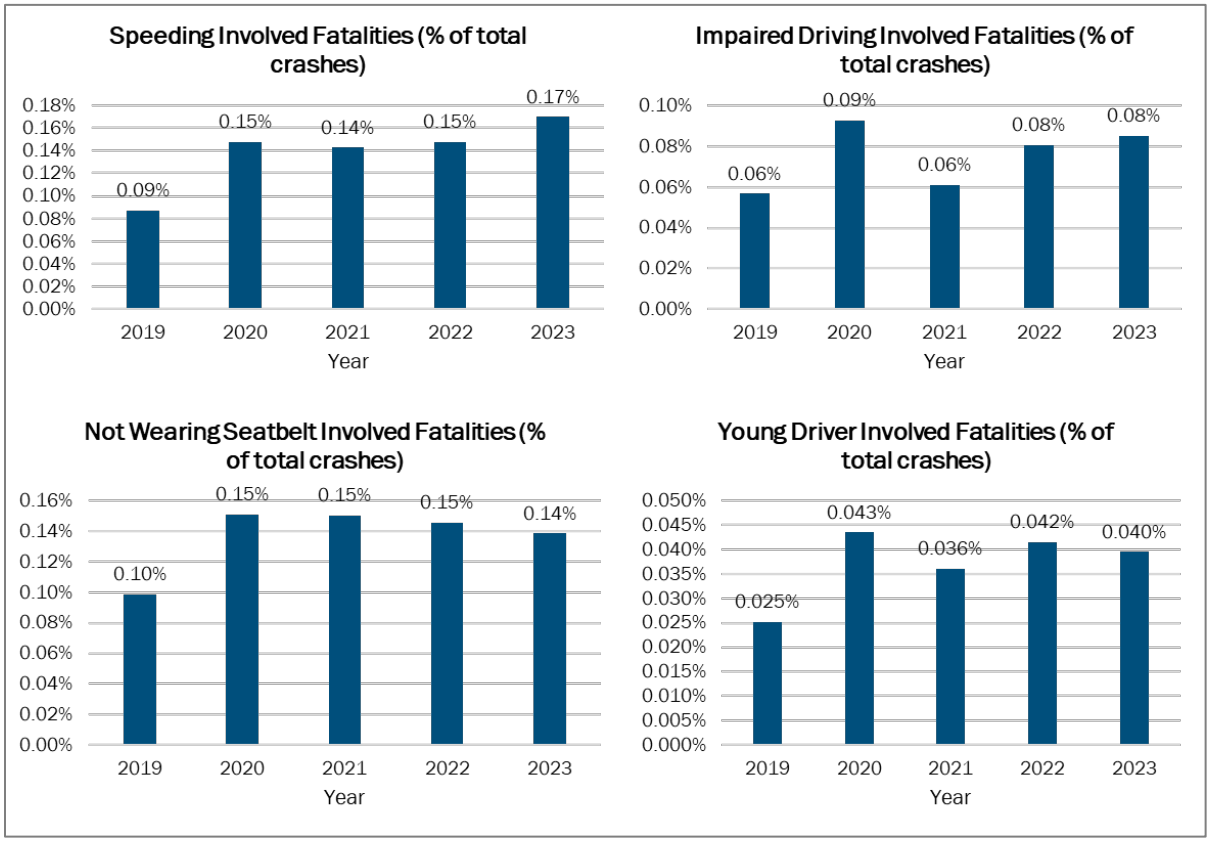


Figure 49: COVID-19 Impacts - Shifts in Behavioral Trends, 2019-2023
[**Source**: District Department of Transportation (DDOT), Virginia Department of Transportation (VDOT), and Maryland Department of State Police]

[19] https://newsroom.aaa.com/2022/02/solving-a-puzzle-with-fewer-drivers-on-the-road-during-covid-why-the-spike-in-fatalities/.

6.4 COVID-19 IMPACTS SUMMARY

- Travel restrictions during COVID resulted in a reduction in VMT. As the restrictions were relaxed, VMT rebounded between 2021-2023, but not to pre-pandemic levels.
- Total crashes decreased during 2020 and increased incrementally between 2021 and 2023 but remained ten percent below pre-pandemic levels.
- Despite lower VMT and lower crashes, fatalities increased in 2020 and spiked in subsequent years. 2023 fatalities were 26 percent higher than in 2019. Fatalities accounted for a larger percentage of total crashes during 2020-2023. The fatality rate (normalized by VMT) also spiked in 2020 compared to 2019 and has remained at a high level through 2023.
- Speeding related fatalities jumped in 2020 by 67 percent. The percentage dropped in 2021 but stayed above 2019 levels through 2023. This is consistent with national trends and local data that indicates an overall increase in speeding-related violations during the early months of the pandemic.
- Impaired drivers involved in fatal crashes jumped in 2020 by 50 percent. This is consistent with national trends and may be correlated to data on increased alcohol and recreational drug sales, alcohol consumption, and alcohol-related health issues during the pandemic. The percentage dropped in 2021 and increased again in 2022 and 2023 and stayed above 2019 levels.
- The percentage of drivers with no seat belts involved in fatal crashes jumped by 36 percent in 2020. This is consistent with national trends. The percentage of drivers with no seat belt involved in fatal crashes dropped in 2021 but stayed above 2019 levels through 2023.
- The percentage of young drivers involved in fatal crashes jumped in 2020 by 32 percent. The percentage dropped in 2021 but stayed above 2019 levels through 2023.
- Behavioral factors involved in fatal crashes (speeding, impaired driving, seat belt usage) changed during COVID; however, as of 2023, these factors have not yet returned to pre-COVID levels.

7

Jurisdictional Questionnaire

7. Jurisdictional Questionnaire

To better understand the safety challenges faced by transportation agencies across the COG jurisdictions, a questionnaire was distributed to transportation safety professionals in member jurisdictions. The purpose of the questionnaire was to gather qualitative information from member jurisdictions and supplement existing crash data with insights as to ongoing trends, barriers to implementing safety efforts, and specific local issues.

The questionnaire was conducted in coordination with COG/TPB staff and included both multiple-choice and open-ended questions. This section summarizes the key findings from the questionnaire, offering perspective into the region's transportation safety landscape and identifying potential areas for future action.

7.1 KEY QUESTIONNAIRE FINDINGS

The questionnaire responses from COG member jurisdictions revealed several important trends and challenges related to their traffic safety. The key takeaways from the questionnaire are summarized below:

- **Increase in Fatalities during COVID-19 pandemic**: Most jurisdictions reported an increase in traffic fatalities during the pandemic, consistent with the trend seen across the region.
- **Decline in Serious Injuries**: Despite the rise in fatalities, most jurisdictions experienced a decline in serious traffic injuries, following the broader regional pattern.
- **Top Involved Factors for Serious Injuries**: Speeding and crashes involving vulnerable road users, such as pedestrians and bicyclists, were frequently cited as the leading causes of serious injuries.
- **Top Involved Factors for Fatalities**: Speeding and impaired driving were identified by respondents as the top involved factors for fatalities in most jurisdictions. These differ from the TPB's top three factors in 2021, which included the lack of seatbelt use, pedestrian incidents, and intersection crashes.
- **Areas of Assistance Needed**: Jurisdictional staff highlighted the need for assistance in the following areas (ranked by priority):
    1. Supportive legislation and policy: Specific areas cited included legislative policies around automated enforcement capabilities, distracted driving, impaired driving, and driver accountability.
    2. Funding: Multiple jurisdictions noted the need for funding for institutionalizing safety programs, data collection, enforcement, and educational and awareness initiatives.
    3. Additional staffing: Respondents indicated that staff capacity limits their jurisdiction's ability to implement projects, policies, and programs.
    4. Data collection and analysis: Respondents expressed a desire for more specific localized data tailored to their jurisdiction.
- **Effective Safety Strategies**: The most effective strategies for reducing fatalities and serious injuries, as mentioned by most jurisdictions, included:
    1. Speed management: Multiple respondents mentioned installation of road diet projects and lowering speed limits as having demonstrated effectiveness.

2. Pedestrian safety improvements: Respondents noted high-visibility crosswalks, quick-build projects, rapid-flashing beacons, and pedestrian signal phasing modifications as having a beneficial effect on roadway user safety.
3. Improved street lighting for enhanced visibility during night/dark conditions: Respondents noted LED streetlight conversions have improved nighttime visibility.
4. Automatic traffic enforcement (e.g., red light and speed cameras): Respondents noted reductions in angle crashes after installation of red-light cameras.

- Adoption of 'Zero Death Goal': 63 percent of the responding jurisdictions (10 out of 16) have adopted the 'zero death goal'. Of those, eight jurisdictions have set a target year to achieve this goal. Target years for the Vision Zero goal ranged from 2024 to 2040, with 2030 being the year most cited.

7.2 QUESTIONNAIRE SUMMARY

- **Jurisdiction responses highlighted that fatalities rose during COVID-19, while serious injuries declined, matching the regional trends found in the crash data analysis.**
- **The top causes of serious injuries mentioned included speeding and crashes involving vulnerable road users (pedestrians and bicyclists).**
- **The top causes of fatalities mentioned included speeding and impaired driving.**
- **Jurisdictional needs identified:**
  - **Supportive legislation**, especially for automated enforcement, distracted and impaired driving.
  - **Increased funding for safety programs**, education, enforcement, and data systems.
  - **Staffing:** participants highlighted that limited capacity hinders the implementation of safety strategies.
  - **Local data:** participants mentioned a desire for more jurisdiction-specific crash data.
- **Effective strategies identified:**
  - **Speed management** (road diets and lower speed limits).
  - **Pedestrian safety improvements** (crosswalks, beacons, signal phasing).
  - **Better lighting** (LED conversions to improve night visibility).
  - **Automated enforcement** (red light/speed cameras reduce angle crashes.
- **Vision Zero commitments:**
  - **63 percent of jurisdictions have adopted a Zero Death Goal.**
  - **Most common target year: 2030, with ranges from 2024 to 2040.**

8

Recommendations and Next Steps

8. Recommendations and Next Steps

Safety throughout the region's transportation network has long been a focus and a challenge. The trend in fatal crashes across the National Capital Region over the five-year study period (2019 - 2023) has not been encouraging. Not only are the safety targets adopted by the TPB not being met, but when it comes to fatal crashes, trends are going in the wrong direction.

This study is a follow up to a 2020 study that analyzed crash data from 2013-2017. Since that study, TPB has taken proactive steps to improve the safety of the NCR transportation network. However, these strategies have not yielded a positive outcome at the regional level.

This chapter highlights the steps taken by the TPB since the last study, recommends strategies for the TPB to consider based on the quantitative (crash statistics) and qualitative (jurisdictional questionnaire and literature review) analysis conducted in this study and identifies future areas of research.

8.1 STEPS TAKEN BY THE TPB SINCE 2020

The TPB adopted **Safety Resolution R3-2021** to establish safety policy to reduce fatalities and serious injuries on the NCR's roadways. The resolution urged member jurisdictions to reaffirm road user safety as a top priority and to prioritize the implementation of projects, programs, and policies that strive to reduce the number of fatal and serious injury crashes on the region's roadways. The resolution recommends actions to significantly reduce the number of people killed or injured in traffic crashes in four focus areas: pedestrian, intersection, major arterial, and young driver crashes. The resolution spells out specific actions that can be taken individually and/or collectively. Specifically, the resolution:

- Advocated for increasing seatbelt use, reducing unsafe speeds, and reducing impaired and distracted driving.
- Identified 59 safety countermeasures for agencies to consider on a case-by-case basis. The countermeasures are grouped under two categories: (1) design and operate safer infrastructure, and (2) encourage safer behavior.
- Initiated the Regional Roadway Safety Program (RRSP) to assist member jurisdictions to develop and/or implement projects, programs, and policies to improve safety outcomes for all roadway users. Since 2020, TPB has awarded $1.78 million through the RRSP across 28 projects including site-specific planning or preliminary design, education campaigns and toolkits, complete streets, local road safety plans, guidelines and standards, and other activities with the goal of increasing safety and reducing crashes on the region's roads.
- Called upon member jurisdictions to adopt safety goals consistent with Vision Zero and adopt procedures that increase the use of ignition interlock devices for impaired driving offenders.

On October 31, 2024, TPB also convened the **Regional Roadway Safety Summit** to develop potential actions the TPB could undertake to address regional roadway safety. Recommendations from the summit include:

- Joining the USDOT Allies in Action Campaign, which incites stakeholders to share how they are embracing the vision of eliminating roadway fatalities and redouble efforts to take specific actions to reduce serious injuries and deaths.
- Assist COG with developing a multijurisdictional arrangement to fully enforce traffic laws and hold dangerous drivers to account (automated enforcement reciprocity).
- Organizing a larger strategy on federal rulemaking.
- Data gathering and reporting activities to support local Vision Zero efforts.

These efforts as well as this study complement additional ongoing safety activities described in Section 1.3.

8.2 RECOMMENDATIONS

Based on regional trends analysis, literature review, the crash data analysis, the identification of focus areas, and the jurisdictional questionnaire results, this study proposes the following recommendations for TPB to improve road safety across the region.

8.2.1 PRIORITIZE FOCUS AREAS

This study identified the following six (6) focus areas:

- Pedestrian Hit by a Vehicle
- Bicyclist Hit by a Vehicle
- Intersection
- Principal Arterial
- Speeding
- Impaired Driving- Alcohol and Drugs

The focus areas were found to have a disproportionate impact on crash severity (fatalities and serious injuries). The TPB and its member jurisdiction and agencies should individually and collectively identify projects, programs, and policies to prioritize addressing the six (6) focus areas. An example of a potential application of the focus areas is to incorporate them into the Regional Roadway Safety Program selection process.

8.2.2 ADOPT THE SAFE SYSTEM APPROACH

The Safe System Approach acknowledges that any death on the transportation system is unacceptable and is based on the understanding that humans make mistakes that can be anticipated.[20] The Safe System Approach relies on shared responsibility and redundancy in systems, so that when a human makes an inevitable mistake, that mistake does not result in a fatality. This report recommends the continued adoption of the Safe System Approach and structures the recommended safety countermeasures in this format.

[20] https://www.transportation.gov/safe-system-approach.

The Safe System Approach is defined by six principles:

- Death and serious injuries are unacceptable
- Humans make mistakes
- Humans are vulnerable
- Responsibility is shared
- Safety is proactive
- Redundancy is crucial

The Safe System Approach is further organized around five complementary objectives:

- **Safer People**, which encourages safe and responsible driving and behavior;
- **Safer Roads,** which focuses on designing roadways to minimize the consequences of human mistakes, encourage safe roadway behaviors, and accommodate travel by vulnerable roadway users;
- **Safer Vehicles,** which notes the role of vehicles and vehicle systems in preventing crashes and minimizing their impact;
- **Safer Speeds,** which promotes thoughtful, context-appropriate roadway design and speed limits, supported by targeted outreach, education, and enforcement; and
- **Post-Crash Care,** which targets improving the likelihood of surviving a serious crash through access to emergency medical care and creating a safe environment for first responders and traffic incident management practices.

8.2.3 RESTRUCTURE COUNTERMEASURES USING THE SAFE SYSTEM FRAMEWORK

The 59 safety countermeasures identified in the **TPB Safety Resolution R3-2021** can be restructured using the Safe System Approach framework discussed in the previous section. The restructured countermeasures (shown in Appendix E) had the following breakdown across the safe system categories – safer roads (36), safer people (18), safer speed (3), safer vehicles (1) and post-crash care (1)**.** In addition**,** the countermeasures can be targeted to achieve co-benefits to multiple focus areas. For example, strategies that target speeding are also likely to improve outcomes for vulnerable road users. Similarly, targeting ways to mitigate behavioral factors related to serious injuries and fatalities (speeding, impaired driving, and distracted driving) are likely to impact all focus areas. The countermeasures were also tweaked to emphasize focus areas identified in this study. As an example, the countermeasure "*conduct pedestrian road safety audits in areas with higher-than-average crashes*" was tweaked to "conduct pedestrian and bike road safety audits in areas with higher-than-average crashes." Similarly, "*develop and implement pedestrian safety programs for elementary school students*" was modified to "develop and implement pedestrian and bike safety programs for elementary school students."

8.2.4 MORE EMPHASIS ON POST-CRASH CARE

Within the Safe System Approach, there are opportunities to identify and implement additional countermeasures related to Safer Vehicles and Post-Crash Care, an area where TPB may have untapped potential to influence jurisdictional efforts to increase the survivability of traffic crashes. Some of the post-crash care countermeasures recommended include:

- Implement pre-hospital blood transfusion programs: These programs enable EMS agencies to supply lifesaving blood and/or blood components to trauma patients and anyone else who might need it at the scene of an incident.[21]
- Introduce signal pre-emption for emergency vehicles: This technology allows emergency vehicles priority passage through intersections when responding to an emergency.[22]
- Coordinate post-crash response regionally between highway safety, EMS, and 911: This involves the coordination of communication protocols, Traffic Incident Management Programs (TIMs), technology and data platforms, joint trainings for responders, and post-crash after-action reviews.[23]
- Expand move-over public education campaigns: These campaigns raise awareness for the need to allow emergency vehicles through by pulling over.[24]

8.2.5 PURSUE ADDITIONAL FUNDING OPPORTUNITIES

The jurisdictional questionnaire identified funding constraints as a challenge to developing more robust safety programs. TPB member jurisdictions have addressed this challenge by dedicating local funding to safety specific programs, re-framing maintenance programs to incorporate safety elements, and exploring federal grant opportunities to supplement their funding. However, the funding needs are broad, with jurisdictions citing the need for funding that supports a range of safety fundamentals including enforcement, media campaigns, education, data collection and analysis, and infrastructure. The region has an impressive track record of successfully leveraging federal programs such as the Highway Safety Improvement Program (HSIP), NHTSA Formula Grants, and the Transportation Alternatives Program (TAP), as well as winning competitive federal grants such as Safe Streets for All (SS4A) and Better Utilizing Investments to Leverage Development (BUILD). Many jurisdictions have used SS4A funding to develop a local Safety Action Plan, helping jurisdictions identify and prioritize initiatives to reduce fatal and serious injury crashes. Once the jurisdiction has an adopted Safety Action Plan, they may be eligible to apply for implementation funds to enhance their safety programs. TPB can play a role in connecting jurisdictions with funding sources, encouraging partnerships on collaborative grant applications that could benefit multiple jurisdictions and reduce competition from within the region.

8.2.6 DEVELOP A MULTIJURISDICTIONAL ARRANGEMENT

Speeding was a contributing factor in a significant percentage of fatalities injuries. With automated enforcement programs becoming more commonplace in the NCR (after the Commonwealth of Virginia passed enabling legislation for automated speed enforcement in school and work zones), the time might be right to work on multijurisdictional arrangements to fully enforce traffic laws and

[21] https://www.ems.gov/issues/prehospital-blood-transfusion/.
[22] https://www.fhwa.dot.gov/publications/research/safety/04091/04091.pdf.
[23] https://www.ems.gov/issues/ems-highway-safety-and-post-crash-care/.
[24] https://www.trafficsafetymarketing.gov/safety-topics/move-over-safety.

hold dangerous drivers to account through automated enforcement reciprocity. This was flagged as an action item from the Regional Roadway Safety Summit.

8.2.7 CONTINUE TO LEVERAGE FORUMS AT MWCOG

The TPB should continue to keep safety at the forefront of the NCR agenda. Forums such as the Transportation Safety Subcommittee can be leveraged to share best practices and coordinate efforts among jurisdictions to identify countermeasures that are having the greatest impact across the region. This enables jurisdictions to leverage their capital program effectively for positive safety outcomes.

8.3 FUTURE AREAS OF RESEARCH

This section identifies potential areas of future research that TPB and its member jurisdictions and agencies may consider:

- **Explore exposure data for pedestrians and bicyclists:**
  - The crash analysis demonstrated a rising trend in crashes involving bicyclists and pedestrians. However, the latest available data for pedestrian and bicycle trips for the NCR precedes the study period and only provides information on commute trips. Whereas VMT data is widely available, annually updated across the region with consistent methodology, and can be used as a method to normalize crash rates, no such data is currently available for pedestrian and bicycle trips. The lack of such data makes it difficult to draw conclusions without an understanding of the number of pedestrians and bicyclists traveling on the road network.
- **Provide consistency in crash data between Maryland, Virginia, and the District of Columbia:**
  - There are minor inconsistencies within the definitions used across the jurisdictions to categorize crash data. For example, in Virginia, 'Left Turn Crashes' are included as a type of 'Angle Crashes,' whereas in Maryland and the District there is a separate category for 'Left Turn Crashes.' In Virginia, the definition of 'Young Driver' is greater than 15 and less than 21, whereas in Maryland it is individuals between 15 and 20 years old, and in the District, the definition applies to anyone under the age of 21. In the District, there is a crash type for 'Parked Vehicle Crash,' which is not a category used in Maryland or Virginia.
- **Conduct further research on the impact of vehicle size and weight data on traffic safety:**
  - The diverging trends between the number of fatalities (trending upward) and the number of serious injuries (trending downward) suggests a change in the dynamics of crashes which result in fatalities. Based on the literature review, a change in the composition of consumer vehicle size and weight may contribute to this. Further research is needed to understand the dynamics that are resulting in a rise in fatalities while serious injuries are decreasing. National research has established a correlation between larger motor vehicles and increased risk and severity of pedestrian injuries, yet there is a gap in the research of how to address this trend. Exploring options for addressing .
- **Explore information sharing for post-crash care:**

    - As post-crash care is an objective of the Safe System Approach, there are opportunities to share information between Emergency Medical Services (EMS) and transportation agencies to coordinate post-crash care and gather further data on crashes that may not have been historically collected. Further research on access to trauma centers across the region may identify areas in which lack of post-crash care is contributing to the discrepancy between rising fatal crash numbers and falling serious injuries.
- **Inventory and report on safety-supportive activities undertaken by TPB members pertaining to the Safety Resolution**:
    - Further understanding of differences in implementation and adoption of safety countermeasures at the jurisdictional level may provide key findings that explain different outcomes in different jurisdictions.
- **Explore proactive tools and strategies for safety analysis:**
    - While it is industry practice to rely on historical crash data to identify road safety issues and develop countermeasures, the shortcomings of this approach are widely recognized. Such analysis is inherently backward looking because it requires road safety analysts to wait for crashes to happen in order to prevent them. There is a need for proactive methods for road safety analysis that do not rely on the occurrence of crashes. Advances in telematics and artificial intelligence have opened opportunities to identify safety issues in advance of a crash occurring. Telematics data can identify high-risk areas of roadway, correlations between behavioral factors (such as distracted driving) and crashes, and be used to aid in real-time traffic monitoring, post-crash response, and reactive traffic safety analysis. Technological advances also allow for the dynamic analysis of “near miss” events that do not show up in a traditional crash analysis and that can be used to generate safety insights rather than responding to crashes that have already occurred.

9

Appendices

9. Appendices

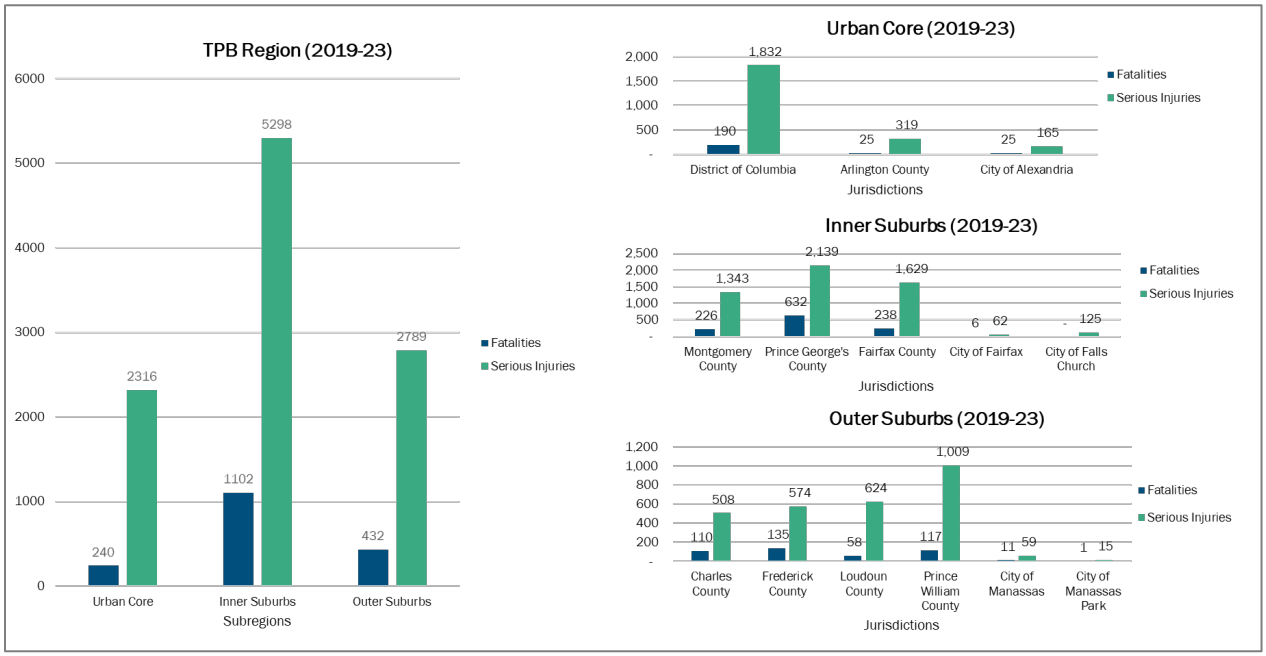
9.1 APPENDIX A: POPULATION DATA BY JURISDICTION, 2019-2023

Jurisdiction	2019	2020	2021	2022	2023	% Change (2019-2023)
District of Columbia	**692,683**	**701,974**	**683,154**	**670,587**	**678,972**	**-2.0%**
Suburban Maryland	**2,363,050**	**2,375,615**	**2,447,675**	**2,454,963**	**2,471,268**	**4.6%**
Charles County	159,428	161,448	165,209	167,035	171,973	**7.9%**
Frederick County	251,422	255,955	267,498	273,829	293,391	**16.7%**
Montgomery County	1,043,530	1,047,661	1,057,201	1,056,910	1,058,474	**1.4%**
Prince George's County	908,670	910,551	957,767	957,189	947,430	**4.3%**
Northern Virginia	**2,489,315**	**2,512,535**	**2,529,723**	**2,539,241**	**2,556,143**	**2.7%**
Arlington County	233,464	236,434	235,764	235,845	234,162	**0.3%**
Fairfax County	1,145,862	1,149,439	1,146,825	1,145,354	1,141,878	**-0.3%**
Loudoun County	395,134	405,312	413,574	420,773	436,347	**10.4%**
Prince William County	461,423	466,834	477,224	481,114	489,640	**6.1%**
City of Alexandria	157,613	158,309	158,185	157,594	155,230	**-1.5%**
City of Fairfax	23,531	23,312	23,980	24,242	25,144	**6.9%**
City of Falls Church	14,128	14,309	14,494	14,576	14,685	**3.9%**
City of Manassas	41,174	41,038	42,596	42,620	42,696	**3.7%**
City of Manassas Park	16,986	17,548	17,081	17,123	16,361	**-3.7%**
Total	**5,545,048**	**5,590,124**	**5,660,552**	**5,664,791**	**5,706,383**	**2.9%**

9.2 APPENDIX B: VEHICLE MILES TRAVELED (VMT) DATA BY JURISDICTION. 2019-2023

Jurisdiction	2018	2019	2020	2021	2022	2023	% Change (2019-2023)
District of Columbia	10,310,914	8,710,405	9,342,916	9,786,439	10,013,979	10,310,914	-2.88%
Suburban Maryland	63,313,562	52,870,082	58,854,658	59,202,740	59,950,685	63,313,562	-5.31%
Charles County	3,754,110	3,164,344	3,639,041	3,636,164	3,785,753	3,754,110	0.84%
Frederick County	9,467,260	7,978,279	9,058,767	9,084,658	9,300,411	9,467,260	-1.76%
Montgomery County	22,648,356	18,805,328	20,539,726	20,729,589	21,011,507	22,648,356	-7.23%
Prince George's County	27,443,836	22,922,131	25,617,123	25,752,329	25,853,014	27,443,836	-5.80%
Northern Virginia	56,635,696	43,293,544	48,081,696	54,606,326	55,318,547	56,635,696	-2.33%
Arlington County	4,707,760	3,481,197	3,553,404	4,537,570	4,483,806	4,707,760	-4.76%
Fairfax County	29,306,752	22,274,951	24,434,654	28,128,534	27,389,501	29,306,752	-6.54%
Loudoun County	8,227,063	6,356,708	7,629,343	8,743,344	9,287,856	8,227,063	12.89%
Prince William County	10,856,362	8,067,552	9,106,422	10,078,938	10,521,425	10,856,362	-3.09%
City of Alexandria	2,325,244	2,159,046	2,306,068	2,065,038	2,340,906	2,325,244	0.67%
City of Fairfax	503,811	389,140	440,850	415,458	480,494	503,811	-4.63%
City of Falls Church	144,555	109,898	111,260	127,407	135,710	144,555	-6.12%
City of Manassas	488,663	390,131	439,393	465,703	528,138	488,663	8.08%
City of Manassas Park	75,485	64,921	60,303	44,336	150,710	75,485	99.66%
Total	130,260,172	104,874,031	116,279,269	123,595,505	125,283,211	130,260,172	-3.82%

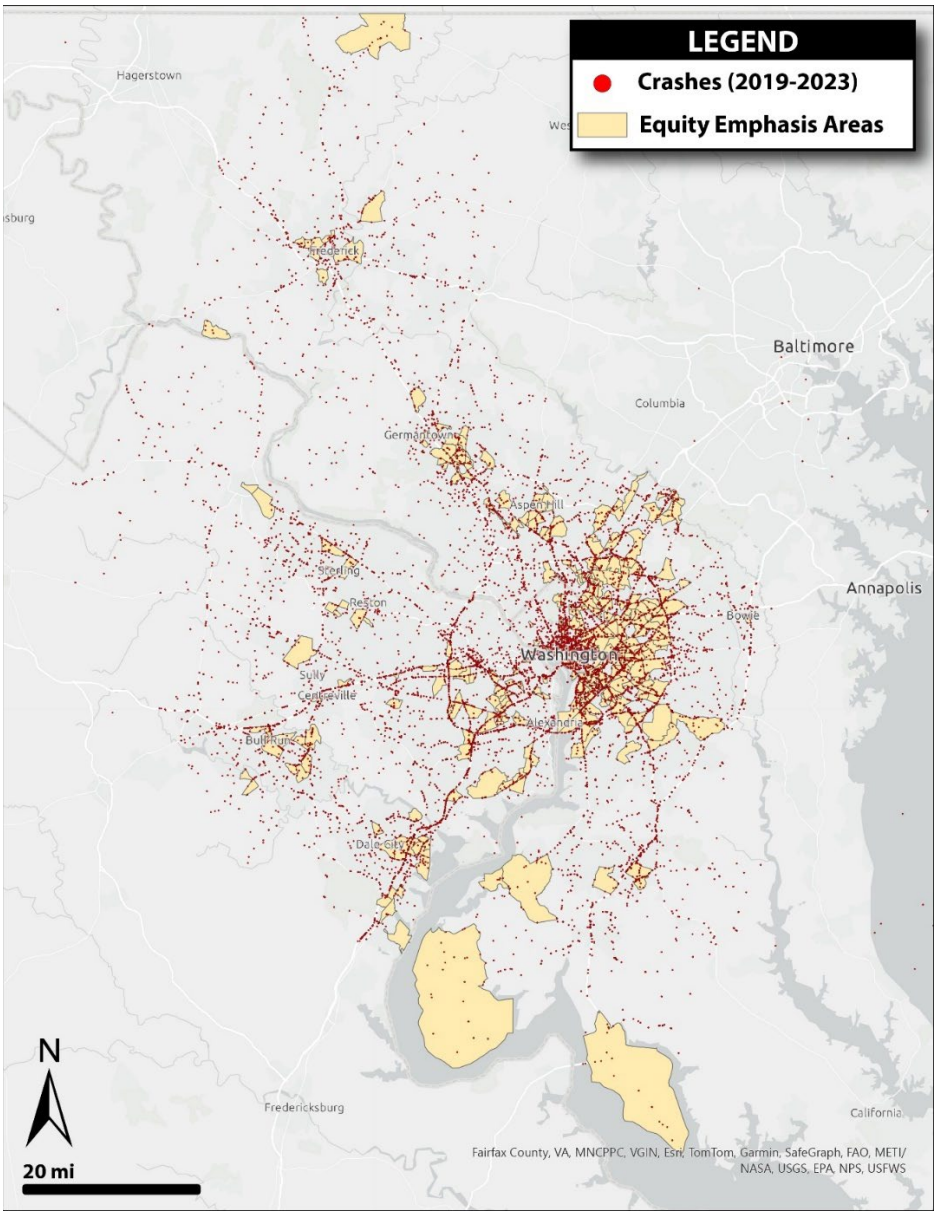
9.3 APPENDIX C: CRASH DATA BY TPB REGION AND JURISDICTION, 2019-2023



9.4 APPENDIX D: EQUITY EMPHASIS AREA ANALYSIS, 2019-2023

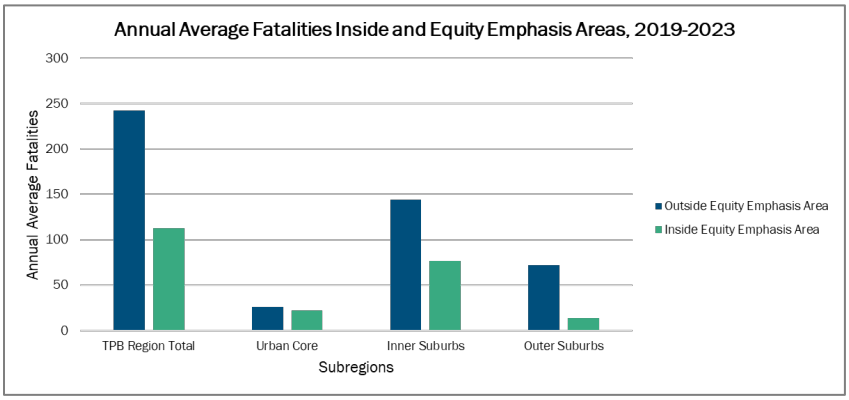
Equity Emphasis Areas (EEAs) are a regional planning concept adopted in 2021 by the COG Board of Directors to elevate equity and inform future growth and investment decisions. As of a 2022 update, 364 of the region's more than 1,300 census tracts are identified as EEAs, meaning they have a high concentration of low-income individuals and/or traditionally disadvantaged racial and ethnic population groups.[25]

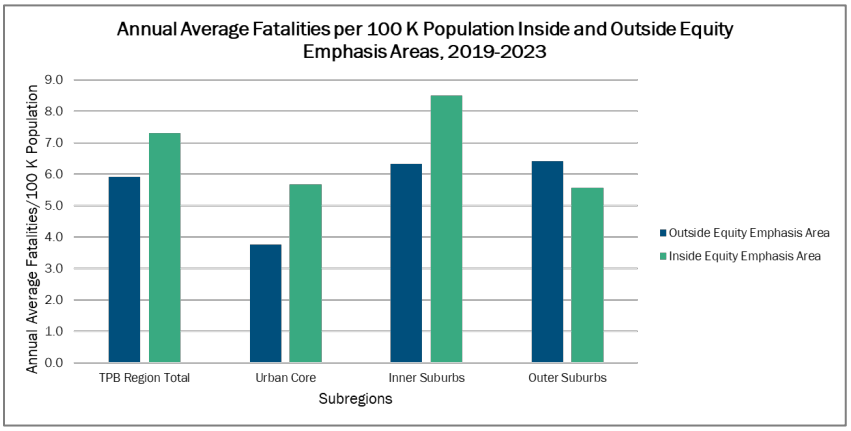
The map below depicts the EEAs overlayed with crash incidents from 2019 to 2023.[26] The graphs below illustrate crashes occurring either in or out of EEAs.

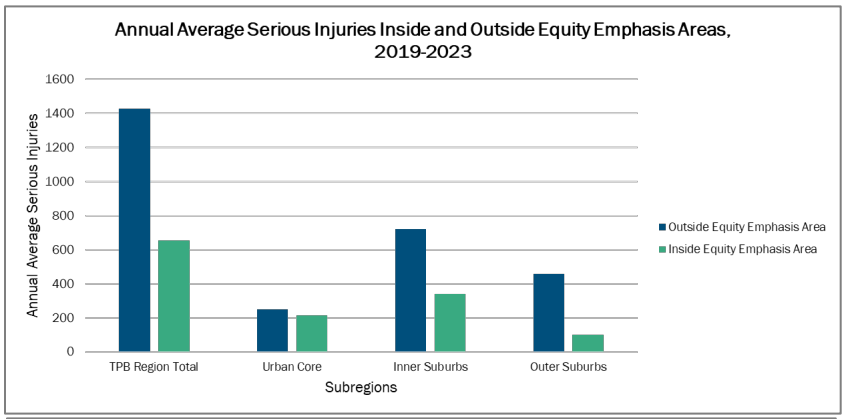


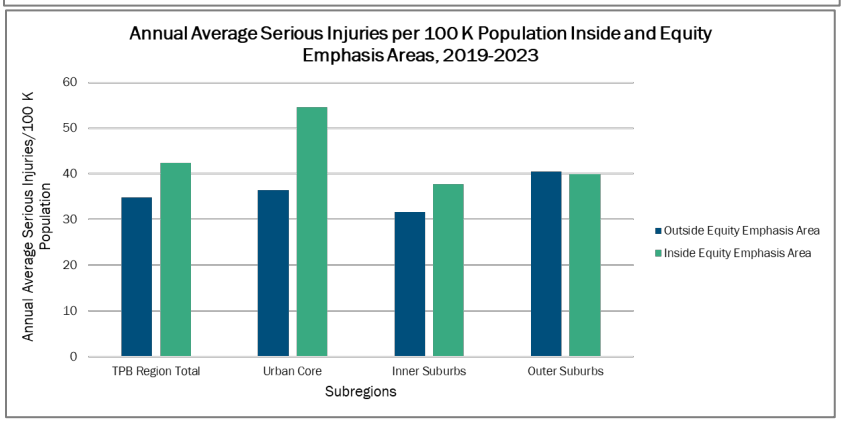
[25] https://www.mwcog.org/transportation/planning-areas/.

[26] As this study is an update of the previous Regional Safety Study, regional Equity Emphasis Areas were used in this analysis for consistency. Different or updated geographies may be used in future analyses.


Annual Average Fatalities Inside and Equity Emphasis Areas, 2019-2023
Annual Average Fatalities
300
250
200
150
100
50
0
TPB Region Total
Urban Core
Inner Suburbs
Outer Suburbs
Subregions
Outside Equity Emphasis Area
Inside Equity Emphasis Area


Annual Average Fatalities per 100 K Population Inside and Outside Equity Emphasis Areas, 2019-2023
Annual Average Fatalities/100 K Population
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
TPB Region Total
Urban Core
Inner Suburbs
Outer Suburbs
Subregions
Outside Equity Emphasis Area
Inside Equity Emphasis Area


Annual Average Serious Injuries Inside and Outside Equity Emphasis Areas, 2019-2023
Annual Average Serious Injuries
1600
1400
1200
1000
800
600
400
200
0
TPB Region Total
Urban Core
Inner Suburbs
Outer Suburbs
Subregions
Outside Equity Emphasis Area
Inside Equity Emphasis Area


Annual Average Serious Injuries per 100 K Population Inside and Equity Emphasis Areas, 2019-2023
Annual Average Serious Injuries/100 K Population
60
50
40
30
20
10
0
TPB Region Total
Urban Core
Inner Suburbs
Outer Suburbs
Subregions
Outside Equity Emphasis Area
Inside Equity Emphasis Area

- Between 2019-2023, EEAs experienced approximately half the fatalities and serious injuries compared to the rest of the region.
- The fatality rate and serious injury rate (normalized by population) in EEAs was higher for the NCR, the urban core, and the inner suburbs. The trends were different for the outer suburbs, where low income areas had a lower fatality rate, but similar serious injury rate compared to the rest of the region.
- The 2019-2023 trends are similar to the 2013-2017 trends with a few exceptions. The past study showed: (a) low income areas in the urban core had higher fatalities than the rest of the urban core, (b) low income areas exhibited higher fatality rates across all geographies, (c) low income areas in the inner suburbs had a lower injury rate than the rest of the inner suburbs.

9.5 APPENDIX E: MAPPING RECOMMENDED COUNTERMEASURES TO FOCUS AREAS

SAFETY COUNTERMEASURE	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
						
	PEDESTRIAN HIT BY A VEHICLE	BICYCLIST HIT BY A VEHICLE	INTERSECTION	SPEEDING	IMPAIRED DRIVING	PRINCIPAL ARTERIAL
SAFER ROADS						
Install pedestrian hybrid beacon and advanced yield signs, stop markings and signs, high visibility crosswalk markings	☑		☑			
Implement leading pedestrian interval (LPI) at intersections with high turning vehicle volumes	☑		☑			
Conduct pedestrian ***and bike road*** safety audits in areas with higher-than-average crashes	☑	☑	☑	☑	☑	☑
Evaluate mid-block crossings with higher rates of fatalities and serious injuries (especially those over 10,000 Annual Average Daily Traffic (AADT)) to determine the need for more improvements such as medians, refuge islands, pedestrian hybrid beacon, and rectangular rapid flashing beacons	☑	☑	☑			
Install pedestrian countdown signals	☑		☑			
Improve geometry of pedestrian and bicycle facilities at signalized intersections with high frequencies of pedestrian and/or bicycle crashes and on routes serving schools or other generators of pedestrian and bicycle traffic	☑	☑	☑	☑		
Provide walkways where appropriate, including paved shoulders, shared-use paths, trails, bicycle lanes and/or separated bike lanes	☑	☑				

SAFETY COUNTERMEASURE	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
						
	PEDESTRIAN HIT BY A VEHICLE	BICYCLIST HIT BY A VEHICLE	INTERSECTION	SPEEDING	IMPAIRED DRIVING	PRINCIPAL ARTERIAL
Install lighting at intersection and mid-block crossings to ensure motorists can see pedestrians crossing the road at locations with high pedestrian crashes	☑		☑			
Evaluate double-right turns at intersections to determine if removal of one right-turn lane is warranted	☑	☑	☑	☑		
Implement audible pedestrian crossing signals where appropriate	☑		☑			
Create pedestrian safety zone programs in areas with high occurrences of pedestrian crashes	☑		☑			
Replace intersections that have high numbers of fatalities and serious injuries with roundabouts, a circular intersection configuration with channelized approaches and a center island that results in lower speeds and fewer conflict points, wherever feasible	☑		☑	☑		☑
Utilize multiphase signal operation at signalized intersections with a high frequency of angle crashes involving left turning and opposing through vehicles as well as rear-end and sideswipe crashes	☑		☑			
Increase change intervals (when the traffic lights change) at signalized intersections at locations where too-short signal change intervals cause rear-end crashes and crashes between vehicles continuing and entering the intersection between phases			☑			
Improve left-turn channelization (providing definite paths for vehicles to follow) at signalized intersections where left-turn crashes, including those associated with left turning vehicles from through lanes, are an issue			☑			

	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
						
SAFETY COUNTERMEASURE	**PEDESTRIAN HIT BY A VEHICLE**	**BICYCLIST HIT BY A VEHICLE**	**INTERSECTION**	**SPEEDING**	**IMPAIRED DRIVING**	**PRINCIPAL ARTERIAL**
Improve right-turn channelization at signalized intersections with a high number of rear-end collisions			☑			
Install LED heads and reflective backplates (reflective borders around traffic lights that make them more visible) in locations with high numbers of signalized intersection fatal and serious injury crashes			☑			
Restrict access to properties using driveway closures or turn restrictions that are near signalized intersections with high crash frequencies related to driveways	☑	☑	☑			☑
Restrict or eliminate turning maneuvers (including right turns on red) or employ signal coordination at signalized intersections with a high frequency of crashes related to turning maneuvers	☑	☑	☑			☑
Improve signage at unsignalized intersections by ensuring foliage does not block the sign, the lettering is still reflective, and the sign is located where motorists can see it			☑			
Add reflective material to sign posts at unsignalized intersections			☑			
Install LED-enhanced stop signs at unsignalized intersections where there are a higher-than-average number of fatal and serious injury crashes	☑	☑	☑			
Implement high friction treatment at intersections that have a high number of rear-end crashes			☑			
Implement left-turn traffic calming (left turn hardening) to reduce left turn speeds and provide for safe turning	☑	☑	☑	☑		

	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
						
SAFETY COUNTERMEASURE	**PEDESTRIAN HIT BY A VEHICLE**	**BICYCLIST HIT BY A VEHICLE**	**INTERSECTION**	**SPEEDING**	**IMPAIRED DRIVING**	**PRINCIPAL ARTERIAL**
behavior at intersections that show a pattern of pedestrian-related left-turn crashes and intersection geometry that facilitates high speeds						
Implement roadside design improvements such as clear zones, slope flattening, and adding or widening shoulders to improve the ability for drivers to safely recover if they leave the travel lane						☑
Implement enhanced delineation treatments to alert drivers in advance of the curve including pavement markings; post-mounted delineation; larger signs and signs with enhanced retro reflectivity; and dynamic advance curve warning signs and sequential curve signs				☑		☑
Implement improvements including installation of cable barriers, guardrails, and concrete barriers to reduce the severity of roadway departure crashes						☑
Identify areas in the region that could benefit from traffic calming, including road diets that reduce the number of traffic lanes and planting trees that encourage reduced speeds	☑	☑	☑	☑		☑
Install high friction surface treatment (HFST) in locations where the available pavement friction is not adequate to support operating speeds at a sharp curve, inadequate cross-slope design, wet conditions, polished roadway surfaces, or driving speeds in excess of the curve advisory speed						☑
Install longitudinal rumble strips and stripes in locations where run-off-the-road crashes are high						☑

SAFETY COUNTERMEASURE	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
	 PEDESTRIAN HIT BY A VEHICLE	 BICYCLIST HIT BY A VEHICLE	 INTERSECTION	 SPEEDING	 IMPAIRED DRIVING	 PRINCIPAL ARTERIAL
Install the Safety Edge to eliminate the vertical drop-off at the pavement edge, allowing drifting vehicles to return to the pavement safely						☑
Develop a regional Safety Checklist or template as a tool for local jurisdictions to use during planning and project identification efforts	☑	☑	☑	☑		☑
SAFER PEOPLE						
Include pedestrian and bike safety and the risks of impairment for pedestrians, bicyclist, and drivers in alcohol related media campaigns	☑	☑		☑	☑	
Develop and implement pedestrian and bike safety programs for elementary school students	☑					
Continue the regional Street Smart Campaign and strengthen by aiding member jurisdictions to engage street teams and other elements of the campaign at more locations throughout the year	☑	☑	☑	☑	☑	☑
Develop and implement school focused pedestrian and bicycle strategies building on the work done in the Safe Routes to Schools program	☑					
Conduct education and fair, equitable, data-driven compliance campaigns focused on distracted driving (D.R.I.V.E, Texting and Driving Initiative)	☑	☑	☑	☑	☑	☑
Support legislative classification of distracted driving as a "moving violation" and decide if changes are needed	☑	☑	☑			☑
Provide public information, education, and training for older drivers on risks associated with signalized intersections such as red-light running, speeding, not	☑	☑	☑	☑		☑

SAFETY COUNTERMEASURE	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
	 PEDESTRIAN HIT BY A VEHICLE	 BICYCLIST HIT BY A VEHICLE	 INTERSECTION	 SPEEDING	 IMPAIRED DRIVING	 PRINCIPAL ARTERIAL
yielding to pedestrians, and difficulty judging speed and distance of approaching vehicles when making left turns						
Conduct a study to determine the safety needs of older adults in the region and coordinate internally and externally to provide information on transportation alternatives other than driving	☑	☑	☑	☑		☑
Implement safety awareness campaigns specifically for low seat belt use groups			☑			☑
Support state primary seat belt legislation			☑			☑
Implement strategic and well-publicized compliance programs aimed at young drivers	☑	☑	☑	☑	☑	☑
Conduct well publicized, multi-component compliance campaigns throughout the region to address underage drinking, including licensing actions for underage alcohol violations, and vendor compliance checks to reduce underage drinking					☑	
Implement and enhance server training programs to enable servers to identify underage customers and prevent overserving					☑	
Encourage uniform support for open-container laws, an effective countermeasure that prevents impaired driving by prohibiting the possession of any open alcoholic beverage container and the consumption of any alcoholic beverage by motor vehicle drivers or passengers					☑	

SAFETY COUNTERMEASURE	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
	 PEDESTRIAN HIT BY A VEHICLE	 BICYCLIST HIT BY A VEHICLE	 INTERSECTION	 SPEEDING	 IMPAIRED DRIVING	 PRINCIPAL ARTERIAL
Provide and encourage use of ride sharing programs (like SoberRide) to reduce impaired driving; encourage more late-night transit service to provide options other than driving while impaired	☑	☑			☑	
Conduct well-publicized compliance programs aimed at impaired drivers	☑	☑	☑	☑	☑	
SAFER SPEEDS						
Increase automated enforcement at intersections including speed on green lights, stop-light camera, blocking the box, etc.	☑	☑	☑	☑		☑
Reduce motor vehicle speeds by using data driven, effective, and equitable enforcement methods that utilize available technology, such as automated speed cameras, and other traffic calming strategies such as narrower lanes, adding roundabouts, and implementing road diets	☑	☑	☑	☑		☑
SAFER VEHICLES						
Increase use of ignition interlocks for impaired driving offenders	☑	☑	☑	☑	☑	☑
POST-CRASH CARE						
Evaluate incident response times to determine if additional Traffic Incident Management (TIMS) training and/or other resources are needed. Develop incident response plans for interstates and arterials throughout the region						☑
Encourage adoption of Pre-Hospital Blood Transfusion programs to increase the survivability of crashes by delivering blood sooner to trauma patients	☑	☑	☑	☑	☑	☑

	FOCUS AREAS AFFECTED BY COUNTERMEASURE					
						
SAFETY COUNTERMEASURE	**PEDESTRIAN HIT BY A VEHICLE**	**BICYCLIST HIT BY A VEHICLE**	**INTERSECTION**	**SPEEDING**	**IMPAIRED DRIVING**	**PRINCIPAL ARTERIAL**
Encourage and facilitate the implementation of Signal Pre-Emption for Emergency Vehicles by supporting technology adoption and knowledge sharing			☑			☑
Encourage and facilitate regional coordination between Traffic Incident Management Programs (TIMs), Emergency Responders, and 911 dispatchers to improve safety, efficiency, and patient outcomes						☑
Incorporate move-over messaging into the Street Smart program or campaigns.						☑