NATIONAL TRANSPORTATION SAFETY BOARD
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SUPPLEMENTAL DATA REPORT: Drug involvement in fatal crashes in the U.S. (2006-2015)

Specialist's Data Report (FINAL)
By Ivan Cheung, PhD

1. DATA REQUESTION SUMMARY

- **Event summary**: This crash occurred on Wednesday, March 29, 2017, at about 12:20 p.m. (local time) when a northbound 2007 Dodge Ram 3500 pickup truck crossed the centerline of U.S. Highway 83 and collided with a southbound 2004 Ford E350 / Turtle Top Vanterra medium-size bus near Concan, TX. As a result of the crash the bus driver and 12 passengers on the bus were fatally injured. The driver of the pickup truck and one bus passenger sustained serious injuries.
- **Objectives (modified):**
  - Examine drug involvements and drug test result availability
    1. 10-year trend (2006-2015)
    2. Drug and alcohol involvement (2015)
    3. State-by-state variation (2015)
  - Examine age distribution of drug involvements (2015)

2. DATA SOURCES

- Fatality Analysis Reporting System (FAR)
  - FAR is a census of fatal motor vehicle crashes on trafficway customarily open to the public. These crashes and must have resulted in the death of a motorist or a non-motorist within 30 days of the crash.
  - 1975-2016 FARS Analytical User's Manual (https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812447)

3. METHOD AND DATA LIMITATIONS

- Driving under the influence of Drugs (DUID), "drugged driving", and "impairment by drugs" are very difficult to examine. In FARS, there are multiple person-level data elements that are related to drug:
  - Drug Test Result (DRUGRES1-3): The data element identifies the drug test result for this person.
  - Drug Test Status (DSTATUS): This data element identifies whether a drug test was given to this person.

- Police Reported Drug Involvement (DRUGS) records whether drugs were involved and reflects the judgement of law enforcement.

- In this report, staff used Drug Test Result (DRUGRES1-3) for the following three analyses:
  - To determine the availability of valid drug test results:
    1. A valid drug test result should have the following values:
       a. 1: No drug reported
       b. 100-995: various drug categories (see below and also page 262 of the FARS manual)
       c. 996: other drugs
       d. 998: tested for drugs, drugs found, type unknown/positive
    2. To be considered having a valid drug test result, a person must have at least 1 of the three drug result values meeting the above criteria
    3. Therefore, the followings are considered invalid:
       a. 0: Not tested for drugs
       b. 95: Not reported
       c. 997: Tested for drugs, results unknown
       d. 999: Unknown if Tested
  - To determine positive drug test results:
    1. Positive drug test results refer to values 100-995, 996, and 998
    2. These values are further categorized into:
       a. 100-295: Narcotic
       b. 300-395: Depressant [value 316 = Clonazepam]
       c. 400-495: Stimulant
       d. 500-595: Hallucinogen
       e. 600-695: Cannabinoid [value 605 = THC]
       f. 700-795: Phencyclidine (PCP)
       g. 800-895: Anabolic Steroid
       h. 900-995: Inhalant
       i. 996: Other Drugs
       j. 998: Tested for drugs, drugs found, type unknown/positive
  - To determine polydrug presence:
    1. Because up to three drug results are included for each person in FARS, a person considered having polydrug involvement must have at least two drug results meeting the above criteria

- It is important to re-iterate that FARS data on drug involvement has many shortcomings. Berning & Smither (2015) (Source: https://www.nhtsa.gov/staticfiles/nti/pdf/812117-Drug_and_Alcohol_Crash_Risk.pdf) provided an excellent discussion on limitations of drug test information in fatal crashes. ***The followings are important cautions when reading the rest of this report.***
  - FARS drug data indicates drug presence, it does not indicate if the driver was impaired by a drug at the time of a crash. Therefore, a positive drug test does not equal to drug impaired driving. Furthermore, the presence of some drugs in the body can be detected long after any impairment (sometimes weeks after use).
  - The impairing effect of alcohol are well understood. However, there is limited research and data on the crash risk of specific drugs. Therefore, the impairing effect of specific drug is not well understood.

- Unlike BAC levels (e.g. 0.05 in Utah and 0.08 in other states), there is no established levels for drugs (some states may have levels for some drugs).
- There is no consistent policy or set of procedure between, or sometimes even within, States for drug testing. Some jurisdictions test only fatally injured drivers; others test all drivers involved in fatal crashes. Some jurisdictions test no one at all. Some jurisdictions only test fatally injured drivers while others test all involved drivers. Some jurisdictions do not conduct drug test if alcohol is presence.
- Also, there is inconsistency in what get submitted to the FARS analyst from each jurisdiction.

- ***Therefore it is not possible to identify drivers impaired by drugs not alcohol. This data report identifies drivers who were tested positive with one of the many listed drugs while their alcohol test yield 0.00 BAC.***
- Regarding alcohol-impairment, BAC 0.05+ and BAC 0.01+ are presented. This data report does not use imputed BAC level.
- Difference between NHTSA Preliminary and Final FARS data:
  - In early October 2017, NHTSA released the final FARS data for 2015 while simultaneously released the preliminary FARS data for 2016. This is a practice that NHTSA used every year. In general, while there are differences between the final and preliminary data, the magnitude is not substantial. For example, according to the 2015 preliminary data, there were 32,166 fatal crashes resulting in 35,092 fatalities; according to the 2015 final data, there were 32,539 fatal crashes and 35,485 fatalities. Respectively the differences were 373 fatal crashes and 393 fatalities.
  - However, staff examined the difference between the two sets of FARS data regarding drug and alcohol results. The difference was substantial. Regarding drug testing, based on preliminary FARs 2015 data, 17,656 (of 48,613) drivers involved in fatal crashes were given drug test, representing 36.3%. However, based on final 2015 data, the percentage increased to 40.9%. Regarding alcohol results, 46.4% of all drivers had valid BAC results according to preliminary data while such percentage increased to 48.5%.
  - ***Because of the considerable increase in drug test results, the subsequent analyses regarding year 2015 was based on final FARS 2015 data. Discussion on trend is based on 10-year period (2006-2015). It is anticipated that final 2016 will be published in October 2018.***

4. SUMMARY

- In 2015, there were 49,162 drivers involved in fatal crashes. Of these, only 18,852 drivers had a valid drug test result (38% of all involved drivers). Table 1 shows that while 38% of all involved drivers had at least 1 valid drug result, the percentage increases as injury level increases (16% for drivers with no injury, 23% for injured drivers, and 62% for fatally injured drivers).

Table 1: Number of drivers involved in fatal crashes with valid and positive drug results by injury level in 2015.

Injury Level (Inj_Sev)	All drivers	Drivers with at least 1 valid drug result		Drivers with at least 1 positive drug result	
		Number	Percent of all drivers	Number	Percent of drivers with valid result
No Injury (0)	13,760	2,237	16.3	542	24.2
Injured (1,2,3)	12,320	2,809	22.8	1,202	42.8
Fatal (4)	22,348	13,777	61.6	5,977	43.4
Total*	49,162	18,852	38.3	7,738	41.0

** Total includes drivers with unknown injury level*

- Table 1 also shows that of the 18,852 drivers given drug tests, 7,738 were tested positive in one of the many drug categories (*Narcotic, depressant, stimulant, hallucinogen, cannabinoid, phencyclidine, anabolic steroid, inhalant, or others; see FARS Analytical User's Manual*). As stated before, tested positive in any of these drugs do not imply drug impairment when the crashes occurred. Therefore, 41% of drivers with valid drug results show at least one positive drug result.
- Table 2 shows alcohol test results by driver injury severity levels for 2015. Compared to drug tests, higher percentage of drivers involved in fatal crashes were given alcohol test with valid results reported (49%). Similarly, this percentage increases as injury level of the driver increases (25% for drivers with no injury, 31% with injury, and 73% with fatal injury). Among those 23,855 drivers with valid alcohol test results, 34% of them had positive BAC value (i.e. BAC > 0.00). The number of drivers with BAC value >=0.05 was provided in Table 2 for reference. For this data report, drivers with any positive BAC value is considered alcohol involved. This approach is used because the drug test results only indicate involvement.

Table 2: Number of drivers by injury level and BAC level with valid alcohol test results in 2015

Injury Level (Inj_Sev)	With Valid Alchol Test Results (ALC_RES<= 940)	All Drivers	% of All Drivers with Valid Alcohol Results	Drivers with Positive Alcohol Results (BAC>0.00)		Drivers with BAC >=0.05	
				Driver Counts	% of All Drivers with Valid Alcohol Results	Driver Counts	% of All Drivers with Valid Alcohol Results
No Injury (0)	3,455	13,760	25.1	568	16.4	453	13.1
Injured (1,2,3)	3,949	12,320	32.1	1,231	31.2	1,081	27.4
Fatal (4)	16,405	22,348	73.4	6,211	37.9	5,487	33.4
Total	23,855	49,162	48.5	8,025	33.6	7,035	29.5

- In 2015, 16,765 of the 17,656 drug-tested drivers had valid alcohol results (95%). These drivers comprised 34% of all drivers involved in fatal crashes.
- As Table 1 and 2 show, much higher percentages of fatally injured drivers had either valid drug result (62%) and alcohol result (73%). Table 3 focuses on fatally injured drivers with

valid drug and alcohol results (13,540 out of 22,348 drivers; i.e. 61% of all fatally injured drivers).

- Of all the 5,822 fatally injured drivers with valid drug result, 2,366 (41%) of them had a BAC value above 0.00. Of all the 8,605 drivers who had BAC value of 0.00 (i.e. not alcohol involved), 3,456 (40%) had test positive for drug. These were the fatally injured drivers identified as drug-involved but not alcohol-involved.

Table 3: Number of drivers by drug and alcohol involvement among those given drug tests and with valid alcohol results in 2015.

	BAC>0.00		BAC=0.00		Total
	Number	%	Number	%	Number
Tested Positive for Drug	2,366 (48%)	41%	3,456 (40%)	59%	5,822 (43%)
No Positive Drug Result	2,569 (52%)	33%	5,149 (60%)	67%	7,718 (57%)
Total	4,935 (100%)	36%	8,605 (100%)	66%	13,540 (100%)

- Table 4 focuses on the 13,540 fatally injured drivers with valid drug and alcohol results. It shows the age distribution of four categories: positive drug and alcohol result (i.e. at least 1 positive drug test result and BAC value > 0.00); drug only; alcohol only; and no drug nor alcohol.

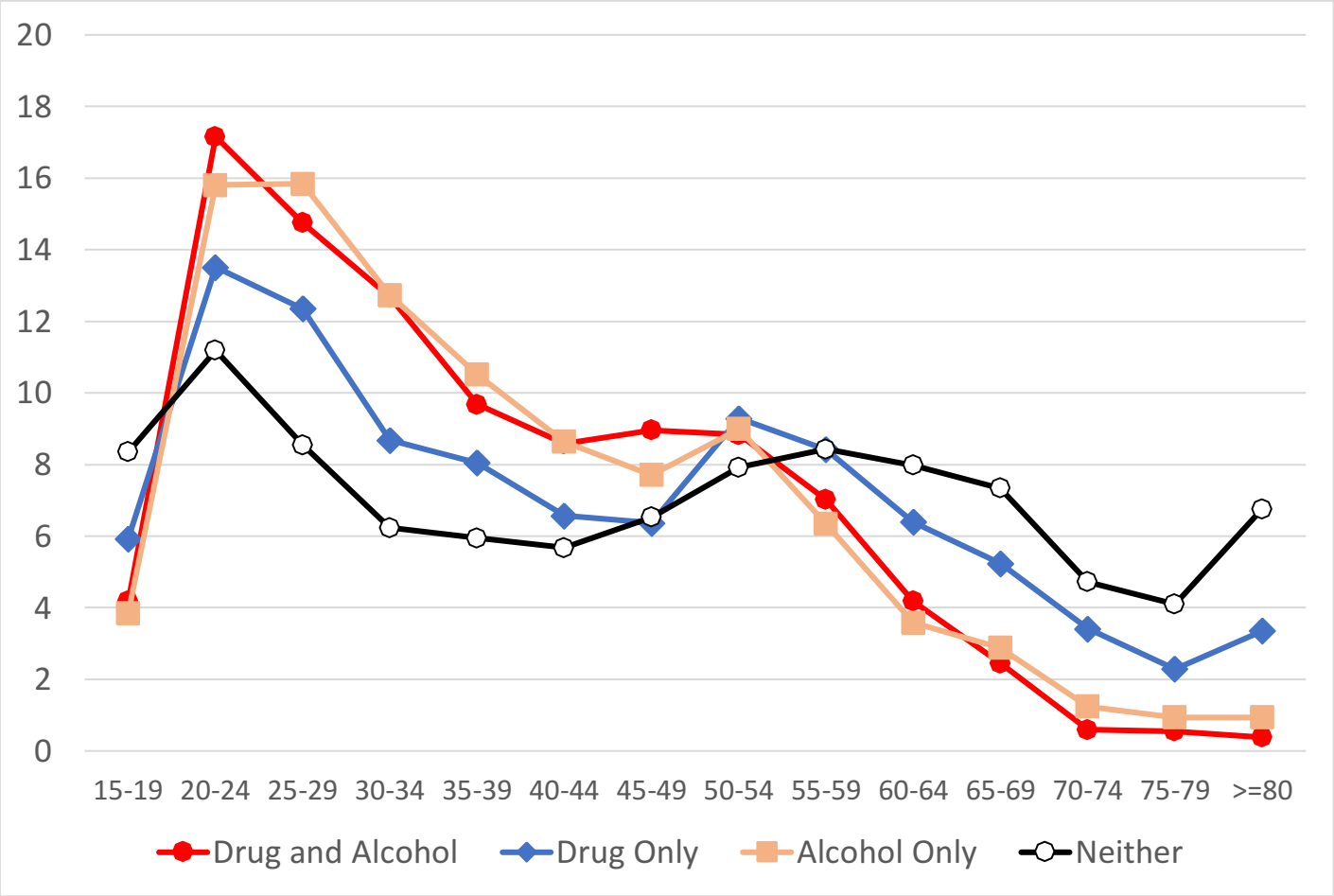
Table 4: Number of drivers by drug and alcohol involvement among those given drug tests and with valid alcohol results by age group in 2015.

Age Group	Positive Drug and BAC > 0.00	Positive Drug only	BAC > 0.00 only	No Drug, No Alcohol	Total
15-19	99	205	99	43	833
20-24	406	467	406	576	1,855
25-29	349	427	407	440	1,623
30-34	300	300	327	321	1,248
35-39	229	278	270	306	1,083
40-44	203	227	222	292	944
45-49	212	220	198	336	966
50-54	209	321	231	408	1,169
55-59	166	291	163	434	1,054
60-64	99	221	92	411	823
65-69	58	181	74	378	691
70-74	14	118	32	243	407
75-79	13	79	24	211	327
>=80	9	116	24	348	497
All *	2,366	3,456	2,569	5,149	13,540

** Includes age under 15 and unknown*

- In general, Table 4 shows that the numbers of fatally injured drivers are comparable across all four categories for ages 20 to 39. However, as Figure 1 shows, using the category "No drug, no alcohol" as a reference, the drug and alcohol involvement groups all skew toward the younger drivers. Particularly, the two categories (drug and alcohol and drug only) show high degree of over-representation for ages 20 to 34.

Figure 1: Age distribution presented as percentage of the four drug and alcohol involvement categories in 2015.



- Table 5 shows the 10-year trend of various measurement metric. (note, 2016 data is added for reference, it should not be compared to other years. See comment earlier). Table 5 shows that from 2006 to 2015, the percentage of fatal crashes in which at least 1 driver with valid drug result generally increased from 43% to 51%. However, the last two columns show that the percentage of all fatalities that were in crashes with at least 1 driver with positive drug test increased from 13% to 24%; increased from 30% to 46% when the percentages were computed based on fatalities in crashes with valid drug result for at least 1 driver.
- Table 6 shows that among those fatally injured drivers with at least 1 valid drug result, those tested positive for more than 1 drug increased gradually from 13% in 2006 to 23% in 2015.

Table 5: Availability of valid drug result and percent of drivers with valid drug result by year (2006-2016)

	All Fatal Crashes		Crashes in which at least 1 driver had a valid drug result			Crashes in which at least 1 driver had a positive drug result				
								Fatalities		
Year	Crashes	Fatalities	Crashes	% of All Crashes	Fatalities	Drivers	Crashes	Fatals	% of All Fatalities	% of All Fatalities with valid drug result
2006	38,648	42,708	16,672	43.1	18,767	5,088	4,943	5,605	13.1	29.9
2007	37,435	41,259	17,153	45.8	19,304	5,282	5,139	5,832	14.1	30.2
2008	34,172	37,423	16,731	49.0	18,688	5,433	5,280	5,927	15.8	31.7
2009	30,862	33,883	14,600	47.3	16,349	5,518	5,349	6,029	17.8	36.9
2010	30,296	32,999	15,611	51.5	17,332	5,946	5,751	6,428	19.5	37.1
2011	29,867	32,479	15,204	50.9	16,920	6,096	5,866	6,590	20.3	38.9
2012	31,006	33,782	15,683	50.6	17,430	6,572	6,353	7,116	21.1	40.8
2013	30,203	32,894	15,154	50.2	16,891	6,540	6,326	7,102	21.6	42.0
2014	30,056	32,744	15,139	50.4	16,854	6,640	6,441	7,193	22.0	42.7
2015	32,539	35,485	16,493	50.7	18,380	7,738	7,451	8,380	23.6	45.6
2016	34,439	37,461	14,758	42.9	16,511	6,982	6,739	7,623	20.3	46.2

Table 6: Number and percent of fatally injured drivers by number of positive drug result and year (2006-2016).

	Number of positive drug result (Maximum is 3)					Poly (2 or 3)	
Year	No	1	2	3	Drivers with valid result	Number	Percent
2006	10,328	2,093	1,011	914	14,346	1,925	13.4
2007	10,707	2,250	1,050	914	14,921	1,964	13.2
2008	10,127	2,237	1,054	976	14,394	2,030	14.1
2009	8,033	2,243	1,027	1,068	12,371	2,095	16.9
2010	8,482	2,269	1,105	1,177	13,033	2,282	17.5
2011	7,912	2,381	1,106	1,209	12,608	2,315	18.4
2012	7,975	2,648	1,174	1,252	13,049	2,426	18.6
2013	7,609	2,465	1,269	1,308	12,651	2,577	20.4
2014	7,494	2,503	1,291	1,377	12,665	2,668	21.1
2015	7,800	2,786	1,583	1,608	13,777	3,191	23.2
2016	6,931	2,325	1,419	1,621	12,296	3,040	24.7
Total	93,398	26,200	13,089	13,424	146,111	26,513	18.1

- Table 7 focuses on the 22,348 fatally injured drivers in 2015 and it shows the vary large degree of variability in terms of availably of valid drug result and percentage of those with valid drug result that were tested positive for at least one drug. About 62% of all fatally injured drivers had at least 1 valid drug result and 43% of these drivers had at least 1 positive drug result. The lowest availability of valid drug result was 1% in North Carolina and highest was 95% in Nevada. Among those with valid drug result, South Dakota had the lowest percentage of positive drug result (5%) and Massachusetts had the highest (68%).
- As reported earlier, 8,380 fatalities in 2015 (see table 5) occurred in crashes in which at least one driver had a positive drug result. Table 8 broke down these fatalities by state along with the overall fatalities and crash counts.

Table 7: Number of fatally injured drivers, availability of valid drug result, and positive drug result by state in 2015.

State	Fatally Injured Drivers	With at least 1 valid drug result	% of all fatally injured drivers	With at least 1 positive drug result	% of those with valid drug result
AK	42	34	81.0	13	38.2
AL	583	370	63.5	164	44.3
AR	388	254	65.5	106	41.7
AZ	506	381	75.3	166	43.6
CA	1799	1517	84.3	647	42.6
CO	359	304	84.7	125	41.1
CT	182	162	89.0	99	61.1
DC	6	5	83.3	2	40.0
DE	70	33	47.1	15	45.5
FL	1654	965	58.3	415	43.0
GA	941	484	51.4	168	34.7
HI	46	40	87.0	16	40.0
IA	216	104	48.1	41	39.4
ID	147	77	52.4	44	57.1
IL	648	490	75.6	199	40.6
IN	537	259	48.2	95	36.7
KS	248	122	49.2	50	41.0
KY	529	396	74.9	203	51.3
LA	489	238	48.7	120	50.4
MA	210	158	75.2	107	67.7
MD	315	255	81.0	82	32.2
ME	107	8	7.5	3	37.5
MI	592	264	44.6	123	46.6
MN	289	204	70.6	93	45.6
MO	589	374	63.5	215	57.5
MS	454	202	44.5	63	31.2
MT	155	128	82.6	70	54.7
NC	909	12	1.3	7	58.3
ND	89	74	83.1	30	40.5
NE	171	74	43.3	33	44.6
NH	80	70	87.5	34	48.6
NJ	275	224	81.5	69	30.8
NM	175	123	70.3	28	22.8
NV	181	172	95.0	60	34.9
NY	584	438	75.0	146	33.3
OH	768	617	80.3	357	57.9
OK	437	152	34.8	53	34.9
OR	283	36	12.7	19	52.8
PA	832	565	67.9	183	32.4
RI	29	26	89.7	10	38.5
SC	669	489	73.1	201	41.1
SD	95	37	38.9	2	5.4
TN	673	505	75.0	281	55.6
TX	2228	968	43.4	453	46.8
UT	171	137	80.1	54	39.4
VA	528	408	77.3	133	32.6
VT	36	29	80.6	17	58.6
WA	335	289	86.3	135	46.7
WI	392	279	71.2	126	45.2
WV	200	173	86.5	75	43.4
WY	107	52	48.6	27	51.9
US	22,348	13,777	61.6	5,977	43.4

Table 8: Number of fatal crashes and fatalities by drug involvement in 2015.

State	All Motor Vehicle Crashes		Drug Involved (at least 1 driver with positive drug result)	
	Crashes	**Fatalities**	**Crashes**	**Fatalities**
AK	60	65	20	23
AL	784	850	229	257
AR	491	550	165	193
AZ	811	897	192	222
CA	3,123	3,387	766	871
CO	507	547	145	158
CT	257	270	117	124
DC	23	23	4	4
DE	127	131	26	27
FL	2,699	2,938	480	539
GA	1329	1432	241	267
HI	85	93	26	32
IA	282	320	47	56
ID	198	216	50	58
IL	914	998	246	278
IN	752	817	147	165
KS	322	355	57	65
KY	694	761	263	302
LA	698	752	152	169
MA	328	345	106	116
MD	479	520	86	92
ME	144	156	7	8
MI	896	967	176	193
MN	375	411	105	111
MO	803	870	241	268
MS	604	677	76	93
MT	204	224	88	99
NC	1,275	1,379	27	34
ND	111	131	36	39
NE	218	246	36	38
NH	103	114	43	46
NJ	521	561	97	111
NM	269	298	29	30
NV	297	326	74	85
NY	1,061	1,136	175	195
OH	1,029	1,110	394	435
OK	590	645	137	154
OR	411	446	59	68
PA	1,102	1,200	220	242
RI	41	45	11	12
SC	911	979	219	245
SD	116	134	6	8
TN	888	962	378	429
TX	3,190	3,582	563	662
UT	258	278	75	85
VA	712	754	134	141
VT	50	57	19	22
WA	499	551	182	202
WI	523	566	168	185
WV	246	268	76	83
WY	129	145	35	39
US	32,539	35,485	7,451	8,380