Research Report
KTC-96-20

1996 SAFETY BELT USAGE SURVEY AND EVALUATION OF EFFECTIVENESS IN KENTUCKY

by

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EXECUTIVE SUMMARY

The objective of this study was to establish 1996 safety belt and child safety seat usage rates in Kentucky. The 1996 survey documents the continuing results from enacting a statewide mandatory safety belt law in 1994. 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 the report is an analysis of accident records evaluating the effectiveness of safety belts.

The data show that the decrease in the usage rate which occurred in 1995 after the dramatic increase in 1994, after enactment of the statewide usage law, did not continue. The driver usage rate in 1996 was 55 percent, compared to 54 percent in 1995 and 58 percent in 1994. The rate is substantially above the 1993 level of 42 percent.

The statewide usage rate for children under the age of four was determined to be 79 percent. This is the highest rate found since the start of the surveys and compares to the previous high of 72 percent in 1994.

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, there was a 63 percent reduction in a driver sustaining a fatal or incapacitating injury in a traffic accident when a safety belt was worn compared to not wearing a safety belt.

1.0 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 various types of efforts used to increase safety belt and safety seat usage. Past efforts have included public information campaigns, and both local and statewide legislation. The most recent legislation in this area was statewide legislation requiring the use of safety belts. This law was passed in 1994 with an effective date in July 1994.

The first legislation in this area was a law 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, prior to the statewide law, local safety belt usage laws were enacted in several local jurisdictions in Kentucky. The first such local law, with an effective date of July 1990, was enacted by the Lexington-Fayette Urban County Government. The second local law, with an effective date of July 1991, was enacted by the city of Louisville. Jefferson County later adopted such a law. Other cities and one county which had local safety belt ordinances prior to the statewide legislation included Murray, Bowling Green, Kenton County, Corbin, Bardstown, and Midway. Prior to the statewide law, the combined population of the counties and cities having a local ordinance represented approximately one-third of the statewide population. The statewide law replaced the various local ordinances.

Statewide observational surveys were first conducted in Kentucky in 1982, with data collected in 19 cities across the state. These surveys have been conducted annually since 1982 (with the exception of 1987) to document safety belt and safety seat usage in Kentucky (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13). The number of sites was increased in 1990 in order to obtain a more representative statewide sample (8).

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. After a penalty was added to the law, this percentage increased to almost 50 percent in 1988 and 1989, and to 57 percent in 1990 and 1991. The 1993 survey indicated a usage rate of 61 percent, with usage increasing to 72 percent in 1994 and then decreasing slightly to 66 percent in 1995.

Safety belt usage for the driver increased each survey year from 1982 through 1994. The statewide driver safety belt usage rate was only 4 percent in 1982. It steadily increased to a level of approximately 40 percent in 1991 through

1993. There was a large increase to 58 percent in 1994 after enactment of the statewide law. The first decrease was in 1995 when usage decreased to 54 percent.

The objective of the survey summarized in this report is to establish statewide 1996 safety belt and child safety seat usage rates in Kentucky. These rates may be compared to those determined from previous surveys. The 1996 survey will determine whether the relatively small decrease in 1995, which occurred after the large increase in usage obtained from enacting a statewide mandatory safety belt law in 1994, has been reversed. Another objective of this study is to analyze accident data to evaluate the effectiveness of safety belts in reducing injuries to occupants of motor vehicles involved in traffic accidents.

2.0 PROCEDURE

2.1 DATA COLLECTION PROCEDURE

The data collection procedure used in the surveys was modified starting with the 1990 survey. The procedure used in the 1990 through 1995 surveys was again used in the 1996 survey. The procedure used for the first several surveys was changed in order to obtain a more representative statewide sample, as well as to use a procedure that would be comparable to surveys taken in other states. The data collection form was changed along with the site selection procedure.

The data collection form used in the survey is shown in Figure 1. Safety belt usage was recorded for drivers and front-seat passengers sitting in the outboard position. These positions are equipped with a combination lap belt/shoulder harness which enables observations to be performed more easily. 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.

Two additional types of information were obtained. Use of motorcycle helmets was noted, and usage for minority drivers was determined. This information was first collected in the 1993 survey.

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, generally include only vehicles in the curb or near lane unless the traffic volume and roadway geometrics allow data to be collected in the next 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 having 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 passengers 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 (typically those vehicles without a head rest).

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

11. Collect four "observer hours" of data 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 when use by the driver cannot be determined.

As noted, data were collected for four hours at each location. This could consists of four hours for one observer or two hours using two observes on different approaches. The decision was made to collect data for an equal time period for each location rather than attempt to collect a given sample size.

Data collection was started in April 1996 and continued through August with the majority of the data obtained in June and July.

2.2 DATA COLLECTION LOCATIONS

Data for the surveys collected from 1982 through 1989 were conducted at 23 sites in 19 cities. The cities were selected so that they would be distributed across the state. These cities were also selected to represent 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 and to include all types of roadways, 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 having the given characteristics of the total vehicle miles driven statewide. The data apply to roads for which a traffic volume was available. This is the state-maintained highway system of slightly over 27,000 miles. Local county and city roadways would not be included. The data shown in Table 1 were obtained using 1990 data. There would be little change in the distribution from year to year, so the same percentages have continued to be used. This would allow the same locations to be used each year to assure consistency in the data.

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, approximately eight percent of all vehicle miles travelled was on rural arterial highways in counties having a population between 10,000 and 25,000, so eight sites were selected on highways meeting this criterion. 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 collected 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 obtained 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 selected to obtain data for interstates were either at an exit ramp or at a rest area. This would be the only exception to the sites being at an intersection. Data at an exit ramp were taken for traffic exiting the interstate at the intersection between the ramp and intersecting roadway. 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. The largest number in any one county was eight in Jefferson County. For each category, the county, location (road and intersecting road), and city (nearest city for rural locations) are given in Table 2.

2.3 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 determined 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 as for combined seating positions. Rates were separated into safety seat, booster seat, and harness or belt.

The 1996 usage rates for the 19 cities previously surveyed were compared to results determined in prior years. The rates for the various types of highway and county population categories were compared.

2.4 ACCIDENT ANALYSIS

The computer files containing all reported accidents in Kentucky (for the years 1991 through 1995) 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 serious injuries and the accident savings from an increase in driver safety belt usage were estimated.

3.0 RESULTS

3.1 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 in 1996, using the data collected at 100 sites and the weighting procedure described, was 55 percent. The sample size was 96,621 drivers. The confidence limits for a probability of 0.99 would be plus or minus 0.4 percent (14). For a given type of highway (excluding rural interstates), the usage rate was higher for counties having larger populations. In several instances, there were large fluctuations in usage rates at survey sites within the same location and population category.

While the data collection procedure changed in 1990, the usage rate may still be compared to the statewide rates from past years. The previous studies showed that statewide driver usage rates had steadily increased from 4.2 percent in 1982 to 42 percent in 1993. However, the rate of the increase had decreased. Only a three percentage point increase occurred in the two-year period from 1991 to 1993. The 58 percent usage in the 1994 survey showed that a dramatic increase occurred between the 1993 and 1994 data collection periods. This increase was directly related to the enactment of a statewide safety belt law. The 1995 survey showed that driver usage remained substantially higher than before enactment of the law, but there was a slight decrease in usage from the rate immediately after enactment of the law. The 1996 survey showed that driver usage increased slightly from 1995 but was below the 1994 level. The slight increase in the driver usage rate in 1996 compared to 1995 was determined not to be statistically significant (probability of 0.99) (15).

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 years of age category was 56 percent plus or minus about 4 percent. This compares to 48 percent for the 1995 survey, and this increase was statistically significant. For children in the 6 to 12 years of age category, the usage rate was 56 percent plus or minus about 3 percent. This compares to 55 percent in 1995, and this increase was not statistically significant. For the 13 to 19 years of age category, the usage rate was 45 percent plus or minus about 2 percent. This was a decrease from 48 percent in 1995, and this decrease was not statistically significant. For the category of over 19 years of

age, the usage rate was 53 percent plus or minus about 1 percent. This was an increase from 52 percent in 1995 with this increase not statistically significant.

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 seats. The usage rate for children under one year of age (91 percent with a confidence limit of about three percent) was higher than that for children one to three years of age (75 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 79 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 3,147. This age category corresponds to the children for which the mandatory child restraint law would apply. This usage rate of 79 percent compares to 66 percent in 1995, 72 percent in 1994, 61 percent in 1993, 62 percent in 1992, and 57 percent in 1990 and 1991. This percentage was about 15 percent in 1982 before enactment of the child restraint law, increased to approximately 30 percent after enactment of the law having no penalty, and increased again to almost 50 percent in 1988 after the addition of a monetary penalty to the child restraint law.

The usage rate for children under four years of age was higher in the rear seat compared to the front seat. For children one to three years of age, the usage rate was 84 percent for the rear seat compared to 63 percent for the front seat. For children under one year old, the usage rate was 97 percent for the rear seat compared to 82 percent for the front seat. There was a higher percentage of children observed in the rear seat for both age groups (56 percent for children one to three years of age, 58 percent for children under one year of age).

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). This would be related in part to the longer trip lengths and higher speeds on interstates, and the tendency of drivers to use safety belts more often for this type of travel. The lowest usage rates were on rural, non-interstate highways with the lowest rate on rural, local highways. There was substantial variation between highway types. For drivers, the percentage using a safety belt varied from 40 percent on rural, local highways to 69 percent on rural interstates. For front-seat passengers, the percentage for those using a safety belt varied from 35 percent on rural, local highways to 68 percent on rural interstates. For children under four years of age, the percentage using a safety seat or safety belt varied from 74 percent on rural, local highways to 90 percent on rural interstates.

There was a variation in usage by the age and sex of the driver (Table 11). Females had a substantially higher usage rate than males. The category of over 50

years of age had a slightly higher usage rate than either the 31 to 50 or 16 to 30 years of age categories.

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 has applied to this age category for several years. Teenagers had the lowest usage rate.

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 rates in 1996 were very similar to that in 1995. The rate increased in nine cities, decreased in eight cities, and was the same in the other two cities. The largest change was five percent. Considering all 19 cities, the usage rate ranged from 68 percent in Lexington to 42 percent in Newport. Using the procedure followed in the original surveys where data were taken only at sites in these 19 cities results in a statewide usage rate of 54 percent. This rate is almost identical to that determined using the revised procedure in which data are collected at 100 sites.

The change which occurred in the first three years after the law can be seen by comparing the usage rates for drivers at the 100 data collection sites. In 1994, the rates increased at 99 of the locations compared to the 1993 data. In 1995, compared to 1994, the rates decreased at 75 sites, increased at 22 sites and remained the same at three sites. In 1996, compared to 1995, the rates increased at 51 sites, decreased at 44 sites and remained the same at five sites. The largest increase was 13 percent, while the largest decrease was 10 percent. Usage rates for drivers ranged from 28 percent in Tollesboro to 80 percent on Interstate 24 in Trigg County. There were 11 sites which had a usage rate over 70 percent, of which 10 were interstate locations (with the remaining site in Lexington). There was only one site with a usage rate under 30 percent, and seven sites with a usage rate under 35 percent. All of these low rates occurred in small towns.

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. The usage rate was higher in 1996 than in 1995 in 14 of the 19 cities, while it decreased in five cities. The usage rates ranged from 90 percent in Madisonville to 52 percent in Lawrenceburg. Using the procedure followed in the original surveys in which data were taken only at sites in these 19 cities results in a statewide usage rate of 79 percent which is identical to the rate 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 three 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 had been estimated in the first several surveys. However, improper usage could only be determined when there was a very obvious problem. Since the improper usage percentages were very low compared to studies dealing specifically with this subject, improper usage data were not summarized for this survey.

Helmet use by motorcyclists was noted during the survey. Kentucky has a statewide law requiring the use of a helmet by a motorcyclist. The results confirm the expected high usage. Only five of the 300 observed motorcyclists were not wearing a helmet, giving a usage rate of 98 percent.

Usage for minority drivers was obtained with a sample size of approximately 3,113 drivers. The same procedure used for all drivers was utilized to obtain a statewide usage rate. The statewide usage rate for minority drivers was determined to be 50 percent compared to 55 percent for all drivers. This shows there was a small difference in usage rates for minority drivers.

3.2 ACCIDENT ANALYSIS

The number and percentage of all drivers involved in police-reported accidents sustaining a given injury as a function of whether a safety belt was used are summarized in Table 15 (based on 1991 through 1995 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 (88 percent reduction) with the reduction decreasing for less severe injuries. For comparison, the reduction was 19 percent for the "possible injury" category. The reductions in the percentage for each of the types of injuries were determined to be statistically significant (probability of 0.99) (15). 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 63 percent reduction in a driver sustaining a fatal or severe injury in a traffic accident when a safety belt was worn compared to not wearing a safety belt. The data is in general agreement 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 (16).

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 the percentage of fatal or severe injuries for drivers of passenger cars, single-unit trucks, and combination trucks. The reduction was slightly 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 for 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 whether a safety seat or safety belt was used are summarized in Table 17. There were substantial reductions, higher for the most severe injury types, associated with using either a safety seat or safety belt. The reductions were fairly similar for use of either the safety seat or safety belt. The reductions for all injury categories were statistically significant (probability of 0.99). Of 52 fatalities, 31 involved children not using a safety seat or safety belt. The percent reductions were slightly higher than that for drivers (as given in Table 15). There was a 65 percent reduction in the chance of a child less than age four, involved in a traffic accident, sustaining a fatal or severe injury when 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.

The number and percentage of occupants other than drivers sustaining a given injury as a function of whether a safety belt was used 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 very similar to those 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 55 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 was 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 primarily 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, with a reduction in fatal or incapacitating injuries of 70 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 1991 through 1995, the 54 percent usage rate determined from the 1995 observational survey, and accident cost estimates recommended by the Federal Highway Administration (17).

4.0 SUMMARY

Observations were taken at 100 sites across Kentucky to obtain safety belt usage rates. A sample of almost 100,000 drivers was obtained.

A statewide safety belt law was passed in Kentucky in 1994. The law applies to all vehicle occupants. Prior to the statewide law, there were local ordinances passed in several cities and counties which covered approximately one-third of the statewide population. The data collected in 1994, after the effective date of the statewide law, showed that enactment of the statewide law had a dramatic effect on usage rates. The usage rate for drivers increased from 42 percent in 1993 to 58 percent in 1994 but it then decreased slightly to 54 percent in 1995. The survey data collected in 1996 show that the rate increased slightly to 55 percent. A summary of usage rates from 1982 through 1996 is given in Table 22. With the exception of rural interstates, the rate was generally higher in urban compared to rural areas. The lowest rates were on local roadways in rural counties.

The statewide usage rates for front-seat passengers were also obtained. Considering all passengers, the usage rate was 52 percent. Usage varied with age, with the highest usage for the under four years of age category and the lowest usage for the teenage category.

Kentucky had a statewide law requiring children under 40 inches in height to be placed in a child restraint prior to the law applying to all occupants. The statewide usage rate for children under the age of four (including both the front and rear seat) was determined to be 79 percent. This represents a increase from the 72 and 66 percent usage determined in the 1994 and 1995 surveys, respectively.

A usage rate was determined for minority drivers. The data show there was a small difference in usage for minority drivers, compared to all drivers. The very

high compliance of motorcyclists with the requirement to wear a helmet was confirmed (98 percent helmet usage).

The significant benefits, based upon 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 63-percent reduction in fatal or incapacitating injuries for drivers involved in a traffic accident wearing a safety belt compared to those who were not. The benefit, in terms of the reduction in injuries, from 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. For example, an increase in the driver usage rate up to 70 percent usage would result in a potential annual reduction of 163 fatalities and an annual accident savings from the reduction in fatalities and serious injuries of about 286 million dollars.

5.0 RECOMMENDATIONS

The data show that the increased level of safety belt usage which occurred after enactment of the statewide safety belt law in 1994 has remained. However, the usage has not continued to increase and is actually slightly below the 1994 level. While the usage rate in 1996 is still substantially above the level prior to the statewide law, efforts must be made to increase usage. The efforts should include both education and enforcement. Public information and education concerning the law and the reasons to wear safety belts should continue. Also, enforcement of the law along with public information about this enforcement and resulting citations should be increased. The survey data can be used to identify areas in need of additional enforcement and education.

To aid in enforcement of the law, consideration should be given to modifying the current law to allow primary, rather than secondary, enforcement.

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Figure 1. Data Collection Form

SAFETY BELT DATA COLLECTION FORM

Date: _____ **Starting Time:** _____ **Ending Time:** _____ **Int #:** _____

Location: _____ **Sheet No:** _____

Observer: _____ **Comment:** _____

DRIVER USAGE

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

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	Booster Seat	Harness or Belt	None
Front				
Rear				

USAGE FOR INFANTS (UNDER 1 YEAR OF AGE)

	Safety Seat	None
Front		
Rear		

Motorcycle Helmet: Y-
N-

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, I 64 at KY 859, Lexington
	50,001-100,000	Boyd, I 64 at US 23, Catlettsburg
		Christian, I 24 at US 41A, Hopkinsville
		Hardin, I 65 at rest area, Sonora
	25,001-50,000	Barren, I 65 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 KY 122, Shelbiana
		Daviess, US 60 at KY 144, Owensboro
		Hardin, US 31W at BR US 31W, 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*
		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

TABLE 2. STATEWIDE SURVEY LOCATIONS (continued)

TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
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, Reidland 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 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 6th Street, 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 840 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 US 68, 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

TABLE 2. STATEWIDE SURVEY LOCATIONS (continued)

TYPE LOCATION	COUNTY POPULATION	SURVEY SITE
Urban Interstate	Over 100,000	Jefferson, I 65 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*
		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 US 127, Lawrenceburg*
		Rowan, US 60 at KY 32, Morehead*
Urban Collector or Local	All	Hardin, Poplar at Sycamore, Elizabethtown*
		Kenton, KY 1072 at Highland, Covington*

* Original data collection site.

TABLE 3. DRIVER USAGE RATES

TYPE OF HIGHWAY	COUNTY POPULATION	USAGE RATE (PERCENT)	SAMPLE SIZE
Rural Interstate	Over 100,000	66	295
	50,001-100,000	71	1,374
	25,001-50,000	70	2,495
	10,000-25,000	68	1,605
	Under 10,000	80	378
Rural Arterial	Over 50,000	54	3,856
	25,001-50,000	52	7,713
	10,000-25,000	48	8,143
	Under 10,000	38	1,942
Rural Collector	Over 100,000	66	1,163
	50,001-100,000	55	3,280
	25,001-50,000	49	5,388
	10,000-25,000	47	7,604
	Under 10,000	42	1,476
Rural Local	Over 50,000	61	695
	25,000-50,000	39	946
	Under 25,000	35	2,426
Urban Interstate	Over 100,000	65	10,223
	50,000-100,000	72	1,031
	Under 50,000	54	118
Urban Arterial	Over 100,000	59	15,197
	25,000-100,000	54	15,212
	Under 25,000	47	1,827
Urban Collector or Local	All	59	2,234
ALL	All	55	96,621

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	100	1
	50,001-100,000	81	16
	25,001-50,000	62	21
	10,000-25,000	58	19
	Under 10,000	83	6
Rural Arterial	Over 50,000	59	49
	25,001-50,000	58	88
	10,000-25,000	45	119
	Under 10,000	36	28
Rural Collector	Over 100,000	80	5
	50,001-100,000	63	24
	25,001-50,000	57	90
	10,000-25,000	44	89
	Under 10,000	63	16
Rural Local	Over 50,000	69	13
	25,000-50,000	27	15
	Under 25,000	54	41
Urban Interstate	Over 100,000	61	64
	50,000-100,000	80	10
	Under 50,000	100	1
Urban Arterial	Over 100,000	57	193
	25,000-100,000	61	216
	Under 25,000	57	30
Urban Collector or Local	All	75	20
ALL	All	56	1,174

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	100	5
	50,001-100,000	69	32
	25,001-50,000	64	36
	10,000-25,000	61	43
	Under 10,000	89	9
Rural Arterial	Over 50,000	53	114
	25,001-50,000	50	212
	10,000-25,000	52	224
	Under 10,000	41	51
Rural Collector	Over 100,000	56	9
	50,001-100,000	59	41
	25,001-50,000	60	159
	10,000-25,000	44	163
	Under 10,000	44	23
Rural Local	Over 50,000	69	29
	25,000-50,000	27	33
	Under 25,000	36	75
Urban Interstate	Over 100,000	74	70
	50,000-100,000	88	17
	Under 50,000	100	3
Urban Arterial	Over 100,000	62	231
	25,000-100,000	61	360
	Under 25,000	49	51
Urban Collector or Local	All	62	47
ALL	All	56	2,037

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	44	9
	50,001-100,000	66	86
	25,001-50,000	63	101
	10,000-25,000	48	85
	Under 10,000	73	37
Rural Arterial	Over 50,000	37	166
	25,001-50,000	42	456
	10,000-25,000	39	393
	Under 10,000	26	120
Rural Collector	Over 100,000	64	11
	50,001-100,000	49	121
	25,001-50,000	44	317
	10,000-25,000	39	383
	Under 10,000	35	57
Rural Local	Over 50,000	60	63
	25,000-50,000	32	54
	Under 25,000	25	168
Urban Interstate	Over 100,000	59	244
	50,000-100,000	66	65
	Under 50,000	0	2
Urban Arterial	Over 100,000	47	481
	25,000-100,000	45	892
	Under 25,000	44	184
Urban Collector or Local	All	59	106
ALL	All	45	4,601

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	52	66
	50,001-100,000	75	403
	25,001-50,000	70	628
	10,000-25,000	68	561
	Under 10,000	81	117
Rural Arterial	Over 50,000	52	942
	25,001-50,000	50	1,652
	10,000-25,000	51	1,837
	Under 10,000	46	376
Rural Collector	Over 100,000	62	135
	50,001-100,000	51	454
	25,001-50,000	46	1,051
	10,000-25,000	46	1,684
	Under 10,000	38	324
Rural Local	Over 50,000	64	123
	25,000-50,000	37	266
	Under 25,000	36	521
Urban Interstate	Over 100,000	61	1,483
	50,000-100,000	75	251
	Under 50,000	57	37
Urban Arterial	Over 100,000	53	2,667
	25,000-100,000	54	2,686
	Under 25,000	52	286
Urban Collector or Local	All	62	391
ALL	All	53	18,941

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	100	4
	50,001-100,000	93	27
	25,001-50,000	77	48
	10,000-25,000	892	24
	Under 10,000	92	12
Rural Arterial	Over 50,000	79	68
	25,001-50,000	75	204
	10,000-25,000	64	176
	Under 10,000	61	28
Rural Collector	Over 100,000	88	8
	50,001-100,000	78	54
	25,001-50,000	73	160
	10,000-25,000	68	170
	Under 10,000	50	48
Rural Local	Over 50,000	80	20
	25,000-50,000	57	28
	Under 25,000	72	64
Urban Interstate	Over 100,000	80	141
	50,000-100,000	62	39
	Under 50,000	100	1
Urban Arterial	Over 100,000	81	408
	25,000-100,000	77	485
	Under 25,000	66	73
Urban Collector or Local	All	80	89
ALL	All	75	2,379

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	N/A	0
	50,001-100,000	100	11
	25,001-50,000	100	12
	10,000-25,000	100	14
	Under 10,000	100	1
Rural Arterial	Over 50,000	97	38
	25,001-50,000	88	60
	10,000-25,000	88	64
	Under 10,000	91	11
Rural Collector	Over 100,000	100	4
	50,001-100,000	90	20
	25,001-50,000	94	49
	10,000-25,000	93	60
	Under 10,000	78	9
Rural Local	Over 50,000	100	4
	25,000-50,000	77	13
	Under 25,000	88	24
Urban Interstate	Over 100,000	98	56
	50,000-100,000	90	10
	Under 50,000	100	3
Urban Arterial	Over 100,000	93	108
	25,000-100,000	83	144
	Under 25,000	88	17
Urban Collector or Local	All	94	36
ALL	All	91	768

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

TYPE OF HIGHWAY	PERCENT USAGE		
	DRIVERS	FRONT-SEAT PASSENGERS	CHILDREN UNDER FOUR YEARS OF AGE
Rural Interstate	69	68	90
Rural Arterial	49	48	76
Rural Collector	50	47	75
Rural Local	40	35	74
Urban Interstate	65	63	81
Urban Arterial	56	53	80
Urban Collector or Local	59	61	84
ALL	55	52	79

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

CATEGORY	USAGE RATE (PERCENT)
Male	48
Female	65
16-30 Years of Age	51
31-50 Years of Age	56
Over 50 Years of Age	58

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

CATEGORY	USAGE RATE (PERCENT)
Under 4	67
4 - 5	56
6 - 12	56
13 - 19	45
Over 19	53

TABLE 13. CHANGE IN USAGE OF SAFETY BELTS BY DRIVERS IN ORIGINAL STATEWIDE SURVEY CITIES

	PERCENT USING SAFETY BELTS													
CITY	1982	1983	1984	1985	1986	1988	1989	1990	1991	1992	1993	1994	1995	1996
Louisville	6	12	13	14	16	25	28	38	70	66	60	66	66	61
Lexington	8	10	10	17	24	31	42	80	69	61	65	70	66	68
Covington	8	9	12	16	22	28	32	39	37	51	58	59	58	60
Hopkinsville	3	3	4	6	10	20	21	24	27	30	27	63	58	54
Frankfort	5	7	7	11	14	19	24	38	38	46	44	63	64	63
Henderson	3	5	7	9	11	20	22	29	29	29	32	62	54	56
Newport	5	6	5	6	9	20	26	35	34	34	29	39	45	42
Madisonville	2	3	5	8	12	20	22	26	26	27	28	70	63	62
Elizabethtown	3	4	5	8	14	20	26	31	34	39	34	60	55	58
Winchester	2	3	6	9	12	25	33	37	35	38	32	59	55	55
Glasgow	3	3	3	5	6	12	15	19	27	29	26	53	44	46
Somerset	2	4	6	7	9	19	26	21	29	28	28	59	54	54
Maysville	2	3	6	6	13	19	25	29	34	33	34	54	47	48
Morehead	3	3	3	5	7	12	15	22	23	26	28	59	53	50
Princeton	2	2	2	3	6	12	15	17	19	20	21	54	45	48
Bardstown	4	4	6	7	13	19	21	23	30	40	45	58	50	47
Hazard	4	3	4	6	5	10	12	15	19	19	29	52	49	52
Lawrenceburg	1	2	3	6	5	9	15	19	22	24	23	43	40	44
Carrollton	3	5	5	7	10	16	19	35	34	30	31	51	47	45

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

	PERCENT USING SAFETY SEATS OR BELTS													
CITY	1982	1983	1984	1985	1986	1988	1989	1990	1991	1992	1993	1994	1995	1996
Louisville	22	36	49	42	40	68	65	80	86	87	83	88	89	85
Lexington	32	46	50	44	46	78	78	91	90	87	81	83	77	84
Covington	22	39	49	47	50	59	53	66	67	72	84	74	86	81
Hopkinsville	12	19	19	20	21	33	38	40	51	54	56	76	78	80
Frankfort	15	26	30	27	30	43	43	57	72	72	62	97	75	88
Henderson	14	18	26	30	31	36	42	53	53	58	58	78	76	83
Newport	11	27	20	22	22	60	60	57	75	57	46	63	80	64
Madisonville	12	18	29	35	38	52	51	54	60	57	59	86	85	90
Elizabethtown	11	27	34	30	32	41	42	51	46	63	71	69	57	88
Winchester	12	14	33	29	26	56	68	51	53	58	64	74	72	76
Glasgow	14	17	20	18	21	36	38	39	47	50	36	67	61	70
Somerset	7	23	24	22	26	48	47	48	62	54	61	60	61	82
Maysville	12	18	17	19	25	31	34	36	55	58	62	70	58	70
Morehead	10	14	13	15	14	25	27	35	51	61	62	72	85	87
Princeton	10	12	12	16	20	33	41	52	52	53	60	71	71	70
Bardstown	20	21	31	31	31	41	39	42	76	67	75	84	76	79
Hazard	7	10	9	11	13	19	20	25	34	50	40	65	61	76
Lawrenceburg	7	6	22	23	20	32	29	35	77	65	41	52	59	52
Carrollton	6	10	16	22	19	26	28	31	45	62	43	62	56	81

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

TYPE OF INJURY	NOT WEARING SAFETY BELT		WEARING SAFETY BELT		PERCENT REDUCTION
	NUMBER	PERCENT	NUMBER	PERCENT	
Fatal	1,878	0.58	495	0.07	88**
Incapacitating	14,530	4.52	13,160	1.80	60**
Non-Incapacitating	24,684	7.67	30,077	4.11	46**
Possible Injury	26,709	8.30	48,853	6.68	19**
Fatal or Incapacitating	16,408	5.10	13,655	1.87	63**

* Based on 1991through 1995 accident data. Total sample size for not wearing a safety belt was 321,799 compared to 730,967 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)*

VARIABLE	CATEGORY	PERCENT SUSTAINING FATAL OR SEVERE INJURY		
		NOT WEARING SAFETY BELT	WEARING SAFETY BELT	PERCENT REDUCTION
Type of Vehicle	Passenger Car	5.20	1.92	63
	Single-Unit Truck	2.95	0.93	69
	Combination Truck	3.27	1.18	64
Type of Accident (Non-Intersection)	Rear End	2.21	1.12	49
	Fixed Object	15.68	5.44	65
	Head-On	19.93	12.57	37
	Overturned	20.68	7.93	62
Speed Limit (mph)	35	3.52	1.33	62
	45	5.11	1.93	62
	55	10.29	3.89	62

* Based on 1991 through 1995 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 NUMBER	NOT USING SAFETY SEAT OR BELT PERCENT	USING SAFETY SEAT NUMBER	USING SAFETY SEAT PERCENT	USING SAFETY BELT NUMBER	USING SAFETY BELT PERCENT	PERCENT REDUCTION SAFETY SEAT	PERCENT REDUCTION SAFETY BELT
Fatal	21	0.18	27	0.11	4	0.02	42	89**
Incapacitating	365	3.19	184	0.72	230	1.18	77**	63**
Non-Incapacitating	812	7.10	720	2.82	547	2.80	60**	61**
Possible Injury	1,113	9.74	1,250	4.89	1,331	6.81	50**	30**
Fatal or Incapacitating	386	3.38	211	0.83	234	1.23	76**	65**

* Based on 1991 through 1995 accident data. Total sample sizes were 11,429 for not using a safety seat or belt, 25,551 for using a safety seat, and 19,531 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 NUMBER	NOT USING SAFETY SEAT OR BELT PERCENT	USING SAFETY SEAT OR BELT NUMBER	USING SAFETY SEAT OR BELT PERCENT	PERCENT REDUCTION
Front	Fatal	14	0.18	10	0.05	72**
	Incapacitating	258	3.31	228	1.14	66**
	Non-Incapacitating	605	7.77	663	3.32	57**
	Possible Injury	816	10.48	1,424	7.14	32**
	Fatal or Incapacitating	272	3.49	238	1.19	66**
Rear	Fatal	7	0.19	21	0.08	56
	Incapacitating	107	2.94	186	0.74	75 **
	Non-Incapacitating	207	5.68	572	2.28	60**
	Possible Injury	297	8.15	1,157	4.61	43**
	Fatal or Incapacitating	114	3.13	207	0.82	74**

* Based on 1991 through 1995 accident data. Total sample sizes were 7,785 and 3,644 for not using a safety seat or belt in the front and rear seats, respectively, and 19,952 and 25,098 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)*

TYPE OF INJURY	NOT USING LAP BELT OR SHOULDER HARNESS NUMBER	NOT USING LAP BELT OR SHOULDER HARNESS PERCENT	USING LAP BELT AND/OR SHOULDER HARNESS NUMBER	USING LAP BELT AND/OR SHOULDER HARNESS PERCENT	PERCENT REDUCTION
Fatal	801	0.36	245	0.08	76**
Incapacitating	9,430	4.20	5,688	1.96	53**
Non-Incapacitating	19,193	8.54	14,272	4.92	42**
Possible Injury	22,257	9.91	23,551	8.13	18**
Fatal or Incapacitating	10,231	4.55	5,933	2.05	55**

* Based on 1991 through 1995 accident data. Total sample sizes were 224,661 not using a safety belt or seat compared to 289,799 using a safety belt.

** Statistically significant reduction (probability of 0.99).

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

SEATING POSITION	TYPE OF INJURY	NOT USING LAP BELT OR SHOULDER HARNESS NUMBER	NOT USING LAP BELT OR SHOULDER HARNESS PERCENT	USING LAP BELT AND/OR SHOULDER HARNESS NUMBER	USING LAP BELT AND/OR SHOULDER HARNESS PERCENT	PERCENT REDUCTION
Front	Fatal	642	0.50	196	0.10	80***
	Incapacitating	6,941	5.36	4,461	2.22	59***
	Non-Incapacitating	13,182	10.19	10,261	5.28	48***
	Possible Injury	13,734	10.61	17,867	8.89	16***
	Fatal or Incapacitating	7,583	5.86	4,657	2.32	60***
Rear**	Fatal	199	0.37	49	0.06	85***
	Incapacitating	2,309	4.35	1,227	1.38	68***
	Non-Incapacitating	4,806	9.05	3,651	4.11	55***
	Possible Injury	4,813	9.06	5,684	6.40	29***
	Fatal or Incapacitating	2,508	4.72	1,276	1.44	70***

* Based on 1991 through 1995 accident data. Total sample sizes were 129,413 and 53,122 for not using a safety belt in the front seat and rear seat, respectively, and 201,014 and 88,785 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*

DRIVER USAGE RATE (PERCENT)	POTENTIAL ANNUAL REDUCTION IN NUMBER OF		ANNUAL ACCIDENT SAVINGS SAVINGS MILLION $ FROM REDUCTION IN		
	FATALITIES	SERIOUS INJURIES**	FATALITIES	SERIOUS INJURIES	TOTAL
60	92	602	138.0	23.5	161.5
70	163	1,064	244.5	41.5	286.0
80	235	1,527	352.5	59.6	412.1
90	306	1,990	459.0	77.6	536.6
100	377	2,453	565.5	90.2	661.2

* Based on increase from the 54% usage rate determined in the 1995 survey, the percent reductions listed in Table 15, and accident cost estimates recommended by the Federal Highway Administration (17). These costs are $1,500,000 for a fatality and $39,000 for an incapacitating injury. The actual number of fatalities and incapacitating injuries for 1991 through 1995 were used along with the average usage rate over this time period.

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

TABLE 22. STATEWIDE USAGE RATES

YEAR	PERCENT USING SAFETY BELTS	
	DRIVERS	CHILDREN UNDER FOUR YEARS OF AGE*
1982	4	15
1983	6	24
1984	7	30
1985	9	29
1986	13	30
1988	21	48
1989	26	49
1990	32	57
1991	39	57
1992	41	62
1993	42	61
1994	58	72
1995	54	66
1996	55	79

* Children using either safety seat or safety belt.
Children seated in either front or rear seat.

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, I65 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 KY 122, Shelbiana
17 Daviess, US 60 at KY 144, Owensboro
18 Hardin, US 31W at BR US 31W, 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, US 31E at KY 44, Mt. Washington
24 Carter, KY 1 at I64, Grayson
25 Laurel, US 25 at KY 80, London
26 Mason, US 62 at KY 11, Maysville
27 Clay, US 421 at KY 80, Manchester
28 Bourbon,US68 at 5th St., Millersburg
29 Casey, US 127 at KY 70, Liberty
30 Meade, US 31W at KY 1638, Muldraugh
31 Lincoln, US127 at KY 78, Hustonville
32 Russell,US127 at KY80,Russell Sprgs.
33 Washington,US 150 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, US 41 at KY 1682, Hopkinsville
38 McCracken, US 62 at US 68, Reidland
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 KY36, Owingsville
52 Larue, KY 84 at KY 61, Hodgenville
53 Scott, US 62 at I75, Georgetown
54 Anderson, US 127 at US 127B, Lawrenceburg
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 6th Street, Carrollton
59 Elliott, KY 32 at KY 7, Sandy Hook
60 McCracken, KY 1286 at US 62, Paducah
61 Harlan, KY 840 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, KY 208 at US 68, Campbellsville
67 Kenton, I275 at KY 17, Covington
68 Kenton,I75 at KY 371, Crescent 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 231, Bowling Green
76 Boone, I71 at KY 14, Verona
77 Jefferson, US 31W at Gagel, Louisville
78 Jefferson,KY 1447 at Hubbards, Louisville
79 Jefferson,KY 1703 at Trevillian,Louisville
80 Fayette, US 27 at KY 1683, Lexington
81 Fayette, Reynolds at 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 St., Henderson
93 Nelson, US 31E at Beall, Bardstown
94 Barren, US 68 at Race St., Glasgow
95 Clark, US 60 at KY 1958, Winchester
96 Warren, US 31W at US 231, Bowling Green
97 Anderson, US 62 at US 127, Lawrenceburg
98 Rowan, US 60 at KY 32, Morehead
99 Hardin, Poplar at Sycamore, Elizabethtown
100 Kenton, KY 1072 at Highland, Covington

TABLE A-1. SUMMARY OF DATA

LOCATION NUMBER	DRIVERS		FRONT SEAT PASSENGERS								FRONT AND REAR			
			4-5 Years		6-12 Years		13-19 Years		OVER 19 Years		1-3 Years		UNDER 1 Year	
	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE
1	295	66	1	100	5	100	9	44	66	52	4	100	0	NA
2	503	69	2	50	9	67	19	68	130	64	8	100	4	100
3	551	69	8	88	9	67	33	64	122	78	8	88	2	100
4	320	75	6	83	14	71	34	68	151	81	11	91	5	100
5	364	72	1	100	11	73	21	76	130	75	10	50	4	100
6	413	76	2	100	6	50	24	75	132	73	1	100	2	100
7	329	57	1	0	2	100	5	60	60	60	3	100	1	100
8	598	76	3	33	1	100	11	45	119	80	8	100	3	100
9	791	67	14	64	16	56	40	55	187	60	26	77	2	100
10	294	58	5	40	15	67	19	42	91	66	4	100	2	100
11	428	76	5	60	7	57	24	58	163	70	10	90	4	100
12	314	72	4	50	7	57	14	50	156	72	5	100	5	100
13	334	63	4	75	13	62	22	45	101	57	3	100	3	100
14	235	69	1	100	1	0	6	33	50	70	2	50	0	NA
15	378	80	6	83	9	89	37	73	117	81	12	92	1	100
16	812	47	12	50	31	55	47	36	238	55	16	75	1	100
17	1192	55	18	61	47	47	70	37	321	50	25	76	18	100
18	1852	56	19	63	36	58	49	39	383	53	27	85	19	95
19	1552	52	15	60	63	51	110	31	379	42	56	75	12	83
20	1475	48	25	56	50	58	83	37	362	49	52	75	19	84
21	547	44	4	50	7	43	35	49	153	49	8	50	2	100
22	985	60	10	50	23	52	64	52	232	55	17	71	3	100
23	493	57	5	80	12	42	28	54	93	63	3	100	1	100
24	1034	48	14	64	21	67	58	52	305	51	26	81	15	87
25	1627	54	24	58	50	42	112	42	270	42	42	76	8	100
26	1466	48	26	38	45	56	25	36	453	53	30	63	10	90
27	1112	39	5	60	4	50	23	30	98	47	23	57	2	50
28	885	55	11	73	24	63	109	41	204	59	26	58	6	100
29	764	34	15	67	34	29	44	32	202	38	17	41	6	100
30	1656	56	20	55	45	56	85	39	451	53	36	89	22	91
31	431	50	5	40	19	53	27	44	128	45	6	50	3	67
32	935	44	30	37	42	57	50	38	240	50	30	60	12	75
33	894	48	7	57	11	55	30	43	61	49	11	55	3	100
34	916	34	15	20	29	28	55	27	195	36	18	44	5	80
35	1026	42	13	54	22	59	65	25	181	55	10	90	6	100
36	1163	66	5	80	9	56	11	64	135	61	8	88	4	100
37	840	51	8	50	17	47	49	45	159	47	17	76	7	86
38	1111	59	10	70	11	64	32	50	193	52	21	81	5	100
39	1329	56	6	67	13	69	40	53	102	57	16	75	8	88
40	270	42	3	33	7	43	14	43	50	50	4	50	3	100
41	379	42	5	40	14	36	28	32	83	41	10	60	2	50
42	1411	54	32	72	53	76	89	49	185	56	64	78	25	96
43	925	53	12	67	13	69	25	48	161	47	14	79	4	100
44	572	40	15	33	17	53	36	33	148	40	21	62	5	100
45	391	44	3	67	7	86	36	33	82	44	3	67	1	100
46	408	52	3	33	16	63	14	64	94	48	7	86	5	80
47	1032	50	17	53	32	44	75	48	248	44	37	73	4	100
48	1421	48	16	63	44	57	80	38	253	45	25	68	2	100
49	1410	44	17	24	46	33	55	36	423	45	33	61	21	95
50	577	47	6	67	10	70	38	32	140	48	16	69	7	100
51	922	34	19	32	20	20	82	33	219	32	31	71	9	89
52	216	47	2	50	1	100	12	58	45	40	6	50	3	100
53	888	59	5	60	4	75	42	62	144	70	12	67	3	100
54	506	57	5	40	4	50	10	40	131	53	4	100	3	100
55	613	51	3	33	4	25	9	33	146	54	9	56	3	33
56	639	39	11	55	26	46	44	34	85	40	20	75	3	33
57	412	40	5	40	4	50	11	36	98	38	14	79	6	100
58	1068	45	10	60	12	50	36	33	195	41	25	76	6	100
59	408	33	6	67	11	36	21	38	129	33	23	22	3	33

TABLE A-1. SUMMARY OF DATA (continued)

LOCATION NUMBER	DRIVERS		FRONT SEAT PASSENGERS								FRONT AND REAR			
			4-5 Years		6-12 Years		13-19 Years		OVER 19 Years		1-3 Years		UNDER 1 Year	
	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE	SAMPLE	USAGE
60	695	61	13	69	29	69	63	60	123	64	20	80	4	100
61	284	48	3	33	8	25	7	29	94	43	9	67	5	80
62	662	36	12	25	25	28	47	32	172	34	19	53	8	75
63	390	28	2	0	10	20	3	0	80	34	12	83	1	100
64	318	31	6	50	13	39	27	33	84	35	10	50	2	10
65	1558	37	31	61	43	42	126	24	306	38	41	73	20	90
66	160	33	2	0	9	22	12	25	51	31	1	100	1	100
67	902	65	10	70	8	63	12	50	160	59	23	70	13	100
68	1393	65	8	50	18	61	39	77	174	66	26	62	8	100
69	749	70	4	75	2	100	26	58	212	69	15	87	9	89
70	1793	70	1	100	5	100	20	70	196	64	10	100	4	100
71	1861	54	19	42	6	83	53	42	283	53	22	77	6	100
72	1388	65	9	56	9	67	28	50	233	62	15	93	3	100
73	1293	69	5	80	12	83	36	75	136	63	15	87	6	100
74	866	67	8	88	10	80	30	50	89	58	15	80	7	100
75	1031	72	10	80	17	88	65	66	251	75	39	62	10	90
76	118	54	1	100	3	100	2	0	37	57	1	100	3	100
77	1983	50	23	48	54	56	107	46	352	50	58	67	10	70
78	1426	67	30	87	53	81	83	64	166	65	55	95	23	100
79	1373	68	12	50	15	67	29	48	252	66	42	88	11	100
80	2023	72	17	71	15	73	44	50	305	66	54	83	15	93
81	1020	68	24	58	22	55	54	56	174	61	40	85	11	91
82	1482	62	15	40	4	100	27	37	256	52	20	70	6	83
83	1804	52	30	50	21	48	27	48	368	55	39	95	11	100
84	1258	42	7	29	2	0	43	21	296	31	23	65	0	N/A
85	1326	40	28	43	39	46	53	32	330	38	54	69	9	78
86	1502	66	7	86	6	67	14	71	168	59	23	96	12	100
87	1232	42	18	56	32	47	85	31	165	45	39	62	8	75
88	1588	54	14	71	38	68	81	49	241	52	40	80	6	83
89	1723	62	13	54	15	67	54	39	254	55	58	90	11	91
90	1875	54	29	66	50	76	162	48	462	54	95	75	27	63
91	1563	63	21	67	25	68	38	61	213	57	33	82	15	100
92	1496	56	15	53	33	58	77	44	259	51	35	83	7	86
93	1558	47	33	52	54	54	152	33	326	48	53	72	27	93
94	1094	46	5	60	12	58	33	42	73	48	25	68	5	80
95	1038	55	20	60	24	50	39	44	338	55	29	69	12	92
96	2045	57	48	65	77	60	171	57	355	62	78	81	26	81
97	937	44	18	50	26	54	45	53	80	44	35	46	9	78
98	890	50	12	67	25	64	56	83	206	55	38	84	8	100
99	1057	58	11	73	37	59	55	55	215	60	34	82	17	100
100	1187	60	9	78	10	70	51	59	176	65	55	78	19	89