



Kentucky Institute of Medicine™

Task Force Report

Saving Lives, Saving Money: The Impact of a Kentucky Primary Seat Belt Law

Lexington, Kentucky
November 2005

The Commonwealth of Kentucky Transportation Cabinet requested that the Kentucky Institute of Medicine™ research and review the data relating to the impact of traffic collision deaths and injuries on health care costs, specifically the costs to state and governmental agencies, and how a primary seat belt law would impact those costs.

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Executive Summary

There is no question that seat belts save lives: Wearing lap/shoulder belts reduces the risk of death by nearly half and the risk of serious injury by even more.¹² On average, seat belts save 13,000 lives annually nationwide, while 7,000 Americans die because they were not wearing safety restraints. With an all-time high national usage rate of 82% recorded in June 2005, an increase of 2% from the previous year, the National Highway Traffic Safety Administration (NHTSA) estimates that seat belt usage at this rate prevents 15,700 fatalities, 350,000 serious injuries, and \$67 billion in economic costs related to traffic injuries and deaths every year.¹⁵⁻¹⁶

Governments have an interest in seat belt usage because of their responsibility for providing safe roads and travel conditions for drivers and passengers. At the same time, fewer deaths and injuries from motor vehicle accidents save taxpayer dollars because of reduced Medicare and Medicaid costs.

Despite efforts in Kentucky to increase seat belt usage over the last decade, our state still trails nearly every other state in the percentage of motorists who buckle up. Consider that:

- *Kentucky ranks 47th in the nation in seat belt usage.* While the nation's average rate of seat belt usage is 82%, only 67% of Kentuckians buckle up.¹⁸
- *Of the 931 Kentuckians who died in motor vehicle accidents in 2003, two thirds were not restrained by seat belts.* The state's death rate in 2003 was 2 per 100 million vehicle miles traveled compared to a national rate of 1.5.^{18, 20}
- *Traffic fatalities increased from 791 in 1994, the year Kentucky passed a secondary seat belt law, to 964 in 2004.* The secondary seat belt law allows police officers to charge motorists for failing to wear a restraint only if the motorist is stopped for another reason. After passage of the law, seat belt usage increased by 16% and the state had 84 fewer fatalities.²¹⁻²³

State officials are focusing on how to reverse those statistics. The 2005 Governor's Executive Committee on Highway Safety has a bold goal to "achieve the most improved and sustainable reduction in highway fatalities and injuries in the nation."¹⁸

If Kentucky is to meet this goal, it must take a simple and sensible step – enactment and enforcement of a primary seat belt law. A primary seat belt law would allow officers to stop motorists solely for failing to wear restraints.

Twenty-two other states have primary seat belt laws. Based on the experience of those states, the NHTSA predicts¹⁷ that passage of such a law in Kentucky would:

- Increase the average rate of seat belt usage by at least 11% (from 67% to 78%)
- Realize cost savings of \$148 million

Moreover, the federal agency predicts no cost impact and no dramatic increases in enforcement responsibilities with the enactment of primary seat belt legislation.

This report examines in detail the cost savings to state government if Kentucky were to enact a primary seat belt law. The focus of our research was the savings to Kentucky's Medicaid program as a result of fewer spinal cord and traumatic brain injuries.

In Kentucky, nearly two-thirds of traumatic brain injuries and one-third of spinal cord injuries are caused by motor vehicle crashes. A significant number of those injured qualify for Medicaid at the time of the accident or in later years as a result of lost income and out-of-pocket medical expenses.⁴⁻⁶

To project the cost savings, we analyzed Kentucky data from 2002 using methods developed by researchers who conducted a similar study in Missouri.⁶

We project that a primary seat belt law would result in 62 fewer fatalities per year, 388 fewer incapacitating spinal cord and traumatic brain injuries, and 1,051 fewer non-incapacitating injuries from accidents involving passenger vehicles and light trucks. Thus,

- Kentucky's Medicaid budget would save a minimum of \$40.9 million over 10 years, including \$2.2 million the first year and \$585,000 per year for long-term medical care.
- Overall, Kentucky would save \$116 million in economic costs (wage loss, medical and administrative costs, property damage and employer costs).
- Overall, Kentucky would save \$324 million in comprehensive costs (lost life years and productivity).

Introduction

Increasing seat belt usage is a public health priority. It is indisputable that seat belts save lives and dollars:

- Nationwide in 2003, seat belts saved the lives of an estimated 14,903 people over 4 years old, and child safety seats saved the lives of 401 children ages 4 years and younger, according to NHTSA.¹⁶
- More than half of the 31,904 occupants killed in 2003 in crashes of passenger cars and light trucks were not wearing seat belts.¹⁶⁻¹⁷
- In Kentucky in 2003, 67% of the 931 vehicle occupants killed were not using seat belts, according to the Kentucky State Police.²¹

Research has shown that lap/shoulder belts, when properly used, reduce the risk of fatal injury to front-seat passenger car occupants by 45% and the risk of moderate to critical injury by 50%. For light truck occupants, seat belts reduce the risk of fatal injury by 60% and moderate-to-critical injury by 65%.^{13,19}

Seat belts should be worn at all times, even in automobiles with airbags. Airbags by themselves have a fatality reducing effectiveness of only 12%.^{14-15,24} Child safety seats reduce the risk of death in passenger cars by about 70% for infants and 55% for toddlers ages 1 to 4.^{13,26,30}

Seat belt usage saves U.S. society an estimated \$50 billion annually in medical care, lost productivity, and other injury related costs. Conversely, deaths and injuries from safety restraint non-use result in an estimated \$26 billion in economic costs to society annually.⁴

The cost of unbuckled drivers and passengers goes far beyond those killed and the loss to their families. It is reflected in higher taxes and higher health care and insurance costs. It is estimated that eliminating unrestrained driving could save U.S. employers \$6 billion annually in fringe-benefits and related medical costs.²⁸

The same estimated savings for Kentucky employers is \$20 million per year.²⁸

The Effect of Requiring Seat Belt Usage

In spite of the clear benefit to public health and the economy from seat belt usage, federal and state governments did not require seat belts for many years. The first seat belt was patented in 1885, and the first modern lap-and-shoulder belt, invented by Swedish inventor Nils Bohlin, was introduced by Volvo in 1959. It was not until 1968 that the federal government began requiring seat belts in all new vehicles.²

Before 1980, usage of seat belts in the United States stayed around 11% despite buckle-up campaigns at the local and state levels. Between 1980 and 1984, individual organizations and public education programs promoted incentives and policy changes to increase the usage of seat belts. By the end of this public campaign, national seat belt usage had reached only 15%.^{8,17}

In 1984, however, New York became the first state to enact a mandatory seat belt usage law, and by 1990, 37 other states had followed suit. The vast majority of these laws were “secondary seat belt laws,” meaning that an officer had to observe another traffic violation before issuing a citation for a seat belt infraction.

Ultimately the federal government required states to enact mandatory seat belt laws or face the loss of federal highway funds. Kentucky was one of the last states to comply, enacting a secondary seat-belt law in 1994.²⁵

How Kentucky’s Seat Belt Law Compares to Other States’ Laws

Over the years, several states changed their seat belt laws to allow police officers to treat a seat belt violation as they would any other violation. They passed “primary seat belt laws,” which allow police officers to stop and cite motorists for not using seat belts. On average, those states now have much higher seat belt usage than states with secondary laws – 85% compared to 75%.¹⁷ In California, Michigan, Hawaii, Oregon and Washington, all states with primary seat belt laws, the usage rates are above 90%.¹⁶⁻¹⁷

Kentucky fares poorly in seat belt usage compared to primary-seat-belt-law states as well as to the nation as a whole. The national average rate of motor vehicle occupants who use seat belts is 82%. Kentucky’s rate is 67%, and ranks 47th among the 50 states.¹⁸

The closest the Kentucky General Assembly has come to passing a primary seat belt law was in 2002, when House Bill 68 passed the House of Representatives.²⁵

One objection, the cost of implementation and enforcement, has been addressed in studies by NHTSA, which predicts no cost impact and no dramatic increases in enforcement responsibilities from a primary seat belt law. This federal agency’s data indicate that additional revenue from tickets written with primary enforcement of a state’s seat belt law more than offsets any additional costs associated with its administration and enforcement.^{21-23,27}

Another objection from some Kentucky lawmakers is that giving police primary enforcement authority infringes on individual rights. Related to this objection is the belief that to use or not to use seat belts is an individual decision and not a public issue.^{7-8,27,30} This objection also delayed the passage of the first mandatory seat belt law in Kentucky, even after the federal government began pressing states to do so.

A primary seat belt law in Kentucky, along with appropriate public education and enforcement, could make a dramatic difference in the number of fatalities and injuries on state roads.

NHSTA estimated that in 2004 Kentucky could have saved 62 lives and prevented 1,439 injuries if the Commonwealth had a primary seat belt law (NHTSA, 2005, and Kentucky State Police news release, Jan. 1, 2005).^{9,22} This is based on the agency’s research that shows the passage of primary seat belt laws would likely increase usage rates by 11% or more. The agency also predicts that substantially fewer motorists would be ejected from their vehicles during crashes (in 2003 more than three-fourths of Kentucky motorists who were ejected during crashes were killed).²¹ One study by

the National Safety Council estimated that 12,177 lives have been lost from 1995 to 2002 because 30 states failed to enact primary seat belt laws.²⁶

Kentucky's neighboring state of Tennessee passed a primary seat belt law in July 2004 and experienced an increase in its seat belt usage from 68.5% in 2003 to 72% in 2004. Active enforcement of seat belt laws, educational campaigns, and the level of penalties for non-compliance with seat belt laws have a significant effect on usage rates in both secondary and primary states. The relatively small increase in usage rates in the first year after Tennessee enacted its primary law can be partially explained by its relatively low fine of \$10 for noncompliance with its law. The average fine for the 49 states with mandatory adult seat belt laws is \$22.32, and average combined fines and fees/court costs total \$33.39. Higher monetary penalties result in higher seat belt use levels in both primary and secondary enforcement states. More than 66% of drivers said they would be more likely to wear seat belts, if the fine for not buckling up was increased.

Studies show that advertising and educational campaigns such as the national "Click It or Ticket" campaign can maximize the effectiveness of tougher seat belt law enforcement, especially with high-risk and younger drivers.^{7-8,11}

There is some evidence to suggest that returning a portion of revenue resulting from fines to local law enforcement agencies, city and county, e.g., will increase seat belt usage. Colorado, a secondary law state, has proposed returning as much as 35% of such revenue to local police because of their key role in enforcement of its seat belt law.

States are contending with the right combination of fines, loss of points on driver licenses, and alternatives, such as drivers' education, to increase seat belt usage so as to save lives, reduce injuries, and lessen the cost burden to the public and businesses.

Projected Cost Savings if Kentucky Enacted a Primary Seat Belt Law

Reducing fatalities and injuries on Kentucky highways would lower the cost to taxpayers of government-funded health care. It is possible to quantify the broader economic costs that drain the resources of Kentucky employers, families and state and local governments.

Medicaid Cost Savings

The Kentucky Institute of Medicine™ examined the impact of a primary seat belt law on Kentucky's Medicaid expenses for accident victims who suffer traumatic brain injuries and spinal cord injuries. These types of injuries result in large costs for emergency room and acute care as well as for long-term medical care. The cost for this care imposes a substantial public burden.

Analysis of data over several years indicates that 64% of traumatic brain injuries and 35% of spinal cord injuries in Kentucky are attributable to motor vehicle crashes. A significant number of those injured have only Medicaid as a source of health insurance coverage. Even some who are covered by private health insurance will eventually qualify for Medicaid because of their inability to work and loss of savings from out-of-pocket medical expenses.

To estimate the costs to Medicaid and annual minimum potential savings to the Kentucky state budget, the Institute used:

- methods developed by N.K. Chaudhary and D.F. Preusser⁶
- Kentucky hospital discharge data from 2002 and projections based on that data over a 10-year period
- an estimate of minimal increase in seat belt usage of 11% based on NHTSA projections¹⁶⁻¹⁷
- estimates of short- and long-term costs of treatment for survivors of traumatic brain and spinal cord injuries in motor vehicle crashes

It is estimated that an 11% increase in seat belt usage by Kentuckians would have produced at least \$2,277,975 in savings for the Kentucky Medicaid budget by the end of 2002 and an additional \$584,970 per year for survivors of traumatic brain and spinal cord injuries. The estimates were based on the projected cost of traumatic brain injuries and traumatic spinal cord injuries.

Estimates indicate there were 1,151 patients with traumatic brain injuries that resulted from motor vehicle traffic crashes in 2002. Of those patients, 176 were on Medicaid. Based on estimates by Chaudhary and Preusser, the percentage of Medicaid patients with traumatic brain injuries could double by the end of the first year after hospital discharge.^{6,8} With patterns specific to Kentucky, we estimated that there could be as many as 309 traumatic brain injury patients by the following year in need of Medicaid coverage.

In addition, estimates indicate there were 50 patients with spinal cord injuries hospitalized as a result of motor vehicle traffic crashes. Ten of them were on Medicaid. Chaudhary and Preusser indicate that the percentage of Medicaid patients with spinal cord injuries for any year could increase by a fourth by the end of the first year after hospital discharge.^{6,8} Based on this model there could be as many as 20 patients with spinal cord injuries needing Kentucky Medicaid coverage by the following year.

While traumatic brain injury and spinal cord injury statistics were selected because of their severity and multi-year impact, they are only part of the overall costs to Medicaid from motor vehicle crashes. These estimates do not include the medical and others costs from accidents involving motorcycles, ATVs, or vehicles hitting pedestrians. Thus, this methodology results in a minimum estimate of Medicaid savings that might be realized by implementing a primary seat belt law in Kentucky. The actual savings would be far greater.

Economic and comprehensive costs in Kentucky

The Institute also used methods developed by the National Safety Council (NSC) to estimate the economic and comprehensive costs of motor vehicle crashes that occurred on Kentucky's public roads in 2002.^{2,22,26} Economic costs include wage loss, medical expenses, administration costs, property damage, and employer costs. Comprehensive costs include both economic costs and a measure of dollar value associated with lost quality-of-life caused by deaths and injuries in motor vehicle crashes. Based on the National Safety Council formula, Kentucky could have saved \$115,973,000 in economic costs and \$324,151,200 in comprehensive costs with a primary seat belt in 2002.

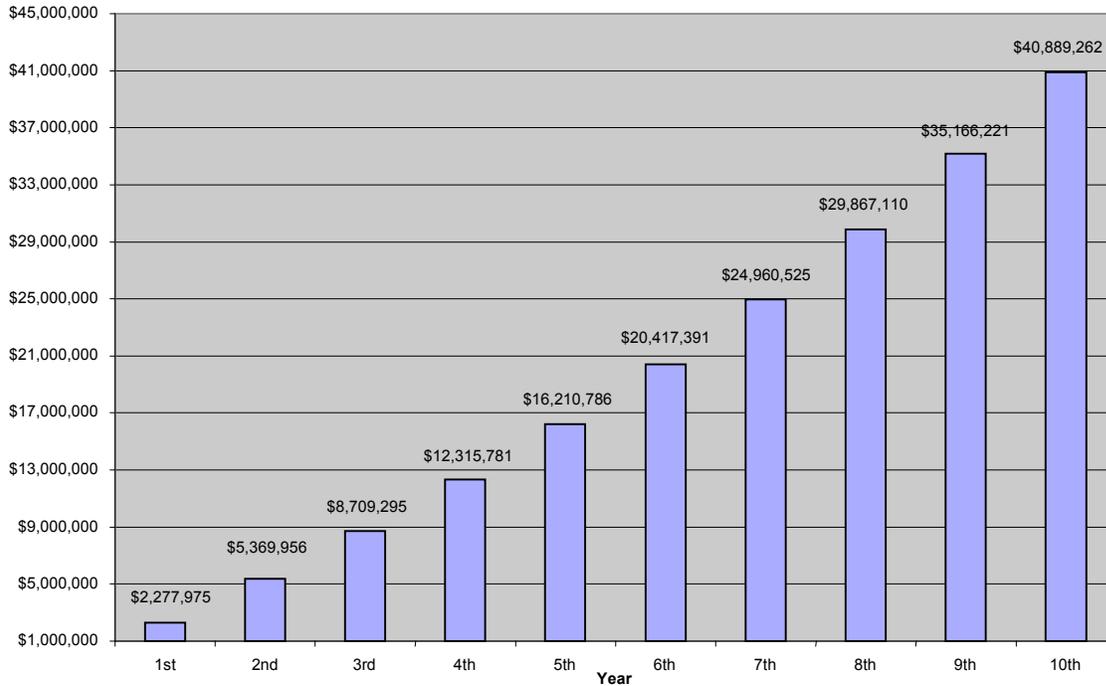
Table 1 below shows the estimated minimum costs for the Kentucky Medicaid program for individuals suffering traumatic brain and spinal cord injuries and deaths from motor vehicle crashes in 2002, with the state's secondary seat belt law in operation.

Table 1 Kentucky Medicaid Estimated Minimum Costs Traumatic Brain and Spinal Cord Injuries and Deaths From Motor Vehicle Crashes in 2002		
Injuries/Deaths	First Year	Each Additional Year
TBI	\$15,492,705	\$9,565,010
SCI	\$7,756,129	\$1,070,801
Total	\$23,248,834	\$10,635,811
Additional \$18,168,893 cost to Medicaid from non-TBI/SCI injuries. Total 2002 cost to Medicaid for motor vehicle crashes is \$41,417,727.		

Table 2 below reflects the savings for Medicaid in 2002 by the reduction of severe injuries from motor vehicle crashes (\$2,277,975 in 2002 and an additional \$584,970 each following year), if a primary seat belt law had been in place. Assuming similar patterns of crashes, injuries and fatalities in subsequent years, the savings projected over 10 years would save the Kentucky Medicaid program \$40,889,262, as shown in the graph below.

Table 2 Kentucky Medicaid Estimated Minimum Costs Savings Traumatic Brain and Spinal Cord Injuries and Deaths From Motor Vehicle Crashes in 2002 With Implementation of a Primary Seat Belt Law		
Injuries/Deaths	First Year	Each Additional Year
Medicaid Savings	\$2,277,975	\$584,970

**Cumulative Medicaid Savings from Impact of Primary Seat Belt Law
Reduced Treatment and After-care Costs for TBI and SCI Patients**



In Kentucky in 2002, traffic collisions resulted in a total economic loss of more than \$2 billion. This includes wage loss, medical expense, administration cost, property damage, and employer cost. If the value of lost life and lost quality of life is added, the total (comprehensive) cost is almost \$6 billion.

Table 3 Estimates of Economic Cost for Kentucky Traffic Collisions, 2002			
Cost Category	Cost Per Incident	Number Reported	Estimated Cost
Fatalities	\$1,090,000	915	\$997,350,000
Incapacitating Injuries	\$52,100	7,046	\$367,096,600
Non-incapacitating Injuries	\$17,200	19,101	\$328,537,200
Later Diagnosed Injuries	\$9,800	23,182	\$227,183,600
Property Damage Only	\$2,000	97,144	\$194,288,000
Total Economic Cost			\$2,114,455,400
National Safety Council Traffic Collisions in Kentucky Annual Reports http://www.kentuckystatepolice.org/data.htm#kspan			

The following estimates of reductions in injuries, deaths, damages, and costs for Kentucky traffic collisions in 2002 were developed based on a projection of an 11% increase in seat belt usage as a

result of enacting a primary seat belt law. The total economic savings would be almost \$116 million. Estimates of economic cost include wage loss, medical expense, administration cost, property damage, and employer cost. If the value of lost life and lost quality of life is added, the total (comprehensive) cost savings is more than \$324 million.

Table 4 Estimates of Reductions in Injuries, Deaths, Damages, and Costs for Kentucky Traffic Collisions, 2002				
Cost Category	Reported	Impact of Primary Seat Belt Law		
		Reduced	Economic	Comprehensive
Fatalities	915	62	\$54,500,000	\$173,500,000
Incapacitating Injuries	7,046	388	\$20,214,800	\$66,736,000
Non-Incapacitating Injuries	19,101	1,051	\$18,077,200	\$46,454,200
Possible Injuries	23,182	1,275	\$12,495,000	\$26,775,000
Property Damage Only	97,144	5,343	\$10,686,000	\$10,686,000
Total			\$115,973,000	\$324,151,200
National Safety Council Traffic Collisions in Kentucky Annual Reports http://www.kentuckystatepolice.org/data.htm#kspan Impact of a Primary Seat Belt Law on Missouri's State Medicaid Expenses, N.K Chaudhary and D.F. Preusser, March 2, 2004 http://www.nsc.org/public/impactseatbeltonmomediticaid.pdf				

CONCLUSIONS

Statistical, empirical, and experiential evidence agree – seat belts save lives, prevent injuries, and reduce society's health care costs.

While the nation's average rate of seat belt usage is 82%, only 67% of Kentuckians buckle up, corresponding to a national ranking of 47th.

States with primary seat belt laws report an average usage rate of 80%, compared to an average of 69% in states with secondary seat belt laws.

Evidence exists that when a state enacts a primary seat belt law, the percentage of its citizens who wear their seat belt increases 11% to 15%.

A conservative estimate of an 11% increase in seat belt usage equates to 62 Kentuckian lives saved, 1,051 fewer people with incapacitating injuries, and a savings in the state's resources of more than \$2 million in the first year, with more than \$40 million savings in the first 10 years after implementation of a primary seat belt law.

References

1. Baker, S.P., Braver, E.R., Cehn, L-H., Pantula, J.F., & Massie, D. (1998). Motor vehicle occupant deaths among Hispanic and black children and teenagers. *Archives of Pediatric & Adolescent Medicine*, 152, 1209-1212.
2. Bellis, M. (2005). History of the seat belts. Retrieved April 2, 2005 from http://inventors.about.com/library/inventors/bl_seat_belts.htm
3. Block, A. (2001, November). 2000 Motor Vehicle Occupant Safety Survey, Volume 2: Seat Belt Report, NHTSA Technical Report, DOT HS 809 389.
4. Blincoe, L., Seay, E., Zaloshnja, T., Miller, E., Romano, S. & Spicer, R. (2002, May). The impact of motor vehicle crashes, 2000. National Highway Traffic Safety Administration, US Department of Transportation.
5. Christian, W.J. (2001, June 20). Traumatic brain injury & spinal cord injury surveillance project: Fiscal year 2001 final report. Kentucky Injury Prevention Research Center, University of Kentucky. Retrieved March 14, 2005, from http://www.kiprc.uky.edu/projects/tbi/tbi_FY01.pdf
6. Chaudhary, N.K., & Preusser, D.F. (2004, March 2). Impact of a Primary Seat Belt Law on Missouri's State Medicaid Expenses: Estimated Minimum Savings to Missouri's Medical Budget by Implementation of a Primary Seat Belt Law. Retrieved April 4, 2005 from <http://www.nsc.org/public/impactseatbeltonmomedicaid.pdf>
7. Chaudhary, N.K., & Northrup, V.S. (2004, April). Teenage and young adult safety belt use: White paper update. Retrieved April 2, 2005 from <http://www.nsc.org/public/teenseatbeltuse.pdf>
8. Chaudhary, N.K., & Northrup, V.S. (2004, June). Predictive models of safety belt use: A regression analysis of MVOSS data. *Traffic Injury Prevention*, 5(2).
9. Centers for Disease Control. (2002, April 2). Mortality and Morbidity Weekly Report (MMWR). Impact of primary laws on adult use of safety belts—United States, 2002. 53(12), 257-260.
10. Centers for Disease Control. (2005). Injury fact book, 2001-2002. Retrieved April 2, 2005 from http://www.cdc.gov/ncipc/fact_book/25_Spinal_Cord_Injury.htm
11. Committee for the Safety Belt Technology Study. (2003, October, 14). Buckling up: technologies to increase seat belt use. Special report 278. National Academies, National Research Council, Transportation Research Board, Washington, DC. Retrieved April 2, 2005 from <http://trb.org/publications/sr/sr278.pdf>
12. Dinh-Zarr, T.B., Sleet, D.A., Shults, R.A., Zaza, S., Elder, R.W., Nichols, J.L., et al. (2001, November). Reviews of evidence regarding interventions to increase the use of safety belts. *American Journal of Preventive Medicine*, 21(48), 48-65.

13. Durbin, D.R., Elliott M.R, Winston, F.K. (2003). Belt-positioning booster seats and reduction in risk of injury among children in vehicle crashes. JAMA, 289, 2835-40.
14. Glassbrenner D. (2002). Safety belt and helmet use in 2002 – Overall results: Report DOT HS 809 500 (2002, September). Washington, DC: US Department of Transportation, National Highway Traffic Safety Administration.
15. Glassbrennar, D. (2003). Estimating the lives saved by safety belts and air bags. National Center for Statistics and Analysis, National Highway Traffic Safety Administration, Paper no. 500. Retrieved April 2, 2005 from <http://www-nrd.nhtsa.dot.gov/pdf/nrd-01/esv/esv18/CD/Files/18ESV-000500.pdf>
16. Glassbrenner, D. (2003). Safety belt use in 2003: Report DOT HS 809 646 (2003, September). Washington, DC: US Department of Transportation, National Highway Traffic Safety Administration. Retrieved April 4, 2005 from <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/Rpts/2003/809646>
17. Glassbrenner, D. (2004, April 2, 2004). Impact of primary laws on adult use of safety belts --- United States, 2002. CDC, MMWR Weekly, 53(12), 257-260. Retrieved April 2, 2005 from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5312a2.htm>
18. Governor's Executive Committee on Highway Safety. Kentucky's road map to safer highways: Partnering Conference, Retrieved September 2, 2005 from <http://transportation.ky.gov/design/partner/presentations2005/Duane%20Thomas%20Partnering%20Conference%202005.ppt>
19. Kahane, J.C. (2002, December). Fatality reduction by safety belts for front-seat occupants of cars and light trucks. Updated and expanded estimates based on 1986-99 FARS data. NHTSA Report Number DOT HS 809 199. Retrieved April 2, 2005 from <http://www.nhtsa.dot.gov/cars/rules/regrev/evaluate/809199.html>
20. Kentucky State Police. (2005, January 1). New Release. Retrieved April 2, 2005 from http://www.kentuckystatepolice.org/press/pr01_10_05.htm
21. Kentucky Traffic Collision Facts 2003 Report (2003). Kentucky Transportation Center, College of Engineering, University of Kentucky. Retrieved January 31, 2005 from <http://www.kentuckystatepolice.org/pdf/CollisionFacts2002.pdf>
22. Kentucky Traffic Collision Facts 2004 Report. (2004). Kentucky Transportation Center, College of Engineering, University of Kentucky. Retrieved January 31, 2005 from <http://www.kentuckystatepolice.org/pdf/CollisionFacts2002.pdf>
23. Kentucky Traffic Collision Facts 2002 Report. (2002). Kentucky Transportation Center, College of Engineering, University of Kentucky. Retrieved January 31, 2005 from <http://www.kentuckystatepolice.org/pdf/CollisionFacts2002.pdf>

24. Larimore, W.L. (1991, October). Encouraging patients to use seat belts – Editorial. *American Family Physician*. Retrieved April 2, 2005 from http://www.findarticles.com/p/articles/mi_m3225/is_n4_v44/ai_11490336
25. Legislative Research Commission Staff. (2004, December). Issues confronting the 2005 Kentucky General Assembly. An update of Informational Bulletin No. 212 (2003).
26. National Safety Council. (2005) Primary seat belt laws save kids: New messages that can redefine the debate. Retrieved April 2, 2005 from <http://www.nsc.org/partners/primary.htm>
27. NHTSA. (1997). Public support for primary laws. National Highway Traffic Safety Administration). Retrieved April 2, 2005 from http://www.nhtsa.dot.gov/people/injury/airbags/buckleplan/BUA_WEBSITE/Archive-04/buckleup/legisave.html
28. NHTSA. (2005, August 24). The economic burden of traffic crashes on employers. Retrieved August 26, 2005 from <http://www.nhtsa.dot.gov/people/injury/alcohol/EconomicBurden/>
29. Nirula, R., Kaufman, R., & Tencer, A. (2003, November). Traumatic brain injury and automotive design: Making motor vehicles safer. *Journal of Trauma-Injury Infection & Critical Care*, 55(5), 844-848.
30. Pierson, G. (2001, June). Just the facts – reasons to use seat belts. *Combat Edge*, United States Airforce. Retrieved April 2, 2005 from http://www.findarticles.com/p/articles/mi_m0JCA/is_1_10/ai_76334024
31. Spurlock, C. & Christian, J. (2000, October). Traumatic brain injury in Kentucky. *Kentucky Epidemiologic Notes & Reports*, 35 (10), 1-3. Cabinet for Health Services, Department for Public Health, Division of Epidemiology & Health Planning. Retrieved March 14, 2005 from <http://chfs.ky.gov/NR/rdonlyres/B779ECD5-AE6C-4033-9582-3D6F3622B132/0/epiOctober2000.pdf>
32. Walker, R., Logan, T.K., Leukefeld, C., & Stevenson, E. Kentucky traumatic brain injury prevalence study. (2004, January). Center on Drug and Alcohol Research, University of Kentucky. Retrieved March 14, 2005 from <http://cdar.uky.edu/Downloads/Complete%20TBI%20Prevalence%20Study.pdf>
33. Tatzman, M. Presentation to the Institute of Medicine Committee on Traumatic Brain Injury (2005, July 18). Retrieved August 1, 2005 from <http://www.iom.edu/Object.File/Master/28/356/0.ppt>
34. Thurman D. The epidemiology and economics of head trauma. (2001). In: Miller L, Hayes R, editors. *Head trauma: basic, preclinical, and clinical directions*. New York (NY): Wiley and Sons.
35. Thurman, D., Alverson, C., Dunn, K., Guerrero, J., Snizek, J. (1999). Traumatic brain injury in the United States: a public health perspective. *Journal of Head Trauma Rehabilitation* 14(6), 602-15.

36. Thurman, D. (1999, December). Traumatic brain injury in the United States: A report to Congress. Centers for Disease Control . Retrieved April 2, 2005) from <http://www.cdc.gov/doc.do/id/0900f3ec8001011c>

37. Thurman, D., Sniezek, J., Johnson, D., et al. (1995). Guidelines for Surveillance of Central Nervous System Injury. Atlanta: Centers for Disease Control and Prevention, 1999.

Appendix

Appendix 1 Medical and Economic Costs for a Young Motor Vehicle Crash Survivor of Traumatic Brain Injury

Maps

MAP 1 Kentucky 2004 Seat Belt Use Rates

MAP 2 2004 Fatality and Injury Rates Due to Motor Vehicle Crashes

MAP 3 2004 Low Seat Belt Usage Results in High Fatalities

Kentucky Mandatory Seat Belt Law

KRS 189.125: “(6) No person shall operate a motor vehicle manufactured after 1965 on the public roadways of this state unless the driver and all passengers are wearing a properly adjusted and fastened seat belt unless the passenger is a child who is secured as required in subsection (3) of this section... (7) A peace officer shall not stop or seize a person or issue a uniform citation for a violation of subsection (6) of this section if the officer has no other cause to stop or seize the person other than a violation of subsection (6) of this section.”

Appendix 1

Medical and Economic Costs for a Young Motor Vehicle Crash Survivor of Traumatic Brain Injury

There are three stages of treatment for traumatic brain injuries (TBIs): [Acute](#) — to stabilize the patient immediately after the injury; [Subacute](#) — to rehabilitate and return the patient to the community; and [Chronic](#) — to continue rehabilitation and treat the long-term impairments. Improved trauma care results in more TBI accident victims surviving and requiring lifetime treatment with diminished quality of life.

In 2002, the average initial hospitalization for a diagnosed traumatic injury in Kentucky was 7.8 days, with a range from 1 to 97 days. The average first-time acute hospital treatment cost was \$52,000. It is not unusual for TBI survivors to require additional hospitalizations and surgeries, treatment for depression and emotional disorders, and counseling for behavioral disorders and job training. Sources of payment for initial hospital treatment of Kentucky TBI patients injured in motor vehicle accidents are Self-pay (6.5%), Workers' Compensation (3.3%), Medicare (22.4%), Medicaid (11.4%), Other Federal (0.1%), Private/Commercial Insurance (54.2%) and Unknown (2.1%). Eighty-five percent of TBI patients requiring long-term medical care become the responsibility of Medicaid and other government programs.

While traumatic brain injuries (TBIs) occur in a broad range of individuals from children through the elderly, the most likely group for TBIs are males age 15-24. Therefore, a case is presented of likely costs generated from a TBI suffered by an 18-year-old male.

Over a lifetime it can cost as much as \$1,875,000 for the treatment and long-term care of a young survivor of severe TBI incurred in a motor vehicle crash. Indirect costs for emergency services (police and fire), the individual's lost earnings, lost productivity for family members who serve as caregivers and employers through missed work time, or the costs associated with providing social services can be as high as \$1,020,800. The total life-time cost for a young TBI survivor could be as high as \$2,895,800.

Type Cost	Cost
Medical and Long-term Care	\$1,875,000
Lost Wages, Taxes, and Other	\$781,600
Lost Productivity Family Members	\$239,200
Total	\$2,895,800
Cost estimates are derived using models from the National Safety Council and data from the Centers for Disease Control. Estimates are in Year 2000 dollars.	

This tragically expensive scenario of both economic costs and lost quality of life is more likely in motor vehicle crashes in which individuals are not wearing seat belts.

Sources: Data from Kentucky Traffic Collision Facts 2002 Report and model from National Safety Council.