

Injury Prevention: What Works?

A Summary of Cost-Outcome Analysis for Injury Prevention Programs

(Fact Sheets)

FAST FACTS

- How can you convey the cost-effectiveness of the injury intervention that you are considering? Use a fast fact! These can be written for any of the interventions summarized in these fact sheets based on the information in the table. The format of the fast facts is “[*Intervention name*] yields an estimated cost savings of [Total Benefits] for a cost of only [Cost per Unit]”. For example, [*Zero Alcohol Tolerance for Drivers Under 21*] yields an estimated cost savings of [\$850] for a cost of only [\$34 per driver]. (See Unit 1.)
- *Midnight Driving Curfew Combined with Provisional Licensing* for teenage drivers yields an estimated cost savings of \$600 for a cost of only \$74 per child. (See Unit 2.)
- *Sobriety Checkpoints* yield an estimated cost savings of \$73,000 for a cost of only \$9,600 per checkpoint. (See Unit 3.)
- *Smoke Alarm Purchases* yield an estimated cost savings of \$940 for a cost of only \$33 per smoke alarm. (See Unit 4.)
- *Treatment Foster Care* yields an estimated cost savings of \$160,000 for a cost of only \$2,200 per child. (See Unit 5.)
- A *20% Alcohol Tax* yields an estimated cost savings of \$91 for an annual cost of only \$9 per drinker. (See Unit 6.)
- *Poison Control Centers* yield an estimated cost savings of \$290 for a cost of only \$43 per call. (See Unit 7.)

1. METHODOLOGY

A. INTRODUCTION

Injury and violence are among the most serious social, economic, medical, and public health issues. Injuries and violence are a leading killer among all ages, and the number one killer among kids, teens, and young adults ages 1-44. Injuries and violence affect all of us including the families left behind, disabled survivors, and the general public who support our overburdened health care system. However, the majority of injuries and violence can be prevented through education, behavior and environmental changes, policy implementation and enforcement, and technology. But how can you tell if a particular prevention program or intervention is right for you, your family, and/or your community? Figure 1 shows some of the factors that you should consider; the only factor discussed in these fact sheets is costs. Costs are a universal metric that allow you to compare dissimilar interventions on the same scale. Costs can be used to produce **cost-outcome analyses** (see glossary for definitions of terms in bold) that are useful tools for the evaluation of prevention and intervention programs. This Fact Sheet Series can be used as an advocacy tool, to assist with the development of injury prevention plans, to guide the selection of an intervention, to provide technical assistance, to assist with resource allocation, or to promote a particular intervention in educational materials. Disciplines that are essential or tangential to injury prevention have a need to evaluate programs in terms of costs.

This Fact Sheet Series presents cost-outcome analyses for motor vehicle, impaired driving and pedestrian, open-flame/burn, substance abuse, violence, and other interventions. In a resource-constrained world, decision makers want to know if a program produces desired results less expensively than alternative approaches. For example, cost-outcome analyses allow you to say:

- On average, a \$46 child safety seat generates \$1,900 in benefits to society, or stated another way, child safety seats yield an estimated cost savings of \$1,900 for an average cost of only \$46.
- On average, a \$31 booster seat generates \$2,200 in benefits to society.
- On average, a \$10 bicycle helmet generates \$570 in benefits to society.
- On average, a \$33 smoke alarm generates \$940 in benefits to society.
- Childproof cigarette lighters cost \$0.04 per lighter and generate \$3.17 in benefits to society.
- Less porous cigarette paper (which reduces the chance of cigarette fires) costs \$0.0001 per pack and generates \$0.07 in benefits to society.
- The average call to a poison control center costs \$43 and saves \$290 in medical costs. At \$43 a call, each \$1 spent on poison control center services saves almost \$7 in medical spending.
- The average admission to a triaged regional trauma system costs \$1,720 and saves \$4,600.

- On average, injury prevention counseling by pediatricians costs \$10 per child ages 0-4 and generates \$86 in benefits to society.
- A sobriety check point costs \$9,600 and generates an average of \$73,000 in benefits to society.
- The *Harlem Hospital Safe Communities* program costs an average of \$16 per child and saves \$38 in medical costs.

The majority of the interventions presented reduce injuries, disability, and death. However, these fact sheets are a partial literature summary of available injury interventions with cost outcome analysis results. Children's Safety Network (CSN) is not suggesting that you choose any of the interventions over others. The focus of these fact sheets is on the cost-effectiveness of interventions, but cost effectiveness should **NOT** be the only factor considered when choosing an intervention to replicate or endorse. Interventions should be chosen based on a multitude of factors, including policy implications, program or community resources, funding, political atmosphere, cost implications, scope of problem, data, votes, personal interests, understanding the problem, time, competing priorities/interest groups, feeling of control over the situation, and other available resources (see Figure 1).



Figure 1: Some factors to consider when choosing which injury prevention intervention is right for you.

B. METHODS FOR THE COST-OUTCOME ANALYSIS OF INJURY INTERVENTION PROGRAMS

The purpose of this section is to help the user properly use the tables and information provided. Details about suggested values to use in determining the appropriateness of an intervention are NOT meant to solely be used in determining the selection of an intervention. Cost-outcome analyses that show cost-savings are just one of many factors to consider.

The 123 injury-related interventions consist of 52 youth only interventions, 32 adult only interventions, and 39 youth and adult interventions. Estimated cost savings (benefits to society) per injury prevented are from a set of related studies or use compatible values from the U.S. Consumer Product Safety Commission's Injury Cost Model. In several highway safety studies, intervention costs included increased travel time or reduced mobility. We valued travel time at 50% of the wage rate for production workers and valued mobility loss at the average cost of vehicle operation including amortization, \$0.31 per mile. All costs take society's viewpoint (everyone's costs and savings count) and use 2004 dollars and a 2.5% **discount rate**. Savings from any demonstration programs were reduced by 25%. When demonstration programs are replicated by others, there are usually differences between the replication and the original (demonstration) program, such that the savings are usually lower.

Savings for some interventions would be higher if we looked at the government perspective. For example, the cost of a sobriety checkpoint includes the time spent by drivers stopped at the checkpoints. If this were excluded, the savings would be higher.

The injury interventions presented were selected from U.S. published and unpublished studies from 1987-2004 identified through Medline and internet searches, bibliographic reviews, and federal agencies. Serious study flaws were corrected when possible. However some studies were subjectively excluded based on the rigor of program cost and effectiveness estimates. Analyses of occupational, air, rail, and water transport safety programs were also excluded. In addition, studies which showed reductions in fatalities, but ignored nonfatal injuries were excluded. All excluded studies are not shown in these fact sheets.

There are two cost measures which can be used to compare interventions: **benefit-cost ratios** and **cost per QALY saved**. If the benefit-cost ratio is greater than 1.0, the cost of implementing the intervention is less than the **total benefits** gained by preventing injuries. The total benefits include the dollar value of medical costs, work loss, and lost quality of life costs. A benefit-cost ratio greater than 1 means the intervention offers a positive return on investment and is **cost-effective**. Costs per QALY is a more stringent measure because it only includes savings from medical costs and other tangible resources and does not include quality of life savings. If the medical and other resource cost savings generated by the prevented injuries exceed the total cost of the intervention, the intervention is **cost-saving** and the cost/QALY is "<\$0." If the intervention is effective, but the cost of the intervention exceeds the medical and other resource cost-savings, the cost/QALY will be greater the \$0. If the intervention is not effective at all, the cost/QALY will be infinite (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes). In summary the best interventions are cost-effective (a BCR > 1) and cost-saving (cost/QALY < \$0). In general interventions with a BCR > 2 and a cost/QALY < \$50,000 are considered acceptable interventions.

Summary of Number and Types of Cost-Outcome Analysis Interventions

Intervention	Youth	Adult	Youth and Adult	Total
Motor Vehicle and Highway Safety	10	0	23	33
Impaired Driver	1	9	0	10
Open-Flame/Burn	1	0	3	4
Violence	15	17	1	33
Alcohol and Substance Abuse	22	4	8	34
Other	3	2	4	9
Total	52	32	39	123

Updated 9/1/05

STUDY SUPPORTERS AND REFERENCES

Development of this Fact Sheet Series was supported by a contract from the Health Resources Services Administration Maternal and Child Health Bureau through the Children’s Safety Network Economics and Data Analysis Resource Center. Special thanks are also given to the National Institute on Alcohol Abuse and Alcoholism and the National Highway Traffic Safety Administration. All cost-outcome analyses presented in these fact sheets are based on a series of analyses conducted by and/or compiled by Ted R. Miller, PhD and others from the Pacific Institute for Research and Evaluation (PIRE) found in the following sources:

- Ted R Miller and David T Levy. Cost-outcome analysis in injury prevention and control: Eighty-four recent estimates for the United States. *Medical Care* 2000;38(6):562–582.
- Eduard Zaloshnja, Ted R. Miller, Maury S. Galbraith, and Bruce A. Lawrence. Reducing Injuries among Native Americans: Five Cost-Outcome Analyses. *Accident Prevention Analysis*, in press 2003.
- Ted R. Miller. The effectiveness review trials of Hercules and some economic estimates for the stables. *American Journal of Preventive Medicine* 2001;21(4S):9-12.
- Ted R. Miller and Delia Hendrie (2005). How should government spend the drug prevention dollar? A buyer’s guide. Book chapter in *Preventing Harmful Substance Use: The Evidence base for policy and practice* edited by T. Stockwell, P.J. Gruenewald, J.W. Toumbourou and W. Loxley, John Wiley & Sons.

Questions about methods and data in this Fact Sheet Series should be referred to:

Children’s Safety Network Economics and Data Analysis Resource Center
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2. MOTOR VEHICLE

A. COST ANALYSIS OF MOTOR VEHICLE AND PEDESTRIAN SAFETY INTERVENTION PROGRAMS

Motor vehicle collisions are the leading cause of fatal injuries. Motor vehicle collisions often result in medical costs, lost work time, and lost quality of life. The total annual cost of motor vehicle related death and injury is over \$240 billion. Interventions to reduce motor vehicle injuries include interventions to improve driver and pedestrian safety, vehicle design, and road design.

Driver and pedestrian safety interventions include broad federal traffic safety programs, speed limits, provisional licenses and curfews for teenage drivers, laws requiring child seats, and distribution of child seats. Vehicle design interventions include installing airbags, seatbelts, and automatic daytime vehicle lights. Road design interventions include bridge end guard rails, median barriers, and post mounted reflectors.

DRIVER AND PEDESTRIAN SAFETY PROGRAMS

Of the eighteen driver and pedestrian programs, thirteen were cost-saving; for these programs, the medical, property damage, and other resource cost savings exceed the intervention costs. *Child Safety Seats (Ages 0-4)* and *Booster Seats (Ages 4-7)* reduce injuries to children in motor vehicle accidents, and the amount saved by preventing these injuries was more than the costs to implement the program. Other cost-saving interventions are *Safety Belt Laws*, *Child Bicycle Helmets*, and *Motorcycle Helmets*. For communities with limited resources to invest in driver and pedestrian safety programs, these programs also offer the highest return.

The remaining programs produced benefits in injuries prevented, but were less **cost-effective**. A *55 Mile per Hour Speed Limit* produces benefits by reducing injuries from speed related crashes, but also has a cost in increased travel time. *Motorcycle Helmet Laws*, *All Terrain Vehicle Helmets*, and *Child Pedestrian Safety Programs* were all effective in reducing injuries, but had a net cost for every year of perfect health gained.

Driving curfews for youth may force them to curtail their drinking and reduce impaired driving and resulting injuries. However curfews have a social cost from lost mobility. A *Midnight Driving Curfew Combined with Provisional Licensing* offers a higher return than a *10 PM Driving Curfew* and is an appropriate intervention for many communities.

CHILD SEATS

Child seats are an effective way of reducing child injuries in motor vehicle crashes.¹ Three types of child seat programs with cost-benefit analyses are included in these facts sheets: *Child Safety Seat Laws*, *Child Safety Seat Distribution (Ages 0-4)*, and *Child Seat Misuse Reduction* through education campaigns and check points. *Child Safety Seat Laws* require that children ages 0-4 be appropriately restrained when traveling in passenger vehicles. *Child Safety Seat Distribution (Ages 0-4)* encompasses giving away approved child safety seats to parents and caregivers and *Child Seat Misuse Reduction* at car seat checkpoints involves ensuring that child safety seats are properly installed in vehicles, that children are appropriately fastened in the child seat, and that parents and caregivers have an understanding of procedures.

¹ Childhood Injury Cost and Prevention Facts. Children's Safety Network Economics and Data Analysis Resource Center fact sheet series (September, 2005).

**Benefit-Cost Ratios of Motor-Vehicle Injury and Pedestrian Safety Intervention Programs
(2004 dollars)**

For information on the research methodology, see Methodology section of this Fact Sheet Series.

	Cost per Unit	Total Benefits	Benefit Cost Ratio	Cost/QALY	
Driver and Pedestrian Safety Interventions					
1	Child Seat Misuse Reduction	\$6/seat	\$500	85	<\$0
2	Booster Seat Law, Ages 4-7	\$34/new user	\$2,200	65	<\$0
3	Federal Traffic Safety Programs	\$3/driver	\$200	60	<\$0
4	Child Bicycle Helmet Law	\$11/new user	\$570	52	<\$0
5	Child Safety Seat Distribution, Ages 0-4	\$46/seat	\$1,900	42	<\$0
6	Child Safety Seat Law, Ages 0-4	\$50/new user	\$1,900	39	<\$0
7	Safety Belt Law	\$300/new user	\$5,400	18	<\$0
8	Upgrade Secondary Belt Law to Primary	\$300/new user	\$5,400	18	<\$0
9	Enhanced Belt Law Enforcement	\$280/new user	\$5,400	19	<\$0
10	Child Pedestrian Safety Program	\$1,660/school	\$14,900	9	\$1,500
11	Midnight Driving Curfew Combined with Provisional Licensing	\$74/driver	\$600	8.1	<\$0
12	10 PM Driving Curfew	\$140/driver	\$360	2.5	\$34,000
13	55 Mile Per Hour Speed Limit	\$7.10/hour of travel added	\$29	4.2	\$17,000
14	Motorcycle Helmet Law	\$1,400/new user	\$4,300	3.1	\$31,000
Voluntary Safety Equipment Purchases					
15	Voluntarily Use a Booster Seat, Ages 4-7	\$31/seat	\$2,200	71	<\$0
16	Voluntarily Wear a Child Bicycle Helmet	\$10/helmet	\$570	57	<\$0
17	Voluntarily Wear a Motorcycle Helmet	\$240/helmet	\$4,300	18	<\$0
18	Voluntarily Wear an All Terrain Vehicle Helmet	\$130/helmet	\$510	3.9	\$36,000
Vehicle Design Safety Research and Regulation					
19	Front Seat Safety Belts	\$67/vehicle	\$3,600	54	<\$0
20	Federal Vehicle Safety Program	\$58/vehicle	\$320	5.5	\$27,000
21	Driver Airbag	\$380/bag	\$1,700	4.4	\$8,800
22	Automatic Daytime Vehicle Lights	\$71/vehicle	\$270	3.8	\$25,000
23	Side Impact Program	\$325/vehicle	\$980	3	\$53,000
24	Passenger Airbag	\$200/bag	\$400	2	\$73,000
25	Add Rear Seat Shoulder Belts to Lap Belts	\$25/vehicle	\$10	0.4	\$433,000
Road Design and Upgrading					
26	Post Mounted Reflectors	\$328/post	\$37,200	113	<\$0
27	Painting Lines on Roads	\$235/mile	\$15,900	68	<\$0
28	Bridge-End Guardrail	\$9,900/bridge	\$373,000	38	<\$0
29	Federal Road Safety Program	\$6/driver	\$200	33	<\$0
30	Flashing Beacons	\$18,600/post	\$299,100	16	<\$0
31	Median Barrier (1-12 foot median)	\$208,000/mile	\$530,000	2.5	\$50,000
32	Flatten Crest Vertical Curves	\$283,200/curve	\$206,500	0.7	\$206,000
33	Median Barrier (>13 foot median)	\$208,000/mile	\$117,000	0.6	\$278,000

Note: If the cost/QALY is <\$0, the intervention is effective and cost saving. If the cost/QALY is infinite, the intervention is not effective (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes),

Updated 9/1/05

VEHICLE DESIGN SAFETY RESEARCH AND REGULATION

Of these seven interventions, only *Front Seat Safety Belts* were cost-saving. All but one of the remaining interventions yielded a positive return on investment. Even personal protective equipment with very low average benefits may be worth the cost to some consumers. For example, among this list, *Adding Rear Seat Shoulder Belts to Lap Belt Systems* is the least cost-effective safety equipment, in part because there are no rear seat passengers in many collisions. However, a car purchaser who expects to regularly have passengers in the back seat might find that rear shoulder belts offered a positive return on investment.

ROAD DESIGN AND UPGRADING

Five of these programs were cost-saving. Federal *Road Safety Programs* provided considerable benefit for the money invested. *Post Mounted Reflectors* gave the highest return for the amount invested with a benefit-cost ratio of 113. *Bridge-End Guardrails*, *Painting Lines on Roads*, and *Flashing Beacons* also were excellent investments. These interventions have a high cost per unit, but also have high returns. Other road design interventions such as installing *Median Barriers* greater than 13 feet wide and *Flattening Crest Vertical Curves* (improving sight distance on inclined roads with at least 1 crash every 3 years) were not cost effective.

3. IMPAIRED DRIVING

A. COST ANALYSIS OF IMPAIRED DRIVING AND PEDESTRIAN INTERVENTION PROGRAMS

Impaired driving, or driving under the influence of alcohol, is a major source of fatalities and injuries. A person with a blood alcohol concentration (BAC) $\geq .08$ drove one of every 140 miles driven in the United States in 2000, Police in the United States reported 1,093,000 crashes involving a driver or pedestrian with a BAC of .01 or more. However, the alcohol involvement of drivers and pedestrians are not always captured in the police report for various reasons. When alcohol involvement is estimated in crashes where this information was not captured by the police, the number of alcohol involved crashes almost doubles to an estimated 2,163,000 crashes. These crashes killed 16,792 and injured an estimated 513,000 people.³

STREETLIGHTS AT BARS

In the *Streetlights at Bars* intervention, the Eastern Arizona District of the IHS's Office of Environmental Health and the White Mountain Apache Tribe (population 10,000) installed 28 streetlights along a 1.1-mile section of highway to reduce pedestrian injuries, primarily to intoxicated victims, in Whiteriver, Arizona. The project also involved the State Transportation Department and the local electric utility.²

Benefit-Cost Ratios of Impaired Driving Prevention Programs (2004 dollars)

For information on the research methodology, see Methodology section of this Fact Sheet Series.

	Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY	
Impaired Driving Prevention Programs					
34	Zero Alcohol Tolerance for Drivers Under 21	\$34/driver	\$850	25	<\$0
35	Administrative License Revocation with Per Se Law	\$2,900/ALR	\$63,000	21	<\$0
36	Administrative License Revocation	\$3,100/ALR	\$53,000	17	<\$0
37	.08% Driver Blood Alcohol Limit	\$3.15/driver	\$48	16	<\$0
38	Sobriety Checkpoints	\$9,600/checkpoint	\$73,000	7.5	<\$0
Repeat Offender Programs					
39	Alcohol-Testing Ignition Interlock	\$1,000/vehicle	\$6,900	6.7	<\$0
40	Driving While Under the Influence Offender Auto Impoundment	\$890/vehicle	\$4,900	5.5	<\$0
41	Driving While Under the Influence Intensive Probation and Treatment	\$1,310/arrestee	\$5,300	4.1	<\$0
42	Driving While Under the Influence Offender Electronic House Arrest	\$1,560/arrestee	\$5,300	3.4	<\$0
Impaired Pedestrian Harm Reduction					
43	Streetlights at Bars, Native American	\$400/light	\$3,400	8.5	<\$0

Note: If the cost/QALY is <\$0, the intervention is effective and cost saving. If the cost/QALY is infinite, the intervention is not effective (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes),

² Zaloshnja, E., Miller, T., Galbraith, M., Lawrence, B., DeBruyn, L., Bill, N., Hicks, K., Keiffer, M., & Perkins, R. (2003). Reducing injuries among Native Americans: Five cost-outcome analyses. *Accident Analysis and Prevention*, 35(5), 631-639.
³ Impaired Driving in the United States, NHTSA Fact Sheet, <http://www.nhtsa.dot.gov/people/injury/alcohol/page%202.htm>

Updated 9/1/05

Impaired driving fatalities and injuries can be prevented by lessening the number of drinking drivers, and the number of times that drinking drivers drive while impaired. Safety measures that improve the survivability of traffic crashes (i.e., proper in-car restraints, airbags, or guardrails) also prevent or improve the outcomes of impaired driving crashes; however, they are listed on the Motor Vehicle Safety section of this Fact Sheet Series.

B. IMPAIRED DRIVING PREVENTION MEASURES

These interventions all offer excellent returns for the amount invested. Nine of the measures reported here directly reduce harm from drinking by reducing impaired driving frequency. All of these interventions were cost-saving (cost/QALY < \$0) meaning that the medical, property damage, and other resource costs saved by these programs exceeded the costs of the program.

These interventions may avert specific incidents and also have a general deterrence effect. For example, *Sobriety Checkpoints* avert specific incidents by apprehending impaired drivers who would otherwise have crashed. *Sobriety Checkpoints* also have a general deterrence effect because some people choose not to drive after drinking to avoid getting caught in checkpoints. Typically this general deterrence effect dominates.

Measures such as *Zero Alcohol Tolerance for Drivers Under 21* and *.08% Driver Blood Alcohol Limits* may have additional benefits such as reducing consumption and associated harms including crime, high-risk sex, and suicide acts. However, only their impact on impaired driving has been evaluated.

Some interventions work well in combination. As a package, automatic *Administrative License Revocation* invoked when caught driving at a blood alcohol level above a 0.08% or even a 0.10% limit, *Zero Alcohol Tolerance for Drivers Under 21*, a *Midnight Driving Curfew Combined with Provisional Licensing* during the first year of driving, and intensive *Sobriety Checkpoints* have worked well in concert to reduce impaired driving deaths among young drivers.

Interventions that can prevent re-offending include *Alcohol-Testing Interlocks* that prevent automobile use by impaired drivers, *DWI Offender Auto Impoundment*, and *DWI Offender Electronic House Arrest*. Any of these three interventions probably should be coupled with intensive case managed treatment. *Auto Impoundment* and *DWI Offender Electronic House Arrest* are also still at demonstration stages. Importantly, their impact on domestic violence has not been evaluated.

C. IMPAIRED PEDESTRIAN PREVENTION MEASURE

One intervention, *Streetlights at Bars*, was designed to protect intoxicated pedestrians. Streetlights were installed on a bar-lined street to increase visibility and reduce the likelihood of drivers hitting impaired pedestrians. It merits replication where similar conditions exist.

4. OPEN-FLAME/BURNS

A. COST ANALYSIS OF PREVENTING OPEN-FLAME BURNS

In the year 2002, fire was the seventh leading cause of unintentional injury deaths in the United States. In 2000, 3,922 people were killed and 624,204 were injured in fires or by burns. An open flame is the leading cause of burn injury for adults, while scalding is the leading cause of burn injury for children. Three inexpensive prevention devices are reviewed here.

Benefit-Cost Ratios of Open-Flame Burn Prevention Programs (2004 dollars)

For information on the research methodology, see Methodology section of this Fact Sheet Series.

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
44	Less Porous Cigarette Paper	\$.0001/pack	\$0.07	660	<\$0
45	Child Resistant Cigarette Lighter	\$.04/lighter	\$3.17	79	<\$0
46	Smoke Alarm Purchase	\$33/home	\$940	29	<\$0
47	Smoke Alarm Law	\$36/new user	\$940	26	<\$0

Note: If the cost/QALY is <\$0, the intervention is effective and cost saving. If the cost/QALY is infinite, the intervention is not effective (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes),

Updated 9/1/05

B. RESULTS

FIRE PREVENTION MEASURES

Smoke Alarm Laws and voluntary *Smoke Alarm Purchases* are a proven way to reduce death, injury, and property damage resulting from fires, providing \$940 in benefits per \$33 smoke alarm. *Less Porous Cigarette Paper* will self-extinguish if left to smolder, thus reducing the chance of cigarette fires. *Less Porous Cigarette Paper* has a very high return on investment. Although it may only provide benefits of 7 cents per cigarette, the cost of the paper is very low and the number of potential cigarette burns is high. *Child Resistant Cigarette Lighters* reduce unintentional fires and injuries by making it more difficult for young children to operate the lighters. All of these interventions are cost-saving, meaning the medical, property damage, and other resource cost savings exceed the intervention costs.

WHAT IS “LESS POROUS” CIGARETTE PAPER?

Various methods for slowing the burn rate of a cigarette by making the paper less porous are currently in use. Some new paper has rings of ultra-thin paper that are applied on top of traditional cigarette paper during the paper-making process. These rings act as “speed bumps” to slow down the rate at which the cigarette burns as the lit end crosses over them. Some brands use a “double wrap” around the tobacco column. This has the effect of making the cigarette paper less porous, thereby decreasing the flow of oxygen to support combustion.



CHILD RESISTANT SAFETY LIGHTERS

In 1994, the U.S. Consumer Product Safety Commission (CPSC) set a Safety Standard for Cigarette Lighters that required outfitting disposable and novelty cigarette lighters with a child-resistant mechanism making the lighter difficult for children under the age of 5 to operate. This has resulted in an estimated savings of \$79 for every dollar spent.

5. VIOLENCE

A. COST ANALYSIS OF VIOLENCE PREVENTION PROGRAMS

Interpersonal violence accounts for approximately one-eighth of medical care spending on injury in the United States. Nationally, homicide is the fifth leading cause of death for people from 1 to 45 years of age. In 2001 dollars, the measurable total costs to society for rape are estimated at \$208 billion; robbery \$10 billion; aggravated assault \$100 billion; and murder at \$69 billion. The resource costs include medical costs, mental health costs, property damage, police costs, victim services, and adjudication and sanctioning costs (e.g., incarceration and probation). Added to these costs are the value of lost work and quality of life.⁴

B. RESULTS

NONOFFENDER PROGRAMS

Two of the nonoffender programs, the *Perry Pre-School and Home Visits Program* and the *Rochester Nurse Home Visitation Program*, were cost-saving, meaning that the medical, property damage, and other resource costs saved by these programs exceeded the costs to implement the program. Intensive home visitation programs can reduce infant/toddler abuse and other problems as the targeted low-income toddlers reach adolescence and adulthood. However, the return on these costly investments takes decades and is not always obtained. Other programs such as *Parent Training on Child Behavior Monitoring* and *Big Brothers/Big Sisters Mentoring* do not produce as many benefits, but may be appropriate when resources are limited.

PERRY PRESCHOOL AND HOME VISITS PROGRAM

The *Perry Preschool and Home Visits Program* provides early education to children ages 3 and 4 from families with low socioeconomic status. The preschool lasts 2 years and is designed to offer high-quality early childhood education and promote young children's intellectual, social, and physical development. In addition, this intervention provides weekly home visits by teachers and referrals for social services, when needed. For more information, see:

<http://www.highscope.org/Research/PerryProject/perrymain.htm>

⁴ Cohen, A., Miller, T., and Rossman, S. (1994). The costs and consequences of violent behavior in the United States. In A. Reiss and J. Roth (Eds.) *Understanding and Preventing Violence Vol. 4*. National Academy Press: Washington DC.

Benefit-Cost Ratios of Violence Prevention Programs (2004 dollars)

For information on the research methodology, see Methodology section of this Fact Sheet Series.

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Nonoffender Programs					
48	Perry Preschool Program (includes home visitation)	\$16,100/child	\$87,000	5.4	<\$0
49	Rochester Nurse Home Visitation Program	\$8,600/child	\$46,000	5.3	<\$0
50	Parent Training (child behavior monitoring)	\$3,700/child	\$16,000	4.3	\$25,000
51	Big Brothers/Big Sisters (mentoring of adolescents)	\$4,100/child	\$7,500	1.8	\$28,000
52	Syracuse Family Development Research Program (includes home visitation)	\$52,500/child	\$52,600	1	\$153,000
53	Financial graduation incentives & intensive counseling for disadvantaged youth	\$21,300/child	\$10,500	0.5	\$322,000
Youth Offender Programs					
54	Multidimensional Treatment Foster Care	\$2,200/client	\$160,000	73	<\$0
55	Multi-Systemic Therapy	\$5,200/client	\$224,000	43	<\$0
56	Functional Family Therapy	\$2,400/client	\$83,000	35	<\$0
57	Delinquency Supervision	\$12,400/client	\$25,400	2.1	\$65,000
Adult Offender Programs					
58	Moral Reconciliation Therapy	\$330/client	\$11,000	34	<\$0
59	Job Counseling/Search for Inmates Leaving Prison	\$620/client	\$7,300	12	<\$0
60	Reasoning & Rehabilitation	\$340/client	\$3,500	10.4	<\$0
61	In-Prison Vocational Education	\$2,200/client	\$20,600	9.5	<\$0
62	In-Prison Adult Basic Education	\$2,200/client	\$15,000	7.1	<\$0
63	Drug Courts	\$2,300/client	\$10,400	4.5	<\$0
64	Financial Assistance at Release	\$3,100/client	\$9,900	3.2	<\$0
65	In-Prison Substance Abuse Therapy	\$6,400/client	\$20,000	3.2	<\$0
66	Subsidized Jobs, Age >+27	\$11,600/client	\$32,000	2.8	<\$0
67	Optimized Sentencing	\$14,700/crime	\$32,000	2.2	\$55,000
68	3 Strikes & You're Out	\$19,800/crime	\$32,000	1.6	\$76,000
69	In-Prison Life Skills Programs	\$930/client	\$0	0	Infinite
70	Post-release Substance Abuse Treatment	\$2,500/client	\$0	0	Infinite
71	Subsidized Jobs, Age < 27	\$11,600/client	\$0	0	Infinite
72	Work-Release Programs	more than \$0/client	\$0	0	Infinite
Crime Prevention, Narrowly Targeted					
73	Aggression Replacement Training (Youth Offender)	\$470/client	\$46,000	100	<\$0
74	Lansing Adolescent Diversion	\$1,700/client	\$75,000	43	<\$0
75	Intensive Probation Supervision, Youth	\$3,900/client	\$7,800	5	<\$0
76	Cognitive-Behavioral Sex Offender Treatment	\$7,400/client	\$17,000	2.3	\$27,000
77	Intensive Probation Supervision, Adult	\$3,500/client	\$5,800	1.5	\$47,000
78	Monitored Burglar and Fire Alarms	\$810/home/year	\$860	1.1	\$107,000
79	Juvenile Boot Camps	-\$2,300/client	(\$27,000)	0.08	Infinite
80	Scared Straight Type Programs (Young Offenders)	>\$0	\$0	0	Infinite

Note: If the cost/QALY is <\$0, the intervention is effective and cost saving. If the cost/QALY is infinite, the intervention is not effective (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes),

Updated 9/1/05

YOUTH OFFENDER PROGRAMS

The four youth offender programs focus on intensively treating troubled youth ages 12–17 and three of them are cost-saving. These interventions address the causes of delinquency and seek to improve family and school/community functioning. *Multi-Systemic Therapy* costs more per youth than the other three cost-effective interventions but also has a greater impact on problem behaviors. *Multi-Systemic Therapy* is very effective if resources are available, but *Functional Family Therapy* also is a credible choice. *Treatment Foster Care* produces considerable benefits but may be limited by the number of trained, dedicated foster parents; therefore this approach is best offered as a complement to one of the other two programs and primarily for extreme, abusive, or neglectful situations where the child should be removed from the home.

ADULT OFFENDER PROGRAMS

Nine of the fifteen adult offender programs were cost-saving. Measures that are strong candidates for adoption are *Drug Courts* that case-manage substance abuse treatment, *In-Prison Vocational* and *Adult Basic Education*, *Job Search Assistance at Release* to help offenders transition back into society, and cognitive-behavioral *Moral Reconation Therapy* to raise moral development and treat moral reasoning disorders of treatment-resistant populations. *Subsidized Jobs* produced benefits only for individuals older than 27 years. These six adult offender programs address different aspects of violent crime and should yield large returns when used in concert with each other.

NARROWLY TARGETED CRIME PREVENTION MEASURES

Eight measures are intended exclusively to reduce crime. Three of these measures are cost-saving, *Youth Offender Aggression Replacement Training*, *Diversion* of low-risk first offenders from juvenile court to a service-oriented system, and *Intensive Probation Supervision of Youth*. However, *Intensive Probation Supervision* for young offenders yields net **cost-savings** primarily because it is less expensive than incarceration, not because it improves outcomes. *Young Offender Boot Camp* was less expensive per client than incarceration, but this program produced negative benefits: those who were exposed to it significantly increased their criminal behavior compared to a control group of offenders.

6. SUBSTANCE ABUSE

A. COST ANALYSIS OF SUBSTANCE ABUSE INTERVENTION PROGRAMS

Alcohol abuse in the U.S. costs an estimated \$501 billion and drug abuse cost \$181 billion in 2002. Of the alcohol costs, 10% is medical care cost, 6% is property damage and other resource costs, 15% is **work loss**, and the remaining 69% is the value of pain, suffering, and lost quality of life.

Most harm caused by substance abuse is crime or injury. Crime accounted for 19% of alcohol abuse costs and 20% of drug abuse costs. Impaired driving accounted for another 19% of alcohol costs; other injuries—notably pedal-cyclist injuries, falls of people under age 65, burns, drownings, and suicides—accounted for 26%.

STRENGTHENING FAMILIES PROGRAM

The *Strengthening Families Program (SFP)* is a 7-week intervention aimed to reduce substance use among 10-14 year-olds and improve the parent-child relationship by teaching various communication, problem-solving, and perspective-taking skills to parents and adolescents. For more information see the SFP website at <http://www.extension.iastate.edu/sfp/>

B. RESULTS

These thirty-four interventions target reducing consumption or over-the-limit consumption of alcohol, drug use, underage drinking, and youth tobacco use.

The first set of ten interventions reduces substance abuse in various ways, including raising the price by increasing taxes (*20% Alcohol Tax* and *30% Alcohol Tax*, inducing servers to discontinue service for the intoxicated (*Enforce Serving Intoxicated Patron Law*), combining peer pressure with random testing for illicit drugs or alcohol in a workplace (*Workplace Peer Support and Drug Testing*, *Workplace Peer Support and Alcohol Testing*), and medical interventions (*Brief Medical Alcohol Intervention*). Six of these ten interventions are cost-saving (cost/QALY < \$0), meaning the cost of implementing the programs is less than the **medical** and **other resource** cost savings they yield. Among the interventions listed, several warrant widespread implementation: the *20% Alcohol Tax*, *Substance Abuse Treatment*, and *Brief Medical Alcohol Intervention* (physician lecture to heavy drinkers). In workplaces coupling a peer support and workplace culture change program, management support for substance abuser rehabilitation, and drug and alcohol testing is quite promising (*Workplace Peer Support and Drug Testing*, *Workplace Peer Support and Alcohol Testing*) and merits broader evaluation. *Enforcing Laws Against Serving Intoxicated Patrons* seems very promising but needs wider evaluation before moving to national implementation.

Benefit-Cost Ratios of Substance Use/Abuse Interventions (2004 dollars)

For information on the research methodology, see Methodology section of this Fact Sheet Series.

	Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Substance Use/Abuse Interventions				
81	Enforcing Laws Against Serving Intoxicated Patrons \$.40/driver	\$28	69	<\$0
82	Workplace Peer Support and Alcohol Testing \$11/employee	\$680	62	<\$0
83	Workplace Peer Support and Drug Testing \$67/employee	\$1,600	24	<\$0
84	Substance Abuse Treatment \$11,100/abuser	\$651,000	59	<\$0
85	Brief Medical Alcohol Intervention \$87/lecture	\$3,200	37	<\$0
86	20% Alcohol Tax \$9/drinker/year	\$91	10	<\$0
87	30% Alcohol Tax \$19/drinker/year	\$120	6.2	\$7,100
88	Youth Anti-tobacco Media Campaign \$380/student	\$4,000	10	\$12,000
89	Mandatory Server Training \$46/driver	\$174	3.8	\$17,000
90	21 Minimum Legal Drinking Age \$180/youth 18–20	\$640	3.6	\$20,000
Youth Development Programs				
91	Good Behavior Game \$63/student	\$2,100	33	\$2,200
92	Strengthening Families (Iowa Strengthening Families Program) \$910/family	\$10,000	11	<\$0
93	Social Competence Program \$360/student	\$2,500	6.9	<\$0
94	Child Development Project \$240/student	\$1,600	6.5	<\$0
95	Seattle Social Development Program-Parent-Teacher Training/SOAR (Skills Opportunity and Recognition) \$3,500/child	\$21,000	5.8	<\$0
96	Guiding Good Choices (formerly Preparing for the Drug Free Years) \$730/family	\$2,500	3.4	\$16,000
97	Across Ages \$1,800/student	\$2,400	1.3	\$107,000
98	CASASTART (National Center on Addiction and Substance Abuse, Striving Together to Achieve Rewarding Tomorrow) \$5,800/student	\$5,300	0.9	\$167,000
Youth Substance Abuse Prevention Programs				
99	All Stars \$145/student	\$4,700	32	<\$0
100	Family Matters \$160/family	\$4,600	29	<\$0
101	Keepin' It Real \$130/student	\$3,500	27	<\$0
102	Life Skills Training \$230/student	\$4,500	20	\$890
103	Project Northland \$410/student	\$6,800	16	<\$0
104	Other Social Influence/Skills Building Substance Prevention Programs \$160/student	\$1,800	12	\$4,800
105	Adolescent Transitions \$820/student	\$8,800	11	\$5,000
106	Project STAR (Students Taught Awareness and Resistance, Midwest Prevention Program) \$410/student	\$4,300	10	\$2,000
107	Other Risk and Protective Factors \$820/student	\$6,900	8.5	\$9,300
108	Project ALERT (Adolescent Learning Experience in Resistance Training) \$120/student	\$800	6.9	<\$0
109	Project Toward No Drugs (TND) \$190/student	\$810	4.3	\$8,400
110	STARS (Start Taking Alcohol Risks Seriously) for Families \$130/family	\$480	3.8	<\$0
111	D.A.R.E (Drug Abuse Resistance Education) \$100/child	\$0	0	Infinite

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Youth Tobacco Programs					
112	Minnesota Smoking Prevention Program	\$100/student	\$5,200	53	\$580
113	Know Your Body	\$150/student	\$5,500	37	\$1,700
114	Project Toward No Tobacco	\$180/student	\$2,800	15	\$7,400

Note: If the cost/QALY is <\$0, the intervention is effective and cost saving. If the cost/QALY is infinite, the intervention is not effective (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes),

Updated 9/1/05

The remaining twenty-four programs focus on general youth development, strengthening families, substance abuse prevention in youth specifically, and youth tobacco use. Ten of these programs are cost-saving (cost/QALY < \$0). One, the original *Drug Abuse Resistance Education* (DARE) program is ineffective. (A new DARE program is now in use, but the cost effectiveness of this program has not been evaluated.) Some of these programs are family centered interventions with a school component such as the *Strengthening Families Program*, *Seattle Social Development Program* (Parent –Teacher Training), *Family Matters*, and *STARS for Families*. Other programs are school-based life skills training programs such as *The Child Development Project*, *All Stars*, *Keepin’ It Real*, and *Life Skills Training* which focus on students. A broader family program like the *Strengthening Families Program* can be more costly than school-based life skills training but may also offer larger returns. School based programs also offer solid returns. With a limited budget, they will let a school system reach the most children, but the same money may yield greater benefits if spent targeting the broader family-centered programs.

7. HEALTH SERVICES AND MISCELLANEOUS

A. COST ANALYSIS OF HEALTH SERVICES AND MISCELLANEOUS INJURY PREVENTION PROGRAMS

The total cost of hospitalized and fatal injuries in the US in 2000 was \$1.1 trillion including \$86.3 billion in medical costs, \$242.3 billion in work loss, and \$785.3 billion in quality of life costs. Poisoning hospital injuries account for \$2.3 billion of the medical costs and \$1.5 billion of the work loss cost. Poisoning fatalities account for \$397 million in medical costs, \$48.2 billion in work loss costs, and \$102 billion in **quality of life costs**. Drowning injuries cost over \$16 billion.

Health services interventions to prevent injury and improve injury outcomes include poison control centers, triaged regional trauma systems, and pediatrician injury prevention counseling. Miscellaneous injury prevention programs in Native American settings include a youth suicide prevention program, winter coats that float to reduce drowning, and a livestock control program to reduce motor vehicle accidents. Other injury prevention programs include the Harlem Hospital Safe Communities child safety program and a fall prevention program for the elderly.

SAFE COMMUNITIES

The *Harlem Hospital Safe Communities* program is designed to reduce injury to community children by making changes in community social and physical environment, raising local awareness of problems, and improving individual safety knowledge through education and training. This program is involved in a wide range of community activities including traffic safety education, renovating area public parks, community gardening projects, rebuilding playgrounds for elementary schools, and establishing dance and art programs at the hospital. For more information see: http://www.nhtsa.dot.gov/people/outreach/safedige/Spring96/SafeComm/New_York.html

Benefit-Cost Ratios of Health Services Interventions and Miscellaneous Injury Prevention Programs (2004 dollars)

For information on the research methodology, see Methodology section of this Fact Sheet Series.

	Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Health Services Interventions				
115	Pediatrician Injury Prevention Counseling for Children Ages 0-4 \$10/child	\$86	8.6	\$2,600
116	Poison Control Center \$43/call	\$290	6.8	<\$0
117	Triaged Regional Trauma System Services \$1,720/admit	\$4,600	2.7	<\$0
Miscellaneous Injury Prevention Programs				
118	Winter Coats that Float Drowning Prevention, Native Alaska \$0.10/person	\$220	2,200	<\$0
119	Youth Suicide Prevention, Native American \$175/youth	\$6,700	38	\$880
120	Livestock Control, Native American \$8/driver	\$14	1.8	<\$0
121	Fall Prevention: High Risk Elderly \$1,250/person	\$10,800	8.6	<\$0
122	Fall Prevention: Low Risk Elderly \$1,100/person	\$700	0.6	\$239,000
123	Harlem Hospital Safe Communities \$16/child	\$38	2.4	<\$0

Note: If the cost/QALY is <\$0, the intervention is effective and cost saving. If the cost/QALY is infinite, the intervention is not effective (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes),
Updated 9/1/05

B. HEALTH SERVICES INTERVENTIONS

The three health services interventions reduce the cost of injuries. Two of these programs were cost-saving (cost/QALY < \$0) which means that the medical costs and other tangible resources saved by these programs exceeded the costs to implement the program.

Health services improve outcomes of trauma cases including injuries associated with alcohol and violence. Establishing regional hospital specialties in trauma care, then triaging serious injuries to these hospitals (*Triaged Regional Trauma System Services*), raises the costs of initial treatment but ultimately improves outcomes and reduces the medical care costs required to achieve maximum medical recovery. A regional or national phone-in poison control center (*Poison Control Center*) consults 24-hours a day on intentional and unintentional poisonings including drug overdose, food poisoning, suicide, and children accidentally taking medications. The centers greatly reduce poisoning treatment costs and probably improve outcomes by advising on whether treatment is needed, supervising home treatment of minor poisonings without more costly medical intervention, more quickly linking serious cases to appropriate treatment, and providing toxicological consultation to hospital staff. Both measures will reduce the harm from injury and warrant implementation.

Pediatrician Injury Prevention Counseling for Children Ages 0-4 is part of The Injury Prevention Program (TIPP). TIPP is a national program that provides pediatricians with age-appropriate topics for counseling parents about ways to reduce child injuries (e.g., car seats). While this program did reduce injuries, the costs of prevention counseling by pediatricians exceeded the medical and other resource cost savings from the prevented injuries.

C. MISCELLANEOUS INJURY PREVENTION PROGRAMS

Three of the miscellaneous interventions have only been tried in Native American settings and need further evaluation prior to widespread implementation. One is a *Youth Suicide Prevention* program that combines counseling, peer support and prevention of alcohol abuse, child abuse, and domestic violence. The second, *Winter Coats that Float Drowning Prevention*, located winter coats that float and convinced local residents who use small boats to buy them, thus aiding boaters who fall overboard. The third is a *Livestock Control* program to impound free-roaming livestock to reduce motor-vehicle crashes with livestock on reservation roads. Two of these programs were cost-saving (cost/QALY < \$0).

The *Fall Prevention* program was a comprehensive community-based fall prevention demonstration targeting the elderly. Benefits were analyzed separately for elderly participants who were at high risk for fall injuries and participants who were at low risk. There was a net cost-saving for high-risk elderly, but its costs exceeded its benefits for low risk elderly.

The *Harlem Hospital Safe Communities* program is a comprehensive community based child safety program. It was cost-saving.

GLOSSARY OF DEFINITIONS

Benefit-cost ratios express the total benefits in saved medical and other costs compared to the costs of the program. A benefit cost ratio is calculated for each intervention by dividing the total savings, including the value of preserving quality of life and preventing pain and suffering, by the unit cost of the intervention. The benefit-cost ratio describes the return on investment in the intervention.

Cost-effective means the benefit-cost ratio is greater than 1.0 and the cost of implementing the intervention is less than the total benefits gained by preventing injuries. The total benefits include medical costs, other resource costs, work loss, and quality of life costs. A cost-effective intervention offers a positive return on investment.

Cost-outcome analysis is the calculation of the economic benefits and costs associated with an intervention so that the intervention can be compared to other interventions.

Cost per quality-adjusted life year (cost/QALY) is the cost of the intervention minus the medical and other tangible resource savings divided by the number of QALYs saved. It does not include quality of life savings.

Cost-saving means the expected resource cost savings (not including quality of life savings) exceed the cost of the intervention. The **cost/QALY** <0.

Discount rates are used because money earns interest. If you have to pay \$10 five years from now, you could put less money in the bank today and have \$10 when the bill comes due. The discount rate essentially is the inflation-free interest rate. With the discount rate, we calculate the present value of future costs. A 2.5% to 3% discount rate is recommended for health policy.

Medical costs include averted emergency medical care, acute care (in hospital, clinic, and office settings), rehabilitation, follow-up care (including physician, allied health, and mental health care), long-term medical and institutional care, prescriptions, ancillary expenses, coroner services, and the costs of health insurance claims processing.

Other resource costs include direct nonmedical costs for police, fire services, criminal adjudication and sanctioning, property damage or loss, and travel delay.

QALY stands for quality adjusted life years. QALYs are a health outcome measure that assigns a value of 1 to a year of perfect health, a 0 to death, and some value in between to impaired health (e.g., from injury). Preventing injuries saves fractions of QALYs and preventing a death saves a lifetime of QALYs. QALYs for different injuries were calculated based on physician ratings of loss of function for victims of injury, probability of permanent work-related disability, and values from surveys of the general population for different functional losses. QALYs are routinely used to evaluate the outcomes of clinical trials and preventive health interventions.

Quality of life costs place a dollar value on the pain, suffering, and lost quality of life that children and their families experience due to death and injury.

Resource costs include medical and mental health, property damage, police and fire services, victim assistance, insurance claims processing, litigation, incarceration and other sanctioning, and other out of pocket costs resulting from injury.

Total benefits reported in this Fact Sheet Series are the amount these interventions saved by preventing injuries. These benefits to society include medical costs, other resource costs, work loss, and quality of life costs.

Unit cost is the cost of the intervention for a single individual.

Work Loss (productivity) includes wages, fringe benefits and household work for adults. It includes short-term work loss and the present value of a lifetime's worth of wage and household work that a child or adult will be unable if he or she is killed or permanently disabled.

**Benefit-Cost Ratios of Motor-Vehicle Injury and Pedestrian Safety Intervention Programs
(2004 dollars)**

	Cost per Unit	Total Benefits	Benefit Cost Ratio	Cost/QALY	
Driver and Pedestrian Safety Interventions					
1	Child Seat Misuse Reduction	\$6/seat	\$500	85	<\$0
2	Booster Seat Law, Ages 4-7	\$34/new user	\$2,200	65	<\$0
3	Federal Traffic Safety Programs	\$3/driver	\$200	60	<\$0
4	Child Bicycle Helmet Law	\$11/new user	\$570	52	<\$0
5	Child Safety Seat Distribution, Ages 0-4	\$46/seat	\$1,900	42	<\$0
6	Child Safety Seat Law, Ages 0-4	\$50/new user	\$1,900	39	<\$0
7	Safety Belt Law	\$300/new user	\$5,400	18	<\$0
8	Upgrade Secondary Belt Law to Primary	\$300/new user	\$5,400	18	<\$0
9	Enhanced Belt Law Enforcement	\$280/new user	\$5,400	19	<\$0
10	Child Pedestrian Safety Program	\$1,660/school	\$14,900	9	\$1,500
11	Midnight Driving Curfew Combined with Provisional Licensing	\$74/driver	\$600	8.1	<\$0
12	10 PM Driving Curfew	\$140/driver	\$360	2.5	\$34,000
13	55 Mile Per Hour Speed Limit	\$7.10/hour of travel added	\$29	4.2	\$17,000
14	Motorcycle Helmet Law	\$1,400/new user	\$4,300	3.1	\$31,000
Voluntary Safety Equipment Purchases					
15	Voluntarily Use a Booster Seat, Ages 4-7	\$31/seat	\$2,200	71	<\$0
16	Voluntarily Wear a Child Bicycle Helmet	\$10/helmet	\$570	57	<\$0
17	Voluntarily Wear a Motorcycle Helmet	\$240/helmet	\$4,300	18	<\$0
18	Voluntarily Wear an All Terrain Vehicle Helmet	\$130/helmet	\$510	3.9	\$36,000
Vehicle Design Safety Research and Regulation					
19	Front Seat Safety Belts	\$67/vehicle	\$3,600	54	<\$0
20	Federal Vehicle Safety Program	\$58/vehicle	\$320	5.5	\$27,000
21	Driver Airbag	\$380/bag	\$1,700	4.4	\$8,800
22	Automatic Daytime Vehicle Lights	\$71/vehicle	\$270	3.8	\$25,000
23	Side Impact Program	\$325/vehicle	\$980	3	\$53,000
24	Passenger Airbag	\$200/bag	\$400	2	\$73,000
25	Add Rear Seat Shoulder Belts to Lap Belts	\$25/vehicle	\$10	0.4	\$433,000
Road Design and Upgrading					
26	Post Mounted Reflectors	\$328/post	\$37,200	113	<\$0
27	Painting Lines on Roads	\$235/mile	\$15,900	68	<\$0
28	Bridge-End Guardrail	\$9,900/bridge	\$373,000	38	<\$0
29	Federal Road Safety Program	\$6/driver	\$200	33	<\$0
30	Flashing Beacons	\$18,600/post	\$299,100	16	<\$0
31	Median Barrier (1-12 foot median)	\$208,000/mile	\$530,000	2.5	\$50,000
32	Flatten Crest Vertical Curves	\$283,200/curve	\$206,500	0.7	\$206,000
33	Median Barrier (>13 foot median)	\$208,000/mile	\$117,000	0.6	\$278,000

Benefit-Cost Ratios of Impaired Driving Prevention Programs (2004 dollars)

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Impaired Driving Prevention Programs					
34	Zero Alcohol Tolerance for Drivers Under 21	\$34/driver	\$850	25	<\$0
35	Administrative License Revocation with Per Se Law	\$2,900/ALR	\$63,000	21	<\$0
36	Administrative License Revocation	\$3,100/ALR	\$53,000	17	<\$0
37	.08% Driver Blood Alcohol Limit	\$3.15/driver	\$48	16	<\$0
38	Sobriety Checkpoints	\$9,600/checkpoint	\$73,000	7.5	<\$0
Repeat Offender Programs					
39	Alcohol-Testing Ignition Interlock	\$1,000/vehicle	\$6,900	6.7	<\$0
40	Driving While Under the Influence Offender Auto Impoundment	\$890/vehicle	\$4,900	5.5	<\$0
41	Driving While Under the Influence Intensive Probation and Treatment	\$1,310/arrestee	\$5,300	4.1	<\$0
42	Driving While Under the Influence Offender Electronic House Arrest	\$1,560/arrestee	\$5,300	3.4	<\$0
Impaired Pedestrian Harm Reduction					
43	Streetlights at Bars, Native American	\$400/light	\$3,400	8.5	<\$0

Benefit-Cost Ratios of Open-Flame Burn Prevention Programs (2004 dollars)

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
44	Less Porous Cigarette Paper	\$.0001/pack	\$0.07	660	<\$0
45	Child Resistant Cigarette Lighter	\$.04/lighter	\$3.17	79	<\$0
46	Smoke Alarm Purchase	\$33/home	\$940	29	<\$0
47	Smoke Alarm Law	\$36/new user	\$940	26	<\$0

Benefit-Cost Ratios of Violence Prevention Programs (2004 dollars)

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Nonoffender Programs					
48	Perry Preschool Program (includes home visitation)	\$16,100/child	\$87,000	5.4	<\$0
49	Rochester Nurse Home Visitation Program	\$8,600/child	\$46,000	5.3	<\$0
50	Parent Training (child behavior monitoring)	\$3,700/child	\$16,000	4.3	\$25,000
51	Big Brothers/Big Sisters (mentoring of adolescents)	\$4,100/child	\$7,500	1.8	\$28,000
52	Syracuse Family Development Research Program (includes home visitation)	\$52,500/child	\$52,600	1	\$153,000
53	Financial graduation incentives & intensive counseling for disadvantaged youth	\$21,300/child	\$10,500	0.5	\$322,000
Youth Offender Programs					
54	Multidimensional Treatment Foster Care	\$2,200/client	\$160,000	73	<\$0
55	Multi-Systemic Therapy	\$5,200/client	\$224,000	43	<\$0
56	Functional Family Therapy	\$2,400/client	\$83,000	35	<\$0
57	Delinquency Supervision	\$12,400/client	\$25,400	2.1	\$65,000

Injury Prevention: What Works?

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Adult Offender Programs					
58	Moral Reconciliation Therapy	\$330/client	\$11,000	34	<\$0
59	Job Counseling/Search for Inmates Leaving Prison	\$620/client	\$7,300	12	<\$0
60	Reasoning & Rehabilitation	\$340/client	\$3,500	10.4	<\$0
61	In-Prison Vocational Education	\$2,200/client	\$20,600	9.5	<\$0
62	In-Prison Adult Basic Education	\$2,200/client	\$15,000	7.1	<\$0
63	Drug Courts	\$2,300/client	\$10,400	4.5	<\$0
64	Financial Assistance at Release	\$3,100/client	\$9,900	3.2	<\$0
65	In-Prison Substance Abuse Therapy	\$6,400/client	\$20,000	3.2	<\$0
66	Subsidized Jobs, Age >+27	\$11,600/client	\$32,000	2.8	<\$0
67	Optimised Sentencing	\$14,700/crime	\$32,000	2.2	\$55,000
68	3 Strikes & You're Out	\$19,800/crime	\$32,000	1.6	\$76,000
69	In-Prison Life Skills Programs	\$930/client	\$0	0	Infinite
70	Post-release Substance Abuse Treatment	\$2,500/client	\$0	0	Infinite
71	Subsidized Jobs, Age < 27	\$11,600/client	\$0	0	Infinite
72	Work-Release Programs	more than \$0/client	\$0	0	Infinite
Crime Prevention, Narrowly Targeted					
73	Aggression Replacement Training (Youth Offender)	\$470/client	\$46,000	100	<\$0
74	Lansing Adolescent Diversion	\$1,700/client	\$75,000	43	<\$0
75	Intensive Probation Supervision, Youth	\$3,900/client	\$7,800	5	<\$0
76	Cognitive-Behavioral Sex Offender Treatment	\$7,400/client	\$17,000	2.3	\$27,000
77	Intensive Probation Supervision, Adult	\$3,500/client	\$5,800	1.5	\$47,000
78	Monitored Burglar and Fire Alarms	\$810/home/year	\$860	1.1	\$107,000
79	Juvenile Boot Camps	-\$2,300/client	(\$27,000)	0.08	Infinite
80	Scared Straight Type Programs (Young Offenders)	>\$0	\$0	0	Infinite

Benefit-Cost Ratios of Substance Use/Abuse Interventions (2004 dollars)

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
Substance Use/Abuse Interventions					
81	Enforcing Laws Against Serving Intoxicated Patrons	\$.40/driver	\$28	69	<\$0
82	Workplace Peer Support and Alcohol Testing	\$11/employee	\$680	62	<\$0
83	Workplace Peer Support and Drug Testing	\$67/employee	\$1,600	24	<\$0
84	Substance Abuse Treatment	\$11,100/abuser	\$651,000	59	<\$0
85	Brief Medical Alcohol Intervention	\$87/lecture	\$3,200	37	<\$0
86	20% Alcohol Tax	\$9/drinker/year	\$91	10	<\$0
87	30% Alcohol Tax	\$19/drinker/year	\$120	6.2	\$7,100
88	Youth Anti-tobacco Media Campaign	\$380/student	\$4,000	10	\$12,000
89	Mandatory Server Training	\$46/driver	\$174	3.8	\$17,000
90	21 Minimum Legal Drinking Age	\$180/youth 18–20	\$640	3.6	\$20,000
Youth Development Programs					
91	Good Behavior Game	\$63/student	\$2,100	33	\$2,200
92	Strengthening Families (Iowa)	\$910/family	\$10,000	11	<\$0

	Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY	
Strengthening Families Program)					
93	Social Competence Program	\$360/student	\$2,500	6.9	<\$0
94	Child Development Project	\$240/student	\$1,600	6.5	<\$0
95	Seattle Social Development Program-Parent-Teacher Training/SOAR (Skills Opportunity and Recognition)	\$3,500/child	\$21,000	5.8	<\$0
96	Guiding Good Choices (formerly Preparing for the Drug Free Years)	\$730/family	\$2,500	3.4	\$16,000
97	Across Ages	\$1,800/student	\$2,400	1.3	\$107,000
98	CASASTART (National Center on Addiction and Substance Abuse, Striving Together to Achieve Rewarding Tomorrow)	\$5,800/student	\$5,300	0.9	\$167,000
Youth Substance Abuse Prevention Programs					
99	All Stars	\$145/student	\$4,700	32	<\$0
100	Family Matters	\$160/family	\$4,600	29	<\$0
101	Keepin' It Real	\$130/student	\$3,500	27	<\$0
102	Life Skills Training	\$230/student	\$4,500	20	\$890
103	Project Northland	\$410/student	\$6,800	16	<\$0
104	Other Social Influence/Skills Building Substance Prevention Programs	\$160/student	\$1,800	12	\$4,800
105	Adolescent Transitions	\$820/student	\$8,800	11	\$5,000
106	Project STAR (Students Taught Awareness and Resistance, Midwest Prevention Program)	\$410/student	\$4,300	10	\$2,000
107	Other Risk and Protective Factors	\$820/student	\$6,900	8.5	\$9,300
108	Project ALERT (Adolescent Learning Experience in Resistance Training)	\$120/student	\$800	6.9	<\$0
109	Project Toward No Drugs (TND)	\$190/student	\$810	4.3	\$8,400
110	STARS (Start Taking Alcohol Risks Seriously) for Families	\$130/family	\$480	3.8	<\$0
111	D.A.R.E (Drug Abuse Resistance Education)	\$100/child	\$0	0	Infinite
Youth Tobacco Programs					
112	Minnesota Smoking Prevention Program	\$100/student	\$5,200	53	\$580
113	Know Your Body	\$150/student	\$5,500	37	\$1,700
114	Project Toward No Tobacco	\$180/student	\$2,800	15	\$7,400

Benefit-Cost Ratios of Health Services Interventions and Miscellaneous Injury Prevention Programs (2004 dollars)

	Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY	
Health Services Interventions					
115	Pediatrician Injury Prevention Counseling for Children Ages 0-4	\$10/child	\$86	8.6	\$2,600
116	Poison Control Center	\$43/call	\$290	6.8	<\$0
117	Triaged Regional Trauma System Services	\$1,720/admit	\$4,600	2.7	<\$0
Miscellaneous Injury Prevention Programs					
118	Winter Coats that Float Drowning Prevention, Native Alaska	\$0.10/person	\$220	2,200	<\$0
119	Youth Suicide Prevention, Native American	\$175/youth	\$6,700	38	\$880

Injury Prevention: What Works?

		Unit Cost	Total Benefits	Benefit Cost Ratio	Cost/QALY
120	Livestock Control, Native American	\$8/driver	\$14	1.8	<\$0
121	Fall Prevention: High Risk Elderly	\$1,250/person	\$10,800	8.6	<\$0
122	Fall Prevention: Low Risk Elderly	\$1,100/person	\$700	0.6	\$239,000
123	Harlem Hospital Safe Communities	\$16/child	\$38	2.4	<\$0

Note: If the cost/QALY is <\$0, the intervention is effective and cost saving. If the cost/QALY is infinite, the intervention is not effective (i.e., an infinite number of dollars can be spent on the intervention without improving health outcomes),

Fact sheets last updated November 28, 2005.