NHTSA

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Behavioral Safety Research

NHTSA Safety Research Portfolio Public Meeting: Fall 2022

November 1-3, 2022

Docket No. NHTSA-2022-0091

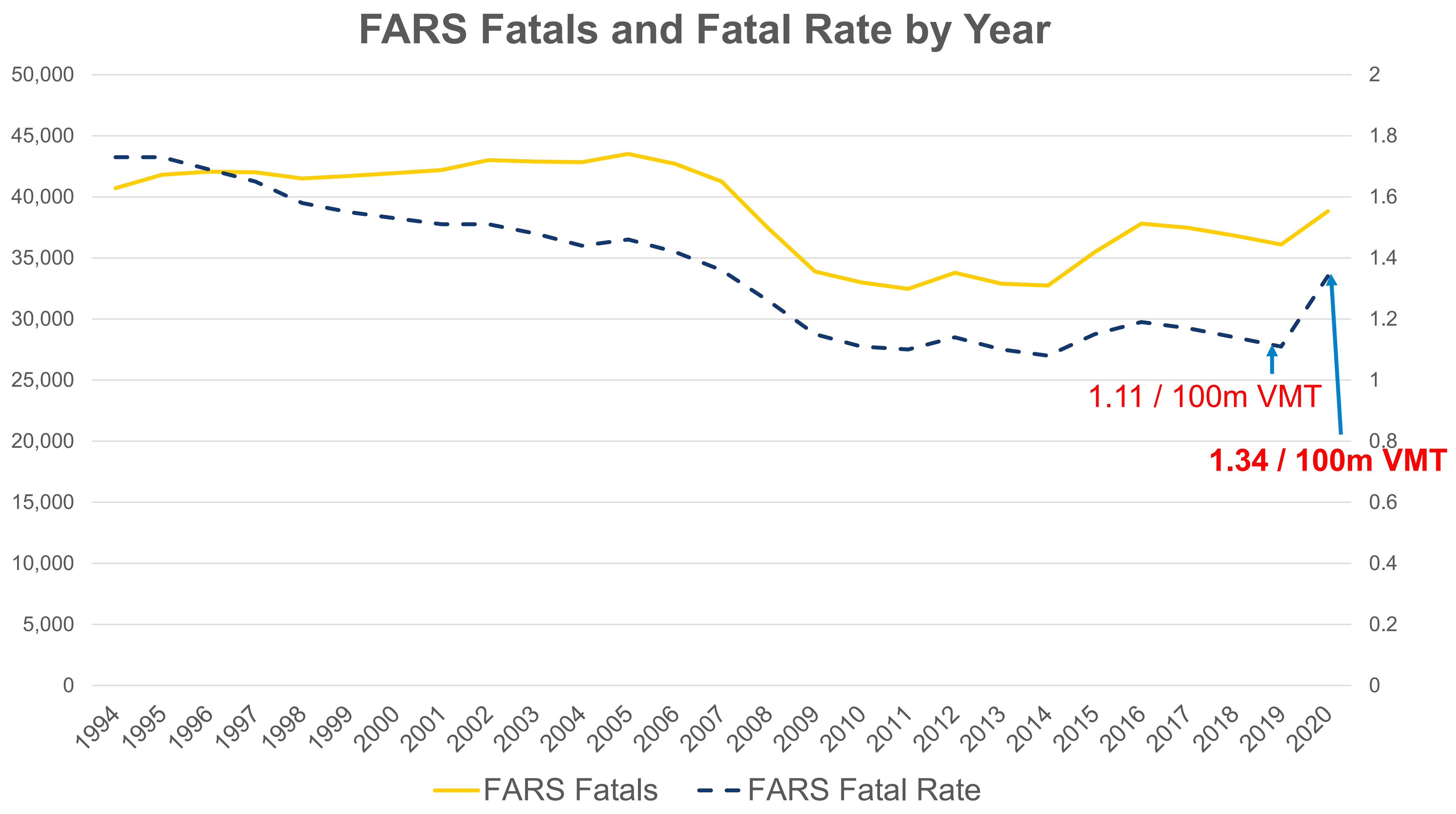
Presentation Agenda

1. **Estimated Contribution of Peak-Hours Non-Commercial Vehicle Traffic to Fatality Rates –** Annette Tucker
2. **Evaluation of Utah's .05 BAC Per Se Law –** Amy Berning
3. **Older Driver Performance Across Six Naturalistic Studies –** Kathy Sifrit
4. **Using Motorcycle Odometer Data to Measure Exposure: A Feasibility Study –** Kathryn Wochinger

Estimated Contribution of Peak-Hours Non-Commercial Vehicle Traffic to Fatality Rates

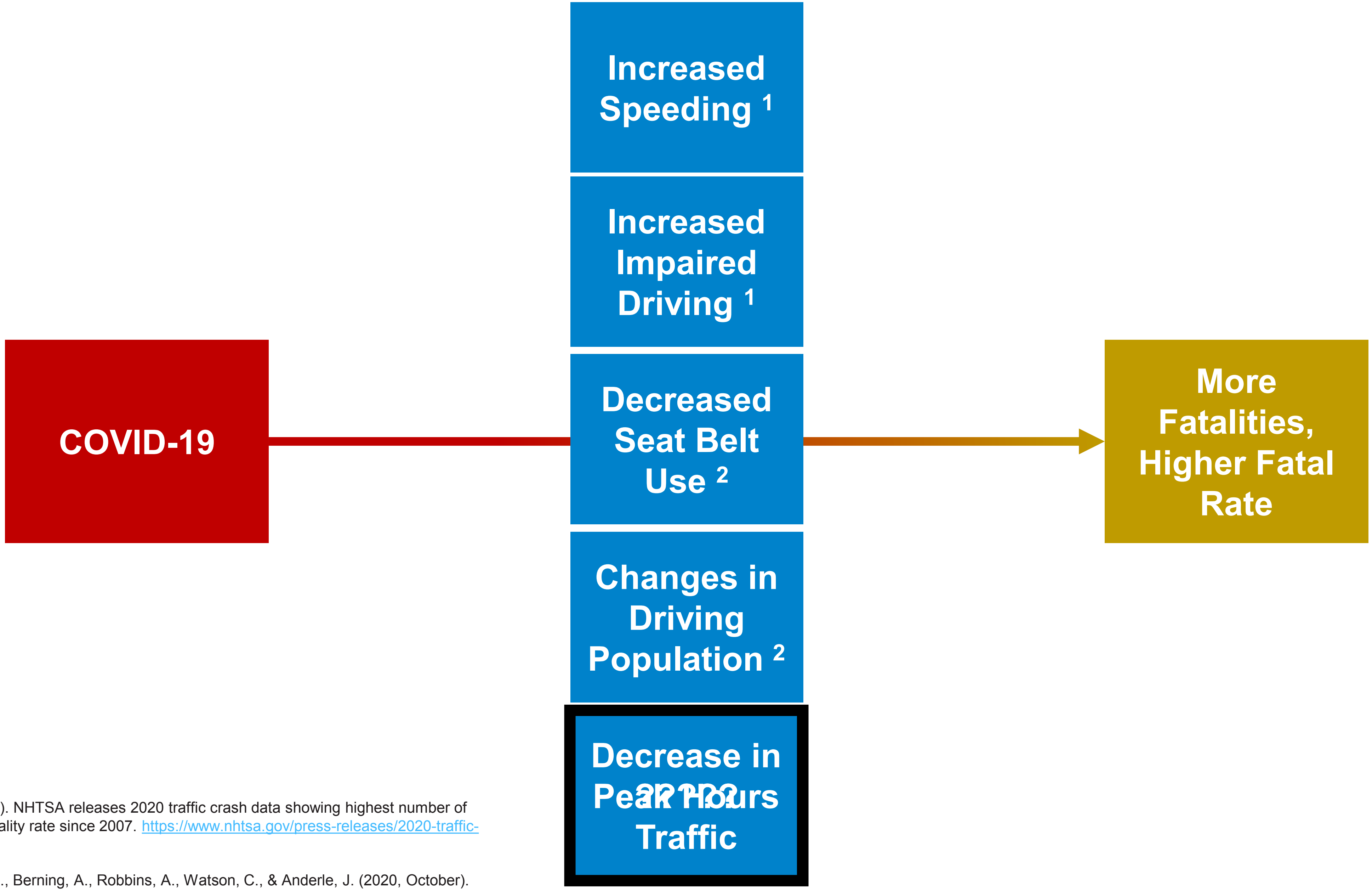
Annette Tucker
andrew.tucker@dot.gov

VMT Down, Fatals Up:



SOURCE: https://www-fars.nhtsa.dot.gov/states/statesfatalitiesfatalityrates.aspx

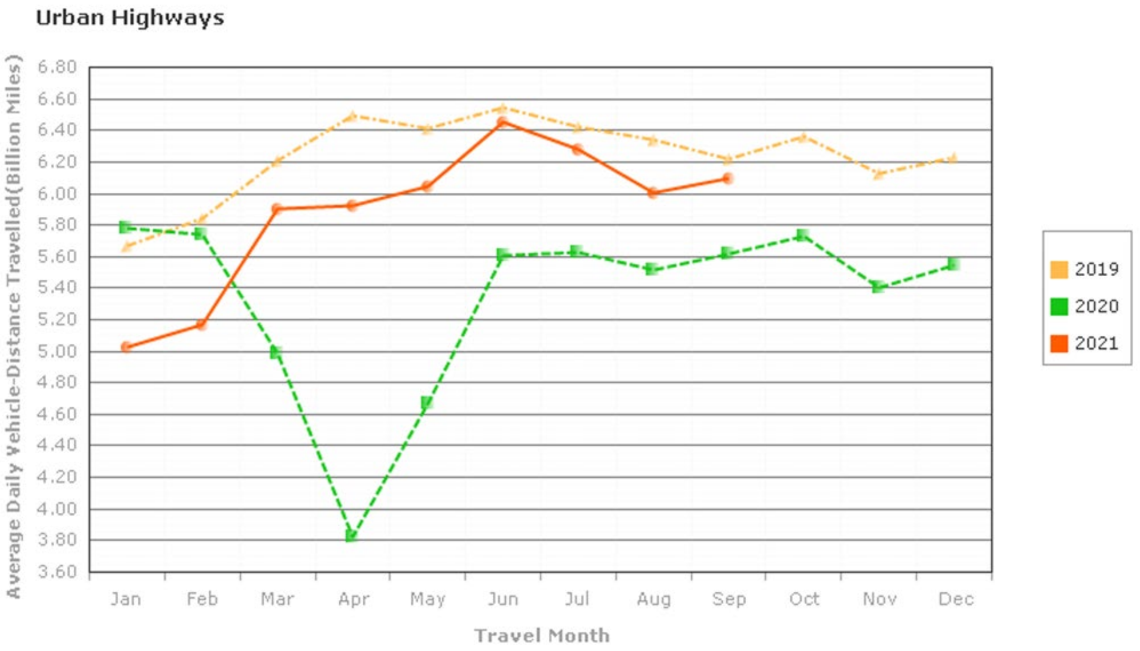
What’s the mechanism?

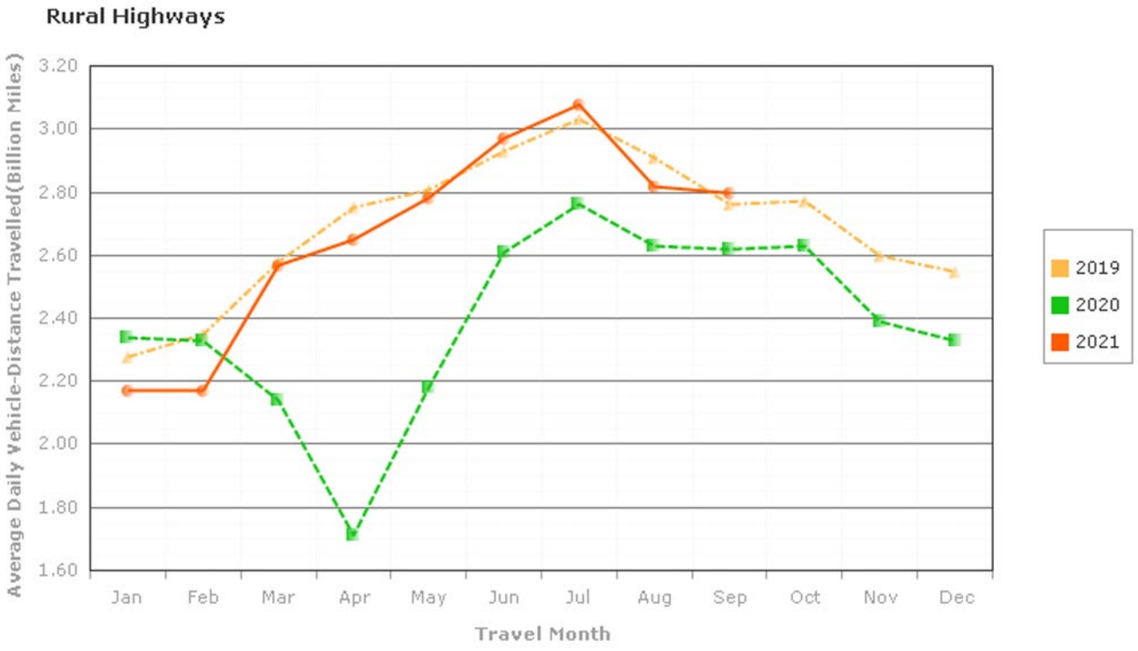


1. NHTSA (2022, March). NHTSA releases 2020 traffic crash data showing highest number of fatalities and highest fatality rate since 2007. https://www.nhtsa.gov/press-releases/2020-traffic-crash-data-fatalities

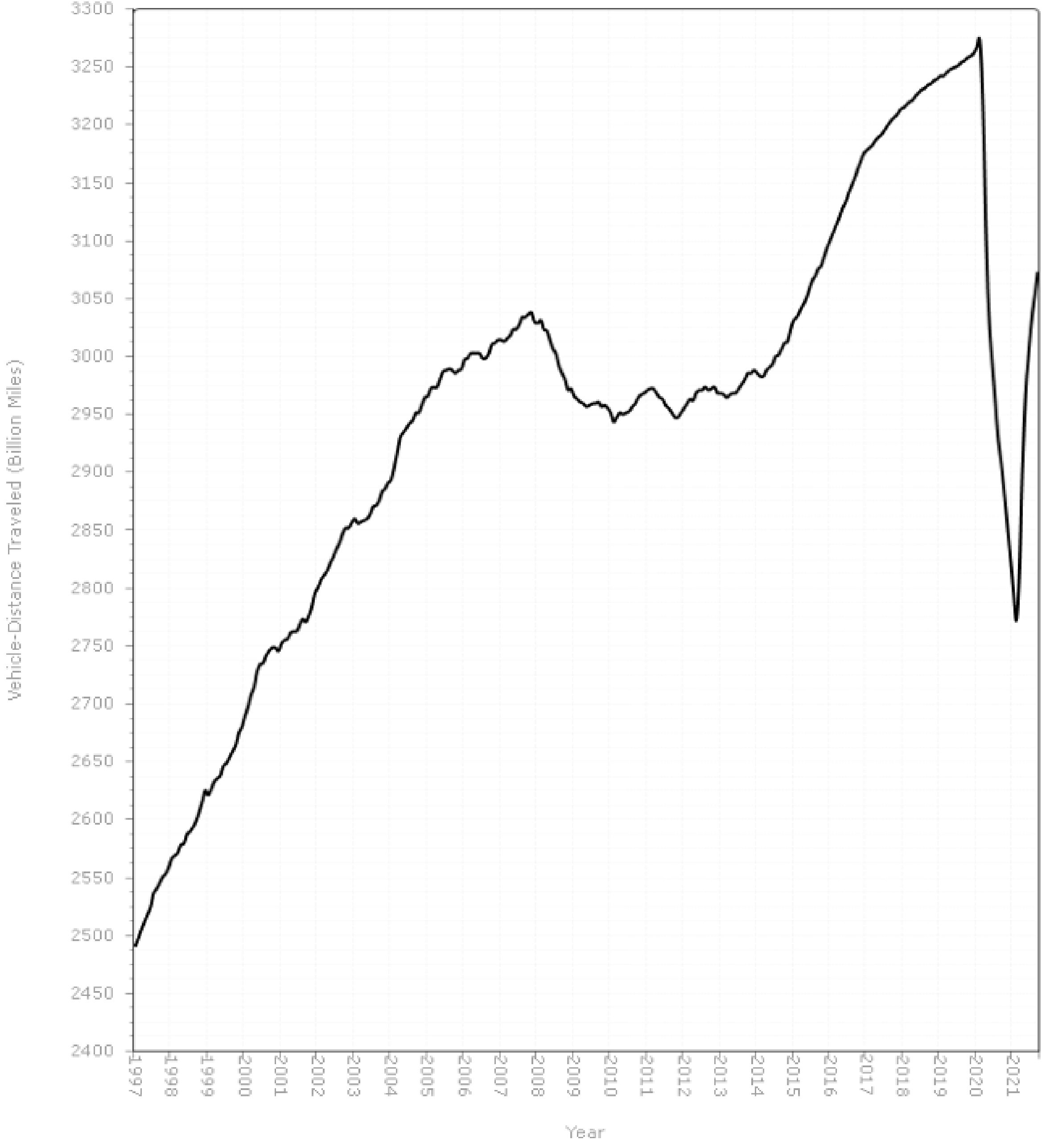
2. Wagner, E., Atkins, R., Berning, A., Robbins, A., Watson, C., & Anderle, J. (2020, October). *Examination of the traffic safety environment during the second quarter of 2020: Special report* (Report No. DOT HS 813 011). National Highway Traffic Safety Administration. https:// rosap.ntl.bts.gov/view/dot/50940

COVID-19 and VMT:





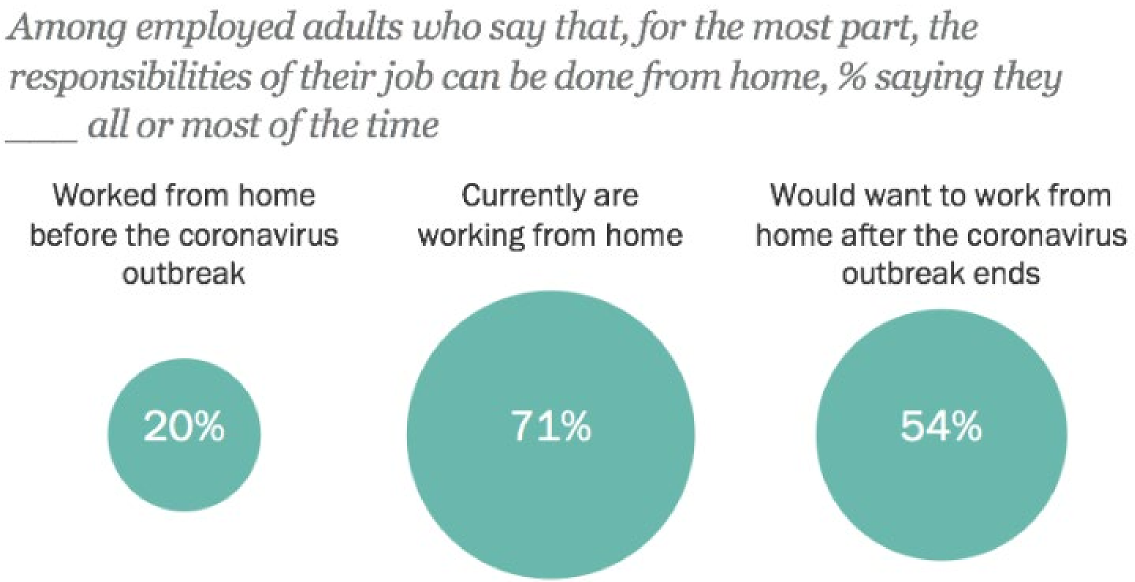
Federal Highway Administration. (2021, September). Traffic Trends.



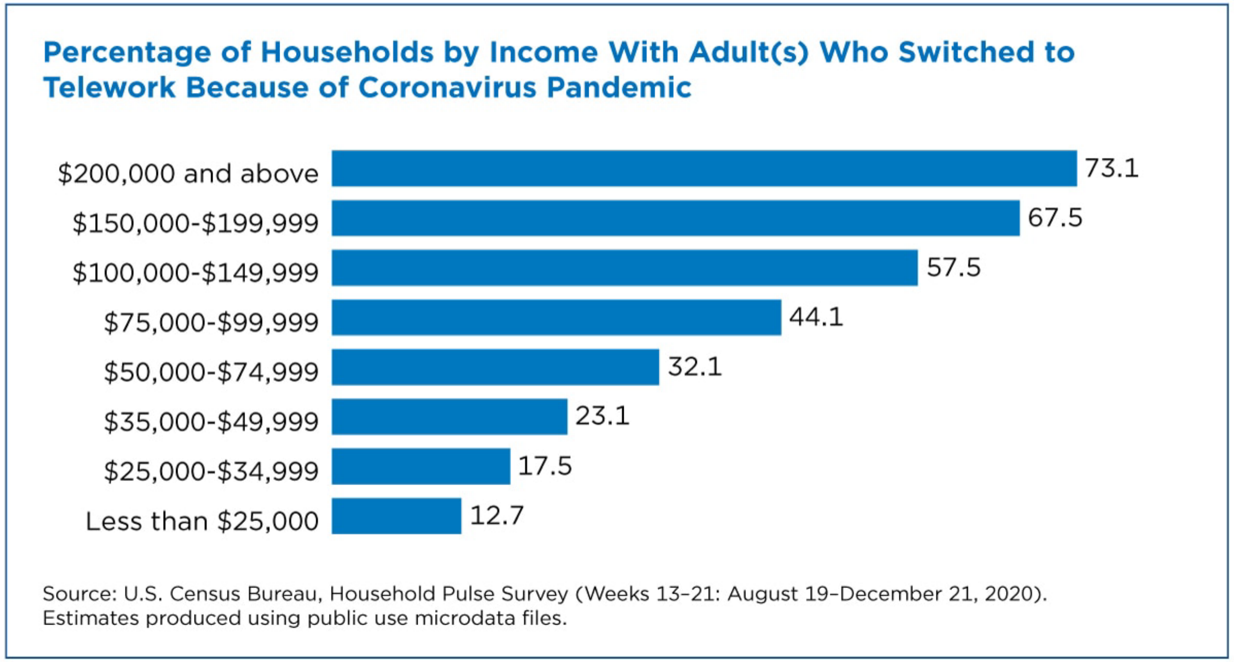
Is all VMT equal?

VMT declined precipitously in early 2020.

What if it's not just the decrease in VMT, but the decrease in commuting?

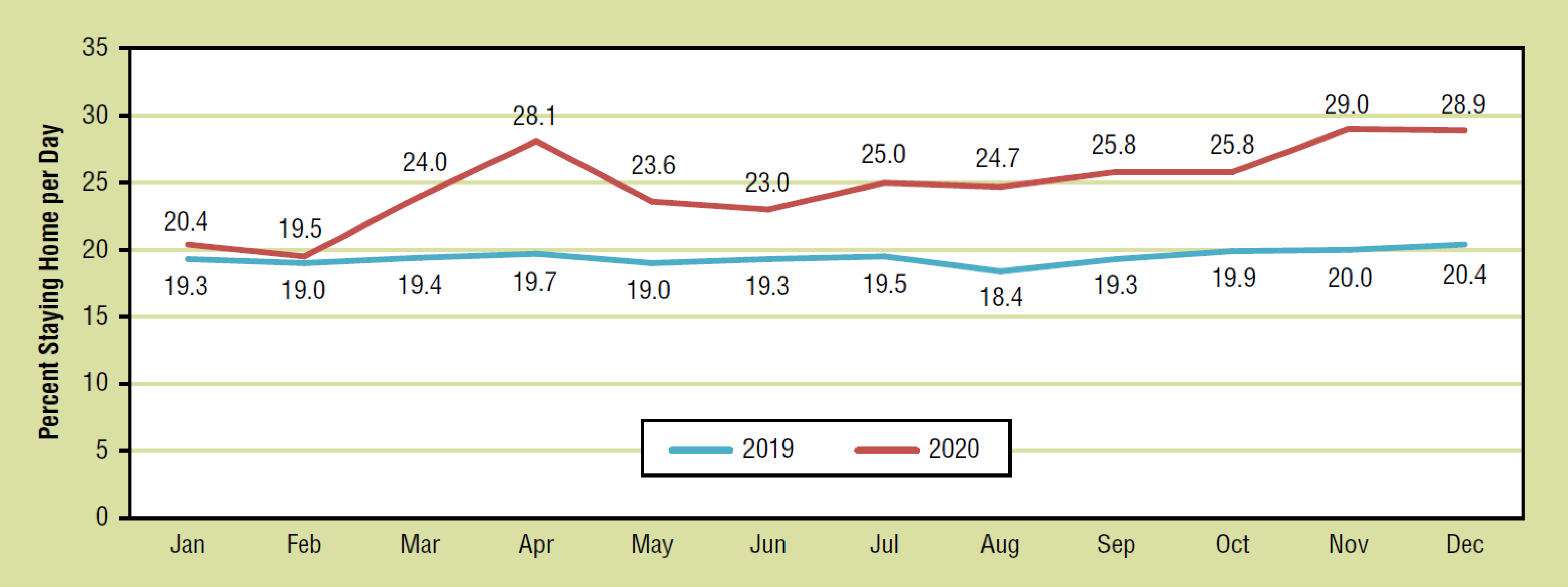


Source: Pew, https://www.pewresearch.org/social-trends/2020/12/09/how-the-coronavirus-outbreak-has-and-hasnt-changed-the-way-americans-work/



COVID-19 and Staying Home

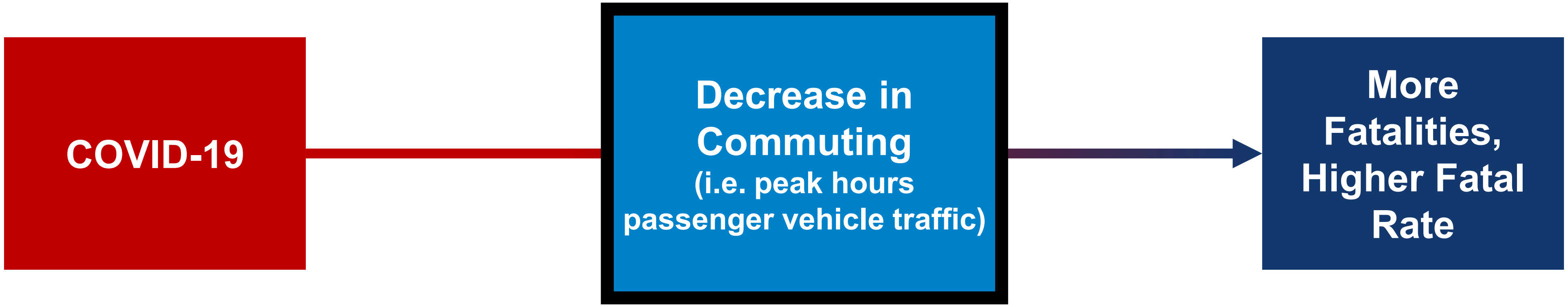
Percentage of People Staying Home per Day by Month, 2019 and 2020



Source: www.bts.gov/daily-travel

Office of Behavioral Safety Research. (2021, June). Update to special reports on traffic safety during the COVID-19 public health emergency: Fourth quarter data (Report No. DOT HS 813 135). National Highway Traffic Safety Administration.

What’s the mechanism?



How did decrease in commuting contribute
to observed increase in fatality rate in 2020?

The Problem:
How do we isolate the contribution of commuting to VMT & Fatality numbers?

Sub-Problem 1:
How to estimate VMT and fatals by hour?

Sub-Problem 2:
How to define passenger vehicle traffic?

FARS has:

- Fatalities by time of day
- VMT by year (from FHWA)

FHWA has:

- VMT by year
- VMT by vehicle type

National Household Travel Survey (NHTS) has:

- VMT for passenger vehicles only
- VMT by time of day
- BUT latest is from 2017

	2019*	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Total**	36,096	36,835	37,473	37,806	35,484	32,744	32,893	33,782	32,479	32,999	33,883	37,423	41,259	42,708	43,510	42,836
Other National Statistics																
Vehicle Miles Traveled (Billions)	3,262	3,240	3,210	3,174	3,090	3,020	2,983	2,963	2,945	2,967	2,957	2,977	3,031	3,014	2,989	2,965

https://www-fars.nhtsa.gov/Main/index.aspx

The Problem:
How do we isolate the contribution of commuting to VMT & Fatality numbers?

Sub-Problem 1:
How to estimate VMT and fatals by hour?

Sub-Problem 2:
How to define passenger vehicle traffic?

The Approach:

1. Use FHWA and NHTS data to estimate 2017 non-commercial VMT for peak & off-peak hours.
2. Use 2017 peak & off-peak VMT to estimate a 2017 fatality rate that excludes commuting.
3. Compare that 2017 fatality rate to the 2020 fatality rate.

	2019*	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Total**	36,096	36,835	37,473	37,806	35,484	32,744	32,893	33,782	32,479	32,999	33,883	37,423	41,259	42,708	43,510	42,836
Other National Statistics																
Vehicle Miles Traveled (Billions)	3,262	3,240	3,210	3,174	3,090	3,020	2,983	2,963	2,945	2,967	2,957	2,977	3,031	3,014	2,989	2,965

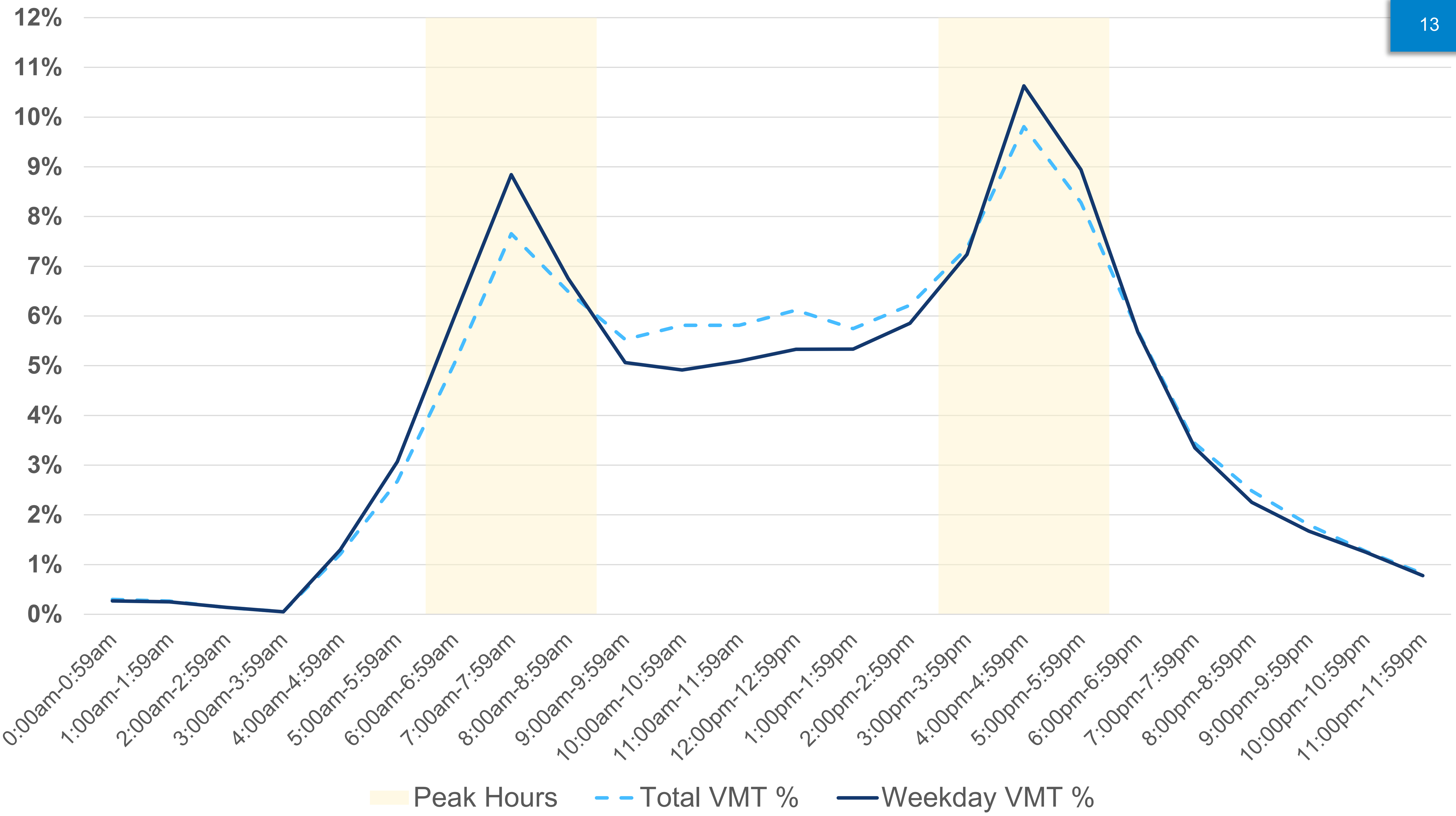
https://www-fars.nhtsa.dot.gov/Main/index.aspx

1. Use FHWA and NHTS data to estimate 2017 non-commercial VMT, peak and off-peak

	NHTS 2017	
	NHTS VMT (M)	NHTS Weekday VMT (M)
0:00am-0:59am	6269.74	4178.79
1:00am-1:59am	5550.21	3898.63
2:00am-2:59am	2879.62	2178.15
3:00am-3:59am	1097.98	795.78
4:00am-4:59am	25414.13	20248.58
5:00am-5:59am	56311.63	47926.69
6:00am-6:59am	106025.76	**93307.98**
7:00am-7:59am	161206.73	**138157.36**
8:00am-8:59am	136739.67	**105549.97**
9:00am-9:59am	116351.92	79126.00
10:00am-10:59am	122425.69	76812.54
11:00am-11:59am	122402.11	79590.44
12:00pm-12:59pm	128827.70	83260.29
1:00pm-1:59pm	121025.10	83323.68
2:00pm-2:59pm	130891.94	91475.41
3:00pm-3:59pm	155201.95	**113107.83**
4:00pm-4:59pm	206521.86	**166070.58**
5:00pm-5:59pm	174413.22	**139715.56**
6:00pm-6:59pm	119947.95	88705.00
7:00pm-7:59pm	72380.32	52321.40
8:00pm-8:59pm	52238.27	35156.41
9:00pm-9:59pm	37845.11	26109.95
10:00pm-10:59pm	26696.11	19491.92
11:00pm-11:59pm	17216.99	12128.76

Calculate VMT by hour with Trip Start & Stop Times

Find Peak-Hours Windows in Morning and Afternoon


12%
11%
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
0:00am-0:59am
1:00am-1:59am
2:00am-2:59am
3:00am-3:59am
4:00am-4:59am
5:00am-5:59am
6:00am-6:59am
7:00am-7:59am
8:00am-8:59am
9:00am-9:59am
10:00am-10:59am
11:00am-11:59am
12:00pm-12:59pm
1:00pm-1:59pm
2:00pm-2:59pm
3:00pm-3:59pm
4:00pm-4:59pm
5:00pm-5:59pm
6:00pm-6:59pm
7:00pm-7:59pm
8:00pm-8:59pm
9:00pm-9:59pm
10:00pm-10:59pm
11:00pm-11:59pm
Peak Hours
Total VMT %
Weekday VMT %

1. Use FHWA and NHTS data to estimate 2017 non-commercial VMT, peak and off-peak

	NHTS 2017	
	NHTS VMT (M)	NHTS Weekday VMT (M)
0:00am-0:59am	6269.74	4178.79
1:00am-1:59am	5550.21	3898.63
2:00am-2:59am	2879.62	2178.15
3:00am-3:59am	1097.98	795.78
4:00am-4:59am	25414.13	20248.58
5:00am-5:59am	56311.63	47926.69
6:00am-6:59am	106025.76	**93307.98**
7:00am-7:59am	161206.73	**138157.36**
8:00am-8:59am	136739.67	**105549.97**
9:00am-9:59am	116351.92	79126.00
10:00am-10:59am	122425.69	76812.54
11:00am-11:59am	122402.11	79590.44
12:00pm-12:59pm	128827.70	83260.29
1:00pm-1:59pm	121025.10	83323.68
2:00pm-2:59pm	130891.94	91475.41
3:00pm-3:59pm	155201.95	**113107.83**
4:00pm-4:59pm	206521.86	**166070.58**
5:00pm-5:59pm	174413.22	**139715.56**
6:00pm-6:59pm	119947.95	88705.00
7:00pm-7:59pm	72380.32	52321.40
8:00pm-8:59pm	52238.27	35156.41
9:00pm-9:59pm	37845.11	26109.95
10:00pm-10:59pm	26696.11	19491.92
11:00pm-11:59pm	17216.99	12128.76

NHTS VMT (M)	
Total (2017)	2,105,882
Peak	755,909
Off-Peak	1,349,972

FHWA VM-1 (M)	
Highway, total (2017)	2,897,528
Light duty vehicle, short wheel-base	2,220,801
Motorcycle	20,149
Light duty vehicle, long wheel-base	656,578

*FHWA has vehicle body type, but not trip purpose

1. Use FHWA and NHTS data to estimate 2017 non-commercial VMT, peak and off-peak

$$\text{FHWA Peak VMT} = (\text{FHWA Passenger VM}-1 \div \text{NHTS Passenger VMT}) \times \text{NHTS Peak Passenger VMT}$$

$$\text{FHWA Non-Peak VMT} = (\text{FHWA Passenger VM}-1 \div \text{NHTS Passenger VMT}) \times \text{NHTS Non-Peak Passenger VMT}$$

FHWA Passenger VM-1 = 2,897,347

NHTS Passenger VMT = 2,105,881

NHTS *PEAK* Passenger VMT = 755,909

FHWA *PEAK* Passenger VMT = 1,040,071

FHWA Passenger VM-1 = 2,897,347

NHTS Passenger VMT = 2,105,881

NHTS *NON-PEAK* Passenger VMT = 1,349,972

FHWA *NON-PEAK* Passenger VMT = 1,857,456

17.9% of time in a week accounts for 35.9% of VMT!

2. Use 2017 peak & off-peak VMT to estimate 2017 fatality rate sans commuting

	Estimated Non-Commercial VMT (M) Light duty + MC	Estimated Fatalities (FARS) Passenger veh / light duty + MC	FATAL RATE
Peak	1,040,072	5,237	0.50
Off-Peak	1,857,456	23,652	1.27
TOTAL	2,897,528	28,889	1.00

Non-Commercial Peak Hours Fatal Rate < Non-Commercial Off-Peak Hours Fatal Rate!

	VMT (FHWA)	Estimated Fatalities (All vehicle types)	FATAL RATE
Total (All vehicles, all times)	3,212,347	37,473	1.17
Total (All vehicles, all times) MINUS Commuting (Passenger + MC only, peak hours only)	2,172,275	32,326	1.48

Fatality rate is higher without commuting!

3. Compare that 2017 fatality rate to 2020 fatality rate:

2017 (sans commuting):

1.48 / 100m VMT

2020:

1.34 / 100m VMT

SOURCE: https://www.nhtsa.gov/press-releases/2020-traffic-crash-data-fatalities#:~:text=The%20fatality%20rate%20per%

Conclusions

Excluding peak hours (6 – 9 am, 3 – 6pm weekdays) non-commercial vehicle traffic, 2017 had a fatality rate of **1.48 / 100m VMT**.

Commuting depresses the fatality rate.

- It accounts for lots of VMT, but not many fatalities.
- Fatality rate during 2017 peak hours was **.5 / 100m VMT.**

Commuting decreased in 2020 due to COVID-19, lockdowns, etc.

- 2020 fatality rate: **1.36 / 100m VMT.**

Increased fatality rate in 2020 relative to past years likely due, in some part, to decrease in commuting.

- Shouldn’t take this to mean that commuting is good!

Evaluation of Utah’s .05 BAC Per Se Law

Amy Berning
amy.berning@dot.gov

Background

- NHTSA often examines the impacts of new legislation
  - Our studies were instrumental in providing States and advocates information on the impacts of lowering BAC limits
  - Studies showed California and Illinois experienced highway safety improvements when lowering their BAC per se limits from .10 to .08
  - Since then, all States have adopted .08 BAC per se limits
- Utah is the first State to lower its limit from .08 to .05
  - Signed by the Governor on March 23, 2017
  - Effective on December 30, 2018
- Utah and other States looked to NHTSA to conduct an evaluation
- Other stakeholders are very interested in the findings

Research Objectives / Methods

- Evaluate impacts of the change in Utah's law from .08 to .05 on
  - Crashes and fatalities
    - Utah State crash files
    - FARS (includes imputed BAC)
  - Impaired driving arrests
  - Driver knowledge, perceptions, and attitudes toward drinking and driving
    - Utah-conducted survey
    - Utah-conducted focus groups
  - Alcohol sales and other economic indicators
- Examine the legislative process that resulted in the per se law change

*** Data Collection does not include COVID-19 time period

Results – All Crashes (State Data)

Selected Driver and Crash Level Measures - Average Monthly Percent Changes from Baseline Projection

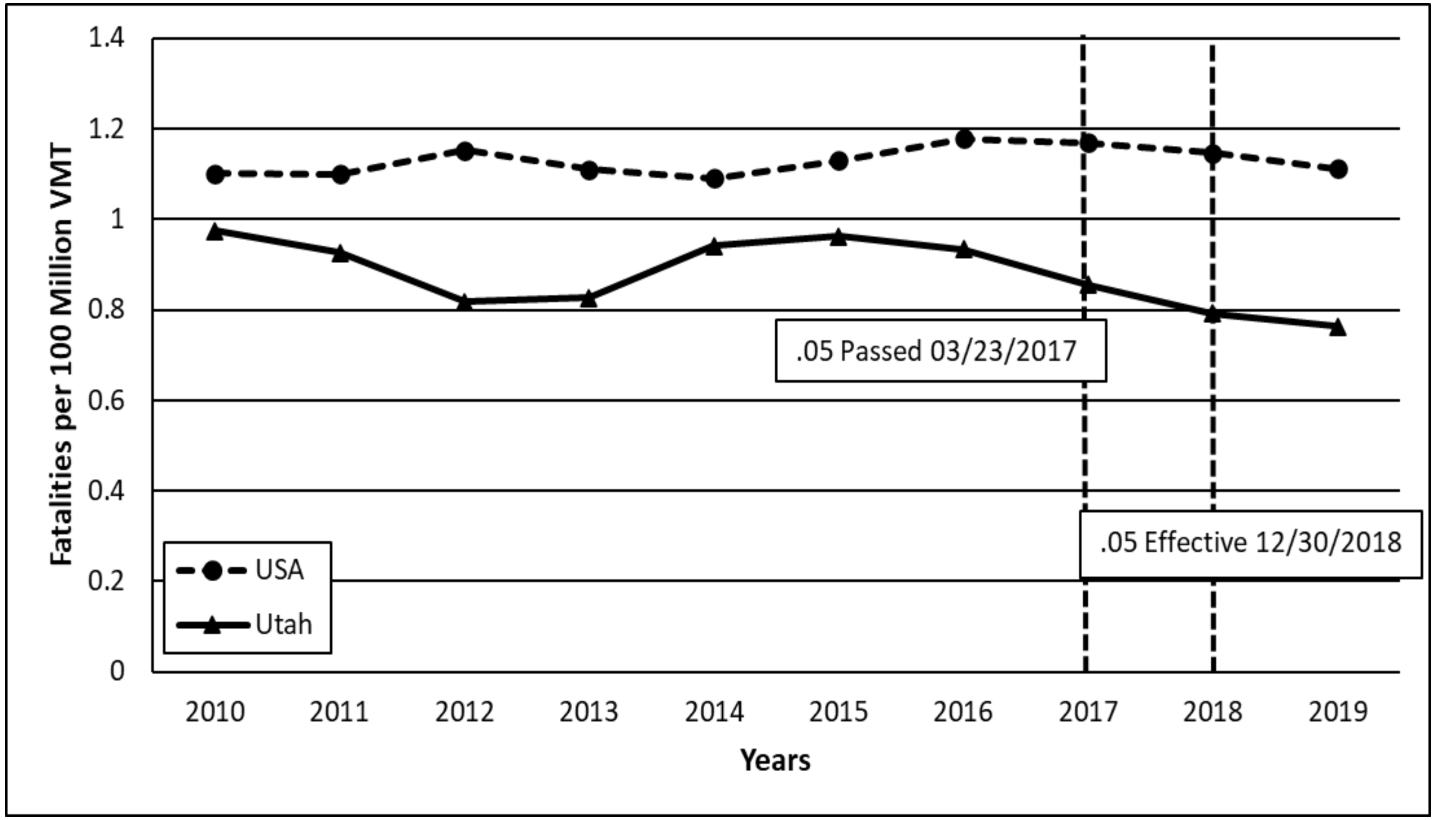
Measure	After .05 Law Passage (21 months before effective)	After .05 Law In Effect (12 months)
	$\Delta_{\%}$	$\Delta_{\%}$
Crashes		
Total per VMT†	-11.5*	-9.6*
Injury per VMT	-10.9*	-10.8*
Single Vehicle Nighttime per VMT	-12.3*	-7.8
Single Vehicle Nighttime Injury per VMT	-18.1*	-13.7*
Alcohol Positive per VMT	-5.8	-8.9*
BAC $\geq$ .05 per VMT	-24.0*	-14.7
BAC $\geq$ .08 per VMT	-23.3*	-13.7
BAC $\geq$ .15 per VMT	-23.9*	-9.1
Drivers		
% Suspected Alcohol	-3.7	-12.5*
% Alcohol Positive	-6.8	-14.6*
% BAC $\geq$ .05	-22.7*	-22.5*
% BAC $\geq$ .08	-19.5*	-22.9*
% BAC $\geq$ .15	-24.1*	-22.5*

$\Delta_{\%}$ = estimated percentage change.
*p < .05, two-tailed ARIMA model.
†VMT is per 100 million miles traveled.

Results – Fatal Crashes (FARS)

- Utah Fatal Crashes and Fatalities – 2016 vs. 2019
  - 2016 (last full year before law passed) - 259 fatal crashes and 281 fatalities
  - 2019 (first full year law effective) - 225 fatal crashes and 248 fatalities

- Fatalities per 100 Million VMT (FARS Data)



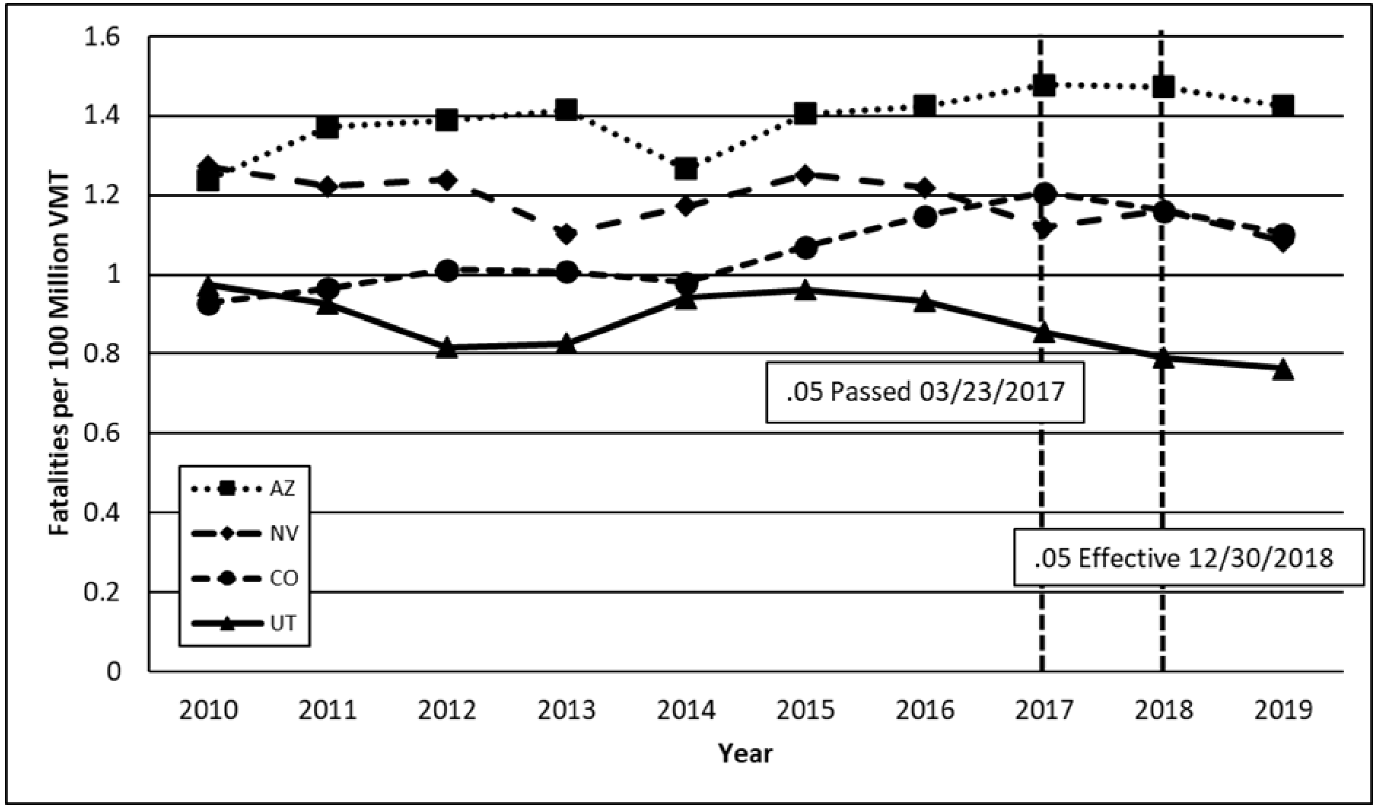
Crash Rate **Reduction** 2016-2019

US
Fatal Crash Rate reduced 5.6%
Fatality Rate reduced 5.9%

Utah
Fatal Crash Rate reduced 19.8%
Fatality Rate reduced 18.3%

Results – Fatality Rate (FARS)

Utah's decrease in fatality rate from 2016 to 2019 was larger than the decreases observed in neighboring States



Utah's fatality rate reduced 18.3%

Colorado's fatality rate reduced 4.3%

Nevada's fatality rate reduced 11.5%

Arizona's fatality rate stayed the same

Other Results

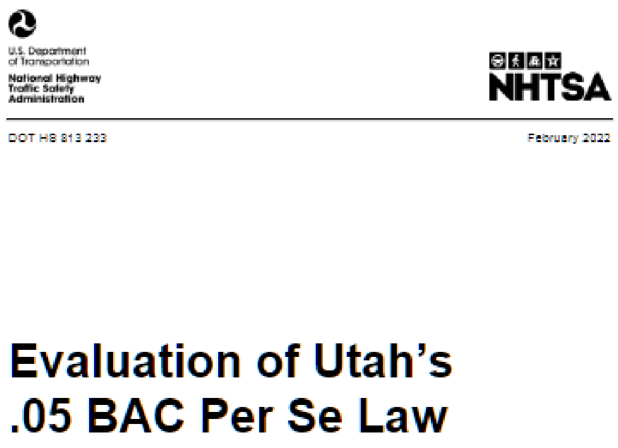
- DUI Arrests
  - No sharp climb in DUI arrests in 2019
  - Slight increase in 2019 in number / proportion of arrests for BACs between .05 and .079
- Public Awareness, surveys conducted by the State
  - In 2018, 26.6% of drinkers and 12.6% of non-drinkers thought limit was already .05
  - In 2019, 22.1% of drinkers reported changing their behaviors when law went into effect
    - Most common was ensuring transportation was available when drinking away from home
- Alcohol Sales, Tax Revenues, and Tourism
  - Alcohol sales continued to increase after the law was effective
  - State revenues from taxes related to hospitality industry continued to rise
  - Tourism continued to increase (highest ever in 2019)
- Documented legislative history including arguments for and against the law

Summary

After Utah's lowering of their BAC limit from .08 to .05:

- Overall reduction in crashes
- Reduction in fatal crashes and fatalities
- No negative impact on criminal justice system
- No negative impact on hospitality industry

Report and Traffic Tech



U.S. Department of Transportation
National Highway Traffic Safety Administration

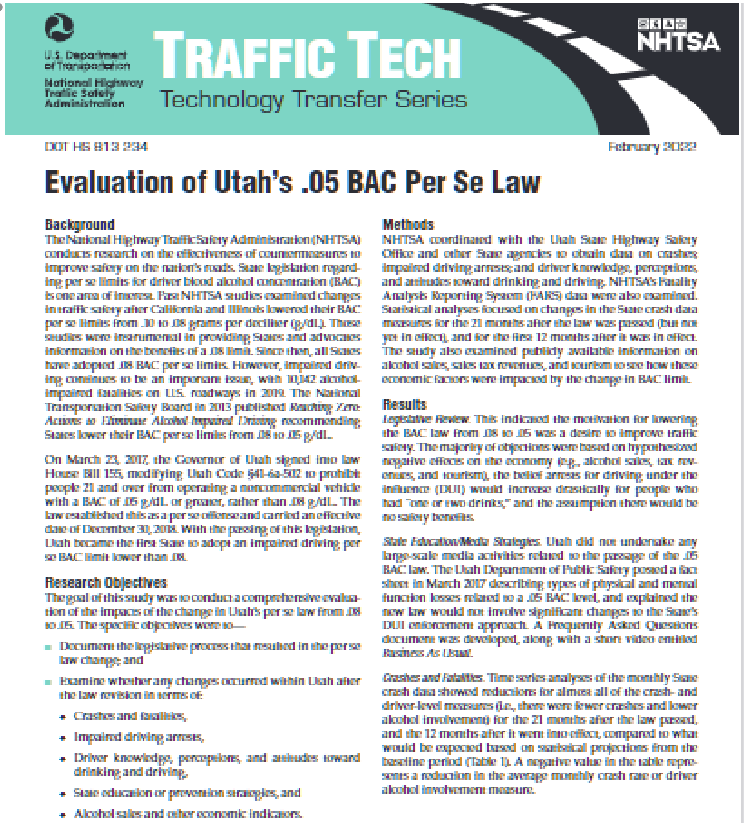
NHTSA

DOT HS 813 233 February 2022

Evaluation of Utah's .05 BAC Per Se Law

Thomas, F. D., Blomberg R., Darrah, J., Graham, L., Southcott, T., Dennert, R., Taylor, E., Treffers, R., Tippetts, S., McKnight, S., & Berning, A. (2022, February). Evaluation of Utah's .05 BAC per se law (Report No. DOT HS 813 233). National Highway Traffic Safety Administration.

[Evaluation of Utah's .05 BAC Per Se Law (bts.gov)]



U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC TECH
Technology Transfer Series

NHTSA

DOT HS 813 234 February 2022

Evaluation of Utah's .05 BAC Per Se Law

Background

The National Highway Traffic Safety Administration (NHTSA) conducts research on the effectiveness of countermeasures to improve safety on the nation's roads. State legislation regarding per se limits for driver blood alcohol concentration (BAC) is one area of interest. Past NHTSA studies examined changes in traffic safety after California and Illinois lowered their BAC per se limits from .10 to .08 grams per deciliter (g/dL). These studies were instrumental in providing States and advocates information on the benefits of a .08 limit. Since then, all States have adopted .08 BAC per se limits. However, impaired driving continues to be an important issue, with 10,142 alcohol-impaired fatalities on U.S. roadways in 2019. The National Transportation Safety Board in 2013 published *Reaching Zero: Actions to Eliminate Alcohol-Impaired Driving* recommending States lower their BAC per se limits from .08 to .05 g/dL.

On March 23, 2017, the Governor of Utah signed into law House Bill 155, modifying Utah Code §41-6a-502 to prohibit people 21 and over from operating a noncommercial vehicle with a BAC of .05 g/dL or greater, rather than .08 g/dL. The law established this as a per se offense and carried an effective date of December 30, 2018. With the passing of this legislation, Utah became the first State to adopt an impaired driving per se BAC limit lower than .08.

Research Objectives

The goal of this study was to conduct a comprehensive evaluation of the impacts of the change in Utah's per se law from .08 to .05. The specific objectives were to—

- Document the legislative process that resulted in the per se law change; and
- Examine whether any changes occurred within Utah after the law revision in terms of:
  - Crashes and fatalities,
  - Impaired driving arrests,
  - Driver knowledge, perceptions, and attitudes toward drinking and driving,
  - State education or prevention strategies, and
  - Alcohol sales and other economic indicators.

Methods

NHTSA coordinated with the Utah State Highway Safety Office and other State agencies to obtain data on crashes; impaired driving arrests; and driver knowledge, perceptions, and attitudes toward drinking and driving. NHTSA's Fatality Analysis Reporting System (FARS) data were also examined. Statistical analyses focused on changes in the State crash data measures for the 21 months after the law was passed (but not yet in effect), and for the first 12 months after it was in effect. The study also examined publicly available information on alcohol sales, sales tax revenues, and tourism to see how these economic factors were impacted by the change in BAC limit.

Results

Legislative Review. This indicated the motivation for lowering the BAC law from .08 to .05 was a desire to improve traffic safety. The majority of objections were based on hypothesized negative effects on the economy (e.g., alcohol sales, tax revenues, and tourism), the belief arrests for driving under the influence (DUI) would increase drastically for people who had "one or two drinks," and the assumption there would be no safety benefits.

State Education/Media Strategies. Utah did not undertake any large-scale media activities related to the passage of the .05 BAC law. The Utah Department of Public Safety posted a fact sheet in March 2017 describing types of physical and mental function losses related to a .05 BAC level, and explained the new law would not involve significant changes to the State's DUI enforcement approach. A Frequently Asked Questions document was developed, along with a short video entitled *Business As Usual.*

Crashes and Fatalities. Time series analyses of the monthly State crash data showed reductions for almost all of the crash- and driver-level measures (i.e., there were fewer crashes and lower alcohol involvement) for the 21 months after the law passed, and the 12 months after it went into effect, compared to what would be expected based on statistical projections from the baseline period (Table 1). A negative value in the table represents a reduction in the average monthly crash rate or driver alcohol involvement measure.

Berning, A. (2022, February). Evaluation of Utah's .05 BAC per se law (Traffic Tech Technology Transfer Series. Report No. DOT HS 813 234). National Highway Traffic Safety Administration

[Evaluation of Utah's .05 BAC Per Se Law [Traffic Tech] (bts.gov)]

Older Driver Performance Across Six Naturalistic Studies

Kathy Sifrit
kathy.sifrit@dot.gov

1

NHTSA Data

Combine data from six NHTSA studies

Analyze to explore relationships among

- functional abilities
- driving performance
- exposure

2

SHRP2 Data

Obtain SHRP2 data on older drivers.

Analyze to explore relationships among

- functional abilities
- exposure.

3

Compare

Findings based on NHTSA and SHRP2 data.

- Does the smaller *n*, shorter data collection period for the NHTSA data result in findings different from those based on SHRP2 data.

Research Questions

What is the relationship between specific clinical measures and

- participants’ total mileage, total driving time?
- driving on high-speed roadways, at night, or during rush hour?
- participants’ scores on a professional driving test (NHTSA data only)?

Were there differences in findings based on NTHSA and SHRP2 data?

Data

NHTSA:

- 116 participants
- 61 to 91 years old
- Total driving:

  - 7,790 trips,

  - 3,363 hours, and

  - 94 miles.684 miles

SHRP2:

- 982 participants
- 60 to 98 years old
- Total driving:

  - 1,586,210 trips,

  - 357,856 hours, and

  - 9,749,341 miles.

NHTSA Studies for Data Aggregation

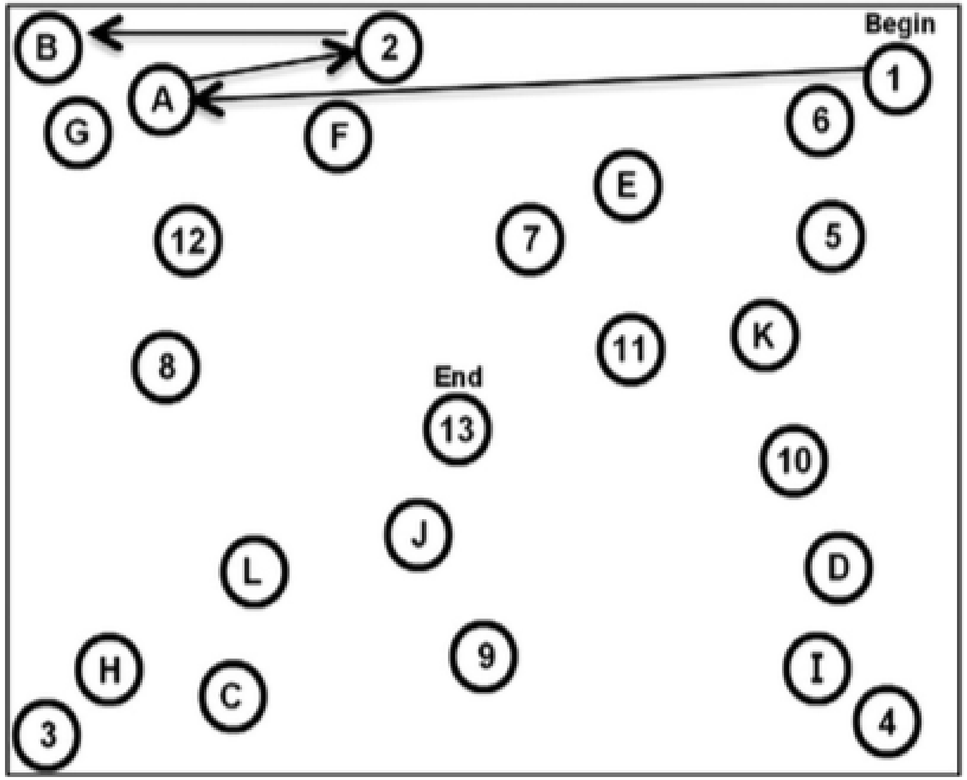
- Older Driver Compliance with License Restrictions
- Effects of Medical Conditions on Driving Performance
- Mild Cognitive Impairment and Driving Performance
- Physical Fitness and Driving Performance
- Physical Fitness and Driving Performance, Phase 2
- Older Drivers’ Self-Regulation and Exposure

Measures

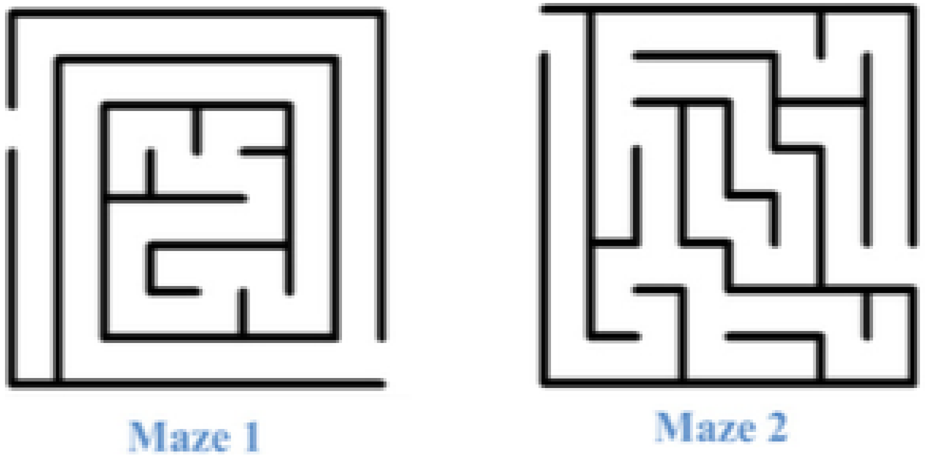
- Clinical measures (NHTSA and SHRP2)
  - cognitive (*Trail-making; Maze Test*)
  - physical (*Rapid Pace Walk*)
- Exposure measures (NHTSA and SHRP2)
  - trip counts and duration
  - trips at different times of day, in wet weather, during rush hour
- Driver performance - *total points off* on a driving test (NHTSA only)
- Crash/near crash information supported exploratory analyses (SHRP2 only)

Cognitive Status Measures

Trail-making Test (Part B)



Maze Test



Results: NHTSA Data

Correlations were very weak (r=.00 to .19), or weak (.20 to .39).

The strongest safety-relevant correlations were between

- Road test score and a clinical measure (Trails B): r = 0.24
- Age and exposure (minutes driven per day): r = - 0.29
- A clinical measure (Trails A) and exposure (avg max trip speed): r = -0.26

The correlation between age and road test score, r = 0.11 accounted for just over 1% of the variance. Age is a poor predictor of driving ability.

Results: SHRP2 Data Analyses

As with the NHTSA data, correlations were in the predicted direction but “very weak” or “weak”

- Strongest: age and average trip speed (r = -.39)
- Next: age and average trip distance (r= -.29)

Exploratory SHRP2 Analyses

Hypothesis: *Older NDS participants with a serious cognitive impairment on at least one test will have longer latencies in crash and/or near-crash events than those without a serious cognitive impairment.*

- Definitions of ‘serious’ cognitive impairment
  - Trails B score $\geq$ 180 s; *or*
  - $\geq$ 5 errors on Visualizing Missing Information [MVPT(VC)]; *or*
  - UFOV subtest 2 score $\geq$ 300 ms
- Response latency distinctions – Driver response time has two components
  - Latency 1: “The time from an event start to the driver’s reaction start”
- Analyses showed no significant differences.

Exploratory SHRP2 Analyses (continued)

- Cognitive impairments can compromise response to hazards originating in the periphery, so events were limited to those where the precipitating event involved a peripheral threat.
- Combined crash and near crash datasets because

  a) crashes were rare events, among drivers with cognitive impairment (n = 21) and,

  b) there was little difference between crash/near crash event types per NDS definition.

Exploratory SHRP2 Analyses (continued)

- Examples of precipitating event types

Peripheral: n = 280
- **Animal approaching roadway**
- **Vehicle backing toward roadway**
- **Vehicle approaching intersection**

Focal: *n* = 191
- Animal in roadway
- Object in roadway
- Slower vehicle ahead

Exploratory SHRP2 Analyses (continued)

- The 280 events with peripheral precipitating events
- Two-sample *t*-test assuming unequal variances
- Results: Latency 1 was significantly longer (p = .019) for the group with a serious cognitive impairment (n = 98, mean latency = 1.47 seconds) than for the group without impairment (n = 182, mean latency = 1.16 seconds).

Conclusions

- Correlations between functional status measures and measures of driver performance and exposure – for both the NHTSA and the SHRP2 data—were in the expected direction but ranged from very weak to weak.
- Older drivers' exposure may be more influenced by a combination of habit and their need to get someplace than by functional ability.

    An older adult who is uncomfortable driving in the city, who needs to get to an appointment downtown, may opt to drive to the appointment, especially if they know of no safe, convenient options.

Conclusions (continued)

The findings from analyses of the aggregated NHTSA data

- small sample, observation periods of a month or less

were consistent with those shown in analyses of SHRP2 data

- much larger sample, data collection intervals averaging more than a year.

The exploratory findings suggest that detecting effects of older drivers' functional limitations on their crash risk requires focusing on driving tasks that rely heavily on functions that tend to decline with age, in this case, the ability to use peripheral visual stimuli to detect and avoid a hazard.

Using Motorcycle Odometer Data to Measure Exposure: A Feasibility Study

Kathryn Wochinger
Kathryn.wochinger@dot.gov

Background

- Exposure is typically measured in vehicle miles traveled (VMT); number of registered vehicles is also an exposure measure
- Exposure enables comparisons of risk
- For example, per VMT, motorcyclists are 28x more frequently killed in traffic crashes than are passenger car occupants (2020 data)

5,579 Motorcyclists killed in 2020;
Fatality Rate per 100 Million VMT
= 31.64

13,472 Passenger Car Occupants killed in 2020;
Fatality Rate per 100 Million VMT
= 1.15

Background (cont.)

- Obtaining exposure measures is challenging for all vehicle types, including motorcycles.
- Motorcycles are smaller and lighter, and travel patterns are unique:
  - More weekend trips
  - More scenic drives
  - Sometimes ride in groups
- Traffic counting technologies must distinguish motorcycles from other vehicle types.

Research Objectives

- Increase our understanding of motorcycle exposure:
  - By examining a direct measure of the number of miles traveled by motorcycles
  - Determine whether inspection records are a feasible source of VMT

➢ Conducted by the University of North Carolina (UNC) Highway Safety Research Center
  - Principal Investigator – Bevan Kirley

Methodology

- Identified States that require motorcycle safety inspections:
  - For all motorcycles
  - Annually
  - Use digital inspection records (not paper!)
  - Have multiple years of data, and,
  - Willing to share data with NHTSA
- Calculated VMT by multiplying mean annual mileage per motorcycle by the number of registered motorcycles in a year, in each State.
- Compared to other measures of VMT.

Results

- 16 States have a motorcycle safety inspection program
- 4 States met criteria (all motorcycles, annual inspections, digital)
- 3 States were able to share the data:
  - Hawaii
  - North Carolina
  - Virginia
- Each of these States provided 3 years of vehicle inspection records

Results: Study Data by State

State	Dates Dataset Covered	Number of Inspections	Number of Motorcycles Inspected	Motorcycle Model Year Ranges
North Carolina	1/1/12 – 12/31/16	982,852	335,876	1977 - 2017
Virginia	8/1/12 – 9/8/17	604,581	255,473	Pre-1950's - 2017
Hawaii	11/1/13 – 2/31/16	101,364	42,803	Pre-1950's - 2017

Results – Valid Records

Hawaii
2013-2016

- 81,132 inspection records
- 24,680 inspected motorcycles

North Carolina
2012-2016

- 962,095 inspection records
- 297,874 inspected motorcycles

Virginia
2012-2017

- 595,143 inspection records
- 239,549 inspected motorcycles

Results: Hawaii

Measure	2014	2015
Mean Annual VMT, Odometer Data	2,064	1,943
Registered Motorcycles	37,771	32,831
Odometer-based VMT	78 million	64 million
FHWA Estimated VMT	113 million	138 million

Results: North Carolina

Measure	2013	2014	2015
Mean Annual VMT, Odometer Data	1,898	1,821	1,839
Registered Motorcycles	191,162	188,675	192,034
Odometer-based VMT	363 million	344 million	353 million
FHWA Estimated VMT	713 million	731 million	622 million

Results: Virginia

Measure	2013	2014	2015	2016
Mean Annual VMT, Odometer Data	2,266	2,033	1,990	2,064
Registered Motorcycles	190,456	200,558	204,089	202,766
Odometer-based VMT	432 million	408 million	406 million	419 million
FHWA Estimated VMT	289 million	281 million	261 million	Not available

Discussion

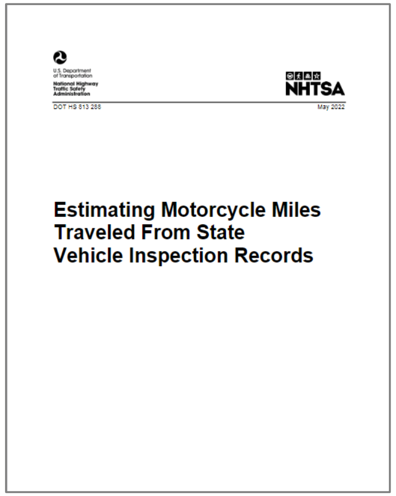
- Most motorcycles had low annual mileage, about 2,000 miles.
- # of motorcycles inspected < # of motorcycles registered
- Unclear why odometer-based VMT did not parallel state-based VMT – worth examining further.
- Takeaway: Inspection records are not feasible as a source for VMT, but they can provide insight into individual motorcycle exposure.

Report and Traffic Tech

[Estimating Motorcycle Miles Traveled From State Vehicle Inspection Records [Traffic Tech] (bts.gov)](https://rosap.ntl.bts.gov/view/dot/62081)
https://rosap.ntl.bts.gov/view/dot/62081

[Estimating Motorcycle Miles Traveled From State Vehicle Inspection Records (bts.gov)](https://rosap.ntl.bts.gov/view/dot/62082)

https://rosap.ntl.bts.gov/view/dot/62082



Contacts

Annette Tucker andrew.tucker@dot.gov
Amy Berning amy.berning@dot.gov
Kathy Sifrit kathy.sifrit@dot.gov
Kathryn Wochinger kathryn.wochinger@dot.gov

Docket No. NHTSA-2022-0091
Please consider submitting comments by January 10, 2023.
www.regulations.gov

NHTSA Resources