Healthy Living Options at 16 U.S. Truck Stops

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National Institute for Occupational Safety and Health (NIOSH)
With partial funding from Federal Motor Carrier Safety Administration (FMCSA)

Expanding Research Partnerships
Concurrent Session 1, Session B, 2:00PM-3:30PM on June 21
I. Background

II. Truck Stop Amenity Conduct and Methods

III. Truck Stop Amenity Results

IV. Future Directions

Research published in September 2016, titled, A Pilot Study of Healthy Living Options at 16 Truck Stops Across the United States in American Journal of Health Promotion

Challenge

- Truck drivers spend long periods of time at truck stops, loading docks, terminals, and rest areas
- These environments provide little opportunity for healthy food and exercise
Background from the NIOSH National Survey of U.S. Long-Haul Truck Driver Health and Injury

- 44% of truck drivers spend 1 to 6 nights at home based each month
- 18% of truck drivers spend no nights at home based each month
- 23% of drivers are overweight
- 69% of drivers are obese
- 27% of truck drivers have no physical activity

*Sieber et. al. 2014 American Journal of Industrial Medicine. 57:615–626*
Amenity Checklist Objectives

• To better understand the truck stop environment
• Determine resources available to truck drivers that may contribute to emotion and physical well-being
NIOSH LHTD Truck Stop Selection

- High flow and low flow highway segments
  - High-flow (12,500 or more trucks/day)
  - Low-flow (less than 12,500 trucks/day)
- Random sample in 5 geographic regions
- Truck stops requirements
  - 5 paved parking spots
  - Dining area
- 32 truck stops were selected
Subset Truck Stop Amenity Locations
Truck Stop Amenity Checklist
Survey Plan

• Conducted in conjunction with the national long haul truck driver survey (LHTDS)

• Data collection
  – 16 of the 32 truck stops
  – 12 states
  – Conducted October-December 2010
Truck Stop Amenity Checklist

• Checklist components
  – Truck stop amenities
  – Restaurant and convenience store healthy food options
  – Energy product options
Truck Stop Amenity Checklist

Truck stop amenities

• Indoor
  – Restaurant (table service)
  – Fast Food (no table service)
  – Arcade
  – Lounge
  – Movie Theater
  – Load Database
  – Health Clinic
  – Designated Exercise Area

• Outdoor
  – Well-lit Parking Area
  – Walking Path
  – Accessible Medical Clinic
  – Personal Care Center
  – Truck Hook-ups (APU)
  – Accessible Grocery
Truck Stop Amenity Checklist

• Restaurant and/or fast food healthy food options
  – Salmon
  – Fresh Salads [excl. iceberg lettuce; can include fish (oily or lean) or low fat meat]
  – White-Meat Poultry
  – Fish (excl. salmon)
  – Shellfish
  – Low Fat/Low Sugar Vegetarian Dishes (excl. white rice and white potatoes)

• Low fat meat is defined as meat that is naturally lean (white-meat poultry or shellfish) and cooked with little or no oil (baked / broiled / steamed / poached)
Truck Stop Amenity Checklist

• Convenience store healthy food options
  – Fresh Fruit
  – Fresh Vegetables
  – Frozen/Canned/Dried Fruit (no added sugar or fat)
  – Frozen/Canned/Dried Vegetables (3g or less fat and 140mg or less sodium per serving)
  – Frozen/Canned Entrees (3g or less fat and 140mg or less sodium per serving)
  – Low fat/low sodium prepared snacks (3g or less fat and 140mg or less sodium per serving)
Truck Stop Amenity Checklist

Components

Energy product options

- Number of different products available
- Ammo
- Hype
- Rockstar Punched Guava
- 5150 Juice
- Jolt Energy
- Fixx Extreme
- DynaPep
- Sudafed
- Caffeine Pills
HEALTHY LIVING OPTIONS AT TRUCK STOPS RESULTS
### Truck Stop Amenities

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Number of Stops</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connectivity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>13</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Service Restaurant</td>
<td>11</td>
<td>69%</td>
</tr>
<tr>
<td>Fast Food</td>
<td>9</td>
<td>56%</td>
</tr>
<tr>
<td>Accessible Grocery</td>
<td>2</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Healthcare</strong></td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parking Area Well Lit</td>
<td>10</td>
<td>63%</td>
</tr>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking Path</td>
<td>3</td>
<td>19%</td>
</tr>
<tr>
<td>Exercise Area</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
## Restaurant Healthy Food Options

<table>
<thead>
<tr>
<th>Food Option</th>
<th>Number of Stops</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Protein</td>
<td>15</td>
<td>94%</td>
</tr>
<tr>
<td>White Meat Poultry</td>
<td>14</td>
<td>88%</td>
</tr>
<tr>
<td>Salmon</td>
<td>6</td>
<td>38%</td>
</tr>
<tr>
<td>Fish (excl. salmon)</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Healthy Vegetable Dish</td>
<td>12</td>
<td>75%</td>
</tr>
<tr>
<td>Fresh Salad (excl. iceberg)</td>
<td>9</td>
<td>56%</td>
</tr>
<tr>
<td>Both Healthy Protein and Vegetable Dish</td>
<td>12</td>
<td>75%</td>
</tr>
<tr>
<td>No Healthy Option</td>
<td>1</td>
<td>9%</td>
</tr>
</tbody>
</table>
## Convenience Store
### Healthy Food Options

<table>
<thead>
<tr>
<th>Food Option</th>
<th>Number of Stops</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Fat/Low Sodium Prepared Snacks*</td>
<td>7</td>
<td>44%</td>
</tr>
<tr>
<td>Fresh/Processed Fruit*</td>
<td>12</td>
<td>75%</td>
</tr>
<tr>
<td>Fresh Fruit</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Fresh Vegetable</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>Both Healthy Fruit and Vegetable</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>No Healthy Option</td>
<td>3</td>
<td>19%</td>
</tr>
</tbody>
</table>

*3g or less fat and 140mg or less sodium per serving
Medical Access

• 94% did not have health care clinic access

• Implications
  – Delay urgent care
  – Self medicate
  – Delay preventative care
  – 80% do not receive the flu shot
Food Options

• 38% of truck stops did not carry fresh vegetables in the restaurant or convenience store

• Implications
  – Drivers cannot consistently choose healthy food options
  – 23% of drivers are overweight
  – 69% of drivers are obese
Safety

- 60% poor lighting
- 94% did not limit parking access to trucks only
- No designated exercise areas
- Implications
  - Increased pedestrian struck by risk
  - Increased sleep disturbance
  - 27% of truck drivers have no physical activity including work activities
Conclusions

• Long-haul truck drivers spend multiple nights away from home and “live” at truck stops
• Truck stops visited did not provide adequate access to healthy food or exercise options
• Few truck stop industry leaders have made efforts to improve availability and accessibility of healthy food at restaurants and exercise options at the truck stop facilities
• More needs to be done to provide truck drivers with access to fruits, vegetables, and exercise opportunities
Strengths and Limitations

• Strengths:
  – Conducted in conjunction with a nationally representative population-based sample
  – Standardized checklist based on well defined FDA product labeling

• Limitations:
  – Cross-sectional design
  – Small sample size
  – Subject to observer bias
Future directions

- More needs to be done to
  - Determine the correlation between driver tenure, obesity, and diet
  - Evaluate dietary solutions for truck drivers to reduce obesity
  - Evaluate exercise solutions to increase truck driver physical fitness
  - Evaluate truck stop environmental solutions to improve truck driver safety and sleep quality
Acknowledgements

This work was supported by the National Institute for Occupational Safety and Health with partial funding from the Federal Motor Carrier Safety Administration, U.S. Department of Transportation. Albert Alvarez, Rebecca Brewster, Dale Belman, Michael Belzer, LaMont Byrd, Gerald Donaldson, Eric Garshick, Gerald Krueger, Scott Madar, Anne McCartt, Stephanie Pratt, Thomas Weakley, Martin Walker, Ann Williamson, and Eric Wood each provided helpful comments and/or guidance in development of our survey and questionnaire.
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The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health. NIOSH does not support or endorse any companies or products referenced.
LHTDS Project Products

• NIOSH Science Blog: www.cdc.gov/niosh/blog/nsb111907_truck.html

• Transportation, Warehousing, and Utilities Sector Program Page: www.cdc.gov/niosh/programs/twu/

• Motor vehicle safety page: www.cdc.gov/niosh/topics/motorvehicle/

• Twitter account: @NIOSHTransport
LONG HAUL TRUCK DRIVER SURVEY RESULTS
Long Haul Truck Driver Survey

Objectives

• Provide baseline data about long-haul truck drivers’ health and safety, including prevalence of selected health conditions and risk factors.

• Describe prevalence of risk factors associated with poor health and safety outcomes within the long-haul truck driver population.

• Provide information to drivers, the trucking industry, and the transportation research community that will guide health and safety promotion, interventions, and future research needs.
<table>
<thead>
<tr>
<th>Self-reported Risk Factor</th>
<th>Truck Drivers</th>
<th>2010 NHIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>22</td>
<td>N.A.</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight (25 &lt;= BMI &lt; 30)</td>
<td>23*</td>
<td>35</td>
</tr>
<tr>
<td>Obese (BMI &gt;= 30)</td>
<td>69*</td>
<td>31</td>
</tr>
<tr>
<td>Morbid Obesity (BMI &gt;= 40)</td>
<td>17*</td>
<td>7</td>
</tr>
<tr>
<td>No moderate or vigorous physical activity for 30 min.</td>
<td>27</td>
<td>N.A.</td>
</tr>
<tr>
<td>Current cigarette smoker</td>
<td>51*</td>
<td>19</td>
</tr>
<tr>
<td>Heart disease</td>
<td>4*</td>
<td>7</td>
</tr>
<tr>
<td>Diabetes</td>
<td>14*</td>
<td>7</td>
</tr>
</tbody>
</table>

*P<0.01 compared to NHIS.
1 Estimates are sex- and age-adjusted to the year 2010 working population.
<table>
<thead>
<tr>
<th>Perceived health status:</th>
<th>Truck Drivers</th>
<th>2010 NHIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent, very good, or good</td>
<td>84*</td>
<td>94</td>
</tr>
<tr>
<td>Fair or poor</td>
<td>17*</td>
<td>6</td>
</tr>
<tr>
<td>Not covered by health insurance or health care plan</td>
<td>38*</td>
<td>17</td>
</tr>
<tr>
<td>Delayed or did not receive needed health care in 12 months</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Did not receive flu shot in last 12 months</td>
<td>80*</td>
<td>67</td>
</tr>
</tbody>
</table>

*P<0.01 compared to NHIS.

Estimates are sex- and age-adjusted to the year 2010 working population.
Delivery schedules linked to job satisfaction, opinions on safety regulations, and behaviors of regulation compliance

NIOSH Survey of U.S. Long-Haul Truck Driver Health and Injury

Guang X. Chen, W. Karl Sieber, Jan Birdsey, James W. Collins, Edward M. Hitchcock, Jennifer E. Lincoln, Stephanie G. Pratt, Cynthia F. Robinson

The NIOSH Expanding Research Partnerships Conference, June 21-23, 2017, Denver, CO
Truck driver safety statistics

In 2014

- **3,500** Fatal crashes involving large trucks
- **55,710** Occupational nonfatal injuries
- **761** Heavy Truck driver Occupational fatalities

Work conditions & safety

HOS regulates the number of hours a truck driver may drive per day and the total number of hours he/she may work per day and per week.

Work conditions
- Long work hours (60 vs. 42)
- Irregular work schedule
- Away from home
- Paid by the miles

Unsafe behaviors
- Drowsy driving
- Speeding*
- Hours of Service (HOS) regulation noncompliance

• Speeding is defined as driving => 10 mph over the speed limit
• Sieber et al., 2014; Chen et al., 2015
Research question: delivery schedule and safety

**Reported unrealistically tight delivery schedules**
- **16%** reported often
- **58%** reported sometimes

**Opinions**
- **22%** think HOS would NOT improve safety AT ALL
- **13%** think increasing of speed limit would improve safety VERY MUCH

**Behaviors of noncompliance**
- **10%** reported HOS being often violated
- **5%** reported often speeding
Objective 1

Driver perceived unrealistically tight delivery schedule

- Job satisfaction
- Opinions on safety regulations
- Behaviors of regulations noncompliance
Objective 2

- The NIOSH survey also collected data on drivers’ opinions on their safety needs
Survey methods and study population

- A nationally representative sample of 1,265 long-haul truck drivers (LHTDs) at 32 truck stops across U.S.
- LHTDs eligible for the survey
  - Had driven a heavy truck for at least 12 months
  - Spend at least one night away from home during each delivery run
Data on drivers’ opinions on safety

1. Build more truck stops/parking area
2. Strictly enforce traffic laws on car and truck drivers equally
3. Pay drivers by the hour for loading and unloading time
4. Equalize the car and truck maximum speed limit on interstate highways
5. Designate truck only lanes on interstate highways
6. Strictly enforce the hours-of-service (HOS) regulations
7. Pay drivers by the hour for driving time
8. Require a short rest break after 4 hours continuous driving
9. Increase the current maximum speed limit on interstate highways by 10 miles per hour
10. Require speed governors for all large trucks
11. Decrease the current maximum speed limit on interstate highways by 10 miles per hour

- Eleven safety related activities were selected
- Drivers were asked to rate how well each activity would improve truck safety using a Likert scale

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td></td>
<td></td>
<td></td>
<td>Very much</td>
<td></td>
</tr>
<tr>
<td>Would not</td>
<td></td>
<td></td>
<td>Would</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Top 5 safety needs identified by the most LHTDs among 11 safety related activities:

1. Build more truck stops/parking area
2. Strictly enforce traffic laws on car and truck drivers equally
3. Pay drivers by the hour for loading and unloading time
4. Equalize the car and truck maximum speed limit on interstate highways
5. Designate truck only lanes on interstate highways
Factors associated with job satisfaction

Odds ratio for feeling work being never adequately rewarded

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrealistically tight delivery schedule, often vs. never</td>
<td>4.5</td>
</tr>
<tr>
<td>Unrealistically tight delivery schedule, sometimes vs. never</td>
<td>2.4</td>
</tr>
<tr>
<td>&lt;=$50k vs. &gt;$50k</td>
<td>2</td>
</tr>
<tr>
<td>Age increase one year</td>
<td>0.99</td>
</tr>
<tr>
<td>Female vs. Male</td>
<td>1.1</td>
</tr>
</tbody>
</table>

*Significant at the 0.05 level*
Factors associated with driver opinion on HOS regulations

Odds ratio for voting HOS would NOT improve safety

- Unrealistically tight delivery schedule, often vs. never: 1.8
- Unrealistically tight delivery schedule, sometimes vs. never: 1.5
- Owner operators vs. company drivers: 1.8
- Age increase one year: 0.99
- Female vs. Male: 1

🌟: Significant at the 0.05 level
Factors associated with driver opinion on speed limit

Odds Ratio for rating increasing maximum speed limit by 10 mph would improve safety

- Unrealistically tight delivery schedule, often vs. never: 2.1
- Unrealistically tight delivery schedule, sometimes vs. never: 1.6
- Age increase one year: 0.99
- Female vs. Male: 1.1

*: Significant at the 0.05 level
Factors associated with behavior of HOS noncompliance

Odds ratio for reporting HOS rules being often violated

- Unrealistically tight delivery schedule, often vs. never: 10.9
- Unrealistically tight delivery schedule, sometimes vs. never: 3.6
- Opinion HOS would not improve safety vs. would: 6.1
- <=$50,000 vs. >$50,000: 0.7
- Age increase one year: 1
- Female vs. Male: 0.7

*: Significant at the 0.05 level
Factors associated with driver continuing to drive despite adverse conditions

Adverse conditions include fatigue, bad weather, or heavy traffic

Odds ratio for often continuing to drive despite adverse conditions:

- Unrealistically tight delivery schedule, often vs. never: 7.5
- Unrealistically tight delivery schedule, sometimes vs. never: 3
- <=$50,000 vs. >$50,000: 1.6
- Age increase one year: 0.98
- Female vs. Male: 0.6

*: Significant at the 0.05 level
Factors associated with driver speeding behavior

Odds ratio for reporting often speeding

- Unrealistically tight delivery schedule, often vs. never: 7.5
- Unrealistically tight delivery schedule, sometimes vs. never: 1.9
- Opinion: Increase speed limit would improve safety vs would not: 4.4
- Age increase one year: 0.98
- Female vs. Male: 0.6

Star: Significant at the 0.05 level.

Speeding is defined as driving >=10 mph than speed limit.
Factors associated with receiving moving violation ticket in the previous 12 months

Odds ratio for receiving moving violation ticket

- Reporting of often speeding vs never: 1.9
- Reporting of sometimes speeding vs never: 1.8
- Age increase one year: 0.98
- Female vs. male: 0.5

🌟: Significant at the 0.05 level.
Quantified the interactions among

Unrealistically tight delivery schedules

- **16%** reported often
- **58%** reported sometimes

Opinions

- Job dissatisfaction
- 22% think HOS would NOT improve safety AT ALL
- 13% think increasing of speed limit would improve safety VERY MUCH

Behaviors of noncompliance

- HOS, **10%** reported HOS being often violated
- **5%** reported often speeding
Ranked safety needs from drivers’ perspective

• Ranked the 11 safety needs by the number of LHTDs who voted it would improve truck safety
Earnings, job satisfaction, and safety

- High annual income linked to high level of job satisfaction
- Results of the association between Income and safety related behaviors were mixed
  - $\leq 50,000$ were less likely to report HOS being often violated
  - $\leq 50,000$ were more likely to report continuing to drive despite fatigue, bad weather or heavy traffic because they must deliver or pick up a load at a given time
Age impact

Younger drivers were more likely to report:

- continuing driving despite adverse conditions (such as fatigue, bad weather, or heavy traffic)
- receiving moving violation tickets in the previous 12 months than older drivers
### Implication for prevention

<table>
<thead>
<tr>
<th>Carriers can</th>
<th>Drivers can</th>
<th>State &amp; private partners can</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule reasonable delivery time</td>
<td>Understand the safety benefits of sleep hygiene, HOS, and speed limit</td>
<td>Build more truck stops/parking area</td>
</tr>
<tr>
<td>Promote safety culture in which drivers can say no</td>
<td></td>
<td>Provide education on safety benefits of sleep hygiene, HOS, and speed limit</td>
</tr>
<tr>
<td>Provide training on safety benefits of sleep hygiene, HOS, and speed limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional training &amp; supervision for young drivers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Limitations

- Sampling bias
- Interview bias: recall, social desirability, and human error
- Causality could not be determined
- Regrouping of the Likert scale is arbitrary
Strengths

EXPANDED RESEARCH PARTNERSHIP

- Multi-division, DSHEFS, DART, RHD, and DSR
- Multi agencies, NIOSH, FMCSA, ATRI, Teamsters, OOIDA, academia, etc.
- The survey design and instrument were products of input from a stakeholder meeting and focus group discussions with LHTDs
- Data collected are relevant to U.S. LHTD safety
Disclaimer: The findings and conclusions in this presentation are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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