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KTC-90-18

1990 SAFETY BELT USAGE SURVEY AND EVALUATION OF EFFECTIVENESS IN KENTUCKY

by

Kenneth R. Agent
Transportation Research Engineer

Kentucky Transportation Center
College of Engineering
University of Kentucky
Lexington, Kentucky

in cooperation with
Kentucky State Police
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16. Abstract

The objective of the survey was to establish 1990 safety belt and child safety seat usage rates in Kentucky. Data were collected at 100 sites and combined based on vehicle miles travelled for a given type of highway, rural or urban location, and county population category. Also included in this report is an analysis of accident records evaluating the effectiveness of safety belts.

Statewide usage rates were 32 percent for drivers and front-seat passengers (over 19 years of age) and 57 percent for children under four years of age (front and rear seats). Usage rates had increased significantly in 1990 compared to 1989. Rates were highest on interstate highways and lowest on rural, non-interstate highways.

Benefits in the reduction of injuries for occupants involved in police-reported accidents wearing a safety belt or in a safety seat were shown through the analysis of accident records. For example, a 45 percent reduction in fatal or incapacitating injuries was determined for drivers wearing a safety belt compared to those who were not restrained.

The increased usage that resulted in Fayette County after enactment of a local mandatory usage law was shown. The recommendation is that a statewide mandatory safety belt law should be passed or, in lieu of a statewide law, local governments should pass such a law.

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INTRODUCTION

The use of safety belts and child safety seats is an effective means of reducing injuries to motor-vehicle occupants involved in a traffic accident. There have been efforts to increase safety belt and safety seat usage. In Kentucky, these efforts have usually involved public information campaigns. While most states have passed a mandatory safety belt usage law, such a law has not been passed in Kentucky. In an attempt to increase usage of child safety seats, a law was enacted by the 1982 Kentucky General Assembly requiring use of a "child restraint system" for children 40 inches or less in height. The 1988 Kentucky General Assembly strengthened the child restraint law to include a $50 fine for violation of the law. Also, a mandatory safety belt usage law was enacted by the Lexington-Fayette Urban County Government with an effective date of July 1, 1990.

Statewide observational surveys have been conducted annually in 19 cities across Kentucky beginning in 1982 (with the exception of 1987) to document safety belt and safety seat usage in Kentucky (1, 2, 3, 4, 5, 6, 7). Statewide usage of child safety seats or safety belts for children under 4 years of age increased from about 15 percent in 1982 before enactment of the mandatory child restraint law to about 30 percent in 1984 and stayed at this level in 1985 and 1986. This percentage increased to almost 50 percent in 1988 and 1989 after a penalty was added to the law. Safety belt usage for the driver has increased each year of the survey. The statewide driver safety belt usage rate was only 4.2 percent in 1982 compared to 25.5 percent in 1989.

The objective of the survey summarized in this report is to establish statewide 1990 safety belt and child safety seat usage rates in Kentucky. These rates can be compared to those determined from previous surveys. Another objective was to analyze accident data to evaluate the effectiveness of safety belts in reducing injuries to occupants of motor vehicles involved in traffic accidents.

PROCEDURE

DATA COLLECTION PROCEDURE

The data collection procedure used in the previous surveys was modified for the 1990 survey. The procedure was changed so that it would be comparable to surveys taken in other states. The data collection form was changed as well as the site selection procedure.

The data collection form used in the survey is shown in Figure 1. Usage was recorded for drivers and front-seat passengers sitting in the outboard position. The exception was for children under four years of age for which data were collected for all positions in the front and the rear seats. Drivers were classified into three age categories and were classified by sex. Passengers were classified into several age

categories. For drivers and front-seat passengers (over three years of age), usage was classified as either using a harness or belt or no restraint. For children one to three years of age, the categories included safety seat, booster seat, harness or belt, or no restraint. For children under one year of age, the categories were either safety seat or no restraint. When a safety seat was used, an attempt was made to determine if there was an obvious misuse.

The following list of guidelines for data collection was given to each observer, and each data collector went through a training period.

1. Always include the driver so the number of vehicles included in the sample will be known.

2. Include all vehicles at low-volume locations. When taking data on a multi-lane road, include only vehicles in the curb or near lane.

3. Collect data on only one approach at the intersection.

4. If traffic volume is too heavy to collect data for all vehicles, record data for the next vehicle in view after recording data for the prior vehicle.

5. Obtain a random sample of vehicles independent of whether the occupants are wearing a safety belt. (Do not attempt to include all vehicles with an occupant wearing a safety belt at a location where all vehicles cannot be obtained.)

6. Attempt to include data for children under four years of age for any vehicle in the sample in which such a child is a passenger.

7. Only include vehicles either stopped or moving so slowly that occupants can be readily observed.

8. Excluding children under four years of age, collect data only for drivers and passsengers in the right-front seat (exclude the center front and rear seating positions).

9. Do not include old passenger cars not equipped with a safety belt (those without a head rest).

10. Collect data during daylight hours on weekdays and weekends.

11. Collect data for four hours at each site.

12. Begin and end data collection at a specified time not considering whether the occupants are using a safety belt.

13. Collect data for cars, vans, and light trucks.

14. Do not include a vehicle in the count if use by the driver cannot be determined.

As noted, data were collected for four hours at each location. The decision was made to collect data for an equal time period for each location rather than attempt to collect a given sample size. However, additional data only for children under four years of age were collected at several sites in order to have a larger sample size for this age category.

DATA COLLECTION LOCATIONS

Data for the past surveys were collected in 19 cities at 23 sites distributed across the state. These cities represented a range of population categories to account for social and economic factors. In order to be able to relate the survey results to data taken in other states, it was necessary to expand the number of sites to include data in rural locations and for interstates. The distribution of the sites was based on vehicle miles travelled statewide for various categories of roads in counties of varying populations. The variables considered were the rural or urban designation of the road, the functional classification of the road, and the county population. This was done so that roads would be stratified to assure a proper representation of urban and rural areas and different road types. The percentages of vehicle miles travelled on various types of highways in counties within given population ranges are given in Table 1. These percentages represent the proportion of vehicle miles driven on roadways with the given characteristics of the total vehicle miles driven statewide. The data apply to roads for which a traffic volume was available (which is the state-maintained highway system of slightly over 27,000 miles). Local county and city roadways would not be included.

The decision was made to take survey data at 100 sites. The number of sites for any type of highway and county population category was equal to the percentage of vehicle miles travelled for the given type of highway and county population. For example, eight percent of all vehicle miles travelled were on rural arterial highways in counties with a population between 10,000 and 25,000 so eight sites were selected on highways meeting these criteria. A computer file was used to prepare a randomly selected list of sections of roadway for each of the categories given in Table 1. This list was used as a source for selecting sites. Data had been selected at 23 sites since 1982, and it was felt that it would be beneficial to maintain a historical record at these sites. Therefore, these sites were maintained. A list of the observation sites is presented in Table 2, and the 23 original sites are identified with an asterisk. Many of the other sites were taken from the randomly selected list of highway sections.

The sites had to be selected at a location where traffic would stop. A list of all locations having a traffic signal was obtained and used in the selection of sites. Except for some interstate locations, all the sites are at an intersection. Most of the intersections are controlled by a traffic signal. The sites on the interstates were either at an exit ramp or at a rest area which would be the only exception to the sites being at an intersection. Another variable which was considered was the geographical location of the sites. Sites were selected to assure that they were distributed across the state. Sites were selected in 62 of the 120 counties with the largest number in any one county of eight in Jefferson County. For each category, the county, location (road and intersecting road), and city (nearest city for rural locations) is given in Table 2.

SURVEY DATA ANALYSIS

Safety belt usage rates were obtained for the driver and for all front-seat occupants. Rates were also obtained by driver age and sex and by age of the front seat occupant. Statewide rates were obtained by weighting the usage found for a given type of highway and county population by the percentage of vehicle miles given in Table 1 and combining the percentages from the various categories. Confidence intervals for the statewide usage rates were calculated.

For children under four years of age, rates were obtained for both front and rear seating positions as well for combined seating positions. Rates were separated into safety seat, booster seat, and harness or belt.

The 1990 usage rates for the 19 cities previously surveyed were compared to results found in prior years. The rates for the various types of highway and county population categories were compared.

ACCIDENT ANALYSIS

The computer files containing all reported accidents in Kentucky (for the years 1985 through 1989) were analyzed to determine the effectiveness of wearing safety belts or riding in a safety seat. The percent reductions in injuries were computed, and statistical tests were conducted to determine if the reductions were significant. This type of analysis was performed for drivers, children age three and under, and front and rear seat passengers. The effectiveness of safety belts was related to several factors such as seating position, type of vehicle, and speed limit. The potential annual reduction in traffic accident fatalities and accident savings from an increase in driver safety belt usage were estimated.

RESULTS

SURVEY DATA ANALYSIS

Driver usage rates for the various types of highways and county population categories are summarized in Table 3. The overall statewide rate, using the data collected at 100 sites and the weighting procedure described, was 32 percent. The sample size was 73,867 drivers. The confidence limits for a probability of 0.99 would be plus or minus 0.4 percent (8). For a given type of highway, the usage rate was higher for counties with larger populations.

While the data collection procedure has changed from previous surveys, the usage rate can still be compared to the statewide rates from past years. The previous studies showed that driver usage rates statewide had steadily increased from 4.2 percent in 1982 to 25.5 percent in 1988. The 1990 survey shows that this increase has continued. The increase in the driver usage rate in 1990 compared to 1989 was determined to be statistically significant (probability of 0.99) (9).

Usage rates for front-seat passengers for the various types of highways and county population categories are summarized in Tables 4 through 7 for the different age categories. Usage for children in the four to five year of age cateory was 39 percent plus or minus about 4 percent. For children in the 6 to 12 years of age category the usage rate was 37 percent plus or minus about 3 percent. For the 13 to 19 years of age category, the usage rate was 35 percent plus or minus about 2 percent. For the category of over 19 years of age, the usage rate was 32 percent plus or minus about 1 percent. The data show that the usage rate for passengers of driving age was the same as for drivers with rates increasing for children.

Usage rates for children one through three years of age are given in Table 8 while rates for children under one year of age are given in Table 9. These rates are for children in both the front and the rear. The usage rate for children under one year of age (61 percent with a confidence limit of about four percent) was slightly higher than that for children one to three years of age (56 percent with a confidence limit of about two percent). The usage rate for the combination of these categories or children under four years of age was 57 percent with confidence limits for a probability of 0.99 percent of about two percent. The sample size for children under four years of age was 4,705. This age category corresponds to the children for which the mandatory child restraint law would apply. This usage rate of 57 percent compares to a rate of 49 percent in 1989. The increase in 1990 represents a statistically significant increase (9). This percentage was about 15 percent in 1982 before enactment of the child restraint law and increased to almost 50 percent in 1988 after the addition of a fine to the child restraint law.

The usage rate for children under four was higher in the rear seat compared to the front seat. For children one to three years of age, the usage rate was 70 percent for the rear seat compared to 41 percent for the front seat. For children under one year old, the usage rate was 72 percent for the rear seat compared to 56 percent for the front seat.

Safety belt usage rates for drivers and front-seat passengers by type of highway are presented in Table 10. The highest usage rates were on interstates (both rural and urban). The lowest usage rates were on rural, non-interstate highways. There was a substantial variation between highway types. For drivers, the percentage using a safety belt varied from 20 percent on rural, local highways to 45 percent on urban interstates. The variation was not as great for children under four years of age for which there is a statewide mandatory usage law.

There was a variation in usage by the age and sex of the driver (Table 11). Females had a higher usage rate than males. The middle age category of 31 to 50 years of age had a slightly higher usage than the 16 to 30 years of age category with the lowest percentage for the over 50 years of age category.

The highest usage rate for front-seat passengers was for the under four years of age category (Table 12). This would be expected since the mandatory child restraint law would apply to this age category. The usage rate then gradually declined with age.

The change in usage of safety belts by drivers in the 19 cities in which data have been collected since 1982 is presented in Table 13. The usage rate was higher in 1990 than in 1989 in 18 of the 19 cities. The rate decreased in Somerset. The highest rates and the largest increase were at the locations in Lexington, and this finding would be related to the passage of a mandatory usage law in Fayette County. The usage rate in Lexington was double that in any other city. This shows the potential increase in usage which could be obtained with a mandatory belt law. The lowest rate (15 percent) was in Hazard with the other lowest rates occurring in the smallest cities. In 15 of the 19 cities, the rate has either increased or remained constant each year. Using the procedure followed in the previous surveys in which data were taken only at sites in these 19 cities results in a statewide usage rate of 34 percent. This rate is very close to that found using the revised procedure in which data are collected at 100 sites.

The change in usage of safety seats or belts by children under four years of age in these 19 cities is presented in Table 14. There was an increase in usage in 1990 compared to 1989 in all but two cities (Newport and Winchester). The highest usage was in Lexington, followed by Louisville. The lowest usage was in Hazard. As with usage rates for drivers, the rate was related to city population with usage generally increasing as population increased. Using the procedure followed in the previous

surveys in which data were taken only at sites in these 19 cities results in a statewide usage rate of 54 percent. As with the driver's rate, this rate is very close to that found using the revised procedure in which data are collected at 100 sites.

A summary of the data collected is given in the Appendix. For each of the 100 data sites, the usage rate and sample size are given for drivers, front-seat passengers (by age category for over four years of age), and children in the one to three years of age and under one year old age categories (both front and rear seat).

Obvious improper usage of safety seats was found to be about 14 percent. Improper usage identified in the survey was limited to the types that could be easily noted as a vehicle passed slowly by the observer. The reasons for improper usage would include the child not being harnessed into the seat, an infant facing forward, the shield not used as required, a tether not used (if required), or the restraint not belted to the seat (typically for infants). Other types of improper usage, such as improper routing of the safety belt, which could not be noted quickly by observation, were not included. Improper usage was higher in the front seat (20 percent) than in the rear seat (12 percent). Improper usage was also higher for children under one year of age (19 percent) compared to the one to three years of age category (11 percent).

ACCIDENT ANALYSIS

The number and percentage of all drivers involved in police-reported accidents sustaining a given injury as a function of safety belt usage are summarized in Table 15 (based on 1985 through 1989 accident data). By comparing the percentages, the percent reduction associated with safety belt usage could be calculated. The largest reduction was for a fatal injury (77 percent reduction) with the reduction decreasing for less severe injuries. For comparison, the reduction was four percent for the "possible injury" category. The reductions in the percentage of each of the types of injuries were determined to be statistically significant (probability of 0.99). In severe accidents, use of a safety belt would lessen, but not eliminate, the injury. This resulted in the smaller reductions in the less severe injury classifications. There was a 45 percent reduction in a driver sustaining a fatal or severe injury in a traffic accident if a safety belt was worn compared to not wearing a safety belt. This agrees with other research studies which report that lap and shoulder safety belts, when used, reduce the risk of fatal or serious occupant injuries by between 40 and 55 percent (10).

The effectiveness of safety belts in reducing driver injuries was related to several variables. In Table 16, the percentage of drivers sustaining either a fatal or severe injury who were wearing or not wearing a safety belt was related to type of vehicle, type of accident, and speed limit. There were reductions in percent fatal or severe injuries for drivers of passenger cars, single-unit trucks, and combination

trucks. The reduction was higher for drivers of trucks. The severity of injuries to drivers of passenger cars was higher than for drivers of trucks. Safety belts also reduced the percentage fatally or severely injured in various types of accidents. The types of accidents were chosen to represent the extremes of accidents in terms of severity. Reductions were noted for the relatively low severity rear-end accidents as well as the more severe fixed object, head-on, and "overturned" accidents. Safety belts also were determined to be effective in reducing fatal or severe injuries for accidents occurring on either 35-mph local streets or 55-mph high speed roadways.

The number and percentage of children age three and under sustaining a given injury as a function of using a safety seat or safety belt are summarized in Table 17. There were substantial reductions, higher for the most severe injury types, associated with both safety seats and safety belts. The reductions were similar for use of either the safety seat or safety belt. The reductions for all injury categories except fatalities were statistically significant (probability of 0.99). Of 47 fatalities, 34 involved children not using a safety seat or safety belt. The percent reductions were higher than that for drivers (as given in Table 15). There was a 70 percent reduction in the chance of a child less than age four sustaining a fatal or severe injury if a safety seat was used compared to not using any restraining device. Also, as shown in Table 18, the reductions in injuries applied to both the rear and front seating positions. The data in Table 18 show that accident severity was less in the rear than in the front seat. Of the 47 fatalities, 32 involved a front seat passenger.

The number and percentage of occupants other than drivers sustaining a given injury as a function of safety belt usage are listed in Table 19. As with drivers, there was a large reduction in the percent injured (all reductions were statistically significant with a probability of 0.99). Overall, these percent reductions were generally higher than that for drivers. The chance of a vehicle occupant, other than the driver, sustaining a fatal or severe injury in a traffic accident was reduced by 48 percent if a safety belt was worn compared to not wearing a safety belt.

The accident severities associated with using a lap belt and/or shoulder harness for occupants other than the driver (by seating position in the front or rear seat) are listed in Table 20. Only a lap belt is available in the rear seat in the majority of vehicles involved in accidents in the time period studied. The use of a shoulder harness and/or lap belt in the front seat or a lap belt in the rear reduced injuries dramatically (all reductions were statistically significant with a probability of 0.99). Accident severity was less in the rear seat and the percent reduction in injuries was generally greater in the rear seat than the front seat. The use of primarily a lap belt in the rear seat has been effective since its use was associated with a reduction in fatal or incapacitating injuries of 62 percent. This finding should not be interpreted to suggest that it would not be preferable to have a combination lap belt/shoulder harness in the rear seat.

The potential annual reductions in traffic accident fatalities and accident savings from an increase in driver safety belt usage are presented in Table 21. The reduction in fatalities and associated accident cost savings were calculated using the reduction factors listed in Table 15, accident data for the years of 1985 through 1989, the 32.2 percent usage rate determined from the 1990 observational survey, and accident cost estimates recommended by the Federal Highway Administration (11).

SUMMARY

Although the methodology used to obtain statewide safety belt usage rates was changed for the 1990 survey, the data show that usage increased in 1990 compared to previous years. The statewide usage rate of safety belts by drivers was 32 percent. This compares to 25.5 percent in 1989. The usage rate varied by type of highway and type of area (rural or urban). The rate was generally higher in urban compared to rural areas. Rates were higher on interstate and arterial highways compared to collector or local streets. While Kentucky does not have a statewide mandatory usage law, a local ordinance was enacted for Fayette County (Lexington). The effect of this law was shown with the very high usage found at the observation sites in Fayette County.

The statewide usage rates for front seat passengers were also obtained. Considering all passengers, the usage rate was 34 percent. Usage varied with age with higher usage for younger passengers.

Kentucky does have a law requiring children under 40 inches in height to be placed in a child restraint. The statewide usage rate for children under the age of four (including both the front and rear seat) was found to be 57 percent. This was an increase compared to that found in previous surveys (49 percent in 1989).

The significant benefits, based on the reduction of injuries, for occupants involved in a police-reported accident wearing a safety belt or in a safety seat were shown through the analysis of accident records. For example, one finding was that there was a 45-percent reduction in fatal or incapacitating injuries for drivers wearing a safety belt compared to those who were not. The benefit in terms of the reduction in injuries by wearing a safety belt in either the front or rear seat was documented. The potential savings in fatalities, serious injuries, and accident costs which could be obtained from an increase in the use of safety belts was shown.

RECOMMENDATIONS

While driver safety belt usage has been increasing in the past few years, statewide usage is only about 32 percent with much lower usage rates (as low as under 10 percent) found in some small cities. While public information has resulted in increases, the method which has been shown to result in a dramatic increase in safety belt usage is enactment of a mandatory safety belt law. This has been demonstrated in Kentucky after enactment of an ordinance in Fayette County. This resulted in an approximate doubling of the usage rate to a level of over 70 percent. Statewide laws have been enacted in the majority of states. National surveys have shown usage rates of 30 percent in cities without a belt law compared to 50 percent in cities having a law (10). Belt use as high as 90 percent has been reported in other countries having belt laws and high levels of enforcement (12). It has been estimated that at the current usage level of about 50 percent in states having belt laws, safety belts would have saved 4,700 lives if all states had belt laws in 1987 (10). An analysis of Kentucky accident records showed the safety benefits associated with safety belt usage and the potential annual reductions in traffic accident fatalities and accident savings from an increase in driver safety belt usage was estimated. For example, an increase in the driver usage rate up to 50 percent usage would result in a potential annual reduction of 73 fatalities and an annual accident savings from the reduction in fatalities and serious injuries of about 125 million dollars. Therefore, a recommendation is that a statewide mandatory safety belt law should be considered by the Kentucky General Assembly. In the event a statewide law is not enacted, additional local governments should consider passing mandatory safety belt laws.

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Figure 1. Data Collection Form

DATA COLLECTION FORM

Date:_____ Starting Time:_____ Ending Time:_____
Location:_____ Sheet No:_____
Observer:_____ Comment:_____

DRIVER USAGE

Age & Sex	Harness or Belt	None
16-30 M		
31-50 M		
> 50 M		
16-30 F		
31-50 F		
> 50 F		

FRONT-SEAT OCCUPANT USAGE (OVER 3 YEARS OF AGE)

Age	Harness or Belt	None
4-5		
6-12		
13-19		
Over 19		

USAGE FOR CHILDREN 1-3 YEARS OF AGE

	Safety Seat	Safety Seat (Improper)	Booster Seat	Harness or Belt	None
Front					
Rear					

USAGE FOR INFANTS (UNDER 1 YEAR OF AGE)

	Safety Seat	Safety Seat (Improper)	None
Front			
Rear			

TABLE 1. DISTRIBUTION OF VEHICLE MILES TRAVELED BY TYPE OF HIGHWAY AND COUNTY POPULATION

TYPE OF HIGHWAY	COUNTY POPULATION	PERCENTAGE OF ALL VEHICLE MILES
Rural Interstate	Over 100,000	1.04
	50,001-100,000	2.78
	25,001-50,000	4.96
	10,000-25,000	5.19
	Under 10,000	1.32
Rural Arterial	Over 50,000	3.14
	25,001-50,000	7.36
	10,000-25,000	8.12
	Under 10,000	1.93
Rural Collector	Over 100,000	0.65
	50,001-100,000	3.19
	25,001-50,000	7.70
	10,000-25,000	9.72
	Under 10,000	2.28
Rural Local	Over 50,000	0.74
	25,000-50,000	1.74
	Under 25,000	3.74
Urban Interstate	Over 100,000	8.32
	50,000-100,000	1.49
	Under 50,000	1.06
Urban Arterial	Over 100,000	10.23
	25,000-100,000	9.52
	Under 25,000	1.79
Urban Collector or Local	All	1.99

TABLE 2. STATEWIDE SURVEY LOCATIONS		
TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Rural Interstate	Over 100,000	Fayette, I64 at KY 859, Lexington
	50,001-100,000	Boyd, I64 at US 23, Catlettsburg
		Christian, I24 at US 41A, Hopkinsville
		Hardin, I64 at rest area, Sonora
	25,001-50,000	Barren, I 64 at KY 70, Cave City
		Boone, I 75 at rest area, Florence
		Clark, I 64 at KY 627, Winchester
		Franklin, I 64 at US 60, Frankfort
		Laurel, I 75 at KY 80, London
	10,000-25,000	Henry, I 71 at KY 153, Sligo
		Rockcastle, I 75 at US 25, Mt. Vernon
		Scott, I 75 at rest area, Georgetown
		Shelby, I 64 at KY 53, Shelbyville
		Woodford, I 64 at KY 341, Midway
	Under 10,000	Trigg, I 24 at US 68, Cadiz
Rural Arterial	Over 50,000	Pike, Us 460 at US 119, Pikeville
		Daviess, US 60 at KY 144, Owensboro
		Hardin, US 31W at KY 835, West Point
	25,001-50,000	Perry, KY 15X at KY 476, Hazard*
		Knox, US 25E at KY 225, Barbourville
		Harlan, US 119 at KY 179, Cumberland
		Floyd, KY 80 at US 23, Allen
		Bullitt, US 31E at KY 44, Mt. Washington
		Carter, KY 1 at I 64, Grayson
		Laurel, US 25 at KY 80, London
	10,000-25,000	Mason, US 62 at KY 11, Maysville*

TABLE 2. STATEWIDE SURVEY LOCATIONS		
TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Rural Arterial	10,000-25,000	Clay, US 421 at KY 80, Manchester
		Bourbon, US 68 at 5th St., Millersburg
		Casey, US 127 at KY 70, Liberty
		Meade, US 31W at KY 1638, Muldraugh
		Lincoln, US 127 at KY 78, Hustonville
		Russell, US 127 at KY 80, Russell Springs
		Washington, US 150 at KY 55, Springfield
	Under 10,000	Cumberland, KY 90 at KY 61, Burkesville
		Ballard, US 60 at KY 358, LaCenter
Rural Collector	Over 100,000	Fayette, KY 418 at I 75, Lexington
	50,001-100,000	Christian, US 41 at KY 1682, Hopkinsville
		McCracken, US 62 at US 68, Paducah
		Madison, KY 52 at KY 876, Richmond
	25,001-50,000	Barren, KY 255 at US 31W, Park City
		Nelson, US 62 at KY 48, Bloomfield
		Boone, KY 18 at KY 237, Burlington
		Oldham, KY 146 at KY 393, Buckner
		Knox, KY 11 at US 25E, Barbourville
		Henderson, KY 145 at US 60, Corydon
		Boyle, US 68 at US 150, Perryville
		Greenup, KY 1 at US 23, Greenup
	10,000-25,000	Caldwell, KY 139 at Jefferson, Princeton*
		Grayson, US 62 at KY 259, Leitchfield
		Allen, US 231 at US 31E, Scottsville
		Bath, US 60 at KY 36, Owingsville
		Larue, KY 84 at KY 61, Hodgenville
		Scott, US 62 at I 75, Georgetown
		Anderson, US 127 at US 127B, Lawrenceburg

TABLE 2. STATEWIDE SURVEY LOCATIONS		
TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Rural Collector	10,000-25,000	Breathitt, KY 30 at KY 15, Jackson
		Webster, US 41 at KY 56, Sebree
		Garrard, KY 39 at US 27, Lancaster
	Under 10,000	Carroll, US 42 at Highland, Carrollton*
		Elliott, KY 32 at KY 7, Sandy Hook
Rural Local	Over 50,000	McCracken, KY 1286 at US 62, Paducah
	25,000-50,000	Harlan, KY 413 at US 119, Loyall
		Greenup, KY 7 at US 23, South Shore
	Under 25,000	Lewis, KY 10 at KY 57, Tollesboro
		Simpson, KY 73 at KY 100, Franklin
		Adair, KY 2290 at KY 55, Columbia
		Taylor, KY 208 at Robert Rd, Campbellsville
Urban Interstate	Over 100,000	Kenton, I 275 at KY 17, Covington
		Kenton, I 75 at KY 371, Cresent Springs
		Fayette, I 75 at US 68, Lexington
		Jefferson, I 64 at KY 1747, Louisville
		Jefferson, I 64 at KY 1631, Louisville
		Jefferson, I 264 at US 31E, Louisville
		Jefferson, I 264 at US 42, Louisville
		Jefferson, I 264 at US 60, Louisville
	50,000-100,000	Warren, I 65 at US 231, Bowling Green
	Under 50,000	Boone, I 71 at KY 14, Verona
Urban Arterial	Over 100,000	Jefferson, US 31W at Gagel, Louisville*
		Jefferson, KY 1447 at Hubbards, Louisville*
		Jefferson, KY 1703 at Trevillian Way, Louisville*

TABLE 2. STATEWIDE SURVEY LOCATIONS		
TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Urban Arterial	Over 100,000	Fayette, US 27 at KY 1683, Lexington*
		Fayette, Reynolds at Lansdowne, Lexington*
		Fayette, KY 4 at KY 353, Lexington*
		Kenton, US 25 at KY 236, Covington
		Kenton, KY 8 at KY 17, Covington
		Kenton, KY 16 at KY 177, Covington
		Fayette, US 25 at Fontaine, Lexington
	25,000-100,000	Campbell, US 27 at Carothers, Newport*
		Christian, US 41 at Ninth, Hopkinsville*
		Hopkins, US 41A at KY 70, Madisonville*
		Pulaski, US 27 at KY 80, Somerset*
		Franklin, US 60 at Sunset, Frankfort*
		Henderson, US 41A at First, Henderson*
		Nelson, US 31E at Beall, Bardstown
		Barren, US 68 at Race, Glasgow*
		Clark, US 60 at KY 1958, Winchester*
		Warren, US 31W at US 231, Bowling Green
	Under 25,000	Anderson, US 62 at Broadway, Lawrenceburg*
		Rowan, US 60 at KY 32, Morehead*
Urban Collector or Local	All	Hardin, Poplar at Sycamore, Elizabethtown*
		Kenton, KY 1072 at Highland, Covington*
* Previous data collection site.		

TABLE 3. DRIVER USAGE RATES			
TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	80	131
	50,001-100,000	36	1,780
	25,001-50,000	38	3,550
	10,000-25,000	45	1,595
	Under 10,000	41	553
Rural Arterial	Over 50,000	22	2,124
	25,001-50,000	17	4,603
	10,000-25,000	28	5,407
	Under 10,000	24	878
Rural Collector	Over 100,000	56	474
	50,001-100,000	33	2,069
	25,001-50,000	23	4,251
	10,000-25,000	26	6,091
	Under 10,000	24	1,174
Rural Local	Over 50,000	33	295
	25,000-50,000	19	821
	Under 25,000	18	1,591
Urban Interstate	Over 100,000	45	6,318
	50,000-100,000	52	961
	Under 50,000	34	712
Urban Arterial	Over 100,000	48	11,257
	25,000-100,000	29	12,042
	Under 25,000	21	2,749
Urban Collector or Local	All	34	2,441
ALL	All	32	73,867

TABLE 4. FRONT SEAT PASSENGER (AGE 4-5 YEARS) USAGE RATES			
TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	DNA	0
	50,001-100,000	44	32
	25,001-50,000	68	25
	10,000-25,000	53	15
	Under 10,000	90	10
Rural Arterial	Over 50,000	21	14
	25,001-50,000	20	83
	10,000-25,000	35	92
	Under 10,000	31	13
Rural Collector	Over 100,000	33	3
	50,001-100,000	42	36
	25,001-50,000	27	85
	10,000-25,000	20	122
	Under 10,000	19	36
Rural Local	Over 50,000	69	16
	25,000-50,000	0	8
	Under 25,000	16	43
Urban Interstate	Over 100,000	71	85
	50,000-100,000	70	10
	Under 50,000	13	8
Urban Arterial	Over 100,000	56	142
	25,000-100,000	38	184
	Under 25,000	27	30
Urban Collector or Local	All	46	52
ALL	All	39	1,144

TABLE 5. FRONT SEAT PASSENGER (AGE 6-12 YEARS) USAGE RATES			
TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	DNA	0
	50,001-100,000	56	34
	25,001-50,000	43	21
	10,000-25,000	74	34
	Under 10,000	92	24
Rural Arterial	Over 50,000	15	34
	25,001-50,000	24	49
	10,000-25,000	38	112
	Under 10,000	16	19
Rural Collector	Over 100,000	88	8
	50,001-100,000	32	57
	25,001-50,000	14	110
	10,000-25,000	22	118
	Under 10,000	24	45
Rural Local	Over 50,000	75	12
	25,000-50,000	7	14
	Under 25,000	10	41
Urban Interstate	Over 100,000	41	73
	50,000-100,000	28	32
	Under 50,000	40	5
Urban Arterial	Over 100,000	62	152
	25,000-100,000	41	239
	Under 25,000	31	51
Urban Collector or Local	All	48	67
ALL	All	37	1,351

TABLE 6. FRONT SEAT PASSENGER (AGE 13-19 YEARS) USAGE RATES			
TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	83	6
	50,001-100,000	49	98
	25,001-50,000	61	137
	10,000-25,000	56	43
	Under 10,000	61	28
Rural Arterial	Over 50,000	18	91
	25,001-50,000	16	177
	10,000-25,000	24	139
	Under 10,000	14	35
Rural Collector	Over 100,000	50	6
	50,001-100,000	38	133
	25,001-50,000	23	196
	10,000-25,000	19	276
	Under 10,000	32	114
Rural Local	Over 50,000	72	39
	25,000-50,000	17	52
	Under 25,000	19	104
Urban Interstate	Over 100,000	46	145
	50,000-100,000	26	53
	Under 50,000	27	15
Urban Arterial	Over 100,000	64	267
	25,000-100,000	31	635
	Under 25,000	21	73
Urban Collector or Local	All	24	112
ALL	All	35	2,974

TABLE 7. FRONT SEAT PASSENGER (OVER 19 YEARS OF AGE) USAGE RATES

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	82	82
	50,001-100,000	41	383
	25,001-50,000	40	1,052
	10,000-25,000	50	623
	Under 10,000	53	313
Rural Arterial	Over 50,000	20	441
	25,001-50,000	16	1,115
	10,000-25,000	32	1,524
	Under 10,000	20	136
Rural Collector	Over 100,000	45	127
	50,001-100,000	31	646
	25,001-50,000	21	1,229
	10,000-25,000	27	1,622
	Under 10,000	26	299
Rural Local	Over 50,000	30	184
	25,000-50,000	27	404
	Under 25,000	18	419
Urban Interstate	Over 100,000	38	981
	50,000-100,000	50	381
	Under 50,000	35	99
Urban Arterial	Over 100,000	47	2,386
	25,000-100,000	26	2,339
	Under 25,000	16	685
Urban Collector or Local	All	30	359
ALL	All	32	17,829

TABLE 8. USAGE RATES FOR CHILDREN 1-3 YEARS OF AGE (FRONT AND REAR			
TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	83	6
	50,001-100,000	61	54
	25,001-50,000	80	97
	10,000-25,000	73	79
	Under 10,000	48	31
Rural Arterial	Over 50,000	63	59
	25,001-50,000	40	194
	10,000-25,000	46	306
	Under 10,000	58	19
Rural Collector	Over 100,000	55	11
	50,001-100,000	50	102
	25,001-50,000	49	231
	10,000-25,000	49	389
	Under 10,000	32	69
Rural Local	Over 50,000	57	54
	25,000-50,000	65	17
	Under 25,000	56	75
Urban Interstate	Over 100,000	63	196
	50,000-100,000	54	48
	Under 50,000	64	14
Urban Arterial	Over 100,000	75	467
	25,000-100,000	49	697
	Under 25,000	31	152
Urban Collector or Local	All	55	184
ALL	All	56	3,549

TABLE 9. USAGE RATES FOR CHILDREN UNDER 1 YEAR OF AGE FRONT AND REAR

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	33	3
	50,001-100,000	52	33
	25,001-50,000	73	52
	10,000-25,000	78	18
	Under 10,000	36	14
Rural Arterial	Over 50,000	62	29
	25,001-50,000	47	90
	10,000-25,000	65	60
	Under 10,000	45	11
Rural Collector	Over 100,000	70	10
	50,001-100,000	36	22
	25,001-50,000	54	79
	10,000-25,000	56	121
	Under 10,000	50	20
Rural Local	Over 50,000	29	34
	25,000-50,000	38	13
	Under 25,000	60	35
Urban Interstate	Over 100,000	67	83
	50,000-100,000	81	21
	Under 50,000	30	10
Urban Arterial	Over 100,000	86	105
	25,000-100,000	61	195
	Under 25,000	51	37
Urban Collector or Local	All	75	61
ALL	All	61	1,156

TABLE 10. USAGE RATES FOR DRIVERS AND PASSENGERS BY TYPE OF HIGHWAY

	PERCENT USAGE		
TYPE OF HIGHWAY	DRIVERS	FRONT SEAT PASSENGERS	CHILDREN UNDER FOUR YEARS OF AGE
Rural Interstate	40	49	68
Rural Arterial	23	26	48
Rural Collector	27	27	49
Rural Local	20	27	53
Urban Interstate	45	43	63
Urban Arterial	36	37	59
Urban Collector or Local	34	33	60
ALL	32	34	57

TABLE 11. STATEWIDE USAGE RATE BY AGE AND SEX OF DRIVER

CATEGORY	USAGE RATE (PERCENT)
Male	29
Female	37
16-30 Years of Age	31
31-50 Years of Age	35
Over 50 Years of Age	27

TABLE 12. STATEWIDE USAGE RATE FOR FRONT SEAT PASSENGERS BY AGE AND SEX

CATEGORY	USAGE RATE (PERCENT)
Under 4	46
4 - 5	39
6 - 12	37
13 - 19	35
Over 19	32

TABLE 13. CHANGE IN USAGE OF SAFETY BELTS BY DRIVERS IN STATEWIDE SURVEY CITIES								
	PERCENT USING SAFETY BELTS							
CITY	1982	1983	1984	1985	1986	1988	1989	1990
Louisville	6	12	13	14	16	25	28	38
Lexington	8	10	10	17	24	31	42	80
Covington	8	9	12	16	22	28	32	39
Hopkinsville	3	3	4	6	10	20	21	24
Frankfort	5	7	7	11	14	19	24	38
Henderson	3	5	7	9	11	20	22	29
Newport	5	6	5	6	9	20	26	35
Madisonville	2	3	5	8	12	20	22	26
Elizabethtown	3	4	5	8	14	20	26	31
Winchester	2	3	6	9	12	25	33	37
Glasgow	3	3	3	5	6	12	15	19
Somerset	2	4	6	7	9	19	26	21
Maysville	2	3	6	6	13	19	25	29
Morehead	3	3	3	5	7	12	15	22
Princeton	2	2	2	3	6	12	15	17
Bardstown	4	4	6	7	13	19	21	23
Hazard	4	3	4	6	5	10	12	15
Lawrenceburg	1	2	3	6	5	9	15	19
Carrollton	3	5	5	7	10	16	19	35

TABLE 14. CHANGE IN USAGE OF SAFETY SEATS OR BELTS BY CHILDREN UNDER 4 YEARS OF AGE IN STATEWIDE SURVEY CITIES

CITY	PERCENT USING SAFETY BELTS							
	1982	1983	1984	1985	1986	1988	1989	1990
Louisville	22	36	49	42	40	68	65	80
Lexington	32	46	50	44	46	78	78	91
Covington	22	39	49	47	50	59	53	66
Hopkinsville	12	19	19	20	21	33	38	40
Frankfort	15	26	30	27	30	43	43	57
Henderson	14	18	26	30	31	36	42	53
Newport	11	27	20	22	22	60	60	57
Madisonville	12	18	29	35	38	52	51	54
Elizabethtown	11	27	34	30	32	41	42	51
Winchester	12	14	33	29	26	56	68	51
Glasgow	14	17	20	18	21	36	38	39
Somerset	7	23	24	22	26	48	47	48
Maysville	12	18	17	19	25	31	34	36
Morehead	10	14	13	15	14	25	27	35
Princeton	10	12	12	16	20	33	41	52
Bardstown	20	21	31	31	31	41	39	42
Hazard	7	10	9	11	13	19	20	25
Lawrenceburg	7	6	22	23	20	32	29	35
Carrollton	6	10	16	22	19	26	28	31

TABLE 15. ACCIDENT SEVERITY VERSUS SAFETY BELT USAGE (ALL DRIVERS)*

	NOT WEARING SAFETY BELT		WEARING SAFETY BELT		PERCENT
TYPE OF INJURY	NUMBER	PERCENT	NUMBER	PERCENT	REDUCTION
Fatal	2,033	0.25	173	0.06	77**
Incapacitating	23,461	2.90	4,970	1.68	42**
Non-Incapacitating	41,227	5.10	11,006	3.71	27**
Possible Injury	44,084	5.46	15,525	5.23	4**
Fatal or Incapacitating	25,494	3.16	5,143	1.73	45**

* Based on 1985 through 1989 accident data. Total sample size for not wearing a safety belt was 807,818 compared to 296,709 for wearing a safety belt.

** Statistically significant reduction (probability of 0.99).

TABLE 16. ACCIDENT SEVERITY VERSUS SAFETY BELT USAGE BY TYPE OF VEHICLE, SPEED LIMIT, AND TYPE OF ACCIDENT (ALL DRIVERS)*

		PERCENT SUSTAINING FATAL OR SEVERE INJURY		
VARIABLE	CATEGORY	NOT WEARING SAFETY BELT	WEARING SAFETY BELT	PERCENT REDUCTION
Type of Vehicle	Passenger Car	3.23	1.79	45
	Single-Unit Truck	1.74	0.67	61
	Combination Truck	2.56	1.21	53
Type of Accident (Non-Intersection)	Rear End	1.49	1.01	32
	Fixed Object	12.93	5.42	58
	Head-On	15.02	11.05	26
	Overturned	17.08	7.25	58
Speed Limit (mph)	35	2.22	1.24	44
	45	3.13	1.31	58
	55	7.58	3.77	50

* Based on 1985 through 1989 accident data.

TABLE 17. ACCIDENT SEVERITY VERSUS SAFETY SEAT AND BELT USAGE (CHILDREN AGE THREE AND UNDER)*

TYPE OF INJURY	NOT USING SAFETY SEAT OR BELT		USING SAFETY SEAT		USING SAFETY BELT		PERCENT REDUCTION	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	SEAT	SAFETY BELT
Fatal	34	0.14	7	0.05	6	0.06	64	54
Incapacitating	453	1.82	75	0.53	73	0.76	71**	58**
Non-Incapacitating	1,293	5.20	434	3.08	296	3.07	41**	41**
Possible Injury	1,702	6.85	594	4.22	443	4.60	38**	33**
Fatal or Incapacitating	487	1.96	82	0.58	79	0.82	70**	58**

* Based on 1985 through 1989 accident data. Total sample sizes were 24,845 for not using a safety seat or belt, 14,087 for using a safety seat, and 9,627 for using a safety belt.

** Statistically significant reduction (probability of 0.99).

TABLE 18. ACCIDENT SEVERITY VERSUS SAFETY SEAT AND BELT USAGE BY SEATING POSITION (CHILDREN AGE THREE AND UNDER)*

SEATING POSITION	TYPE OF INJURY	NOT USING SAFETY SEAT OR BELT		USING SAFETY SEAT OR BELT		PERCENT REDUCTION
		NUMBER	PERCENT	NUMBER	PERCENT	
Front	Fatal	26	0.15	6	0.05	64**
	Incapacitating	344	2.01	88	0.80	60**
	Non-Incapacitating	957	5.59	372	3.38	40**
	Possible Injury	1,315	7.68	556	5.05	34**
	Fatal or Incapacitating		2.16	94	0.85	61**
Rear	Fatal	8	0.10	7	0.06	47
	Incapacitating	109	1.41	60	0.47	67**
	Non-Incapacitating	336	4.36	358	2.82	35**
	Possible Injury	387	5.02	481	3.79	24**
	Fatal or Incapacitating	117	1.52	67	0.53	65**

* Based on 1985 through 1989 accident data. Total sample sizes were 17,130 and 7,715 for not using a safety seat or belt in the front and rear seats, respectively, and 11,020 and 12,694 for using either a safety seat or belt in the front and rear seats, respectively.

** Statistically significant reduction (probability of 0.99).

TABLE 19. ACCIDENT SEVERITY VERSUS SAFETY BELT OR SEAT USAGE (OCCUPANTS OTHER THAN DRIVERS)*

	NOT USING LAP BELT OR SHOULDER HARNESS		USING LAP BELT AND/OR SHOULDER HARNESS		
TYPE OF INJURY	NUMBER	PERCENT	NUMBER	PERCENT	PERCENT REDUCTION
Fatal	696	0.23	73	0.08	65**
Incapacitating	10,963	3.63	1,735	1.91	47**
Non-Incapacitating	21,440	7.10	4,096	4.50	37**
Possible Injury	23,109	7.65	6,116	6.72	12**
Fatal or Incapacitating	11,659	3.86	1,808	1.99	48**

* Based on 1985, 1987, 1988, and 1989 accident data. Total sample sizes were 302,106 not using a safety belt or seat compared to 90,946 using a safety belt.

** Statistically significant reduction (probability of 0.99).

TABLE 20. ACCIDENT SEVERITY VERSUS SAFETY BELT USAGE (OCCUPANTS OTHER THAN DRIVERS)*

POSITION	TYPE OF INJURY	NOT USING LAP BELT OR SHOULDER HARNESS		USING LAP BELT AND/OR SHOULDER HARNESS		PERCENT REDUCTION
		NUMBER	PERCENT	NUMBER	PERCENT	
Front	Fatal	541	0.24	61	0.09	61***
	Incapacitating	8,588	3.84	1,424	2.20	43***
	Non-Incapacitating	16,378	7.32	3,092	4.79	35***
	Possible Injury	18,073	8.08	4,748	7.35	9***
	Fatal or Incapacitating	9,129	4.08	1,485	2.30	44***
Rear**	Fatal	155	0.20	12	0.05	77***
	Incapacitating	2,375	3.03	311	1.18	61***
	Non-Incapacitating	5,062	6.45	1,004	3.81	41***
	Possible Injury	5,036	6.42	1,368	5.19	19***
	Fatal or Incapacitating	2,530	3.22	323	1.23	62***

* Based on 1985, 1987, 1988, and 1989 accident data. Total sample sizes were 223,608 and 78,498 for not using a safety belt in the front seat and rear seat, respectively, and 64,692 and 26,354 for using a safety belt in the front and rear seat, respectively.

** Lap belts only primarily used in rear seats.

*** Statistically significant reduction (probability of 0.99).

TABLE 21. POTENTIAL ANNUAL REDUCTION IN TRAFFIC ACCIDENT FATALITIES AND ACCIDENT SAVINGS FROM INCREASE IN DRIVER SAFETY BELT USAGE*

	POTENTIAL ANNUAL REDUCTION IN NUMBER OF		ANNUAL ACCIDENT SAVINGS MILLION $) FROM REDUCTION IN		
DRIVER USAGE RATE (PERCENT)	FATALITIES	SERIOUS INJURIES**	FATALITIES	SERIOUS INJURIES	TOTAL
40	32	173	48.0	6.7	54.7
50	73	401	109.5	15.6	125.1
60	115	630	172.5	24.6	197.1
70	157	858	235.5	33.5	269.0
80	199	1,086	298.5	42.4	340.9
90	240	1,314	360.0	51.2	411.2
100	282	1,542	423.0	60.1	483.1

* Based on increase from the 32.2 usage rate determined in the 1990 survey, the percent reductions listed in Table 15, and accident cost estimates recommended by the Federal Highway Administration (11). These costs are 1,500,000 for a fatality and $39,000 for an incapacitating injury.

** Serious injuries were defined as those listed as incapacitating on the accident report.

APPENDIX

SUMMARY OF DATA

LIST OF SURVEY LOCATIONS

1	Fayette, I64 at KY 859
2	Boyd, I64 at US 23
3	Christian, I24 at US 41A, Hopkinsville
4	Hardin, I64 at rest area, Sonora
5	Barren, I65 at KY 70, Cave City
6	Boone, I75 at rest area, Florence
7	Clark, I64 at KY 627, Winchester
8	Franklin, I64 at US 60, Frankfort
9	Laurel, I75 at KY 80, London
10	Henry, I71 at KY 153, Sligo
11	Rockcastle, I75 at US 25, Mt. Vernon
12	Scott, I75 at rest area, Georgetown
13	Shelby, I64 at KY 53, Shelbyville
14	Woodford, I64 at KY 341, Midway
15	Trigg, I24 at US 68, Cadiz
16	Pike, US 460 at US 119, Pikeville
17	Daviess, US 60 at KY 144, Owensboro
18	Hardin, US31W at KY 835, West Point
19	Perry, KY 15X at KY 476, Hazard
20	Knox, US 25E at KY 225, Barbourville
21	Harlan, US 119 at KY 179, Cumberland
22	Floyd, KY 80 at US 23, Allen
23	Bullitt, US31E at KY 44, Mt. Washington
24	Carter, KY 1 at I64, Grayson
25	Laurel, KY 25 at KY 80, London
26	Mason, US 62 at KY 11, Maysville
27	Clay, US 421, at KY 80, Manchester
28	Bourbon, US 68 at 5th St., Millersburg
29	Casey, US 127 at KY 70, Liberty
30	Meade, US 31W at KY 1638, Muldraugh
31	Lincoln, US 127 at KY 78, Hustonville
32	Russell, US 127 at KY 80, Russell Sprgs.
33	Washington, US150 at KY 55, Springfield
34	Cumberland, KY 90 at KY 61, Burkesville
35	Ballard, US 60 at KY 358, LaCenter
36	Fayette, KY 418 at I75, Lexington
37	Christian, US41 at KY 1682, Hopkinsville
38	McCracken, US 62 at KY 68, Paducah
39	Madison, KY 52 at KY 876, Richmond
40	Barren, KY 255 at US 31W, Park City
41	Nelson, US 62 at KY 48, Bloomfield
42	Boone, KY 18 at KY 237, Burlington
43	Oldham, KY 146 at KY 393, Buckner
44	Knox, KY 11 at US 25E, Barbourville
45	Henderson, KY 145 at US 60, Corydon
46	Boyle, US 68 at US 150, Perryville
47	Greenup, KY 1 at US 23, Greenup
48	Caldwell, KY 139 at Jefferson, Princeton
49	Grayson, US 62 at KY 259, Leitchfield
50	Allen, US 231 at US 31E, Scottsville
51	Bath, US 60 at KY 26, Owingsville
52	Larue, KY 84 at KY 51, Hodgenville
53	Scott, US 62 at I75, Georgetown
54	Anderson, US 127 at US 127B, L'burg
55	Breathitt, KY 30 at KY 15, Jackson
56	Webster, US 41 at KY 56, Sebree
57	Garrard, KY 39 at US 27, Lancaster
58	Carroll, US 42 at Highland, Carrollton
59	Elliott, KY 32 at KY 7, Sandy Hook
60	McCracken, KY 1286 at US 62, Paducah
61	Harlan, KY 413 at US 119, Loyall
62	Greenup, KY 7 at US 23, South Shore
63	Lewis, KY 10 at KY 57, Tollesboro
64	Simpson, KY 73 at KY 100, Franklin
65	Adair, KY 55 at KY 80, Columbia
66	Taylor, KY208-Roberts Rd., Camp'ville
67	Kenton, I275 at KY 17, Covington
68	Kenton, I75 at KY 371, Cresent Springs
69	Fayette, I75 at US 68, Lexington
70	Jefferson, I64 at KY 1747, Louisville
71	Jefferson, I65 at KY 1631, Louisville
72	Jefferson, I264 at US 31E, Louisville
73	Jefferson, I264 at US 42, Louisville
74	Jefferson, I264 at US 60, Louisville
75	Warren, I65 at US 341, Bowling Green
76	Boone, I71 at KY 14, Verona
77	Jefferson, US 31W at Gagel, Louisville
78	Jefferson, KY 1447-Hubbards, Louisville
79	Jefferson, KY 1703-Trevillian, Louisville
80	Fayette, US 27 at KY 1683, Lexington
81	Fayette, Reynolds-Lansdowne, Lexington
82	Fayette, KY 4 at KY 353, Lexington
83	Kenton, US 25 at KY 236, Covington
84	Kenton, KY 8 at KY 17, Covington
85	Kenton, KY 16 at KY 177, Covington
86	Fayette, US 25 at Fontaine, Lexington
87	Campbell, US 27 at Carothers, Newport
88	Christian, US 41 at 9th, Hopkinsville
89	Hopkins, US 41A at KY 70, Madisonville
90	Pulaski, US 27 at KY 80, Somerset
91	Franklin, US 60 at Sunset, Frankfort
92	Henderson, US 41A at First, Henderson
93	Nelson, US 31E at Beall, Bardstown
94	Barren, US 68 at Race, Glasgow
95	Clark, US 60 at KY 1958, Winchester
96	Warren, US31W at US231, Bowl.Green
97	Anderson, US62 at US127, Lawrenceburg
98	Rowan, US 60 at KY 32, Morehead
99	Hardin, Poplar-Sycamore, Elizabethtown
100	Kenton, KY 1072-Highland, Covington

TABLE A-1. SUMMARY OF DATA

LOCATION	DRIVERS		FRONT-SEAT PASSENGERS										FRONT AND REAR			
			4-5 Years		6-12 Years		13-19 Years		OVER 19 Years		UNDER 4 Years		1-3 Years		UNDER 1 Year	
NUMBER	SAMPLE	USAGE*	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE
1	131	80	0	**	0	**	6	83	82	82	7	57	6	83	3	33
2	551	36	17	47	10	50	26	50	106	34	8	63	11	91	6	67
3	431	32	6	17	6	33	31	26	83	31	14	29	15	53	8	25
4	798	37	9	56	18	67	41	66	194	48	25	48	28	54	19	58
5	543	34	3	67	13	38	11	64	55	35	1	100	2	100	1	100
6	1,106	35	9	100	3	100	55	85	399	41	31	58	59	85	35	77
7	408	45	0	**	3	0	9	0	100	36	4	75	5	80	0	**
8	997	45	7	71	1	100	36	64	379	48	13	62	16	81	12	58
9	496	32	6	17	1	0	26	23	119	17	12	67	15	60	4	75
10	407	24	9	22	5	100	8	63	97	27	10	70	19	84	4	100
11	410	47	3	100	11	73	8	75	108	29	27	56	43	74	8	50
12	444	59	0	**	8	100	14	36	324	59	7	43	14	57	4	100
13	267	47	3	100	8	50	6	67	65	65	4	75	3	67	2	100
14	67	69	0	**	2	0	7	57	29	66	0	**	0	**	0	**
15	553	41	10	90	24	92	28	61	313	53	22	41	31	48	14	36
16	312	22	2	100	22	14	41	12	78	17	9	44	11	73	6	50
17	940	24	3	0	4	50	30	37	263	23	11	73	7	71	6	83
18	872	20	9	11	8	0	20	0	100	14	38	50	41	59	17	59
19	299	15	10	60	8	50	22	23	98	23	39	15	60	25	19	26
20	564	17	13	8	14	36	31	10	97	22	37	59	29	72	24	54
21	378	16	14	14	7	0	47	9	144	19	15	67	12	83	11	64
22	599	10	11	0	2	0	30	7	161	11	15	20	14	21	15	27
23	602	25	7	43	0	**	13	46	113	27	11	64	13	77	6	83
24	527	18	2	0	10	0	28	29	195	12	17	29	26	31	2	100
25	1,834	17	26	19	8	38	6	17	307	12	43	21	40	25	13	46
26	987	29	8	13	55	36	43	26	258	33	36	17	80	30	8	100
27	607	15	13	15	7	0	34	18	126	9	22	41	18	67	11	27
28	606	35	10	30	20	35	19	53	251	39	11	27	20	25	2	50
29	874	24	18	28	1	0	7	29	144	26	34	26	51	49	14	43
30	993	45	6	17	2	50	7	14	327	46	13	62	38	47	10	100
31	212	17	10	60	1	0	3	33	126	18	15	60	22	64	4	75
32	416	24	2	0	12	33	26	8	128	31	11	64	33	64	2	100
33	712	22	25	56	14	71	0	**	164	29	23	22	44	48	9	67
34	527	26	3	0	0	**	7	14	81	23	8	50	6	83	5	40
35	351	23	10	40	19	16	28	14	55	15	15	47	13	46	6	50
36	474	56	3	33	8	88	6	50	127	45	12	67	11	55	10	70
37	504	34	10	30	14	21	19	84	221	44	16	31	19	37	4	25
38	311	31	12	42	9	44	43	26	147	30	16	44	15	53	8	38
39	1,254	33	14	50	34	32	71	32	278	21	58	41	68	53	10	40
40	613	20	12	33	3	0	47	47	271	34	16	69	15	80	13	62
41	430	22	7	29	12	8	21	14	131	22	8	50	15	60	3	67
42	800	39	10	80	8	63	24	46	89	35	53	38	67	55	21	52
43	537	20	15	27	8	0	13	0	106	21	7	57	15	73	7	43
44	1,062	14	17	12	26	27	27	11	381	9	49	27	61	34	12	75
45	116	23	5	20	11	18	7	14	27	19	12	42	14	36	7	43
46	294	21	8	0	27	0	19	0	153	22	24	13	33	30	8	0
47	399	26	11	18	15	0	38	13	71	10	12	67	11	73	8	88
48	1,111	17	16	19	38	29	78	17	196	16	38	32	63	43	16	88
49	1,004	21	8	0	13	0	53	13	329	26	35	49	42	60	14	57
50	452	33	8	25	9	11	39	28	86	34	7	71	9	78	4	100
51	374	3	14	7	2	0	0	**	145	4	28	46	31	39	12	67
52	738	37	14	29	8	25	9	11	100	28	9	56	12	58	8	88
53	635	46	0	**	11	27	20	15	277	46	18	67	52	73	10	70
54	631	27	12	25	9	22	32	19	79	16	50	42	60	50	25	48
55	299	10	13	15	1	100	0	**	91	10	45	16	76	30	16	13
56	262	19	35	23	23	17	35	23	129	24	18	39	20	35	9	33
57	585	33	2	50	4	50	10	40	190	36	17	47	22	55	7	43
58	715	35	22	32	32	28	98	37	227	34	32	19	50	28	11	45
59	459	7	14	0	13	15	16	0	72	0	13	38	19	42	9	56
60	295	33	16	69	12	75	39	72	184	30	47	47	54	57	34	29
61	253	12	4	0	3	33	11	18	122	16	8	63	5	40	4	75
62	568	22	4	0	11	0	41	17	282	32	12	42	12	75	9	22
63	86	10	2	0	7	0	12	25	7	14	5	40	2	50	5	40
64	385	16	7	29	1	100	22	68	183	17	49	45	45	56	22	59
65	494	20	28	18	29	10	39	0	86	22	5	100	17	59	4	100
66	626	20	6	0	4	0	31	6	143	18	11	36	11	55	4	50
67	867	44	11	82	8	63	15	80	95	35	42	38	63	49	24	54
68	1,019	39	17	65	6	17	4	75	208	38	26	31	36	39	10	80
69	359	57	0	**	3	100	8	25	127	44	8	63	18	78	2	100

TABLE A-1. SUMMARY OF DATA (continued)

LOCATION	DRIVERS		FRONT-SEAT PASSENGERS										FRONT AND REAR			
			4-5 Years		6-12 Years		13-19 Years		OVER 19 Years		UNDER 4 Years		1-3 Years		UNDER 1 Year	
NUMBER	SAMPLE	USAGE*	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE
70	745	54	6	17	1	0	1	0	153	50	4	100	8	100	4	100
71	622	41	6	67	5	60	16	44	71	38	0	**	2	100	0	**
72	831	43	10	70	9	44	23	43	88	35	22	64	21	81	17	59
73	929	48	18	94	27	41	63	37	133	27	8	75	13	85	5	100
74	946	41	17	65	14	21	15	67	106	27	30	63	35	74	21	67
75	961	52	10	70	32	28	53	26	381	50	37	57	48	54	21	81
76	712	34	8	13	5	40	15	27	99	35	15	27	14	64	10	30
77	1,498	27	20	45	13	38	42	12	275	21	27	63	59	78	6	100
78	1,043	49	9	67	19	42	11	36	119	46	7	71	21	76	5	80
79	1,669	42	24	54	21	24	10	30	251	36	24	71	43	84	9	78
80	728	78	6	100	23	96	45	87	208	76	16	94	44	91	6	100
81	696	82	16	94	11	82	55	82	173	80	25	92	47	94	12	92
82	971	80	14	79	19	89	75	81	312	82	38	82	48	92	24	79
83	1,121	31	16	19	12	42	4	25	238	29	37	41	86	67	16	69
84	1,102	32	5	60	0	**	0	**	287	26	20	60	21	67	5	80
85	1,058	21	28	36	9	33	7	29	260	19	46	54	82	46	17	100
86	1,371	66	4	75	25	80	18	61	263	67	7	86	16	88	5	100
87	1,201	35	21	24	23	39	57	32	149	32	95	44	121	60	46	52
88	1,436	24	19	16	34	32	93	14	167	17	25	28	36	33	11	64
89	1,878	26	28	32	55	31	118	29	277	22	37	32	75	53	9	56
90	798	21	9	56	4	25	33	36	265	18	16	44	15	47	10	50
91	1,396	38	11	55	32	44	40	30	344	36	22	18	53	47	14	93
92	1,244	29	26	38	43	42	99	27	252	25	35	34	77	51	6	83
93	1,470	23	17	76	22	50	46	52	340	19	30	23	57	35	10	80
94	547	19	4	50	0	**	22	64	162	20	45	29	62	26	31	65
95	735	37	19	37	15	67	56	25	152	39	80	40	106	51	27	52
96	1,337	35	30	30	11	73	71	37	231	35	76	55	95	62	31	55
97	1,386	19	18	17	23	13	4	25	308	12	35	26	75	32	7	71
98	1,363	22	12	42	28	46	69	20	377	20	59	15	77	30	30	47
99	1,631	31	41	39	58	47	65	23	271	28	46	26	70	44	26	69
100	810	39	11	73	9	56	47	26	88	34	50	44	114	62	35	80

* Percent

** No data available.