Rural-Urban IMPACT Analysis Compares Special Crash Problems Associated with Rural and Urban Areas 2017-2021 Crash Data By David B. Brown (<u>brown@cs.ua.edu</u>) March 7, 2023

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Introduction

The purpose of this study was to produce as much information as possible to enable drivers to know what the crash records reveal to be the particular dangers or Rural and Urban driving. With this information it is not anticipated that drivers would seek out one of these environments rather than another, because they are usually fixed by each trip. However, it is expected that this information can better help them adjust their driving styles and habits as they recognize that they are transitioning from one roadway environment type to the other. As defined by the crash report, these two roadway environments are mutually exclusive.

The report is subdivided into the following parts to enable the presentation to evolve in a reasonable way:

- 1. As a continuation of this Introduction, a high level orientation of the Rural and Urban roads in Alabama will be given. This will be accomplished by presenting a frequency distribution that shows these roadway environments in Alabama. This is followed by a cross-tabulation of Rural/Urban by Crash Injury Severity to provide a feel for the different consequences of these crashes.
- 2. The Introduction will continue by providing a definition of IMPACT so that the IMPACT displays and their summaries can be better understood. This will use the C011 Highway Classification IMPACT output display to exemplify the terminology involved..
- 3. Driver advisories for each of the environments (Rural and Urban) will then be given to produce concise presentations so that drivers might have the information in a nutshell to adjust their driving strategies accordingly.
- 4. An Executive Summary for the much more detailed IMPACT outputs will be given to provide a quick reference to them.
- 5. The detailed IMPACT analysis referenced back to summaries above by the crash report numbers. This will enable readers to see the sources for the conclusions drawn.

The acronym Causal Unit (CU) is used to refer to the unit that the reporting officer felt had the highest chance of being the cause of the crash.



C010 Rural or Urban (Total Statewide Frequency Breakdown)

All crashes that occurred in calendar years 2017-2021 are included and being considered in this study. Generally, in IMPACT studies, we let the particular crash subject of concern (e.g. speed, distracted driving, DUI, etc.) to be the focus of the study, and all other crashes (e.g., non-speed) are compared to it within each IMPACT run. It should be obvious that if we compare crash attributes, for example of speed-caused crashes against those that are not speed causes, that this will give us insight into what is different between speed and non-speed for these crashes. This information is extremely valuable in developing crash countermeasures.

This study is different from the typical in that we will be looking at both the Rural and the Urban crashes simultaneously and drawing conclusion regarding both of them. We will focus on Rural crashes as a pseudo primary problem, however, because Rural crashes tend to be more severe. The cross-tabulation on the next page quantifies this difference. The frequency distribution above shows that 23.48% of the total crashes occurred in the Rural roads, whereas the rest (76.52%) occurred in the Urban roads. Crashes in city limits are determined to be Urban, all others are Rural.

Every crash report requires the entry of a city code (if one exists) to provide this information. Reporting officers will determine this from whether the crash occurred within the city limits, or sometimes within the police jurisdiction of an incorporated city. It should be understood that this is not a definitive statement of the area environments under consideration, and we will consider this in more detail when we address C033 Locale, which will be one of the first IMPACTs performed.

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	Rural	Urban	TOTAL					
Fatal Injury	2597 1.45%	1724 0.30%	4321 0.57%					
Suspected Serious Injury	11680 6.52%	10516 1.80%	22196 2.91%	_				
Suspected Minor Injury	20985 11.72%	39078 6.70%	60063 7.88%	-				
Possible Injury	12304 6.87%	56093 9.61%	68397 8.97%	-				
Property Damage Only	126675 70.74%	460496 78.91%	587171 76.99%					
Unknown	4837 2.70%	15672 2.69%	20509 2.69%	-				
TOTAL	179078 23.48%	583579 76.52%	762657 100.00%					
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C010 by C025 CU Crash Severity by Rural or Urban

Of the Fatal Injury crashes 1.45% occurred in the Rural areas, while only 0.30% occurred in the areas indicated to be Urban, so from just a percentage point of view, the rural areas had (4.833) - close to five times – the fatal crashes. It is about the same ratio when we look at it as number of fatal crashes per crash. For Urban crashes, this is 1724/583579 = one for every 338.5 crashes, while the Rural fatal crash rate is 2597/179078 = one fatal crash for every 69.0 rural crashes, which also shows Rural roads have about five times the fatal crashes per crash more than on the Urban roads.

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•	County			75508	42.16	30645	5.25	8.030*	66104.226	C010: Rural or	Urban		
	Intersta	ite		36759	20.53	50207	8.60	2.386*	21352.398	C011: Highway	y Classificatio	ins	
	State			39828	22.24	100690	17.25	1.289*	8930.103	C012: Controll	ed Access		
	Federal	I		24647	13.76	73330	12.57	1.095*	2144.837	C015: Primary	Contributing	Circum	stanc
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C011 Highway Classification IMPACT Example

General Discussion of IMPACT Output Terms Using Highway Classification for Example

IMPACT in this context stands for *Information Mining Performance Analysis Control Technique*. It is an analytics technique that can be applied to any database for which the cases are made up of a number of *attributes*. The attributes are used, not only to subdivide the data into two comparable subsets, but which enable these subsets to be compared for all pairs of these attributes.

To understand the details of how IMPACT is used to create information from the comparison of two datasets, please see *TECHNOLYTICS*, which is available on Safe Home Alabama at <u>Technolytix - Home</u> or <u>https://technolytics.net</u>. A brief summary of these details is given below.

General definitions for the IMPACT outputs. These are best understood in terms of a simple IMPACT output. We will use the Highway Classifications output given above to illustrate the concepts.

Ordering. A list of the attributes are found in the far right column of the IMPACT output. Generally, this ordering is maintained for the IMPACT report.. However, for the Rural/Urban application, exceptions were made where certain attributes were closely related to others. This grouping was done to give additional explanation for given attribute subjects. When this was done, the attribute name was indented in the various Word lists below the main subject. This is for the IMPACT outputs in general, each of which is for a different attribute. The ordering of the lists within the IMPACT tables is discussed next.

General components of the IMPACT outputs. Each IMPACT output has two components: a table and a chart below the table. Each can have the results of the analysis listed in a variety of orders as specified in the Order box just above the table. However, in most cases only two orders are considered (1) Max Gain and (2) Natural Order, according to which ordering will make more sense to the reader. More details will be given on these below.

Max Gain. Generally, the ordering within the tables will be by largest Max Gain first, since this provides a metric by which attribute values can be compared against each other. The Max Gain for items that tend to cause problems is defined to be the reduction in crashes that would result if the percent by which the item is over-represented were reduced to one, indicating no over- or under-representation for that attribute. For example, in the example C011 Highway Classification output, the Max Gain for the attribute "County roads" is 66,104.226.

The over-representations are computed from the *Subset Percent* and *Other Percent* columns, which for the County roads example are 42.16% and 5.25%, respectively. These percentages represent the odds of any crash either occurring on a County road (42.16%), or not on a County Road (5.25%). This makes the ratio of these two percentages (or the *Odds Ratio*) to be 42.16%/5.25% = 8.030 (see it under the *Odds Ratio* heading). The Max Gain for County roads is a little over 66,104; so this is saying that if somehow we could change the odds so that County roads would have the same percent as <u>not</u> County roads, e.g., in this example, 5.25%, the number of crashes that would be reduced would be a little over 66,104. Those that have proportions that are more favorable (at the bottom of the table listing) will have negative Max Gains indicating that changing their under-representation to "1.00" would result in an increase in crashes.

Natural Order. When an expected natural ordering of the output will make more sense (for attributes such as time of day, day of the week, year and several others), the ordering can be changed to Natural Order as opposed to Max Gain order. See the Order specification box immediately above the tables.

Subset Frequency and Subset Percent. These are the frequencies and percentages of the corresponding attribute values for the subset, which for this application is Rural.

Other Frequency and Other Percent. These are the values to which the subset attribute values are compared for any given application (for this example, Urban. For example, if the Subset Frequency for the Day of the Week Rural subset was for Sunday, the Other Frequency would be the number of Urban crashes for Sunday. In this example, this column counts all Day-of-the-Week values that are not for Rural. The subset and other percentages are also called the Odds because they represent the probability (Odds) with which each of these events occur. The *Other Percent* serves as a control in that it tells us what the subset frequency would be if not Rural.

Odds Ratio. The Odds Ratio is the ratio between the *Subset* and *Other* percentages. This measures the degree to which the *Subset* is at variance with the *Other*. A large Odds Ratio indicates that there is a large disparity, and, if it is over 2, then the background is colored red. At

the other end of a Max Gain ordered listing, if the Odds Ratio is less than 0.50, then the background will be a green.

*. An Odds Ratio with an asterisk on it is an indication that the *Subset* and *Other* data are significantly different from each other from a statistical point of view. No analysis is performed in this regard if the frequency for either the Subset or the Other value of the given attribute is less than 20 cases, due to the requirements of the statistical test being applied.

Driver Advisories for Rural and Urban Driving

The purpose of this section is to answer the questions that drivers might have depending on whether they expect to be driving in Rural areas as opposed to Urban, or from transitioning from one to the other. Some issues apply to both, and it is recognized that most trips involve some combination of Rural and Urban driving. However, the primary focus will be on the particular area type that is expected in order to sharpen the knowledge of issues within each. This is to accommodate the changes in perception required when drivers move from Rural to Urban or vice versa.

The formal definition of Rural and Urban as used for crash reporting is determined by whether the crash occurred within the city limits of an incorporated city (Urban), or not (Rural). Thus, if there is an entry in the part of the report form that requires a city, the crash will be determined to be Urban. If no city is entered, then this crash will be recognized to be on a Rural road. This distinction is admittedly imperfect, and it is recognized that "open country" areas exist in some cities, just as some Rural areas might contain unincorporated Urban roads. It is expected that these two types of error will involve a relatively small number of crashes, and that they will generally "cancel each other out."

Issues of Driving in Predominately Rural Roadways

These "issues" will be arranged below in the order considered to be the most critical combination of frequency and severity that they cause (in the experience of the author). It is understood that drivers have very little choice to drive in Rural as opposed to Urban (or vice-versa), and the purpose here is not change their driving habits in this regard. The purpose in this section is just to alert drivers of what additional safety factors they need to apply when they are driving in predominantly Rural areas. Those for Urban areas are covered in the section following this one.

- C015 Primary Contributing Circumstances -- Speed. While speed limits are generally higher, there is nothing mandating greater speeds in Rural areas, except some Interstates with minimum speeds specified. For most drivers the actual speed chosen is a combination of what they consider to be (1) acceptably safe, and (2) not apt to get them a speeding ticket. The fact that you are traveling a safe speed is no guarantee that you will not fall victim to someone who is not, and we shall see that excessive speed is much more common on Rural than Urban roads.
 - C224 CU Estimated Speed at Impact. All collision speeds in excess of 40 MPH were very highly significantly over-represented (Odds Ratios between 2.004 and

7.086). The only exception was 96 to 100 MPH, which was over-represented with an Odds Ratio of 1.372.

- C223 CU Speed Limit. With the exception of 60 MPH, all speed limits in excess of 50 MPH had over-representations in Rural areas with Odds Ratios ranging from 2.338 to 5.481. The typical county road speed limit of 45 MPH had 45,958 occurrences with an over-representation in rural areas of 1.207.
- C025 Crash (Injury) Severity. This is highly related to speed an increase in impact speed of 10 MPH has been found (on average, above 40 MPH) to double the probability of a crash resulting in death. Other factors affecting injury severity include the following:
 - C323 Motorcycle Safety Equipment (Rural and Urban combined statistics). Helmet used 1 death in 26.5 crashes; no helmet 1 death in 9.7 crashes.
 - C323 Seatbelts (Rural and Urban Combined Statistics). With shoulder and lap belt: 1 death in 388.9 crashes; with no restraints: 1 death in 14.5 crashes.
 - C036 and C038 Police and Ambulance Delay. First responder time to the crash will be longer in Rural crashes for the obvious reasons that most police and EMS services are concentrated in urban areas. There is also a problem in Rural roads where the traffic volume is quite low, that the crash itself may not be discovered as quickly as on Urban roadways, especially in dark areas.
- C226 and C227 Vehicle Damage and Vehicle Towed (crash severity). Even if the safety equipment that is used (e.g. seatbelts) results in reduced injury severity, the downside of crashes with greater velocity on Rural roads is significantly more damage to the vehicles involved.
- C011 Highway Classification. Crash frequencies by Highway Classifications are highly significantly different for Rural than for Urban road crashes. Rural travelers are 8.030 times more likely to be on a County road and 2.386 more likely to be on an Interstate. There are also increased probabilities for State (1.289) and Federal roads (1.095). The construction (e.g., clear roadsides) of the various highway classifications can be highly related to both frequency and severity of crashes related to these roads.
- C412 CU Trafficway Lanes. The number of lanes is most often determined by the traffic density. While the additional lanes tend to inspire higher speeds, this might be countered by the increase ability of police and EMS to arrive at the scene in a shorter time. The probability of a fatality per crash on a two-lane Rural road is one in 40.2, while that same probability for four lane rural roads is one in 62.0.
- C052 Number of Vehicles. Single Vehicle crashes on Rural roads were over-represented by 3.513 times the probability of a Single Vehicle crash on Urban roads.
- C023 Manner of Crash. The following two crash types had the highest frequencies as well as the highest Odds Ratios (both given in parenthesis): Single Vehicle Crash all types (82,486, 4.020), and Sideswipe Opposite Direction (4,693, 1.612).
- C006 Day of the week. Weekends (Saturdays and Sundays) are over-represented both because the traffic mix is largely non-commuters on the road and issues with alcohol and other drugs. See C122 and C123 below.
- C019a Most Harmful Event (Rural Over-representations). The following rural results had a combination of a large frequency over 1000 crashes per year and an Odds Ratio of over 5.000. Both of these metrics are given in parenthesis: Overturn/Rollover (16,501,

9.726), Collision with Tree (16,290, 6.641), Collision with Ditch (11,266, 5.603), and Collision with Animal: Deer (6,939, 6.081).

- C008 Time of Day. The early morning hours from midnight until 7 AM are the most over-represented, with a second lower over-represented group occurring in the evening (7:00 PM through midnight), so these times might be avoided when driving on Rural roads.
- C031 Lighting Conditions. As indicated by the time of day, those hours without sunlight, and those areas without lighting are the largest problems for Rural roads.
- C004 Month. Rural crashes tend to occur during the winter months of December and January, and the summer months of June and July. The winter increase is typically linked to weather conditions, while the summer increase has more to do with increased vehicles on the Rural roads.
- C015 Primary Contributing Circumstances (PCCs) Fatigued/Asleep. The longer driving times as well as the unchanging environment lead to about 4.516 times the probability of falling asleep at the wheel on Rural roads as opposed to Urban roads.
- C015 Primary Contributing Circumstances (PCCs) DUI. Crashes due to driving
 impaired by alcohol or other intoxication drugs occur on Rural roads with a proportion
 that it 2.488 times that which occurs on Urban roads. One reason for this is the increased
 time spent on the roads when impaired driving occurs in the Rural areas. Just because
 you do not drink or take drugs is no reason to think this problem will not affect you –
 there are many innocent victims, so it is best to avoid Rural roads during the nighttime
 hours.
 - C122 Officer's Opinion Alcohol. The Rural roads are clearly those most apt to have crashes caused by DUI – Alcohol. The proportion of these crashes was 5.69% as compared to only 2.61% for those in the Urban areas (a highly significant Odds Ratio of 2.183).
 - C123 Officer's Opinion Non-Alcohol Drugs. While only about a third of the number, the proportions and Odds Ratios look very much the same as DUI Alcohol given above. The proportion positive here was 1.94 for the Rural roads, but only 0.96 for the Urban roads, which results in an Odds Ratio of 2.025 (amazingly close to that of DUI alcohol above).
- C015 Primary Contributing Circumstances (PCCs) Swerved to Avoid Animal. In over 90% of the cases the animal is a deer, but even large farm animals are several times more likely to wander out into a Rural as opposed to an Urban road.
 - C017 First Harmful Event. The following are the top four crash types, each of which had more than 5,000 (1,000 per year): Collision with Ditch (15,580), Collision with Tree (12,218), Collision with Animal: Deer (7,243), and Overturn/Rollover (5,656).
- C015 Primary Contributing Circumstances (PCCs) Unseen Object /Person/Vehicle. This item is over-represented only by an Odds Ratio of 1.356, but its frequency in rural areas of 14.731 over the five years was the highest PCC, just below to the two combined speed indicators.
- C015 Primary Contributing Circumstances other Rural PCCs with over 1,000 crashes per year: Defective Equipment (5,611), Swerved to Avoid Vehicle (6,930), Other Distraction Inside the Vehicle (5.950), and Ran off Road (5,360). Frequencies given are over the five years of the 2017-2021 data.

• C101 Causal Unit (CU) Type. The highest frequency causal units for Rural Crashes were: Pick-Up – Four-Tire Light Truck (37,707), Tractor/Semi-Trailer (6,996), Motorcycle (2,406), and Single-Unit Truck – 2-Axle/6-Tire (2,280).

Issues of Driving in Predominately Urban Roadways

These are arranged in the same ordering as those above for ease of reference. The following were found to be issues particularly associated with Urban driving:

- C015 Primary Contributing Circumstances -- Speed. While speed limits are generally lower in Urban areas, there is nothing keeping some violators from exceeding the speed limits. They will most often be weaving in and out trying to get ahead of slower vehicles. When identified, special care should be given not to conflict with their behavior. Once they get ahead they generally pose fewer problems. Despite being under-represented on the Urban roads, the combination of Over the Speed Limit and Driving too Fast for Conditions was a total of 18,342 crashes, so speed is an issue.
 - C223 CU Speed Limit. With the exception of 45 MPH, all speed limits below 55 MPH were over-representations for Urban roads. The most common speed limit for County roads (both Urban and Rural) is 45 MPH, and that is the reason that this speed is under-represented.
- C025 Crash (Injury) Severity. The two lowest injury severities, Property Damage Only and Possible Injury were over-represented for Urban roads. Despite this, there were still 1724 fatal crashes on Urban Roadways, and of there, 224 were pedestrian crashes. This was out of a total of 794 total pedestrian crashes, which is 30% of all pedestrian crashes.
 - C323 Motorcycle Safety Equipment (Rural and Urban combined statistics). Helmet used resulted in one death in 26.5 crashes; no helmet one death in 9.7 crashes.
 - C323 Seatbelts (Rural and Urban Combined Statistics). With shoulder and lap belt: one death in 388.9 crashes; with no restraints: one death in 14.5 crashes.
- C011 Highway Classification. Municipal and Private Property were the only two classifications over-represented for urban crashes. Municipal had an Odds Ratio of 44.869, since only 1.16% of Municipal crashes are recorded to occur on Rural roads. Federal, State, Interstate and County roads were all under-represented.
- C412 CU Trafficway Lanes. Two lanes is the only number of lanes that is underrepresented, having only 37.39% of their proportion on Urban as opposed to 62.06% on Rural roads. Four lanes and 6 lanes (or more) account for about another 40% of Urban road crashes.
- C052 Number of Vehicles. By far, the largest frequency for number of vehicles on Urban roads is two-vehicle crashes (469,385), with 80.43% of the Urban crashes and an over-representation indicated by an Odds Ratio of 1.662. Four vehicles or above accounted for over 30,000 more crashes. Only about 13.56% of Urban crashes involve a single vehicle.
- C023 Manner of Crash. The largest number of Urban crashes were Rear End (front to rear). These are generally caused by what is known as "tailgating," i.e., driving too close to another vehicle resulting is a crash when the car in front applies the brakes. The following are the top four Manner of Crash types (total five year frequencies in

parenthesis): Rear End – front to rear (223,657), Side Impact – angled (56,339), Side Impact – 90 degrees (58,813), and Sideswipe - Same Direction (60,421). All other types had frequencies less than 20,000 over the five years.

- C006 Day of the week. Weekend days (Saturday and Sunday) are under-represented in Urban crashes. All of the other ("work") days are under-represented.
- C019b Most Harmful Event (Urban Over-representations). The following Urban results had a large frequency over 5,000 crashes over the five years of the data (frequencies given in parenthesis): Collision with Vehicle in Traffic (446,181), Collision with Parked Motor Vehicle (32,938), and Collision with Vehicle in (or from) Other Roadway (15,552), and Ran Off Road Right (6,814). Ran Off Road Left was the next down on the list with 3,892 crashes.
- C008 Time of Day. The greatest Urban crash over-representations were from 11 AM through 5:59 PM. Later evening hours are under-represented from 7:00 PM through 7:59 AM. Rush hours, especially those in the afternoon are dramatically over-represented. Optimal time for shopping would be 8:00 AM through 11:00 AM.
- C031 Lighting Conditions. The favored time for travel is in natural daylight, and as a result the largest number of crashes occur during these times. Dark times, either with roadway lighting or not are the conditions that have the fewest Urban crashes. The following are the top 4 conditions with the largest number of crashes (frequency during the five-year reporting period): Daylight (430,604), Dark Spot Illumination Both Sides of Roadway (44,797), Dark Continuous Lighting Both Sides of Roadway (23,566), and. Dark Spot Illumination One Side of Roadway (22,021).
- C004 Month. Urban crashes tend to occur in the early Spring months (February, March and April) along with others to the end of the year (August, September, October and November. None of these have dramatically high Odds Ratios, and so we conclude that the month of the year is not a major factor in Urban crashes, which generally follow the natural variations.
- C015 Primary Contributing Circumstances (PCCs) Following too Close (86,549) and Misjudge Stopping Distance (54,591). These two PCCs point to the largest crash frequencies for Urban crashes. They account for most of the rear-end crashes. The connection between them is obvious, and it might be difficult for the reporting officers to distinguish between them.
- C015 Primary Contributing Circumstances (PCCs) Failed to Yield. The following list demonstrates the various ways that Urban drivers: (1) Failed to Yield, (2) Ran Traffic Signals, and (3) Ran Stop Signs. All (except those noted otherwise) were over-represented for Urban crashes and the frequency over the five years of the data is given for each. Items are arranged by highest Max Gain first.

0	Failed to Yield Right-of-Way Making Left or U-Turn	27,443
0	Ran Traffic Signal	20,502
0	Failed to Yield Right-of-Way from Traffic Signal	11,871
0	Failed to Yield Right-of-Way from Driveway	12,314
0	Failed to Yield Right-of-Way from Stop Sign	28,456
0	Failed to Yield Right-of-Way Making Right Turn	2,727
0	Failed to Yield Right-of-Way from Yield Sign	3,199
0	Failed to Yield Right-of-Way from Parked Position	1,733
0	Other Failed to Yield	6,051

0	Failed to Yield Right-of-Way at Uncontrolled Intersection	2,710
0	Failed to Yield Right-of-Way Making Right Turn on Red Signal	495
0	Failed to Yield Right-of-Way to Pedestrian in Crosswalk	264
0	Ran Stop Sign (Urban Under-Represented)	5,600
0	Failed to Yield Right-of-Way (Urban Under-represented)	1,152

- C015 Primary Contributing Circumstances (PCCs) Improper Lane Change. This fault had an Urban frequency over the five years of the data of 35,663 and an Odds Ratio of 1.231. The comparable Rural item had a frequency of 8,890.
- C101 Causal Unit (CU) Type. The highest frequency causal units (over the five years of the data) for Urban Crashes with Odds Ratios greater than 1.000 were: Passenger Car (185,448) and Sport Utility Vehicle SUV (123,573). All others except for Mini-van (with 12,499) had less than 5000 crashes over the five years.

Executive Summary: Brief Results of IMPACT Findings

As a general description, IMPACT is a convenient and simple way of comparing data in two subsets in order to determine what the differences are between comparable attributes. In this example all Rural crash attributes were compared to the same attributes for all Urban collisions in the same subset. The *attributes* are characteristics that appear in both datasets, such as County, City, Year, Month, Day of the Week, Time of Day, etc. We will have over 40 such comparisons in the IMPACT Results section below. Unlike most other IMPACT studies, there is no single type of crash that is being analyzed for purposes of reducing it. In this study, the goal is to provide information on both Rural and Urban crashes so that they may both be reduced by taking the appropriate action for both. Thus, we elected to consider all attributes that could in any way change the frequency or severity of either the Rural or the Urban components of these crashes. Attributes that could have any effect on driver or passenger behavior for such crashes were included. More information is given on IMPACT details using Highway Classifications as an example presented above in a section called "General Discussion of IMPACT Output Terms Using Highway Classification for Example."

Brief Summary of IMPACT Findings for Rural and Urban Crash Reduction

This section will provide a very brief statement of the findings within each of the IMPACT analyses, which might be helpful in traversing the IMPACT studies. Some attributes are indented five columns to show a deviation from the normal CARE IMPACT ordering, and to indicate that these variables generally add information to the attribute above it (that is not indented).

Overall Geographical Attributes

C001 County Locations. County locations are somewhat surprising since we would expect the counties with the largest cities to appear on top. However, the counties of Jefferson, Mobile and Montgomery were at the bottom of the list because they were under-represented in comparison to Rural crashes in general (over-represented in Urban crashes). Notice that the filter being used is called Rural. The default subset for comparison is all of the crashes that were considered to be not Rural, or what we are calling Urban. So, unless otherwise stated, all of the IMPACT analyses compare both the Rural and Urban simultaneously in one IMPACT output.

C002 City Location. The virtual cities (Rural areas of counties), which are viewed as cities for comparative purposes, are the only areas of the roadway that are over-represented in Rural crashes.

C033 Locale. The only locale that is over-represented in Rural crashes is Open Country, which is a more specific description indicating the roadway environment than calling them Rural or Urban. As expected, its over-representation for the rural roads is very large, with an Odds Ratio of 6.449. All other items were significantly under-represented for Rural roads.

Time attributes

C003 Year. Years 2020, and 2021 are significantly higher in their proportions of Rural than Urban crashes. The pandemic-caused drop in 2020 included both Rural and Urban, but it had a larger effect on Urban crashes. Years 2017 and 2018 show a higher proportion of Urban crashes. The table and chart are in Max Gain order. All of the difference seen in the table or on the chart are significant, so this would indicate a turn-around in fewer Rural crashes, or it could equally be viewed as a relative increase in the Urban frequency.

C004 Month. December and January, the two months when weather could cause slippery roads and bridges that might account for the increased crashes. May, June and July probably have more traffic in the Rural areas because of vacation and recreational travel.

C006 Day of the Week. Rural crashes are significantly over-represented on the weekends, while Urban crashes are over-represented on the weekdays. See C122 and C123 for the effects of DUI may be having on weekend crash rates.

C007 Week of the Year. The first three weeks of the year and the last two weeks of the year are nearly identical in their over-representations of Rural. The other weeks are highly mixed so no patterns emerge.

C008 Time of Day. The early morning hours (12 Midnight through 6:59 AM) are overrepresented for Rural crashes, as are the late evening hours (after 7 PM).

C031 Lighting Conditions. This confirms the time of day findings, and it also indicates the positive effects that roadway lighting can have. There are two attributes that are the most over-represented in the Rural dark hours (1) Dark—Roadway Not Lighted and (2) Dark – Roadway Lighted. While the second of these has a huge Odds Ratio (33.359), the number of Rural crashes in this category was only 2,078, as compared to 48,083 in the Dark – Roadway Not Lighted category.

Crash Severity and Severity Contributing Attributes

C025 Crash Severity. All of the Rural injury crashes are over-represented, demonstrating that Rural crashes are usually the more severe for injuries. The two most serious Rural injuries (with Frequency and Odds Ratios) are Fatal Injury (2,597, 4.909) and Suspected Serious Injury (11,680, 3.620).

C323 CU Driver/Non-Motorist Safety Equipment. The overall Rural-Urban comparison for Safety Equipment shows that Urban seatbelt use proportion (96.38%) is significantly higher than that in the Rural areas (90.19%). In several categories, however, motorcycle safety equipment is more predominant in the Rural areas. The following cross-tabulation display illustrates the value of this Safety Equipment.

C025 Severity by C323 Safety Equipment Cross Tabulation. This analysis was performed over both Rural and Urban records to see the effects of all of the listed safety equipment types.

Any use of a motor vehicle without the appropriate Safety Equipment multiplies the chance of a fatality or serious injury by several orders of magnitude. This cross-tabulation demonstrates this with combined Rural and Urban crash data. Please see the blurb under this cross tabulation for more details

C226 CU Vehicle Damage. Damage was major and disabling in 55.99% of all of the Rural cases. This should clearly reinforce the necessity to buckle up regardless of the duration or destination of the trip. It is also a further reminder that Rural crashes are generally of much higher severity than those occurring in Urban areas.

C227 Vehicle Towed. This is a further objective observation with regard to potential injury and death. The fact that 56.45% of the Rural crashes required towing because they were disabled, but only 27.59% of the Urban crashes required it shows the great disparity. Disabled Damage means that the vehicle cannot be safely driven away from the scene. Other reasons for towing could include the driver's inability to operate the vehicle because of such things as trauma or DUI.

C036 Police Arrival Delay. Arrival delays are the time of arrival minus the time of the crash. They relate to severity in that the sooner the responders get to the scene, the more they can do to address any injuries. For rural crashes, all items 15 minutes or less were significantly under-represented; all items from 21 to above 180 minutes were over-represented by at least factors of 2.000.

C038 Adjusted EMS Arrival Delay. A cross-tabulation between EMS and Police Arrival Times showed a strong correlation between them, and also that the EMS often arrived prior to the police. People might put off calling the police, but when an injury is involved, they recognize the need for immediate action.

C038 by C025 Adjusted EMS Arrival Delay by Crash Injury Severity. This cross-tabulation shows how much quicker a response is called for as a function of the crash severity. This cross-tabulation is for all roadways and crashes, not just rural as in the IMPACT runs. Generally, response time is longer for Rural than for Urban roads since police and EMS capabilities reside primarily in the cities. The next four items appear here (indented) because they might have an effect on arrival times.

C011 Highway Classification. County roads had the highest over-representation of Rural crashes with a very high Odds Ratio of 8.030. At the other end are under-represented Municipal roads with nearly the opposite Odds Ratio (0.022). Both were highly statistically significant. The table ordering for this was again Max Gain, as opposed to the natural ordering for the arrival delay items.

C412 CU Trafficway Lanes. Almost all county roads are two lanes, which explains their highest over-representation (1.660 Odds Ratio) of all categories. All other Odds Ratios were less than 1.000, indicating that the Urban proportion of crashes on these roads is higher than the Rural proportion.

C030 Functional Class. This attribute, which is displayed in Rural Max Gain order, shows the use of the various roadway Functional Classifications. Interstate, Major Collector and Minor Collector were the only three Classes that were over-represented for Rural roads.

C030 by C011 Cross-tabulation (Functional Class by Highway Classification). This was run because few people have a working knowledge of Functional Class categories. The correlations are obvious, but not perfect. This cross-tabulation includes both Rural and Urban crashes.

Driver Behavior

C015 Primary Contributing Circumstances. The major purpose for this attribute is in discovering those driver behavior causes that were instrumental in either causing or increasing the severity of the crashes. The displays for C015 are subdivided into (a) the Rural over-represented and (b) the Urban over-represented (which appear on the display as under-represented). The displays give the two ends of the distribution, and thus they present the most over- (and under-) represented items. Additional items within C015 are presented in separate discussions – see the additional C015 narratives within the "Issues of Driving in Predominantly Rural Areas" section above.

C224 Estimated Speed at Impact. Past repetitive research has determined and confirmed that for every increase in the impact speed or 10 MPH (above 40 MPH) there is a doubling of the probability that the crash will be fatal. It is obvious from this display the reason that so many more fatalities occur on the Rural roads.

C223 CU Speed Limit. This is quite useful for comparing against the estimate impact speed, C224, immediately above. It is important to realize that just being under some speed limit does not imply legality. For example, most County roads have speed limits of 45 MPH, but the roadway conditions (especially weather) can mandate speeds less than that. Drivers that obey all speed laws can also be victims of speeders on both Rural and Urban roads.

C052 Number of Vehicles. This is in Natural Order. It shows that Rural crashes are predominantly single-vehicle (47.62%), while Urban Crashes are much more likely to involve more than one vehicle (13.56% for single). The large majority of Urban crashes (80.43%) involve two vehicles.

C019a Most Harmful Event (Rural over-representations). We have divided this attribute into those that have Rural over-representations and those with Urban over-representations. This attribute is quite useful in providing information on what made the crash as severe as it turned out to be. The six with the highest Max Gains (with their frequencies) are as follow: Overturn/Rollover (16501), Collision with Tree (16290), Collision with Ditch (11266), Collision with Animal: Deer (6939), Collision with Other Non-Fixed Object (3768), and Collision with Cable Barrier (2566).

C019b Most Harmful Event (Urban over-representation). The following six items had the smallest negative Max Gains, indicating their Urban over-representations (given with their frequencies): Collision with Curb/Island/Raised Median (229), Ran Off Road Left (495), Ran Off Road Right (882), Collision with Vehicle in (or from) Other Roadway (1,510), Collision with Parked Motor Vehicle (2,604), and Collision with Vehicle in Traffic (84,732).

C023 Manner of Crash. Because it is correlated with potential severity, the manner of crash is a very useful attribute. There are only three of these over-represented items for Rural crashes: Single Vehicle (all types), Sideswipe, Opposite Direction, and Non-Collision. Bottom of the output the over-represented Urban crash types are given. The top four are: Rear End (from to rear), Side Impact (angled) and Side Impact (90 degrees), and Sideswipe – Same Direction. The following cross-tabulation shows the relationship with Crash Severity for all items.

C025 by C022, Cross-tabulation: Crash Injury Severity C025 by Manner of Crash C022. This cross-tabulation is for all crashes, both Rural and Urban. The highest four over-representations for fatal crashes are: Single Vehicle Crash (all types), Head On (front to front only), Angle Oncoming (frontal), and Side Impact 90 degrees.

C101 Causal Unit (CU) Type. The top four over-represented vehicle types (Passenger Car, Sport Utility Vehicle, Motorcycle and Mini-van) account for 83.93% of the Rural crashes. The two most over-represented Urban crash Causal Units are Passenger Cars and Sport Utility Vehicles (SUVs)

C080 Commercial Motor Vehicle (CMV) Involved. CMV crashes are over-represented on rural roads with a proportion of 8.47% as opposed to Urban roads where their presence is 4.57%, resulting in an Odds Ratio of 1.852, which is nearly twice that expected.

C104 CU Left Scene. When considering all crashes, it seems clear that leaving the scene of a crash is more of an Urban issue that that of Rural crashes. One thing that would contribute to this is the increased severity of the Rural crashes making fewer vehicles able to leave the scene even though there might be a high incentive to do so.

Driver Characteristics

C107 CU Driver Raw Age. Ages 16-18 are significantly over-represented compared to their crashes in general. However, the major Rural over-representation problem group seems to be in the 33 through 56 age groups, which are consistently over-represented as shown in the table and the chart. This age group probably consists of a large proportion of professional drivers, who are on Rural roads more than most other drivers. They should be particularly aware of their collective vulnerability to be involved in Rural road crashes that generally result in higher injury severities.

C108 CU Driver Race. White/Caucasian was significantly over-represented in Rural crashes (Odds Ratio 1.238). Hispanic and Black were significantly under-represented (Odds Ratios 0.956 and 0.788, respectively). All others were close to that expected from their proportions of crashes in general.

C109 CU Driver Gender. Reflecting their driving patterns, Males are over-represented on Rural roads, while Females are over-represented on Urban roads.

C110 CU Driver Residence Distance. "Greater than 25 Miles" is over-represented for Rural roads with an Odds Ratio of 1.570. "Less than 25 Miles" is over-represented for Urban roads with at a proportion of about 5% greater than expected.

C111 Driver License State. As expected, except for Alabama-licensed drivers, those from states proximal to Alabama have the greatest numbers of Rural crashes in Alabama. Tennessee, Mississippi, and Georgia were the only three states that were significantly over-represented for Rural crashes. About 17 states were over-represented in Urban crashes, and about 36 states had no Rural crashes at all in Alabama.

C122 Officer's Opinion Alcohol. Rural roads are clearly those most apt to have crashes caused by DUI from Alcohol. The proportion of these crashes was 5.69 as compared to only 2.61 of those in the Urban areas (a highly significant Odds Ratio of 2.183). This could be caused, here and for drugs below, due to the increased driving required to get back from the Rural areas.

C123 Officer's Opinion Non-Alcohol Drugs. While only about a third of the number, the proportions and Odds Ratios look very much the same as was true of the DUI from Alcohol. The proportion positive here was 1.94 for the Rural roads, but only 0.96 for the Urban roads, which results in an Odds Ratio of 2.025 (amazingly close to that for DUI alcohol above).

IMPACT Results

C001 County Locations



County locations are somewhat surprising since we would expect the counties with the largest cities to appear on top. However, the counties of Jefferson, Mobile and Montgomery were at the bottom of the list because they were under-represented in comparison to Rural crashes in general (over-represented in Urban crashes). Notice that the filter being used is called Rural. The default subset for comparison is all of the crashes that were considered to be not Rural, or what we are calling Urban. So, all of the IMPACT analyses compare both the Rural and Urban simultaneously in one IMPACT output.

C002 City Locations

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	Rural Jefferson	20583	11.49	0	0.00	0.000	20583.0		C003: Year	
	Rural Mobile	10119	5.65	0	0.00	0.000	10119.0		C004: Month	
	Rural Madison	9916	5.54	0	0.00	0.000	9916.000		C005: Day of Month C006: Day of the Week	
	Rural Tuscaloosa	8993	5.02	0	0.00	0.000	8993.000		C007: Week of the Year	
	Rural Baldwin	7129	3.98	0	0.00	0.000	7129.000		C000: Time of Dov Sort by Sum of Max Gain	×
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In Max Gain order, all of the over-represented cities will be the virtual areas of the county that are considered as cities for comparative purposes.

C033 Locale

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C033	: Locale		Subset Frequency	Subset Percent	Other Frequency	r Other Percent	Odds Ratio	Max Gain	C001: County C002: City			^
•	Open Country		148293	82.8	1 74934	12.84	6.449*	125298.631	C003: Year			
	Playground		9	0.01	1 200	0.03	0.147	-52.372	C004: Month	o oth		
	School		601	0.34	4 8985	5 1.54	0.218*	-2156.152	C005: Day of M	e Week		
	Other		288	0.16	6 862	7 1.48	0.109*	-2359.295	C007: Week of	the Year		
	Manufacturing or l	ndustrial	1138	0.64	4 13284	4 2.28	0.279*	-2938.350	C008: Time of	Day		
	Residential		16304	9.10	142670) 24.45	0.372*	-27475.948	C010: Rural or	Urban		~
	Shopping or Busin	ess	12445	6.95	5 334879	57.38	0.121*	-90316.514	Sort by Sum of	Max Gain		
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The locale of Open Country is generally thought to be consistent with Rural crashes. However, 74,934 Urban crashes were also classified as Open Country. This shows that approximately 12.84% of "Urban Crashes" are actually in Open country even though technically they are within the boundaries of city limits. This being the case, some of the attributes of Rural areas might apply to areas marked as Urban.

C003 Year



From a proportion point of view, the rural crashes started out higher than Urban, but in the past three years it has gotten significantly smaller. All of the difference seen in the table or on the chart are significant, so this would indicate a turn-around in fewer Rural crashes, or it could equally be viewed as a relative increase in the Urban frequency.

C004 Month

🖡 CA	RE 10.2.1.3 - [IMPACT Resu	lts - 2017-202	1 Alabama Int	egrated Cras	h Data - Rural	vs. Not Rural]			_		×
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C004:	Month	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C001: County C002: City			^
•	January	14720	8.22	45931	7.87	1.044*	625.539	C003: Year			
	February	13248	7.40	44875	7.69	0.962*	-522.415	C004: Month	anth		
	March	14500	8.10	48964	8.39	0.965*	-525.173	C005: Day of M C006: Day of th	e Week		
	April	13995	7.82	46441	7.96	0.982	-255.961	C007: Week of	the Year		
	May	15342	8.57	49246	8.44	1.015	230.292	C008: Time of	Day		
	June	14871	8.30	47296	8.10	1.025*	357.673	C010: Rural or	Urban		
	July	14569	8.14	46083	7.90	1.030*	427.896	C012: Controlle	Classification ed Access	IS	
	August	15387	8.59	50433	8.64	0.994	-88.952	C013: E Highw	ay Side		
	September	14648	8.18	48891	8.38	0.976*	-354.772	C015: Primary	Contributing (Circumst	anc
	October	16391	9.15	53517	9.17	0.998	-31.314	C016: Primary	Contributing L	Jnit Num	ibe
	November	15180	8.48	50551	8.66	0.979*	-332.162	C017: First Har	miul Event First Harmful	Event R	elt V
	December	16227	9.06	51351	8.80	1.030*	469.349	Sort by Sum of	Max Gain		
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While there is considerable significant variation by month, there is no clear consistent pattern, so the differences appear to be random.

C006 Day of the Week



Clearly Saturday and Sunday are over-represented in Rural crashes, while the days during the week are all significantly over-represented with Urban crashes. The former would include some recreational travel while the latter would include many shopping trips.

C008 Time of Day

🖡 CA	RE 10.2.1.3 - [IMPACT Resul	ts - 2017-2021	1 Alabama Int	tegrated Cras	h Data - Rural	/s. Not Rural]]	– 🗆 X
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C008:	Time of Day	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C001: County C002: City
▶	12:00 Midnight to 12:59 AM	3509	1.96	6035	1.03	1.895*	1657.090	C003: Year
	1:00 AM to 1:59 AM	2879	1.61	5004	0.86	1.875*	1343.464	C004: Month
	2:00 AM to 2:59 AM	2690	1.50	4444	0.76	1.973*	1326.307	C006: Day of the Week
	3:00 AM to 3:59 AM	2782	1.55	3638	0.62	2.492*	1665.637	C007: Week of the Year
	4:00 AM to 4:59 AM	3429	1.91	3807	0.65	2.935*	2260.778	C008: Time of Day
	5:00 AM to 5:59 AM	5682	3.17	7104	1.22	2.606*	3502.055	C010: Rural or Urban
	6:00 AM to 6:59 AM	7417	4.14	13491	2.31	1.792*	3277.130	C012: Controlled Access
	7:00 AM to 7:59 AM	10545	5.89	33434	5.73	1.028*	285.388	C013: E Highway Side
	8:00 AM to 8:59 AM	7052	3.94	25300	4.34	0.908*	-711.599	C015: Primary Contributing Circumstanc
	9:00 AM to 9:59 AM	6351	3.55	22715	3.89	0.911*	-619.362	C016: Primary Contributing Unit Number
	10:00 AM to 10:59 AM	7043	3.93	26386	4.52	0.870*	-1053.851	C017. First Harmiul Event C018: Location First Harmful Event Rel t
	11:00 AM to 11:59 AM	8114	4.53	33144	5.68	0.798*	-2056.622	C019: E Most Harmful Event
	12:00 Noon to 12:59 PM	9085	5.07	41170	7.05	0.719*	-3548.493	C020: E Distracted Driving Opinion
	1:00 PM to 1:59 PM	9618	5.37	40212	6.89	0.779*	-2721.520	C021: Distance to Fixed Object
	2:00 PM to 2:59 PM	10735	5.99	43526	7.46	0.804*	-2621.459	C022: E Type of Roadway Junction/Featu
	3:00 PM to 3:59 PM	13519	7.55	53241	9.12	0.827*	-2818.620	C024: School Bus Related
	4:00 PM to 4:59 PM	12882	7.19	51971	8.91	0.808*	-3065.905	C025: Crash Severity
	5:00 PM to 5:59 PM	13930	7.78	54920	9.41	0.827*	-2922.840	C026: Intersection Related
	6:00 PM to 6:59 PM	10533	5.88	34851	5.97	0.985	-161.434	C027: At Intersection
	7:00 PM to 7:59 PM	8014	4.48	23725	4.07	1.101*	733.708	C028: Mileposted Route C029: National Highway System
	8:00 PM to 8:59 PM	7155	4.00	19138	3.28	1.218*	1282.282	C030: Functional Class
	9:00 PM to 9:59 PM	6402	3.57	15272	2.62	1.366*	1715.609	C031: Lighting Conditions
	10:00 PM to 10:59 PM	5258	2.94	11569	1.98	1.481*	1707.918	C032: Weather
	11:00 PM to 11:59 PM	4075	2.28	8406	1.44	1.580*	1495.521	C033: Locale
	Unknown	379	0.21	1076	0.18	1.148	48.817	Sort by Sum of Max Gain
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	0	4:00 AM to 4	:59 AM	00 AM to 9	59 AM 21	0 PM to 2.4	59 PM 7.0	0 PM to 7:59 PM Unknown
					C008: Time	of Day		

A very strong correlation is in the time of day. Most normal work hours from 8 AM through 6 PM are over-represented in Urban crashes, while most of the nighttime hours, and especially those after midnight are over-represented in rural crashes.

C031 Lighting Conditions

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6 2	2017-2021 Alabama Inte	egrated Crash Data		~		Rural			✓ ♥ 33 1/ 1/
Order:	Max Gain	Descending	~	Suppr	ess Zero-	Valued F	Significan	ice: Over	Representation V Threshold: 2.0
C031:	Lighting Conditions		Subset	Subset	Other squency	Other Percent	Odds Ratio	Max Gain	C028: Mileposted Route
•	Dark - Roadway Not Li	ighted	48083	26.85	25179	4.31	6.223*	40356	C030: Functional Class
	Dark - Roadway Lighte	d	2078	1.16	203	0.03	33.359*	2015	C031: Lighting Conditions
	Dawn		3228	1.80	7905	1.35	1.331*	802.259	C032: Weather
	Other		27	0.02	661	0.11	0.133*	-175.8	C034: E Police Present at Time of Crash
	Not Applicable		47	0.03	1443	0.25	0.106*	-395.8	C035: Police Notification Delay
	Unknown		247	0.14	2421	0.41	0.332*	-495.9	C036: Police Arrival Delay
	E Dark - Unknown Roa	adway Lighting	140	0.08	2665	0.46	0.171*	-677.7	C037: EMS Arrival Delay
	E Dark - Continuous Lig	ghting One Side of	341	0.19	3568	0.61	0.311*	-753.8	C039: Non-Vehicular Property Damage
	Dusk		4563	2.55	18546	3.18	0.802*	-1128	C040: Agency ORI
	E Dark - Spot Illuminati	on One Side of Ro	3124	1.74	22021	3.77	0.462*	-3633	C042: Highway Patrol Troops
	E Dark - Continuous Li	ghting Both Sides	926	0.52	23566	4.04	0.128*	-6305	C043: Highway Patrol Posts
	E Dark - Spot Illuminati	on Both Sides of R	3001	1.68	44797	7.68	0.218*	-1074	C044: ALEA DIVISION
	Daylight		113273	63.25	430604	73.79	0.857*	-1886	Sort by Sum of Max Gain
00) 😪 🖉								
		2017-2	021 Alaba	ma Integr	ated Crae	h Data - E	ilter – Rur	ral ve. Not	Rural
		2017-2		CO:	aleu Cras	a Conditic	nier – Mur		Nurai
				00.	r. Lighun	g conditio	113		
	100								
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	50-								
Ι.									
		1							
								-	
	0	Dark - Roadway	Other		Unknown		E Dark -	E D	ark - Spot E Dark - Spot
		Lighted				C	Continuous Lighting	Illu	mination Illumination ne Side Both Sides
						0	One Side f Roadway	of F	coadway of Roadway
					C031: Li	ighting Co	nditions		

Dark-not lighted has the largest number, Percentage and Max Gain. Clearly most travel during darkness is in the rural areas. Dark-Roadway Lighted is also over-represented by a very large Odds Ratio, mainly because there are so few of these (only 203, 0.03%) in the Urban areas. Recognize that these results are not telling us what *ought* to be, they are telling us what the reality has been over the past five years.

C025 Crash Severity

🚦 CA	ARE 10.2.1.3 - [IMPACT Resu	Ilts - 2017-2021	Alabama Inte	egrated Crash	Data - Rural v	s. Not Rural]		- 🗆 X
B E	ile <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact <u>L</u> o	cations <u>T</u> oo	ols <u>W</u> indow	<u>H</u> elp		_ 8 :
6 2	2017-2021 Alabama Integrate	ed Crash Data		\sim	Rural			✓ ♥ 1/ 1/2017 ∨ 12/3
Order	; Natural Order 🗸 🗸	escending)	✓ □ 5	Suppress Zero	-Valued Rows	Si	gnificance: Ov	ver Representation V Threshold: 2.0
C025	: Crash Severity	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	 C022: E Type of Roadway Junction/Feature C023: E Manner of Crash
▶ _	Fatal Injury	2597	1.45	1724	0.30	4.909*	2067.971	C024: School Bus Related
	Suspected Serious Injury	11680	6.52	10516	1.80	3.620*	8453.043	C025: Crash Severity
	Suspected Minor Injury	20985	11.72	39078	6.70	1.750*	8993.461	C027: At Intersection
	Possible Injury	12304	6.87	56093	9.61	0.715*	-4908.789	C028: Mileposted Route
l	Property Damage Only	126675	70.74	460496	78.91	0.896*	-14633.551	C029: National Highway System
L	Unknown	4837	2.70	15672	2.69	1.006	27.865	✓ Sort by Sum of Max Gain
) 🐼 🖉							🔽 Display
			2017-2021 A	labama Integra	ited Crash Data	-Filter = Rura	al vs. Not Rural	1
				C	025: Crash Sev	erity		
	100							
	2							
	50							
	Ľ							
	0-	Fatal Injury	Suspected Serious Inju	d Susj ry Mino	pected p r Injury	Possible Injury	Property Damage Or	nly Unknown
					C025: Crash Se	everity		

The Crash Severity IMPACT results (in natural order) demonstrate how much more severe Rural crashes tend to be than those in the Urban areas. The top most severe Rural crashes are significantly over-represented. The primary cause for this is speed at impact.

CARE 10.2.1.3 - [IMPACT Results - 2017-2021 A	Alabama Int	egrated C	rash Data -	Rural AN	ID Not CU D	river/Non-	Motorist Saf	ety —		×
File Dashboard Filters Analysis Ir	npact <u>L</u> o	cations	Tools \	<u>N</u> indow	<u>H</u> elp				-	8 ×
2017-2021 Alabama Integrated Crash Data		\sim	Rural					~ 9 I	1/	1/2017
Order: Max Gain V Descending	~ 🛛	Suppress 2	Zero-Valueo	l Rows S	ignificance:	Over Repre	esentation	✓ Threshold	: 2.0	÷
C323: CU Driver/Non-Motorist Safety Equipment	Subset requency	Subset Percent	Other irequency	Other Percent	r Odds Ratio	Max Gain 👻	C323: Cl	J Driver/Non-Mo	otorist Sa	afety E
None Used - Motor Vehicle Occupant	12899	7.94	10465	2.25	5 3.529*	9243.514				
Dot-Compliant Motorcycle Helmet Used	1786	1.10	1720	0.37	7 2.973*	1185.194				
No Motorcycle Helmet Used	173	0.11	119	0.03	4.162*	131.433				
E Helmet Used	195	0.12	282	0.06	5 1.980*	96.496				
E Other Motorcycle Helmet Used	111	0.07	114	0.02	2 2.787*	71.179				
E Lighting Used by Non-Motorist	10	0.01	14	0.00	2.045	5.110				
Reflective Clothing (Jacket/Backpack)	8	0.00	12	0.00	1.909	3.808				
E Protective Pads Used (Elbows/Knees/Shin)	1	0.00	2	0.00	1.431	0.301				
E Rear Facing Child Safety Seat Used Properly	3	0.00	11	0.00	0.781	-0.842				
E Unknown Child Restraint Type	2	0.00	12	0.00	0.477	-2.192				
E Forward Facing Child Safety Seat Used Properly	4	0.00	22	0.00	0.521	-3.685				
E Other Safety Equipment Used by Non-Motorist	5	0.00	33	0.01	0.434	-6.527				
Lap Belt Only Used	400	0.25	1503	0.32	2 0.762*	-125.007				
Shoulder Belt Only Used	344	0.21	2497	0.54	4 0.394*	-528.217				
Shoulder and Lap Belt Used	146598	90.19	448491	96.38	0.936*	-10062	Sort by	Sum of Max Gain		
										[
	20 ⁻ C323:	17-2021 Ala CU Driver	abama Integ /Non-Motori	rated Cras ist Safety I	sh Data Equipment					
100								1	1	
Erequency										
0 E Other I	Motorcycle	Helmet U: 23: CU Driv	sed EU ver/Non-Mot	nknown (orist Safel	Child Restra	aint Type	Shoulde	r and Lap Belt (Jsed	

C323 CU Driver/Non-Motorist Safety Equipment

The bottom line gives an overall comparison that shows that Urban seatbelt use proportion (96.38%) is significantly higher than that in the Rural areas (90.19%). On the other hand, results for motorcycles show proportionate the use of safety equipment for motorcycles to be twice as high in the rural areas as in the urban areas. Motorcycle riders and operators realize that the increased speeds in the rural areas can be lethal without this protection.

See the C025 vs C323 cross-tabulation – next item for an indication of the increased severity when safety equipment is not used.

2017-2021 Alabama Inte	egrated Crash Data	~	All records ((do not apply a filter)		× 9	1/ 1/2017 ~ 12/
Suppress Zero Values: Rows	s and Columns 🗸 🗸	Select Cells: 🔳 🗸	3 9	Column: Crash S	Severity ; Row: CU D	river/Non-Motorist S	Safety Equipment 🕢
	Fatal Injury	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	Property Damage Only	Unknown	TOTAL
None Used - Motor Vehicle Occupant	1615	4529	5186	2479	8921	634	23364
Shoulder and Lap Belt Used	1530	13361	44988	55681	467346	12183	595089
Lap Belt Only Used	9	50	115	165	1478	86	1903
Shoulder Belt Only Used	6	37	152	214	2293	139	2841
E Forward Facing Child Safety Seat Used Properly	0	1	3	1	21	0	26
E Rear Facing Child Safety Seat Used Properly	0	0	0	3	10	1	14
E Child Booster Seat Used Properly	0	0	0	0	1	1	2
E Forward Facing Child Safety Seat Used Improperly	0	0	0	0	2	0	2
E Rear Facing Child Safety Seat Used Improperly	0	0	0	0	1	0	1
E Unknown Child Restraint Type	0	0	0	0	11	3	14
E Child in Arms of Restrained Adult	0	0	2	0	16	0	18
Dot-Compliant Motorcycle Helmet Used	197	954	1168	343	791	53	3506
E Helmet Used	18	97	159	48	117	38	477
E Protective Pads Used (Elbows/Knees/Shin)	0	1	0	1	1	0	3
Reflective Clothing (Jacket/Backpack)	2	8	8	0	1	1	20
E Lighting Used by Non- Motorist	2	4	4	3	11	0	24
E Other Safety Equipment Used by Non-Motorist	1	6	10	7	11	3	38
E Other Motorcycle Helmet Used	25	77	64	11	42	6	225
No Motorcycle Helmet Used	30	103	90	23	34	12	292
Other	9	24	63	36	268	38	438
Unknown	343	1636	4731	5699	69547	4538	86494
Not Applicable	390	678	1007	474	2912	337	5798
CU is Unknown	104	462	1887	2652	22975	1258	29338
E CU Driver Not Recorded	J Driver Not Recorded 33 114 341 487 102		10279	1166	12420		
E CU Non-Motorist Not Recorded	CU Non-Motorist Not Recorded 7 54 85 68 71		71	12	297		
TOTAL	4321	22196	60063	68395	587160	20509	762644

C025 and C323 Cross-Tab of Severity by Safety Equipment

Any use of a motor vehicle without the appropriate Safety Equipment multiplies the chance of a fatality or serious injury by several orders of magnitude. The cross-tabulation above demonstrates this with real data for combined Rural and Urban roads. Comparing the results on the top two lines, the probability of the crash being a fatality when no safety equipment is used is 1,615/23,364 = one in 14.5 crashes, while if safety equipment is used, the fatality rate is 1,530/595,089 = one in 388.9 crashes (a survival rate that is 26.8 times greater).

C226 CU Vehicle Damage

[(CARE 1	0.2.1.3 - [IMPA	CT Resu	ults - 201	7-2021 Alal	bama Integi	rated Crash	Data - Rura	al vs. Not Ru	ural]	– 🗆 X
B	<u>F</u> ile	<u>D</u> ashboard	<u>F</u> ilters	<u>A</u> naly	sis <u>I</u> mpa	act <u>L</u> ocat	tions <u>T</u> oo	ols <u>W</u> ind	ow <u>H</u> elp		_ & ×
6	201	7-2021 Alabama	Integrate	ed Crash I	Data	```	/	Rural			✓ ♥ 1/
Ord	er: Ma	x Gain	~ [)escendin	ig .	∽ 🔽 Sut	opress Zero-	Valued Sigr	ificance: C	Over	Representation V Threshold: 2.0
C22	6: CU	Vehicle Dama	ge Fre	Subset quency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	^	C223: CU Speed Limit C224: CU Estimated Speed at Impact
•	Maj	ior and Disabled		100258	55.99	161106	27.61	2.028*	50820.666		C225: CU Citation Issued
	Maj	or Not Disabled		21080	11.77	58601	10.04	1.172*	3097.571		C226: CU Vehicle Damage
	Not	Applicable		711	0.40	2044	0.35	1.134*	83.774	-	C227: CU Vehicle Towed
	CU	is Not a Vehicle		496	0.28	1626	0.28	0.994	-2.958		C231: E CU Areas Damaged #2
	Nor	ne Visible		4634	2.59	32877	5.63	0.459*	-5454.707		C232: E CU Areas Damaged #3
	CU	is Unknown		1939	1.08	27399	4.70	0.231*	-6468.716		C233: CU Point of Initial Impact
	Uni	known		4751	2.65	47386	8.12	0.327*	-9789.970		C301: CU Non-Motorist Prior Action
	EN	linor		45209	25.25	252539	43.27	0.583*	-32285.6	\checkmark	Sort by Sum of Max Gain
1		se 🖉									
				2	017-2021 A	labama Integ C2	grated Crash 226: CU Veh	n Data - Filte icle Damage	er = Rural vs e	. Not	Rural
	Frequency	60 40 20 0	Major a Disabi	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Tajor Not Disabled	L Not Applicable	CU is Not a Vehicle	None Visi	ble CU Unkno	is	Unknown E Minor
							C226: CU \	/ehicle Dam	age		

Rural had major damage in over two-thirds (67.76%), while urban crashes had only 27.61% with major damage. This is only considering the damage to the involved vehicles as opposed to injury severities, which were discussed above.

C227 Vehicle Towed

🚦 CAR	E 10.2.1.3 - [IMPAC]	TResults - 2017-2	2021 Alabam	na Integrate	d Crash Da	ta - Rural vs	. Not Rur	al]	-	- 🗆	×
🖡 <u>F</u> ile	<u>D</u> ashboard <u>F</u>	ilters <u>A</u> nalysis	: <u>I</u> mpact	<u>L</u> ocatior	ns <u>T</u> ools	<u>W</u> indow	<u>H</u> elp			-	8 ×
\$	017-2021 Alabama Int	tegrated Crash Da	ta	~	Ru	ıral			~ 9	1/ 1	1/2017 \
Order:	Max Gain	 ✓ Descending 	~	Suppre	ess Zero-Va	lued Rows	Significa	ance: Over	Representation 🗸 Thr	eshold: 2.0	
C227: C	U Vehicle Towed		Subset irequency	Subset Percent	Other requency	Other Percent	Odds Ratio	Max Gain	C222: CU Contributing C223: CU Speed Limit	Vehicle Defe	ct ^
► E	E Vehicle Towed - Dis	abling Damage	101084	56.45	161016	27.59	2.046*	51674.3	C224: CU Estimated Sp	eed at Impa	ct
E	E Vehicle Towed - Oth	ner Reasong	6552	3.66	22826	3.91	0.935*	-452.423	C225: CU Citation Issue	ed	
\	/ehicle Not Towed		66636	37.21	349935	59.96	0.621*	-40745	C227: CU Vehicle Towe	d	
L L	Jnknown		449	0.25	6695	1.15	0.219*	-1605.439	C230: CU Areas Damag	ged #1	
L N	Not Applicable		1917	1.07	14079	2.41	0.444*	-2403.305	C231: E CU Areas Dam	aged #2	
0	CU is Not a Vehicle		497	0.28	1626	0.28	0.996	-1.957	C232: E CU Areas Dam	aged #3	
0	CU is Unknown		1938	1.08	27399	4.69	0.231*	-6469.702	C301: CU Non-Motorist	Prior Action	~
L F	P Vehicle Towed*		5	0.00	3	0.00	5.431	4.079	Sort by Sum of Max Gai	n	
0	se 🖉										
			2017-2021	Alabama Int	egrated Cra C227: CU V	sh Data - Filt ehicle Tower	er = Rural d	vs. Not Rura	al		
Frequency	60 40 20 0	E Vehicle Towed - Disabling Damage	E Vehicle Towed - Other Reasong	Vehicle Not Towed	Unknown	Not	able a	2U is Not a Vehicle	CU is PVehicle Unknown Towed*		

This is a further indicator that Rural crashes are more severe, mostly because of the speed at impact. Generally, the Rural crashes require a higher percentage of towing, although it is not as dramatic as some of the other indicators. "Vehicle Towed – Other Reason" would include if the driver were DUI or otherwise disabled to the point of not being able to safely remove the vehicle from the scene.

C036 Police Arrival Delay

🖡 CA	RE 10.2.1.3 - [IMPACT Re	sults - 2017-2	2021 Alabar	ma Integrate	d Crash Dat	a - Rural vs.	Not Rural]	- 🗆 ×
🖡 Ei	le <u>D</u> ashboard <u>F</u> ilte	rs <u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocation	s <u>T</u> ools	<u>W</u> indow	<u>H</u> elp	_ & ×
6	2017-2021 Alabama Integr	ated Crash Dat	a	~	Run	al		✓ ♥ 1/1.
Order:	Natural Order 🗸 🗸	Descending	~	Suppre	ss Zero-Valu	ued F Signific	cance: Over	Representation ~ Threshold: 2.0 文
C036:	Police Arrival Delay	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C028: Mileposted Route C029: National Highway System
▶	0 to 5 minutes	9243	5.16	185594	31.80	0.162*	-47708.358	C030: Functional Class
	6 to 10 minutes	11620	6.49	179541	30.77	0.211*	-43473.935	C032: Weather
	11 to 15 minutes	13570	7.58	95105	16.30	0.465*	-15613.912	C033: Locale
	16 to 20 minutes	15668	8.75	47667	8.17	1.071*	1040.909	C034: E Police Present at Time of Crash
	21 to 30 minutes	32420	18.10	37976	6.51	2.782*	20766.688	C035: Police Notification Delay
	31 to 45 minutes	38294	21.38	17728	3.04	7.039*	32853.987	C036: Police Arrival Delay
	46 to 60 minutes	23532	13.14	6410	1.10	11.964*	21565.028	C038: Adjusted EMS Arrival Delay
	61 to 90 minutes	20792	11.61	4680	0.80	14.478*	19355.896	C039: Non-Vehicular Property Damage
	91 to 120 minutes	6706	3.74	1433	0.25	15.250*	6266.270	C040: Agency ORI
	121 to 180 minutes	3734	2.09	1400	0.24	8.692*	3304.396	C042: Highway Patrol Troops
	Over 180 minutes	3119	1.74	4938	0.85	2.058*	1603.726	C043: Highway Patrol Posts
	Unknown	379	0.21	1107	0.19	1.116	39.306	Sort by Sum of Max Gain
00) 🞯 🖉							
		20	17-2021 Ala	bama Integra	ted Crash Da	ata - Filter = I	Rural vs. Not	Rural
				C036	: Police Arriv	val Delay		
	40							
	20		1		ļ	1	L	
	- 1	6 to 10 minutes	16 to 20) minutes	31 to 45 minut	es 61 to	90 minutes	121 to 180 minutes Unknown
4					2036: Police	Arrival Delay	v	

Police arrival delay generally reflects how far out in the Rural area the crash took place. Zero to 20 minutes are significantly under-represented while the longer times are all significantly over-represented.

🚦 CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Rural AND Not Adjusted EMS Arrival ... \times đх File <u>D</u>ashboard <u>I</u>mpact Locations Tools Window <u>H</u>elp <u>Filters</u> <u>A</u>nalysis Rural 2017-2021 Alabama Integrated Crash Data 12 Order: Max Gain Descending Suppress Zero-Valu Significance: Over Representation Threshold: 2.0 + C038: Adjusted EMS Arrival Delayoubset C038: Adjusted EMS Arrival Delay Subset Other Other Odds Max Frequency Percent Frequency Percent Ratio -10935. 0 to 5 minutes 4889 9.53 42327 30.84 0.309* 6 to 10 minutes 22.94 47059 34.29 0.669* -5820.9.. 11773 11 to 15 minutes 12825 24.99 20065 14.62 1.710* 5323.284 8360 16.29 8973 6.54 2.492* 5005.258 16 to 20 minutes 21 to 30 minutes 7992 15.57 7054 5.14 3.030* 5354.716 31 to 45 minutes 3253 6.34 2871 2.09 3.031* 2179.617 46 to 60 minutes 953 1.86 696 0.51 3.662* 692.786 61 to 90 minutes 562 1.10 284 0.21 5.293* 455.821 91 to 120 minutes 118 0.23 54 0.04 5.845* 97.811 121 to 180 minutes 0.20 79.446 103 63 0.05 4.373* Over 180 minutes 98 0.19 20 0.01 13.106* 90.523 Unknown 390 0.76 7790 5.68 0.134* -2522.4.. Sort by Sum of Max Gain 📋 🕼 🚳 🖉 2017-2021 Alabama Integrated Crash Data C038: Adjusted EMS Arrival Delay 40 Frequency 20 0 121 to 180 61 to 90 minutes 6 to 10 minutes 16 to 20 minutes 31 to 45 minutes Unknown minutes C038: Adjusted EMS Arrival Delay

C038 Adjusted EMS Arrival Delay

Rural EMS Arrival Delay is generally longer than Urban for the same Rural reasons as the police arrival delay. In some cases, this is because of a delay in reporting the crash to the proper EMS authority. But this is more the case for police arrival than for EMS arrival. When people are injured there is an urgency that causes a more rapid response.

CARE 10.2.1	.3 - [Cross	stab Resul	ts - 2017-20	21 Alabam	na Integrated	Crash Data]				_		×
File Das	shboard	<u>F</u> ilters	<u>A</u> nalysis	<u>C</u> rosstab	<u>L</u> ocations	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp				-	8
2017-202	21 Alabama	Integrated	Crash Data		~	All red	cords (do not	apply a filter)			~ 💡	1/	1/201
Suppress Zero	Values: N	one	~	Select C	Cells: 🔳 🗸	36 9		Column: Crash	n Severity	; Row: Adjust	ed EMS A	rrival Dela	y 🙋
	Fat	al Injury	Suspe Serious	ected s Injury	Suspected Mi Injury	nor Pos	sible Injury	Property Dan Only	nage	Unknown		TOTAL	
0 to 5 minutes		653	40	37	12219		13757	14631		1919		47216	
	R	5.34%	18.3	5%	20.48%		20.21%	2.49%	_	9.41%		6.20%	- 1
6 to 10 minutes		1223	61	66	16466		1/392	15726		1859		58832	_
	28	5.74%	28.0	3%	27.60%		25.56%	2.68%		9.11%	_	1.13%	_
11 to 15 minutes	s av	813	43	21	9/26		9006	8118		906	_	32890	_
	R	9.10%	19.6	5%	16.30%		13.23%	1.38%		4.44%		4.32%	-
16 to 20 minutes	s	462	25	18	52/1		4/65	3855		462	_	1/333	_
	10	0.86%	11.4	5%	8.84%		7.00%	0.66%		2.21%	_	2.28%	-
21 to 30 minutes		406	22	90	4692		4223	3064		371	_	15046	_
	9	.54%	10.4	1%	7.86%		6.21%	0.52%		1.82%	_	1.98%	_
31 to 45 minutes		156	75	3	1820		1902	1290		163	_	6124	_
	3	.6/%	3.6	1%	3.05%		2.79%	0.22%		0.80%	_	0.80%	-
46 to 60 minutes	s	43	18	34	488		508	378		48	_	1649	-
	1	.01%	0.84	4%	0.82%		0.75%	0.05%		0.24%	_	0.22%	-11
61 to 90 minutes		22	10)2	276		221	199		26		846	_
	0	.52%	0.4	5%	0.46%		0.32%	0.03%		0.13%		0.11%	-
91 to 120 minute	s .	13	2	5	49		47	32		6		172	_
	0	.31%	0.1	1%	0.08%		0.0/%	0.01%		0.03%		0.02%	-
121 to 180		11	2	1	57		31	45		1	_	166	_
minutes	0	.26%	0.10	0%	0.10%		0.05%	0.01%		0.00%	_	0.02%	- 11
Over 180 minute		34	2	9	17		13	23		2	_	118	
	~ 0	.80%	0.13	3%	0.03%		0.02%	0.00%		0.01%		0.02%	- 11
Unknown		30	14	48	632		979	5970		421		8180	
on a contraction of the	0	.70%	0.6	7%	1.06%		1.44%	1.02%		2.06%		1.07%	
Not Applicable		390	13	61	7944		15211	533359		14211		572476	
Not Applicable	9	.16%	6.1	9%	13.32%		22.35%	90.91%		69.68%		75.22%	
τοτοι	4	4256	219	995	59657		68055	586690		20395	7	761048	
TOTAL	0	.56%	2.8	9%	7.84%		8.94%	77.09%		2.68%	1	00.00%	

C038 by C025 Adjusted EMS Arrival Delay by Crash Severity

The above cross-tabulation shows how much quicker a response is called for as a function of the crash severity. This cross-tabulation is for all roadways and crashes, not just rural as in the IMPACT runs. Generally, response time is longer for Rural than for Urban roads since police and EMS capabilities reside primarily in the cities.

C011 Highway Classification

🚦 CA	CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Rural vs. Not Rural] - C X												
🖡 Ei	le <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis <u>I</u>	mpact <u>L</u> oca	ations <u>T</u> ools	s <u>W</u> indow	<u>H</u> elp			_ 8	×			
6	2017-2021 Alabama Integrated	d Crash Data		~ F	Rural			~ 🌱 🈨 1	/ 1/2017 ~	12/31			
Order:	Max Gain 🗸 De	escending	✓ Ø Si	ippress Zero-V	alued Rows	Signif	ficance: Over F	Representation V Threst	hold: 2.0	÷			
C011:	Highway Classifications	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain 👻	C007: Week of the Year C008: Time of Day		^			
<u>۲</u>	County	75508	42.16	30645	5.25	8.030*	66104.226	C010: Rural or Urban					
	Interstate	36759	20.53	50207	8.60	2.386*	21352.398	C011: Highway Classificat	tions				
	State	39828	22.24	100690	17.25	1.289*	8930.103	C012: Controlled Access C013: E Highway Side					
	Federal	24647	13.76	73330	12.57	1.095*	2144.837	C015: Primary Contributin	g Circumstan	ac			
	Private Property	261	0.15	25305	4.34	0.034*	-7504.133	C016: Primary Contributin	g Unit Numbe	» ر			
	Municipal	2075	1.16	303402	51.99	0.022*	-91027.431	Sort by Sum of Max Gain					
0) 😪 🔎								🔽 Dis	play			
			2017-2021 Ala	bama Integrate C011: Hig	d Crash Data - ghway Classifi	Filter = Rural v cations	vs. Not Rural						
60 40 40 40 40 40 40 40 40 40 4													
		,		C011:1	 Highway Class	ifications		,					

Generally, this display gives the proportion of the included roadways that are were designated as Rural and Urban. As expected, County roads and Interstates have the highest Rural crash over-representations.

C412 CU Trafficway Lanes

🚦 CA	ARE 10.2.1.3 - [IMP/	ACT Resu	lts - 2017-20)21 Alabama	Integrated C	rash Data -	Rural vs. Not	: Rural]	- 0	Х
🔋 E	ile <u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocations	<u>T</u> ools <u>V</u>	<u>/</u> indow <u>H</u>	elp		- 8 ×
6	2017-2021 Alabama	a Integrate	ed Crash Data	1	\sim	Rural			~ 💡	1/ 1/2017
Order	: Natural Order	~ D	escending	~	Suppress	Zero-Valued	Rows Signi	ificance: Over	Representation V Threshold:	2.0 🚖
C412	CU Trafficway La Voice One Lane Two Lanes Three Lanes Four Lanes Five Lanes Six Lanes or More Not Applicable (Pa	nes	Subset Frequency 1751 111143 2533 45742 1392 13911 667	Subset Percent 0.98 62.06 1.41 25.54 0.78 7.77 0.37	Other Frequency 15283 218200 35228 169445 26923 62516 28585	Other Percent 2.62 37.35 6.04 29.04 4.61 10.71 4.90	Odds Ratio 2 0.373' 9 1.660' 4 0.234' 5 0.168' 6 0.725' 9 0.076'	Max Gain -2938.766 -44185.794 -8277.121 -6254.168 -6869.636 -5272.761 -8104.640	C410: CU Traffic Control Function C411: CU Opposing Lane Separa C412: CU Trafficway Lanes C413: E CU Turn Lanes C414: CU One-Way Street C415: CU Workzone Related C416: E CU Workzone Type C417: E CU Workers Present C418: E CU Law Enforcement Pro C450: CU CMV Indicator	ation esent i
	CU is Unknown		1939	1.08	27399	4.69	0.231	-6468.702	Sort by Sum of Max Gain	*
	a a <i>s</i>		2	2017-2021 Ala	abama Integra C412	ted Crash Da : CU Trafficw	ata - Filter = R vay Lanes	lural vs. Not Ru	ral	
	80 60 40 20 0	One	Lane Tw	D Lanes Th	ree Lanes	FourLanes	Five Lanes	Six Lanes or More	Not Applicable (Parking Lot)	
					C4	112: CU Traf	ncway Lanes			

This shows that most Rural roads are two-lane, with the others fairly well distributed but primarily Urban. This accounts for some of the slower response times on rural roads.

C030 Functional Class

C.	ARE 1	0.2.1.3 - [IMP/	ACT Resu	ılts - 2017-202	1 Alabama I	Integrated Cras	sh Data - Rura	vs. Not Rur	ral]			_		×
E E	ile	<u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	Locations <u>T</u>	ools <u>W</u> indo	w <u>H</u> elp					-	₽×
¢?	201	7-2021 Alabama	a Integrate	ed Crash Data		\sim	Rural				~ 9	12 1/	1/2017	~ 12/31
Orde	r: Ma	x Gain	~ [)escending	~ 5	Suppress Zer	ro-Valued Row	s [Significance:	Over f	Representation	✓ Thresh	old: 2.0	
C 030	Interview of the second	estate ior Collector cord from Paper incipal Arterial - C cal ior Arterial incipal Arterial - C	r System Dther Fr Dther	Subset Frequency 36593 37203 5570 13 97 26314 33023 33086	Subset Percent 21.2 21.6 3.2 0.0 0.0 15.3 19.2 19.2 2017-2021	Other Frequency 9 51545 4 59539 4 1353 1 6 6 5719 1 94413 1 121556 5 173866 I Alabama Integ C C	Other Percent 10.15 11.72 0.27 0.00 1.13 18.59 23.93 34.23 34.23	Odds Ratio 2.098 1.847 12.166 6.40 0.050 0.824 0.803 0.562 ta - Filter = F	Max Gain 19150.90 7* 17055.84 5* 5112.16 13 10.97 -1838.22 4* -5634.02 3* -8109.83 2* -25747.79 Rural vs. Not R	↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑	C027: At Inters C028: Milepost C029: National C030: Function C031: Lighting C032: Weather C033: Locale C034: E Police C035: Police A C036: Police A C037: ENS Arri Sort by Sum of	ection ed Route Highway Sy al Class Conditions Present at 1 otification D otification D rrival Delay wal Delay Max Gain	stem	rast Display
	Frequency	40	Int	erstate c	Major	Minor Collector	Record from Paper System	I Principal Arterial - Other Freeways or Expressways onal Class	Local	L L L L L L L L L L L L L L L L L L L	nor Arterial Print	ipal rial her		

Since most people are not nearly as familiar with functional class as they are with roadway classification, the following cross-tabulation has been given to show their relationship in terms of crashes..

CARE 10.2.1.3	- [Crosstab Results	s - 2017-2021 Alabaı	ma Integrated Crasł	n Data]					- 0	×	
Eile Dashl	board <u>F</u> ilters	<u>A</u> nalysis <u>C</u> rosstal	b <u>L</u> ocations <u>T</u>	ools <u>W</u> indow	<u>H</u> elp				-	в×	
2017-2021	Alabama Integrated (Crash Data	\sim	All records (do not a	pply a filter)	~	9 😨 1/ 1	/2017 ~ 12/31/20	21 🗸 🚦 🗲		
Suppress Zero Values: Rows and Columns 🗸 Select Cells: 🔹 😨 🌱 Column: Functional Class ; Row: Highway Classifications 👔											
	Interstate	Principal Arterial - Other Freeways o	Principal Arterial - Other	Minor Arterial	Major Collector	Minor Collector	Local	Record from Paper System	TOTAL		
Interstate	83389	164	789	356	196	9	390	0	85293		
Federal	361	1057	76293	14056	1509	24	930	1	94231		
State	661	2404	69110	48481	9546	72	2547	3	132824		
County	506	36	4384	16032	37672	6090	30816	15	95551		
Municipal	2482	2111	54014	74110	46683	610	84133	0	264143		
Private Property	739	44	2362	1544	1136	118	1911	0	7854		
TOTAL	88138	5816	206952	154579	96742	6923	120727	19	679896		

C030 by C011 Cross-tabulation – Functional Class by Highway Classification

This cross-tabulation is for all roadways and crashes, not just Rural as in most of the IMPACT runs. This shows how the Functional Class is divided by the various Highway Classification for all roadways in the state.

C015a Primary Contributing Circumstances (Rural) All items with less than 400 occurrences were removed

CARE 10.2.1.3 - [IMPACT Results - 2017-2021 A	labama Inte	egrated Cra	ash Data - F	Rural AND I	Not Prima	ry Contributi	ng Circumstance = 55 — 🗆 🗙
File Dashboard Filters Analysis Im	pact <u>L</u> o	cations	<u>T</u> ools <u>W</u>	indow <u>H</u>	<u>H</u> elp		_ & :
2017-2021 Alabama Integrated Crash Data		\sim	Rural				✓ ♥ 〒 1/ 1/2017 ∨ 12/
Order: Max Gain V Descending	✓ Ø 5	Suppress Z	ero-Valued I	Rows	Signi	ficance: Ove	er Representation V Threshold: 2.0 🖨
C015: Primary Contributing Circumstance	Subset requency	Subset Percent	Other irequency	Other Percent	Odds Ratio	Max 🚽 ^	C015: Primary Contributing Circumstance
Driving too Fast for Conditions	14573	8.75	15408	3.05	2.866*	9488.488	
Over Speed Limit	7845	4.71	2934	0.58	8.103*	6876.804	
E Fatigued/Asleep	7714	4.63	5176	1.03	4.516*	6005.963	
DUI	9340	5.61	11377	2.26	2.488*	5585.685	
E Swerved to Avoid Animal	5192	3.12	2394	0.47	6.572*	4402.000	
Unseen Object/Person/Vehicle	14731	8.85	32932	6.53	1.356*	3863.714	
Defective Equipment	5611	3.37	6546	1.30	2.598*	3450.875	
E Swerved to Avoid Vehicle	6930	4.16	11795	2.34	1.780*	3037.748	
E Other Distraction Inside the Vehicle	5950	3.57	10776	2.14	1.673*	2394.010	
E Ran off Road	5360	3.22	11680	2.32	1.391*	1505.697	
E Over Correcting/Over Steering	2846	1.71	4976	0.99	1.733*	1203.961	
Cargo Fell or Load Shift	1356	0.81	1187	0.24	3.462*	964.300	
Improper Passing	2269	1.36	4450	0.88	1.545*	800.537	
E Distracted by Use of Electronic Communic	2231	1.34	4701	0.93	1.438*	679.709	
Traveling Wrong Way/Wrong Side	1172	0.70	2037	0.40	1.744*	499.807	
E Crossed Centerline	2916	1.75	7360	1.46	1.201*	487.261	
Failed to Yield the Right-of-Way	828	0.50	1152	0.23	2.178*	447.850	
E Distracted by Use of Other Electronic Devi	871	0.52	1620	0.32	1.629*	336.413	
E Swerved to Avoid Object	574	0.34	902	0.18	1.928*	276.348	
Improper Parking/Stopped in Road	673	0.40	1418	0.28	1.438*	205.072	
Vision Obstructed	1057	0.63	2641	0.52	1.213*	185.492 🗸	Sort by Sum of Max Gain
📋 🕼 📽 🖉							Displa
		2017-202	1 Alabama Ir	ntegrated Ci	rash Data		
		C015: Pri	mary Contri	buting Circu	umstance		
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0	l I'm.	D Dra	la na	-			
ERa	off Road		Improper Parki	ing/Stopped in	Road	E Faile Right-of-Way	ed to Yield Followed too Close y from Stop Sign
		C015	: Primary Co	ontributing (Circumstan	ce	

See C015c.

C015b Primary Contributing Circumstances (Urban) All items with less than 400 occurrences were removed

	DE 10 2 1 2 - UMDA CT D	I-I					Cartalitati	
	RE 10.2.1.3 - [IMPACT Results - 2017-2021 A	labama inte	egrated Cra	ash Data - F	(ural AND I	Not Prima	ry Contributi	ing Circumstance = 55 — L X
	ile <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis <u>I</u> m	ipact <u>L</u> oo	cations	<u>T</u> ools <u>W</u>	indow <u>F</u>	<u>l</u> elp		
6 2	2017-2021 Alabama Integrated Crash Data		\sim	Rural				✓ ♥ 1/ 1/2017 ∨ 12/3
Order	: Max Gain V Descending	~ Ø\$	ouppress Z	ero-Valued I	Rows	Signi	ficance: Ov	er Representation V Threshold: 2.0
C015	Primary Contributing Circumstance	Subset requency	Subset Percent	Other requency	Other Percent	Odds Ratio	Max 🚽 🖌	C015: Primary Contributing Circumstance
	Improper Parking/Stopped in Road	673	0.40	1418	0.28	1.438*	205.072	
	Vision Obstructed	1057	0.63	2641	0.52	1.213*	185.492	
	E Distracted by Passenger	810	0.49	2029	0.40	1.210*	140.447	
	E Ran Stop Sign	1931	1.16	5600	1.11	1.045	83.047	
	E Distracted by Fallen Object	507	0.30	1902	0.38	0.808*	-120.644	
	E Aggressive Operation	3260	1.96	10334	2.05	0.956	-150.134	
	E Other Distraction Outside the Vehicle	2977	1.79	10181	2.02	0.886*	-382.645	
	E Failed to Yield Right-of-Way at Uncontrolle	486	0.29	2710	0.54	0.543*	-408.277	
	E Other Failed to Yield	1473	0.88	6051	1.20	0.738*	-523.780	
	E Failed to Yield Right-of-Way from Yield Sign	417	0.25	3199	0.63	0.395*	-638.643	
	E Failed to Yield Right-of-Way from Stop Sign	8094	4.86	28456	5.64	0.862*	-1296.2	
	E Other Improper Action	1870	1.12	10018	1.99	0.566*	-1435.8	
	Made Improper Turn	2494	1.50	12642	2.51	0.598*	-1677.7	
	E Failed to Yield Right-of-Way from Driveway	2050	1.23	12314	2.44	0.504*	-2013.5	
	Improper Lane Change/Use	8890	5.34	35663	7.07	0.755*	-2878.4	
	E Failed to Yield Right-of-Way from Traffic Si	774	0.46	11871	2.35	0.198*	-3143.3	
	Improper Backing	1867	1.12	16923	3.35	0.334*	-3717.4	
	E Failed to Yield Right-of-Way Making Left o	4146	2.49	27443	5.44	0.458*	-4909.9	
	E Ran Traffic Signal	1109	0.67	20502	4.06	0.164*	-5656.4	
	Misjudge Stopping Distance	8070	4.85	56591	11.22	0.432*	-10604	
	Followed too Close	15197	9.13	86549	17.16	0.532*	-13363 🔊	Sort by Sum of Max Gain
0) @ Ø							Display
			2017-2021	I Alabama Ir	ntegrated Cr	ash Data		
			C015: Pri	mary Contri	buting Circu	Imstance		
	20							
·		n	hitra	1		n_1	La	
	E Rar	n off Road	C015	Improper Parki	ing/Stopped in ontributing (Road Circumstan	E Fail Right-of-Wa ce	ed to Yield Followed too Close y from Stop Sign

SeeC015c

C015c Primary Contributing Circumstances (PCC Discussion)

Because we will discuss this same IMPACT result separately for both the Rural and the Urban, we have split it into its rural and urban results in the two C015 sections above. The IMPACT results contain both the over-representations for the Rural areas at the top and those for the Urban areas at the bottom (technically they came out as significant under-representations). There are so many over- (and Under-) represented items that we felt it would be beneficial to separate the Rural and Urban results in the discussions below.

Rural C015a. All of the rural over-representations are in the top half of the table, and they are given by the red bars in the chart. Several of them have either a direct reference to excessive speed, or they have an obvious linkage to this root cause. Examples are: Driving too Fast for Conditions, Over Speed Limit, Swerved to Avoid Animal, Unseen Object/Person/Vehicle, Swerved to Avoid Vehicle, Ran off Road, Over Correcting/Over Steering, Improper Passing, Crossed Centerline, and Swerved to Avoid Object. Those directly connected with excessive speed are critical in that that they generally result in increased injury severity. Other high severity PCCs generally follow their ordering in the list. For example, Fatigued/Asleep and DUI are generally much more severe that most items lower on the list. Items with Odds Ratios greater than 2.00 are assigned a red background.

Urban C015b. Urban over-representations are given at the bottom of the IMPACT output, the largest ones are closest to the bottom. In these cases, the over-represented Urban Odds Ratios will be less than 1.00, and any that are 0.500 or less will be assigned a green background. While these are under-representations for Rural roads, they are over-representations for the Urban, since rural and urban are complementary. So, the largest over-representation for Urban roads (in terms of negative Max Gain caused by the high frequency) is Following too Close. Its Odds Ratio is not as low as some above it on the list, but frequency goes into the Max Gain calculations. Following too Close is closely related to Misjudge Stopping Distance, which is the next above it on the list. Many of the other PCCs toward the bottom of the list are related to urban traffic control, and the chance of finding most of them in a Rural area is relatively small. Note that the top 3 items on this list are actually rural over-representations. It is interesting that Aggressive Operation and several Distraction items are in the Urban over-representation listing, and thus more closely associated with Rural than Urban driving.

Other items of C015 are discussed individually under their displays.

C224 CU Estimated Speed at Impact

🖡 CA	RE 10.2.1.3 - [IMPA	CT Results	- 2017-20)21 Alaban	na Integra	ted Crash	Data - Rur	al AND Not CU	Esti —		×
🖡 Ei	le <u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocatio	ons <u>T</u> oo	ols <u>W</u> ind	dow <u>H</u> elp		_ 1	ð ×
6 2	2017-2021 Alabama	Integrated (Crash Data		~		Rural			6	
Order:	Max Gain	✓ Des	cending	~	Supp	Significar	nce: Over	Representation	✓ Threshole	d: 2.0	÷
C224:	CU Estimated Sp	eed at Impa requency	ct <mark>Subset</mark> Percent	Other equency	Other Percent	Odds Ratio	Max Gain	C224: CU Es	timated Speed	at Impact	
•	1 to 5 MPH	9061	5.84	50766	23.23	0.251*	-27008				
	6 to 10 MPH	9475	6.10	33445	15.31	0.399*	-14288				
	11 to 15 MPH	6948	4.48	22318	10.21	0.438*	-8909				
	16 to 20 MPH	4810	3.10	16043	7.34	0.422*	-6588				
	21 to 25 MPH	4765	3.07	13669	6.26	0.491*	-4947				
	26 to 30 MPH	4622	2.98	14660	6.71	0.444*	-5794				
	31 to 35 MPH	7865	5.07	15095	6.91	0.733*	-2860				
	36 to 40 MPH	8678	5.59	12849	5.88	0.951*	-451.387				
	41 to 45 MPH	21363	13.76	14041	6.43	2.141*	11386				
	46 to 50 MPH	10234	6.59	7186	3.29	2.004*	5128.2				
	51 to 55 MPH	21965	14.15	6284	2.88	4.920*	17500				
	56 to 60 MPH	9871	6.36	3627	1.66	3.830*	7293.9				
	61 to 65 MPH	12544	8.08	3457	1.58	5.107*	10087				
	66 to 70 MPH	15603	10.05	3099	1.42	7.086*	13401				
	71 to 75 MPH	3615	2.33	755	0.35	6.739*	3078.5				
	76 to 80 MPH	2183	1.41	562	0.26	5.467*	1783.6				
	81 to 85 MPH	716	0.46	157	0.07	6.419*	604.449				
	86 to 90 MPH	491	0.32	167	0.08	4.138*	372.344				
	91 to 95 MPH	103	0.07	42	0.02	3.452*	73.158				
	96 to 100 MPH	194	0.12	199	0.09	1.372*	52.608				
	Over 100 MPH	149	0.10	90	0.04	2.330*	85.054	Sort by Sum	of Max Gain		
00	i 😪 🖉										
	-			2017-2021	Alabama	Integrated	Crash Data	3			
				C224: (CU Estimat	ted Speed	at Impact				
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2	20										
	10	1			1	1					
- L	10		11	11							
	0	21	to 25 Mi	РН	46 to 5	0 MPH	71	to 75 MPH	96 to 100 M	APH	
		2	1020101	<u></u>	24· CII Fe	timated Sn	eed at Imna	act	50101001		

Speed is a factor not only in the crash cause but also in the crash severity. That being the case, we can see from this attribute why there are more fatal crashes in the rural areas.

C223 CU Speed Limit

6	2017-2021 Alabama	a Integrated	Crash Dat	3	~		Rural	0 D
Order:	Max Gain	∼ De	scending	~	Supp	Significa	nce: Ove	r Representation V Threshold: 2.0 🚖
C223:	CU Speed Limit	Subset equency	Subset Percent	Other requency	Other Percent	Odds Ratio	Max Gain	C223: CU Speed Limit
•	5 MPH	60	0.04	1595	0.32	0.112*	-474.364	11
	10 MPH	90	0.05	2548	0.51	0.105*	-763.643	
	15 MPH	411	0.25	4552	0.92	0.270*	-1114	
	20 MPH	338	0.20	4812	0.97	0.210*	-1274	
	25 MPH	4827	2.90	61434	12.36	0.235*	-15754	
	30 MPH	2034	1.22	41227	8.29	0.147*	-11778	
	35 MPH	13152	7.90	91823	18.47	0.428*	-17610	
	40 MPH	6790	4.08	61059	12.28	0.332*	-13666	
	45 MPH	45958	27.59	113658	22.86	1.207*	7879.7	
	50 MPH	3990	2.40	30837	6.20	0.386*	-6341	
	55 MPH	42996	25.81	45052	9.06	2.849*	27902	
	60 MPH	2804	1.68	10002	2.01	0.837*	-546.917	
	65 MPH	12158	7.30	11749	2.36	3.089*	8221.7	
	70 MPH	30869	18.53	16811	3.38	5.481*	25236	
	75 MPH	47	0.03	60	0.01	2.338*	26.899	
	80 MPH	37	0.02	5	0.00	22.088	35.325	
	Over 80 MPH	25	0.02	11	0.00	6.784	21.315	Sort by Sum of Max Gain
0) 🕼 🖉							
				2017-202	1 Alabama	Integrated	Crash Dat	la
					C223: CU	Speed Lin	nit	
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nenc	20				_			
Free 1								
	0		-					
	,		25	ŴРН		50	ŴРН	75 MPH
					C223:	CU Speed	d Limit	

This is quite useful for comparing against the estimate impact speed, C224, immediately above. It is important to realize that just being under some speed limit does not imply legality. For example, most County roads have speed limits of 45 MPH, but the roadway conditions (especially weather) can mandate speeds less than that.

C052 Number of Vehicles

🔋 CA	RE 10.2.1.3 - [IMP/	ACT Resu	ilts - 2017-202	21 Alabama	Integrated Cr	ash Data - Ru	ral vs. Not Ru	ural]				_		Х
🔋 Ei	i le <u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocations	<u>T</u> ools <u>W</u> ine	dow <u>H</u> elp						-	₽×
*	2017-2021 Alabama	a Integrate	ed Crash Data		\sim	Rural				~	\mathbb{P}	12	/ 1/201	7 ~ 12
Order	Natural Order	~ [)escending	~ 6	Suppress Z	ero-Valued Ro	ws Si	ignificance: 0	ver R	Representation	~ T	hreshold	: 2.0	÷
C052:	Number of Vehicl	es	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	î	C046: ALDOT C047: ADECA	Region	Region		^
•	1 Vehicle		85268	47.62	79106	13.56	3.513*	60993.404		C048: RPO				
	2 Vehicles		86662	48.39	469385	80.43	0.602*	-57374.244		C049: MPO		_		
	3 Vehicles		6100	3.41	30139	5.16	0.660*	-3148.503		C050: Has C C051: E Man	oordinat Click Us	e ed		
	4 Vehicles		819	0.46	4078	0.70	0.654*	-432.382		C052: Numb	er of Veh	icles		
	5 Vehicles		163	0.09	662	0.11	0.802*	-40.142		C053: Numb	er of Driv	ers Rec	orded	
	6 Vehicles		42	0.02	144	0.02	0.950	-2.188		C054: Numb	er of Per	sons Re	ecorded	
	7 Vehicles		11	0.01	41	0.01	0.874	-1.581		C055: Numb	er of Mot	orists Ro Motoric	ecorde	d
	8 Vehicles		9	0.01	14	0.00	2.095	4.704		C056. Numb C057: Numb	er of Nor	lestrians	sis Rec	
	9 Vehicles		3	0.00	4	0.00	2.444	1.773		C058: Numb	er of Peo	lacyclist	s	~
	10 Vehicles		1	0.00	3	0.00	1.086	0.079	$\overline{}$	Sort by Sum	of Max G	ain		
0	a 🗞 🖉												[🗸 Disp
				2017-2021	Alabama Integ	rated Crash Da	ita - Filter = R	lural vs. Not Ru	ıral					
					CO	52: Number of	Vehicles							
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	E _													
	0								-		-		-	
			2 Vehic	cles	4 Vehicl	es	6 Vehicles	8 \	/ehic	cles	10 Vehi	cles		
						C052: Numb	er of Vehicles	3						

Note the natural ordering of the table. It is interesting that most multiple-vehicle crashes occur in the urban areas (blue bars). Think of it as a traffic concentration issue. Generally, these multiple crashes are not as severe in causing fatalities, but, of course, some of them are quite severe.

C019a Most Harmful Event (Rural Over-representations)

All items with less that 200 occurrences were removed

C/	ARE 10.2.1.3 - [IMPACT Results - 2017-20	21 Alabama	Integrated Cr	ash Data - Ru	ıral AND Not	E Most Harn	nful Event = 56	6 OR 15 OR 1	13 — 🗆	×
₿ E	ile <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocations	<u>T</u> ools <u>W</u> ir	ndow <u>H</u> elp					- 8 ×
¢°	2017-2021 Alabama Integrated Crash Data		\sim	Rural				~ 9	2 1/ 1/2017	~ 12/31/
Order	: Max Gain ~ Descending	~ 6	Suppress Z	ero-Valued R	ows	Significan	ce: Over Repr	esentation	✓ Threshold: 2	2.0 🜩
C019	: E Most Harmful Event	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max 🚽 ' Gain	▲ C019:	E Most Harmful Even	t
	Overtum/Rollover	16501	9.31	5474	0.96	9.726*	14804.458			
	Collision with Tree	16290	9.19	7914	1.38	6.641*	13837.235			
	Collision with Ditch	11266	6.36	6488	1.13	5.603*	9255.191			
	Collision with Animal: Deer	6939	3.92	3682	0.64	6.081*	5797.848			
	Collision with Other Non-Fixed Object	3768	2.13	2481	0.43	4.900*	2999.070			
	Collision with Cable Barrier	2566	1.45	1195	0.21	6.928*	2195.637			
	Collision with Embankment	2430	1.37	1225	0.21	6.400*	2050.339			
	Collision with Guardrail Face	2779	1.57	2779	0.49	3.227*	1917.712			
	Collision with Culvert Headwall	2185	1.23	989	0.17	7.128*	1878.482			
	Fire/Explosion	1814	1.02	269	0.05	21.758*	1730.630			
	Collision with Utility Pole	3583	2.02	6715	1.17	1.722*	1501.838			
	Collision with Animal: Farm/Ranch	1405	0.79	221	0.04	20.513*	1336.506			
	Collision with Fence	1950	1.10	1998	0.35	3.149*	1330.765			
	Collision with Concrete Barrier	2279	1.29	3965	0.69	1.855*	1050.138			
	Collision with Sign Post	1403	0.79	2182	0.38	2.075*	726.739			
	Collision with Bridge Abutment/Rail	1035	0.58	1039	0.18	3.214*	712.985			
	Collision with Animal: Other	874	0.49	585	0.10	4.821*	692.693			
	Collision with Other Fixed Object	2239	1.26	5073	0.89	1.424*	666.739	Sort L	by Sum of Max Gain	
) 🕼 🖉] Display F
			2017-202	1 Alabama Int	tegrated Crash	Data				
			C	019: E Most H	armful Event					
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	• I	Fire/Exp	olosion	C019- E M	Collision with G	iuardrail End	Collisi	on with Curb/Is	land/Raised Median	
				CO19: EIN	nost narmtul E	went				

Almost all of these in the top half of the IMPACT output are Collision With ... Exceptions here are the top items, Overturn/Rollover, and Fire/Explosion, plus there are several on the next page given below.

C019b Most Harmful Event (Urban Over-representations)

All items with less that 200 occurrences were removed

i Eiler Qashboard Eilers Analysis Impact Locations Jool Window Help Impact Impact Locations Jool Window Help Impact Impact Impact Locations Jool Mark Impact Impact Impact Locations Jool
Image: Normal Integrated Crash Data Rural Image: Normal Integrated Crash Data Image
Order: Max Gain Descending Suppress Zero-Valued Rows Significance: Over Representation Threshold: 2.0 1 C019: Hoot Harmfel Event Subset Subset Other Precent Odds Max Ratio Max Collision with Other Fixed Object 2239 1.26 5073 0.89 1.424* 666.739 Collision with Guardrall End 920 0.52 831 0.16 3.332* 643.855 600.196 Collision with Guardrall End 920 0.52 831 0.16 3.332* 643.855 660.196 Collision with Maibox 1111 0.63 2049 0.36 1.749* 475.959 Vehicle Defect/Component Failure 379 0.21 407 0.07 3.005* 252.860 Collision with Maibox 1111 0.63 0.11 1.809* 159.196 Collision with Guardrall End 202 0.635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Work Zone/Maintenance Equip 2
C0193:E Most Harmful Event Voice Subset Frequency Subset Percent Other Frequency Other Percent Other Ratio Odds Gain Max Gain A Collision with Other Fixed Object 2233 1.26 5073 0.89 1.424 666.739 Collision with Faling/Shfting Cargo 857 0.48 633 0.11 4.355 660.196 Collision with Guardral End 920 0.52 891 0.16 3.332 643.855 Collision with Mallbox 1111 0.63 2049 0.07 3.005 252.860 Vehicle Defect/Component Falure 379 0.21 407 0.07 3.005 252.860 Gargo/Equipment Loss or Shift 302 0.17 337 0.06 2.891 197.554 Jackkmife 224 0.13 111 0.02 51.26 180.300 Other Nor-Collision 356 0.20 635 0.11 1.809 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 322 0.68 <
Collision with Other Fixed Object 2239 1.26 5073 0.89 1.424* 666.739 Collision with Falling/Shifting Cargo 857 0.48 635 0.11 4.355* 660.196 Collision with Guardrail End 920 0.52 891 0.16 3.332* 643.855 Collision with Mailbox 1111 0.63 2049 0.36 1.749* 475.959 Vehicle Defect/Component Failure 379 0.21 407 0.07 3.005* 252.860 Cargo/Equipment Loss or Shift 302 0.17 337 0.06 2.891* 197.554 Jackknife 224 0.13 141 0.02 5.126* 180.300 Thrown or Falling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* <
Collision with Falling/Shifting Cargo 857 0.48 635 0.11 4.355 660.196 Collision with Guardrail End 920 0.52 891 0.16 3.332 643.855 Collision with Mailbox 1111 0.63 2049 0.36 1.749 475.959 Vehicle Defect/Component Failure 379 0.21 407 0.07 3.005* 252.860 Cargo/Equipment Loss or Shift 302 0.17 337 0.06 2.891* 197.554 Jackknife 224 0.13 141 0.02 5126* 180.300 Thrown or Falling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Non-Motorist: Pedestrian 513 0.29 1806 0.480 0.585 362.855 Collision with Curb/I
Collision with Guardrail End 920 0.52 891 0.16 3.332* 643.855 Collision with Mailbox 1111 0.63 2049 0.36 1.749* 475.959 Vehicle Defect/Component Failure 379 0.21 407 0.07 3.005* 252.860 Cargo/Equipment Loss or Shift 302 0.17 337 0.06 2.891* 197.554 Jackknife 224 0.13 141 0.02 5.126* 180.300 Thrown or Falling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Orther Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291*
Collision with Mailbox 1111 0.63 2049 0.36 1.749 475.959 Vehicle Defect/Component Failure 379 0.21 407 0.07 3.005* 252.860 Cargo/Equipment Loss or Shift 302 0.17 337 0.06 2.891* 197.554 Jackknife 224 0.13 141 0.02 5.126* 180.300 Thrown or Faling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Other Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* 555.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* 771.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* 1229.845
Vehicle Defect/Component Failure 379 0.21 407 0.07 3.005* 252.860 Cargo/Equipment Loss or Shift 302 0.17 337 0.06 2.891* 197.554 Jackknife 224 0.13 141 0.02 5.126* 180.300 Thrown or Faling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Other Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collis
Cargo/Equipment Loss or Shift 302 0.17 337 0.06 2.891* 197.554 Jackknife 224 0.13 141 0.02 5.126* 180.300 Thrown or Falling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Other Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.555 2.72 0.313* -3
Jackknife 224 0.13 141 0.02 5.126* 180.300 Thrown or Falling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Other Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.505 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.555 2.72 0.313* -3309.990
Thrown or Falling Object 231 0.13 211 0.04 3.532* 165.605 Other Non-Collision 356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Other Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.85 15552 2.72 0.313* -3309.990
Other Non-Collision 3356 0.20 635 0.11 1.809* 159.196 Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Work Zone/Maintenance Equip 366 0.21 1160 0.20 1.018 6.484 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.855 15552 2.72 0.313* -3309.990
Collision with Work Zone/Maintenance Equip 201 0.11 321 0.06 2.020* 101.513 Collision with Other Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Other Post/Pole/Support 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.855 15552 2.72 0.313* -3309.990
Collision with Other Post/Pole/Support 366 0.21 1160 0.20 1.018 6.484 Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.555 2.72 0.313* -3309.990
Collision with Non-Motorist: Pedestrian 513 0.29 2826 0.49 0.586* -362.855 Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.555 2.72 0.313* -3309.990
Collision with Curb/Island/Raised Median 229 0.13 2541 0.44 0.291* -558.525 Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.555 15552 2.72 0.313* -3309.990
Ran Off Road Left 495 0.28 3892 0.68 0.410* -711.237 Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.85 15552 2.72 0.313* -3309.990
Ran Off Road Right 882 0.50 6814 1.19 0.418* -1229.845 Collision with Vehicle in (or from) Other Road 1510 0.85 15552 2.72 0.313* -3309.990
Collision with Vehicle in (or from) Other Road 1510 0.85 15552 2.72 0.313* -3309.990 O line with D level 10 and
Collision with Parked Motor Vehicle 2604 1.47 32938 5.76 0.255° -7604.387
Collision with Vehicle in Traffic 84732 47.81 446181 78.03 0.613* -53551.6 🗸 Sort by Sum of Max Gain
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2017-2021 Alabama Integrated Crash Data
C019: E Most Harmful Event
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Urban over-representations start (and are below) Collision with a non-Motorist-Pedestrian. Most have a green background because their Odds Ratios are less than 0.500.

C023 Manner of Crash

🚦 CA	CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Rural vs. Not Rural] - 🗆 X										
₿ E	ile <u>D</u> ashboard <u>F</u> ilters <u>A</u> nalysis	; <u>I</u> mpact	<u>L</u> ocations	Tools	<u>W</u> indow <u>H</u>	lelp		_ & ×			
6 2	2017-2021 Alabama Integrated Crash Da	ta	\sim	Rural				✓ ♥ 〒 1/ 1/2017 ∨ 12/31.			
Order	: Max Gain v Descending	~	Suppres	s Zero-Value	d Rows	Signifi	cance: Over	Representation V Threshold: 2.0			
C023	E Manner of Crash	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C012: Controlled Access C013: E Highway Side			
•	Single Vehicle Crash (all types)	82486	46.06	66873	11.46	4.020*	61965.243	C015: Primary Contributing Circumstanc			
	Sideswipe - Opposite Direction	4693	2.62	9485	1.63	1.612*	1782.417	C016: Primary Contributing Unit Number			
	Non-Collision	1537	0.86	3832	0.66	1.307*	361.106	C017: First Harmful Event C018: Location First Harmful Event Rel t			
	Record from Paper System	13	0.01	6	0.00	7.061	11.159	C019: E Most Harmful Event			
	Head-On (front to front only)	3417	1.91	12931	2.22	0.861*	-551.028	C020: E Distracted Driving Opinion			
	Other	3885	2.17	15304	2.62	0.827*	-811.210	C021: Distance to Fixed Object			
	Causal Veh Backing: Rear to Rear	175	0.10	4248	0.73	0.134*	-1128.548	C022: E Type of Roadway Junction/Featu			
	Unknown	81	0.05	4925	0.84	0.054*	-1430.294	C024: School Bus Related			
	Angle Oncoming (frontal)	2889	1.61	15568	2.67	0.605*	-1888.222	C025: Crash Severity			
	Angle (front to side) Opposite Direction	3305	1.85	19816	3.40	0.544*	-2775.770	C026: Intersection Related			
	Causal Veh Backing: Rear to Side	717	0.40	12752	2.19	0.183*	-3196.099	C027: At Intersection			
	Angle (front to side) Same Direction	2499	1.40	18609	3.19	0.438*	-3211.388	C028: Mileposted Route			
	Sideswipe - Same Direction	12007	6.70	60421	10.35	0.648*	-6533.886	C030: Functional Class			
	Side Impact (90 degrees)	10540	5.89	58813	10.08	0.584*	-7507.453	C031: Lighting Conditions			
	Side Impact (angled)	9699	5.42	56339	9.65	0.561*	-7589.277	C032: Weather			
	Rear End (front to rear)	41135	22.97	223657	38.33	0.599*	-27496.750	Sort by Sum of Max Gain			
0) 🛯 🖉							🗹 Display F			
		2017-20	21 Alabama	Integrated Cr	ash Data - Filt	ter = Rural vs	. Not Rural				
				C023: E M	anner of Crasl	h					
	60										
	> 40										
	1 20										
		Head-On (f	ront to front o	only)	Angle (front to	side) Oppos	ite Direction	Side Impact (angled)			
				C023	E Manner of	Crash					

Of these, the manner of crash that would seem to be the most significant is the Head On (Front to front only) crashes (3,417 Rural; 12,931 Urban). These are not as lethal as expected since they would generally be of lower speeds in the Urban areas. The cross-tabulation that follows shows the severity as a function of Manner of Crash for all crashes (both rural and urban combined).

CARE 10.2.1.3 - [Crossta	b Results - 2017-20	21 Alabama Integra	ated Crash Data]				- 0	_
File Dashboard F	ilters <u>A</u> nalysis	<u>C</u> rosstab <u>L</u> ocat	tions <u>T</u> ools <u>W</u>	indow <u>H</u> elp			-	r
2017-2021 Alabama In	tegrated Crash Data	~	All records	(do not apply a filter))	~ 9 <u>1</u>	1/ 1/2017 ~	ł
Suppress Zero Values: Nor	ie v	Select Cells: 🔳	• % 💡		Column: Cr	ash Severity ; Row:	E Manner of Crash	
	Fatal Injury	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	Property Damage Only	Unknown	TOTAL	
Non-Collision	10	125	320	301	4206	407	5369	
	0.23%	0.56%	0.53%	0.44%	0.72%	1.98%	0.70%	
Single Vehicle Crash (all	2138	10072	19484	11585	101229	4851	149359	
types)	49.48%	45.38%	32.44%	16.94%	17.24%	23.65%	19.58%	
Head-On (front to front only)	570	1428	2487	1969	9205	689	16348	
ioud on (none to none only)	13.19%	6.43%	4.14%	2.88%	1.57%	3.36%	2.14%	
Angle Oncoming (frontal)	138	799	2507	2504	11889	620	18457	
Angle Oncoming (nontal)	3.19%	3.60%	4.17%	3.66%	2.02%	3.02%	2.42%	
Angle (front to side) Same	22	272	1099	1377	17623	715	21108	
Direction	0.51%	1.23%	1.83%	2.01%	3.00%	3.49%	2.77%	
Angle (front to side)	83	644	2338	2760	16335	961	23121	
Opposite Direction	1.92%	2.90%	3.89%	4.04%	2.78%	4.69%	3.03%	
Pear End (front to cons)	330	3083	13295	25905	216522	5657	264792	
Real End (Iron: to real)	7.64%	13.89%	22.14%	37.87%	36.88%	27.58%	34.72%	
Side Impact (applied)	220	1444	5257	7056	50422	1639	66038	
Side impact (angled)	5.09%	6.51%	8.75%	10.32%	8.59%	7.99%	8.66%	
Side Impact (00 degrees)	472	2895	9216	10346	45103	1321	69353	7
Side impact (30 degrees)	10.92%	13.04%	15.34%	15.13%	7.68%	6.44%	9.09%	
Cideoutine Come Discution	50	477	1795	2544	66314	1248	72428	7
Sideswipe - Same Direction	1.16%	2.15%	2.99%	3.72%	11.29%	6.09%	9.50%	
Sideswipe - Opposite	33	240	730	613	12165	397	14178	1
Direction	0.76%	1.08%	1.22%	0.90%	2.07%	1.94%	1.86%	
Causal Veh Backing: Rear	1	7	66	160	12871	364	13469	
to Side	0.02%	0.03%	0.11%	0.23%	2.19%	1.77%	1.77%	
Causal Veh Backing: Rear	0	3	17	42	4223	138	4423	
to Rear	0.00%	0.01%	0.03%	0.06%	0.72%	0.67%	0.58%	
Other	245	664	1365	1142	14983	790	19189	
Other	5.67%	2.99%	2.27%	1.67%	2.55%	3.85%	2.52%	
University	9	43	87	89	4066	712	5006	
Unknown	0.21%	0.19%	0.14%	0.13%	0.69%	3.47%	0.66%	
	0	0	0	4	15	0	19	
Record from Paper System	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	
TOTAL	4321	22196	60063	68397	587171	20509	762657	
TOTAL	0.57%	2.91%	7.88%	8.97%	76.99%	2.69%	100.00%	-

Cross-tabulation: Severity C025 by Manner of Crash C022

C025 by C022, Cross-tabulation: Crash Injury Severity C025 by Manner of Crash C022. This cross-tabulation is for all crashes, both Rural and Urban. The highest four over-representations for fatal crashes are: Single Vehicle Crash (all types), Head On (front to front only), Angle Oncoming (frontal), and Side Impact 90 degrees.

C101 Causal Unit (CU) Type

All items with fewer than 40 crashes have been removed

C/	CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Rural AND Not Causal Unit (CU) Type = 44 OR 4 — 🛛 🗙												
E E	ile <u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis <u>I</u> r	mpact <u>I</u>	ocations	<u>T</u> ools	<u>W</u> indo	w <u>H</u> el	р				_ 8 ×
*	2017-2021 Alabama	a Integrate	ed Crash Data		\sim	R	ural					~ 💡	1/ 1/2017
Order	r: Max Gain	~ 0)escending	~ 2	Suppres	s Zero-Va	lued Rows	Signific	cance: (Over I	Representation	✓ Threshold:	2.0 🖨
C101	: Causal Unit (CU)	Туре		Subset equency	Subset Percent	Other equency	Other Percent	Odds Ratio	Max Gain	^	C101: Causa	al Unit (CU) Type	
	Motor Home/Recre	eational V	ehicle	176	0.10	251	0.05	2.180*	95.264				
	E Tractor/Doubles			105	0.06	102	0.02	3.200*	72.191				
	E Other Heavy Tru	ck (Canno	ot Classify)	223	0.13	495	0.09	1.401*	63.779				
	Pedestrian			408	0.23	1109	0.20	1.144	51.281				
	E Low Speed Vehi	cle		67	0.04	90	0.02	2.314*	38.051	-			
	E Other Light Truck	k (100001	bs or Less)	40	0.02	41	0.01	3.033*	26.812				
	E Other Motorized	Cycle/Lov	w Speed Vehicle	63	0.04	114	0.02	1.718*	26.331	-			
	Station Wagon			405	0.23	1440	0.26	0.8/4*	-58.18/	-			
				/5	0.04	454	0.08	0.514	-/1.033	~	Sort by Sum	of Max Gain	
				2	017-2021	Alabama	Integrated (Crash Dai	ta				
					C10	1: Causal	Unit (CU) 1	Гуре					
	60												
	40-												
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	20											_	
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	0			-						_			
	- 1-		E Truck (6 or 7) with Trailer	М	otor Home/ Veh	Recreationa icle	I E C (10	Other Light 1 1000 lbs or L	Truck .ess)		E Other Passenger Vehicle	Passeng	er Car
	C101: Causal Unit (CU) Type												

All other things being equal, we would expect the number of Rural crashes per vehicle type to be the same as their presence on rural roadways. Similarly with Urban. Passenger Cars and SUVs are over-represented on Urban roads, but not to a great degree (Odds Ratios are 0.886 and 0.932, respectively, see bottom two items in the table). Odds Ratios close to 1.000 show that there is little differences in the two proportions. Considerably larger Odds Ratios are at the other (Rural) end where Pickups, large trucks and Motorcycles seem to dominate. Large trucks, many of them CMVs, will be predominate on the Rural roads, as indicated by the next result.



C080 Commercial Motor Vehicle (CMV) Involved

CMV crashes are over-represented on rural roads with a proportion of 8.47% as opposed to Urban roads where their presence is 4.57%, resulting in an Odds Ratio of 1.852, which is nearly twice that expected.

C104 CU Left Scene

🖡 CA	RE 10.2.1.3 - [IMPACT Res	ults - 2017-2021 A	Alabama Integ	jrated Crash Da	ata - Rural vs.	Not Rural]			_		Х
🖡 Ei	le <u>D</u> ashboard <u>F</u> ilter	s <u>A</u> nalysis <u>I</u> n	mpact <u>L</u> oca	tions <u>T</u> ools	<u>W</u> indow	<u>H</u> elp				-	₽ ×
6 2	2017-2021 Alabama Integra	ted Crash Data		~ Ru	ural			~ Y	1/ 1/	2017 ~	12/31
Order:	Natural Order 🗸 🗸 🗸	Descending	V 🗹 Su	ippress Zero-Va	lued Rows	Signif	icance: Over	Representation	✓ Threshold	2.0	÷
C104:	CU Left Scene	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C102: CU Non C103: CU Con	-Motorist Indica nmercial Motor	tor /ehicle	Inc
•	Yes	14722	8.22	62746	10.75	0.765*	-4532.339	C104: CU Left	Scene		
	No	162417	90.70	493434	84.55	1.073*	11001.041	C105: CU Driv	er Age Range 1 er Ane Ranne 2		~
	CU is Unknown	1939	1.08	27399	4.69	0.231*	-6468.702	Sort by Sum o	f Max Gain		
00	1 🚳 🖉)isplay
	100 50 0		2017-2021 Ala	C104	: CU Left Scer	riter = Kurai V					
			Yes		No	(CU is Unknow	/n			
				C104:	CU Left Scen	e					

When considering all crashes, it seems clear that leaving the scene of a crash is more of an Urban issue that that of Rural crashes. One thing that would contribute to this is the increased severity of the Rural crashes making fewer vehicles able to leave the scene.

2017-2021 Alabama Integrated Crash Data Rural 12 1/ 1/2017 12/3 Suppress Zero-Valued Rows Order: Max Gain \sim Descending Significance: Over Representation Threshold: 2.0 ÷ \sim C107: CU Driver Raw Age C107: CU Driver Raw Age Odds Ratio Other Subset Subset Other Max Frequency Percent Gain Percent Frequency 33 3199 1.95 9206 1.84 1.057 171.288 34 3066 1.86 8870 1.77 1.051* 148.793 35 3060 1.86 8616 1.72 1.080* 226.329 1.67 36 3019 1.84 8374 1.096* 264.920 37 1.78 8197 1.083* 2920 1.64 224.132 1.65 1.58 1.048 38 2718 7887 124.086 39 2789 1.70 7682 1.54 1.104* 262.508 40 2577 1.57 7409 1.48 1.058* 140.293 1.39 41 2444 1.49 6963 1.067* 153.976 42 2465 1.50 6669 1.33 1.124* 271.668 43 1.42 6395 1.28 1.111* 232.782 2336 44 1.39 6190 1.24 1.121* 246.204 2282 45 1.20 2208 1.34 5985 1.122* 239 625 46 2373 1.44 6188 1.24 1.166* 337.862 47 2228 1.35 6135 1.23 1.104* 210.292 48 2215 1.35 6055 1.21 1.112* 223.603 49 2200 1.34 5904 1.18 1.133* 258.265 50 2142 1.30 5868 1.17 1.110* 212.105 51 2029 1.23 5645 1.13 1.093* 172.446 52 2012 1.22 5440 1.09 1.125* 222.867 53 78.002 1951 1.19 5695 1.14 1.042 54 1.087* 161.312 2008 1.22 5615 1.12 55 1.19 5692 1.14 1.048 89.988 1962 56 2045 1.24 5709 1.14 1.089* 167.397 🗸 Sort by Sum of Max Gain 📋 🕼 🚳 🖉 Display 2017-2021 Alabama Integrated Crash Data C107: CU Driver Raw Age 4 Frequency 2 0 74 94 34 54 C107: CU Driver Raw Age

C107 CU Driver Raw Age

Ages 16-18 are significantly over-represented compared to their crashes in general. The overrepresentation problem seems to be in the 33 through 56 age groups, which are consistently overrepresented as shown in the table and the chart. This age group probably consists of a large proportion of professional drivers, who are on the Rural roads more than most other drivers. They should be particularly aware of their collective vulnerability to be involved in Rural road crashes.

C108 CU Driver Race

🔋 CA	CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Rural vs. Not Rural] - 🗆 X										
E E	ile <u>D</u> ashboard <u>F</u> ilters	<u>A</u> nalysis <u>I</u>	mpact <u>L</u> oca	tions <u>T</u> ools	<u>W</u> indow	<u>H</u> elp		_ & ×			
6	2017-2021 Alabama Integrate	ed Crash Data		~ R	ural			✓ ♥ 1/ 1/2017 ∨ 12/31			
Order	: Natural Order 🗸 🛛)escending	🗸 🖂 Su	ppress Zero-Va	alued Rows	Signif	ficance: Over	Representation V Threshold: 2.0			
C108	: CU Driver Race	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C102: CU Non-Motorist Indicator C103: CU Commercial Motor Vehicle Inc			
•	White/Caucasian	114998	64.22	302668	51.86	1.238*	22120.806	C104: CU Left Scene			
	Black/African American	42350	23.65	175249	30.03	0.788*	-11427.193	C105: CU Driver Age Range 1			
	Hispanic	6054	3.38	20626	3.53	0.956*	-275.328	C106: CU Driver Age Range 2 C107: CLI Driver Raw Age			
	Asian/Pacific Islander	1050	0.59	4559	0.78	0.751*	-348.982	C108: CU Driver Race			
	American Indian	244	0.14	646	0.11	1.231*	45.767	C109: CU Driver Gender			
	Other	327	0.18	1520	0.26	0.701*	-139.430	C110: CU Driver Residence Distance			
	Unknown	10391	5.80	47485	8.14	0.713*	-4180.324	C111: CU Driver License State			
	Not Applicable	1229	0.69	1801	0.31	2.224*	676.342	C113: CU Driver Second License Class			
	CU is Not a Vehicle	496	0.28	1626	0.28	0.994	-2.957	C114: CU Driver License Status 🗸			
	CU is Unknown	1939	1.08	27399	4.69	0.231*	-6468.702	Sort by Sum of Max Gain			
1) 🕸 🖉							Display			
			2017-2021 Alal	bama Integrated C108	d Crash Data - : CU Driver Ra	Filter = Rural v ce	vs. Not Rural				
	80										
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	ð										
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	<u> </u>	Black/African Am	erican Asiar	n/Pacific Islande	r C	Other	Not Appli	cable CU is Unknown			
				C	108: CU Drive	r Race					

The racial distribution reflects the overall driver distribution, with the only significant underrepresentation being in the Hispanic classification (albeit quite small). White/Caucasian was over-represented by about 23.8% according to its Odds Ratio.

C109 CU Driver Gender

🔋 CA	RE 10.2.1.3 - [IMPACT R	esults - 2017-202	1 Alabama Int	egrated Crash	Data - Rural v	/s. Not Rural]			_		×		
🖡 Ei	le <u>D</u> ashboard <u>F</u> ilte	rs <u>A</u> nalysis	<u>I</u> mpact <u>L</u> o	cations <u>T</u> o	ols <u>W</u> indov	v <u>H</u> elp				-	₽×		
6 2	2017-2021 Alabama Integ	rated Crash Data		\sim	Rural			~	9	1/ 1/201	7 ~ 12		
Order:	Max Gain 🗸 🗸	Descending	~ D:	Suppress Zero	-Valued Rows	Signif	icance: Over	Representation	✓ Thresh	old: 2.0	÷		
C109:	CU Driver Gender	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C107: CU Driv C108: CU Driv	er Raw Age er Race		^		
•	Male	103378	57.73	280262	48.02	1.202*	17376.347	C109: CU Driv	er Gender				
	Not Applicable	1183	0.66	1623	0.28	2.375*	684.964	C110: CU Driv	er Residence) Distance ato	e		
	CU is Not a Vehicle	496	0.28	1626	0.28	0.994	-2.957	C112: CU Drive	er Eicense St er First Licen	ale se Class			
	Unknown	9565	5.34	45208	7.75	0.689*	-4307.600	C113: CU Driv	er Second Li	cense Cla	ass		
	CU is Unknown	1939	1.08	27399	4.69	0.231*	-6468.702	C114: CU Driv	er License St	atus			
	Female	62517	34.91	227461	38.98	0.896*	-7282.052	Sort by Sum o	f Max Gain	r			
00) 🕼 🖉							,			🗸 Disp		
	Image: Contract of the second seco												
	60 40 20 0	Hale	Not Applicable	e CU is Not	a Vehicle	Juknown	CU is Unknown	n Female	1				
				C1	09: CU Driver (Gender							

Men are typically over-represented in most crash types. Thus, it comes as no surprise to see them significantly over-represented in Rural crashes with about 20.2% more Rural crashes than would typically be expected. Females are shown to be significantly under-represented in Rural crashes, and thus, they are significantly over-represented in Urban crashes.



C110 CU Driver Residence Distance

This indicates that Rural travel and their accompanying crashes tend to be at distances greater than 25 miles from home. The Urban distances were also under-represented in being less than 25 miles, but with a relatively small differences in the proportions.

C111 Driver License State

All states with less than 100 crashes were removed as was Alabama in order to get better relative estimates of the Rural crashed occurring from out of state drivers.

6	2017-2021 Alabama Integrate	ed Crash Data		\sim	Rural				✓ ♥ 1/	1/2017 $ \smallsetminus $
Order	Max Gain 🗸 D	escending	~ 🗹	Suppress Zer	p-Valued Rows	Signific	cance: Over	Representation	✓ Threshold:	2.0 🜲
C111	CU Driver License State	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C111: CU Dr	iver License State	
	Tennessee	2937	13.62	4816	11.22	1.214*	517.727			
	Mississippi	2942	13.64	5069	11.81	1.155*	395.635			
	Georgia	5540	25.69	10639	24.78	1.037*	195.597			
	Kentucky	384	1.78	682	1.59	1.121	41.404			
	Indiana	330	1.53	578	1.35	1.137	39.647			
	Louisiana	874	4.05	1674	3.90	1.039	33.082			
	South Carolina	384	1.78	726	1.69	1.053	19.301			
	Texas	1279	5.93	2526	5.88	1.008	10.087			
	Arkansas	276	1.28	546	1.27	1.006	1.722			
	North Carolina	511	2.37	1030	2.40	0.988	-6.411			
	Pennsylvania	156	0.72	350	0.82	0.887	-19.819			
	Oklahoma	125	0.58	297	0.69	0.838	-24.195			
	Arizona	126	0.58	306	0.71	0.820	-27.716			
	Ohio	261	1.21	611	1.42	0.850	-45.930			
	Maryland	108	0.50	313	0.73	0.687*	-49.233			
	Washington	123	0.57	369	0.86	0.664*	-62.364			
	Virginia	247	1.15	619	1.44	0.794*	-63.949			
	Michigan	239	1.11	630	1.47	0.755*	-77.475			
	New York	173	0.80	521	1.21	0.661*	-88.720			
	Missouri	204	0.95	620	1.44	0.655*	-107.451			
•	Mexico	100	0.46	498	1.16	0.400*	-150.166			
	California	343	1.59	1015	2.36	0.673*	-166.876			
	Illinois	331	1.53	1000	2.33	0.659*	-171.341			
	Florida	3575	16.58	7484	17.43	0.951*	-184.518	Sort by Sum	of Max Gain	
00	a a 19									Dis
			:	2017-2021 Ala	bama Integrate	d Crash Data				
				C111: C	U Driver Licens	e State				
	40									
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		India	na	North Ca	rolina 11. CU D-iu!	Maryla	nd	Missour		
<u>н</u>				UI	TI: CU Driver L	license State				

As expected, drivers from states proximal to Alabama have the greatest numbers of rural and Urban crashes in Alabama. Tennessee, Mississippi and Georgia were the only significantly over-represented in Rural crashes, while the over-representations in the urban areas were quite varied.

CARE 10.2.1.3 - [IMPACT Results - 2017-2021 Alabama Integrated Crash Data - Rural AND Not CU Driver Officer Opinion Alcohol															×		
🔋 Ei	ile <u>D</u> a	ishboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpa	act <u>L</u> oc	ations	<u>T</u> ools <u>\</u>	<u>N</u> indow	<u>H</u> elp					-	₽×	
😵 2017-2021 Alabama Integrated Crash Data 🗸 Rural 🗸 🖓 🛐 1/ 1/2017 🗸															/2017 ~		
Order: Max Gain V Descending V Suppress Zero-Valued Rows											Significance: Over Representation V Threshold: 2.0						
C122:	CU Dri	ver Office	r Opinion /	Vcohol		Subset equency	Subset Percent	Other equency	Other Percent	Odds Ratio	Max Gain	C122: CU [Driver Off	icer Opin	ion Alco	hol	
► _	Yes - D	river Was l	Jnder Influe	nce of Alcoh	ol	9100	5.69	12619	2.61	2.183*	4930.9						
	No - Dri	iver Was N	ot Under In	fluence of Al	cohol	150814	94.31	471413	97.39	0.968*	-4930	Sort by Su	m of Max	Gain			
2017-2021 Alabama Integrated Crash Data																	
C122: CU Driver Officer Opinion Alcohol																	
	Frequency	100 50 0			Yes - Dri	ver Was Un	fer Influence	eof N	No - Driver Wi	as Not Under Alcohol	r Influence of						

C122 Officer's Opinion Alcohol

The Rural roads are clearly those most apt to have crashes caused by DUI of Alcohol. The proportion of these crashes was 5.69 as compared to only 2.61 of those in the Urban areas (a highly significant Odds Ratio of 2.183).



C123 Officer's Opinion Non-Alcohol Drugs

While only about a third of the number, the proportions and Odds Ratios look very much the same as was true of the DUI of Alcohol given above. The proportion positive here was 1.94 for the Rural roads, but only 0.96 for the Urban roads, which results in an Odds Ratio of 2.025 (amazingly close to that of DUI alcohol above).