MARITIME TRANSPORTATION RESEARCH AND EDUCATION CENTER
TIER 1 UNIVERSITY TRANSPORTATION CENTER
U.S. DEPARTMENT OF TRANSPORTATION

Measures of Freight Network Resiliency During the Covid-19 Pandemic

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PI: Sarah V. Hernandez, PhD, P.E.
Co-PI: Andrew Balthrop, PhD
University of Arkansas

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University of Arkansas
4190 Bell Engineering Center
Fayetteville, AR 72701
479-575-6021

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1 Project Description

1.1 Project Overview and Objectives

Recent headlines depict significant shifts in operations within the freight community in particular, e.g., HOS laws suspended at a national level for the first time in 82 years[1]; national carriers shifting operations completely to grocery supply chains[2]; fleet operators laying off employees in response to manufacturing closures[3]. As a result of the current COVID-19 pandemic, there is a great need to capture freight movement data (not otherwise collected) to measure the effects of the COVID-19 response and recovery practices on freight network resiliency. In this project, we consider an expanded definition of the freight network, beyond roads and warehouses, to include truck drivers and driver support systems.

Driver support systems include physical infrastructure like public and private rest stops as well as operational protections like Hours of Service (HOS). COVID-19 responses by public agencies and private citizens have affected drivers and driver support systems by three mechanisms. First, increased demand for medical supplies, food and packaged goods creates a need for more trucks and drivers, and the increased need for quick shipments promotes an environment in which speeding and unsafe driving practices may prevail. Second, with HOS restrictions lifted by the National Highway Transportation Safety Administration (NHTSA) driver fatigue may occur at greater frequency leading to unsafe driving conditions and higher likelihood of accidents. Third, the effects of social distancing mandates can lead to closures of critical, but oft forgotten, freight infrastructure like rest areas and truck stops, leaving drivers without necessary rest opportunities. While any single mechanism has detrimental effects on driver health and safety, the economy, and national recovery efforts, when combined, the system can be pushed to failure. Pandemic responses have only exacerbated critical industry issues like driver shortages, lack of available parking, and HOS compliance issues stemming from electronic logbooks. **The purpose of this work was to develop and implement a driver health and safety survey during the pandemic.**

1.2 Background

The survey was conducted through the Qualtrics survey platform during the week of May 25th, when the HOS regulations were partially lifted and near the height of social distancing and stay at home orders across the U.S.. Considering that several weeks after the survey HOS regulations were reinstated, the timing of the survey provides a unique opportunity to capture immediate impacts of these policy changes. A total of 500 responses were gathered through a non-probability internet opt-in panel of commercial truck drivers (18 years and older) who had used a public or private truck stop and who were driving the pandemic. Questions aimed to compare operational (e.g., time of day patterns, parking practices, team-driving preferences) and behavioral (e.g., risk tolerance, safety perceptions, fatigue management) patterns before and during the pandemic.

1.3 Contribution

In this report, we present the survey questionnaire and the responses. Future work will include analyses of the findings including econometric modeling efforts to estimate the extent of the impacts of the

[1] https://www.businessinsider.com/coronavirus-trucking-truck-driver-hours-of-service-suspended-2020-3
[2] https://freightwaves.com/news/sysco-shifts-fleet-to-grocery-supply-chain-during-coronavirus-slowdown?utm_campaign=Daily%20Newsletter&utm_source=hs_email&utm_medium=email&utm_content=85247204&_hsenc=p2ANqtz-9qaBtPd5d0BmK2m3ylimQwaFIc77OSAFsq6OuvcU5I36GPI4USOh_rfnm_-fp9_7oHpQ0Kz16q_t_0-7nF7D0vquuSFQ&_hsmi=85247204
[3] https://freightwaves.com/news/pam-transportation-lays-off-75-employees-mostly-nondrivers?utm_campaign=Daily%20Newsletter&utm_source=hs_email&utm_medium=email&utm_content=85247204&_hsenc=p2ANqtz-9qaBtPd5d0BmK2m3ylimQwaFIc77OSAFsq6OuvcU5I36GPI4USOh_rfnm_-fp9_7oHpQ0Kz16q_t_0-7nF7D0vquuSFQ&_hsmi=85247204

pandemic response on driver health and safety. Over the long term, the data collected in this project will provide a platform to study the multi-faceted role of drivers, fleet operators, truck stop operators, and state and federal transport agencies within pandemic response and recovery practices. The results of the survey can be used to inform the following research questions: (i) How does the current lack of available and safe truck parking affect the ability of drivers and fleet operators to route and deliver supplies for pandemic response? (ii) What is the tradeoff between relaxed HOS regulations to provide faster delivery of critical supplies and potential increases in unsafe driving conditions? (iii) How are current supply chain networks shifting operations to meet increased demand for pandemic response and recovery supplies? (iv) In what ways can we incorporate driver and driver support systems into disaster planning and modeling?

2 Survey Development

This section describes the sample frame, online survey platform, and the survey questions. The work was approved by the Internal Review Board (IRB) at the University of Arkansas, under Protocol # 2005265650.

2.1 Sample Frame and Survey Platform

The sample frame for the survey included drivers of commercial grade trucks who used public or private truck stops or rest areas in the six months prior to the survey, were operating their truck during the Covid-19 pandemic, and were older than 18 years of age. To meet the project budget, a total of 500 complete surveys were gathered. The general response rates reported by Qualtrics was between 5-12% for surveys of this type.

The survey was viewable using a web browser and through a mobile phone. Participants were recruited through the online survey platform Qualtrics. Qualtrics finds participants through website intercept recruitment, member referrals, targeted email lists, gaming sites, customer loyalty web portals, permission-based networks, and social media. Participants are sent an email from Qualtrics to invite them to the survey. The invitation email is generic and contains a hyperlink to the survey and a mention of the incentive. Once on the survey landing page, the participate is able to review the survey consent form and other IRB approved invitation and recruitment narratives. Participant names, addresses, and dates of birth are typically validated with third-party verification measures. Participants were provided an incentive for completing the survey. The incentives were distributed through Qualtrics and take varied forms. Examples include airline miles, points for retail stores, or cash or gift cards. Participants are informed when taking the survey that they will be compensated.

2.2 Questions

The survey contained 61 questions with logic to skip questions. Four additional questions were included to assess the participants relevance to the sample frame. The expected duration of the survey was 16.7 minutes. Topics and number of questions within each topic are presented in **Table 1**. A copy of the survey questions is included in **Appendix A**.

Table 1. Survey Questions by Topic

Topic Area	Type of Questions	Number of Questions
Socioeconomic Characteristics	Driver age, gender, income, years of experience, pay type, education, company type	10
Business Characteristics	Company size, trips per week, distance per trip, origins and destinations of trips	11
Driver Characteristics	Type of shipment, team driving, decisions for parking	7
Driving Characteristics	Risk tolerance, concentration	3
Safety Perceptions	Road safety, citations	4
Time of Day Operations	Trip start time, parking difficulties, HOS challenges, service disruptions at private and public rest stops, real time parking	14
Driving Management	Driving hour restrictions, fatigue management, electronic logging device	8
Truck Configuration	Truck configuration, commodity carried	4

3 Survey Response Summary

This section summarizes the responses by time of response and participant demographics.

3.1 Respondents and Timeline

A total of 523 responses were collected between the dates of May 19th, 2020 and June 1st, 2020 (Figure 1). The median survey duration was 9.3 minutes with a range of 3 to 30 minutes (removing outliers) (Figure 2).

Respondents were mostly male (66%) (Figure 3) and the median age was 34 years (Figure 4). Most respondents (39%) had between two and three years of driving experience (Figure 5). The majority of drivers (22%) reported income of $60 to $80k (Figure 6) with most (32%) being paid hourly (Figure 7). Most drivers (39%) reported an education level of completed secondary diploma or degree, the second most (23%) reported level was completion of high school or technical school (Figure 8). Forty percent of drivers reported working for both for-hire and private carriers, 34% reported working for private carriers and, 24% for for-hire carriers, with 2% not responding. The majority of drivers (30%) reported working for a company with 11 to 25 drivers (Figure 9).

Although the survey did not directly ask for the registered location of the truck or driver, using the IP Address of the survey response, we were able to see the spatial distribution of responses with heavier concentration along the East Coast of the US (Figure 10).

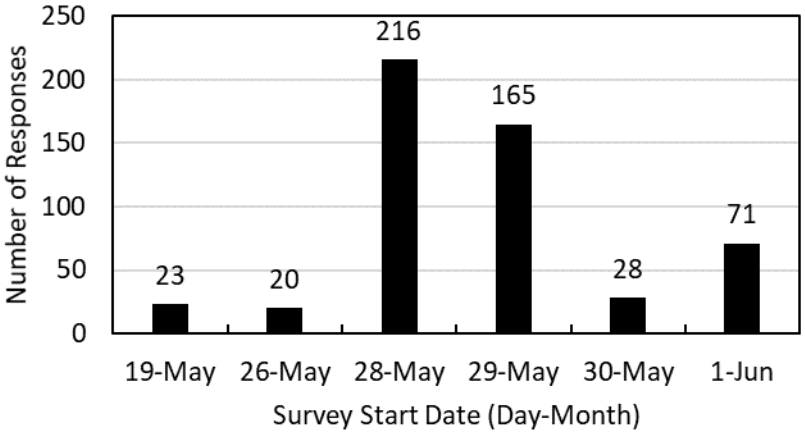


Figure 1. Reponses by Date

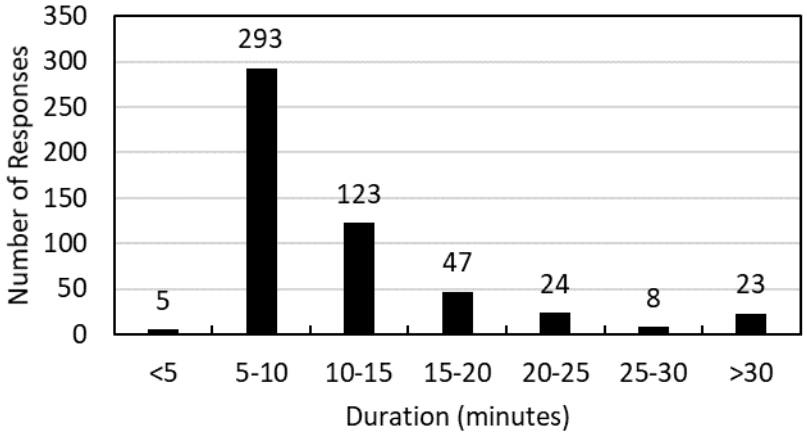


Figure 2. Responses by Duration of Survey

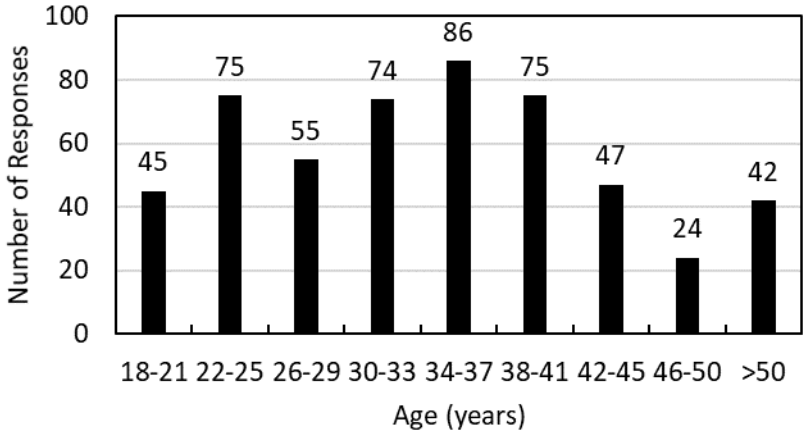


Figure 3. Respondents by Age

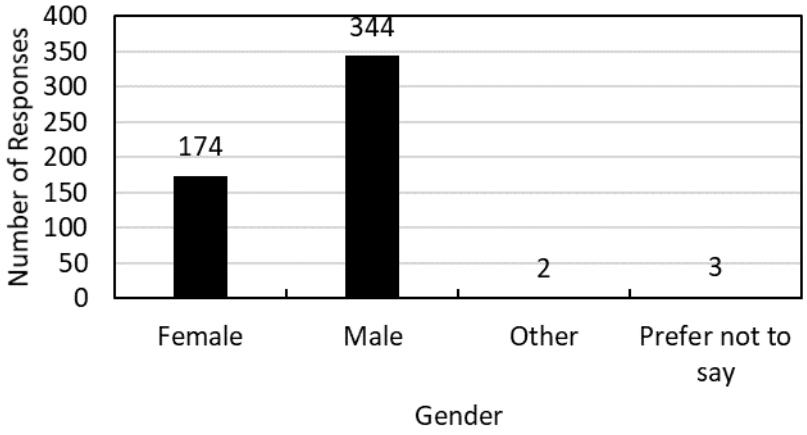


Figure 4. Respondents by Gender

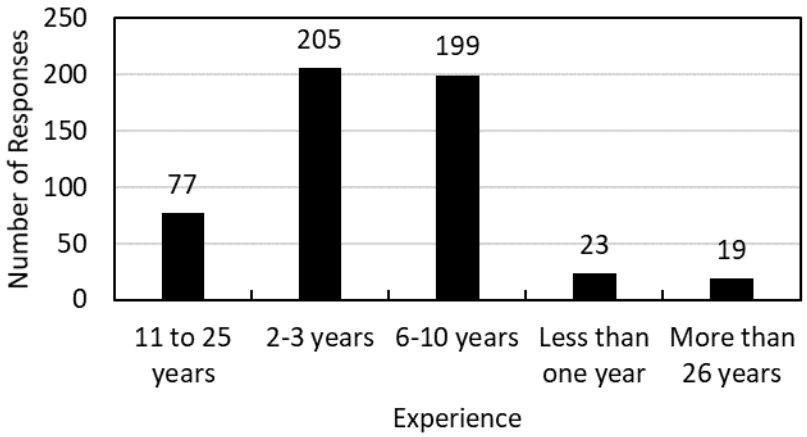


Figure 5. Respondents by Driving Experience

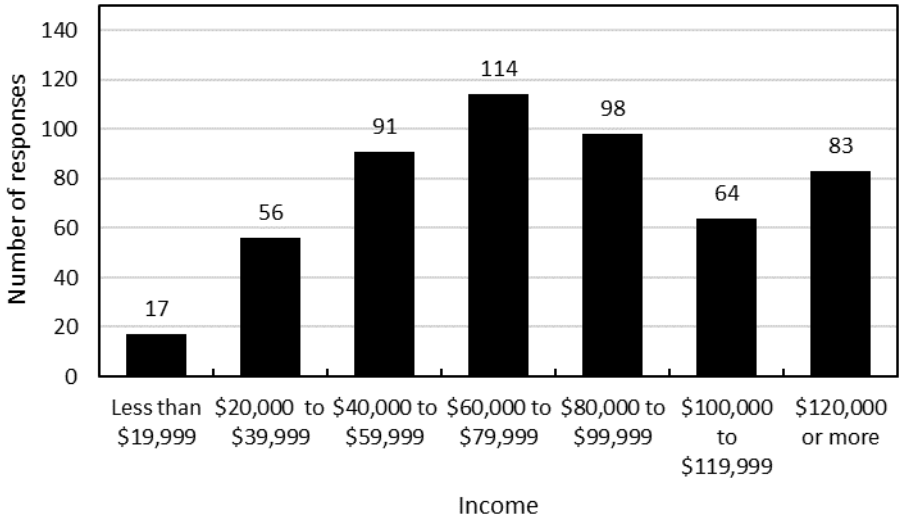


Figure 6. Driver Reported Income

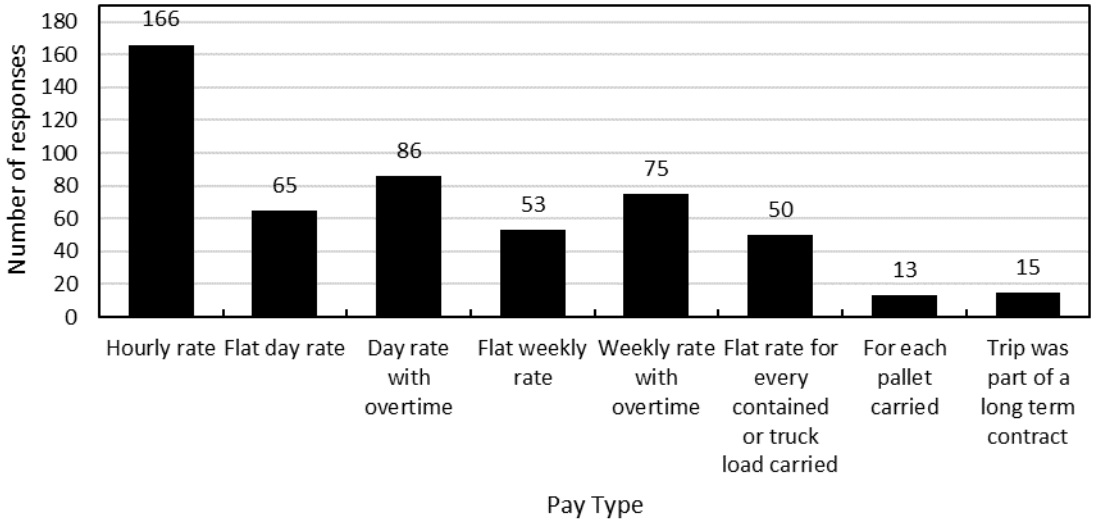


Figure 7. Driver Reported Pay Type

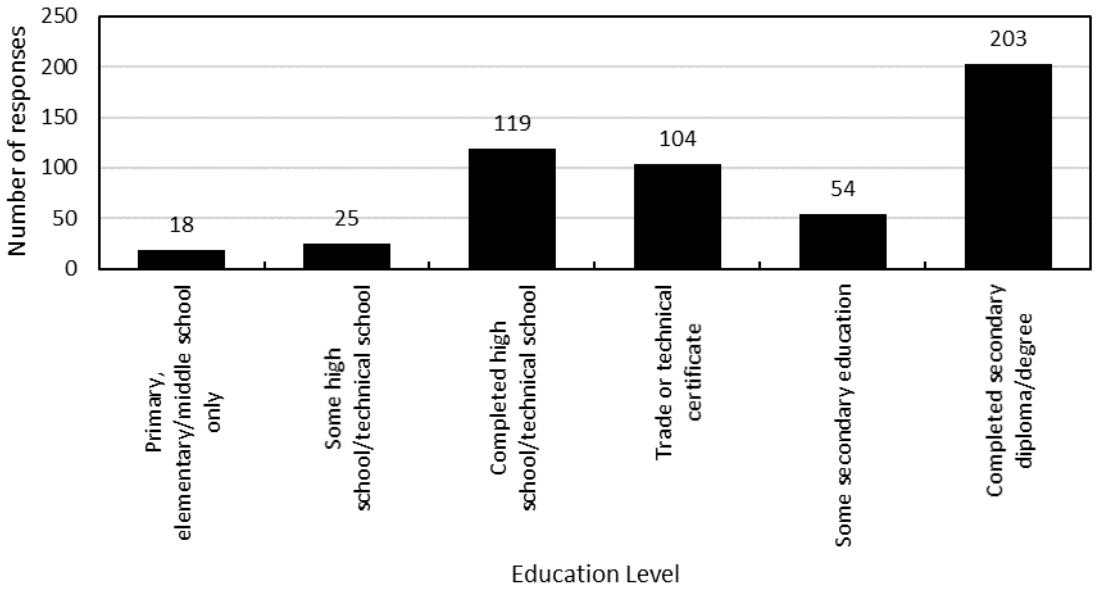


Figure 8. Driver Reported Education Level

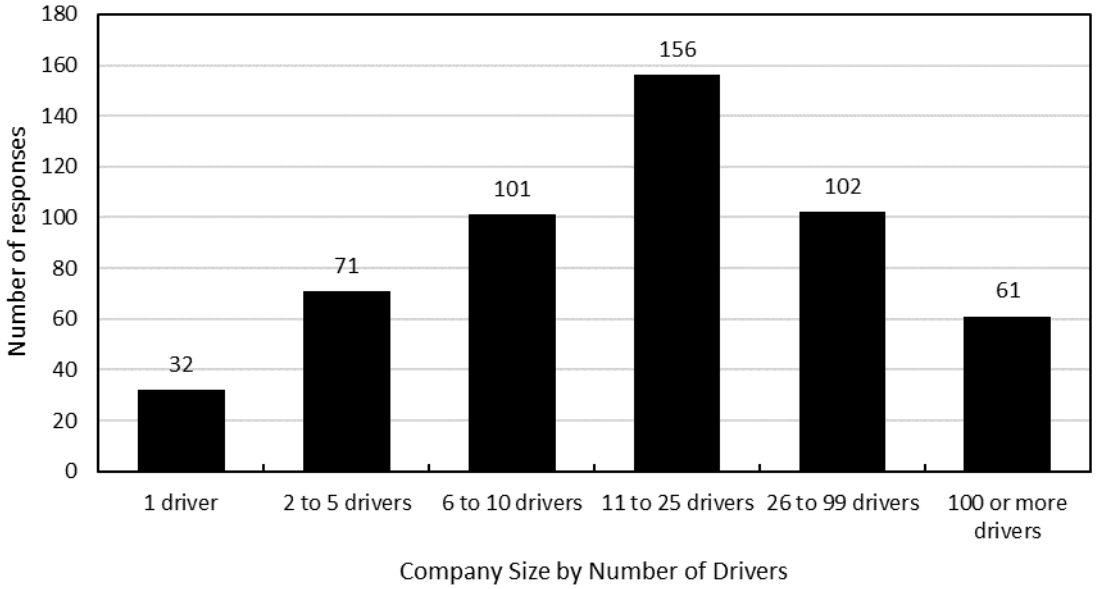


Figure 9. Company Size Reported by Drivers

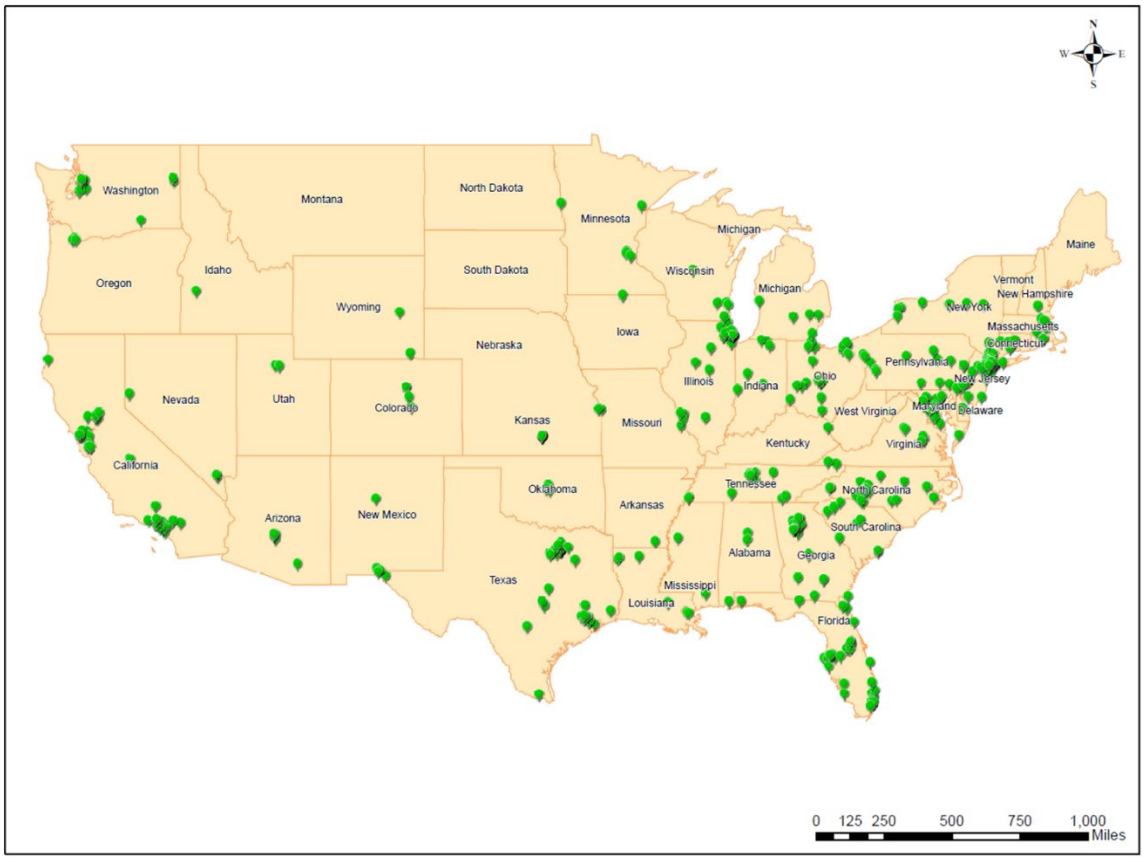


Figure 10. Spatial Distribution of Survey Responses

3.2 Overview of Responses

This section contains an overview of the responses for each question in the survey. A complete record of the responses is provided in Zenodo.

3.2.1 Socioeconomic Characteristics

In addition to their normal pay scale, 79.8% of drivers reported being paid hazard pay under the current Covid-19 pandemic. For drivers not reporting hazard pay arrangements, 89.8% responded that they believe they should receive hazard pay for trips made during the pandemic.

3.2.2 Business Characteristics

The majority of drivers (57%) reported making between 4 to 10 freight related trips per week before the pandemic with 29% reporting making 4 to 5 trips and 27% reporting making 6 to 10 trips per week (Figure 11). As a result of the pandemic, 31% of drivers reported making fewer weekly trips while 47% of drivers reported making more trips (Figure 12).

Drivers reported the percent of trips by trip length for trips made before the pandemic ("this time last year"). On average drivers reported 28% of trips being less than 200 miles, 23% being 200 to 499 miles, 20% being 500 to 999 miles, 15% being 1,000 to 1,999 miles, and 13% being greater than 2,000 miles. As a result of the Covid-19 pandemic, 81% of drivers reported that the proportions of their freight

related trips by length changed. On average drivers reported 31% of trips being less than 200 miles, 23% being 200 to 499 miles, 19% being 500 to 999 miles, 17% being 1,000 to 1,999 miles, and 9% being greater than 2,000 miles. In general, there was an increase in the number of shorter trips (Figure 13).

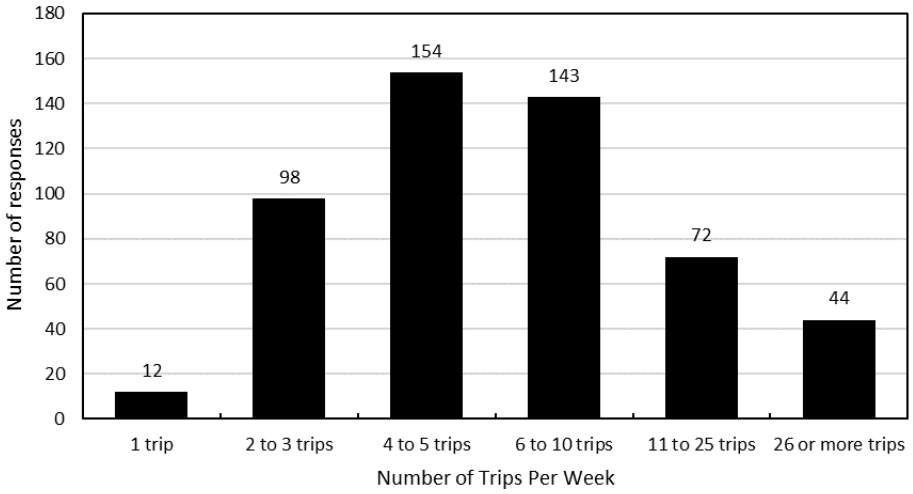


Figure 11. Trips Per Week Before the Pandemic

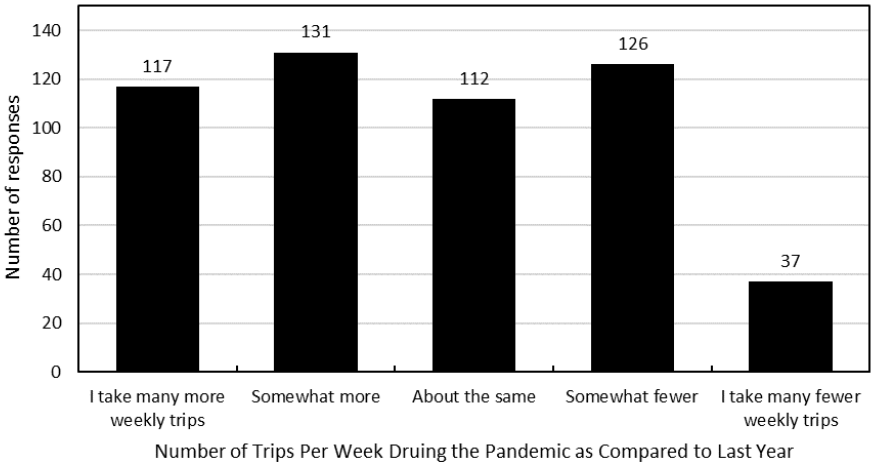


Figure 12. Change in Weekly Trip Rate as a Result of the Pandemic

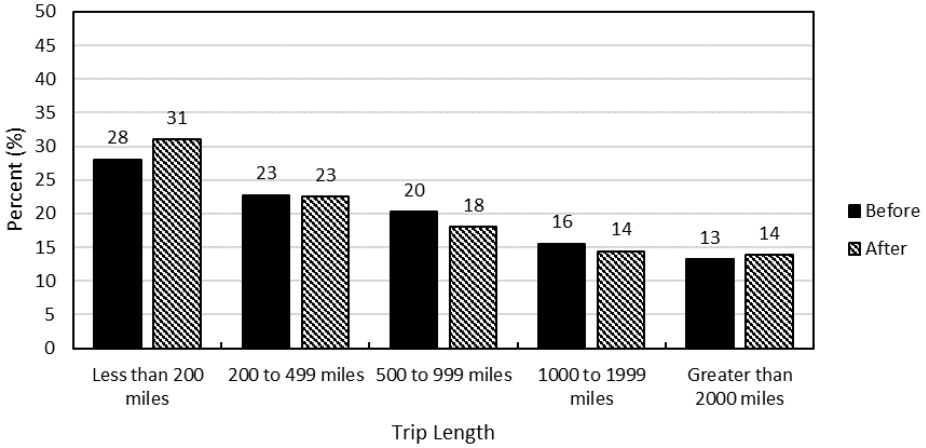
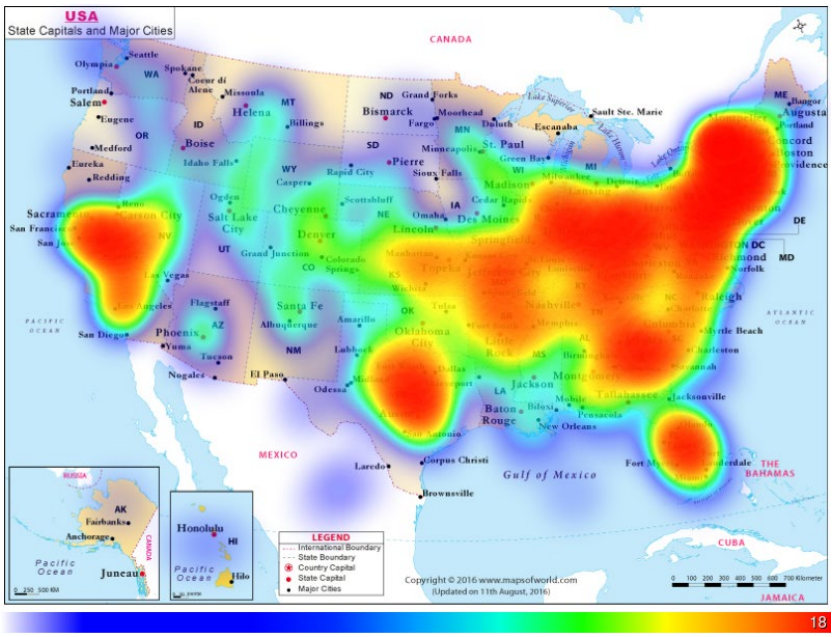
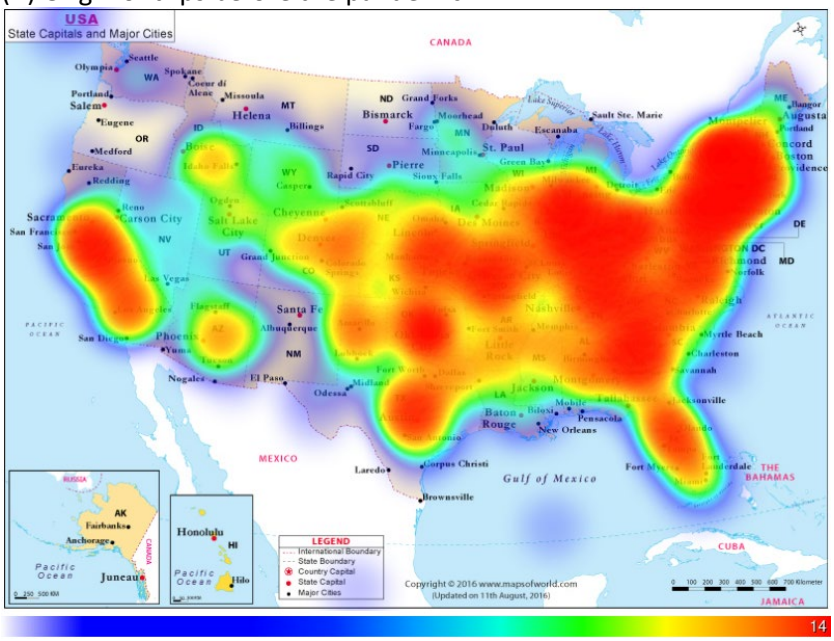


Figure 13. Percent of Trips by Length Before and After the Pandemic

Drivers were asked about the origin and destination of the majority of their trips before and during the pandemic. The highest number of reported trip origins and destinations was in the Ohio Valley region: 13% of trip origins before the pandemic and 14% during the pandemic; 15% of trip destinations before the pandemic and 14% during the pandemic (Figures 14 and 15). By ranking the change in the number of responses of origins before and during the pandemic, the largest shift (2 percentage points difference) was observed in the Upper Midwest region (Figure 16a). By ranking the change in the number of responses of destinations before and during the pandemic, the largest shift (2 percentage points difference) was observed in the California, South Texas, and Upper Midwest regions (Figure 16b).

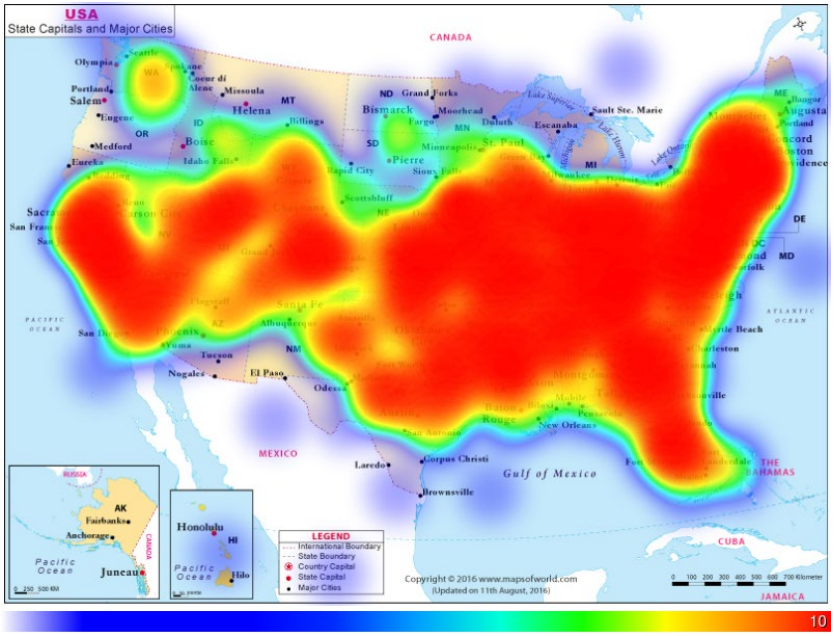


(A) Origin of trips before the pandemic

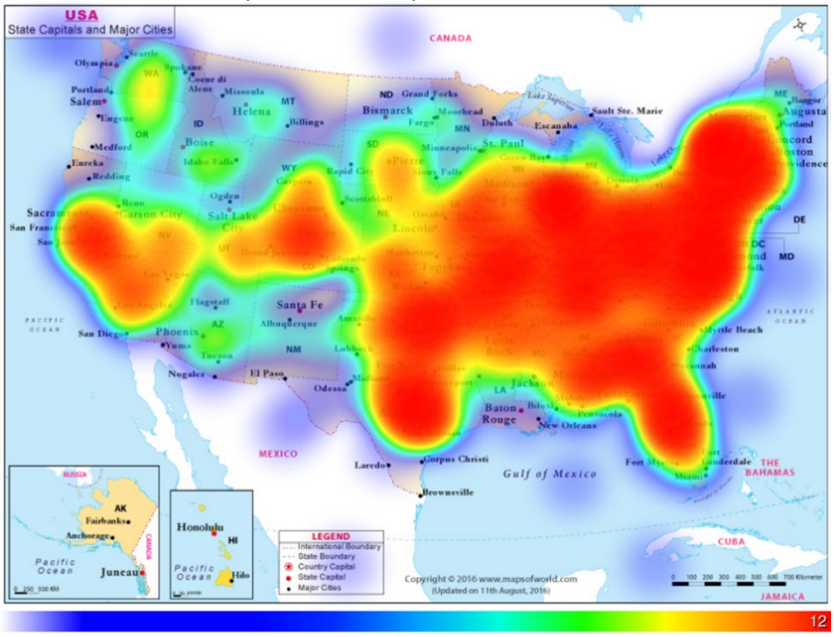


(B) Origin of trips during the pandemic

Figure 14. Origin of Trips Before and During the Pandemic

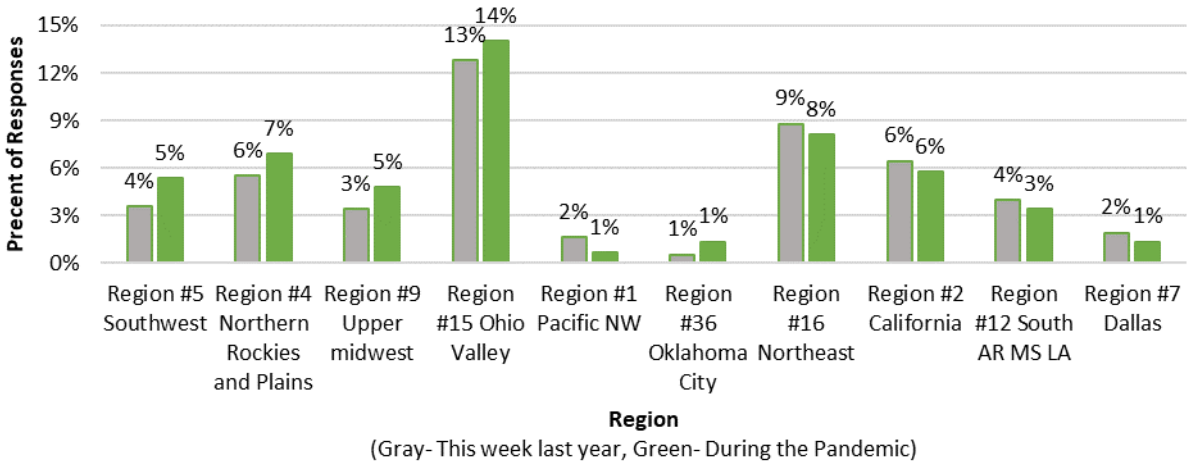


(A) Destination of trips before the pandemic

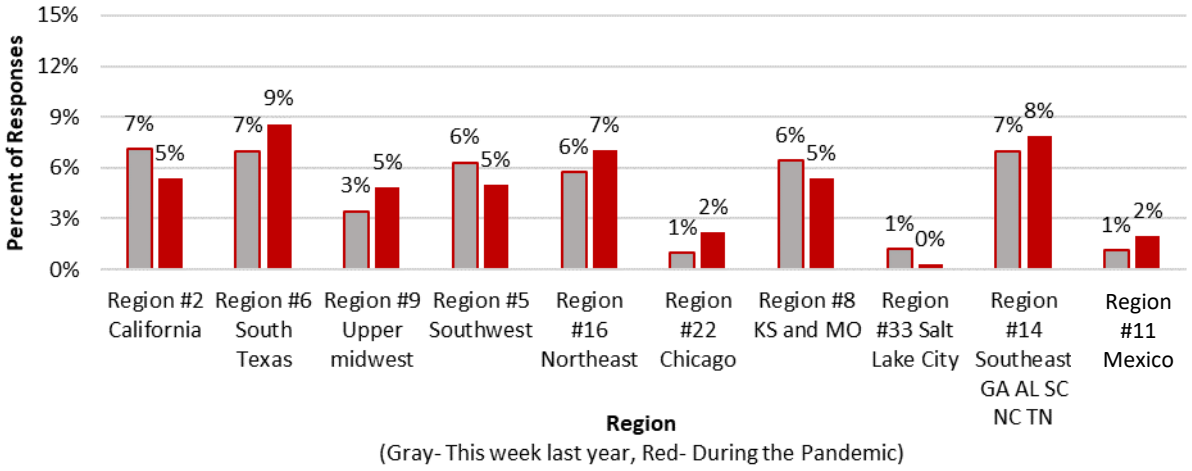


(B) Destination of trips during the pandemic

Figure 15. Destination of Trips Before and During the Pandemic



(a) Change in trip origin (top ten changes)



(b) Change in trip destination (top ten changes)

Figure 16. Change in Number of Responses of Trip Origin and Destinations Before and During the Pandemic

3.2.3 Driver Characteristics

Most drivers (45%) in the survey reported hauling truckload shipments before the pandemic which decreased to 34% of responses during the pandemic indicating a shift toward less than truckload and parcel shipments (Figure 17). In fact, 75% of drivers reported the type of trip changing as a result of the Covid-19 pandemic.

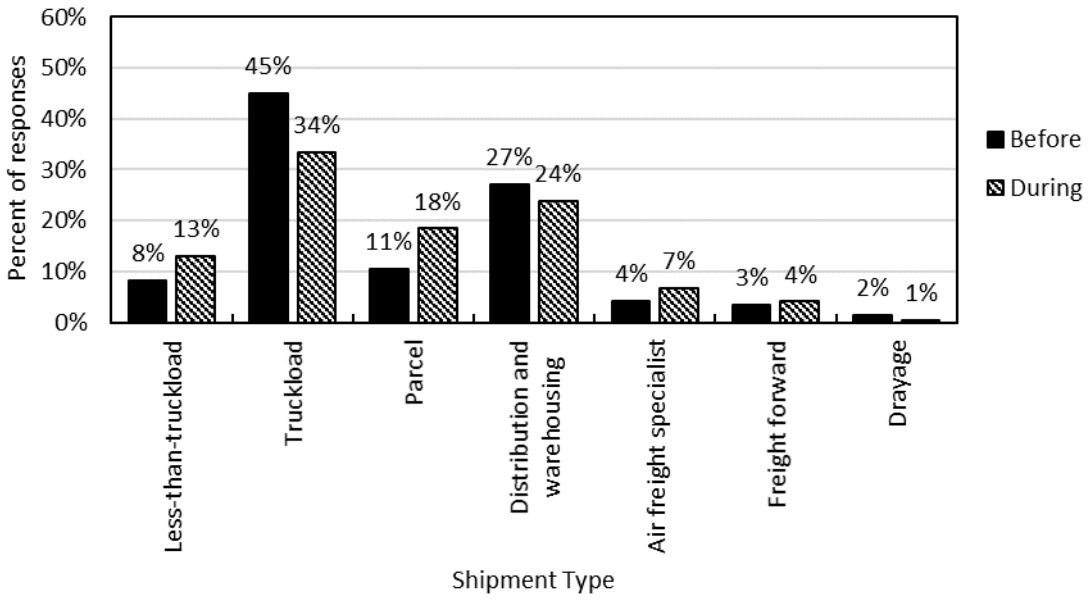


Figure 17. Shipment Type Before and During the Pandemic

For team driving, before the pandemic, 34% of drivers reported sometimes participating in team driving, with 17% reporting never participating in team driving and 10% reporting always participating. During the pandemic, 32% of drivers reported sometimes team driving, with 22% reporting never team driving and 10% always reporting team driving. Seventy-two percent of drivers reported that the Covid-19 pandemic affected their ability to team drive (Figure 18).

When searching for parking, 73% of drivers reported that they are responsible for making the decision on where to park, the alternative being that their company dictates where to park. Most (29%) of drivers reporting using smart phone applications to find available parking, 25% reported using highway message signs, 21% used websites, 21% used communications with other drivers (e.g., CB radios), and 4% reported not using any tools.

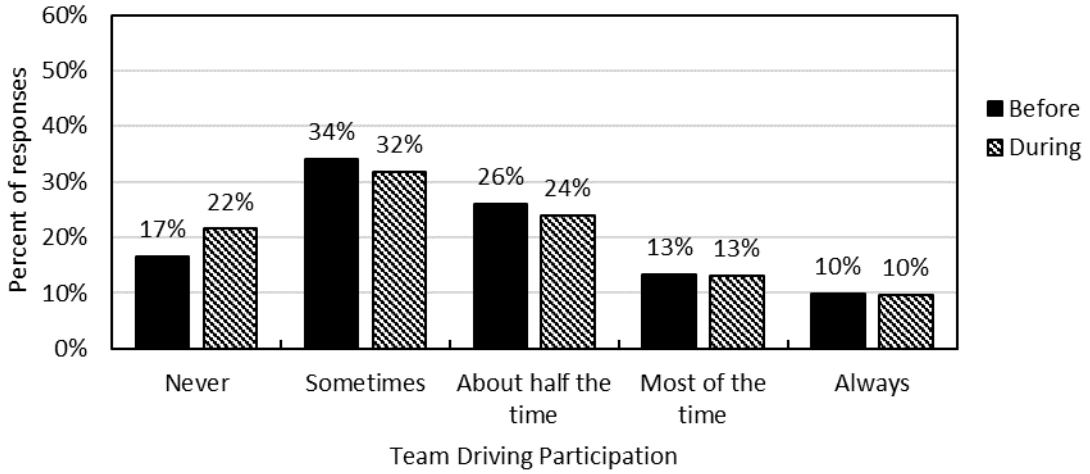
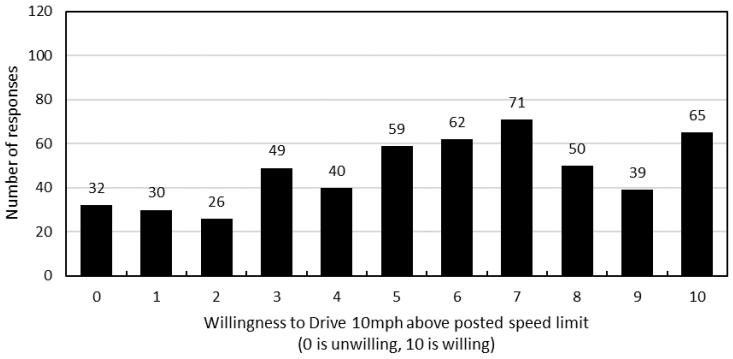
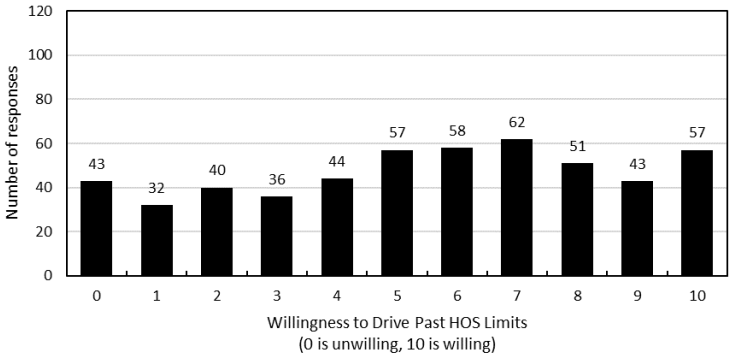


Figure 18. Team Driving Participation Before and During the Pandemic

3.2.4 Driving Characteristics

Drivers were asked a series of questions about risk characteristics. Risk characteristics were measured on a scale of 0 to 10, with 0 representing an unwillingness to take risks and 10 representing a high degree of willingness to take risks (Figure 19). When asked if willing to drive 10mph above the posted speed limit, the average response was a 5.6 with a standard deviation of 2.95. When asked if willing to drive past the HOS limits, the average response was a 5.4, with a standard deviation of 3.07. When asked if willing to park illegally, the average response was a 4.0 with a standard deviation of 3.48. The willingness of drivers to park illegally had the lowest risk tolerance with the large majority of drivers (21%) being entirely unwilling to park illegally (score of 0). Before the pandemic, 4.4% of drivers reported never finding that their concentration lapsed after driving for a long time while during the pandemic, 6.5% of drivers reported finding that their concentration lapsed after driving for a long time (Figure 20).





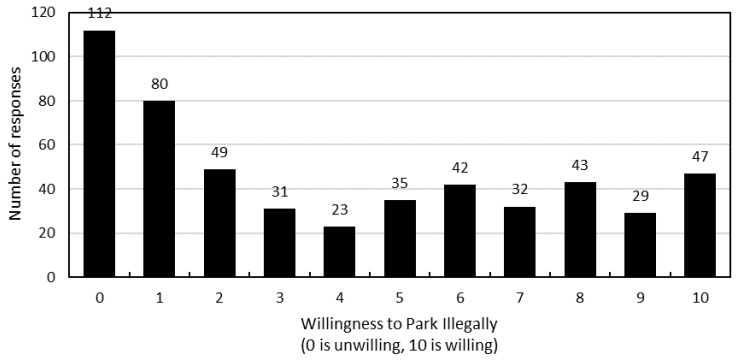


Figure 19. Willingness to Take Risks

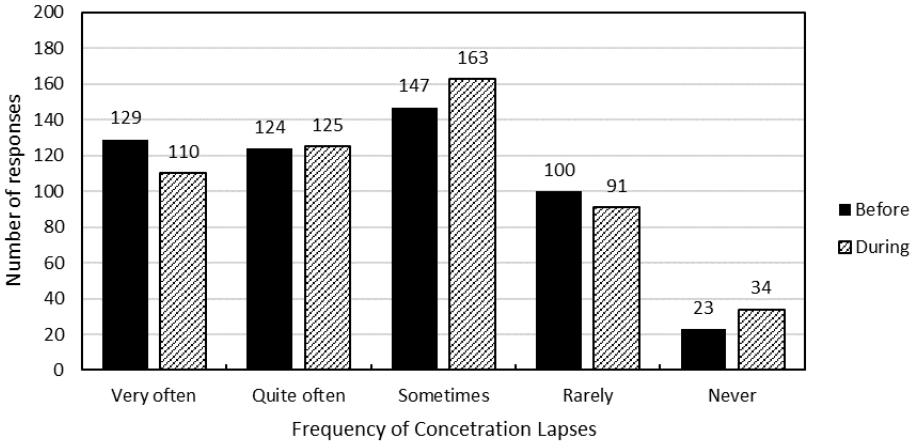


Figure 20. Frequency of Concentration Lapses Before and During the Pandemic

3.2.5 Safety Perceptions

Drivers were asked to what degree their perception of how safe the roads are changed as a result of the pandemic. Thirty-five percent of drivers reported that the roads were perceptibly safer during the pandemic (Figure 21). The risk of citation was lowest for driving under the influence and the highest for excessive speeding both before and during the pandemic (Figure 22). Sixty-six percent of drivers reported that they thought their risk for citations changed as a result of the pandemic.

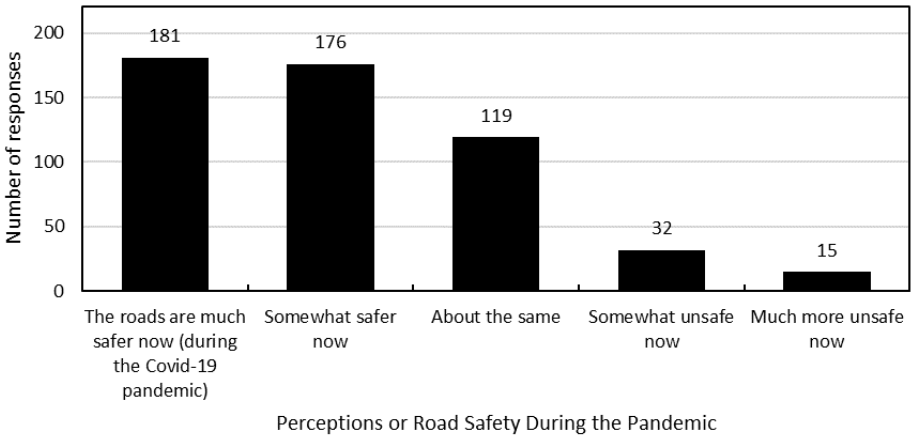


Figure 21. Perceptions of Road Safety During the Pandemic

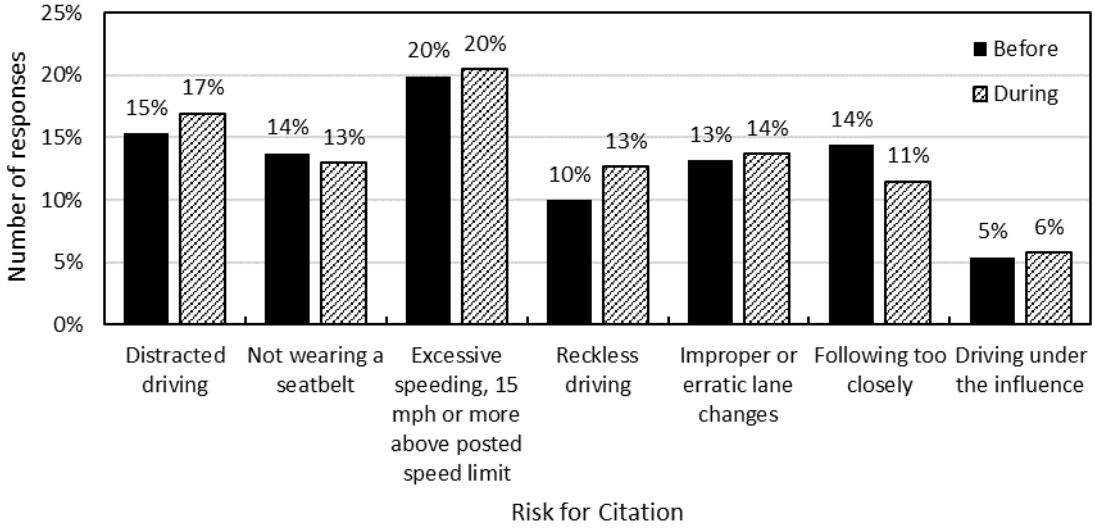


Figure 22. Risks for Citation Before and During the Pandemic

3.2.6 Time of Day Operations

Seventy-six percent of drivers reported starting their trips early (12AM to 6AM) to mid-morning (6-10AM), while 3% of drivers reported starting their trips in the evening (9PM-12AM) before the pandemic. After the pandemic, 60% of drivers reported starting trips in the early and mid-morning, the number of trips started in the evening remained the same. There was a shift towards mid-day trip starts as a result of the pandemic (Figure 23).

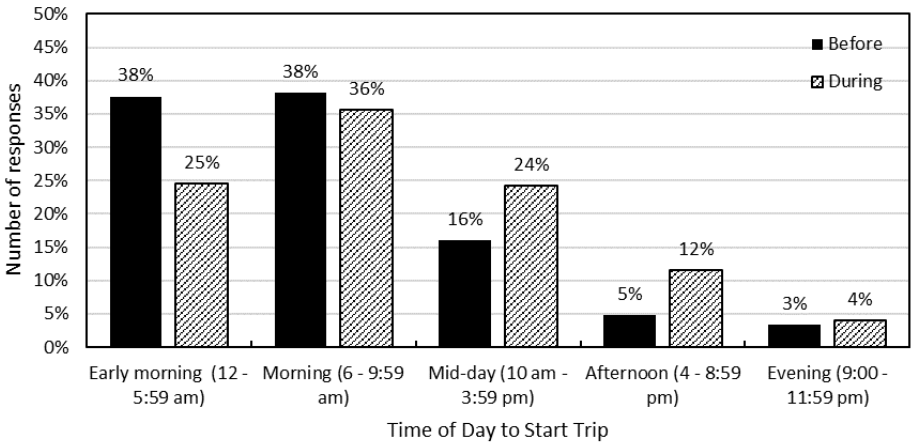


Figure 23. Trip Start Time Before and During the Pandemic

Before the pandemic, 4% of drivers reported having no difficulty finding parking; Those reporting difficulty finding parking, reported difficulty across all times of day. During the pandemic, 8% of drivers reported having no difficulty finding parking; Those reporting difficulty finding parking reported difficulty across all times of day. The largest shifts in challenges finding parking before and during the pandemic were noted in the early morning period (Figure 24). By day of week, Sunday was the least reported day to have difficulty finding parking before and during the pandemic (Figure 25). Sixty-six percent of drivers reported that the day of the week that is most challenging to find parking has changed as a result of the pandemic.

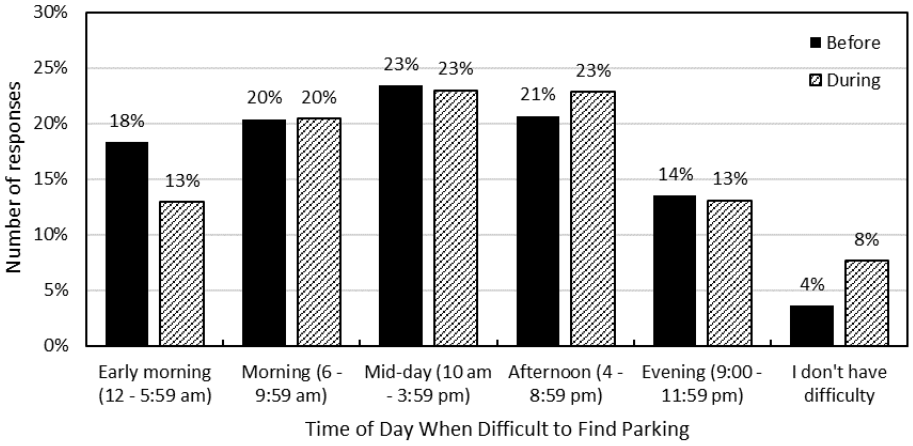


Figure 24. Time of Day Reported for Parking Difficulties Before and During the Pandemic

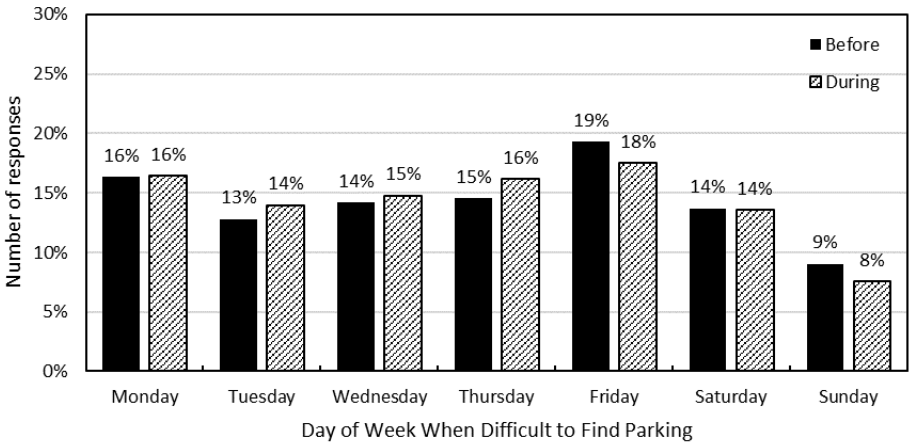


Figure 25. Day of Week Reported for Parking Difficulties Before and During the Pandemic

Lack of safe and available parking cause problems with adhering to HOS limits for 93% of drivers before the pandemic, and 85% of drivers during the pandemic (Figure 26). Before the pandemic drivers most often reported service disruptions related to fuel services. During the pandemic, service disruptions were reported most often for restrooms at private truck stops (Figure 27). At public rest stops, before the pandemic, service disruptions were most often reported for restrooms while during the pandemic, service disruptions were reported most often for dine-in food services (Figure 28). Seventy percent of respondents noted that they experienced service disruptions at private truck stops and public rest areas as a result of the pandemic.

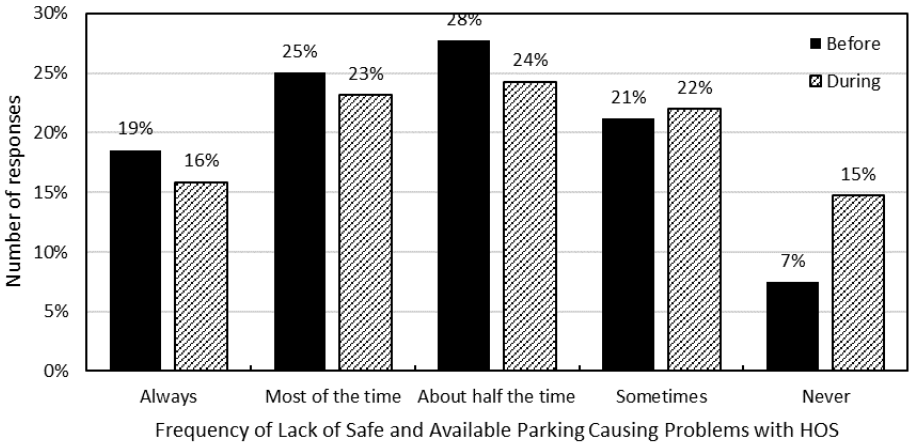


Figure 26. Frequency of Lack of Safe and Available Parking Causing Problems Adhering to HOS

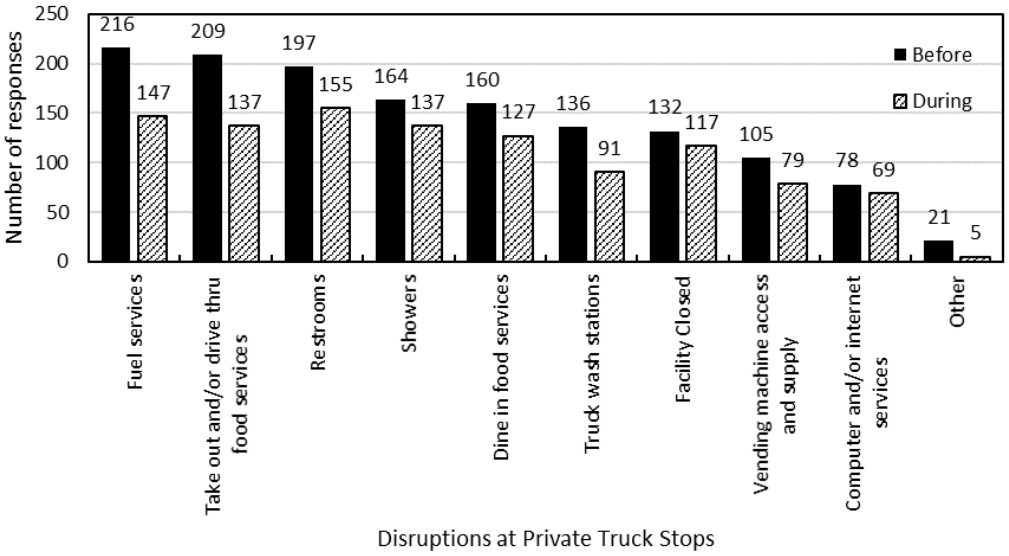


Figure 27. Service Disruptions at Private Truck Stops

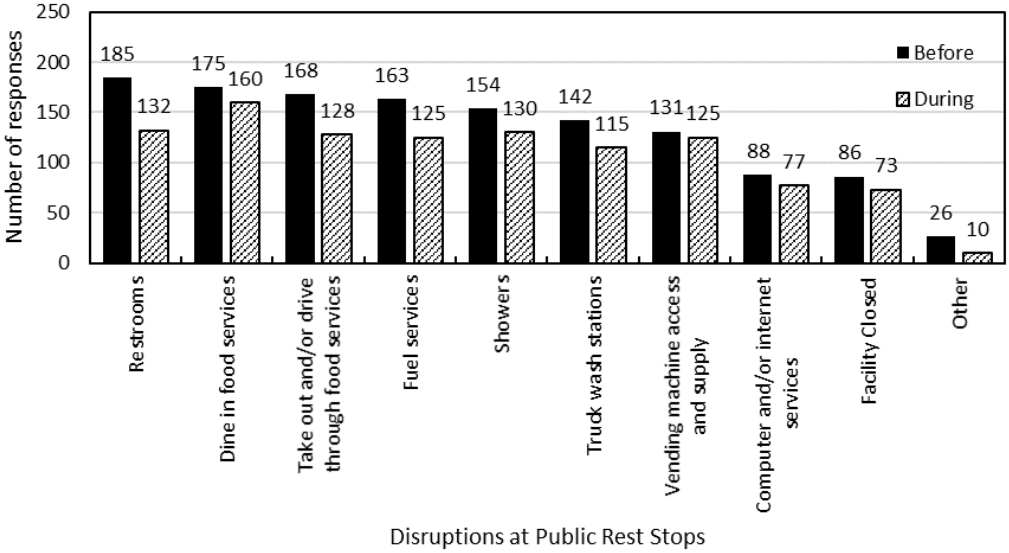


Figure 28. Service Disruptions at Public Rest Stops

3.2.7 Driving Management

As a result of the pandemic, drivers most often (37% of responses) reported that the restrictions on the number of hours worked per week changed (Figure 29). Three percent of drivers reported that their company does not monitor driver fatigue. Drivers reported equally distributed use of fatigue management methods such as using monitoring devices and reviewing truck computer records (Figure 30). Sixty-five percent of drivers reported that fatigue management practices changed as a result of the Covid-19 pandemic.

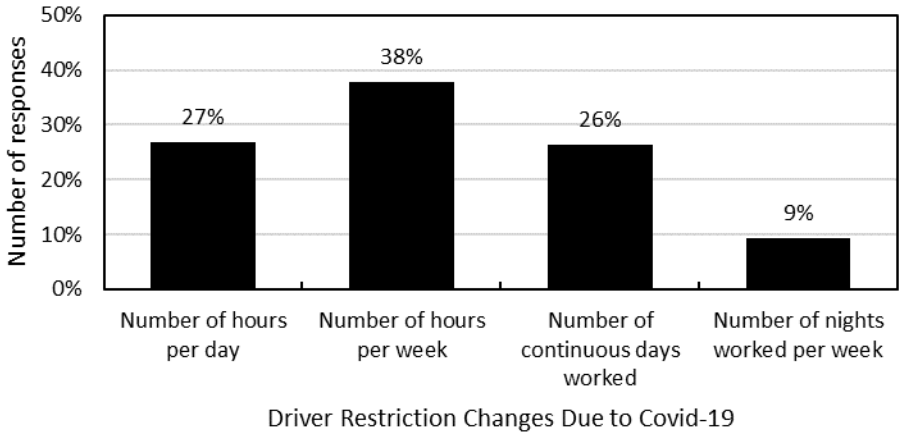


Figure 29. Driving Management Changes Resulting from Pandemic

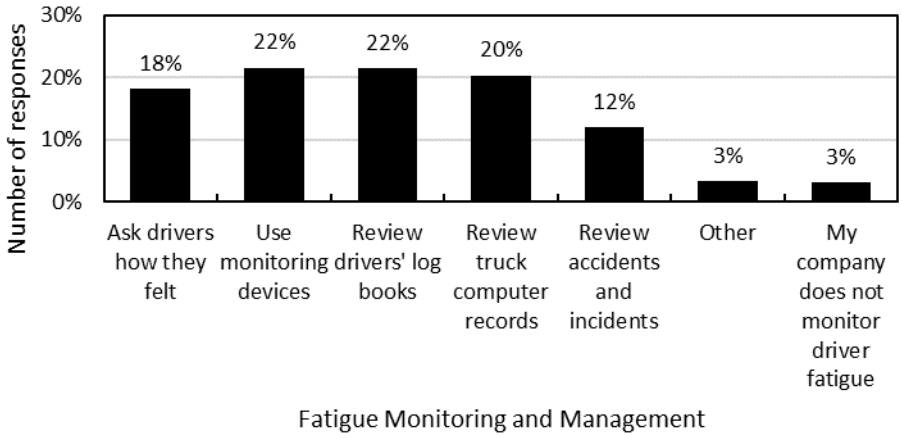


Figure 30. Fatigue Management Methods

Drivers were asked a Likert style question about the degree to which they agreed with statements about fatigue management practices. The question was scaled from 0 to 5 with 0 being disagree strongly and 5 being agree strongly (Figure 31). When asked if drivers agree with the statement "Management encourages me to take breaks whenever I need", the average response was 2.42 with a standard deviation of 1.50 for conditions before the pandemic. During the pandemic, the response average was 2.48 with a standard deviation of 1.45. When asked if drivers agree with the statement "Drivers are always allowed sufficient time to reach their destination", the average response was 2.48 with a standard deviation of 2.31 for the conditions before the pandemic. During the pandemic, the response average was 2.63 with a standard deviation of 2.24. When asked if drivers agree with the statement "The schedule imposed by my company makes it easy for me to take a break when I feel the need", the average response was 2.47 with a standard deviation of 2.36 for conditions before the pandemic. During the pandemic, the response average was 2.57 with a standard deviation of 1.48.

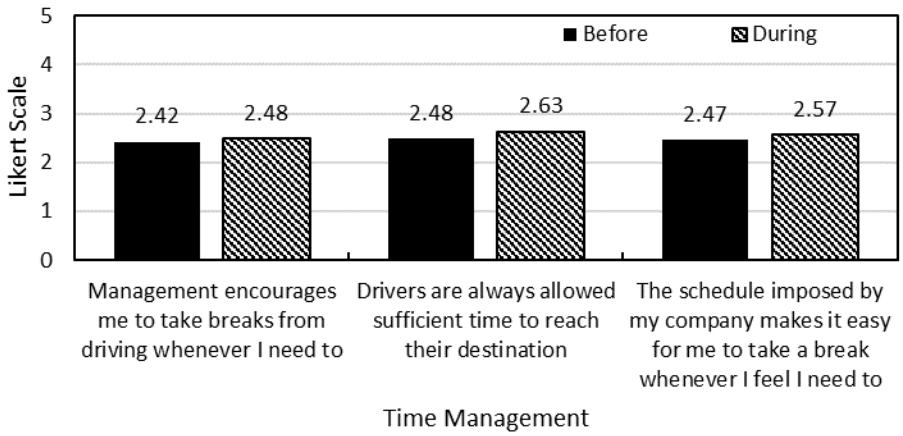


Figure 31. Fatigue Management Practice Changes Before and During the Pandemic

Before the pandemic, 7% of drivers reported never driving while tired compared to 8% during the pandemic (Figure 32). When making rest stops, before the pandemic, 3% of drivers reported never making a stop, while after the pandemic 5% of drivers reported never making a stop (Figure 33). The most common Electronic Logging Device (ELD) was the Big Road device (13% of responses), followed by AT&T Fleet Complete (10%), and KeepTruckin (9%). All other ELD devices were reported by less 8% of the drivers.

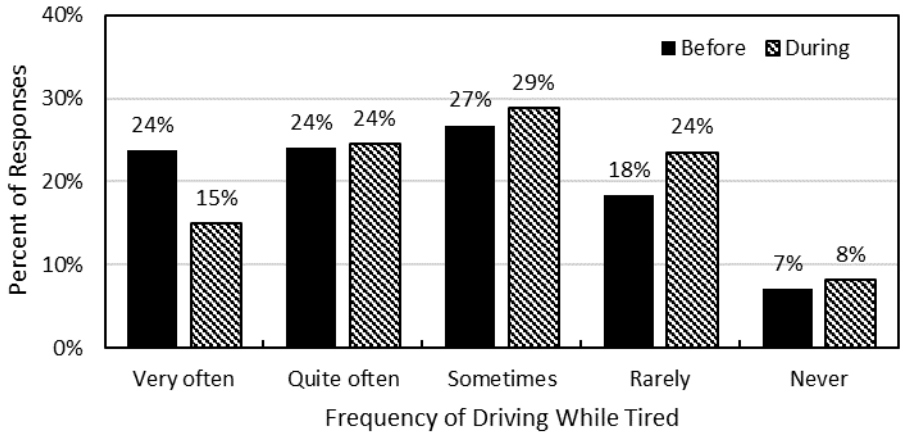


Figure 32. Frequency of Driving While Tired Before and During the Pandemic

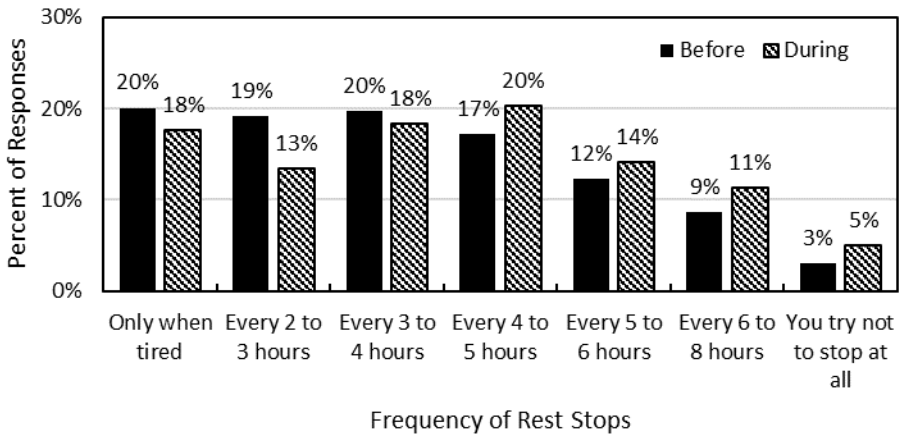


Figure 33. Frequency of Rest Stops Before and During the Pandemic

3.2.8 Truck Configuration

The survey asked drivers to report on their most commonly driven truck configuration. Forty-five percent of drivers reported driving a tractor trailer with a single trailer, 39% drove a single unit truck, 14% drove a tractor trailer with double trailers, and 2% reported other configurations.

In terms of commodity carried, drivers were asked to report their most commonly transported commodity before and during the pandemic. Drivers were allowed to select more than one commodity. Before and during the pandemic, the most commonly reported commodity carried was 'meat, seafood, and their preparations' (Figure 34). The second most commonly reported commodity carried was 'agricultural products', followed by 'prepared foodstuffs'. The largest shifts from before to during the pandemic were in the transport of vehicles (change of 1.8 percentage points) with fewer drivers reporting vehicle transports during the pandemic and crude petroleum (change of 1.5 percentage points) with more drivers reporting transport of crude petroleum.

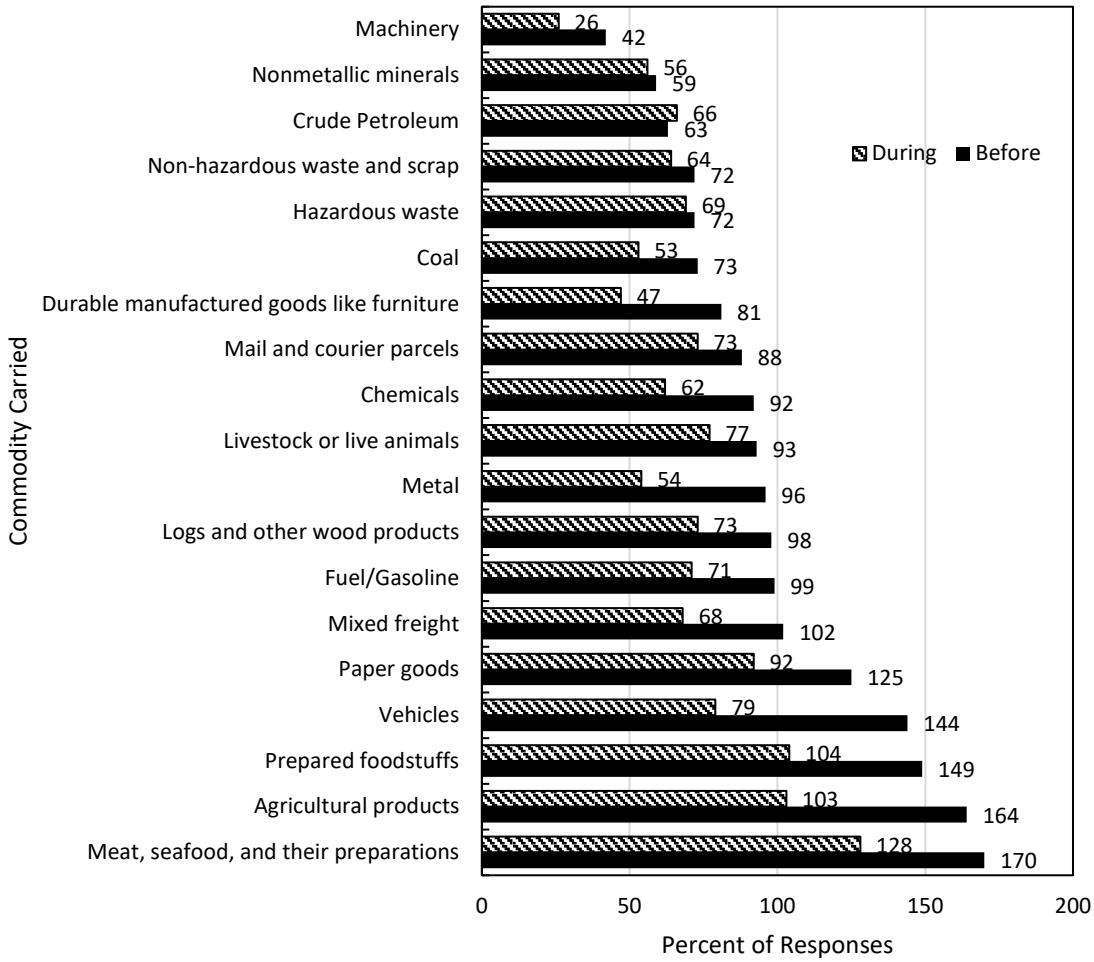


Figure 34. Commodity Carried Before and During Pandemic

3 Conclusions

The purpose of this research was to collect timely data on the impacts of the Covid-19 pandemic on truck driver and trucking operations with a specific focus on issues that affect driver health and safety. An online opt-in panel survey was developed using the Qualtrics survey platform. The survey questionnaire contained 65 questions with skip logic dependent on responses. A total of 523 responses were collected between the dates of May 19th and June 1st, 2020. The dates of the survey correspond to the period of lifted Hours of Service (HOS) restrictions.

This report summarizes the responses to each survey question. Along with this report, a complete data file of the responses in a Comma Separated Value (.csv) format is available on Zenodo (www.zenodo.org) in the MarTREC repository.

Future work aims at developing econometric models to quantify the significant impacts of Covid-19 pandemic response actions on driver health and safety. The goal of the work is to provide evidence of the impacts of Covid-19 responses in order to develop future policy that may mitigate unintended consequences of pandemic responses. In this way, we can ensure that goods, medicines, and supplies are delivered in a timely and safe manner during a pandemic without causing undue harm on the drivers that transport those goods.

4 References

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Appendix: Survey Questions

Start of Block: Front Matter

Q1 Do you drive a commercial grade truck for your profession?

- Yes (1)
- No (2)

Q2 Have you used a public and/or private truck stop or rest area in the last six months?

- Yes (1)
- No (2)

Q3 Have you been operating your commercial motor vehicle during the current Covid-19 (Coronavirus) pandemic?

- Yes (1)
- No (2)

Q4 **EXPLANATION OF RESEARCH** Project Title: Measures of Freight Network Resiliency During the Covid-19 Pandemic Principal Investigators: Sarah Hernandez, PhD, PE (UA) and Andrew Balthrop, PhD (UA) Student Researchers: Karla Diaz Corro Sponsor: University of Arkansas; Maritime Transportation Research and Education Center (MarTREC).
Version Date: April 30, 2020

Purpose: You are being asked to take part in a research study. The purpose of this research study is to give guidance and to assist Federal, State and local agencies in important policy decisions with regards to improved roadway safety (e.g., due to HOS exemptions) and truck parking issues (e.g., due to pandemics). The results of the study will be used for research reports, academic papers and theses, and policy documents.

Activities: The study activities include the administration of a survey designed to understand driving behaviors during the COVID-19 (coronavirus) pandemic .

Time: Your participation in this study will last about 15 minutes.

Confidentiality: It is possible that others could learn that you participated in this study but the information you provide will be kept confidential to the extent permitted by law. The data will be shared between the University of Arkansas (UA) and collaborating institutions.

Risks: The security and confidentiality of the information collected from participants online cannot be guaranteed. Confidentially will be kept to the extent permitted by the technology being used. Information collected online can be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or

contain viruses.

Benefits: There are not direct benefits to participants, however the research has the potential to influence improved roadway safety for commercial motor vehicle drivers.

Voluntary: Participation in this study is voluntary. If you choose to participate, you can choose to skip questions, however for your results to be included in the research all question must be answered.

Study contacts: If you have any questions about this research project, please contact: Dr. Sarah Hernandez at sarahvh@uark.edu. If you have questions about your rights or welfare as a participant, please contact the University of Arkansas Institutional Review Board (IRB) Office, at 479-575-2208 or by email at IRB@uark.edu

Dr. Sarah Hernandez Assistant Professor Department of Civil Engineering University of Arkansas4190 Bell Engineering Center Fayetteville, AR 72701 (479) 575-4182 sarahvh@uark.edu
sites.uark.edu/sarahvh

End of Block: Front Matter

Start of Block: Socioeconomic Characteristics (individual)

Q5 We care about the quality of our data. In order for us to get the most accurate measures of your opinions, it is important that you thoughtfully provide your best answers to each question in this survey.

Do you commit to thoughtfully provide your best answers to each question in this survey?

- ○ I will provide my best answers (1)
- ○ I will not provide my best answers (2)
- ○ I can't promise either way (3)

Q6 What is your gender?

- ○ Male (5)
- ○ Female (6)
- ○ Other (7)
- ○ Prefer not to say (8)

Q7 Age: How old are you (please enter a value)?

_____

Q119 How many years have you been driving commercial motor vehicles?

- Less than one year (1)
- 2-3 years (2)
- 6-10 years (3)
- 11 to 25 years (4)
- More than 26 years (5)

Q9 Which of the following annual income categories best describes you?

- Less than $19,999 (1)
- $20,000 to $39,999 (2)
- $40,000 to $59,999 (3)
- $60,000 to $79,999 (4)
- $80,000 to $99,999 (5)
- $100,000 or more (6)

Q10 How are you normally paid?

- Hourly rate (1)
- Flat day rate (2)
- Day rate with overtime (3)
- Flat weekly rate (4)
- Weekly rate with overtime (5)
- Flat rate for every contained or truck load carried (6)
- For each pallet carried (7)
- Trip was part of a long term contract (8)

Q11 In addition to your normal pay scale, are you being paid hazard pay under the current Covid-19

(coronavirus) pandemic?

- ○ Yes (1)
- ○ No (2)

Q12 Do you believe you should receive hazard pay for trips made during the current Covid-19 pandemic?

- ○ Yes (1)
- ○ No (2)

Q13 What is your highest completed level of education?

- ○ Primary, elementary/middle school only (1)
- ○ Some high school/technical school (2)
- ○ Completed high school/technical school (3)
- ○ Trade or technical certificate (4)
- ○ Some secondary education (5)
- ○ Completed secondary diploma/degree (6)

Q14 What type of company do you work or contract for?

- ○ For-hire (1)
- ○ Private carriage (2)
- ○ Both for-hire and private (3)
- ○ Don't know/refuse (4)

End of Block: Socioeconomic Characteristics (individual)

Start of Block: Business Characteristics

Q15 To the best of your knowledge, what is the total number of drivers operating in your company currently?

- ○ 1 driver (1)
- ○ 2 to 5 drivers (2)

- ○ 6 to 10 drivers (3)
- ○ 11 to 25 drivers (4)
- ○ 26 or more drivers (5)

Q16 Around this week last year, how many weekly freight related trips did you make on average?

- ○ 1 trip (1)
- ○ 2 to 3 trips (2)
- ○ 4 to 5 trips (3)
- ○ 6 to 10 trips (4)
- ○ 11 to 25 trips (5)
- ○ 26 or more trips (6)

Q17 As a result of the Covid-19 pandemic, how has your average number of weekly trips changed?

- ○ I take many more weekly trips (25)
- ○ Somewhat more (26)
- ○ About the same (27)
- ○ Somewhat fewer (28)
- ○ I take many fewer weekly trips (29)

Q18 Around this week last year, what percentage of your trips (e.g. loaded or empty) were within the following ranges (must add up to 100%)?
Less than 200 miles : _____ (1)
200 to 499 miles : _____ (2)
500 to 999 miles : _____ (3)
1000 to 1999 miles : _____ (4)
Greater than 2000 miles : _____ (5)
Total : _____

Q19 As a result of the current Covid-19 pandemic, have the proportions of your total freight related trips within the ranges mentioned in the previous question changed?

- ○ Yes (1)

○ No (2)

Q20 <u>This week,</u> what percentage of your trips (e.g. loaded or empty) are within the following ranges (must add up to 100%)?
Less than 200 miles : _____ (1)
200 to 499 miles : _____ (2)
500 to 999 miles : _____ (3)
1000 to 1999 miles : _____ (4)
Greater than 2000 miles : _____ (5)
Total : _____

Q21 For the following 4 questions, a map of the United States is presented. These questions require that you click on the map to respond to each question.

Q22 <u>Around this week last year,</u> where did the majority of your trips **BEGIN**? (Please click on the nearest location on the map)

Q23 <u>Around this week last year,</u> where did the majority of your trips **END**? (Please click on the nearest location on the map)

Q24 <u>This week,</u> where did the majority of your trips **BEGIN**? (Please click on the nearest location on the map)

Q25 <u>This week,</u> where did the majority of your trips **END**? (Please click on the nearest location on the map)

End of Block: Business Characteristics

Start of Block: Driver Characteristics

Q26 Around this week **last year**, what type of shipments did your trips mostly consist of?

- Less-than-truckload (1)
- Truckload (2)
- Parcel (3)
- Distribution and warehousing (4)
- Air freight specialist (5)
- Freight forward (6)
- Drayage (7)

Q27 As a result of the current Covid-19 pandemic, has the type of trip (truckload, less than truck load, etc.) you make changed?

- Yes (1)

- ○ No (2)

Q28 This week, what type of shipments did your trips mostly consist of?

- ○ Less-than-truckload (1)
- ○ Truckload (2)
- ○ Parcel (3)
- ○ Distribution and warehousing (4)
- ○ Air freight specialist (5)
- ○ Freight forward (6)
- ○ Drayage (7)

Q29 Around this week last year, how often did you participate in team driving?

- ○ Never (6)
- ○ Sometimes (7)
- ○ About half the time (8)
- ○ Most of the time (9)
- ○ Always (10)

Q125 Has the Covid-19 pandemic affected your ability to participate in team driving?

- ○ Yes (1)
- ○ No (2)

Q30 This week, how often did you participate in team driving?

- ○ Never (13)
- ○ Sometimes (14)
- ○ About half the time (15)
- ○ Most of the time (16)

○ Always (17)

Q31 When it comes to deciding where to stop to park...

○ I typically make that decision (1)

○ My company (e.g., dispatcher, etc.) makes that decision (2)

○ Other, please specify (3) _____

End of Block: Driver Characteristics

Start of Block: Driving Characteristics

Q32 Please use the slider below to indicate your willingness to take risks.

	Completely unwilling 0 1 2 3 4 5 6 7 8 9 10 Very willing
Driving up to 10 mph above the posted speed limit ()	
Driving past Hours of Service (HOS) limits ()	
Parking illegally ()	

Q33 Around this week **last year**, how often did you find your concentration lapsing after driving for a long time?

○ Very often (1)

○ Quite often (2)

○ Sometimes (3)

○ Rarely (4)

○ Never (5)

Q34 This week, how often did you find your concentration lapsing after driving for a long time?

○ Very often (1)

○ Quite often (2)

- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

End of Block: Driving Characteristics

Start of Block: Safety Perceptions

Q35 To what degree has your perception of how safe the roads you travel on changed as a result of the Covid-19 pandemic?

- ○ The roads are much safer now (during the Covid-19 pandemic) (42)
- ○ Somewhat safer now (43)
- ○ About the same (44)
- ○ Somewhat unsafe now (45)
- ○ Much more unsafe now (46)

Q36 Around this week **last year**, did you feel at risk for being cited for any of the following?

- ☐ Distracted driving (1)
- ☐ Not wearing a seatbelt (2)
- ☐ Excessive speeding, 15 mph or more above posted speed limit (3)
- ☐ Reckless driving (4)
- ☐ Improper or erratic lane changes (5)
- ☐ Following too closely (6)
- ☐ Driving under the influence (7)
- ☐ Other (8)

Q132 Do you think your risk for any citations has changed as a result of the Covid-19 pandemic?

- ○ Yes (1)

○ No (2)

Q106 This week, did you feel at risk for being cited for any of the following?

- ☐ Distracted driving (1)
- ☐ Not wearing a seatbelt (2)
- ☐ Excessive speeding, 15 mph or more above posted speed limit (3)
- ☐ Reckless driving (4)
- ☐ Improper or erratic lane changes (5)
- ☐ Following too closely (6)
- ☐ Driving under the influence (7)
- ☐ Other (8)

End of Block: Safety Perceptions

Start of Block: Time of Day Operations

Q38 When do you normally start driving?

	Around this week LAST YEAR (1)	This week (2)
Early morning (12 - 5:59 am) (1)	☐	☐
Morning (6 - 9:59 am) (2)	☐	☐
Mid-day (10 - 3:59 am) (3)	☐	☐
Afternoon (4 - 8:59 pm) (4)	☐	☐
Evening (9:00 - 11:59 pm) (5)	☐	☐

Q41 In your experience, what times of the day have you found to be the MOST difficult in finding safe truck parking? (Please select all that apply)

	Around this week LAST YEAR (1)	This week (2)
Early morning (12 - 5:59 am) (1)	☐	☐
Morning (6 - 9:59 am) (2)	☐	☐
Mid-day (10 - 3:59 pm) (3)	☐	☐
Afternoon (4 - 8:59 pm) (4)	☐	☐
Evening (9 - 11:59 pm) (5)	☐	☐
I don't have difficulty (6)	☐	☐

Q41 Around this week **last year**, what days of the week did you find to be the MOST difficult in locating safe truck parking?

- ☐ Monday (4)
- ☐ Tuesday (5)
- ☐ Wednesday (6)
- ☐ Thursday (7)
- ☐ Friday (8)
- ☐ Saturday (9)
- ☐ Sunday (10)

Q126 Has the day(s) of the week you find it most difficult to find parking changed as a result of the

Covid-19 pandemic?

- ○ Yes (1)
- ○ No (2)

Q108 This week, what days of the week did you find to be the MOST difficult in locating safe truck parking?

- ☐ Monday (4)
- ☐ Tuesday (5)
- ☐ Wednesday (6)
- ☐ Thursday (7)
- ☐ Friday (8)
- ☐ Saturday (9)
- ☐ Sunday (10)

Q43 Around this week **last year**, how often did the lack of available parking cause problems with adhering to the hours of service (HOS) limitations?

- ○ Always (12)
- ○ Most of the time (13)
- ○ About half the time (14)
- ○ Sometimes (15)
- ○ Never (16)

Q110 This week, how often did the lack of available parking cause problems with adhering to the hours of service (HOS) limitations?

- ○ Always (12)
- ○ Most of the time (13)
- ○ About half the time (14)

- ○ Sometimes (15)
- ○ Never (16)

Q44 Around this week **last year**, which service disruptions did you encountered at **PRIVATE** truck stops like Loves, Pilot, Flying J, etc.?

- ☐ Fuel services (1)
- ☐ Dine in food services (2)
- ☐ Take out and/or drive thru food services (3)
- ☐ Vending machine access and supply (23)
- ☐ Showers (18)
- ☐ Restrooms (19)
- ☐ Truck wash stations (20)
- ☐ Computer and/or internet services (21)
- ☐ Facility Closed (22)
- ☐ Other (24)

Q128 Have you experienced service disruptions at **PRIVATE** truck stops as a result of the Covid-19 pandemic?

- ○ Yes (1)
- ○ No (2)

Q122 This week, which service disruptions have you encountered at **PRIVATE** truck stops like Loves, Pilot, Flying J, etc.?

- ☐ Fuel services (1)
- ☐ Dine in food services (2)
- ☐ Take out and/or drive thru food services (3)

- [ ] Vending machine access and supply (23)
- [ ] Showers (18)
- [ ] Restrooms (19)
- [ ] Truck wash stations (20)
- [ ] Computer and/or internet services (21)
- [ ] Facility Closed (22)
- [ ] Other (24)

Q45 Around this week **last year**, which service disruptions did you encountered at **PUBLIC** parking areas such as those maintained by state departments of transportation?

- [ ] Fuel services (1)
- [ ] Dine in food services (2)
- [ ] Take out and/or drive through food services (3)
- [ ] Vending machine access and supply (9)
- [ ] Showers (4)
- [ ] Restrooms (5)
- [ ] Truck wash stations (6)
- [ ] Computer and/or internet services (7)
- [ ] Facility Closed (8)
- [ ] Other (10)

Q129 Have you experienced service disruptions at **PUBLIC** truck stops as a result of the Covid-19 pandemic?

- ○ Yes (1)

○ No (2)

Q123 This week, which service disruptions have you encountered at PUBLIC parking areas such as those maintained by state departments of transportation?

- ☐ Fuel services (1)
- ☐ Dine in food services (2)
- ☐ Take out and/or drive thru food services (3)
- ☐ Vending machine access and supply (23)
- ☐ Showers (18)
- ☐ Restrooms (19)
- ☐ Truck wash stations (20)
- ☐ Computer and/or internet services (21)
- ☐ Facility Closed (22)
- ☐ Other (24)

Q47 Do you use any of the following real time parking availability tools when searching for parking?

- ☐ Smart phone applications (1)
- ☐ Websites (2)
- ☐ Highway message signs (3)
- ☐ Communications with other drivers (e.g., CB radio) (4)
- ☐ I don't use any real time parking availability tools (5)

End of Block: Time of Day Operations

Start of Block: Driving Management (Fatigue, HOS)

Q133 Have the restrictions on any of the following management practices put in place by your company changed as a result of Covid-19?

- [ ] Number of hours per day (1)
- [ ] Number of hours per week (2)
- [ ] Number of continuous days worked (5)
- [ ] Number of nights worked per week (6)

Q49 How does your company monitor driver fatigue? (select all that apply)

- [ ] Ask drivers how they felt (1)
- [ ] Use monitoring devices (2)
- [ ] Review drivers' log books (3)
- [ ] Review truck computer records (4)
- [ ] Review accidents and incidents (5)
- [ ] Other (6)
- [ ] My company does not monitor driver fatigue (7)

Q130 Thinking about <u>this week **last year**,</u> to what degree do you dis/agree with the following statements about fatigue management practices?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
	0	1	2	3	4	5
Management encourages me to take breaks from driving whenever I need to ()						
Drivers are always allowed sufficient time to reach their destination ()						
The schedule imposed by my company makes it easy for me to take a break whenever I feel I need to ()						

Q51 Have fatigue management practices such as those in the previous question changed as a result of the current Covid-19 pandemic?

○ Yes (1)

○ No (3)

Q131 Thinking about <u>this week,</u> to what degree do you dis/agree with the following statements about fatigue management practices?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
	0	1	2	3	4	5
Management encourages me to take breaks from driving whenever I need to ()						
Drivers are always allowed sufficient time to reach their destination ()						
The schedule imposed by my company makes it easy for me to take a break whenever I feel I need to ()						

Q54 How often do you drive when tired?

	Very often (6)	Quite often (7)	Sometimes (8)	Rarely (9)	Never (10)
Around this week LAST YEAR (1)	○	○	○	○	○
This week (2)	○	○	○	○	○

Q55 When you are making a longer trip, how often do you stop for rest?

	Around this week LAST YEAR (1)	This week (2)
Only when tired (1)	○	○
Every 2 to 3 hours (2)	○	○
Every 3 to 4 hours (3)	○	○
Every 4 to 5 hours (4)	○	○

Every 5 to 6 hours (5)	○	○
Every 6 to 8 hours (6)	○	○
You try not to stop at all (7)	○	○

Q56 Which Electronic Logging Device (ELD) provider do you use?

▼ KeepTruckin (1) ... Other (22)

End of Block: Driving Management (Fatigue, HOS)

Start of Block: Truck Configuration

Q57 Which best describes your most commonly driven truck configuration?

- ○ Single unit truck (1)
- ○ Tractor Trailer with Single Trailer (2)
- ○ Tractor Trailer with Double Trailers (3)
- ○ Other (4)

Q58 Around this week last year, which category best described the primary product(s) you carried?

- ☐ Agricultural products (1)
- ☐ Livestock or live animals (2)
- ☐ Chemicals (3)
- ☐ Prepared foodstuffs (4)
- ☐ Meat, seafood, and their preparations (5)
- ☐ Logs and other wood products (6)
- ☐ Paper goods (7)
- ☐ Metal (8)

- [ ] Nonmetallic minerals (9)
- [ ] Durable manufactured goods like furniture (10)
- [ ] Machinery (11)
- [ ] Coal (12)
- [ ] Vehicles (13)
- [ ] Crude Petroleum (14)
- [ ] Fuel/Gasoline (15)
- [ ] Hazardous waste (16)
- [ ] Non-hazardous waste and scrap (17)
- [ ] Mail and courier parcels (18)
- [ ] Mixed freight (19)
- [ ] Other (20)
- [ ] Don't know (21)

Q59 Have the product(s) you carry changed as a result of the current Covid-19 pandemic?

- ○ Yes (1)
- ○ No (2)

Q60 Currently (during the Covid-19 pandemic), which category best describes the primary product(s) you carried?

- [ ] Agricultural products (1)
- [ ] Livestock or live animals (2)
- [ ] Chemicals (3)
- [ ] Prepared foodstuffs (4)

- [ ] Meat, seafood, and their preparations (5)
- [ ] Logs and other wood products (6)
- [ ] Paper goods (7)
- [ ] Metal (8)
- [ ] Nonmetallic minerals (9)
- [ ] Durable manufactured goods like furniture (10)
- [ ] Machinery (11)
- [ ] Coal (12)
- [ ] Vehicles (13)
- [ ] Crude Petroleum (14)
- [ ] Fuel/Gasoline (15)
- [ ] Hazardous waste (16)
- [ ] Non-hazardous waste and scrap (17)
- [ ] Mail and courier parcels (18)
- [ ] Mixed freight (19)
- [ ] Other (20)
- [ ] Don't know (21)

End of Block: Truck Configuration

End f Survey