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1993 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
Commonwealth of Kentucky

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16. Abstract

The objective of the survey was to establish 1993 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 42 percent for drivers and front-seat passengers (over 19 years of age) and 61 percent for children under four years of age (front and rear seats). Driver usage rates increased in 1993 compared to 1992, however, the amount of the increase has decreased. Rates were highest on interstate highways and lowest on rural, non-interstate highways.

Benefits in the reduction of injures 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 54 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, Jefferson County, Bardstown, Covington, and Bowling Green after enactment of local mandatory usage laws was shown. The recommendation is that a statewide mandatory safety belt law should be passed or, in lieu of a statewide law, additional 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 statewide 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, local mandatory safety belt usage laws have been enacted in several local jurisdictions in Kentucky. The first such local law was enacted by the Lexington-Fayette Urban County Government with an effective date of July 1, 1990. The second local law was enacted by the city of Louisville with an effective date of July 1, 1991. Jefferson County later adopted such a law. Within the couple of years, local safety belt ordinances have been adopted by Murray, Bowling Green, Kenton County, Corbin, Bardstown, and Midway. The combined population of the counties and cities having a local ordinance represents approximately one-third of the statewide population.

Statewide observational surveys began in Kentucky in 1982 with data collected in 19 cities across the state. These surveys have been conducted annually (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). The number of sites was increased starting in 1990 in an attempt 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. This percentage increased to almost 50 percent in 1988 and 1989 and to 57 percent in 1990 and 1991 after a penalty was added to the law. The 1992 survey found a usage rate of 62 percent. 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 41 percent in 1992.

The objective of the survey summarized in this report is to establish statewide 1993 safety belt and child safety seat usage rates in Kentucky. These rates may be compared to those determined from previous surveys. Another objective of this study 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 surveys was modified starting with the 1990 survey. The procedure used in the 1990 through 1992 surveys was again used in the 1993 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 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.

Two additional types of information were obtained for the first time in the 1993 survey. Use of motorcycle helmets was noted. Also, at some of the locations, a separate usage rate was determined for minority drivers.

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 (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 when 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.

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 (which 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.

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 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 an 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 a typical intersection. Data at an exit ramp were taken for traffic exiting the interstate at the intersection with 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.

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

The 1993 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. Rates were also compared by region of the state.

ACCIDENT ANALYSIS

The computer files containing all reported accidents in Kentucky (for the years 1988 through 1992) 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.

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 42 percent. The sample size was 101,567 drivers. The confidence limits for a probability of 0.99 would be plus or minus 0.4 percent (11). For a given type of highway, 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 driver usage rates statewide had steadily increased from 4.2 percent in 1982 to 41 percent in 1992. The 1992 survey shows that this increase has continued. The increase in the driver usage rate in 1993 compared to 1992, given the large sample size, was determined to be statistically significant (probability of 0.99) (11). However, the magnitude of the increase in 1993 of only one percentage point was the smallest since 1984. The data show that the increase in the driver usage rate has become smaller the past few years.

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 37 percent plus or minus about 3 percent. This compares to 40 percent for the 1992 survey but this slight decrease was not statistically significant. For children in the 6 to 12 years of age category, the usage rate was 41 percent plus or minus about 2 percent. This compares to 37 percent in 1992 with this slight increase not being statistically significant. For the 13 to 19 years of age category, the usage rate was 37 percent plus or minus about 2 percent. This was an increase from 31 percent in 1992, and this increase was statistically significant. For the category of over 19 years of age, the usage rate was 40 percent plus or minus about two percent. This was a slight increase from 39 percent in 1992 with this slight 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. The usage rate for children under one year of age (76 percent with a confidence limit of about three percent) was higher than that for children one to three years of age (56 percent with a confidence limit of about three percent). The usage rate for the combination of these categories or children under four years of age was 61 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 6,505. This age category corresponds to the children for which the mandatory child restraint law would apply. This usage rate of 61 percent compares to 57 percent in 1990 and 1991 and 62 percent in 1992. This percentage was about 15 percent in 1982 before enactment of the child restraint law and 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 dollar penalty 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 64 percent for the rear seat compared to 44 percent for the front seat. For children under one year old, the usage rate was 87 percent for the rear seat compared to

61 percent for the front seat. There was a higher percentage of children one to three years of age observed in the rear seat (61 percent) while the number in the front and rear seats was almost identical for children under one year old (53 percent in the rear 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). Urban interstates had the highest rate, and this would be related to data taken in Jefferson County where a safety belt law exists. The lowest usage rates were on rural, non-interstate highways. For drivers and front seat passengers, the highest rate was for urban interstates with the lowest rate on rural, local highways. There was a substantial variation between highway types. For drivers, the percentage using a safety belt varied from 25 percent on rural, local highways to 62 percent on urban interstates. For front-seat passengers, the percentage for those using a safety belt varied from 26 percent on rural, local highways to 56 percent on urban interstates. For children under four years of age, the percentage using a safety seat or safety belt varied from 49 percent on rural, arterial highways to 79 percent on urban interstates.

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 and over 50 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 would apply to this age category. The usage rate for the other age categories were similar as that for drivers.

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 1993 than in 1992 in 10 of the 19 cities with identical rates in one city. The largest increase was at the Hazard location where there has been a low rate over the past several years. The second largest increase was in Covington, and this finding would be related to the mandatory usage law in Kenton County. The usage rates in Lexington, Louisville, and Covington were higher than that in any other city. This shows the potential increase in usage which could be obtained with a mandatory belt law. The lowest rate (21 percent) was in Princeton with the other lowest rates occurring in the smallest cities. In 5 of the 19 cities, the rate has either increased or remained constant from one year to the next since the first survey in 1982. 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 41 percent. This rate is almost identical to that determined using the revised procedure in which data are collected at 100 sites.

The change in usage of safety seats or belts by children under 4 years of age in these 19 cities is presented in Table 14. The usage rate was higher in 1993 than in 1992 in 10 of the 19 cities. The highest usage rates were in Covington, Louisville and Lexington. The lowest usage was in Glasgow. The small sample sizes could result in substantial variations in usage rates. 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 67 percent. This rate is higher than that determined 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 had been estimated in previous surveys. However, improper usage could only be determined when there was a very obvious problem. Since the percentages were very low compared to studies dealing specifically with this subject, improper usage data were not obtained in this survey.

Helmet use by motorcyclists was noted during the survey. Kentucky has a statewide law requiring the use of a helmet by motorcyclists. The results confirm the expected high usage. All of the 405 observed motorcyclists were wearing a helmet.

Usage for minority drivers was obtained at the majority of the sites with a total sample of 3,403. However, since data were not taken at all locations and the sample was very low at many locations, a statewide percentage using the same methodology as previously described could not be obtained. Comparisons could be made for a few highway categories where data were collected at all sites. For rural interstates, the usage rate for minority drivers was 61 percent (sample of 299 drivers) compared to 56 percent for all drivers. For urban interstates, the usage rate for minority drivers was 62 percent (sample of 670 drivers) which was identical to that for all drivers. For rural local highways, the usage rate for minority drivers was 23 percent (sample of 102 drivers) compared to 25 percent for all drivers. The largest sample of minority drivers at any location was an urban arterial site was in Hopkinsville where the usage rate was 21 percent for minority drivers compared to 27 percent for all drivers. At the three sites (urban arterial) in Louisville were data have been collected for several years, the usage rate for minority drivers was 49 percent compared to 60 percent for all drivers. However, at rural arterial sites in Muldraugh (sample of 122 drivers) and West Point

(sample of 124 drivers) the usage rate for minority drivers was higher than for all drivers. The usage was 67 percent for minority drivers in Muldraugh compared to 61 percent for all drivers and, in West Point, the usage rate was 72 percent for minority drivers compared to 60 percent for all drivers. There were three other non-interstate sites where a sample size of at least 100 minority drivers was obtained. At a rural arterial site near Hopkinsville, the usage rate was 24 percent for minority drivers and 27 percent for all drivers. At one urban arterial site in Lexington, the usage rate was 59 percent for minority drivers and 65 percent for all drivers. At an urban arterial site in Frankfort, the usage rate was 42 percent for minority drivers and 44 percent for all drivers.

A large sample of minority drivers was obtained as part of another study which included an extensive usage survey in Lexington. A sample of 3,612 minority drivers was obtained at 12 locations. These 12 locations were part of 24 locations at which data were collected. The usage rate for minority drivers at these 12 locations was 43 percent compared to an overall rate of 54 percent for all drivers. The overall rate at all 24 locations was 59 percent. These locations were typically urban arterial locations. The results of this survey were consistent with the difference noted at the three locations in Louisville which were part of the statewide survey.

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 1988 through 1992 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 (82 percent reduction) with the reduction decreasing for less severe injuries. For comparison, the reduction was 13 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 54 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 (13).

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 3 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 fairly 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 40 fatalities, 19 involved children not using a safety seat or safety belt. The percent reductions were generally 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 4 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 40 fatalities, 23 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 slightly 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 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 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 with a reduction in fatal or incapacitating injuries of 64 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 1988 through 1992, the 41 percent usage rate determined from the 1992 observational survey, and accident cost estimates recommended by the Federal Highway Administration (14).

SUMMARY

The methodology used to obtain statewide safety belt usage rates in 1993 was the same as that used for the 1990 through 1992 surveys. The data show that, while the usage rate for drivers in 1993 continued the increase that has been documented in previous years, the amount of the increase was less (Table 22). The statewide usage rate of safety belts by drivers was 42 percent. This compares to 41 percent in 1992. 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, local ordinances have been enacted in Fayette County (Lexington), Jefferson County (Louisville), Murray, Bowling Green, Kenton County, Corbin, Bardstown, and Midway. The effect of these laws was shown with the very high usage determined for the observation sites in Lexington, Louisville and Covington (Table 13).

The statewide usage rates for front-seat passengers were also obtained. Considering all passengers, the usage rate was 40 percent. Usage varied with age with the highest usage for the under four years of age category and the lowest usage for the 4 to 5 and 13 to 19 years of age categories.

Kentucky has 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 determined to be 61 percent. This represents a very slight decrease from the 62 percent usage determined in the 1992 survey.

The compliance of motorcyclists with the requirement to wear a helmet was confirmed. All observed motorcyclists were wearing their helmet.

Considering all the various highway types, the differences between the usage rates for minority drivers and all drivers were not consistent. The data suggest, statewide, there is not a substantial difference between the usage rate of minority drivers and other drivers. Usage changed with such variables as type of highway and population of the area similarly for minority drivers as for all drivers. The highway type where the usage rate for minority appear to be substantially lower than other drivers is urban arterials. This was shown at the Louisville sites. This difference was also shown in data taken at a number of sites in Lexington as part of an extensive usage survey in that city.

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 54-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 42 percent with much lower usage rates (as low as under 15 percent) determined for 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 ordinances in Fayette County and Louisville. This resulted in the usage rate almost doubling to a level of about 70 percent shortly after the ordinance was passed. A recent detailed survey in Lexington found a usage rate of 59 percent (15). Local ordinances have also been passed in Murray, Bowling Green, Kenton County, Corbin, and Bardstown with increased usage documented at survey sites in Covington, Bardstown and Bowling Green.

Statewide laws have been enacted in all but a few states. Past national surveys have shown usage rates of 30 percent in cities in states without a belt law compared to 50 percent in cities in states having a law (13). Belt use as high as 90 percent has been reported in other countries having belt laws and high levels of enforcement (16). A recent survey of licensed drivers revealed that the respondents were in favor (76 percent in favor statewide) of a statewide law requiring use of safety belts (17).

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 (13). 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 70 percent usage would result in a potential annual reduction of 168 fatalities and an annual accident savings from the reduction in fatalities and serious injuries of about 296 million dollars.

Therefore, a recommendation is that a statewide mandatory safety belt law should be enacted by the Kentucky General Assembly. In the event a statewide law is not enacted, additional local governments should consider passing mandatory safety belt laws.

Public information and education concerning the reasons to wear safety belts should continue. The survey shows that emphasis areas would be for the 13 to 19 years of age category and for rural areas.

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17. Agent, K. R.; "Seat Belt Attitudinal Survey," University of Kentucky, Transportation Center, KTC-91-18, December 1991.

18. 1991 Occupant Protection Facts, National Highway Traffic Safety Administration.

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, 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 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 KY 122, Shelbiana
		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*
		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, 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 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 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 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* 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	65	227
	50,001-100,000	58	1,386
	25,001-50,000	56	3,586
	10,000-25,000	54	2,257
	Under 10,000	69	242
Rural Arterial	Over 50,000	41	3,670
	25,001-50,000	30	6,681
	10,000-25,000	35	8,141
	Under 10,000	24	1,683
Rural Collector	Over 100,000	62	1,393
	50,001-100,000	40	4,054
	25,001-50,000	34	5,878
	10,000-25,000	27	8,541
	Under 10,000	25	1,746
Rural Local	Over 50,000	42	762
	25,000-50,000	26	1,171
	Under 25,000	21	3,238
Urban Interstate	Over 100,000	63	10,391
	50,000-100,000	58	1,497
	Under 50,000	37	237
Urban Arterial	Over 100,000	57	13,880
	25,000-100,000	35	14,321
	Under 25,000	26	3,349
Urban Collector or Local	All	46	3,236
ALL	All	42	101,567

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	67	3
	50,001-100,000	41	17
	25,001-50,000	57	72
	10,000-25,000	41	46
	Under 10,000	50	12
Rural Arterial	Over 50,000	51	67
	25,001-50,000	24	121
	10,000-25,000	23	176
	Under 10,000	19	43
Rural Collector	Over 100,000	32	22
	50,001-100,000	31	89
	25,001-50,000	32	188
	10,000-25,000	24	204
	Under 10,000	30	37
Rural Local	Over 50,000	44	18
	25,000-50,000	23	39
	Under 25,000	20	59
Urban Interstate	Over 100,000	59	186
	50,000-100,000	28	18
	Under 50,000	50	4
Urban Arterial	Over 100,000	54	220
	25,000-100,000	31	225
	Under 25,000	26	76
Urban Collector or Local	All	48	21
ALL	All	37	1,963

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	33	6
	50,001-100,000	55	22
	25,001-50,000	53	91
	10,000-25,000	51	80
	Under 10,000	100	5
Rural Arterial	Over 50,000	51	45
	25,001-50,000	23	166
	10,000-25,000	33	193
	Under 10,000	24	42
Rural Collector	Over 100,000	59	27
	50,001-100,000	40	80
	25,001-50,000	42	234
	10,000-25,000	20	310
	Under 10,000	14	66
Rural Local	Over 50,000	44	41
	25,000-50,000	30	53
	Under 25,000	20	81
Urban Interstate	Over 100,000	60	249
	50,000-100,000	59	29
	Under 50,000	30	10
Urban Arterial	Over 100,000	59	339
	25,000-100,000	31	304
	Under 25,000	32	71
Urban Collector or Local	All	52	94
ALL	All	41	2,638

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	38	8
	50,001-100,000	50	40
	25,001-50,000	55	156
	10,000-25,000	52	118
	Under 10,000	70	23
Rural Arterial	Over 50,000	33	106
	25,001-50,000	22	368
	10,000-25,000	27	310
	Under 10,000	26	66
Rural Collector	Over 100,000	58	36
	50,001-100,000	31	123
	25,001-50,000	40	305
	10,000-25,000	18	478
	Under 10,000	21	108
Rural Local	Over 50,000	46	54
	25,000-50,000	16	87
	Under 25,000	19	163
Urban Interstate	Over 100,000	60	387
	50,000-100,000	63	95
	Under 50,000	60	10
Urban Arterial	Over 100,000	50	567
	25,000-100,000	22	627
	Under 25,000	37	103
Urban Collector or Local	All	37	218
ALL	All	37	4,556

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	56	73
	50,001-100,000	59	449
	25,001-50,000	59	1,477
	10,000-25,000	54	818
	Under 10,000	46	63
Rural Arterial	Over 50,000	45	801
	25,001-50,000	28	1,531
	10,000-25,000	34	2,236
	Under 10,000	33	324
Rural Collector	Over 100,000	58	473
	50,001-100,000	36	856
	25,001-50,000	33	1,476
	10,000-25,000	25	1,941
	Under 10,000	26	427
Rural Local	Over 50,000	35	164
	25,000-50,000	23	338
	Under 25,000	22	630
Urban Interstate	Over 100,000	58	2,161
	50,000-100,000	62	511
	Under 50,000	40	53
Urban Arterial	Over 100,000	53	2,726
	25,000-100,000	30	2,844
	Under 25,000	26	860
Urban Collector or Local	All	37	444
ALL	All	40	23,676

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	50	12
	50,001-100,000	73	33
	25,001-50,000	72	215
	10,000-25,000	63	110
	Under 10,000	71	14
Rural Arterial	Over 50,000	66	115
	25,001-50,000	38	312
	10,000-25,000	43	425
	Under 10,000	40	84
Rural Collector	Over 100,000	52	64
	50,001-100,000	56	168
	25,001-50,000	52	348
	10,000-25,000	41	423
	Under 10,000	36	107
Rural Local	Over 50,000	67	49
	25,000-50,000	30	91
	Under 25,000	58	127
Urban Interstate	Over 100,000	71	493
	50,000-100,000	90	71
	Under 50,000	62	8
Urban Arterial	Over 100,000	74	763
	25,000-100,000	52	560
	Under 25,000	52	141
Urban Collector or Local	All	60	97
ALL	All	56	4,830

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	100	1
	50,001-100,000	100	9
	25,001-50,000	86	57
	10,000-25,000	87	45
	Under 10,000	78	9
Rural Arterial	Over 50,000	69	58
	25,001-50,000	50	104
	10,000-25,000	8	151
	Under 10,000	85	41
Rural Collector	Over 100,000	55	31
	50,001-100,000	76	59
	25,001-50,000	71	138
	10,000-25,000	64	113
	Under 10,000	52	40
Rural Local	Over 50,000	85	13
	25,000-50,000	54	28
	Under 25,000	96	69
Urban Interstate	Over 100,000	89	187
	50,000-100,000	97	79
	Under 50,000	83	6
Urban Arterial	Over 100,000	88	250
	25,000-100,000	79	117
	Under 25,000	62	55
Urban Collector or Local	All	93	15
ALL	All	76	1,675

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	56	56	73
Rural Arterial	33	32	49
Rural Collector	34	32	52
Rural Local	25	26	60
Urban Interstate	62	60	79
Urban Arterial	44	41	68
Urban Collector or Local	46	40	77
ALL	42	40	61

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

CATEGORY	USAGE RATE (PERCENT)
Male	37
Female	49
16-30 Years of Age	41
31-50 Years of Age	43
Over 50 Years of Age	40

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

CATEGORY	USAGE RATE (PERCENT)
Under 4	50
4 - 5	37
6 - 12	41
13 - 19	37
Over 19	40

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
Louisville	6	12	13	14	16	25	28	38	70	66	60
Lexington	8	10	10	17	24	31	42	80	69	61	65
Covington	8	9	12	16	22	28	32	39	37	51	58
Hopkinsville	3	3	4	6	10	20	21	24	27	30	27
Frankfort	5	7	7	11	14	19	24	38	38	46	44
Henderson	3	5	7	9	11	20	22	29	29	29	32
Newport	5	6	5	6	9	20	26	35	34	34	29
Madisonville	2	3	5	8	12	20	22	26	26	27	28
Elizabethtown	3	4	5	8	14	20	26	31	34	39	34
Winchester	2	3	6	9	12	25	33	37	35	38	32
Glasgow	3	3	3	5	6	12	15	19	27	29	26
Somerset	2	4	6	7	9	19	26	21	29	28	28
Maysville	2	3	6	6	13	19	25	29	34	33	34
Morehead	3	3	3	5	7	12	15	22	23	26	28
Princeton	2	2	2	3	6	12	15	17	19	20	21
Bardstown	4	4	6	7	13	19	21	23	30	40	45
Hazard	4	3	4	6	5	10	12	15	19	19	29
Lawrenceburg	1	2	3	6	5	9	15	19	22	24	23
Carrollton	3	5	5	7	10	16	19	35	34	30	31

TABLE 14. CHANGE IN USAGE OF SAFETY SEATS OR BELTS BY CHILDREN UNDER 4 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
Louisville	22	36	49	42	40	68	65	80	86	87	83
Lexington	32	46	50	44	46	78	78	91	90	87	81
Covington	22	39	49	47	50	59	53	66	67	72	84
Hopkinsville	12	19	19	20	21	33	38	40	51	54	56
Frankfort	15	26	30	27	30	43	43	57	72	72	62
Henderson	14	18	26	30	31	36	42	53	53	58	58
Newport	11	27	20	22	22	60	60	57	75	57	46
Madisonville	12	18	29	35	38	52	51	54	60	57	59
Elizabethtown	11	27	34	30	32	41	42	51	46	63	71
Winchester	12	14	33	29	26	56	68	51	53	58	64
Glasgow	14	17	20	18	21	36	38	39	47	50	36
Somerset	7	23	24	22	26	48	47	48	62	54	61
Maysville	12	18	17	19	25	31	34	36	55	58	62
Morehead	10	14	13	15	14	25	27	35	51	61	62
Princeton	10	12	12	16	20	33	41	52	52	53	60
Bardstown	20	21	31	31	31	41	39	42	76	67	75
Hazard	7	10	9	11	13	19	20	25	34	50	40
Lawrenceburg	7	6	22	23	20	32	29	35	77	65	41
Carrollton	6	10	16	22	19	26	28	31	45	62	43

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	2,027	0.34	317	0.06	82**
Incapacitating	20,955	3.50	8,702	1.69	52**
Non-Incapacitating	35,869	5.99	19,394	3.78	37**
Possible Injury	39,348	6.57	29,258	5.70	13**
Fatal or Incapacitating	22,982	3.84	9,019	1.76	54**

* Based on 1988 through 1992 accident data. Total sample size for not wearing a safety belt was 599,102 compared to 513,493 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	3.92	1.84	53
	Single-Unit Truck	2.24	0.94	58
	Combination Truck	2.49	1.13	55
Type of Accident (Non-Intersection)	Rear End	1.92	1.13	41
	Fixed Object	14.59	5.37	63
	Head-On	19.44	14.11	27
	Overturned	18.52	7.49	60
Speed Limit (mph)	35	2.50	1.25	50
	45	3.52	1.41	60
	55	8.27	3.82	54

* Based on 1988 through 1992 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	19	0.09	16	0.08	5	0.03	17	65
Incapacitating	482	2.33	138	0.66	141	0.91	72**	61**
Non-Incapacitating	1,172	5.66	582	2.78	415	2.67	51**	53**
Possible Injury	1,645	7.94	947	4.52	832	5.35	43**	33**
Fatal or Incapacitating	501	2.42	154	0.74	146	0.94	70**	61**

* Based on 1988 through 1992 accident data. Total sample sizes were 20,716 for not using a safety seat or belt, 20,949 for using a safety seat, and 15,538 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	12	0.08	11	0.07	20
	Incapacitating	362	2.52	156	0.94	63**
	Non-Incapacitating	860	5.98	545	3.29	45**
	Possible Injury	1,244	8.65	965	5.83	33**
	Fatal or Incapacitating	374	2.60	167	1.01	61**
Rear	Fatal	7	0.11	10	0.05	55
	Incapacitating	120	1.89	123	0.62	67**
	Non-Incapacitating	312	4.92	452	2.27	54**
	Possible Injury	401	6.33	814	4.08	36**
	Fatal or Incapacitating	127	2.00	133	0.67	67**

* Based on 1988 through 1992 accident data. Total sample sizes were 14,380 and 6,336 for not using a safety seat or belt in the front and rear seats, respectively, and 16,547 and 19,940 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		USING LAP BELT AND/OR SHOULDER HARNESS		PERCENT REDUCTION
	NUMBER	PERCENT	NUMBER	PERCENT	
Fatal	898	0.29	147	0.08	74**
Incapacitating	12,532	4.09	3,676	1.90	54**
Non-Incapacitating	24,500	8.00	8,860	4.58	43**
Possible Injury	26,261	8.58	13,536	6.99	18**
Fatal or Incapacitating	13,430	4.39	3,823	1.97	55**

* Based on 1988 through 1992 accident data. Total sample sizes were 306,250 not using a safety belt or seat compared to 193,649 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		USING LAP BELT AND/OR SHOULDER HARNESS		PERCENT REDUCTION
		NUMBER	PERCENT	NUMBER	PERCENT	
Front	Fatal	698	0.31	119	0.09	72***
	Incapacitating	9,622	4.34	2,939	2.17	50***
	Non-Incapacitating	18,351	8.27	6,668	4.92	40***
	Possible Injury	20,023	9.03	10,403	7.68	15***
	Fatal or Incapacitating	10,320	4.65	3,058	2.26	51***
Rear**	Fatal	200	0.24	28	0.05	80***
	Incapacitating	2,910	3.45	737	1.27	63***
	Non-Incapacitating	6,149	7.28	2,192	3.76	48***
	Possible Injury	6,238	7.38	3,133	5.38	27***
	Fatal or Incapacitating	3,110	3.68	765	1.31	64***

* Based on 1988 through 1992 accident data. Total sample sizes were 221,781 and 84,469 for not using a safety belt in the front seat and rear seat, respectively, and 135,396 and 58,253 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 FATALITIES	POTENTIAL ANNUAL REDUCTION IN NUMBER OF SERIOUS INJURIES**	ANNUAL ACCIDENT SAVINGS SAVINGS MILLION $ FROM REDUCTION IN FATALITIES	ANNUAL ACCIDENT SAVINGS SAVINGS MILLION $ FROM REDUCTION IN SERIOUS INJURIES	TOTAL
50	52	353	78.0	13.8	91.8
60	110	74	165.0	29.1	194.1
70	168	1,137	252.0	44.3	296.3
80	226	1,529	339.0	59.6	398.6
90	284	1,921	426.0	74.9	500.9
100	342	2,313	513.0	90.2	603.3

* Based on increase from the 41 usage rate determined in the 1992 survey, the percent reductions listed in Table 15, and accident cost estimates recommended by the Federal Highway Administration (14). 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.

TABLE 22. STATEWIDE USAGE RATES

YEAR	PERCENT USING SAFETY BELTS DRIVERS	PERCENT USING SAFETY BELTS 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

* 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 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, 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 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 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 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, 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	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	227	65	3	67	6	33	8	38	73	56	3	0	12	50	1	100
2	608	50	2	50	3	33	21	43	100	39	4	50	6	67	1	100
3	392	83	4	25	8	50	11	64	127	57	7	86	21	71	6	100
4	388	65	11	45	11	64	8	50	222	70	3	67	6	83	2	100
5	959	50	22	59	26	62	65	55	454	57	17	62	54	87	16	94
6	772	71	21	67	29	55	38	63	472	77	22	77	81	78	16	89
7	476	41	10	60	13	54	18	50	140	39	13	38	25	56	6	67
8	709	83	4	50	3	33	4	25	173	52	4	50	9	89	4	75
9	668	50	15	40	20	40	31	52	238	46	21	46	46	48	11	82
10	450	46	9	33	16	38	21	43	126	43	16	38	27	56	10	70
11	934	53	17	35	37	43	50	46	376	53	27	59	31	61	20	90
12	341	68	11	45	16	81	29	66	206	63	7	43	22	68	8	100
13	346	51	6	50	6	50	10	40	64	42	4	50	11	55	4	100
14	166	63	3	67	5	60	8	75	46	59	6	83	19	74	3	67
15	242	69	12	50	5	100	23	70	63	46	6	67	14	71	9	78
16	728	22	25	64	15	47	56	20	130	20	22	32	40	30	16	50
17	1,420	31	15	27	9	33	16	26	291	31	17	65	28	89	17	71
18	1,522	60	27	52	21	62	32	59	380	63	39	77	47	83	25	80
19	783	29	20	20	14	29	61	26	131	21	35	40	53	36	29	48
20	1,016	27	29	14	43	12	47	9	227	22	32	31	53	34	22	41
21	431	24	14	21	16	6	38	11	155	22	22	14	43	33	15	27
22	993	34	7	43	10	30	40	28	166	30	8	13	19	53	2	50
23	952	43	19	37	33	52	44	45	224	52	27	46	48	54	16	75
24	818	25	5	20	19	11	65	12	153	14	8	38	11	36	3	100
25	1,668	25	27	26	31	23	73	23	453	27	47	17	65	32	17	53
26	1,594	34	46	25	55	45	68	41	454	37	46	59	72	54	30	80
27	1,074	16	27	4	45	11	77	14	372	17	65	11	83	17	29	24
28	915	35	6	33	27	26	31	23	192	30	9	56	19	68	2	100
29	690	23	30	10	15	27	25	20	246	19	55	24	68	28	22	18
30	1,519	61	21	57	12	83	36	50	416	64	50	64	66	64	33	85
31	403	29	10	10	4	0	10	0	134	13	16	17	27	30	5	60
32	734	27	12	17	25	32	32	25	192	26	24	17	38	26	12	42
33	1,012	34	22	36	10	50	31	23	230	37	26	54	52	73	16	83
34	875	22	25	8	17	6	13	36	119	31	29	38	36	31	28	89
35	808	27	16	33	25	36	53	23	205	34	30	57	46	48	13	77
36	1,393	62	22	32	27	59	36	58	473	56	32	69	53	62	31	55
37	850	27	19	26	22	32	44	16	210	23	31	19	44	36	13	54
38	910	41	12	42	22	41	35	40	190	35	20	55	33	52	9	100
39	2,294	44	58	31	36	44	44	36	456	43	66	59	91	67	37	78
40	388	30	8	38	16	50	23	52	134	38	5	20	15	73	11	100
41	463	31	10	10	6	50	11	36	98	34	23	26	29	41	20	65
42	1,637	41	54	41	81	49	76	42	338	43	62	71	110	68	38	89
43	1,283	48	42	48	51	57	95	53	363	47	35	49	61	62	30	77
44	639	19	43	16	35	17	51	25	216	11	49	22	61	25	21	29
45	273	23	4	50	7	43	11	18	50	22	9	44	21	62	2	100
46	541	26	13	31	9	22	5	20	128	23	15	40	15	27	6	67
47	454	25	14	14	29	28	31	19	149	21	14	29	36	33	10	50
48	1,152	21	16	38	46	28	85	22	194	16	20	40	49	59	6	67
49	1,561	23	45	22	43	21	66	22	322	16	61	26	108	31	28	54
50	582	30	27	15	34	12	32	13	192	33	22	32	33	36	13	77
51	1,296	14	42	14	107	12	116	14	295	12	39	28	54	37	19	68
52	467	35	11	27	19	32	37	24	156	38	16	38	29	38	7	43
53	712	52	20	50	10	60	21	24	126	49	19	58	24	63	11	73
54	1,045	48	10	40	11	55	26	12	235	50	17	71	29	72	5	60
55	649	16	10	30	22	9	37	8	216	10	25	12	39	26	10	50
56	598	19	8	25	9	11	15	13	110	14	16	38	24	50	3	100
57	461	22	15	7	9	11	23	35	95	13	29	24	34	29	11	64
58	1,138	31	19	42	37	19	60	32	251	39	44	30	77	38	27	59
59	608	14	16	17	29	7	48	8	176	7	24	13	30	30	13	38

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
60	762	42	18	44	41	44	54	46	164	35	25	52	49	67	13	85
61	394	24	11	18	19	26	36	11	128	13	15	20	26	23	14	43
62	777	27	28	25	34	32	51	20	210	30	32	19	65	32	14	64
63	264	11	17	12	19	5	15	20	62	10	12	25	20	30	6	67
64	476	25	7	29	9	67	31	29	104	25	11	73	27	74	12	100
65	2,238	21	31	23	48	20	97	18	388	24	43	58	72	67	50	98
66	260	20	4	25	7	0	20	10	76	17	5	20	8	0	1	100
67	965	55	17	41	23	57	45	49	146	41	31	45	53	53	17	94
68	1,535	58	28	39	36	47	69	45	381	53	46	67	92	70	39	79
69	607	59	16	63	29	45	45	58	237	54	17	71	37	70	10	100
70	1,067	69	12	50	19	74	25	88	174	65	22	77	47	72	19	95
71	1,596	53	21	67	22	59	50	56	365	47	32	88	70	63	11	82
72	1,734	66	31	52	35	40	56	61	377	64	37	81	60	68	33	91
73	1,387	73	28	75	38	79	54	70	253	70	38	86	68	90	34	91
74	1,300	72	33	76	47	77	43	66	226	71	36	83	70	80	24	92
75	1,497	56	18	28	29	59	95	63	511	62	50	90	71	90	79	97
76	237	37	4	50	10	30	10	60	53	40	2	50	8	63	6	83
77	1,571	49	16	50	32	47	94	34	217	44	17	59	38	71	6	75
78	1,887	66	46	59	71	73	100	70	375	67	77	88	131	83	45	91
79	1,585	63	27	67	53	66	70	61	347	60	36	86	89	81	30	93
80	1,192	67	3	100	7	57	26	65	269	58	40	73	71	79	28	93
81	856	66	9	56	7	71	22	45	113	58	35	74	63	73	24	100
82	1,258	61	9	44	18	61	41	59	259	58	22	64	61	79	6	100
83	1,803	48	46	54	78	54	66	52	375	48	66	65	140	69	48	85
84	1,045	45	6	67	15	53	37	27	178	30	11	64	21	62	5	100
85	1,122	39	37	32	36	36	66	24	221	33	22	23	67	46	23	70
86	1,561	65	21	62	22	64	45	58	352	59	31	74	82	80	33	82
87	1,102	29	27	26	17	24	40	23	149	20	31	58	62	31	19	95
88	1,605	27	18	28	39	38	65	15	269	19	21	43	57	54	4	75
89	1,616	28	17	29	42	14	97	18	239	22	24	38	55	58	3	87
90	1,178	28	19	26	24	29	39	26	361	27	31	35	71	58	14	79
91	1,942	44	28	21	21	24	81	16	431	42	32	50	65	55	20	65
92	1,522	32	17	29	28	36	64	19	260	25	29	41	62	55	7	86
93	1,326	45	35	51	38	42	47	34	253	46	17	76	49	89	16	94
94	1,235	26	40	20	51	31	73	19	303	24	46	27	70	33	24	46
95	1,152	32	12	25	27	30	61	21	266	26	13	31	40	63	4	100
96	1,643	50	12	58	17	47	60	35	293	42	14	64	29	66	6	100
97	1,279	23	25	28	20	15	38	42	293	28	36	33	57	39	11	55
98	2,070	28	51	25	51	39	65	34	567	25	62	47	84	62	44	64
99	1,673	34	14	43	53	38	134	26	305	29	29	66	52	67	11	91
100	1,563	58	7	57	41	71	84	54	139	53	8	63	45	82	4	100