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Distracted Driving in Washington State, 2016-2017: Results from the Annual Observation Surveys

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TABLE OF CONTENTS

INTRODUCTION

Driver distraction has always been a focus of prevention among the traffic safety community. Driver distraction includes all activities that divert attention and full engagement from the task of driving including general inattention (lost in thought), smoking, eating, grooming, reading, interactions with passengers or vehicle controls, and electronic device use. Traffic safety researchers agree that driver distractions can greatly increase the risk that a crash will occur. American motorists appear to be highly conflicted about using cell phones while driving. Though most drivers (71.5 percent) surveyed in the *2016 AAA Foundation Traffic Safety Index* reported that they supported restrictions on talking on a cell phone while driving; interestingly two out of three drivers admitted to having talked on a cell phone while driving in the past month.

Cell phones and other electronic communications or entertainment devices have been of particular interest to researchers. Two studies, one in Canada (Redelmeier and Tibshirani, 1997) and the other in Australia (McEvoy *et. al.*, 2005) concluded that engaging in handheld or hands-free cell phone conversations while driving leads to a four-fold increase in the risk of crashing. Numerous simulator studies, closed-track, in-vehicle camera, and other studies have shown significant increases in serious driving errors resulting from cell phone use while driving.

In an ongoing series of studies, Dr. David Strayer, a professor of psychology at the University of Utah, has studied the nature of cell phone use while driving and has concluded that the distracting effect of cell phone conversation amounts to a serious performance deficit. Strayer described this in a 2005 essay:

> "We found that even when drivers were directing their gaze at objects in the driving environment they often failed to see them because attention was directed elsewhere. Thus, talking on a cell phone created a form of inattention blindness, making drivers less aware of important information in the driving scene. We also compared hand-held and hands-free cell phones and found the impairments to driving are identical for these two modes of communication. There was no evidence that hands-free cell phones were any safer to use while driving than hand-held devices."

It is clear that conducting a cell phone conversation while driving leads to greatly weakened visual information processing, with predictable and often disastrous consequences. In Washington State, distracted driving is a factor in nearly 1 of every 3 traffic fatalities and more than 1 of every 4 serious injuries. Driver distraction ranks only behind driver impairment as a prevalent driver behavior in traffic fatalities and serious injuries. In 2015 and continuing in 2016, driver distraction for the first time became more prevalent in fatal crashes than driver speeding.

In 2017, Washington passed stricter distracted driving laws (RCW 46.61.672 and RCW 46.61.673). Until recently, Washington State had not attempted to measure the statewide level of driver distraction on Washington roads. This report marks the second year of this effort. This survey was first conducted in May 2016, and again in May 2017, prior to the new law implementation. The new laws became effective on July 1, 2017. This report provides the baseline measure of driver

distraction prior to the new laws effective date. Currently the information is only being collected at randomly selected intersections. In order to evaluate the impact of the new laws on observed driver distractions, the data will be collected following the exact same methods in May 2018. Once the pre- and post- evaluation has been completed using these three survey years, driver distraction will be measured on all road types across the state in subsequent years.

SURVEY METHOD

Intersections were sampled in incorporated areas 1) so that observers would be able to view more clearly the target behaviors of drivers inside their vehicles, and 2) so that observers would be able to collect a sufficient number of observations to reach a robust estimate. Accordingly, a database of all 6,279 intersections in Washington's incorporated areas was generated and tagged with geographic coordinates, road names (where available), and other information. This process is detailed further in Appendix A.

Intersections were randomly sampled from 23 counties with 50 or more total intersections. These 23 counties comprised 94 percent of all municipal intersections in the state (5,906 of 6,279). Each of the 23 counties was allotted the percentage of survey intersections equal to that county's proportion of all intersections in the 23-county pool of 5,906 sites. For example, since 929 of the sites in the 23-county sample (15.7 percent) are in King County, 47 of the 300 sample sites (15.7 percent) were assigned to King County. The final sites were randomly selected for each county to reach the predetermined proportional allotment.

In preparation for the survey, the survey coordinator assigned a smaller team to visit each site in order to document, photograph, and record relevant information. Geographic coordinates for each location were programmed into GPS devices and site sheets were produced to instruct the observers where to stand and which direction of travel to observe. Two-person teams (consisting of an observer and a recorder) receive classroom instruction and field training in observation and data recording procedures.

Data was collected using an iPad application modified from the Washington State seat belt observation application to collect distracted driver observations. The observations were conducted for 20 minute periods at each site in May 2016 and 2017 between the hours of 7 a.m. and 6 p.m. For each vehicle surveyed at a given site, one member of the team observed oncoming vehicle motion and driver distraction behavior and reported those observations verbally to the team's recorder (facing the observer), who entered that information into the data fields appearing on the iPad screen. A more detailed description of the data collection process is described in Appendix B.

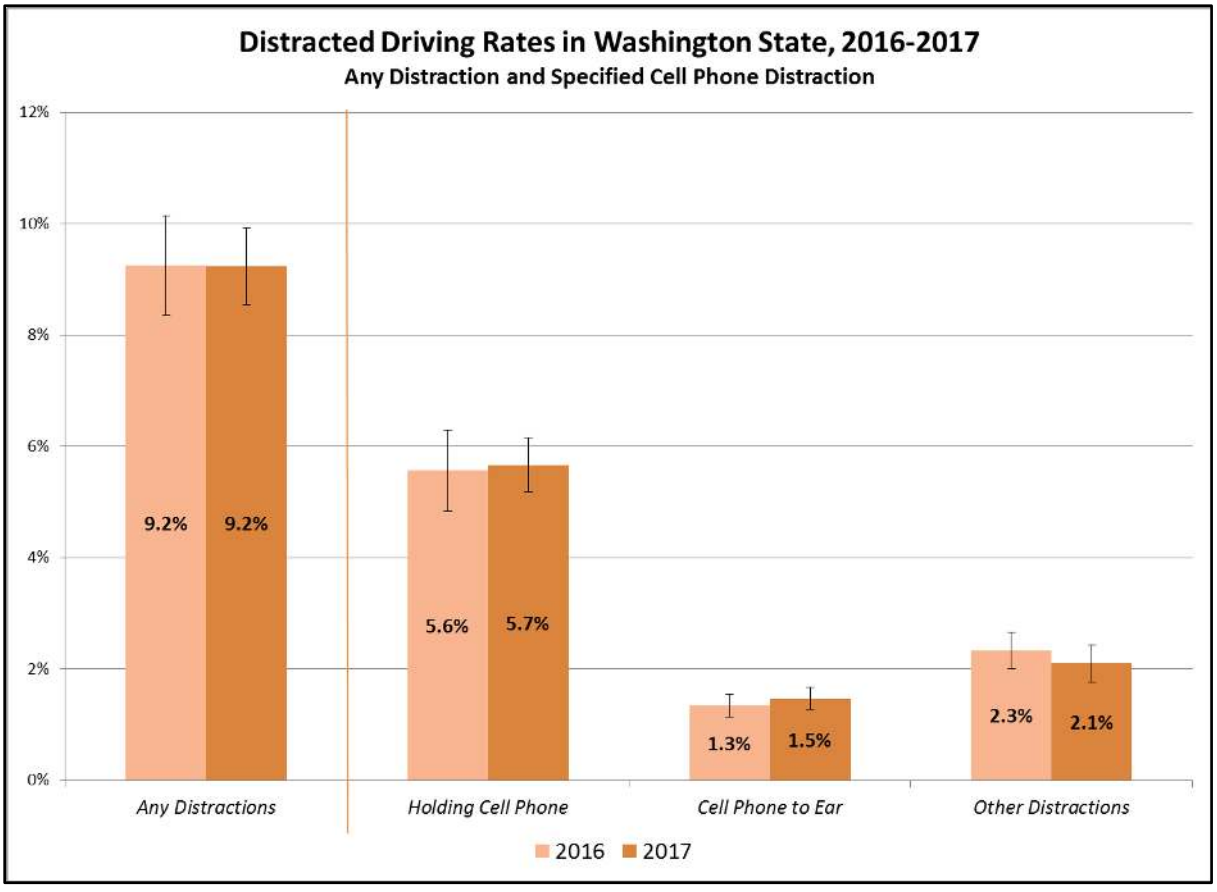
RESULTS

A total of 22,322 vehicle drivers were observed in 2016 and 27,638 in 2017 during the survey conducted in May of each year. The weighted statewide estimate of Washington's driver-distraction rate was 9.2 percent of all drivers observed in both 2016 and 2017. The specific type

of distraction also changed very little in 2017 compared with 2016. In 2017 5.7 percent of observed drivers were holding or manipulating phones, 1.5 percent were holding phones to their ears, and 2.1 percent were observed engaging in some other distracting behavior, such as eating, tuning a radio, or attending to pets or children. Overall 78 percent of driver distraction was related to cell phone use. Figure 1 shows the weighted rates for all specific distraction categories included in the survey.

Figure 1. DRIVER DISTRACTION RATES, By Specific Distraction

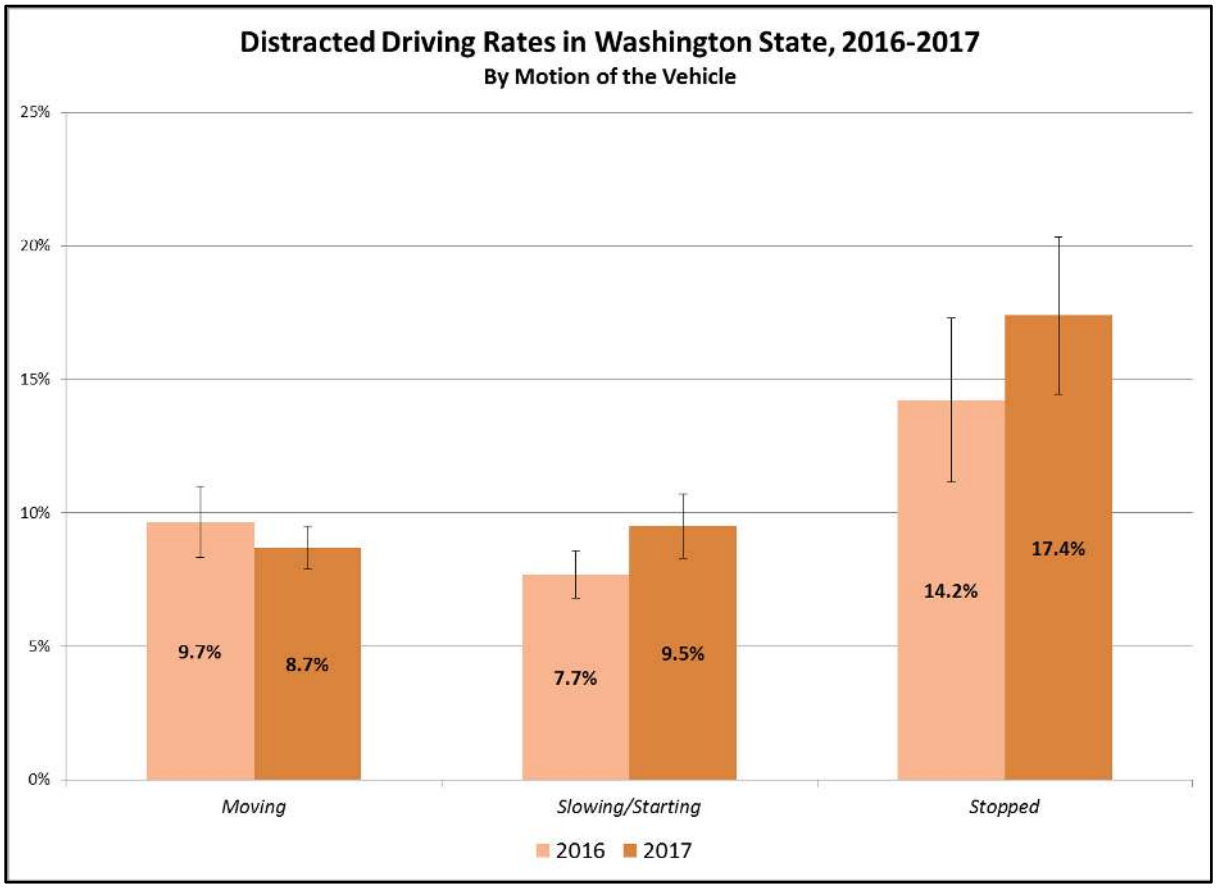
Type of Distraction	2016			2017		
	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL
Not Distracted	20,235	90.8%	89.9-91.6%	25,009	90.8%	90.1-91.5%
Holding Phone	1,160	5.6%	4.8-6.3%	1,496	5.7%	5.2-6.2%
Other Distraction	600	2.3%	2.0-2.7%	697	2.1%	1.8-2.4%
Holding Phone to Ear	321	1.3%	1.1-1.5%	435	1.5%	1.3-1.7%
TOTAL	22,322	9.2%	8.4-10.1%	27,638	9.2%	8.5-9.9%



Analysis of driver distraction by Vehicle Motion showed higher rates of distraction among drivers of stopped vehicles than among drivers of vehicles that were moving or slowing/starting. The frequency at which drivers were engaged with distractions while the vehicle was slowing or stopped increased slightly from 2016, but this increase is not significant. Figure 2 shows driver distraction rates by vehicle motion.

Figure 2. DRIVER DISTRACTION RATES, By Vehicle Motion

Vehicle Motion	2016			2017		
	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL
Moving	13,304	9.7%	8.3-11.0%	20,174	8.7%	7.9-9.5%
Slowing/Starting	7,673	7.7%	6.8-8.6%	6,473	9.5%	8.3-10.7%
Stopped	1,339	14.2%	11.1-17.3%	991	17.4%	14.5-20.3%
TOTAL	22,322	9.2%	8.4-10.1%	27,638	9.2%	8.5-9.9%



Analysis of driver distraction by intersection type showed that drivers at stop lights engage in distractions at a higher rate than drivers of vehicles at roundabouts or at stop signs. In 2017, the point estimate of the distraction rate at yield signs was slightly higher than at stop lights; however the confidence interval for yield signs is broad. Figure 3 shows these figures.

Figure 3. DRIVER DISTRACTION RATES, By Intersection Type

Intersection Type	2016			2017		
	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL
Stop Light	15,839	9.8%	8.7-10.9%	20,025	9.7%	8.9-10.5%
Stop Sign	4,426	6.8%	5.5-8.1%	5,512	7.6%	6.5-8.8%
Yield Sign	1,595	8.5%	7.8-9.3%	1,185	10.0%	6.7-13.3%
Roundabout	462	8.5%	7.8-9.3%	916	5.0%	1.6-8.4%
TOTAL	22,322	9.2%	8.4-10.1%	27,638	9.2%	8.5-9.9%

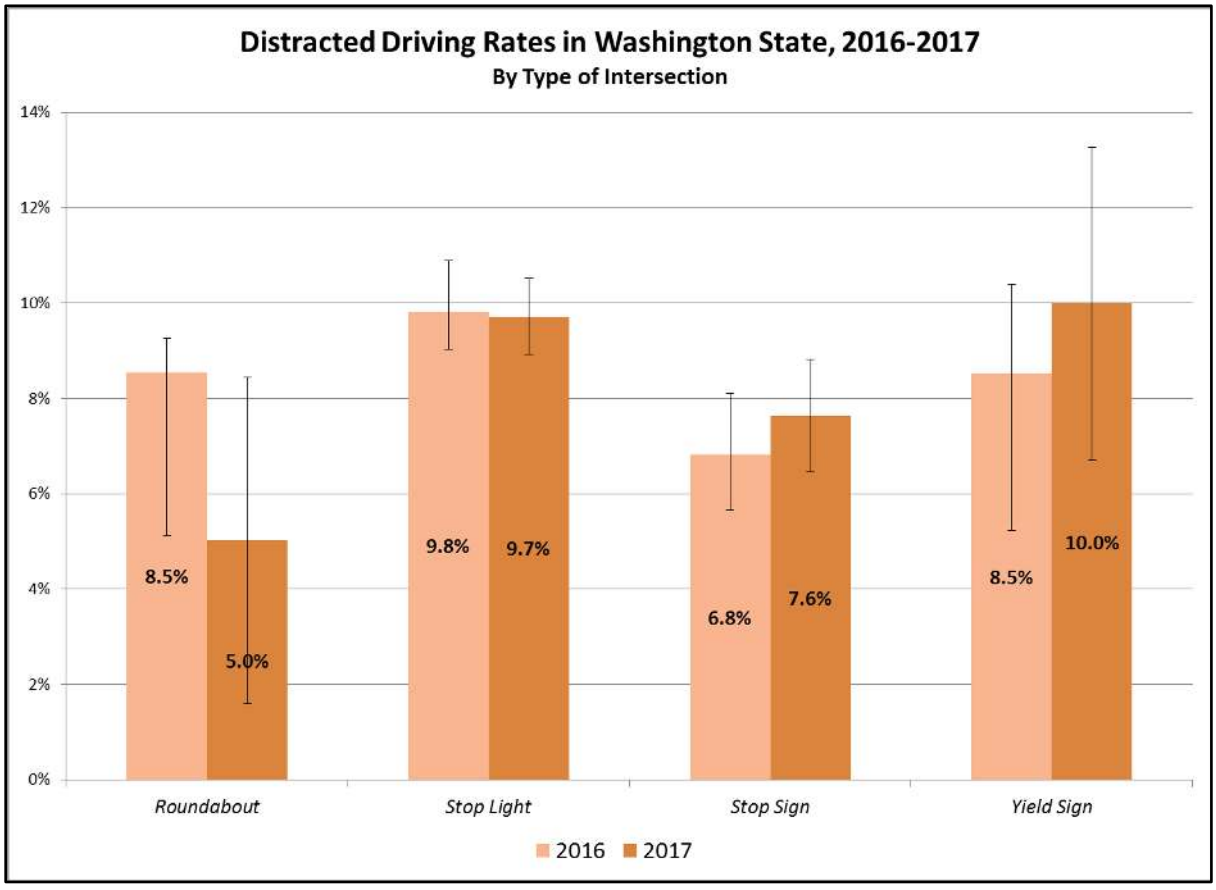
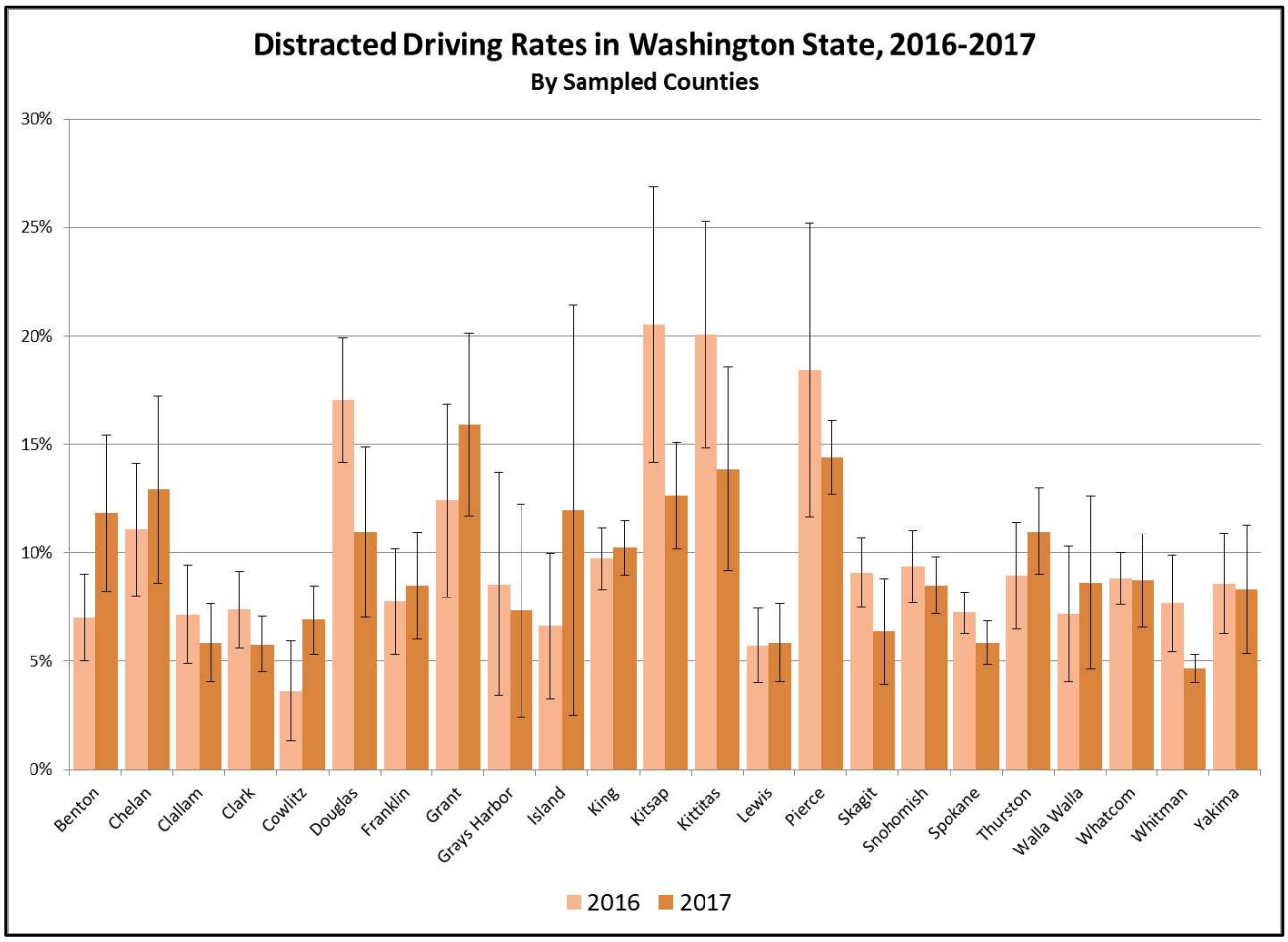


Figure 4 shows observed driver distraction rates for all counties included in the survey. Variability among the counties is evident in these rates, which ranged from a driver distraction peak of 20.5 percent in Kitsap County, down to a low of 3.6 percent in Cowlitz County.

Figure 4. DRIVER DISTRACTION RATES, By County

Intersection Type	2016			2017		
	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL	TOTAL OBSERVATIONS	WEIGHTED RATE	95% CL
Benton	1,213	7.0%	5.0-9.0%	1,622	11.8%	8.2-15.4%
Chelan	370	11.1%	8.0-14.1%	642	12.9%	8.6-17.2%
Clallam	252	7.1%	4.9-9.4%	239	5.9%	4.17.7%
Clark	1,166	7.4%	5.6-9.1%	1,351	5.8%	4.5-7.1%
Cowlitz	441	3.6%	1.3-5.9%	623	6.9%	5.3-8.5%
Douglas	129	17.1%	14.2-19.9%	155	11.0%	7.0-14.9%
Franklin	542	7.7%	5.3-10.2%	777	8.5%	6.0-10.9%
Grant	444	12.4%	8.0-16.9%	528	15.9%	11.7-20.1%
Grays Harbor	117	8.5%	3.4-13.7%	84	7.3%	2.4-12.2%
Island	136	6.6%	3.3-10.0%	117	12.0%	2.5-21.4%
King	3,766	9.7%	8.3-11.2%	4,271	10.2%	9.0-11.5%
Kitsap	381	20.5%	14.2-26.9%	1,204	12.6%	10.2-15.1%
Kittitas	289	20.1%	14.8-25.3%	310	13.9%	9.2-18.6%
Lewis	473	5.7%	4.0-7.4%	376	5.9%	4.1-7.6%
Pierce	1,353	18.4%	11.7-25.2%	3,114	14.4%	12.7-16.1%
Skagit	551	9.1%	7.5-10.7%	471	6.4%	3.9-8.8%
Snohomish	1,945	9.4%	7.7-11.0%	1,732	8.5%	7.2-9.8%
Spokane	4,811	7.2%	6.3-8.2%	4,909	5.9%	4.8-6.9%
Thurston	782	9.0%	6.5-11.4%	1,876	11.0%	9.0-13.0%
Walla Walla	237	7.2%	4.1-10.3%	174	8.6%	4.6-12.6%
Whatcom	1,396	8.8%	7.6-10.0%	1,353	8.7%	6.6-10.9%
Whitman	353	7.6%	5.4-9.9%	665	4.7%	4.0-5.3%
Yakima	462	7.6%	6.3-10.9%	1,045	8.3%	5.4-11.3%
TOTAL	22,322	9.2%	8.4-10.1%	27,638	9.2%	8.5-9.9%

While it may appear that some counties experienced significant reductions in distracted driving rates, the differences are not statistically significant as is evident by the overlapping confidence intervals between 2016 and 2017. The only county with a statistically significant reduction was Whitman County, where the distracted driving rate decreased from 7.6 percent in 2016 to 4.7 percent in 2017.



DISCUSSION

This report is based on Washington's statewide observation survey of distracted driving, representing benchmark measures of estimated driver distraction. A similar study was conducted in 2013 and 2014 by the Harborview Injury Prevention and Research Center, collecting information in King, Spokane, and Whatcom Counties. Despite the differences in these studies, the results were similar; the majority of distracted drivers are using a cell phone. These efforts to measure the frequency of distracted driving in Washington are critical due to significant data limitations from other sources, such as crash data.

On January 1, 2006, the Washington State Department of Transportation (WSDOT) and the Washington State Patrol implemented Legislature-enacted changes to the state's Police Traffic Collision Report, adding 12 new and specific distraction codes to the collision report form. This change increased the frequency of crash investigators' reporting of driver distraction from 6.1 percent of crashes in 2005 to 11.1 percent in 2006. Through 2012, that proportion remained fairly steady, after which an even larger increase occurred in 2013 as a result of administrative changes to collision coding practices at the WSDOT. When analyzing distraction involvement in crashes from WSDOT's statewide collision database, the baseline benchmark is now year 2013 as previous years are not comparable.

In addition to collision data challenges, there are good reasons to believe that police investigators under-report the involvement of driver distraction in crashes. One important reason is the difficulty of gaining access to driver cell phone records during the investigation of crashes. Even when police suspect that cell phone-based distraction has played a role in a crash, unless they are able to establish probable cause (e.g., through witness statements or other evidence) they will be unable to obtain a warrant for a driver's cell phone records.

Considering these limitations with other data sources, this study provides important information regarding the nature of distracted driving in Washington State. At intersections, drivers are more likely to engage in distracting behaviors at signals, likely because there is not an immediate action that needs to occur compared to intersections controlled by stop signs, yield signs, and roundabouts, the drivers just wait for a cue from the traffic signal. For similar reasons, drivers are also more likely to engage in distracting behaviors when they are stopped at intersections as opposed to moving through the intersection. By far, the dominant driver distraction continues to be cell phone use. Future observation surveys of distracted driving will be conducted at all road types, not just intersections.

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APPENDIX A: Methodology

Selecting Intersections

The observation survey demanded site locations at high-traffic intersections. To fit these criteria a list of intersections was developed in ArcGIS. Roads were queried out from the densest available network (a statewide transportation geodatabase published by Washington Department of Natural Resources). The Unsplit Line functionality of ArcGIS was used to remove inadvertent road segments created by the digitizing process. Next, the unified road dataset was intersected with itself, generating a spatial dataset of points at intersections. The road name, where it existed, was transferred to these points.

Points that fell within municipal boundaries (obtained from incorporated municipalities as recorded by Washington State Office of Financial Management) were extracted and labeled with the county name and the municipality name and tagged with major city (a county seat or one of the two largest cities in a given county). Data fields for latitude and longitude were added and populated with each point's geographic coordinates in decimal degrees. Duplicate points were removed by deleting all instances of identical latitude and longitude values past the first occurrence.

A field was added to the spatial data detailing the resulting list of 6,279 sites and populated with random numbers between 0 and 1 (0.000001 – 0.999999). Organizing the sites within each municipality by ascending number enabled the selection of the first N intersections, where N is a number that reflects each county's proportional share of the total number of candidate sites.

Weighting Observations

A probability of selection was derived for each intersection within selection counties by dividing the number of sampled intersections by the total number of intersections. During the intersection site mapping, a primary trafficway was provided for determining the direction of travel that would observed. The probability of observing a direction of traffic travel was constant 0.5 (considering two possible directions of travel). A constant probability of observation time was also considered and set at 0.0303 (1 20-minute period divided by all 20-minute periods during the 11 hours per day of observation collection time). The final weight is the inverse of the product of the three probabilities.

$$Weight = \frac{1}{P_S * P_D * P_T}$$

SAS survey procedures were used to conduct domain and ratio analyses using the final derived weights.

APPENDIX B: Data Collector Procedures

Each pre-selected site was observed by a two-person team for a 20-minute period between the hours of 7 a.m. and 6 p.m. during the month of May. Teams collected driver behavior data on passenger vehicles and commercial vehicles with a gross vehicle weight of 10,000 pounds or less (such as a pizza delivery driver), including cars, vans, pickups, and SUVs at pre-selected controlled intersections. Controlled intersections included roundabouts, stop signs, yield signs, and stop lights.

Each team was comprised of two positions: an Observer and a Recorder. Teams could alternate positions when moving between sites, but could not change positions when in the middle of a site observation. The team proceeded to the location per the site data sheet and observed the predetermined traffic flow. If the team reached a site that included multiple lanes eligible for observation then traffic was observed for a few minutes in order to make an assessment of how many lanes could accurately be observed.

During data collection, the Recorder was positioned either in front of or parallel to the Observer so they could best hear the observations as they were called out. The Observer called out the initial observation to the Recorder who entered the data in the iPad survey app. In addition, field training revealed that the presence of the observers obviously looking inside vehicles was in and of itself causing distraction. Having the observer and recorder facing each other made it appear that they were in conversation rather than observing vehicles. This technique significantly reduced the amount of driver attention diverted to the observer team.

Data was only collected on drivers. Data collected on each driver included whether the vehicle was moving, slowing/starting, or stopped and whether the driver had no distraction, cell phone to ear, holding/manipulating phone, or other distraction (such as eating, radio, and pets). Drinking a beverage or smoking did NOT count as distractions so long as the driver was not clearly distracted otherwise. Only the initial behavior at the observation point was recorded. If the driver changed behavior while being observed, only the initial observation was recorded.

Quality Control (QC) Monitors made unannounced visits to at least 5 percent of the total survey sites. During these visits, the QC Monitor first evaluated the data collector team's performance from a distance (if possible), and then observed from beside the team to monitor data recording. The QC Monitor ensured that the data collector team was following all survey protocols including: being at the assigned sites, making accurate observations, and accurately entering the data into the iPad survey app. For every visit, the QC Monitor prepared a site report indicating data collector team names, date and time of observation, site ID, photo of team in action, and any problems with data collection site locations and data collector team performance.

Observer Guidelines

The team remained fixed at the intersection for the duration of the observation period. Vehicles were recorded as moving, slowing/starting, or stopped. A vehicle was considered moving if it maintained speed above 10 mph (through subjective assessment) through the intersection. A vehicle was considered slowing/starting if it was just starting from a stopped position or coming to a stop position. A vehicle was considered stopped when it had come to a complete rest. The following guidelines were provided to the observer teams and were used in determining when to make the initial observation.

Stop Signs, Yield Signs, and Roundabouts

If traffic is light, then try to catch the initial observation while the driver is approaching the intersection (as opposed to when the driver is stopped). The observer might choose a point just before the intersection to focus observations. If traffic is heavy (three or more vehicles lining up to pass through the intersection), then record the initial observation of the vehicle in position one or two when the vehicles are stopped.

Intersections with Signals

At intersections with signals, the observer will always be capturing some initial observations as vehicles move through the intersection (when the light is green). If traffic is light and the signal turns yellow or red and the vehicle will not proceed through the intersection, then capture the initial observation as the vehicle approaches the signal. In heavier traffic (three or more vehicles lining up to pass through the intersection), capture the initial observation of the first two vehicles as they approach the intersection (as opposed to when the driver stops). The team may move down the line of cars up to two car lengths to capture a 'stopped' observation of the third and fourth vehicles. The team should then return to the primary observation spot. Once the light turns green, wait until the fourth or fifth (depending on how many 'stopped' observations were recorded while the light was red) to reach the observation point and record the 'moving' observation. Repeat the steps above for each light cycle.

Quality Observations

The team should find the approach that works best for them. Observations should be captured on moving (as opposed to stopped) vehicles when possible; however, if traffic is moving fast and/or is heavy, it is OK to collect mainly stopped observations. The most important thing is quality (accurate) observations, so find the approach that works best for the team while still following the protocol. Observing the presence of an earpiece will be the most challenging and is likely to be infrequent. It may be most efficient for the observer to only call out the vehicle movement and the observed distraction, and call out the earpiece status only when one is observed. You may also consider a callout for the recorder indicating the completion of the observation, such as "next!" or "done!"

APPENDIX C: iPad Driver Distraction Data Collection Application