Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle
Alcohol Impact Evaluation (Interim Report)

5. Report Date
September 1983

6. Performing Organization Code

7. Author(s)
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8. Performing Organization Report No.
UKTRP-83-22

9. Performing Organization Name and Address
Kentucky Transportation Research Program
College of Engineering
University of Kentucky
Lexington, Kentucky 40622

10. Work Unit No. (TRAIS)

11. Contract or Grant No.

12. Sponsoring Agency Name and Address
Highway Safety Standards Section
Kentucky State Police
Frankfort, Kentucky 40601

13. Type of Report and Period Covered
Interim

14. Sponsoring Agency Code

15. Supplementary Notes
Study Title: Alcohol Impact Evaluation

16. Abstract

This report is an evaluation of increased police enforcement to reduce alcohol-related accidents in Lexington-Fayette County, Kentucky. Three types of information were collected for the analysis; accident data, arrest and adjudication data, and personal opinion data obtained by means of a questionnaire survey. Accident data were collected for two years before the Traffic Alcohol Program (TAP) and one year during the program. A 25 percent sample of arrest and adjudication data was collected one year before and one year during TAP. The questionnaire was sent to 2,500 registered vehicle owners.

Results from before-and-after comparisons and time-series analysis show alchol-related accidents decreased significantly as a result of TAP. The number of DUI arrests increased from 929 in the year before to 4,427 during the first year of TAP. The program was found to be cost effective with a benefit-cost ratio over two. More than half of the respondents indicated that TAP increased their danger of DUI arrest.

17. Key Words		18. Distribution Statement
Alcohol	Driving Under Influence	
Highway Safety	Cost Effectiveness	
Accidents	Arrests	
Enforcement	Adjudication	
Questionnaire Survey	Perceived Risk	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

Research Report
UKTRP-83-22

ALCOHOL IMPACT EVALUATION
(INTERIM REPORT)

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Federally funded through
Highway Safety Standards Section
Kentucky State Police
Commonwealth of Kentucky

September 1983

ACKNOWLEDGEMENTS

An expression of sincere appreciation is extended to Tom Creasey, Carla Crossfield, Louise Hensley, and Suzanne Long for their contributions to the completion of this research report.

Without the assistance of other agencies, it would have been very difficult to have obtained the various types of data included in the report. Significant assistance was received from Larry Ball with the Lexington-Fayette Urban County Division of Police and Joan Rutledge with the Criminal and Traffic Division of the Fayette District Court.

Additional appreciation is also expressed for the valuable guidance provided by the Kentucky State Police's Highway Safety Standards Section. Review and comments by Joe Ann O'Hara and Charles V. Caldwell were certainly beneficial in the overall analysis of data and report preparation.

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INTRODUCTION

Drunk driving continues to be one of the nation's most serious health and safety problems. Approximately 50 percent of all drivers killed each year have blood alcohol concentrations in excess of the legal limit of 0.10 percent (1). In single-vehicle fatal crashes, where fault is certain, nearly 65 percent of those drivers who died were legally drunk. Over the past 10 years the number of highway deaths involving alcohol has averaged approximately 25,000 per year. Economic losses due to drunk driving also are staggering. An estimate of the total economic cost of drunk driving is between 21 and 24 billion dollars per year(2). In Kentucky, the number of alcohol-related accidents has averaged slightly over 10,000 during each of the past five years (1978-1982). Alcohol-related fatal accidents have averaged 193 during each of the past five years. This relatively low number of reported alcohol-related fatal accidents is because alcohol involvement is based on an officer's observations at the scene. Subsequent blood tests have shown that alcohol is a factor in approximately 50 percent of all fatal accidents. When considering the cost of fatalities and injuries, the estimated annual cost of alcohol-related accidents in Kentucky is $86 million (3). The problem has reached the point where it has been estimated that one out of every two Americans will be involved in an alcohol-related accident in their lifetime.

The Lexington-Fayette County area certainly is not exempt from the problems of accidents related to drunk driving. Prior to receiving a grant for its Traffic Alcohol Program, the Lexington-Fayette County area was identified as having a high rate of alcohol-related accidents (3) as a result of extensive accident analyses performed as part of the problem identification process for Kentucky's Annual Highway Safety Plan. In the past, the approach to problem identification was to identify problems in the 18 highway safety program areas. The most recent problem identification report continued to search for problems in each of the standard areas; however, the areas of alcohol and occupant protection were identified for emphasis.

Other areas within Kentucky were identified as having high rates of alcohol-related accidents and were given grants by the Kentucky State Police's Highway Safety Standards Section to implement alcohol enforcement programs. Areas where other enforcement programs are to be evaluated include Paducah, Bowling Green, and Barren, Hart, and Warren Counties. The results reported herein will serve as an interim report on the Lexington Traffic Alcohol Program. A final report, which is to be completed by September 30, 1984, will include additional data on the Lexington program along with a comparison of enforcement programs in other parts of the state. An attempt will be made to determine which of several enforcement management styles is most effective in terms of program cost versus reduction of accidents related to alcohol.

ALCOHOL PROBLEM IDENTIFICATION

Much of the data representing the alcohol safety problem has been compiled in reports prepared for the Kentucky State Police's Highway Safety Standards Section. The most recent report for Fiscal Year 1984 addresses several problem areas; however, problems associated with alcohol-related accidents were emphasized (3).

Analysis of contributing factors (human, vehicular, and roadway) revealed that alcohol was listed as a contributing factor in 7.7 percent of all accidents and 25.6 percent of fatal accidents. For Lexington-Fayette County, the percentage of accidents involving alcohol was 8.3 percent. For all Kentucky accident records, alcohol was second to unsafe speed as a contributing factor in fatal accidents and was the fifth most common contributing factor in all accidents. Again, it should be noted that reported alcohol-related accidents would be much higher if a definitive measure of blood-alcohol could be used at the scene of an accident.

To identify locations having alcohol-related accident problems, counties and cities having the highest percentages of accidents involving alcohol were tabulated. Those locations having alcohol conviction rates below the average for their population categories were identified. Locations having high percentages of alcohol-related accidents and low conviction rates were selected as logical choices for increased enforcement. The Lexington-Fayette County area was identified as in need of increased alcohol enforcement and education programs.

LEXINGTON-FAYETTE COUNTY TRAFFIC ALCOHOL PROGRAM (TAP)

In an attempt to impact the number of fatalities, injuries, and property-damage accidents related to alcohol, a comprehensive program of countermeasures has been implemented in Lexington-Fayette County. The program involves a coordinated effort between the Division of Police, the judicial system, rehabilitation program administrations, educational institutions, and the local news media. Generally, the program includes the following components: 1) officer DUI training course, 2) deployment of officers for DUI enforcement, 3) public information campaign, and 4) development and administration of an effective alcohol education program.

Some expected accomplishments and anticipated long-range results of Lexington's Traffic Alcohol Program are listed below:

1. Reduce alcohol-related fatality/injury accidents by 25 percent.
2. Decrease the average blood alcohol level of those arrested for DUI from 0.20 to between 0.10 to 0.14.
3. Reduce the number of "Reckless Driving - Had Been Drinking" arrests (this notation is used to identify reckless driving arrests in which alcohol was involved).
4 Increase community awareness of the problems created by drinking drivers.
5. Increase voluntary compliance to the DUI and Implied Consent Laws.

The Traffic Alcohol Program began in Lexington-Fayette County on May 1, 1982 and is scheduled to continue through September 30, 1984. This enforcement program operates every night of the week except Sunday, and the hours of operation are generally from 10:30 pm to 3:30 am. The number of police officers on the TAP patrol varies from 15 to 25 per night, with higher numbers usually on weekends. Even though the program is still in operation, only the first year of data was selected for the impact evaluation.

DATA COLLECTION PROCEDURES

To assess the impact of the Traffic Alcohol Program, three primary types of data were collected for analysis. Those were accident data, arrest and adjudication data, and personal opinion data obtained by means of questionnaire survey.

ACCIDENT DATA

Accident data were collected for the three-year period from May 1, 1980, through April 30, 1983. To obtain the type of data necessary for detailed analysis, copies of all accident reports having alcohol listed as a contributing factor were obtained from the Lexington-Fayette County Division of Police. Additional data for injury, property-damage, and total accidents were also obtained from the Division of Police. The primary purpose for obtaining accident reports rather than using the computerized file was to obtain a more detailed description of the type of accident and to have available the location within Fayette County. Location information was to be used for zonal analysis and comparison of arrest and accident locations.

ARREST AND ADJUDICATION DATA

Arrest and adjudication data were the second major data element included in the analysis. Data reflecting a complete summary of the arrest and adjudication

history for each DUI case were available from the Administrative Office of the Courts, which is part of Kentucky's judicial system. Arrest and adjudication data were collected for the two-year period from May 1, 1981, through April 30, 1983. Due to time required to collect those data, only a 25-percent sample was obtained for inclusion in the analysis. The sample of 25 percent is sufficient to insure that the confidence level or reliability is 95 percent that the error of the observed values would be between two and three percent.

QUESTIONNAIRE SURVEY DATA

To determine public opinion of the Traffic Alcohol Program, a survey of registered vehicle owners in Fayette County was conducted. The number of registered vehicle owners in Fayette County is approximately 100,000 and the questionnaire was sent to 2,500. The questionnaire included 15 questions, about half of which were socio-economic and the other half related to opinions concerning the Traffic Alcohol Program. The one-page questionnaire was attached to a letter briefly explaining the research and enforcement program. Copies of the letter and questionnaire are in the Appendix. A postage-paid return envelope was also attached to encourage response. The survey response was sufficient to insure a confidence level of 95 percent that the error of the results would be very near three percent.

ANALYSIS OF RESULTS

ACCIDENT DATA

As noted previously, accident trends and statistics were one of three primary areas of analysis. Alcohol-related accidents in Lexington-Fayette County were analyzed for the three-year period from May 1, 1980, through April 30 1983. This included a two-year period before the Traffic Alcohol Program and a one-year period during TAP. Presented in Table 1 is a summary of alcohol-related accidents by month for each of the two years before TAP and the first year of TAP. It may be seen that the difference between average accidents for the two-year period before and the one-year period during TAP varies considerably from month to month. Overall there was a 21-percent decrease between the two-year period before and the one-year during TAP. To determine the significance of the accident reduction, the chi square test was applied and the decrease was found to be significant at the 99.5-percent confidence level (4).

To determine whether the significant decrease in accidents was a result of TAP or a general decrease in accidents, total accidents for the same time period were tabulated. This summary is presented in Table 2, and the overall decrease was shown to be 7.6 percent. This decrease was also significant at the 99.5-percent confidence level. The question of whether all the decrease in total accidents was attributable to alcohol-related accidents was also addressed. Alcohol-related accidents represent slightly over 10 percent of all accidents during the three-year study period. If they are excluded from each year's total, then the decrease in accidents is 6.1 percent (significant at 99.5-percent confidence level) when comparing the two years before with the year during TAP. Therefore, a general decrease in total accidents did occur beyond the influence of alcohol-related accidents. The result was a 6.1-percent decrease in all accidents, excluding those related to alcohol, and a 21.0-percent decrease in alcohol-related accidents. It should be noted that even though the reduction in both alcohol-related and "other" accidents were significant at the 99.5-percent confidence level, the magnitude of the reduction in alcohol-related accidents is approximately three times greater than for "other" accidents.

The significant decrease in alcohol-related accidents of 21.0 percent was for all hours of the day. Further analysis was required to determine if variations in accidents for the hours of TAP enforcement were different from all hours of the day. During the hours of TAP enforcement (10:30 pm till 3:30 am except Sunday night and Monday morning), the decrease in alcohol-related accidents was 29.7 percent

(significant at 99.5-percent confidence level). This is slightly more than the decrease in alcohol-related accidents for all hours (21.0 percent); however, the impact of TAP extended to hours other than those hours of special enforcement because of increased public awareness and an increased level of enforcement during non-TAP hours. A summary of alcohol-related accidents during TAP hours by month is presented in Table 3. Again, there was considerable variability among months with the decrease in accidents ranging from 13 to 48 percent.

Additional time distributions of alcohol-related accidents are presented in Tables 4 and 5. The summary of alcohol-related accidents by day of week in Table 4 shows that distribution was very similar for the two-year period prior to TAP and the year during TAP. Fridays and Saturdays had the highest number of alcohol-related accidents. The distribution of alcohol-related accidents by time of day is presented in Table 5. When comparing three-hour periods, it was noted that the only increase from before to during TAP occurred between 6:00 am and 8:59 am. The largest number of accidents occurred between midnight and 2:59 am. This time period also had the largest decrease in number of accidents.

Another aspect of the overall accident analyses was an investigation of alcohol-related accidents by enforcement action (Table 6). From the enforcement action noted on the accident report form, it was found that the offense of "driving under the influence" increased slightly when comparing the two years before with the first year of TAP. A reason for the small change in the offense of "driving under the influence" is the fact that Kentucky statutes do not permit arrest for "probable cause". Therefore, an officer would have to observe a person driving before or after an accident to issue a citation for "driving under the influence". An opposite trend was found for public intoxication offenses with a decrease from 303 and 281 the two years before TAP to 192 during TAP. Likewise, "Reckless Driving - Had Been Drinking" offenses decreased after implementation of TAP.

The Lexington-Fayette County area was divided into ten zones for the purpose of comparing location of accidents arrests, and residence of those arrested and those responding to the questionaire. Zones were selected so they generally represented areas of similar land use, population density, and socio-economic characteristics. A map showing the zones used in the evaluation is presented in Figure 1. Results of comparing alcohol-related accidents by zone are presented in Table 7. The data show a wide range in the number of accidents per zone before and during TAP. In addition, the percentage changes from a two-year period before to the year during TAP varied significantly by zone. Zones having the smallest change in accidents were combination residential-commercial-farmland in the west and northwest sections of the county. Greatest decreases in accidents were for residential-commercial zones in the east and northeast sections.

Further analysis by zone is presented in Table 8. To explain the differences in accident patterns, the population of each zone and the number of alcohol establishments within each zone are also presented. Zones 6, 7, and 9, which had the greatest decreases in accidents between the before-and-during TAP study periods, were in the medium population range with varying numbers of alcohol establishments. A better relationship could probably have been obtained if the alcohol establishments had been stratified further to show the number of bars separately from package liquor stores and grocery stores.

Alcohol-related accidents for the three-year study period were classified by the most severe injury in Table 9. Data from this summary show the percentage of fatal or injury accidents decreased by 22.5 percent when comparing the two-year before period with the one-year period during TAP.

Additional data showing total injuries resulting from alcohol-related accidents during the three-year study period are presented in Table 10. When total

fatalities and injuries for the two-year before period were compared to the year during TAP, the result was a 25.0-percent decrease. This decrease was a direct result of the decrease in accidents rather than reduced severity because the calculated severity index remained essentially unchanged over the three-year period. Severity indices were 2.50 and 2.49 for the two years prior to TAP and 2.48 during the first year of TAP.

Alcohol-related accidents were also summarized by a description code that explains the type of accident involved. Presented in Table 11 are the most frequently occurring types of accidents during the two-year before and one-year during TAP period. It is shown that collisions with fixed objects were the most frequently occurring type. Accidents with one vehicle in a parked position and rear-end accidents were also frequently occurring.

TIME-SERIES ANALYSIS OF ACCIDENT DATA

Alcohol-related accidents were obtained beginning in January 1980. This gave a total of 173 weeks of accident data that was available to be analyzed for the time period of January 5, 1980, through April 29, 1983. The analysis period was started on January 5, 1980, because the TAP program started on a Saturday (May 1, 1982) and January 5 was the first Saturday in 1980. The relationship between number of accidents and time in weeks was analyzed. The purpose of time-series analyses was to determine whether this alcohol enforcement program had a significant impact on alcohol-related accidents. A time series is defined as a sequence of data elements recorded over equally spaced time periods. Typical before-and-after studies of the effect of a new safety program may be invalidated by failure to detect and eliminate within-series relationships or autocorrelation in the accident data. Examination of data over a period by time-series analysis often reveals within-series relationships existing between the data points. Frequently, this is the result of annual cycles or seasonality in accident data. Autocorrelation may also result from longer term trends such as population growth or decline or changes in vehicle-miles traveled.

Classical regression analysis is not applicable when the data are time dependent or correlated. A time-series regression approach can determine the dependence of each data point in a series with its own history and then determine the relationship between the independent variable input time-series and the dependent variable output time-series. The relationship between the input series and the output series is found in the development of the transfer function. The transfer function relates not only the contemporaneous but also the lagged input series with the output series. A typical transfer function may be of the form

$$Y_t = b_o + b_1 X_t + b_1 X_{t-1} + \ldots + b_m\ t-m + \text{error}$$

in which Y_t = value of the dependent variable at time t;

X_t = value of the independent variable at time t;

X_{t-1} = value of the independent variable at time (t-1), or the input series lagged by one period;

X_{t-m} = value of the independent variable at time t-m, or the input series lagged by m periods.

$b_o, b_1, \ldots, b_m$ = the variable coefficents;

b_1 = the instantaneous effect of the input on the output; and

b_2 = the one period lagged effect of the input on the output.

In this case, the input series is represented by a dummy variable assuming a value of 0 before TAP and 1 after TAP. The output series is weekly accidents.

The time-series analysis for the weekly accident data was first performed without consideration of a time series lag. A plot of alcohol-related accidents versus time over the 173 weeks is

presented in Figure 2. The resultant equation was

$$Y_t = 18.29 - 3.77x_t + \text{error}.$$

Both coefficients were significant when the t-statistic was calculated. Based on this equation, the impact due to the Traffic Alcohol Program was a significant reduction of 3.77 accidents per week.

Another equation was developed to assess whether a time-lag effect impacted the overall program. Results of that analysis showed the impact was immediate and did not lag the beginning of the Lexington TAP Project on May 1, 1982.

Another analysis was performed for the relationship between alcohol-related accidents during TAP hours for each of the 173 weeks. As shown in Figure 3, the relationship was similar to that for total alcohol-related accidents. Again, the analysis was first performed without consideration of a time-series lag impact. The resultant equation was

$$Y_t = 8.77 - 2.33\ X_t + \text{error}.$$

The t-statistics for the variable coefficients were significant and the estimated reduction in alcohol-related accidents during TAP hours was 2.23 accidents per week. Results of the analysis showed that impact was immediate and did not lag the beginning of the Traffic Alcohol Program.

ARREST AND ADJUDICATION DATA

Results from arrest and adjudication data were based on a 25-percent sample of data for the two-year period between May 1, 1981, and April 30, 1983. Presented in Table 12 are total and sampled DUI arrests by month. The impact of TAP on number of DUI arrests occurred immediately after the program began on May 1, 1982. A large increase in the total number of DUI arrests is noted when comparing the year before (929 arrests) with the year during TAP (4,427 arrests). The distribution of DUI arrests by month is also presented in Table 12. Before TAP began, the lowest and highest number of DUI arrests were in July and April, respectively. During TAP, the lowest number of arrests was in January and the highest number was in October. It is likely that the unusually large number of arrests during October is related to University of Kentucky football games and Kenneland horse racing season.

Additional time distributions are shown for day of week and time of day in Tables 13 and 14. Most arrests were made on Saturdays both before and during TAP. Days having the next highest percentages were Fridays and Sundays. Even though there were no liquor sales on Sunday, the high percentages of arrests on that day were during the first few hours after midnight. This was generally confirmed by data presented in Table 14. The time period between midnight and 2:59 am has by far the highest percentage DUI arrests for both years of analysis.

Another summary of DUI arrests information presented in Table 15 shows the number of arrests during TAP hours increased from 141 before TAP to 939 during the first year of TAP. Additional statistics comparing TAP versus non-TAP DUI arrests are presented in Table 16. After the beginning of TAP, 84 percent of DUI arrests occurred during TAP hours (10:30 pm - 3:30 am). Before TAP, 60 percent of all DUI arrests occurred during those same hours. The results of police officer drunk-driving awareness has had an impact on the number of arrests during non-TAP hours and arrests by non-TAP officers. The number of arrests during non-TAP hours almost doubled from the year before as compared to the year during TAP. Similarly, the number of arrests by non-TAP officers increased by 68 percent.

One of the first items of concern by the police officer and, later, the judical system is whether the DUI offender has a valid driver's license. In almost 80 percent of the arrests during both years. the person arrested for DUI had a valid license. In 10.4 percent of the DUI arrests before TAP, the person arrested either had no license or the license was suspended or revoked. This compares with 8.7 percent of the DUI offenders in the first year of TAP who did not have a valid license. A summary of DUI arrests by license status is presented for both years of data in Table 17.

With an overflow of DUI arrests that had to be processed through the judicial system as a result of TAP, considerable

concern was expressed about the potential delays between arrest and adjudication However, data presented in Table 18 show the number of days between arrest and adjudication during TAP is very similar to before TAP. For both time periods, over 80 percent of the cases were brought before the court within 40 days after arrest. It should be noted that delay between arrest and adjudication was probably reduced by the addition of three people to the staff of the Administrative Office of the Courts as a result of TAP.

The outcome of the adjudication process is a critical element to any alcohol enforcement program. This process serves as the primary means for the judicial system to have an opportunity to rehabilitate and/or deter the offender. Presented in Table 19 is a summary of the types of adjudication resulting from DUI arrests. Education is offered in the form of the Alcohol Driver Education (ADE) School. Penalties are generally in the form of fines and jail sentences. A typical sentence for first-time offenders is a fine and mandatory attendence at the ADE School. One unique penalty required by some judges for first-time offenders is the requirement to submit a written report or an article relating to the consequences of drunk driving. Over 60 percent of the sample arrest cases resulted in combined sentences of fines and the ADE School Almost 95 percent of the arrests resulted in fines for the offender. Cases dismissed or ammended were approximately 15 percent before TAP and 11 percent during TAP. Some differences were noted when comparing the sampled data in Table 19 with available statistics from the complete adjudication data, which shows a conviction rate of 95 percent for DUI arrests.

At this point, it may be beneficial to assess the magnitude of TAP arrest and adjudication statistics by comparing them with statewide and national data (5). From Table 19, it can be seen that 62 percent of the DUI offenders attended the ADE School. Statewide, those attending the ADE School was 50 percent in 1980 and 59 percent in 1981. On the national level, the percentage of drivers referred to some type of education program was lower; 39 percent in 1978 and 1979, and 43 percent in 1980.

Other measures of performance available on the state and national level are DUI arrest rates per licensed driver and conviction rates for DUI offenses (5). The arrest rate per licensed driver in Fayette County was 0.7 during the year before TAP and 3.4 during TAP. In comparison the rate in Kentucky was 1.8 in both 1979 and 1980 and the national rate averaged 1.0 for the period of 1978 through 1980. One of the most revealing statistics associated with the handling of drunk-driving cases in Fayette County is the conviction rate. Sampled data presented in Table 19 show the conviction rate is in the range of 90 percent. Additional statistics for the total data indicate the conviction rate during the year of TAP may be in the order of 95 percent. In any case, it appears that the conviction rate is significantly higher than either the state or national average. For all of Kentucky, the conviction rate was 52 percent in 1980. The national average for 1978 through 1980 was 56 percent (5).

One of the objectives of the Traffic Alcohol Program was to reduce the blood-alcohol level (BAC) of those arrested for DUI. The data presented in Table 20 show this has occurred during the first year of TAP as compared to the year before TAP, the percentage arrested with a BAC level of 0.20 or more was 25.6 percent as compared to 16.5 percent during TAP. Those arrested with BAC levels between 0.10 and 0.14 increased from 19.1 to 29.5 percent. The average BAC level dropped from 0.173 the year before TAP to 0.152 the first year of TAP.

Average fines for DUI offenses are presented in Table 21. The data show fines have increased when comparing the year before to the year during TAP. In both years, the highest percentage of fines was in the range of $201 to $300. The average fine increased from $177 the year before TAP to $194 the first year of TAP. With these average fines, the estimated income would be $164,000 from the 929 DUI arrests during the year before

TAP and $859,000 from 4,427 DUI arrests during the first year of TAP.

Presented in Table 22 is a summary of average fines for various BAC levels. As expected, the average fine increases with increasing BAC level with slightly higher fines during TAP as compared to the year before.

Another important consideration when attempting to deal with the drunk-driving problem is the driving record of those arrested for DUI. Drivers arrested for DUI were found to have a worse prior driving record than the general driving population. This was true for both points and accidents. Presented in Table 23 is a summary of information that compares driving records before and during TAP. As may be seen, there are no significant differences when comparing the two periods of analysis. However, from a previous study of driver characteristics (6), the number of points per driver per year for a sample of all drivers was 0.22 as compared to 0.80 for those arrested for DUI as presented in Table 23. From that same study, it was determined that all drivers have an average of 0.03 accidents per driver per year as compared to 0.18 for drivers arrested for DUI during the year of TAP. Also, the number of violations per driver per year was 0.10 for all drivers as compared to 0.29 and 0.26 for drivers arrested for DUI the year before and the year during TAP, respectively. The percentage of drivers arrested who had a previous DUI arrest was 18 percent for both years of analysis.

Information related to the arrested DUI driver's age, sex, and race is presented in Tables 24 and 25. Over two-thirds of the drivers were between the ages of 20 and 39. A primary difference between the year before and the year during TAP was the higher percentage in the 20 to 24 age category. The summary of age and sex of the DUI driver shows that more than 80 percent were white males during both years. It is interesting to note that white females make up the next largest group and the percentage arrested almost doubled during the TAP year as compared to the year before.

The percentage of DUI drivers that was male (87 percent) was much higher than the percentage of male drivers in the general driving population (56 percent)(6). The age distribution of DUI drivers showed a higher percentage of drivers under 25 years of age (38 percent) compared to the general driving population (24 percent) and a much lower percentage of drivers 50 years or older (9 percent) than the general driving population (28 percent)(6). The percentages of drivers between 25 and 49 years of age were similar.

Data presented in Table 26 are a summary of DUI arrests by location of residence. Comparing the two years of analysis shows the number of Fayette County residents arrested decreased during TAP while the number from other Kentucky counties and areas outside Kentucky increased. Additional analysis was performed by comparing DUI arrests by zone of residence and zone of arrest. These data are presented in Table 27. Zones 7 and 10 were frequented by drunk drivers even though not very many arrested for DUI lived in those zones.

A basic skill required by the police officer involved in enforcement of drunk-driving laws is the ability to detect those suspected of DUI. During the first year of the program, the police officers were given training dealing with the most frequently occurring characteristics to use for detecting drunk drivers at night. To determine which driving characteristics were most frequently observed by the police officer, data were extracted from the arrest report and summarized in Table 28. The most commonly occurring driving characteristic that indicated a potential drunk driver was weaving of the vehicle. Other frequently occurring types were speeding, straddling or crossing center of lane marker, almost striking an object or vehicle, or disregarding a traffic signal.

After a driver has been stopped as a potential DUI offender, the officer generally requires the driver to go through a series of field sobriety tests to determine whether the person should be arrested. These tests are critical to the outcome of the case because the credibility of the arresting officer is at

stake. An officer does not want to arrest a person unless they are legally drunk. In borderline cases (BAC close to 0.10), the officer needs substantial evidence to support his decision to make an arrest. A summary of results from the specific field sobriety tests is presented in Table 29. The most common test given was having the driver place one foot near the bumper to test the person's balance. Other common tests were requiring the driver to 1) touch his nose with his eyes closed and head tilted and 2) walk a line heel-to-toe. As the data show, a very small percentage of those performing these tests passed. A large number of tests are available for use and generally several tests are given to each driver. In some cases, the driver may pass one but fail others.

An analysis was made of results from the field sobriety tests and BAC levels. Only a small percentage of drivers arrested for DUI passed any of the tests given. A significantly higher percentage of drivers passed the field sobriety tests when their BAC levels were less than 0.10. As expected in a situation where considerable judgement is required, there were some drivers arrested who had BAC levels later determined to be less than 0.10. However, from the sample of 1,114 arrests, only 72 drivers failed a field sobriety test and was arrested even though their BAC was later found to be less than 0.10. There could be a reason for a driver failing a test when his BAC was less than 0.10. The driver could be under the influence of some type of drug or there could be a problem with administering the test.

COST EFFECTIVENESS

Even though all of the costs and benefits associated with the Traffic Alcohol Program in Lexington-Fayette County were not readily available, sufficient data were gathered to make a reasonable estimate of the program's overall cost effectiveness. One of the primary cost components of the program was personnel for increased enforcement. For the period of May 1, 1982, through April 30, 1983, total police personnel costs associated with the program were $367,900. In addition to personnel, other costs were for administration, vehicle mileage, equipment, supplies, officers' court time, and additional salaries for Administrative Office of the Courts' personnel. These support costs totaled $115 600. Other significant costs were court costs and jail costs. Court costs, which are part of the DUI fine imposed by the judge, increased from $25.00 to $37.50 per case during the first year of TAP. However, only $27.00 of the $37.50 was returned to the state General Fund as the portion necessary to support the Administrative Office of the Courts. Based on a total of 4,427 DUI arrests during the first year of TAP, court costs were determined to be $114,700. Court costs to handle other traffic violations and public intoxication arrests totaled $99,700. Jail costs were determined to be approximately $497,500 during the first year of the program. The jail costs were calculated using an average of $25 per day for each day served. Estimates of numbers of days served and costs were based on the sample arrest data and other information obtained from the Lexington-Fayette County Jailer. It is not completely clear whether some of the basic operational costs of the jail should be included or whether only increased costs resulting from processing and handling those arrested as part of TAP are appropriate. To be certain that all costs were included, full per diem allowance was tabulated in the total of $497,500. Considering all components, the total cost of the program during the first year was computed to be $1,195,400.

Benefits and income were derived from two primary sources; DUI fines and reduced accident costs. Income from TAP was the result of fines assessed to those who were arrested for DUI. During the first year of TAP there were 4,427 arrests and the average fine per arrest was determined to be $194 (from the 25-percent sample of data at the Administrative Office of the Courts). After subtracting court costs from the total fine, income received from DUI fines was $697,900. A total court cost of $160,900 was paid by the drivers arrested for DUI yielding an income of

$858,800 from DUI fines (including court costs).

While TAP officers were on duty, they gave out a significant number of citations for other traffic violations and made several public intoxication arrests. The revenue from these violations and arrests was estimated to be $245,400 (including court costs).

A commonly used measure of the benefit of a highway safety program is an estimate of accident costs that will not be incurred as a result of reduced accidents. For this program, the numbers of injuries and property-damage accidents were previously shown in Tables 9 and 10. Using those data and accident costs reported by the National Safety Council (7), the savings resulting from reduced accident costs were determined to be $1,505,000. Therefore, total benefits and income for a one-year period resulting from the program were $2,609,200.

All known and estimated costs and benefits associated with the first year of TAP are summarized in Table 30. Also in the table is the calculated benefit-cost ratio of 2.18, which shows that benefits were about two times greater than costs during the first year. It is also significant to note that direct revenue from fines and court costs would account for 92 percent of the cost of the program.

QUESTIONNAIRE SURVEY

The survey of registered vehicle owners was conducted in the spring of 1983. From the total of approximately 100,000 registered vehicle owners, a random sample of 2,500 was selected and mailed a questionnaire containing 15 questions. Responses were received from 989, or approximately 40 percent of those sent questionnaires. Results from the survey, other than questions dealing with general socio-economic data, are presented in Table 31. The first question dealt with the public's awareness of TAP, and it was found that 96 percent of the respondents knew about the program. More than three-fourths felt that TAP reduced their chances of involvement in an alcohol-related accident. Only 17 percent felt the enforcement program violated their rights as a driver. Eighty-five percent indicated they were in favor of increased enforcement as a means of reducing the number of drunk drivers Probably the most surprising result was that 65 percent indicated they were willing as a taxpayer, to support increased enforcement after federal funding was discontinued.

Because of the concentrated effort to inform the public about TAP, an attempt was made to determine the specific means that people became aware. The results are summarized in Table 32. Of the respondents who knew about TAP 95 percent noted they became aware through the local news media and 40 percent had heard of the program through discussions with others. An additional three percent had found out about the program by being arrested or warned by a police officer. Seven percent had become acquainted with TAP by some other means.

One of the primary purposes of the survey was to determine the perceived risk of the drivers while the Traffic Alcohol Program was ongoing. The question asked was "Do you feel that your chances of being arrested for drinking and driving are greater now than before the Traffic Alcohol Program began?" More than half (55 percent) indicated that TAP increased their danger of DUI arrest. Data on perceived risk are not available before TAP; however, it would be of value to survey the public's attitude again after TAP is discontinued to determine if the level of perceived risk changes.

More information from the survey related to perceived risk is presented in Table 33. A cross tabulation of the question dealing with perceived risk and several other questions produced interesting results. There were only two questions where a significant difference existed between the levels of perceived risk for those answering yes or no to the question. The questions related to whether the respondent ever felt in danger of a DUI arrest and if he felt the level of enforcement violated drivers' rights. It was found that the level of perceived risk because of TAP was higher for those who felt they had been in danger of DUI

arrest. Results also showed the level of perceived risk was higher for those who also thought the increased enforcement violated their rights as drivers.

Many responses included comments that explained the respondent's answers or expanded on another subject not included in the questionnaire. A major question not included was information pertaining to the drinking habits of the respondent. Constraints of the questionnaire approval process would not permit inclusion of questions related to drinking habits. However, it is interesting to note that approximately 10 percent of the respondents made sufficient effort to indicate they did not drink. This and other frequent respondent comments are summarized in Table 34.

Additional information about the personal characteristics of the questionnaire respondents is presented in Table 35. This table includes information about respondents' sex, marital status, education, occupation, annual income, and zone of residence. These personal characteristics are summarized as follows: about half of the respondents were less than 40 years old; two-thirds were male; almost 75 percent were married; and over half had a college education. By far, the occupation of respondents representing the highest percentage was professional employees. Included in this category were accountants, doctors, engineers, lawyers, nurses, school teachers, and others where significant education and training are required to be employed in that profession. The high percentage of professionals is also reflected in the relatively high income levels, with 31 percent earning over $30,000 per year.

SUMMARY OF FINDINGS

Results from the impact evaluation of the Lexington-Fayette County Traffic Alcohol Program were analyzed for the following four areas: accidents, arrests and adjudication, cost effectiveness, and a questionnaire survey. A summary of major findings from each of these analyses is presented. Also, findings related to the goals and expected accomplishments set before the implementation of TAP are summarized.

ACCIDENTS

1. Alcohol-related accidents decreased by 21.0 percent when comparing the two-year period before TAP with the first year of TAP.
2. Other non-alcohol-related accidents decreased by 6.1 percent when comparing the before period with the TAP enforcement period.
3. Alcohol-related accidents decreased by 29.7 percent during the TAP hours of enforcement (10:30 pm until 3:30 am, except Sunday night and Monday morning).
4. Alcohol-related fatal and injury accidents decreased by 22.5 percent when comparing the two-year before period with the one-year period during TAP
5. Results from the time-series analysis revealed a significant reduction in the number of alcohol-related accidents after TAP began.

ARREST AND ADJUDICATION

1. DUI arrests increased from 929 in the year before to 4,427 during the first year of TAP.
2. DUI arrests during TAP hours were 84 percent as compared to 60 percent during an equivalent time the year before TAP.
3. The most common types of adjudication were a fine and/or attendance at the Alcohol Driver Education School.
4. Slightly over 95 percent of those arrested and charged with DUI during the first year of TAP were convicted.
5. A significant drop in BAC level has occurred when comparing the year before and the first year of TAP.
6. The number of points per driver per year was 0.22 for all drivers as compared to 0.80 for those arrested for DUI during the study period.
7. The percentage of drivers arrested for DUI who were male or young (under 25 years of age) was much higher than the percentages of male or young drivers in the general driving population.
8. It was found that 18 percent of

drivers arrested during the study period had a previous DUI arrest.

9. Drivers arrested for DUI during the study period were found to have a worse prior driving record than the general driving population. This was true for both points and accidents.

COST EFFECTIVENESS

1. Total cost of TAP during its first year was determined to be $1,195,400.

2. Benefits resulting from reduced accident costs and income from DUI totaled $2,609,200.

3. The first-year benefit-cost ratio of the program was determined to be 2.18.

4. Direct revenue from fines and court costs would account for 92 percent of the cost of the program.

QUESTIONNAIRE SURVEY

1. Responses were received from 989 (40 percent) of those mailed questionaires.

2. It was found that 96 percent of the respondents previously knew about the program.

3. Seventy-eight percent felt that TAP reduced their chances of involvement in an alcohol-related accident.

4. Only 17 percent felt the enforcement program violated their rights as a driver.

5. Eighty-five percent indicated they were in favor of increased enforcement as a means of reducing the number of drunk drivers.

6. Almost two-thirds indicated they were willing, as taxpayers, to support increased enforcement after federal funding was discontinued.

7. More than half (55 percent) responded that TAP increased their danger of DUI arrest.

EXPECTED ACCOMPLISHMENTS

A list of five expected accomplishments and anticipated long-range results of TAP was developed before implementation of the program. Following is a discussion of how the findings of this study relate to those stated goals.

1. A 25-percent reduction in alcohol-related fatality or injury accidents was set as a goal. There was an actual decrease of about 23 percent in the number of fatal or injury accidents the first year during TAP and a 25-percent decrease in the number of fatalities and injuries resulting from those accidents.

2. A goal was to reduce the BAC level from about 0.20 to between 0.10 to 0.14. The average BAC level for the sample of arrested drivers decreased from 0.173 the year before to 0.152 the first year after implementation of TAP.

3. A goal was to reduce the number of "reckless driving - had been drinking" arrests. The number of arrests for this offense decreased from 567 the year before to 359 the first year during TAP.

4. The goal of increasing community awareness of the drinking driver problem was accomplished as shown by responses to the questionnaires. For example, 96 percent of the respondents were aware of the TAP program and 85 percent favored increased enforcement to reduce the number of drunk drivers.

5. Increased compliance with the DUI and Implied Consent law was set as a goal and the percent of drivers refusing the BAC test decreased from 8.6 percent before to 7.6 percent during the first year of TAP.

REFERENCES

1. Joscelyn, K. B.; Jones, R. K.; and Ruschmann, P. A.; "Alcohol and Highway Safety," Highway Safety Research Institute, University of Michigan, 1981.
2. Onder, James I., "Drunk Driving Public Information and Education Program," Preliminary Draft, Contract DTNH 22-81-C-05093, National Highway Traffic Safety Administration, U.S. Department of Transportation.
3. Pigman, J. G.; Agent K. R.; and Creasey, T.; "Problem Identification for Highway Safety Plan (FY 1984)." Transportation Research Program, College of Engineering, University of Kentucky, September 1983.

4. Sparks, J. W.; "Development of an Effective Highway Safety Program," Traffic Engineering, January 1977.
5. "A National and State Alcohol Assessment - 1978 Through 1981", U. S. Department of Transportation, National Highway Traffic Safety Administration, 1983.
6. Agent, K. R., "Characteristics of Kentucky Drivers," Research Report 489, Bureau of Highways, Kentucky Department of Transportation, January 1978.
7. "Estimating the Cost of Accidents, 1982", National Safety Council Bulletin, August 1983.

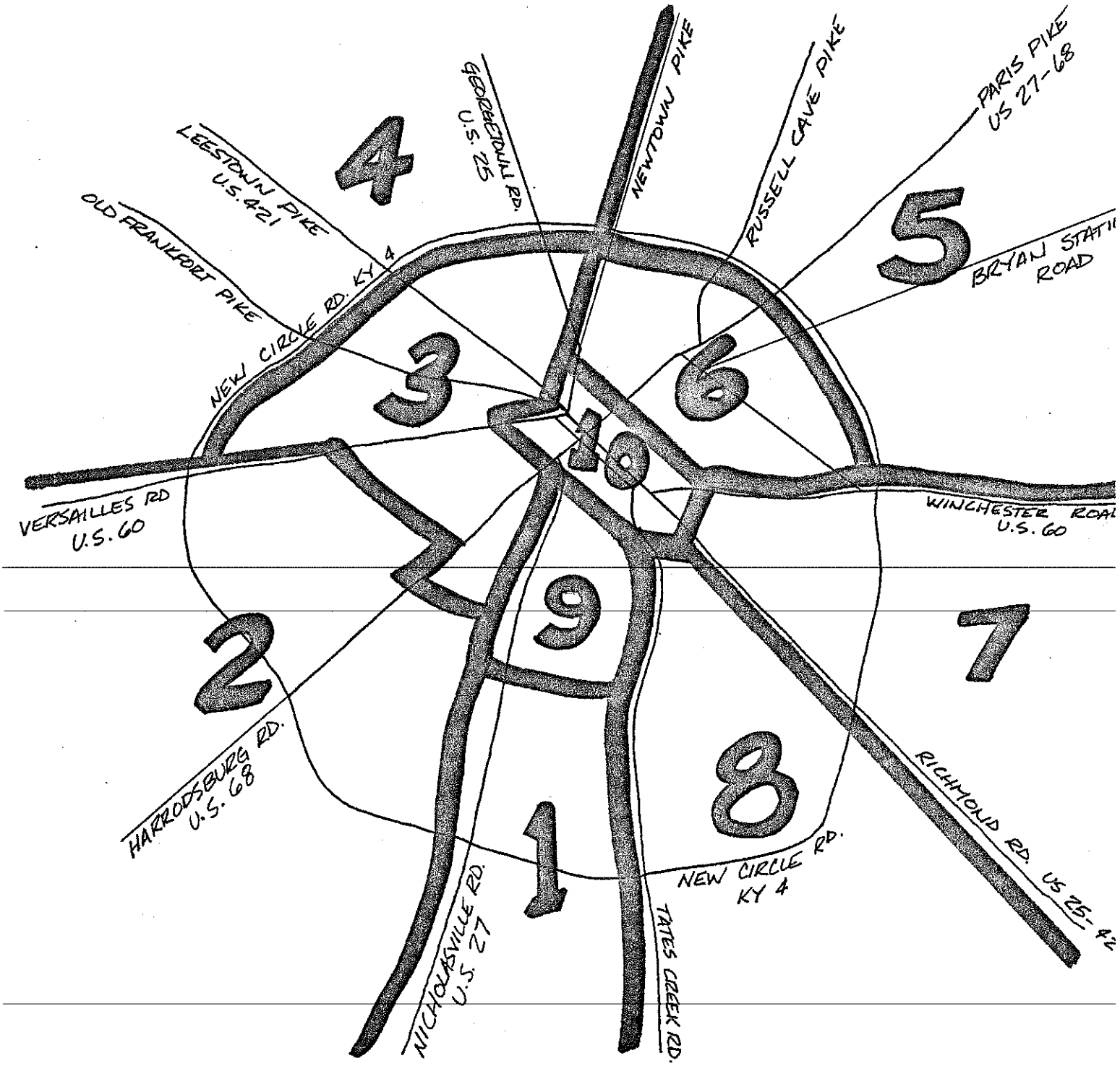

Figure 1. Lexington-Fayette County Zones Used in Study

Figure 2. Weekly Distribution of Alcohol-Related Accidents

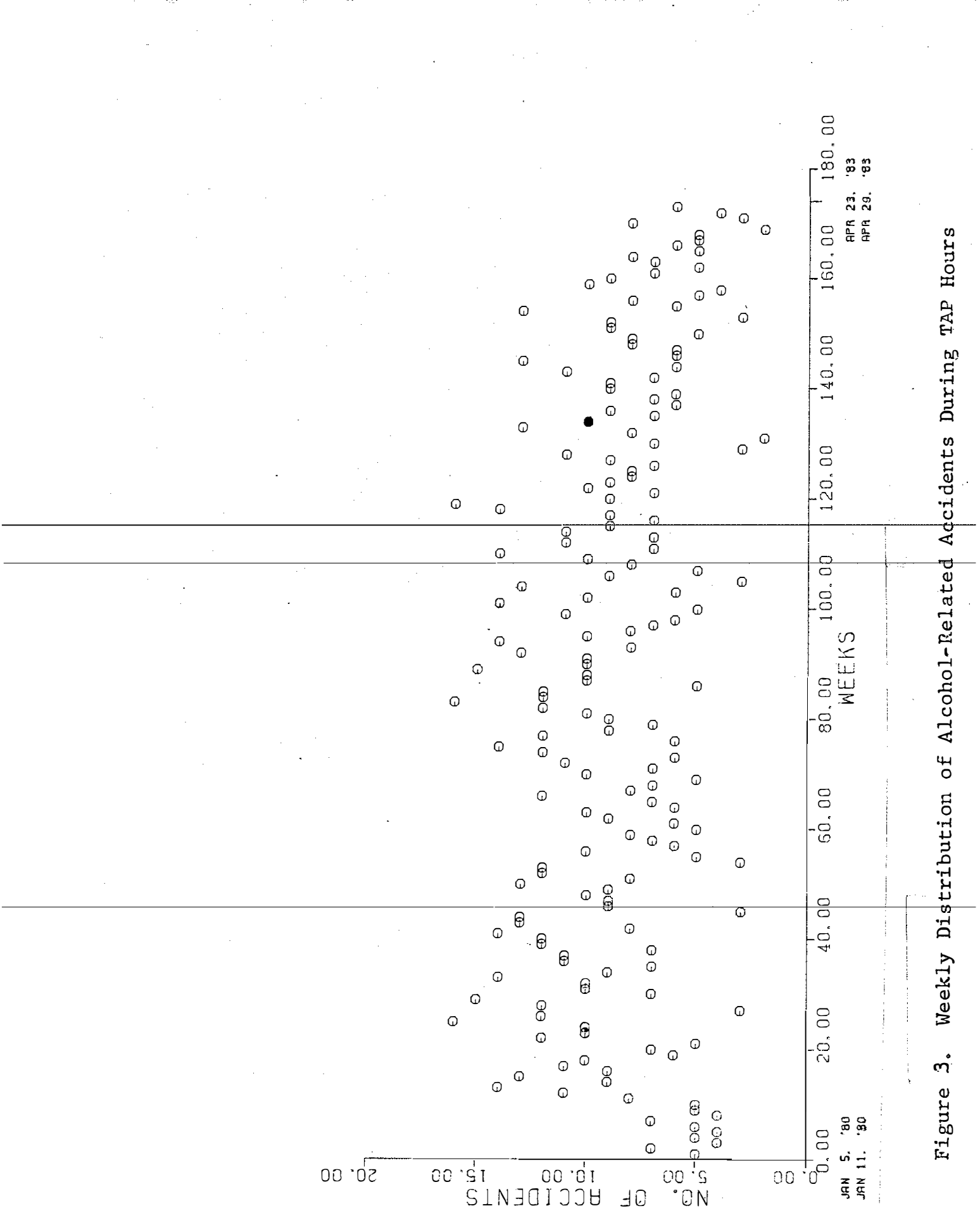

Figure 3. Weekly Distribution of Alcohol-Related Accidents During TAP Hours

TABLE 1. ALCOHOL-RELATED ACCIDENTS BY MONTH

MONTH	MAY 1980 - APRIL 1981 NUMBER	PERCENT	MAY 1981 - APRIL 1982 NUMBER	PERCENT	2-YEAR AVERAGE	MAY 1982 - APRIL 1983 NUMBER	PERCENT	PERCENT CHANGE FROM 2-YEAR AVERAGE
May	83	8.1	99	9.5	91	96	11.8	+5.5
June	93	9.1	91	8.6	91	48	5.9	-47.3
July	87	8.5	82	7.9	85	73	9.0	-14.1
August	100	9.8	94	9.0	97	65	8.0	-33.0
September	81	7.9	86	8.3	84	73	9.0	-13.1
October	89	8.7	89	8.6	89	85	10.4	-4.5
November	83	8.1	84	8.1	84	58	7.1	-31.0
December	99	9.7	84	8.1	92	76	9.3	-17.4
January	75	7.3	77	7.4	76	61	7.5	-19.7
February	77	7.5	81	7.8	79	65	7.0	-17.7
March	73	7.1	60	5.8	67	65	8.0	-3.0
April	85	8.3	116	11.1	101	51	6.3	-49.5
TOTAL	1,025		1,041		1,033	816		-21.0

TABLE 2. TOTAL ACCIDENTS BY MONTH

MONTH	MAY 1980 - APRIL 1981 NUMBER	PERCENT	MAY 1981 - APRIL 1982 NUMBER	PERCENT	2-YEAR AVERAGE	MAY 1982 - APRIL 1983 NUMBER	PERCENT	PERCENT CHANGE FROM 2-YEAR AVERAGE
May	919	8.7	911	8.5	915	858	8.7	-6.2
June	814	7.7	809	7.6	812	754	7.7	-7.1
July	831	7.9	807	7.6	819	809	8.2	-1.2
August	935	8.8	845	7.9	890	826	8.4	-7.2
September	945	8.9	917	8.6	931	796	8.1	-14.5
October	1031	9.8	959	9.0	995	925	9.4	-7.0
November	865	8.2	881	8.3	873	883	9.0	+1.1
December	933	8.8	994	9.3	964	927	9.4	-3.8
January	857	8.1	1097	10.3	977	730	7.4	-25.3
February	794	7.5	839	7.9	817	756	7.7	-7.5
March	783	7.4	780	7.3	782	742	7.6	-5.1
April	864	8.2	839	7.9	852	813	8.3	-4.6
Total	10,571		10,678		10,626	9,819		-7.6

TABLE 3. ALCOHOL-RELATED ACCIDENTS BY TAP HOURS AND MONTH*

MONTH	MAY 1980 - APRIL 1981 NUMBER	PERCENT	MAY 1981 - APRIL 1982 NUMBER	PERCENT	2-YEAR AVERAGE	MAY 1982 - APRIL 1983 NUMBER	PERCENT	PERCENT CHANGE FROM 2-YEAR AVERAGE
May	34	7.5	41	8.7	37	32	9.8	-13.5
June	48	10.5	37	7.8	42	26	8.0	-38.1
July	41	9.1	38	8.1	39	34	10.4	-12.8
August	48	10.5	46	9.7	47	29	8.9	-38.3
September	38	8.4	42	8.9	40	27	8.3	-32.5
October	49	10.8	48	10.2	49	33	10.1	-32.6
November	33	7.3	30	6.3	32	22	6.8	-31.3
December	44	9.7	35	7.4	40	22	10.1	-45.0
January	37	8.2	34	7.2	36	25	7.7	-30.6
February	22	4.9	40	8.5	31	25	7.7	-19.4
March	30	5.8	32	6.8	31	19	5.8	-38.7
April	30	6.6	50	10.6	40	21	6.4	-47.5
Totals	454		473		464	326		-29.7

*TAP hours 10 30 pm to 3.30 am except Sunday night and Monday morning.

TABLE 4. ALCOHOL-RELATED ACCIDENTS BY DAY OF WEEK

DAY OF WEEK	MAY 1980 - APRIL 1981 NUMBER	PERCENT	MAY 1981 - APRIL 1982 NUMBER	PERCENT	MAY 1982 - APRIL 1983 NUMBER	PERCENT
Sunday	158	15.4	164	15.8	113	13.9
Monday	90	8.8	80	7.7	74	9.1
Tuesday	122	11.9	111	10.7	86	10.5
Wednesday	117	11.4	118	11.3	72	8.8
Thursday	132	12.9	119	11.4	98	12.0
Friday	162	15.8	194	18.6	143	17.5
Saturday	244	23.8	255	24.5	230	28.2
Totals	1,025		1,041		816	

LE 5. ALCOHOL-RELATED ACCIDENTS BY TIME OF DAY

E OF DAY	MAY 1980 - APRIL 1981		MAY 1981 - APRIL 1982		TWO-YEAR AVERAGE BEFORE TAP		MAY 1982 - APRIL 1983		CHANGE FROM TWO-YEAR AVERAGE	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
night - 2 59 am	279	27.3	320	31.2	300	29.2	216	27.3	-84	-28.0
0 am - 5:59 am	64	6.3	65	6.3	65	6.3	48	6.1	-17	-15.4
0 am - 8.59 am	16	1.6	15	1.5	16	1.6	27	3.4	+11	+68.8
0 am -11.59 am	25	2.4	25	2.4	25	2.4	13	1.6	-12	-48.0
n - 2 59 pm	45	4.4	55	5.4	50	4.9	37	4.7	-13	-26.0
0 pm - 5.59 pm	110	10.8	110	10.7	110	10.7	89	11.2	-21	-19.1
0 pm - 8 59 pm	201	19.7	166	16.2	184	17.9	147	18.6	-37	-20.1
0 pm - 11.59 pm	281	27.5	270	26.3	276	26.9	215	27.1	-61	-22.1

LE 6. ALCOHOL-RELATED ACCIDENTS BY MONTH AND ENFORCEMENT ACTION

TH	MAY 1980 - APRIL 1981			MAY 1981 - APRIL 1982			MAY 1982 - APRIL 1983		
	DUI*	PUBLIC INTOXICATION	RECKLESS DRIVING-HAD BEEN DRINKING**	DUI	PUBLIC INTOXICATION	RECKLESS DRIVING-HAD BEEN DRINKING	DUI	PUBLIC INTOXICATION	RECKLESS DRIVING-HAD BEEN DRINKING
	4	33	1	12	23	2	12	25	2
e	9	27	4	6	25	2	4	10	1
y	4	30	2	3	20	2	12	18	2
ust	5	32	2	10	26	1	8	19	0
tember	8	24	3	8	21	1	7	17	0
ber	7	27	2	4	25	1	14	24	0
ember	8	21	2	12	18	2	7	15	2
ember	8	22	1	4	28	0	9	21	1
uary	7	23	0	7	24	2	7	7	0
ruary	5	21	2	10	26	0	13	11	0
ch	9	17	0	8	10	1	9	15	0
l	10	26	2	8	35	1	6	10	0
ls	84	303	21	92	281	15	108	192	8

iving under the influence.
ckless driving arrests in which alcohol was involved.

TABLE 7. ALCOHOL-RELATED ACCIDENTS BY FAYETTE COUNTY ZONES

ZONE	MAY 1980 - APRIL 1981	MAY 1981 - APRIL 1982	2-YEAR AVERAGE BEFORE TAP	MAY 1982 - APRIL 1983	PERCENT CHANGE FROM 2-YEAR AVERAGE
1	75	75	75	59	-21.3
2	84	118	101	76	-24.8
3	100	88	94	91	-3.2
4	44	39	42	41	-2.4
5	160	166	163	132	-19.0
6	129	108	119	82	-31.1
7	152	160	156	108	-30.8
8	134	138	136	108	-20.6
9	34	46	40	28	-30.0
10	113	103	108	91	-15.7
Totals	1,025	1,041	1,033	816	-21.0

TABLE 8. POPULATION, ALCOHOL ESTABLISHMENTS, AND CHANGE IN ACCIDENTS BY ZONE

ZONE	POPULATION	ALCOHOL ESTABLISHMENTS	PERCENT CHANGE IN ACCIDENTS*
1	22,425	52	-21.3
2	34 501	54	-24.8
3	24,583	60	-3.2
4	3 678	20	-2.4
5	37,416	57	-19.0
6	20 480	39	-31.1
7	17,590	78	-30.8
8	36,038	19	-20.6
9	10,403	30	-30.0
10	4 983	78	-15.7
TOTAL	212,097	487	-21.0

*Percent change first year during TAP from 2-year average before TAP.

BLE 9. ALCOHOL-RELATED ACCIDENTS CLASSIFIED BY MOST SEVERE INJURY*

ST SEVERE INJURY	MAY 1980 - APRIL 1981		MAY 1981 - APRIL 1982		TWO-YEAR AVERAGE BEFORE TAP		MAY 1982 - APRIL 1983		CHANGE FROM TWO-YEAR AVERAGE	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
tality	6	0.6	9	0.9	8	0.8	5	0.6	-3	-37.5
capacating Injury	98	9.6	95	9.1	96	9.7	75	9.2	-21	-21.9
n-Incapacitating Injury	207	20.2	209	20.1	208	20.2	153	18.8	-55	-26.4
ssible Injury	54	3.8	71	6.8	62	6.0	57	7.0	-5	-8.1
Injury	660	71.9	657	63.1	658	63.0	526	64.5	-132	-20.1
tal or Injury Accident	365	35.6	384	36.9	374	36.2	290	35.5	-84	-22.5

ata obtained from contributing factors noted on uniform report form.

BLE 10. NUMBER OF INJURIES RESULTING FROM ALCOHOL-RELATED ACCIDENTS

PE OF JURY	MAY 1980 - APRIL 1981	MAY 1981 - APRIL 1982	CHANGE FROM TWO-YEAR AVERAGE BEFORE TAP	MAY 1982 - APRIL 1983	TWO-YEAR AVERAGE NUMBER	TWO-YEAR AVERAGE PERCENT
tality	6	9	8	6	-2	-25.0
capacitIng Injury	133	134	134	97	-37	-27.6
n-Incapacitlng Injury	316	323	320	236	-84	-26.2
ssible Injury	106	114	110	89	-21	-19.1
tal	561	580	570	428	-142	-25.0

TABLE 11. MOST FREQUENTLY OCCURRING TYPE OF ACCIDENT

TYPE OF ACCIDENT	NUMBER	PERCENT
Fixed Object	676	23.5
Collision with Parked Vehicle	549	19.0
Rear End	435	15.1
Angle	260	9.0
Parking Lot	214	7.4
Ran-Off-Roadway	95	3.3

TABLE 12. TOTAL AND SAMPLED DUI ARRESTS BY MONTH

	MAY 1981 - APRIL 1982				MAY 1982 - APRIL 1983			
	TOTAL ARRESTS		SAMPLED ARRESTS		TOTAL ARRESTS		SAMPLED ARRESTS	
MONTH	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
May	71	7.6	18	7.6	406	9.2	102	9.2
June	51	5.5	13	5.5	346	7.8	87	7.8
July	45	4.8	11	4.6	352	8.0	88	7.9
August	62	6.7	16	6.8	331	7.5	92	8.3
September	66	7.1	17	7.2	393	8.9	96	8.6
October	56	6 0	14	5.9	519	11.7	137	12.3
November	67	7.2	19	8.1	317	7.2	79	7.1
December	60	6.5	16	6.8	318	7.2	82	7.4
January	87	9.4	22	9.3	320	7.2	75	6.7
February	116	12.5	29	12.3	320	7.2	76	6.8
March	119	12.8	29	12.3	376	8.5	93	8.4
April	129	13.9	32	13.6	429	9.7	107	9.6
Totals	929		236		4,427		1,114	

ABLE 13. SAMPLE DUI ARRESTS BY DAY OF WEEK

AY OF WEEK	MAY 1981 - APRIL 1982 NUMBER	PERCENT	MAY 1982 - APRIL 1983 NUMBER	PERCENT
unday	34	14.4	182	16.3
onday	20	8.5	36	3.2
uesday	36	15.3	120	10.8
ednesday	29	12.3	140	12.6
hursday	30	12.7	169	15.2
riday	40	17.0	187	16.8
aturday	47	19.9	280	25.1

ABLE 14. SAMPLE DUI ARRESTS BY TIME OF DAY

TIME OF DAY	MAY 1981 - APRIL 1982 NUMBER*	PERCENT	MAY 1982 - APRIL 1983 NUMBER*	PERCENT
idnight - 2:59 am	98	43.2	733	66.7
:00 am - 5:59 am	25	11.0	67	6.1
:00 am - 8:59 am	6	2.6	7	0.6
:00 am - 11:59 am	1	0.4	11	1.0
oon - 2:59 pm	16	7.1	6	0.6
:00 pm - 5:59 pm	8	3.5	13	1.2
:00 pm - 9:59 pm	19	8.4	35	3.2
0:00 pm - 11:59 pm	54	23.8	227	20.7

Does not include arrests in which time of day was not reported.

TABLE 15. SAMPLE DUI ARRESTS DURING TAP HOURS BY MONTH

	MAY 1981 - APRIL 1982		MAY 1982 - APRIL 1983	
MONTH	NUMBER	PERCENT	NUMBER	PERCENT
May	12	8.5	85	9.1
June	7	5.0	80	8.5
July	7	5.0	79	8.4
August	7	5.0	75	8.0
September	8	5.7	82	8.7
October	6	4.3	109	11.6
November	9	6.4	66	7.0
December	9	6.4	67	7.1
January	12	8.5	61	6.5
February	19	13.5	65	6.9
March	24	17.0	80	8.5
April	21	14.9	90	9.6
Totals	141		939	

TABLE 16. SUMMARY OF SAMPLE DUI ARRESTS (TAP VERSUS NON-TAP)

	MAY 1981 - APRIL 1982	MAY 1982 - APRIL 1983
Total DUI Arrests	236	1,114
Arrests During TAP Hours*	141	939
Arrests During Non-TAP Hours*	86	160
Arrests By TAP Officers**	0	712
Arrests By Non-TAP Officers**	236	397

*Does not include arrests in which hour was not reported.
**Does not include arrests in which "TAP or non-TAP" officer category was not reported.

TABLE 17. SAMPLE DUI ARRESTS BY LICENSE STATUS

	MAY 1981 - APRIL 1982		MAY 1982 - APRIL 1983	
LICENSE STATUS	NUMBER*	PERCENT	NUMBER*	PERCENT
In Force	160	79.2	767	79.6
Expired	4	2.0	13	1.4
On Probation	0	0.0	6	0.6
Suspended	4	2.0	23	2.4
Revoked	12	5.9	41	4.3
Learner	0	0.0	7	0.7
Not KY Driver	17	8.4	88	9.1
No License	5	2.5	19	2.0

*Does not include arrests in which license status was not reported.

TABLE 18. NUMBER OF DAYS BETWEEN DUI ARREST AND ADJUDICATION (SAMPLE DATA SET)

	MAY 1981 - APRIL 1982		MAY 1982 - APRIL 1983	
NUMBER OF DAYS	NUMBER	PERCENT	NUMBER	PERCENT
Less Than 10	27	11.4	114	10.2
10-20	42	17.8	181	16.3
21-30	79	33.5	411	36.9
31-40	39	16.5	237	21.3
41-50	13	5.5	68	6.1
Over 50	36	15.3	103	9.3

TABLE 19. SAMPLE DUI ARRESTS BY TYPE OF ADJUDICATION

TYPE OF ADJUDICATION	MAY 1981 - APRIL 1982 NUMBER	PERCENT**	MAY 1981 - APRIL 1983 NUMBER	PERCENT
Dismissed	6	2.5	19	1.7
Amended	29	12.3	103	9.2
Fine	221	93.6	1 060	95.2
ADE School*	159	67.4	692	62.1
Jail Sentence	32	13.6	159	14.3
Active - Warrant	2	0.8	23	2.1
Sentence Probated	0	0.0	1	0.1
Fine & ADE School	158	67.0	690	61.9
Fine & Jail Sentence	16	6.8	121	10.9
Total Sampled Arrests	236		1,114	

* Alcohol Driver Education School
**Percentages were determined by dividing adjudication type by the total sampled arrests for each year.

TABLE 20. SAMPLE DUI ARRESTS BY BAC LEVEL

BAC LEVEL (PERCENT)	MAY 1981 - APRIL 1982 NUMBER*	PERCENT	CUMULATIVE PERCENT	MAY 1982 - APRIL 1983 NUMBER*	PERCENT	CUMULATIV PERCENT
0	4	1.8	2.0	13	1.2	1.3
0.01 - 0.04	2	0.9	3.0	22	2.0	3.5
0.05 - 0.09	5	2.3	5.5	80	7.3	11.4
0.10 - 0 14	42	19.1	26.4	323	29.5	43.3
0.15 - 0.19	92	41.8	72.1	393	35.9	82.2
0 20 - 0.24	43	19.6	93.5	149	13.6	96.9
0.25 - 0.29	9	4.1	98.0	28	2.6	99.7
0.30 - 0.34	3	1.4	99.5	2	0.2	99.9
0.35 - 0.39	1	0.5	100.0	1	0.1	100.0
0 40 or More	0	0.0	100.0	0	0.0	100.0
Refused	19	8.6		83	7.6	

*Does not include arrests in which BAC level was not reported.

TABLE 21. DISTRIBUTION OF FINES FOR DUI OFFENSE (SAMPLE DATA SET)

FINE	MAY 1981 - APRIL 1982 NUMBER	MAY 1981 - APRIL 1982 PERCENT	MAY 1982 - APRIL 1983 NUMBER	MAY 1982 - APRIL 1983 PERCENT
Less Than $100	18	7.6	60	5.4
$100 - $150	68	28.8	196	17.6
$151 - $200	65	27.5	376	33.8
$201 - $300	79	33.5	448	40.2
Over $300	6	2.5	34	3.1

TABLE 22. AVERAGE FINE FOR DUI OFFENSE AT VARIOUS BAC LEVELS (SAMPLE DATA SET)

BAC LEVEL (Percent)	MAY 1981 - APRIL 1982 (Dollars)	MAY 1982 - APRIL 1983 (Dollars)
0	56	83
0.01 - 0.04	25	76
0.05 - 0.09	120	123
0.10 - 0.14	148	168
0.15 - 0.19	179	212
0.20 - 0.24	212	246
0.25 - 0.29	265	262
Over 0.30	388	367

TABLE 23. DRIVING RECORD OF DUI OFFENDERS (SAMPLE DATA SET)

	TIME PERIOD	
	MAY 1981 - APRIL 1982	MAY 1982 - APRIL 1983
Current Points per Driver per Year (Two Years)	.80*	.80*
Total Points per Driver per Year (Five Years)	.83*	.80*
Total Accidents per Driver per Year	.17**	.18**
Total Violations per Driver per Year	.29***	.26***
Percent with Previous DUI Arrest	18	18
Percent with Previous Reckless Driving Offense	20	18

* Sample of all licensed drivers found an average of .22 points per driver per year over a two-year period.

** Sample of all licensed drivers found an average of 0.03 accidents per driver per year over a five-year period.

*** Sample of all licensed drivers found an average of 0.10 total violations per driver per year.

TABLE 24. DUI DRIVER'S AGE (SAMPLE DATA SET)

	MAY 1981 - APRIL 1982		MAY 1982 - APRIL 1983	
AGE	NUMBER*	PERCENT	NUMBER*	PERCENT
16-19	22	9.4	94	8.5
20-24	53	22.7	343	31.0
25-29	49	21.0	192	17.4
30-39	47	20.2	257	23.3
40-49	31	13.3	122	11.0
50-59	24	10.3	73	6.6
Over 60	7	3.0	23	2.1

*Does not include arrests in which driver's age was not reported.

TABLE 25. DUI DRIVER'S SEX AND RACE (SAMPLE DATA SET)*

SEX	MAY 1982 - APRIL 1982				MAY 1982 - APRIL 1983			
	WHITE		BLACK		WHITE		BLACK	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
Male	203	87.1	12	5.2	901	81.5	49	4.4
Female	17	7.3	1	0.4	151	13.7	4	0.4

*Does not include arrests in which driver's sex and race were not reported or where driver's race was classified as "other".

TABLE 26. DUI DRIVER'S ZONE OF RESIDENCE (SAMPLE DATA SET)

ZONE*	MAY 1981 - APRIL 1982		MAY 1982 - APRIL 1983	
	NUMBER**	PERCENT	NUMBER**	PERCENT
1	19	8.4	80	7.4
2	21	9.3	117	10.9
3	23	10.2	79	7.4
4	1	0.4	19	1.8
5	22	9.7	96	8.9
6	21	9.3	59	5.5
7	18	8.0	85	7.9
8	18	8.0	120	11.2
9	13	5.8	60	5.6
10	22	9.7	59	5.5
11	40	17.7	232	21.6
12	8	3.5	69	6.4

* Zones 1-10 are within Fayette County.
Zone 11 represents other Kentucky counties outside Fayette.
Zone 12 represents locations outside Kentucky.
**Does not include arrests in which driver's zone of residence was not reported.

TABLE 27. SAMPLE DUI ARRESTS BY ZONE OF RESIDENCE AND ZONE OF ARREST (PERCENTAGES)

	MAY 1981 - APRIL 1982		MAY 1982 - APRIL 1983	
ZONE*	RESIDENCE	ARREST	RESIDENCE	ARREST
1	8.4	3.6	7.4	7.1
2	9.3	7.1	10.9	10.2
3	10.2	6.3	7.4	5.8
4	0.4	4.5	1.8	2.5
5	9.7	15.2	9.0	12.2
6	9.3	6.7	5.5	6.2
7	8.0	17.0	7.9	23.5
8	8.0	8.5	11.2	10.3
9	5.8	14.7	5.6	7.0
10	9.7	16.5	5.5	15.2
11	17.7	-	21.6	-
12	3.5		6.4	-

*Zones 1-10 are within Fayette County.
Zone 11 represents other Kentucky counties outside Fayette.
Zone 12 represents locations outside Kentucky.

TABLE 28. DUI ARRESTS BY DRIVING CHARACTERISTICS (SAMPLE DATA SET)

	MAY 1981 - APRIL 1982		MAY 1982 - APRIL 1983	
DRIVING CHARACTERISTICS	NUMBER	PERCENT	NUMBER	PERCENT
Weaving	51	18.0	521	28.2
Speeding	27	9.5	172	9.3
Straddling or Crossing Center of Lane Marker	14	5.0	161	8.7
Almost Striking Object or Vehicle	23	8.1	90	4.9
Disregard Traffic Signal	17	6.0	101	5.5
Speed More Than 10 MPH Below Speed Limit	10	3.5	94	5.1
Strike Curb, Sign, Etc.	13	4.6	75	4.1
Driving On Other Than Designated Roadway or Ran Off Roadway	12	4.2	75	4.1
Accelerating or Decelerating	4	1.4	53	2.9
Driving Into Opposing or Crossing Traffic	18	6.4	38	2.1
Swerving	9	3.2	42	2.3
Turning Abruptly or Illegally	2	0.7	48	2.6
Headlights Off or No Taillights	4	1.4	41	2.2
Accident Involvement	17	6.0	28	1.5
Turning With Wide Radius	2	0.7	35	1.9
Following Too Closely	2	0.7	28	1.5
Stopping Inappropriately (Other Than In Lane)	2	0.7	24	1.3
Appearing to Be Drunk	1	0.4	22	1.2
Intoxicated In Vehicle	9	3.2	14	0.8
Tires On Center or Lane Marker	0	0.0	21	1.1
Slow Response to Traffic Signals	1	0.4	20	1.1
Stopping Without Cause In Traffic Lane	4	1.4	13	0.7
Braking Erratically	1	0.4	16	0.9
Signaling Inconsistent with Driving Actions	1	0.4	5	0.3
Drifting	0	0.0	3	0.2
Other	39	13.8	110	6.0

3LE 29. FIELD SOBRIETY TESTS AND RESULTS (SAMPLE DATA SET)

	MAY 1981 - APRIL 1982				MAY 1982 - APRIL 1983				
ST	PASS	PROBLEM	FAIL	UNKNOWN	PASS	PROBLEM	FAIL	UNKNOWN	TOTAL
ot to Bumper	0	0	25	7	19	32	421	99	603
uch Nose With Finger (Eyes Closed and Head Tilted)	2	1	33	9	23	32	337	107	544
lk Line Heel-to-Toe	1	0	32	10	12	26	311	49	441
C's or Counting	0	0	10	4	20	23	115	32	204
anding (Balance)	0	0	5	0	2	10	67	17	101
lk and Turn	0	0	11	0	3	7	62	8	91
and On One Foot (Swing Other)	0	0	6	1	0	2	37	12	58
xterity	1	1	1	1	0	6	19	7	36
nberg Test (Eye Movements)	0	0	0	0	2	0	22	7	31
alation of Pupils	0	0	0	0	0	0	1	3	4
Test Given	0	0	0	0	0	0	1	1	2
known	0	0	5	0	0	0	24	3	32
tals	4	2	128	32	81	138	1,417	345	2,147

ABLE 30. SUMMARY OF COSTS AND BENEFITS OF TAP

. COSTS	$1,195,400
1. Police Enforcement Costs (Federally Reimbursed)	367,900
2. Police Administrative and Support Costs	115,600
3. Jail Costs	497,500
4. DUI Court Costs	114,700
5. Court Costs (Other Violations and Arrests)	99,700
. BENEFITS AND INCOME	2,609,200
1. Reduced Accident Costs	1,505,000
2. DUI Fines (Including Court Costs)	858,800
3. Other Traffic Violations and Public Intoxication Arrests (Including Court Costs)	245,400

BENEFIT - COST RATIO = 2.18

TABLE 31. SUMMARY OF QUESTIONNAIRE RESPONSE

QUESTION	PERCENT ANSWERING YES
Aware of TAP	96
Ever in danger of DUI arrest	25
TAP increased pesonal danger of DUI arrest	55
TAP reduced chances of involvement in alcohol related accident	78
Level of enforcement violates driver rights	17
Favor increased enforcement to reduce number of drunk drivers	85
Willing to support increased enforcement after funding for TAP discontinued	65

TABLE 32. METHOD RESPONDENT BECAME AWARE OF TAP

METHOD	PERCENT NOTING GIVEN METHOD
Local News Media	95
Discussion with Others	40
Arrest or Warning by Police Officer	3
Other	7

TABLE 33. QUESTIONNAIRE RESPONSE AS A FUNCTION OF PERCEIVED RISK OF DUI ARREST

QUESTION	PERCENT ANSWERING YES	
	INCREASED PERCEIVED RISK	NO INCREASE IN PERCEIVED RISK
Aware of TAP	98	95
Ever in danger of DUI arrest	40	8
TAP reduced chances of involvement in alcohol related accident	80	77
Level of enforcement violated drivers rights	25	8
Favor increased enforcement to reduce number of drunk drivers	81	90
Willing to support increased enforcement after funding for TAP discontinued	60	70

TABLE 34. SUMMARY OF FREQUENT RESPONDENT COMMENTS

COMMENT	NUMBER COMMENTING
Do not drink	103
Objects to method program is operated	21
Worried about false arrest before BAC test	13
Need more severe penalities for DUI	12
Are more careful now about drinking and driving	7

TABLE 35. PERSONAL CHARACTERISTICS OF QUESTIONNAIRE RESPONDENTS

CHARACTERISTIC	CATEGORY	PERCENTAGE IN CATEGORY
Age	Under 25	6.3
	25-29	12.6
	30-34	13.9
	35-39	12.9
	40-49	18.1
	50-59	19.9
	60-65	7.3
	Over 65	8.9
Sex	Male	66.7
	Female	33.3
Marital Status	Married	72.5
	Single	14.9
	Divorced	8.2
	Widowed	4.4
Education	Elementary School	5.0
	High School	39.6
	College	55.4
Occupation	Professional	24.7
	Unskilled	13.0
	Retired	12.5
	Skilled	11.6
	Supervisory	9.3
	Sales	6.6
	Housewife	6.1
	Clerical	5.2
	Technician	3.3
	Student	2.8
	Agricultural	2.0
	Unemployed	1.0
	Other	2.0
Annual Income	Less than $10,000	11.6
	$10,000 - $19,999	29.7
	$20,000 - $30,000	27.5
	Over $30,000	31.3
Zone of Residence	1	14.1
	2	24.2
	3	7.8
	4	1.8
	5	13.9
	6	4.8
	7	6.4
	8	19.6
	9	4.2
	10	3.3

APPENDIX

QUESTIONNAIRE SURVEY FORM

UNIVERSITY OF KENTUCKY

LEXINGTON. KENTUCKY 40506 - 0043

April 6, 1983

257-4513

TELEPHONE: (606 [illegible]

COLLEGE OF ENGINEERING
KENTUCKY TRANSPORTATION RESEARCH PROGRAM
TRANSPORTATION RESEARCH BUILDING

The Transportation Research Program at the University of Kentucky is performing an evaluation of the Traffic Alcohol Program presently being conducted by the Lexington-Fayette Urban County's Division of Police. The Traffic Alcohol Program is a program of increased enforcement and public information with the objective of reducing drunk driving and alcohol-related accidents.

In order to determine the public's awareness of the program, this questionnaire is being sent to 2,500 randomly selected owners of registered vehicles in Fayette County. Your participation in the survey will be an important factor in the overall evaluation. The results of this survey and an analysis of alcohol-related accident trends will be considered when attempting to determine whether this program or other similar programs should be continued.

As indicated, your selection for participation in the survey was completely random and in no way will the results be associated with the respondent's name. You may wish to complete only part of the questionnaire if you feel that certain questions may force you to withdraw your participation. A postage-paid envelope is enclosed for returning the questionnaire. The geographic location of your zone of residence has already been coded on the questionnaire.

A final report on the evaluation will be prepared at the end of the study and results of the survey will be included in summary form. If you have any questions concerning any aspect of the survey or the overall study, you may contact Jerry Pigman, the principal investigator or Ken Agent, the co-principal investigator, at the telephone number listed at the top of the page.

Thank you for your participation in this survey.

QUESTIONNAIRE

1. Age_____ 2. Sex: M_____ F_____

3. Marital Status:

_____Married _____Single _____Divorced _____Widow

4. Education - highest level completed:

_____Elementary School _____High School _____College

5. Occupation_____

6. Annual Income:

_____Less than $10,000 _____$10,000-$19,999 _____$20,000-$30,000

_____Over $30,000

7. Zone of residence in Fayette County (1 of 10 zones)

8. Are you aware that the Lexington-Fayette Urban County Police are conducting a Traffic Alcohol Program (increased enforcement as an attempt to reduce alcohol related accidents)?_____Yes _____No

9. If you are aware of the Traffic Alcohol Program (TAP), by what means did you become acquainted with the subject? (check more than one if applicable)

_____Local News Media _____Discussion with others

_____Arrest or warning by police officer _____Other

10. Have you ever felt that you were in danger of being arrested for driving under the influence of alcohol?_____Yes _____No

11. Do you feel that your chances of being arrested for drinking and driving are greater now than before the Traffic Alcohol Program began?_____Yes _____No

12. Do you feel that the Traffic Alcohol Program has been effective in reducing your chances of being involved in an alcohol related accident?_____Yes _____No

13. Do you feel that the level of enforcement is violating your rights as a driver in Fayette County? _____Yes _____No

14. Are you in favor of increased enforcement as a means of reducing the number of drunk drivers? _____Yes _____No

15. Are you willing, as a taxpayer, to support increased enforcement after federal funding of the Traffic Alcohol Program is discontinued?_____Yes _____No