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Blood Alcohol Concentrations in Drinking Drivers in Tucson, Arizona, 1967–1971

The literature contains a number of reports on alcohol as a factor in fatal collisions [*1–4*]. It is my experience that many of those who have been involved in collisions had blood alcohol concentrations (BAC) which exceeded the recently adopted standard of 0.10 percent weight/volume as a presumptive limit currently on the statute books in many states. A detailed study was started following an inquiry from a state agency relative to BAC's found to be below the 0.15 percent weight/volume presumptive limit then existing in Arizona. In this state there were no readily available statistics dealing with the range of BAC's found in tested drivers such as has been provided by Bradford [*5*]. Tucson is an ideal place to extend such information since the City-County Crime Laboratory administers blood and breath tests in connection with all matters possibly involving alcohol and traffic, including all accident cases with or without injury or fatality. In this study the experience of five years (1967 through 1971) in metropolitan Tucson was examined. Certain consistencies were revealed relating to the BAC's and their frequencies.

Method

There were over 4000 suspected driving-while-intoxicated (DWI) cases during the 5-year period and all tests were run on the Breathalyzer [*6*]. The laboratory method of retaining the test record pad and letting the courts and officers have the "check list," which contains the procedural steps and result, proved to be a considerable convenience as it was a simple matter to locate the results of all of these tests.

Drivers who had determinations performed directly on blood are not included in the submitted figures because almost always a greater lapse of time occurred between arrest and procurement of the specimen. The vast majority of the breath tests were completed within one hour following an incident or apprehension. The breath tests principally came from four different enforcement agencies; namely, Tucson Police Department, Pima County Sheriff's Office, South Tucson Police Department, and the Arizona Highway Patrol working in metropolitan Tucson.

Results

In 1967 (Fig. 1), with 360 administered breath tests, the most frequent BAC encountered was 0.20 percent weight/volume. Next most frequent were the BAC's of 0.16 and 0.17

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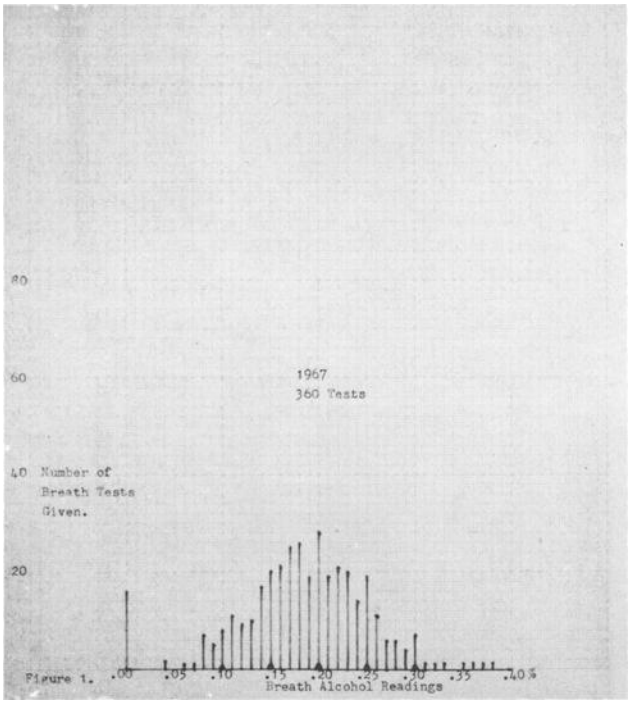

FIG. 1—*Breath-alcohol readings of the 1967 tests.*

percent weight/volume, respectively. Eighty-seven percent of those tested for suspected DWI were in the range of 0.10 to 0.27 percent weight/volume BAC. There were 75 cases out of 360 which were between 0.10 and 0.15 percent weight/volume BAC. There were 60 cases or 16 percent of the total with BAC's above 0.24 percent weight/volume.

During 1968 (Fig. 2) there were 433 tests recorded. BAC's of 0.18 and 0.20 percent weight/volume had the highest frequencies. Again, approximately 87 percent of the cases were in the range of 0.10 to 0.27 percent BAC. Ninety-eight cases were in the range of 0.10 to 0.15 percent weight/volume. There were 67 cases or 15 percent of the total with BAC's above 0.24 percent weight/volume.

In 1969 (Fig. 3) there were 598 breath tests given with BAC's of 0.20 and 0.16 percent weight/volume alcohol readings having the greatest frequencies. Eighty-seven percent of the cases were in the range of 0.10 to 0.27 percent weight/volume BAC. There were 186 cases with BAC's between 0.10 and 0.15 percent weight/volume. Eight percent of the total cases had BAC's in excess of 0.24 percent.

The year 1970 (Fig. 4) was the first full year under an implied consent statute in Arizona and there were 1004 breath tests recorded. Again 0.20 percent weight/volume was the most frequently encountered BAC. Eighty-nine percent of the results were in the range of 0.10 to 0.27 percent. Two hundred thirty-eight (24 percent) were in the range of 0.1 to 0.15 percent weight/volume. Slightly over 9 percent of the subjects had BAC's over 0.24 percent.

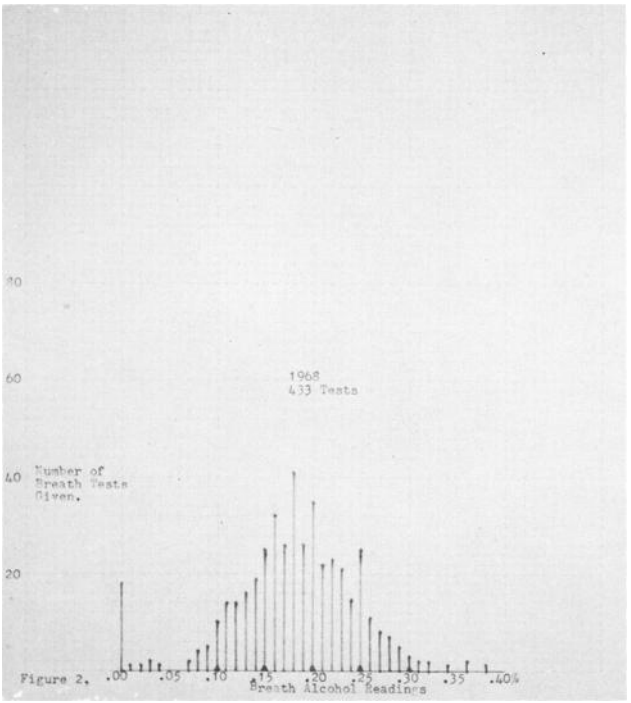

FIG. 2—*Breath-alcohol readings of the 1968 tests.*

The last year of the study was 1971 (Fig. 5) which was the second full year with the implied consent statute, and 1606 tests were administered. The largest number (150) subjects again had a 0.20 percent weight/volume BAC. The next highest BAC was 0.17 percent, totaling 125 cases. Again as in most other years, 87 percent of all those tested were in the BAC range of 0.10 to 0.27 percent. Three hundred sixty-seven subjects (23 percent) had BAC's in the range of 0.10 to 0.15 percent weight/volume and 14 percent of those tested had concentrations above 0.24 percent.

Discussion

Beginning in November 1969, Arizona implemented its implied consent law, and the tests given have greatly increased in each succeeding year. The original presumptive concentration of 0.15 percent weight/volume in the statute was lowered to 0.10 percent by the 1972 legislature. Refusal to submit to a breath test under the implied consent law may mean the loss of driver's license for six months. The swelling volume of tests strongly suggests that the implied consent statute gave impetus to the detection of the drinking driver.

During each year a considerable number of zero readings were recorded. These were often obtained as drivers who were involved in serious collisions, but who were alcohol-

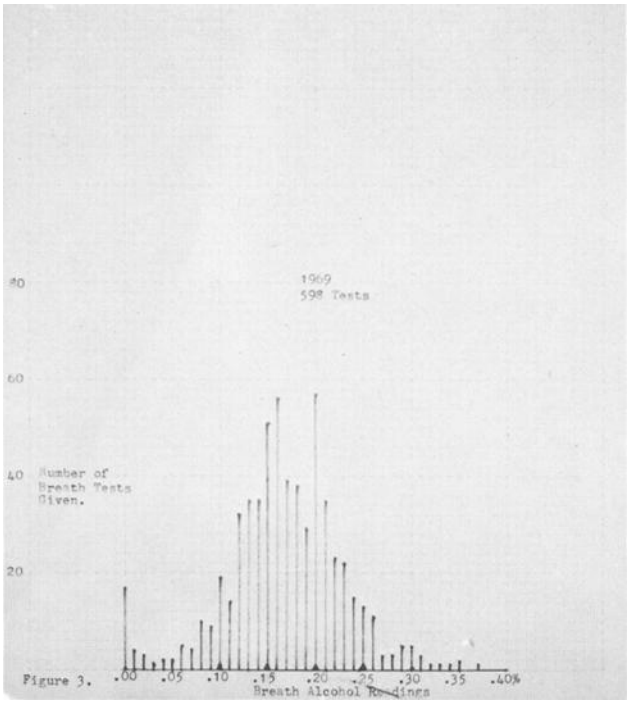

FIG. 3—*Breath-alcohol readings of the 1969 tests.*

free. Others were drivers who exhibited symptoms which resembled intoxication and included such subjects as diabetics and drivers presumably or known to be under the influence of a drug other than alcohol.

Eighty-seven percent of the subjects tested each year had BAC's in the range of 0.10 to 0.27 percent weight/volume. These and the other data indicate drinking drivers of the Southwest are acutely or chronically generous users of alcoholic beverages. Obviously these high concentrations are appreciably above the social drinking norms of one to three drinks. The following table shows the percentages of subjects with BAC's in the range of 0.10 to 0.15 percent weight/volume for the 5-year period. It is seen that lowering the presumptive limit in the implied consent law renders an additional 20 to 30 percent of tested drivers subject to prosecution.

Year	BAC Range, %	Percent
1967	0.10 to 0.15	20
1968		22
1969		31
1970		23
1971		22

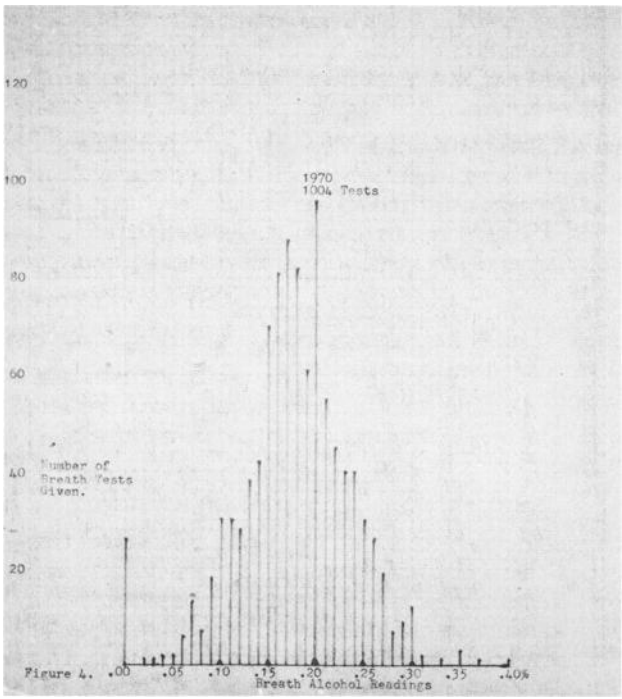

FIG. 4—*Breath-alcohol readings of the 1970 tests.*

A BAC of 0.20 percent weight/volume was by far the most common concentration encountered, with 0.21 percent BAC the next most common concentration above 0.20 percent in three out of the five years studied. As might be expected, there were fewer subjects with BAC's in the range of 0.20 to 0.25 percent weight/volume than in the lower range of 0.15 to 0.20 percent.

Summary

Blood alcohol concentrations found in drivers during a five-year period in metropolitan Tucson have been tabulated. The most frequent BAC encountered in over 4000 tests was 0.20 percent weight/volume. Eighty-seven percent of the tested drivers had BAC's in the range of 0.10 to 0.27 percent weight/volume. Twenty-three percent of those tested had BAC's of 0.10 to 0.15 percent weight/volume.

Acknowledgments

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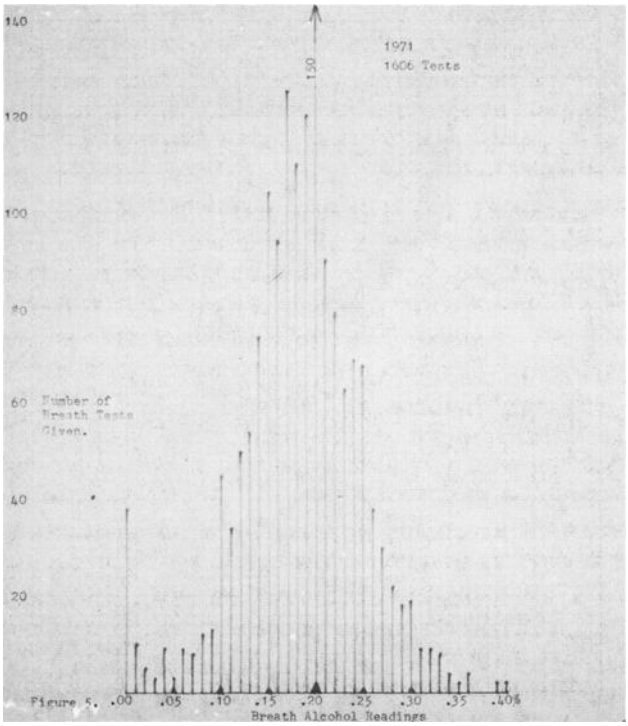

FIG. 5—*Breath-alcohol readings of the 1971 tests.*

References

[1] Waller, J. A., King, E. M., Nielson, G., and Turkel, H. W., "Alcohol and Other Factors in California Highway Fatalities," *Journal of Forensic Sciences*, Vol. 14, 1969, pp. 429–444.
[2] Gradwohl, R. B. H., *Legal Medicine*, C. V. Mosby Co., St. Louis, 1954, pp. 754–755.
[3] Graham, J. W., "Fatal Motorcycle Accidents," *Journal of Forensic Sciences*, Vol. 14, 1969, pp. 79–86.
[4] Donigan, R. L., *Chemical Tests and the Law*, The Traffic Institute, Northwestern University, 1966, p. 1.
[5] Bradford, Lowell, "Changing Attitudes in Drinking Driver Enforcement as Reflected by the Actions of Researchers, Courts, Prosecutors, and Society," *Journal of Forensic Sciences*, Vol. 6, 1966, pp. 204–208.
[6] Breathalyzer, Stephenson Company, Bangor Punta, Red Bank, N.J.

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