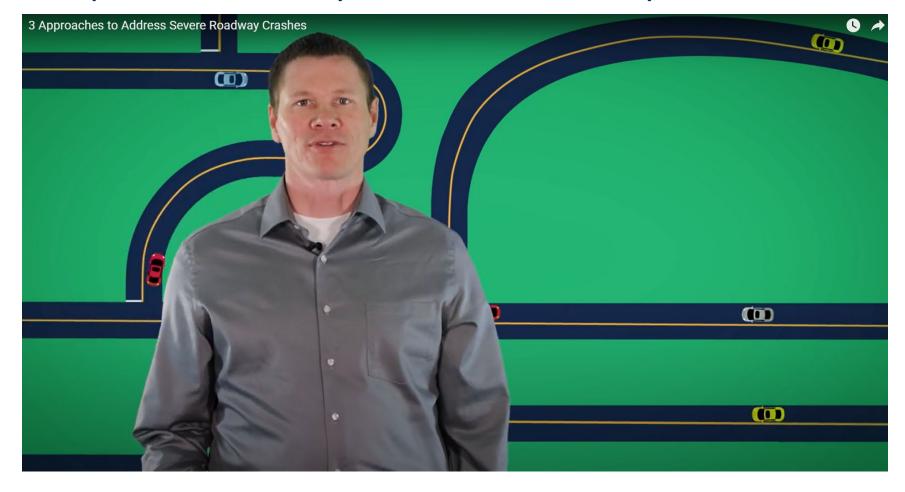
2025 National Regional Transportation Conference: Rural Safety Countermeasures

Natalie Villwock-Witte, PhD, PE

Wednesday, July 16, 2025

Data: Site Specific vs. Systematic vs. Systemic Analysis



https://www.youtube.com/watch?v=1Gtz0qjPx0M

You've analyzed your data — what's next?

Resources to Consult



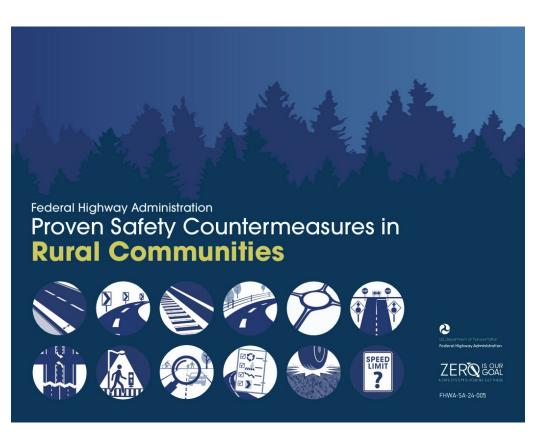
https://highways.dot.gov/sites/fhwa.dot.gov/files/2024-01/FHWA_PSCs_in_Rural_Communities_508.pdf



https://www.transportation.gov/sites/dot.gov/files/2024-10/NHTSA_Rural%20CMTW_508.pdf

Proven Safety Countermeasures in Rural Communities

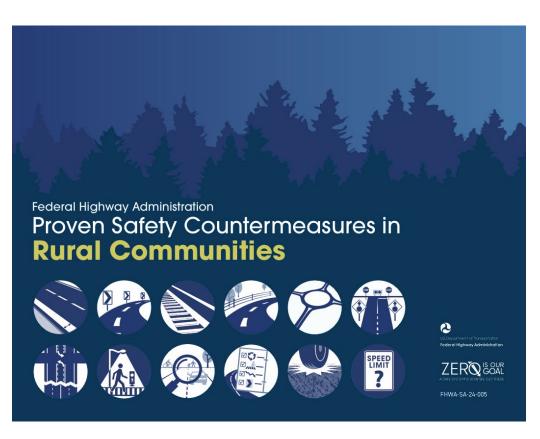




What if my data suggests that there is an over-representation of roadway departure crashes?

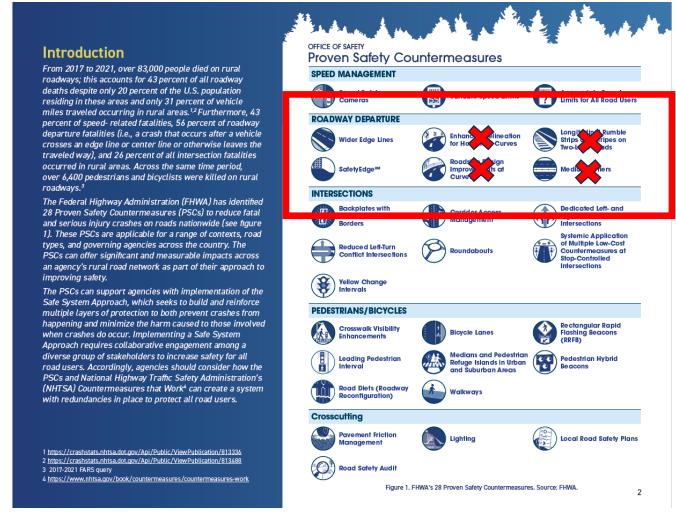
Proven Safety Countermeasures in Rural Communities





Proven Safety Countermeasures in Rural Communities

- A review of the data suggests that many of these crashes are occurring on straight portions of the roadway at several locations
- The crashes tend to be a vehicle leaving the roadway to the outside (not crossing the opposing direction)
 - **Site-specific:** Funding only allows the application of Safety Edge and the replacement of an eroded shoulder at one location with numerous crashes
 - **Systematic:** All straight roadway segments within a county had the SafetyEdge applied and the shoulder material refreshed.
 - Systemic: Upon closer inspection, it appears that narrow straight segments (e.g., 11 feet or less) with little or no shoulder had a greater number of road departure crashes. Any straight segments whose pavement width was 11 feet or less with no shoulders had the SafetyEdge applied and a shoulder added or the material rebuilt.



Why Rural?

Rural America makes up 97% of the Nation's land mass and—at the time of the 2020 U.S. Census—was home to more than 66 million people or 20% of the U.S. population (U.S. Census Bureau, 2023). While the U.S. Census Bureau defines rural a a "all population, housing, and territory not included within an urban area," rural definitions vary across the Federal Government and even within the U.S. Department of Transportation. The USDOT typically defines a rural area based on the community's location in relation to a U.S. Census-designated urban area of certain populations (e.g., the community is located outside of a U.S. Census-designated urban area with a population of 50,000 or more).¹ Regardless of the definition used, the communities that comprise rural America are distinctive and may vary by geography and population. The distinct characteristics of Tribal Nations in rural areas must be noted as well. Still, rural communities have a few things in common—they are critical to our nation's economic competitiveness and well-being, and they face challenges that impede their safety.

Rural roads are disproportionately affected by the ongoing crisis on our Nation's roadways. While only 20% of the U.S. population live in rural areas, the fatality rate per 100 million vehicle miles traveled (VMT) in 2021 was 1.5 times higher in rural areas than in urban areas (NCSA, 2023). Behavioral (e.g., speeding and higher speed limits), infrastructural (e.g., poor roadway conditions), and other factors (e.g., longer emergency response times) affect rural communities more adversely than urban communities, causing this gap to persist over time.

One reason for the higher fatality rates in rural areas concerns EMS. Emergency response times can be much greater in rural America due in part to the limited number of EMS personnet, large coverage areas, and long distances to trauma centers. In 2021 some 69% of drivers killed in rural areas died at the scenes of the crashes, compared to 52% of drivers killed in urban areas. Of all drivers who were transported to hospitals and died en route, 56% were in rural areas compared to 44% in urban areas (NCSA, 2023). The availability of emergency responders and access to trauma centers are essential to survival in rural crashes.

When a serious injury or fatal crash occurs, it can affect the entire community and have a devastating ripple effect on the community's social and economic fabric. The impact can be even more apparent in the smallest and most remote communities. Therefore, it is important that people living in and serving rural communities are knowledgeable about traffic safety countermeasures that can save lives.

What is a Countermeasure?

The countermeasures presented in this guide provide an overview for traffic safety stakeholders to familiarize themselves with behavioral strategies and identify opportunities to implement programs in their communities countermeasures are the basis for effective programs that save lives, prevent crashes, and make our roads safer for everyone.

The effectiveness of any countermeasure varies immensely across States and communities. What is done is often less important than how it is done. The best countermeasure may have little effect if it is not implemented vigorously, publicized extensively, and funded appropriately. The countermeasure effectiveness data presented in this guide shows the maximum effect that has been realized with high-quality implementation. Effectiveness ratings are based primarily on demonstrated reductions in crashes, however, changes in behavior and knowledge are factored into the ratings when crash information is not available. Countermeasure effectiveness is shown using a 5-star rating system:

5 Stars (★★★★★) — Demonstrated to be effective by several high-quality evaluations with consistent results.

4 Stars (★★★★) — Demonstrated to be effective by several high-quality evaluations in certain situations.

3 Stars (★★★) — Likely to be effective based on balance of evidence from high-quality evaluations.

2 Stars (**) – Limited evaluation evidence but adheres to principles of human behavior and may be effective if implemented well

1 Star (*) — No evaluation evidence but adheres to principles of human behavior and may be effective if

NHTSA Countermeasures

SPEED

Lower Speed Limits

Dynamic Speed Display/Feedback Signs

ALCOHOL-IMPAIRED DRIVING

Alcohol Ignition Interlocks

Publicized Sobriety Checkpoints

DWI Courts

DWI Offender Monitoring

Alcohol Vendor Compliance Checks

Alternative Transportation

Alcohol-Impaired Driving Mass Media Campaigns

SEAT BELTS AND CHILD RESTRAINTS

Short-Term, High-Visibility Seat Belt Law Enforcement

Nighttime, High-Visibility Seat Belt

aw Enforcement

Communication Strategies for Low-Belt-Use Groups as Part of High-Visibility Enforcement (HVE)

Programs for Increasing Child Restraint and Booster Seat Use

1 See the Bureau of Transportation Statistics Rural Funding Eligibility Tool for additional information on USDOT's rural definitions, www.transportation.gov/rural/eligibility.





What if my data suggests that there is limited use of seat belts in serious injury or fatal crashes?

Why Rural?

Rural America makes up 97% of the Nation's land mass and—at the time of the 2020 U.S. Census—was home to more than 66 million people or 20% of the U.S. oppulation (U.S. Census Bureau, 2023). While the U.S. Census Bureau defines rural as "all population, housing, and territory not included within an urban area," rural definitions vary across the Federal Government and even within the U.S. Department of Transportation. The USDOT typically defines a rural area based on the community's location in relation to a U.S. Census-designated urban area of certain populations (e.g., the community is located outside of a U.S. Census-designated urban area with a population of 50,000 or more).¹ Regardless of the definition used, the communities that comprise rural America are distinctive and may vary by geography and population. The distinct characteristics of Tribal Nations in rural areas must be noted as well. Still, rural communities have a few things in common—they are critical to our nation's economic competitiveness and well-being, and they face challenges that impede their safety.

Rural roads are disproportionately affected by the ongoing crisis on our Nation's roadways. While only 20% of the U.S. population live in rural areas, the fatality rate per 100 million vehicle miles traveled (VMT) in 2021 was 1.5 times higher in rural areas than in urban areas (NCSA, 2023). Behavioral (e.g., speeding and higher speed limits), infrastructural (e.g., poor roadway conditions), and other factors (e.g., longer emergency response times) affect rural communities more adversely than urban communities, causing this gap to persist over time.

One reason for the higher fatality rates in rural areas concerns EMS. Emergency response times can be much greater in rural America due in part to the limited number of EMS personnet, large coverage areas, and long distances to trauma centers. In 2021 some 69% of drivers killed in rural areas died at the scenes of the crashes, compared to 52% of drivers killed in urban areas. Of all drivers who were transported to hospitals and died en route, 56% were in rural areas compared to 44% in urban areas (NCSA, 2023). The availability of emergency responders and access to trauma centers are essential to survival in rural crashes.

When a serious injury or fatal crash occurs, it can affect the entire community and have a devastating ripple effect on the community's social and economic fabric. The impact can be even more apparent in the smallest and most remote communities. Therefore, it is important that people living in and serving rural communities are knowledgeable about traffic safety countermeasures that can save lives.

What is a Countermeasure?

The countermeasures presented in this guide provide an overview for traffic safety stakeholders to familiarize themsel with behavioral strategies and identify opportunities to implement programs in their communities. Countermeasures a the basis for effective programs that save lives, prevent crashes, and make our roads safer for everyone.

The effectiveness of any countermeasure varies immensely across States and communities. What is done is often less important than how it is done. The best countermeasure may have little effect if it is not implemented vigorously, publicized extensively, and funded appropriately. The countermeasure effectiveness data presented in this guide show; the maximum effect that has been realized with high-quality implementation. Effectiveness ratings are based primarily on demonstrated reductions in crashes, however, changes in behavior and knowledge are factored into the ratings whe crash information is not available. Countermeasure effectiveness is shown using a 5-star rating system:

5 Stars (★★★★★) — Demonstrated to be effective by several high-quality evaluations with consistent results.

4 Stars (★★★★) — Demonstrated to be effective by several high-quality evaluations in certain situations.

3 Stars (★★★) — Likely to be effective based on balance of evidence from high-quality evaluations.

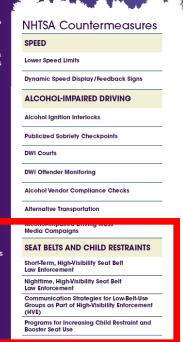
2 Stars (**) – Limited evaluation evidence but adheres to principles of human behavior and may be effective if

Western

Institute

Transportation

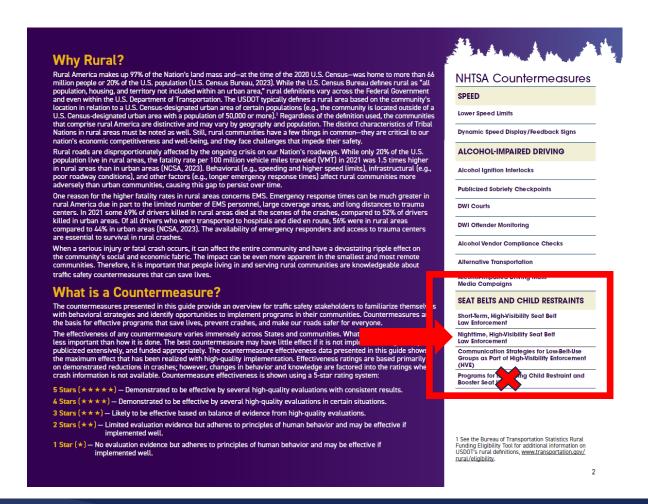
1 Star (*) — No evaluation evidence but adheres to principles of human behavior and may be effective if



1 See the Bureau of Transportation Statistics Rural Funding Eligibility Tool for additional information on USDOT's rural definitions, <u>www.transportation.gov/</u> rural/eligibility.



- A review of the data does not suggest that unbelted children are experiencing serious injuries or fatalities during crashes.
- Of the serious injury and fatal crashes, those occurring late in the evening (e.g., 10pm-12am) seemed to have reports of more unbelted occupants.



- Questions Consider to Include:
 - How many (3, 5?) high-visibility enforcement activities will be conducted, and over what time period (1, 3, or 5 years)?
 - What levels of law enforcement are able to be involved (e.g., local, county, state)?
 - What media will be disseminated, via what methods (radio, TV, social media)? Is there a focus group for the information (e.g., males, 16-24 years of age)? If so, how does that influence the methods of dissemination?

Nighttime, High-Visibility Seat Belt Law Enforcement

Resources focused on nighttime seat belt enforcement may provide additional gains in seat belt use and injury reduction. In particular, belt law checkpoints, saturation patrols, or enforcement zone operations could be conducted at night, when belt use is lower, DWI is higher, and crash risk is greater than during the day. Enforcement activities should be conducted in locations with adequate lighting or by using light enhancing technologies.

Effectiveness: 5 Stars (★★★★)

Chapter: Seat Belts and Child Restraints

Examples

➤ A 3-year high-visibility nighttime seat belt enforcement program conducted in Maryland successfully raised nighttime seat belt use (Retting et al., 2018). This program included five waves of HVE coupled with extensive paid and earned media. The primary message of the ad campaign was: "Cops are cracking down on seat belt violations, especially at night." Driver awareness of the seat belt enforcement increased significantly during the HVE period. Furthermore, even though seat belt use rates were already high in this region (90-95%), there was a small but significant increase in observed nighttime seat belt use in three of the five waves when compared to a pre-HVE period.

7

Concluding Thoughts

- The only acceptable number is zero
- There is no single solution to address crashes
- Review changes to crash occurrence over time
- Engage the community for sustainability
- These resources are a good starting point.

Additional Resources

- National Center for Rural Road Safety (https://ruralsafetycenter.org/)
 - Webinar on Human Factors: https://www.youtube.com/watch?v=C0XZi 7dCMk
- For guidance on how to implement an urban countermeasure in the rural context, see Highway Safety Behavioral Strategies for Rural and Tribal Areas

(https://nap.nationalacademies.org/catalog/27197/highway-safety-behavioral-strategies-for-rural-and-tribal-areas-a-guide)

 Implement a Serious Injury/Fatal Crash Review Team BEHAVIORAL TRAFFIC SAFETY COOPERATIVE RESEARCH PROGRAM

BTSCRP RESEARCH REPORT 8

Highway Safety Behavioral Strategies for Rural and Tribal Areas

A GUIDE

Jaime Sullivan

WESTERN TRANSPORTATION INSTITUTE
MONTANA STATE UNIVERSITY
BOZEMAN, MT

Jay Otto
Katie Dively
Bridget Hanson
Kari Finley
Karen Gee
Samantha Pinzl
Jamie Arpin
Center for Health AND SAFETY CULTURE
MONTANA STATE UNIVERSITY

Bozeman, MT

AND

Cara Hamann
University of Iowa

Iowa City, IA

Subscriber Calegories
Highways • Safety and Human Factors

Research sponsored by the Governors Highway Safety Association and National Highway Traffic Safety Administration

NATIONAL Sciences Engineering Medicine

TRANSPORTATION RESEARCH BOARD

2023

Questions?

Natalie Villwock-Witte, PhD, PE n.villwockwitte@montana.edu 505-414-8935