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"2013-2014 National Roadside Survey of Alcohol and Drug Use by Drivers"

Submitted by the United States of America

This document, submitted by the Government of the United States, provides the results of the "2013-2014 National Roadside Survey of Alcohol and Drug Use by Drivers."

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Results of the 2013–2014 National Roadside Survey of Alcohol and Drug Use by Drivers

By Amy Berning, Richard Compton, and Kathryn Wochinger

Over the last four decades, the National Highway Traffic Safety Administration and/or the Insurance Institute for Highway Safety (IIHS) conducted four national surveys to estimate the prevalence of drinking and driving in the United States (Wolfe, 1974; Lund & Wolfe, 1991; Voas et al, 1998; Compton & Berning, 2009; Lacey et al, 2009). The first National Roadside Survey (NRS) was conducted in 1973, followed by national surveys of drivers in 1986, 1996, 2007, and now 2013–2014. These surveys used a stratified random sample of weekend nighttime drivers in the contiguous 48 States and collected data directly from drivers on the road.

The 2007 NRS added procedures to the NRS for the first time to estimate the use by drivers of other potentially impairing drugs. Prior roadside surveys had only collected breath samples to determine breath alcohol concentration (BrAC). Due to developments in analytical toxicology, NHTSA determined it would be feasible in the 2007 and 2013–2014 surveys to determine driver use of a variety of potentially impairing drugs including illegal drugs as well as legal medications.

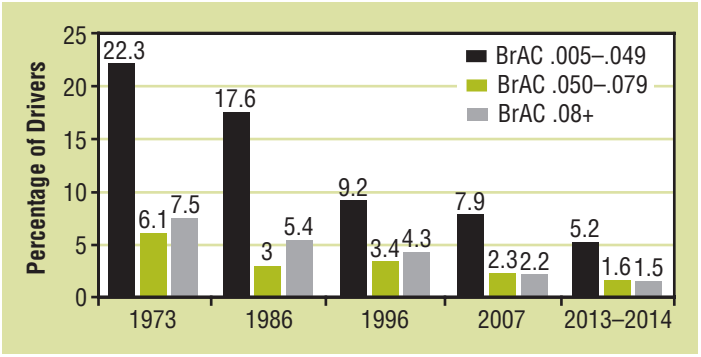
In 2013–2014, the National Highway Traffic Safety Administration conducted the most recent National Roadside Survey of Alcohol and Drug Use by Drivers.[1] This voluntary and anonymous study is the second to collect data on drug use, presenting our first opportunity to examine drug use trends on a national scale. The 2013–2014 NRS was designed to produce national estimates of alcohol and drug use by weekday daytime and weekend nighttime drivers. Thus, the use rates presented below are national prevalence rates calculated from the percentage of drivers using alcohol or drugs and adjusted with an appropriate weighting scheme.

Summary of Results

Prevalence of Alcohol Use by Drivers

The NRS surveys reveal a decreasing trend in alcohol use from the first survey in 1973 to the most recent one in 2013–2014. Figure 1 shows the percentage of weekend nighttime drivers with BrACs across three categories: BrAC of .005 to .049 g/210 L;[2] BrACs of .050 to .079; and BrACs of .080 and higher. The surveys found a decline in each BrAC category. Further, there has been a large decrease in the percentage of drivers who were alcohol positive, from 35.9 percent in 1973 to 8.3 percent in 2013–2014. For BrACs of .08 and higher, there was a decrease from 7.5 percent in 1973 to 1.5 percent in 2013–2014, revealing an impressive 80 percent reduction in the percentage of alcohol-impaired drivers on the road on weekend nights. Also of importance is the decrease

Figure 1.
Percentage of Weekend Nighttime Drivers by BrAC Category in the Five National Roadside Surveys[3]



[1] The Office of National Drug Control Policy provided funds to NHTSA for this study. The National Institute on Drug Abuse, and the Insurance Institute for Highway Safety provided additional funding through investigator initiated grants and contracts to the Pacific Institute for Research and Evaluation, NHTSA's contractor for the 2013–2014 NRS.

[2] .08 g/210 L = grams per 210 liters of breath. The illegal limit in all States is .08.

[3] From 1973 to 2004, the States had BrAC limits that ranged from .08 to .15. After 2004, all States had BrAC limits of .08.

from 6.1 percent to 1.6 percent from 1973 to 2013–2014 for BrACs of .050 to .079 category.

The 2013–2014 survey found large differences by the day of week and the time of day in the likelihood of drivers being alcohol positive or having an illegal BrAC (Table 1). During weekday daytime hours (Friday), only 1.1 percent of drivers were alcohol positive, while at weekend nighttime hours (Friday and Saturday), 8.3 percent of drivers were alcohol positive. During weekday daytime hours there were very few drivers with illegal BrACs (BrAC ≥ .08), just 0.4 percent, while at weekend nighttime hours 1.5 percent drivers had illegal BrACs. Daytime compared to nighttime percentages are statistically significant. Compared with the NRS 2007, the 2013–2014 NRS BrAC prevalence shown in Figure 1 was significantly lower only for the .005 to .049 BrAC category.

Table 1
Alcohol Prevalence by Data Collection Period and BrAC in the 2013–2014 NRS

Data Collection Time Period	% Alcohol Positive (%BrAC > .005)	% BrAC > .08
Weekday Daytime	1.1%	0.4%
Weekend Nighttime	8.3%	1.5%

Prevalence of Drug Use by Drivers

The 2013–2014 study examined the use of drugs, focusing on drugs with the potential to impair driving skills, including over-the-counter, prescription, and illegal drugs. Participants were asked to provide an oral fluid and blood sample in addition to a breath sample. The oral fluid and blood samples were tested for the presence of a large number of potentially impairing drugs including cannabinoids, stimulants, sedatives, antidepressants, and narcotic analgesics. Not all drivers provided both an oral fluid and blood sample; some drivers provided just one sample but many provided both.

The reader is cautioned that drug presence does not necessarily imply impairment. For many drug substances, drug presence can be detected after impairment that might affect driving has passed. For example, traces of marijuana use can be detected in blood samples several weeks after heavy chronic users stop ingestion. In this study, for marijuana, we tested only for THC (delta 9 tetrahydrocannabinol), the psychoactive substance in marijuana, and 11-OH-THC, its active metabolite. When marijuana is smoked or ingested, THC is absorbed into the blood stream and is distributed into areas of the body, including the brain. There are over 100 marijuana metabolites detectable in blood that research has not associated with the psychoactive effects of marijuana use. Whereas the impairment effects for various concentration levels of alcohol in the blood or breath are well understood, there is little evidence available to link concentrations of other drugs to driver performance.

Table 2
Overall Drug Prevalence by Data Collection Period and Type of Test in the 2013–2014 NRS

Time of Day	% Drug-Positive Oral Fluid Test	% Drug-Positive Blood Test	% Drug-Positive Oral Fluid and/or Blood Test
Weekday Daytime	19.0%	21.6%	22.4%
Weekend Nighttime	19.8%	21.2%	22.5%

In contrast to alcohol use, overall drug prevalence (shown in Table 2), did not appear to differ between daytime and nighttime, regardless of whether oral fluid or blood tests were conducted. The much higher nighttime use of alcohol appears to represent recreational use. For other drugs, a different pattern emerges.

As shown in Table 3, the pattern of drug use among drivers varies by day and category of drug. The prevalence of illegal drug use increases from daytime to nighttime, but there is a countervailing pattern of a reduction in prevalence of driver use of medicinal drugs in nighttime drivers compared to daytime drivers.[4]

Table 3
Drug Prevalence by Data Collection Period, Drug Category, and Type of Drug Test in the 2013–2014 NRS

Drug Category	Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test	
	N	%	N	%	N	%
Weekday Daytime						
Any Illegal Drug[5]	189	10.6%	137	11.3%	221	12.1%
Only Medications[6] (prescription and over-the-counter)	197	8.4%	128	10.3%	234	10.3%
Weekend Nighttime						
Any Illegal Drug	783	13.9%	423	14.3%	852	15.2%
Only Medications (prescription and over-the-counter)	317	5.9%	216	6.9%	391	7.3%

[4] Despite recent changes in the legal status of marijuana in some States, for simplicity and to allow inter-survey comparisons, this drug remained included within the "illegal" category in the 2013–2014 NRS.

[5] "Any Illegal Drug" includes drivers who tested positive for one or more illegal drugs, whether or not they also tested positive for medications.

[6] "Only Medications" includes drivers who tested positive for one or more medications, but did not test positive for illegal drugs.

Table 4
Weekend Nighttime Drug Prevalence by Drug Category and Test Type Comparing 2007 Data to 2013–2014 Comparable Data

Drug Category	2007 Data						2013–2014 Comparable Data					
	Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test		Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test	
	N	%	N	%	N	%	N	%	N	%	N	%
Any Illegal Drug	635	11.4%	297	9.8%	699	12.4%	779	13.8%	422	14.3%	849	15.1%
Only Medications (prescription and over-the-counter)	201	3.0%	169	4.0%	277	3.9%	211	3.9%	155	4.9%	266	4.9%

Comparison of Drug Prevalence Between the 2007 NRS and 2013–2014 NRS

The specific drugs and detection thresholds changed somewhat between the 2007 NRS and 2013–2014 NRS. A few drugs that were either not detected or rarely detected in the 2007 NRS were not included on the 2013–2014 NRS, and a few new drugs were added in the 2013–2014 NRS. For example, we tested for selected synthetic cannabinoids in the new survey. Also, improvements in analytical technology allowed the detection thresholds to be lowered significantly for a number of drugs in the 2013–2014 NRS. To compare the prevalence rates between the 2007 NRS and 2013–2014 NRS, we included only the drugs that were tested for in both surveys and based 2013–2014 NRS prevalence rates using the cutoff levels from the 2007 NRS.

To account for these refinements in lab testing since 2007, Table 4 presents the 2013–2014 NRS data after applying the same set of drugs and drug cutoff levels as used for 2007 survey. The results from either oral fluid tests or blood tests, or both oral fluid and/or blood tests, show a small increase in drug-positive drivers using medications (from 3.9% in 2007 to 4.9% in 2013–2014), and a larger increase in the prevalence of illegal drugs (from 12.4% in 2007 to 15.1% in 2013–2014). In 2007, 16.3 percent of weekend nighttime drivers were drug-positive based on the combined results of either or both oral fluid and blood tests (Compton & Berning, 2009). In 2013–2014, 20.0 percent of weekend nighttime drivers tested positive for drugs using the 2007 cut-off criteria.

The drug with the largest increase in weekend nighttime prevalence was THC (Table 5). In the 2007 NRS, 8.6 percent of weekend nighttime drivers tested positive for THC (based on the combined oral fluid and/or blood tests), whereas in the 2013–2014 NRS, 12.6 percent of weekend nighttime drivers tested positive for THC, a 48 percent increase.

Changes in State policy on marijuana use, including medical and recreational use, may have contributed to an increase in marijuana use by drivers. However, the survey does not permit a state-by-state comparison. The change in use may reflect the emergence of a new trend in the country that warrants monitoring.

Survey Methodology

This most recent NRS started in the summer of 2013, continued through the spring of 2014, and involved 60 sites across the contiguous United States. The study used a multistage sampling procedure based on the National Automotive Sampling System—General Estimates System (NHTSA, 2008). The sites were large cities, counties, or groups of counties representing four regions within the United States and three levels of population density. As a whole, the 60 sites provide a representative sample of drivers across the country. The 2013–2014 NRS attempted to re-visit the same sites as 2007; however, because not all sites were available, statistical sampling techniques were used to identify replacement sites with similar characteristics.

Roadside survey data were collected in 5 different locations at each site (for a total of 300 locations). Although there were practical considerations for selecting a site, such as traffic flow and safety, the 5 locations were randomly chosen within the boundaries of the cooperating local law enforcement agency's area of jurisdiction. This approach provided, as much as possible, a representative sample of drivers for that site. Locations were not selected on the basis of assumptions of where there would be a high per-

Table 5
Weekend Nighttime Prevalence of THC in 2007 Compared to 2013–2014 Comparable Data

2007 Data						2013–2014 Comparable Data					
Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test		Oral Fluid Test		Blood Test		Oral Fluid and/or Blood Test	
N	%	N	%	N	%	N	%	N	%	N	%
438	7.7%	234	7.6%	499	8.6%	597	11.3%	332	11.7%	663	12.6%

centage of alcohol- or drug-positive drivers. The objective of this study was to estimate the alcohol and other drug prevalence of all drivers "on the road in the United States" during the given time periods.

In the 2007 NRS, in an effort to learn more about the presence of alcohol and drug use during daytime driving, we added data collection on Fridays during the day, from either 9:30 to 11:30 a.m., or 1:30 to 3:30 p.m. (the times were randomized across sites). This additional data collection allowed us to examine drug use and alcohol trends among daytime drivers. This method was repeated for the 2013–2014 NRS, and data were collected on weekend nights, from 10:00 p.m. to midnight, and from 1 to 3 a.m. on Fridays (i.e., early Saturday mornings) and from 1 to 3 a.m. on Saturdays (i.e., early Sunday mornings). By using these same time frames for each NRS, we can compare data on BrACs and drug use over time.

Participation in the survey was entirely voluntary and anonymous. When a data collector was available, drivers were allowed to enter the data collection location. Where researchers described the project and offered incentives for participation. Drivers were informed that participation was voluntary and that they were free to leave at any time. Data collectors asked participants for a breath test, an oral fluid sample, and a blood sample. The vast majority of eligible drivers entering the research area participated in the study (see Table 6). The number of drivers who entered the site and were eligible to participate (e.g., non-commercial drivers 16 and older, English- or Spanish-speaking) was 11,100. Out of the 11,100 eligible drivers, 85.2 percent (9,455 drivers) provided breath samples; 71 percent (7,881 drivers) provided oral fluid samples; and 42.2 percent (4,686 drivers) provided blood samples.

National prevalence rates were derived from a complex weighting scheme based on the volume of serious crashes at each site and the probability of a survey driver being randomly selected from the total driving trips at that site.

Table 6
Number of Participants and Participation Rates in the 2013–2014 NRS

Drivers	Participants	
	N	%
Eligible and Entered Site	11,100	100.0%
Breath Test	9,455	85.2%
Oral Fluid Test	7,881	71.0%
Blood Test	4,686	42.2%
Oral Fluid and/or Blood	7,898	71.2%

Challenges in Determining How Drugs Affect Driving

Most psychoactive drugs are chemically complex molecules, whose absorption, action, and elimination from the body are difficult to predict, and considerable differences exist between individuals with regard to the rates with which these processes occur. Alcohol, in comparison, is more predictable. A strong relationship between alcohol concentration and impairment has been established, as has the correlation between alcohol concentration and crash risk.

Factors that make similar prediction difficult for most other psychoactive drugs include:

- The large number of different drugs that would need to be tested (extensive testing of alcohol has been undertaken over many decades, whereas relatively little similar testing has occurred for most other drugs).
- Poor correlation between the effects on psychomotor, behavioral, and/or executive functions and blood or plasma drug concentrations (peak psychomotor, behavioral, and executive function effects do not necessarily correspond to peak blood levels; detectable blood levels may persist beyond the impairing effects or the impairing effects may be measurable when the drug cannot be detected in the blood).
- Sensitivity and tolerance (accentuation and diminution of the impairing effects with repeated exposure).
- Individual differences in absorption, distribution, action, and metabolism (some individuals will show evidence of impairment at drug concentrations that are not associated with impairment in others; wide ranges of drug concentrations in different individuals have been associated with equivalent levels of impairment).
- Accumulation (blood levels of some drugs or their metabolites may accumulate with repeated administrations if the time-course of elimination is insufficient to reduce or remove the drug or metabolite before the next dose is administered).
- Acute versus chronic administration (it is not unusual to observe greater impairment during initial administrations of drugs than is observed when the drug is administered over a long period of time).

At the current time, specific drug concentration levels cannot be reliably equated with a specific degree of driver impairment.

For More Information

For questions on this document, please contact Amy Berning at amy.berning@dot.gov.

Detailed information about the study and results will be available in upcoming publications. Three technical reports are under development: one provides a complete description of the methodology used (sampling, analysis, weighting, and imputation procedures) and subject participation rates (report entitled, 2013–2014 National Roadside Survey of Alcohol and Drug Use: Methodology). Detailed information on the use of alcohol by drivers and the relationship of alcohol to various factors like time of day and vehicle type will be available in a report entitled, 2013–2014 National Roadside Survey of Alcohol and Drug Use: Alcohol Prevalence Rates. Detailed information on the use of drugs by drivers and the combined use of drugs and alcohol, as well as more detailed trend analysis examining changes in drug prevalence from 2007 to 2013–2014 will be provided in a third report titled *2013–2014 National Roadside Survey of Alcohol and Drug Use: Drug Prevalence Rates.* These upcoming reports will be posted on NHTSA's Web site.

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