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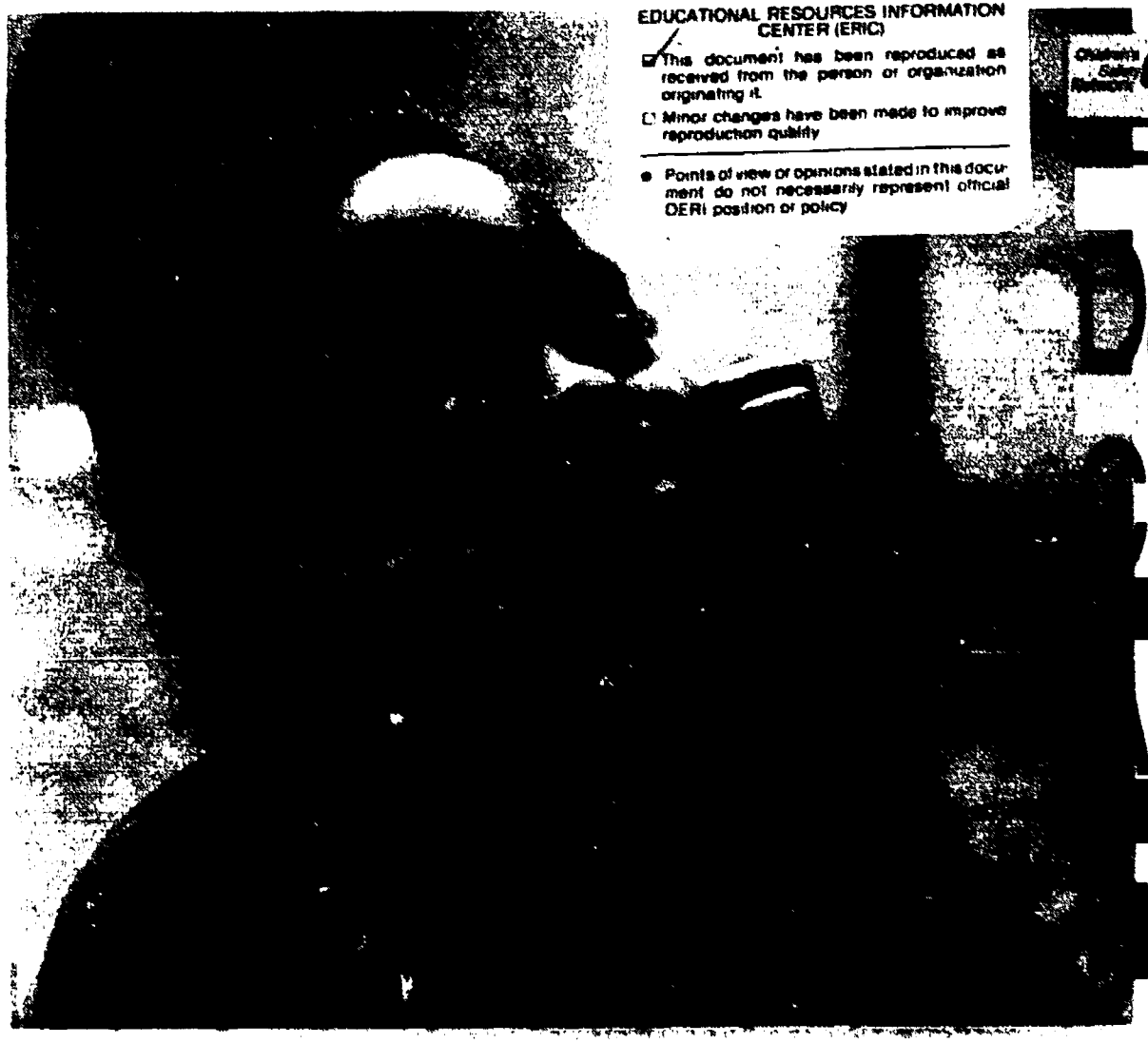
ABSTRACT

This booklet contains 54 graphs and accompanying narrative which summarize available data on child and adolescent non-natural injuries and deaths and are intended to help in the multi-disciplinary and multi-agency "Healthy People 2000" campaign to improve the nation's health and prevent needless child and adolescent injuries. Graphs illustrate data which address the following subjects: deaths from injuries versus deaths from natural causes; international injury mortality rates; international homicide rates; deaths ages 1-4, deaths ages 5-9, deaths ages 10-14, deaths ages 15-19, death rates by gender; motor vehicle deaths; alcohol and motor vehicles; pedestrians; motor vehicle injuries; bicycles; drowning and near drowning; fires and burns; unintentional firearms; unintentional poisoning; falls; occupational injuries of adolescents; farm injuries; sports injuries; toys; recreational equipment; homicide; assault; suicide; child abuse and neglect; rape; childhood injury prevention programs; and the cost of injury. Suggestions for preventing child and adolescent injury are given, including: stress planning and prioritizing; use of a comprehensive multifaceted approach; and institutionalization and acceptance of injury prevention programs. An appendix summarizes injury mortality rates by age group. (60 references) (DB)



MCHB

a Data Book of Child and Adolescent Injury

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Prepared by Children's Safety Network

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The Children's Safety Network (CSN) provides technical assistance in developing programs to reduce unintentional injuries and violence. You can contact the Children's Safety Network through:

National Center for Education in Maternal and Child Health
38th and R Streets, N.W.
Washington, DC 20057
(202) 625–8400

Education Development Center, Inc.
55 Chapel Street
Newton, MA 02160
(617) 969–7100

CSN staff contributing to *A Data Book of Child and Adolescent Injury:*

Washington site: Susan Brink, Dr.P.H., Laurie Duker, M.P.P.M., Laura Kavanagh, and Sue Lindsay.
Newton site: Alison Dana, M.P.H., Susan Gallagher, M.P.H., and Chris Miara, M.S.
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CONTENTS

How To Use This Book

The charts in this book are not under copyright. Individuals are encouraged to make copies and use them in injury prevention efforts.

The charts are designed to compare groups within the chart but not across charts. In Sections III and IV, the scales used on individual charts differ dramatically. Charts are presented in these sections so that the reader may make comparisons between age groups, sex or race, within each injury category. Citations are listed at the back of the book. Mortality rate charts do not address injuries in infants under 1 year, because available population estimates used to calculate rates reflect all live births rather than the actual number for that age category, thereby affecting the calculation of the rates.

ACKNOWLEDGMENTS

This book was developed by the Children's Safety Network (CSN), a national resource for child and adolescent injury and violence prevention supported by the Maternal and Child Health Bureau. Special appreciation goes to Sue Lindsay for her work in coordinating the gathering of information and data display.

This publication draws on the work and experience of a number of individuals and agencies, without which the data would not be available. The National Center for Health Statistics of the Centers for Disease Control provided the analysis of the 1988 vital statistics, information from the National Health Interview Survey, and the National Hospital Discharge Survey. The data on the use of safety belts and car seats were obtained through the National Highway Traffic Safety Administration (NHTSA). The Consumer Product Safety Commission, the Department of Justice and the National Institute for Occupational Safety and Health were also supportive of this effort.

The data presented here have been gathered from a multitude of sources. The interpretation of the data is the responsibility of the Children's Safety Network.

INTRODUCTION

Injury is the most significant health problem affecting the Nation's children and adolescents, however it is measured—number of deaths, dollar costs for treatment, or relative rankings with other health problems—as this report makes abundantly clear. However, injury need not maim and kill so many of our children. This is an epidemic that we can control, as both prior successes and the international comparisons illustrate. Targeted prevention strategies that have proven effective include flame retardant fabrics for children's sleepwear, child safety seats, smoke detectors, and child-resistant medicine bottles. Other promising strategies have yet to be implemented and evaluated.

Injury includes, but is not limited to, the following categories: motor vehicle crashes, burns, poisonings, drownings, pedestrian and bicycle crashes, homicides, assaults, rapes, suicides and suicide attempts, and child abuse. The National Committee for Injury Prevention and Control defines injury as "any unintentional or intentional damage to the body resulting from acute exposure to thermal, mechanical, electrical, or chemical energy or from the absence of such essentials as heat or oxygen" (National Committee for Injury Prevention and Control, 1989). Injury is thus a biophysical event.

Contributing factors and prevention strategies for violence and unintentional injury are sometimes the same. For example, alcohol and other drugs are often implicated in many types of injuries, especially those affecting adolescents. Likewise,

poverty is a strong risk factor for both violence and unintentional childhood and adolescent injuries (Baker et al., 1991). Safety improvements to firearms and limitations on access to them, reductions in tap water temperature, and supports of various kinds to multi-need families, can reduce injuries, regardless of intent.

While we have had successes in injury prevention, it is vital that we do better. Too many children are dying or becoming disabled and the costs are high. In this report, information is provided on the substantial dollar costs of childhood injury to our society, but the most significant costs are ones we cannot depict graphically, those of child and family pain. The loss of life or function experienced by a child or adolescent is a terrible burden for a family to sustain. Guilt, rage, grief, blame and despair are common family reactions to a serious injury of a child, not infrequently leading to divorce, severe depression of parents or siblings, and even suicide. Medical care costs may sometimes result in family impoverishment (Rice and MacKenzie, 1989). Thus, one of the intangible costs of child and adolescent injury is that of family suffering and even disintegration.

Healthy People 2000 (USDHHS, 1991), the government document that outlines the strategy for improving the Nation's health over the decade, emphasizes the need to prevent the thousands of needless child and adolescent injuries that occur annually. Numerous injury reduction objectives for children and adolescents are specified. Most importantly, the key target objective for both children and adolescents is to reduce the overall death rate; this will require a reduction in the injury rate. As a nation, we have made a commitment through the year 2000 objectives to more systematically address the problem of injury as it affects children, adolescents, and families.

To do so successfully will require a multi-disciplinary and multi-agency approach. Public health agencies must work together with environmental, criminal justice, traffic safety, education, social services, and other agencies, as well as with coalitions of private groups,

To reduce the incidence of injury in America, we must learn to combine legislative, technological and behavioral strategies, change norms that regard most injuries as inevitable, and actively address the causes of violence on our streets and in our homes. A problem of this magnitude requires the talents and hard work of a variety of dedicated individuals representing many fields and working together for a common goal. Only then can we meet the challenge before us.

Maternal and Child Health Bureau
October 1991

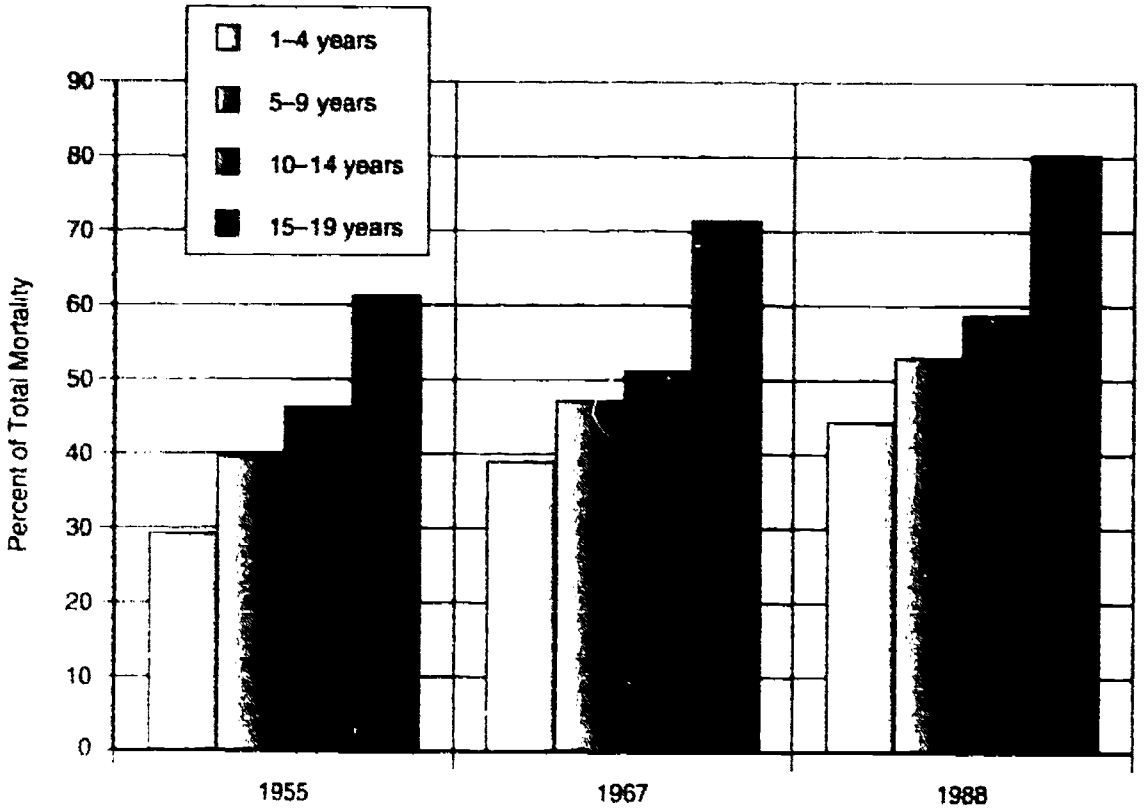


Figure 1.1

Injury as a Percentage of Total Mortality Among Children 1–19: 1955, 1967, 1988. Source: Fingerhut, NCHS, 1988.

SECTION I OVERVIEW

Childhood injury is the principal public health problem in America today, causing more deaths than all childhood diseases combined and contributing greatly to childhood disability. In 1988, injury claimed the lives of more than 22,400 children 19 and under in the United States and accounting for 80% of deaths in the 15–19 year old age group.

Historically, there has been a dramatic reduction in child mortality due to natural causes (diseases, including congenital anomalies) while the percentage of mortality due to injury has steadily increased.

For children ages 1-19, injuries far exceed cancer and congenital anomalies as the leading cause of death.

"If a disease were killing our children in the proportions that injuries are, people would be outraged and demand that this killer be stopped."

—former Surgeon General C. Everett Koop, M.D.

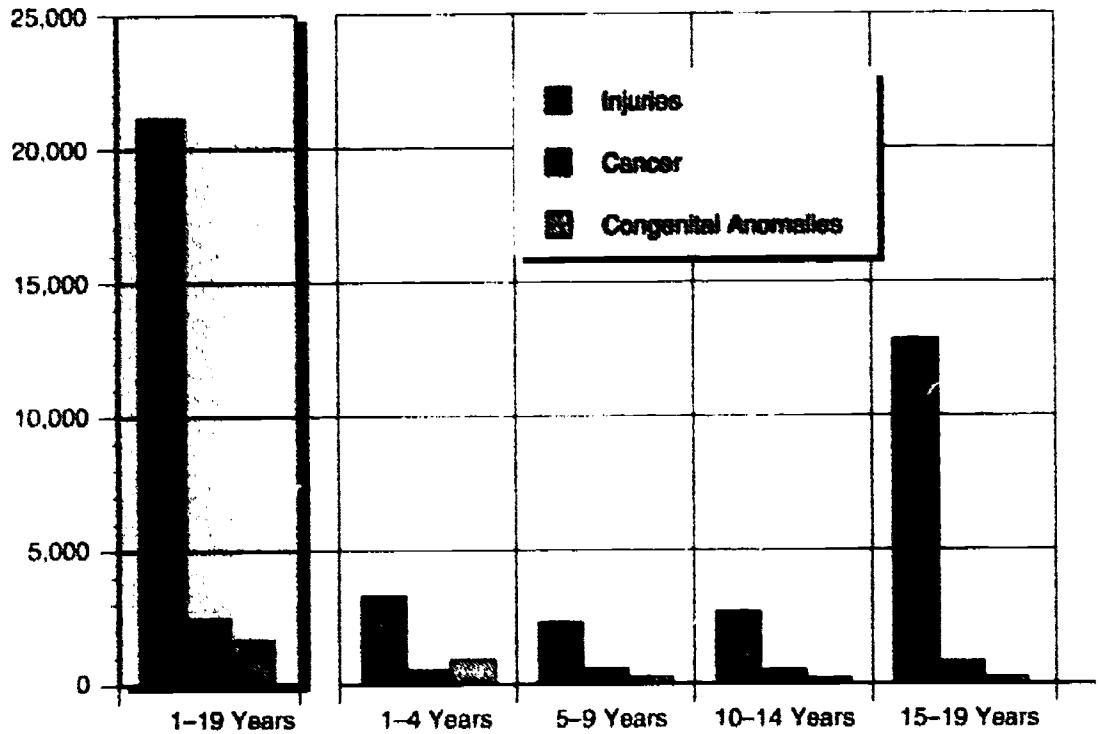


Figure 1.2

Deaths Due to Injuries vs. Deaths from Cancer and Congenital Anomalies, 1988. Source: Fingerhut, NCHS, 1988.

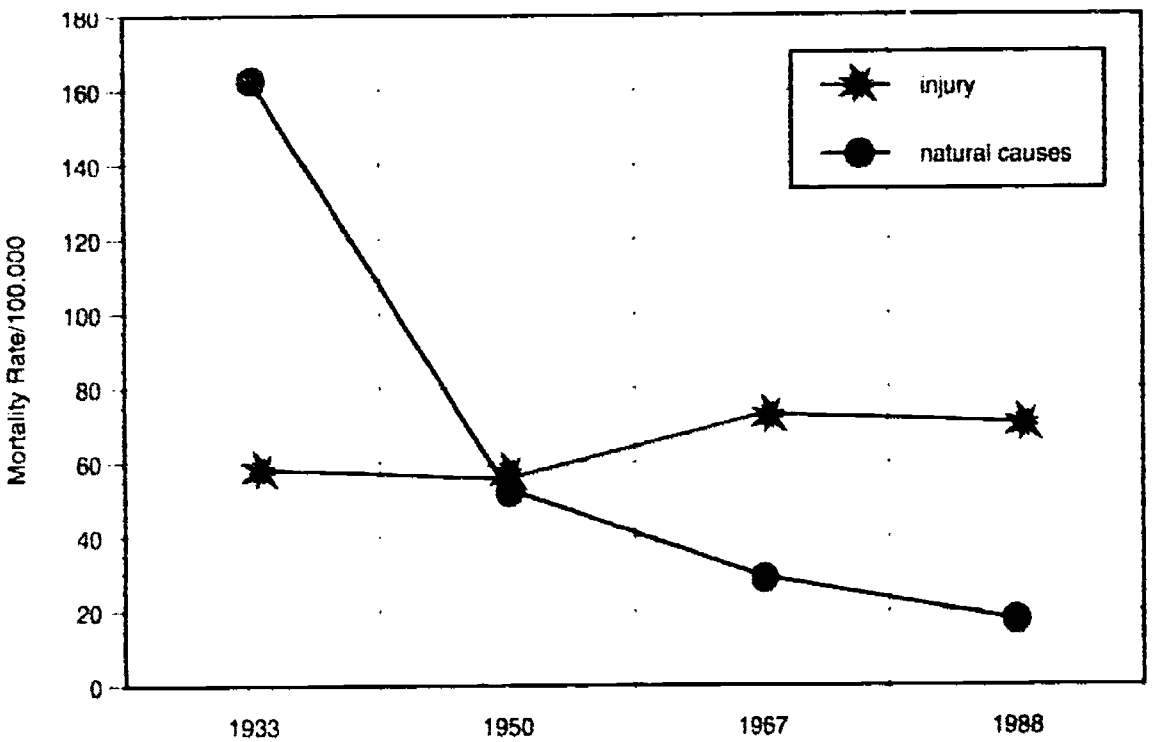


Figure 1.3
Mortality Rate/100,000 Due to Natural Causes vs. Injury: 15–19 Year Olds, 1933–1988.
Source: National Center for Health Statistics, 1989; Fingerhut, NCHS, 1988.

Adolescents are a particularly high-risk population for injury-related deaths. Figure 1.3 shows the significant decline in mortality due to natural causes for this age group while the mortality rate due to injury has increased. In 1988, a 15–19 year old was four times more likely to be killed by injury than by natural causes.

Child mortality rates in the United States are higher than those in other industrialized nations similar to our own in culture and history. "This excess in mortality is not due to a difference in death rates from all natural causes; rather, all the excess mortality among U.S. children can be attributed to injury" (Rosenberg et al., 1990). Figure 1.4 compares injury mortality rates for five countries, including unintentional injury and violence.

About 75% of the U.S. child mortality due to injury is caused by unintentional injury (motor vehicle collisions are the leading cause of unintentional childhood death). The other 25% is caused by violence, including homicide and suicide.

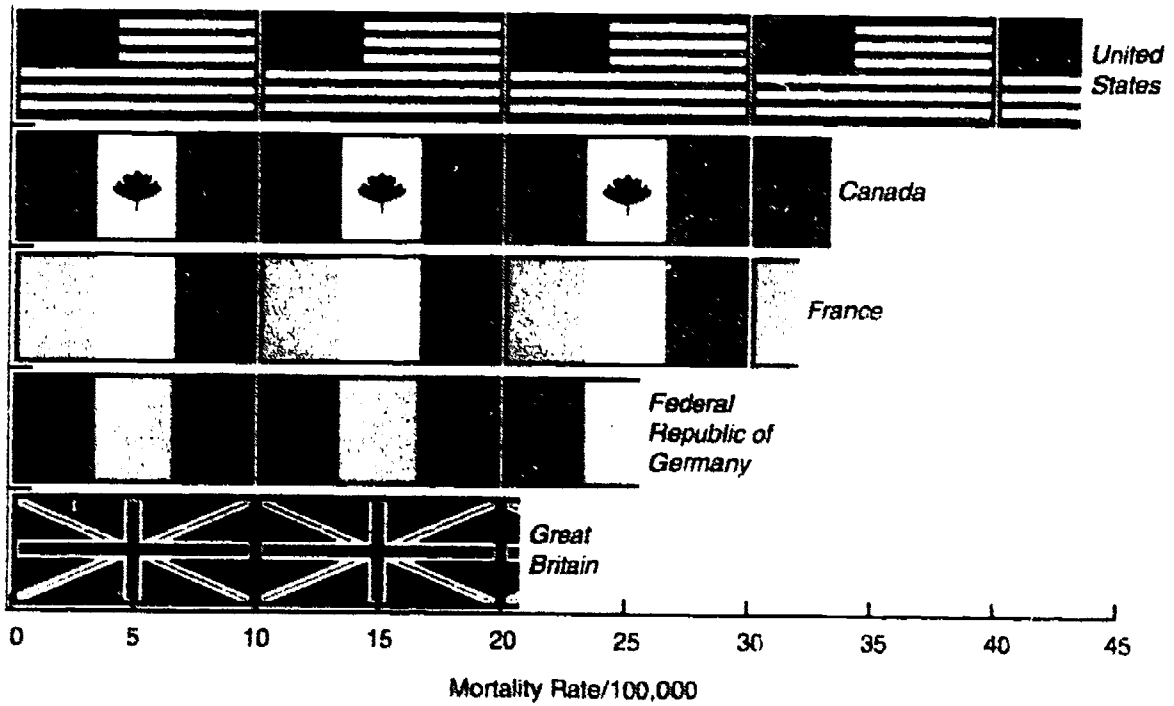


Figure 1.4

International Injury Mortality Rates/100,000 Including Violence: Ages 0–24.
Source: World Health Organization, 1991.

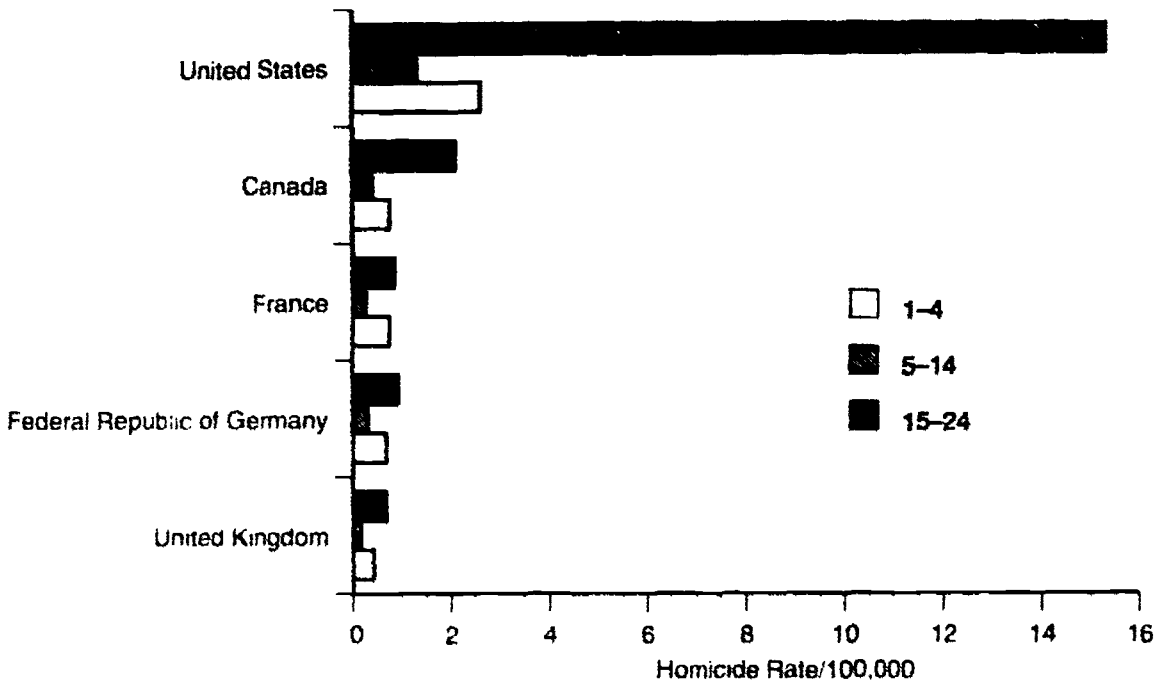
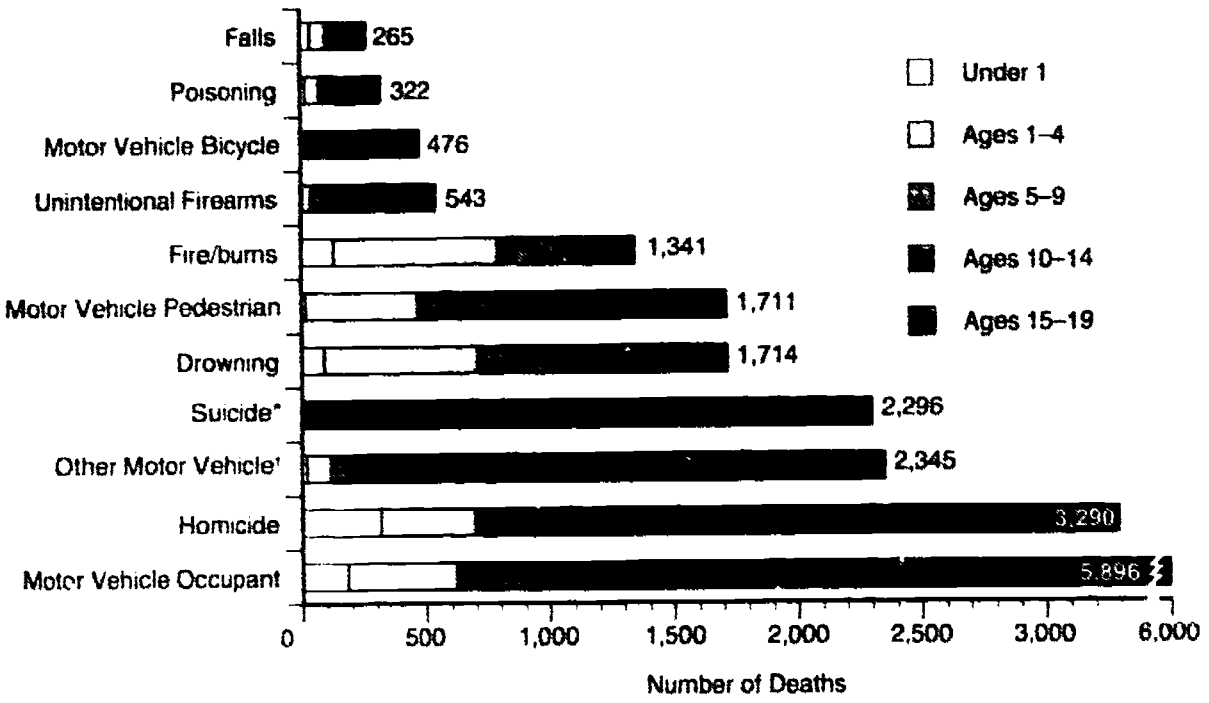


Figure 1.5
International Homicide Rates/100,000 by Age Group.
Source: World Health Organization, 1991.

The United States is a nation plagued by violence. In 1988 there were 5,718 deaths due to homicide in the United States among 15–24 year olds. During the same time period there were only 411 homicide-related deaths in this age group in the countries of Canada, France, Germany, Spain, the Netherlands, Switzerland, Finland and the United Kingdom combined, despite a total population of 15–24 year olds very similar in size to our own.

U.S. children are 10 times more likely than German children, 11 times more likely than French children, and 15 times more likely than English children to be victims of homicide.



* *Suicide statistics are only tabulated for persons 10 and older.*

† *"Other motor vehicle" includes deaths involving motorcycles, mopeds, snowmobiles, and all-terrain vehicles.*

Figure 2.1

Total Number of Deaths by Cause and Age Group: U.S. Children 0–19, 1988.
Source: Fingerhut, NCHS, 1988

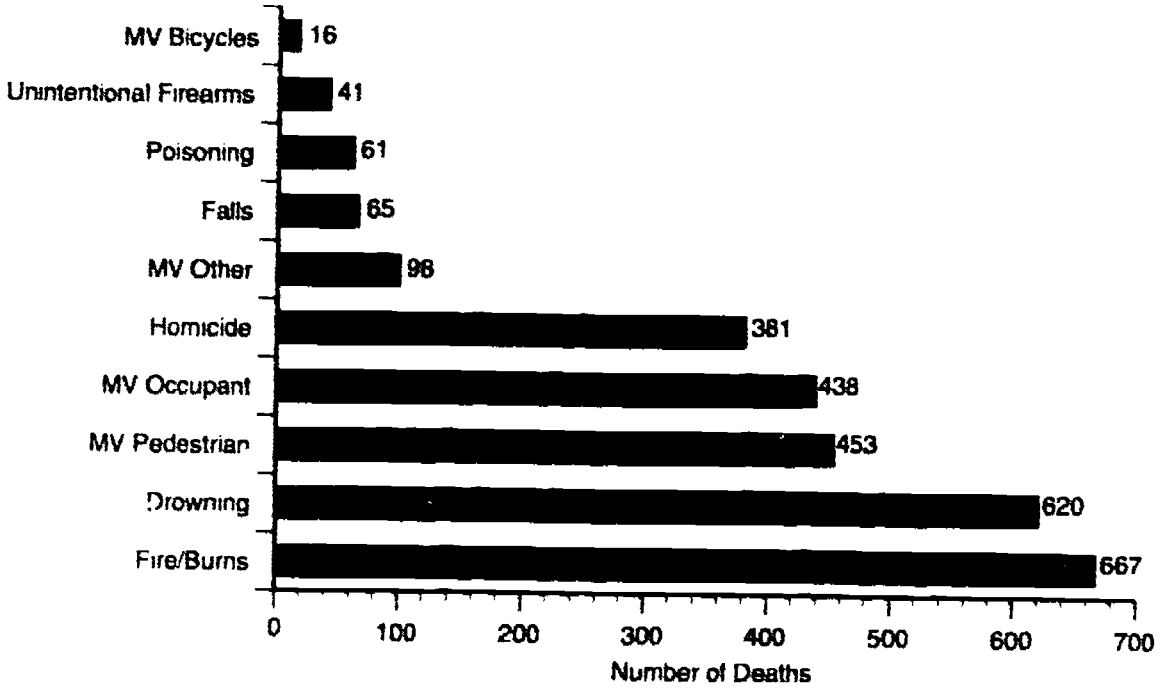
SECTION II MORTALITY

Figure 2.1 shows the leading causes of injury-related deaths by age group. The patterns of childhood injury deaths are shaped significantly by developmental stage and the kinds of activities in which children participate. To be effective, any injury prevention strategy must first examine the link between developmental stage and cause of injury.

Ages 1–4

When viewed together, motor vehicle-related injuries (occupant, pedestrian, bicycles, and "other") were the number one cause of death in all age groups. Because interventions differ for each of these injury categories, the figures in this section present these four injury types separately.

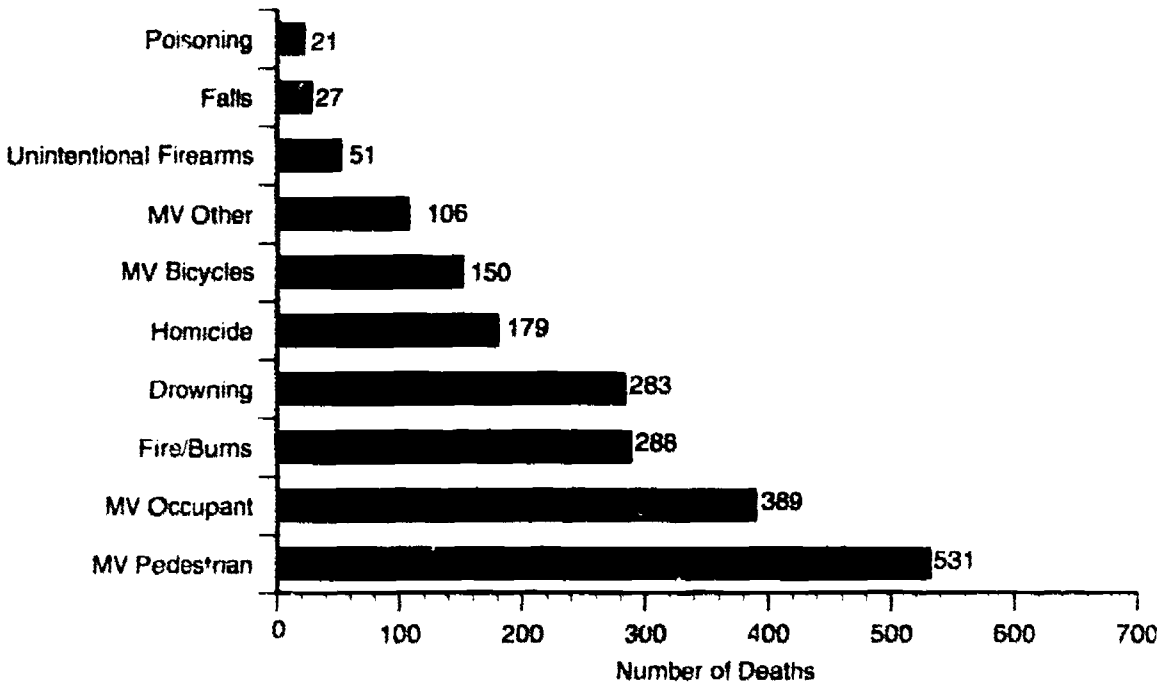
In 1988, fires and burns caused the greatest number of injury deaths to toddlers and preschoolers (ages 1–4), with drowning second, pedestrian injuries third, and motor vehicle occupant injuries fourth.



Rates/100,000 are included in Appendix A.

Figure 2.2

Number of Deaths by Cause, Toddlers and Preschoolers: Ages 1–4, 1988.
Source: Fingerhut, NCHS, 1988.



Rates/100,000 are included in Appendix A.

Figure 2.3

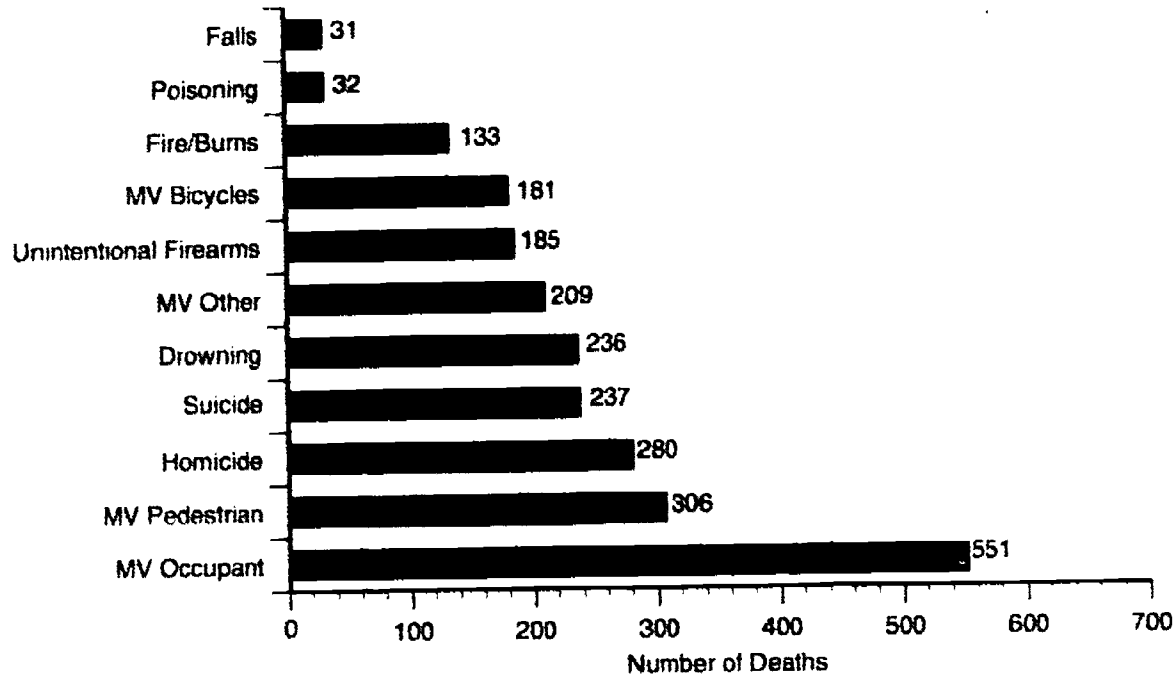
Number of Deaths by Cause, Elementary School-Aged Children: Ages 5–9, 1988.
Source: Fingerhut, NCHS, 1988.

Ages 5–9

The four leading causes of injury death to school-aged children (ages 5–9) in 1988 were motor vehicle pedestrian, motor vehicle occupant, fire/burns and drowning. Motor vehicle pedestrian deaths reflect the increased mobility and independence of this age group. Motor vehicle pedestrian and occupant injuries account for nearly 40% of all deaths in this age group.

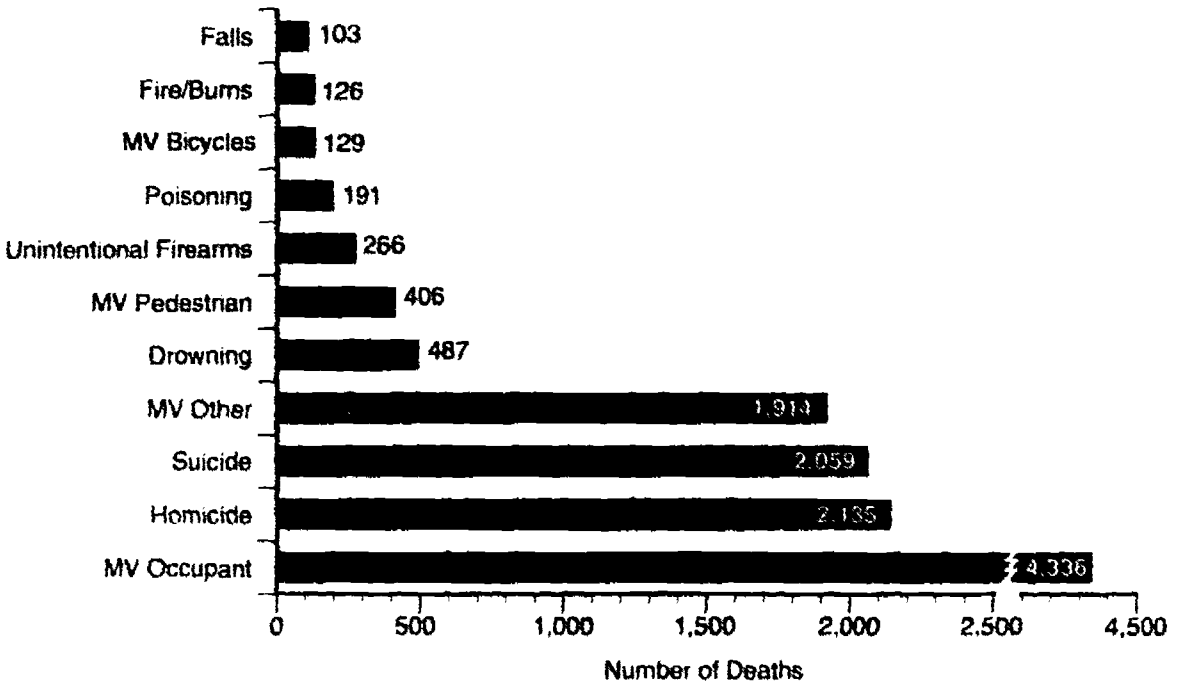
Ages 10–14

Once children reach middle school (ages 10-14), the three leading causes of injury death are motor vehicle occupant, motor vehicle pedestrian and homicide, closely followed by suicide and drowning. Intentional injuries account for almost 20% of the total injury deaths for these children.



Rates/100,000 are included in Appendix A.

Figure 2.4
Number of Deaths by Cause, Middle School Aged Children: Ages 10–14, 1988.
Source: Fingerhut, NCHS, 1988.



Rates/100,000 are included in Appendix A.

Figure 2.5
Number of Deaths by Cause, High School Aged Children: Ages 15–19, 1988.
Source: Fingerhut, NCHS, 1988.

Ages 15–19

For high school aged youth (ages 15–19), motor vehicle occupant injuries are by far the leading cause of injury-related death. Twice as many 15–19 year olds die as occupants of motor vehicles than from any other cause. After motor vehicle occupant deaths, homicide, suicide and other motor vehicle deaths far exceed all other causes of death.

In all injury causes males are consistently at higher risk for death due to injury than females. Males are almost four times more likely than females to commit suicide, 2.5 times more likely to be victims of homicide, almost 3 times more likely to drown and 6.5 times more likely to be the victim of an unintentional firearm discharge.

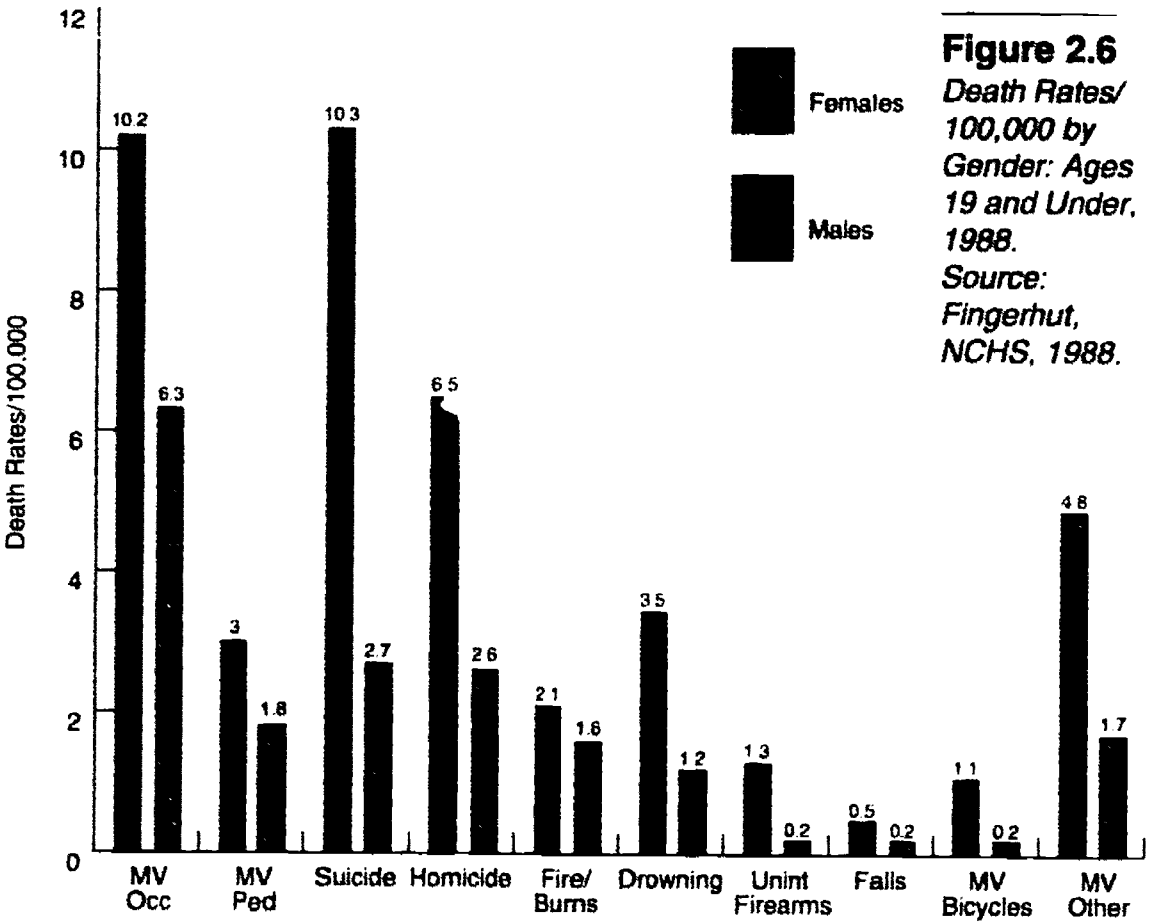
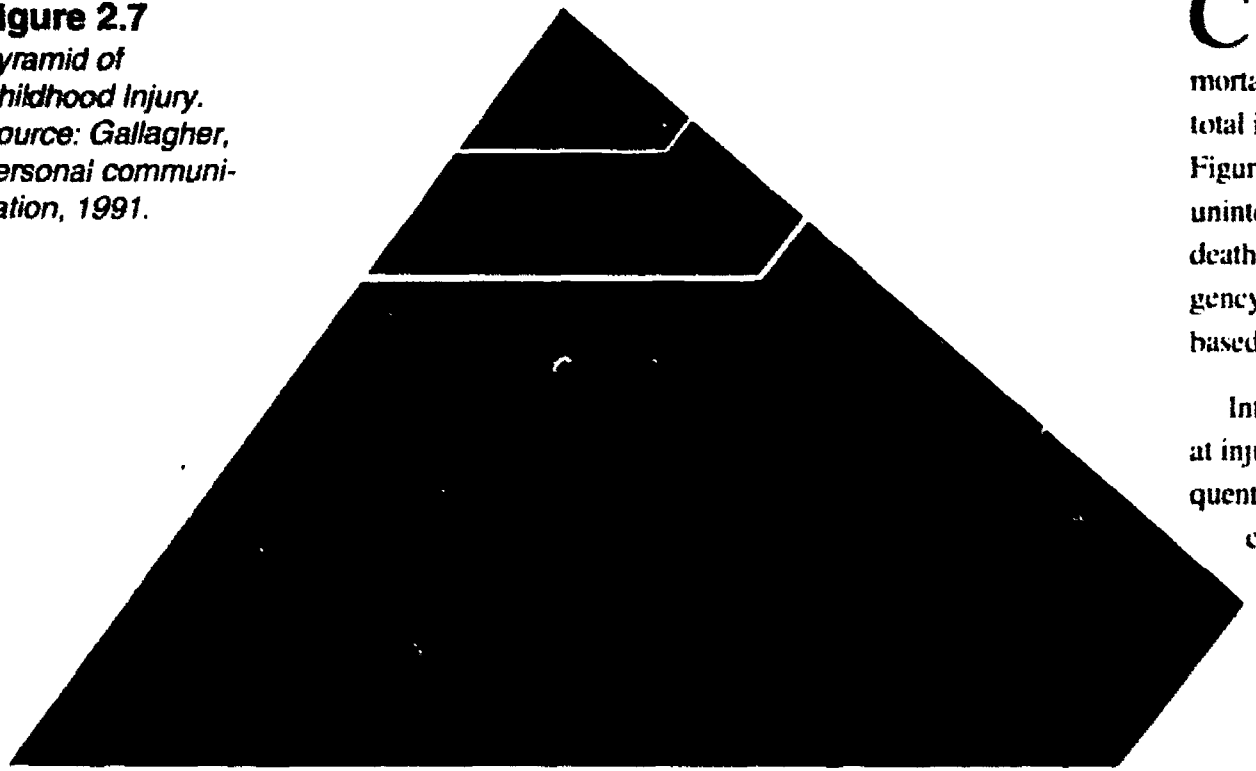


Figure 2.6
Death Rates/ 100,000 by Gender: Ages 19 and Under, 1988.
Source: Fingerhut, NCHS, 1988.

Figure 2.7
Pyramid of Childhood Injury. Source: Gallagher, personal communication, 1991.



Childhood injury mortality figures are shocking. However, mortality is only a small part of the total injury picture. The pyramid in Figure 2.7 compares the number of unintentional and intentional injury deaths to hospitalizations to emergency room visits in a population-based study in Massachusetts.

Interventions targeted solely at injury deaths may neglect frequent injuries that are costly, and cause children to be treated in hospitals and perhaps left permanently disabled.

SECTION III
UNINTENTIONAL INJURY

Unintentional injuries result from the complex interaction of the child's developmental stage, parental awareness of a child's abilities, and a product or environment. For example, injuries caused by motor vehicles represent a concern at all ages. However, the most frequent cause of injury by motor vehicle differs by the child's age, with infants injured as occupants, preschoolers injured as occupants and often as pedestrians in driveways, elementary school children injured on streets as pedestrians and bicycle riders and adolescents injured as drivers and passengers—often with alcohol involvement.

Attention to the developmental differences in children will help in the design of prevention strategies. Reduction of unintentional injuries to children and adolescents will require not only legislative and regulatory initiatives, but also changes in products, the environment and individual behavior.

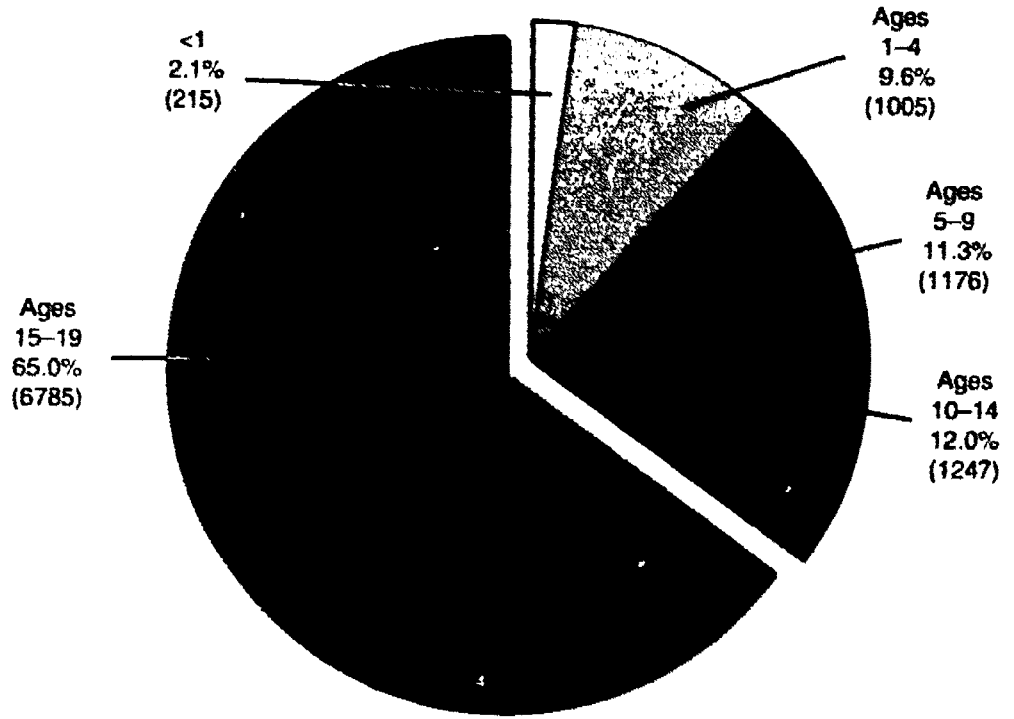


Figure 3.1
Children Killed in Motor Vehicle Crashes by Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

Motor Vehicles

On average, more than 28 children and adolescents die in motor vehicle-related incidents every day. This is equal to almost 3 school buses full of children every week. In 1988, adolescents ages 15–19 accounted for 65% of the 10,428 motor vehicle deaths to children and youth.

Motor Vehicle Occupants

For motor vehicle occupants, the death rates of males and females are very similar across all age groups until ages 15–19, when the male fatality rate exceeds the female rate by almost 2 to 1. The death rate for adolescents ages 15–19 is more than 5 times the rate for any other age group.

Two out of three teenage passenger deaths occur in crashes in which another teenager is driving (Fleming, 1990).

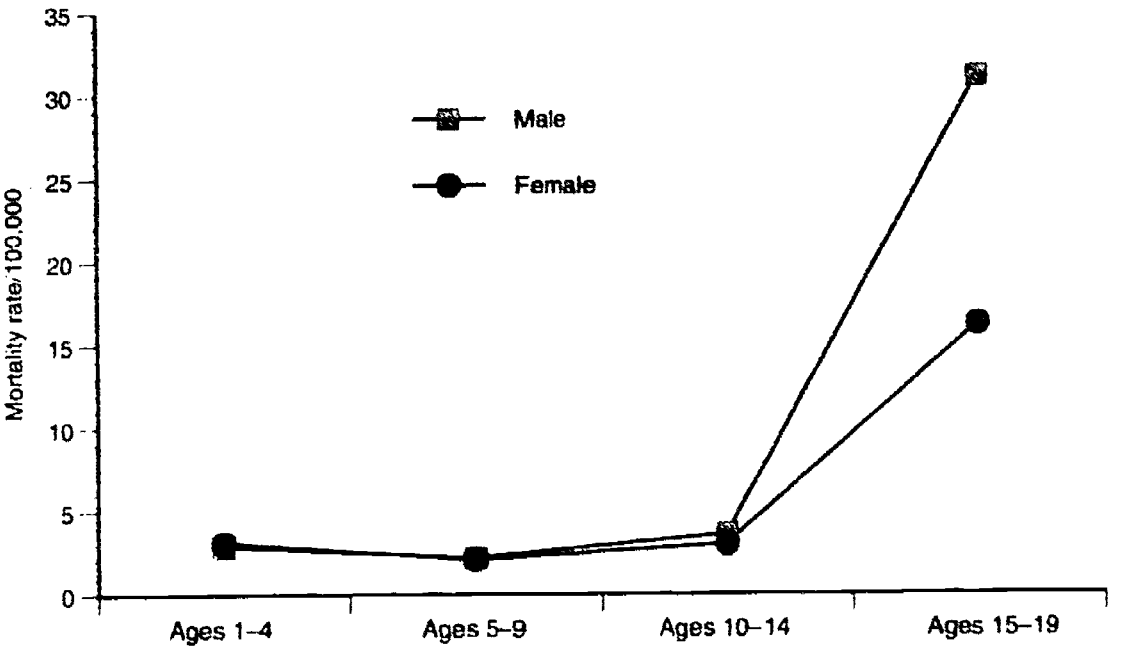


Figure 3.2

Motor Vehicle Occupant Mortality Rates/100,000 by Gender and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

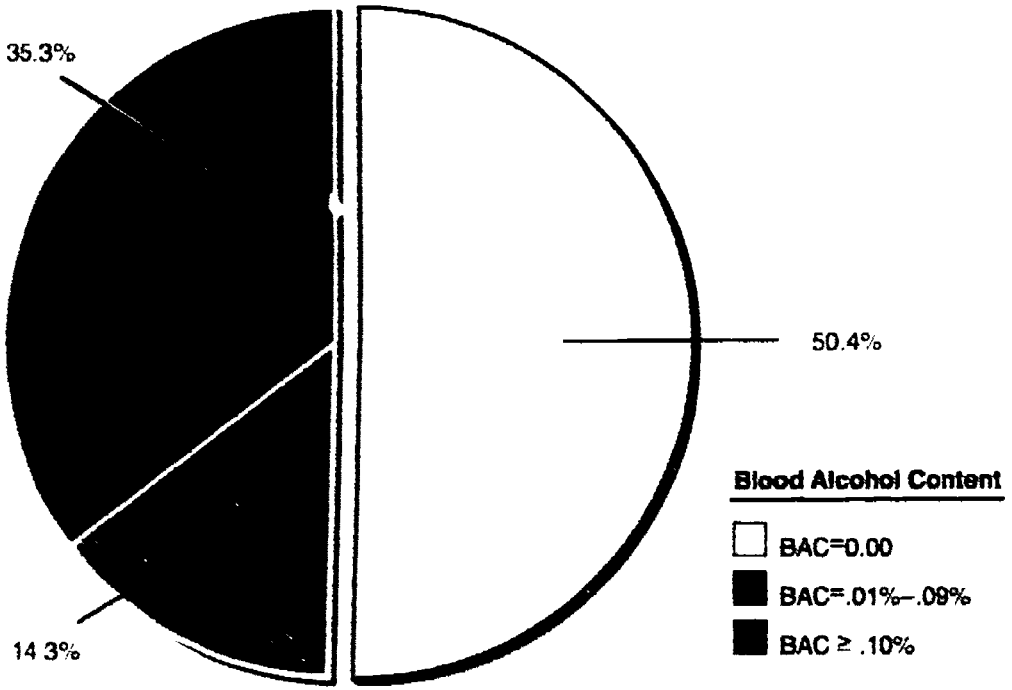


Figure 3.3

Adolescents Ages 15–20 and Alcohol Use in Fatal Motor Vehicle Crashes, April to June 1990. Source: Centers for Disease Control, 1991.

Adolescents, Alcohol and Motor Vehicles

During the past seven years NHTSA has shown that the proportion of intoxicated drivers involved in fatal motor vehicle crashes has decreased in all age groups including adolescents. Nevertheless, during one 3-month period in 1990, it was found that just under one-half of adolescent motor vehicle fatalities involved alcohol. Of adolescents involved in a fatal crash, one in every three had a blood alcohol concentration greater than or equal to 0.10%, the legal limit of intoxication in most states.

Safety Belts

Increased usage of safety belts in the last decade is one of the most dramatic victories of the injury prevention movement to date. From 1983–1989 the use of safety belts saved an estimated 20,086 lives and prevented approximately 523,100 moderate to severe injuries (NHTSA, 1991a).

Although safety belt use in general has increased dramatically from 11% in 1982 to 49% in 1990 (NHTSA, 1991a), adolescents continue to wear safety belts less often than older drivers. In a nationwide survey of adolescents, 41% reported that they wore a safety belt the last time they rode in a vehicle. However, fewer than one quarter of the students (22%) reported that most of their friends usually wear a safety belt (American School Health Association et al., 1989).

Healthy People 2000 states a goal of increasing use of occupant protection systems to at least 85% of motor vehicle occupants (USDHHS, 1991). As of July 1991 only 40 states and the District of Columbia have safety belt use laws (IIHS, 1991), and as of June 1990 only 8 states allowed police to write tickets for safety belt violations alone, without citing for another moving violation (Fleming, 1990).

Child Safety Seats

Properly installed and used, child safety seats reduce the risk of death and serious injury to children by 70%. The use of safety seats in 1989 saved the lives of over 200 children ages 4 and under and prevented 28,000 injuries. Tragically, 336 unrestrained children under age 4 died in passenger cars in the same year (NHTSA, 1991a).

The year 2000 objective for child restraint usage is 95% for children ages 4 and under (USDHHS, 1991). The current usage rate is estimated to be approximately 83% (NHTSA, 1991a). While this rate appears high, improper installation and use of child safety seats are widespread problems. Research suggests that 80% of child safety seats are misused in some way (NHTSA, 1990). Correct use of child safety seats could prevent about 500 deaths and 53,000 injuries every year (NHTSA, 1991a).

Although all states have child occupant protection laws, their scope varies widely. Many laws exempt children beyond a certain age or allow children to ride unrestrained in the back seat. Meeting the year 2000 objective will require closing legal loopholes and stringently enforcing existing laws.

Pedestrians

Pedestrian deaths account for 16% of all the motor vehicle-related deaths to children ages 19 and under. Males accounted for 2 out of 3 childhood pedestrian deaths in 1988. The age groups at highest risk were the 1–4 and 5–9 year olds.

Pedestrian death rates for black children are consistently higher than for white children across all age groups except for male adolescents ages 15–19. Fewer neighborhood off-street play areas may put poor children at higher risk of pedestrian injury (Malek et al., 1990).

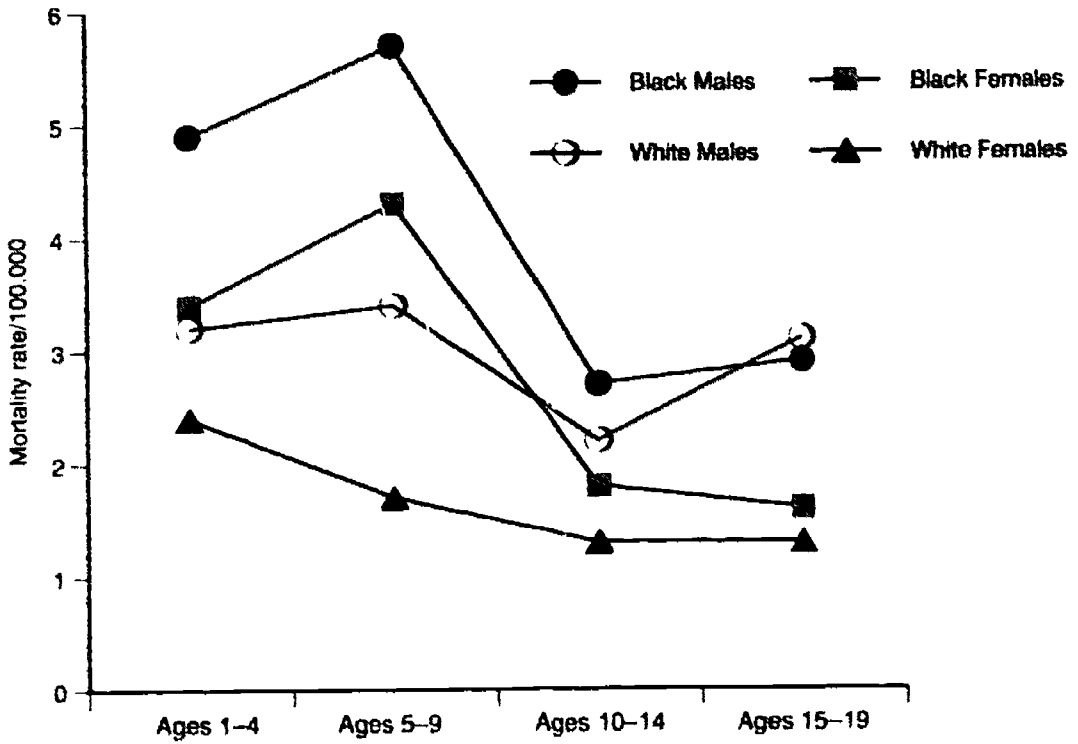


Figure 3.4

Child Pedestrian Mortality Rates/100,000 by Gender, Race and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

Pedestrians

In 1988, 1,711 children and youth died as a result of pedestrian injuries. Children ages 5–9 were far more likely to die as pedestrians (531 or 45% of all motor vehicle-related deaths) than as occupants of motor vehicles (389 or 33% of all motor vehicle-related deaths). Young children have difficulty judging distance and the speed at which cars are moving. Most injuries occur when a child darts out into the street in the middle of the block. Children under the age of 5 are often fatally injured in home driveways or parking lots (Brison et al., 1988).

Motor Vehicle Injuries

The Massachusetts Statewide Comprehensive Injury Prevention Program (SCIPP) calculated annual motor vehicle injury morbidity rates. As with deaths, adolescent occupants and pedestrians ages 6–12 had the highest risk of injury from motor vehicles.

Deaths represent only a small fraction of the outcomes of motor vehicle injuries. In a study of injuries at 55 pediatric trauma centers, 38% of the trauma cases seen in emergency rooms were motor vehicle related (DiScala, 1991). The vast majority of these injuries were non-fatal.

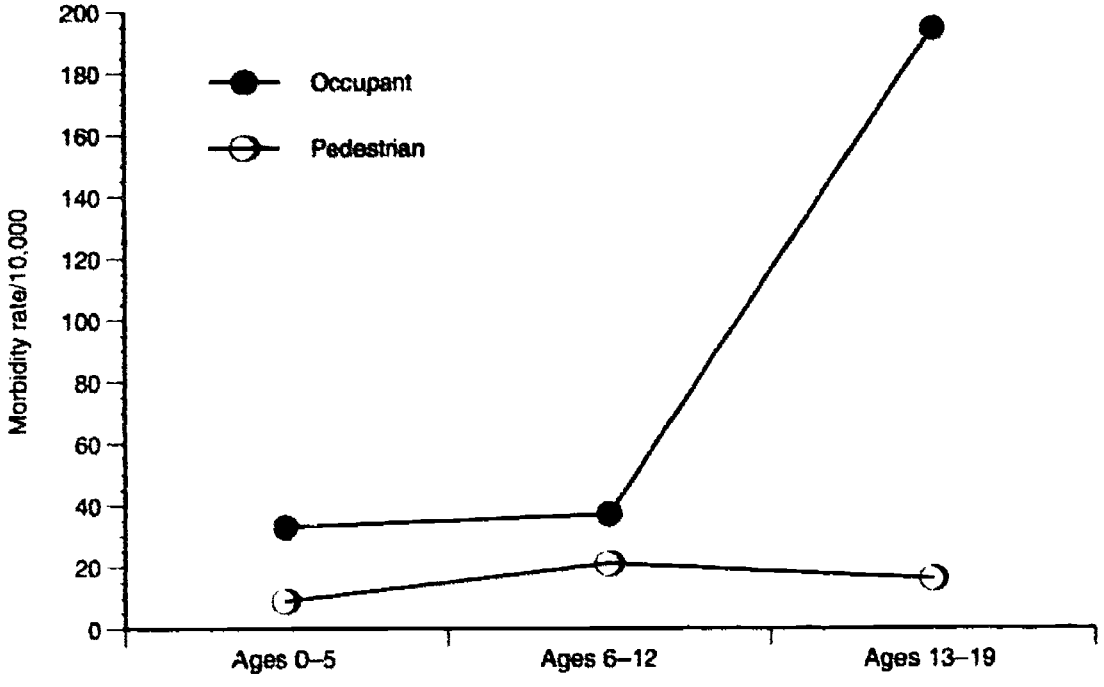


Figure 3.5

Motor Vehicle-Related Morbidity (Occupant and Pedestrian) by Age Group, 1979–1982. Source: Guyer and Gallagher, 1988.

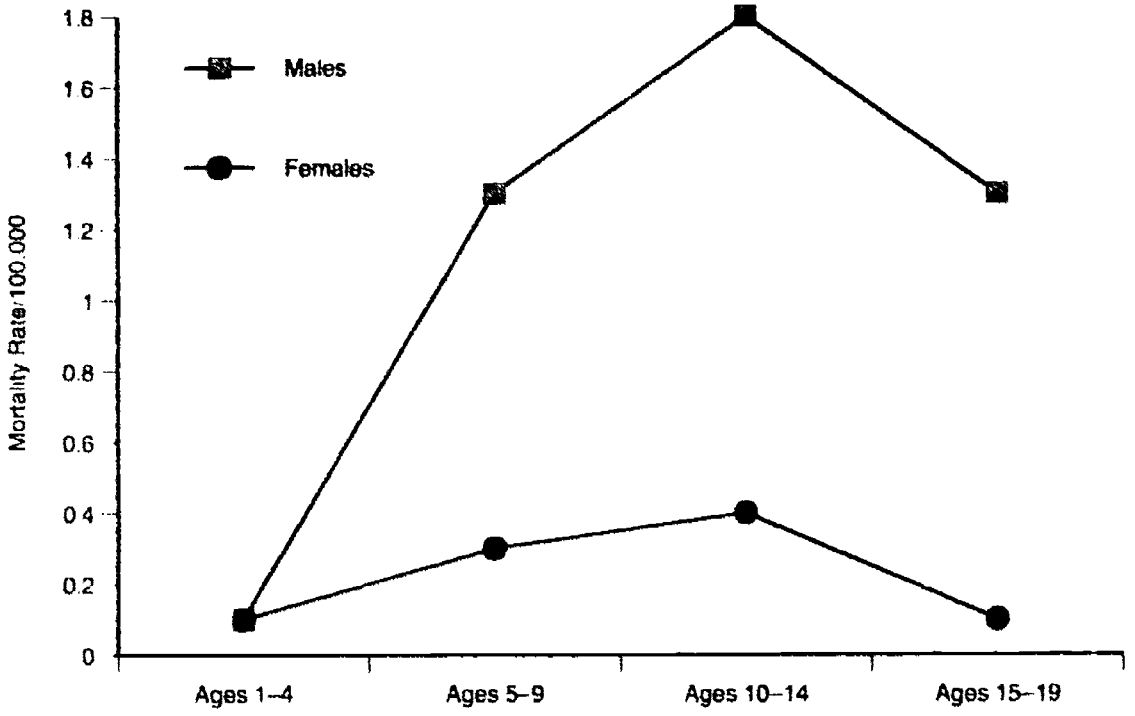


Figure 3.6
Motor Vehicle-Related Bicycle Mortality Rates/100,000, 1988.
Source: Fingerhut, NCHS, 1988.

Bicycles

As many as 90% of bicycling fatalities involve motor vehicles (Kraus et al., 1987). Children ages 10–14 are at greatest risk and males over the age of 5 are at much greater risk than females of motor vehicle bicycle fatalities.

The majority of bicycling deaths are due to head injuries. Riders who wear bicycle helmets reduce their risk of head injury by 85% (Thompson et al., 1989), yet it has been estimated that less than 10% of recreational bicyclists of all ages wear helmets (Wasserman et al., 1988).

Drowning

Approximately 1,700 children and youth were victims of drowning in 1988. Males account for over 3 out of 4 childhood drowning deaths. Black males have particularly high drowning rates in all age groups. Children ages 1-4 and male adolescents are at greatest risk for drowning. In 18 states drowning is the leading cause of death for children ages 1-4 (Baker and Waller, 1989).

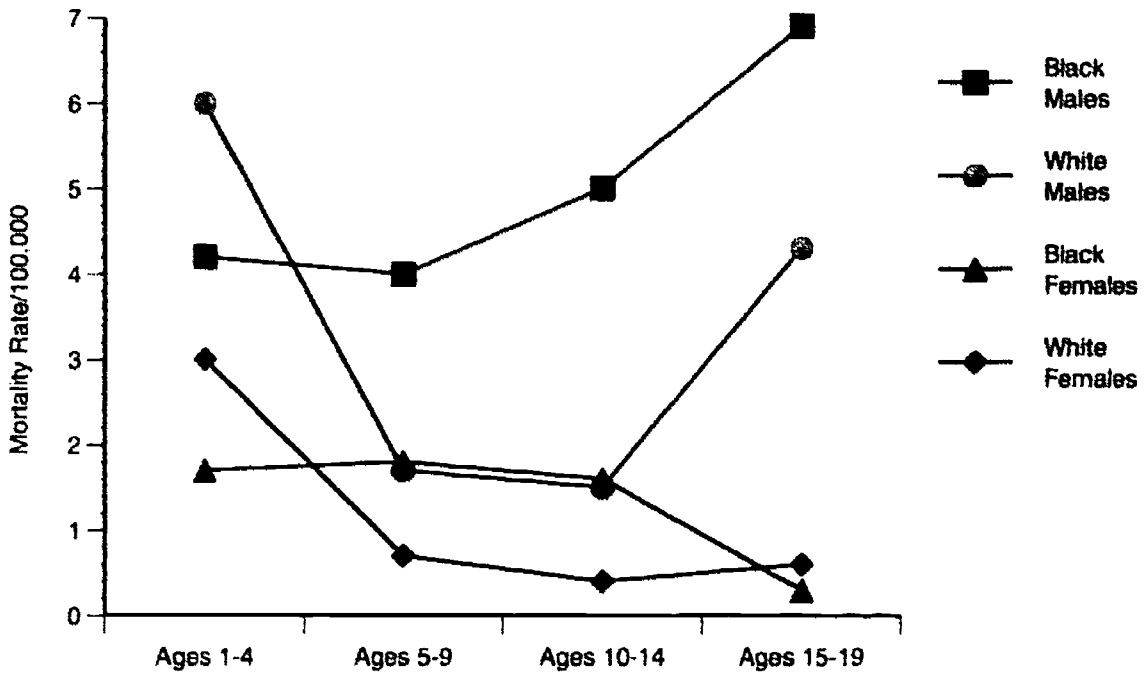
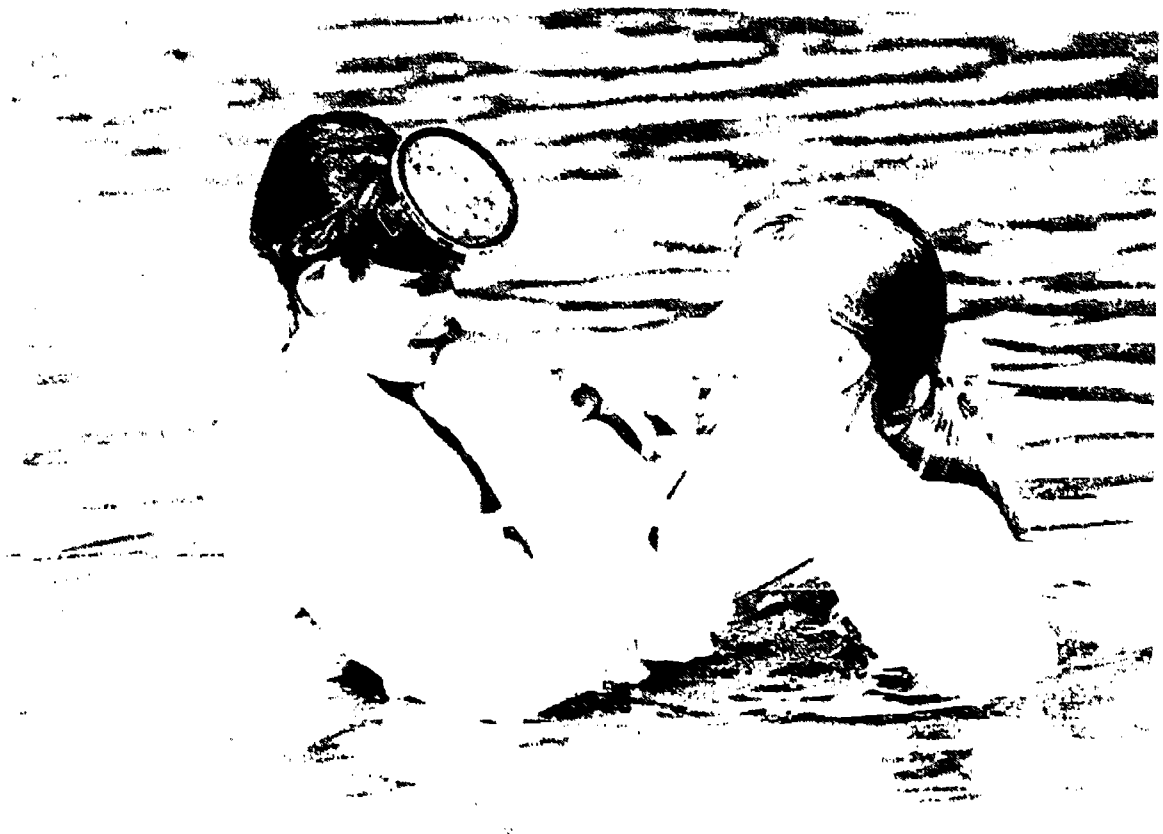


Figure 3.7
Mortality Rates/100,000 Due to Drowning by Gender, Race and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.



Drowning and Near Drowning

Young children, under age 5, are more likely to drown in pools and standing household water; adolescents drown most often in open bodies of water. For every drowning death, approximately 2–10 children are hospitalized and 8–40 are seen in emergency rooms and released (Spyker, 1985). Approximately 5–20% of children who are hospitalized for near drowning sustain severe, permanent brain damage (Pearn et al., 1979).

Fires and Burns

For children ages 1–4, black males are 4 times more likely than white males and black females are 4.5 times more likely than white females to die from fire or burn injuries. Income and the quality of housing are more likely explanations for these differences than race per se.

While fire causes the greatest number of deaths, scalds are the leading cause of burn morbidity (McLoughlin and Crawford, 1985). In 1989, 21,000 children and youth under 20 years old were admitted to hospitals to be treated for burn injuries nationwide (Kozak, 1991).

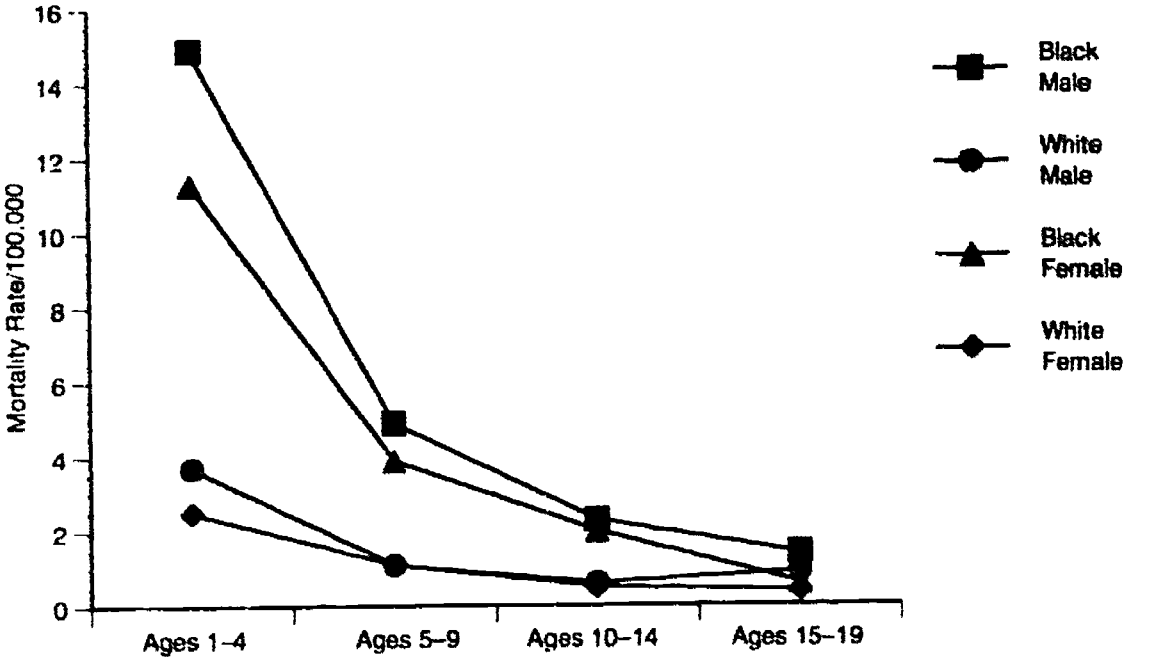
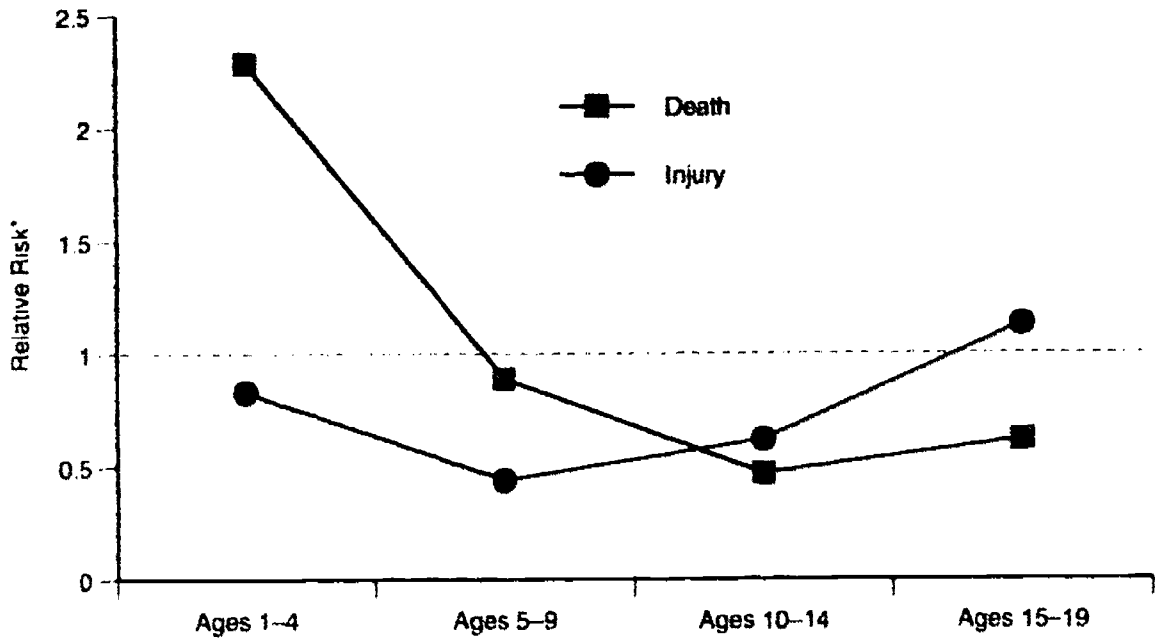


Figure 3.8

Mortality Rates/100,000 Due to Fires and Burns by Gender, Race and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.



*The population as a whole has a relative risk of 1.

Figure 3.9

Relative Risk of Death Due to Fire vs. Risk of Injury Due to Fire by Age Group, 1987.
Source: United States Fire Administration, 1990.

Fires and Burns

Seventy-four percent of fire-related deaths occur in residences with the majority of these in one- and two-family dwellings (United States Fire Administration, 1990).

Children under the age of 5 have 2.5 times the relative risk of any other childhood age group of dying in a fire (the population as a whole has a relative risk of 1). As children get older, the risk of death decreases but the risk of suffering non-fatal fire-related injuries increases, peaking at ages 15–19.

Unintentional Firearms

Unintentional firearm injuries killed 543 U.S. children in 1988. The availability and accessibility of firearms presents a high risk for children of all ages, but especially for male adolescents ages 10–19.

About 1 of every 3 deaths from unintentional firearm discharges could be prevented by a firearm safety device such as a trigger lock or loading indicator. A study of autopsy and police reports determined that a child-resistant trigger lock could have prevented *every* incident in which children under age 6 killed themselves or others (U.S. General Accounting Office, 1991)

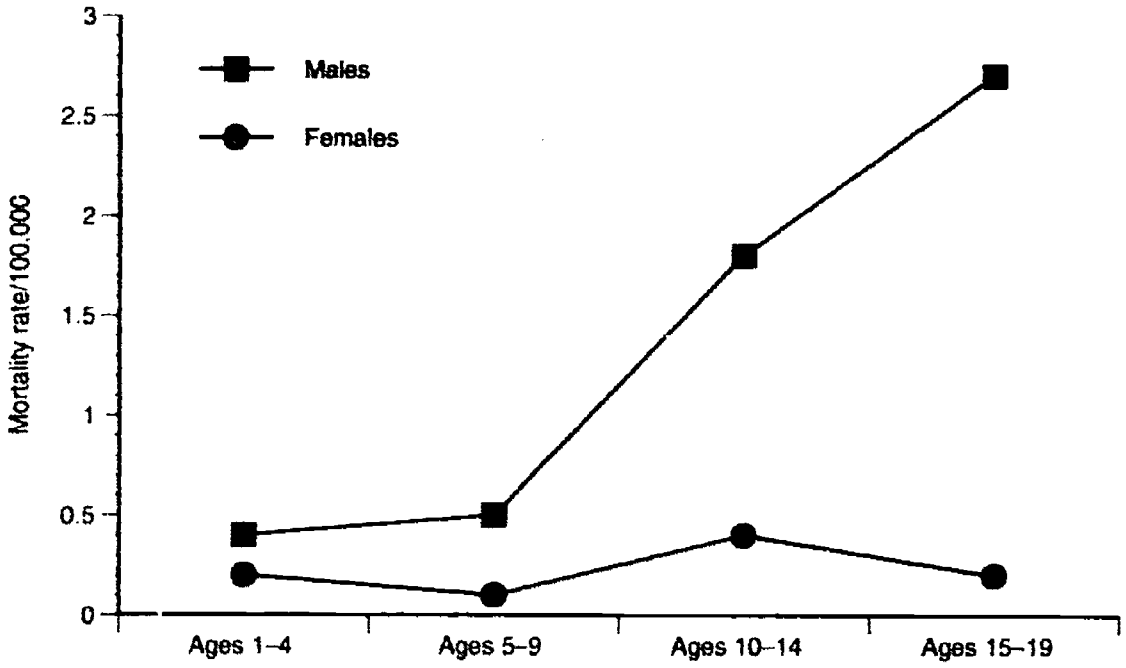


Figure 3.10
Unintentional Firearm Mortality Rates/100,000 by Gender and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

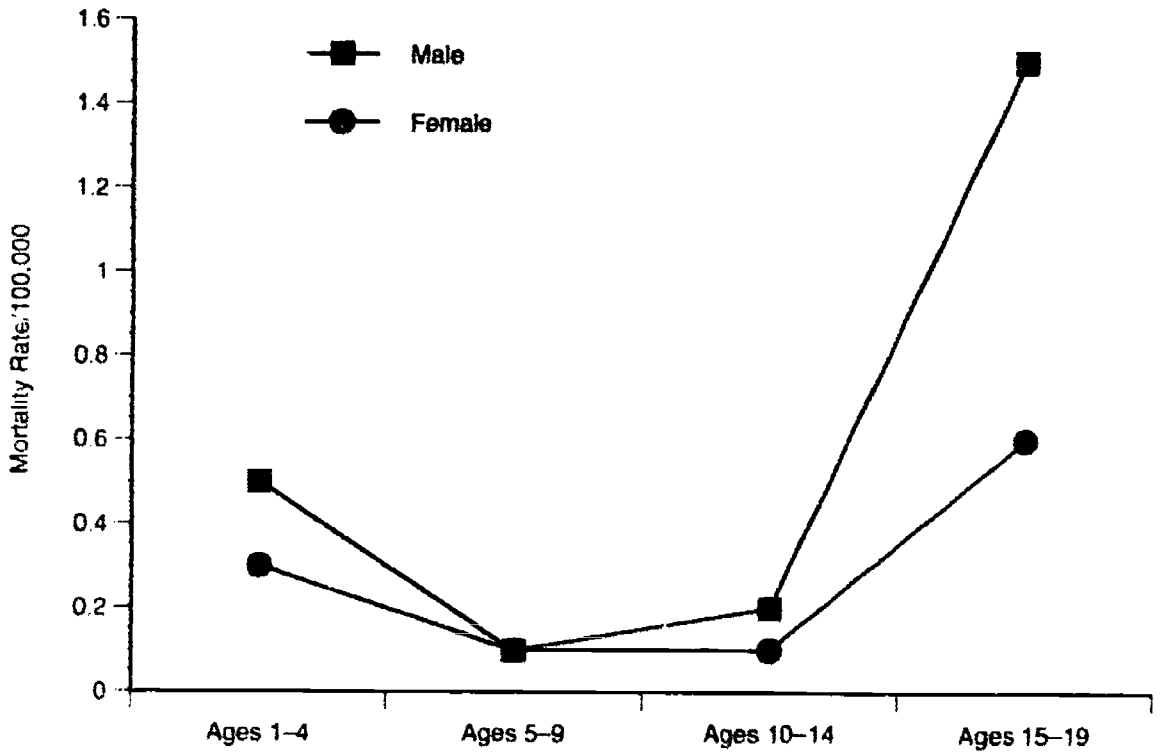


Figure 3.11

Unintentional Poisoning Mortality Rates/100,000, by Gender and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

Unintentional Poisoning

Since 1970 legislation requiring child-resistant closures on many products, poisoning deaths have decreased dramatically, particularly among children under 5 years old.

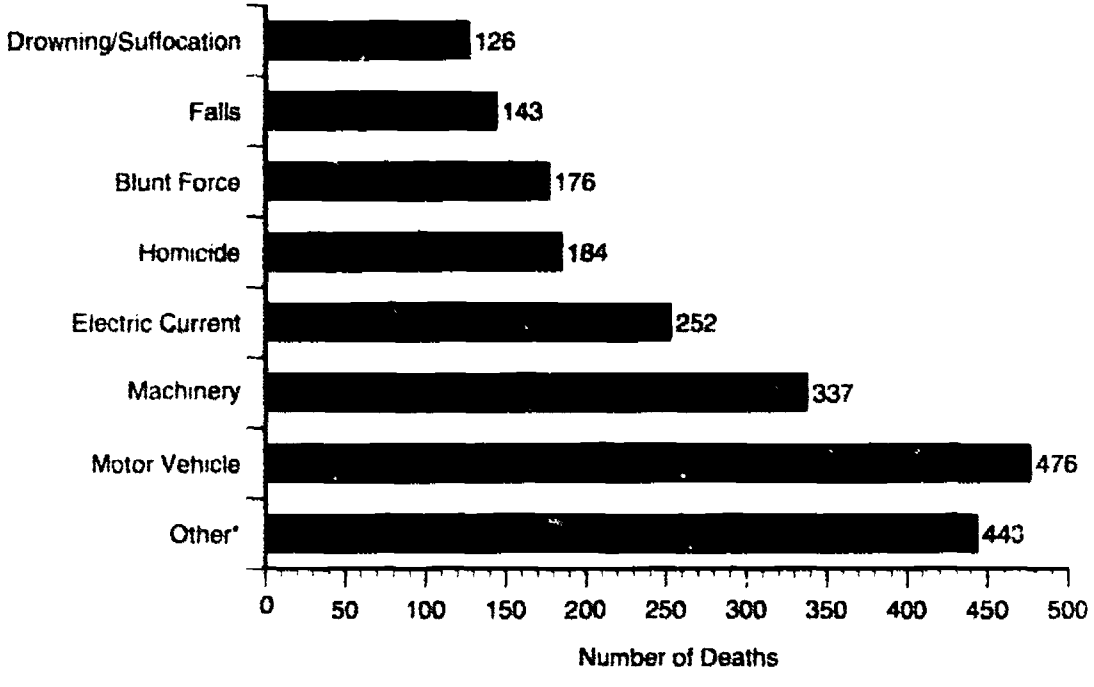
In 1988, 322 children died from unintentional poisoning. Rates were highest for adolescents 15–19; many of these deaths are thought to be undetected suicides. Adolescent males are 2.5 times more likely than females, and black children ages 9 and under are 3 times more likely than their white counterparts, to die from unintentional poisoning. An estimated 69,000 children and youth were hospitalized in the U.S. in 1989 due to poisoning (Kozak, 1991).

Falls

Deaths due to falls are most prevalent among males under 5 and ages 15–19. Among toddlers, fatal falls occur most often from windows and on stairs. Risk-taking behaviors put adolescents at risk for death from falls.

Most falls do not result in death, but may result in serious injuries. Falls in children are most often associated with stairs, furniture, strollers, high chairs, walkers, changing tables and playground equipment (Gallagher et al., 1984). An estimated 100,000 children are treated in emergency rooms each year for playground-related falls (U.S. CPSC, 1990a).

Figure 3.12
Mortality Rates/100,000 Due to Falls, by Gender and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.



** Other includes air/water transport, nature/environment, suicide, explosion, fires, missiles/firearms, cutting/piercing, hot substances, and unknown.*

Figure 3.13
Occupational Deaths to Adolescents Ages 16–19, 1980–1986.
Source: National Traumatic Occupational Fatality Database, 1991.

Occupational Injuries

U.S. adolescents are severely injured and die in a wide variety of occupational settings. From 1980–1986, 2,137 adolescents ages 16–19 died at work as reported to the National Traumatic Occupational Fatality data base. Males accounted for 93.4% of the deaths. The top two causes of death were motor vehicles and machinery. The industries (when provided) in which adolescents were most likely to die were construction (312), fishing (213), public administration (156), transportation (141), manufacturing (134), retail trade (128), and services (121).

Occupational Injuries

Estimates of occupational injuries to adolescents are underreported due to several factors: death certificates are often not accurately coded as work-related (Colorado Department of Health, 1988), surveys of occupational injuries do not ask the age of the victim, and agricultural and transportation injuries and homicides are often not reported as occupational injuries (Suruda and Emmett, 1988). Injuries that do not result in death are even less likely to be reported. One population-based study of adolescents ages 14–19 found that 24% of all hospital and emergency room treated injuries were job-related, and resulted in a greater median length of stay than for other adolescent injuries (Anderka et al., 1985).

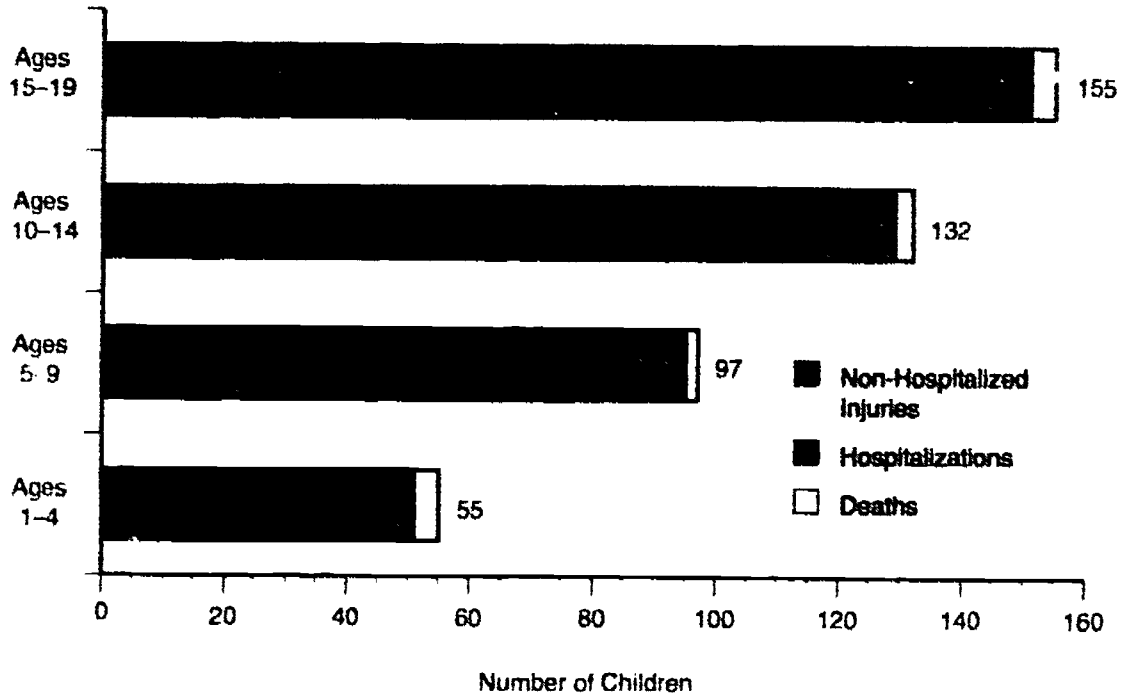


Figure 3.14

Agricultural Injuries to Iowa Children and Youth Ages 19 and Under, 1990.
Source: Jones, 1990.

Farm Injuries

Children are particularly susceptible to agricultural injuries because they ride on or work with farm machinery at a young age and often live on the same site where work is performed. Federal labor laws do not apply to the family farm.

One surveillance study of work and leisure-related agricultural injuries to all children in Iowa found that 369 children were injured but not hospitalized, 57 were hospitalized and 13 died in 1990. Males accounted for 81% of the injuries, and children were most often injured by machinery, animals, falls/slips, and striking against something (Jones, 1990).

Sports Injuries

The risk of injury through participation in sports and recreational activities increases as a child grows older. The injury rates in a Massachusetts study of childhood injuries indicate that 1 in every 14 adolescents will be seen in an emergency room (ER) or hospitalized for a sports-related injury annually. Twice as many males are injured in sports-related activities as females. In the Massachusetts study, 17% of all injuries treated in emergency rooms and 16% of all hospitalizations for injuries were related to sports and recreational activities (Guyer et al., 1990).

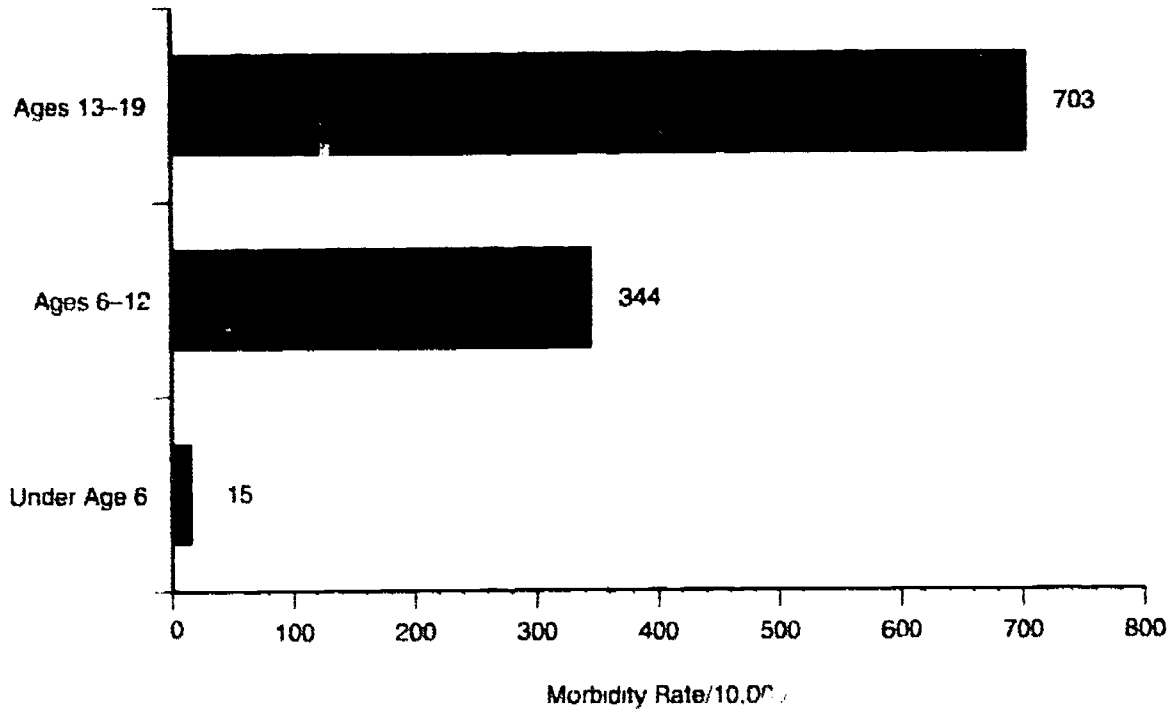


Figure 3.15

Annual Sports-Related Morbidity/10,000 in Massachusetts by Age Group, 1979–1982.
Source: Guyer and Gallagher, 1988.

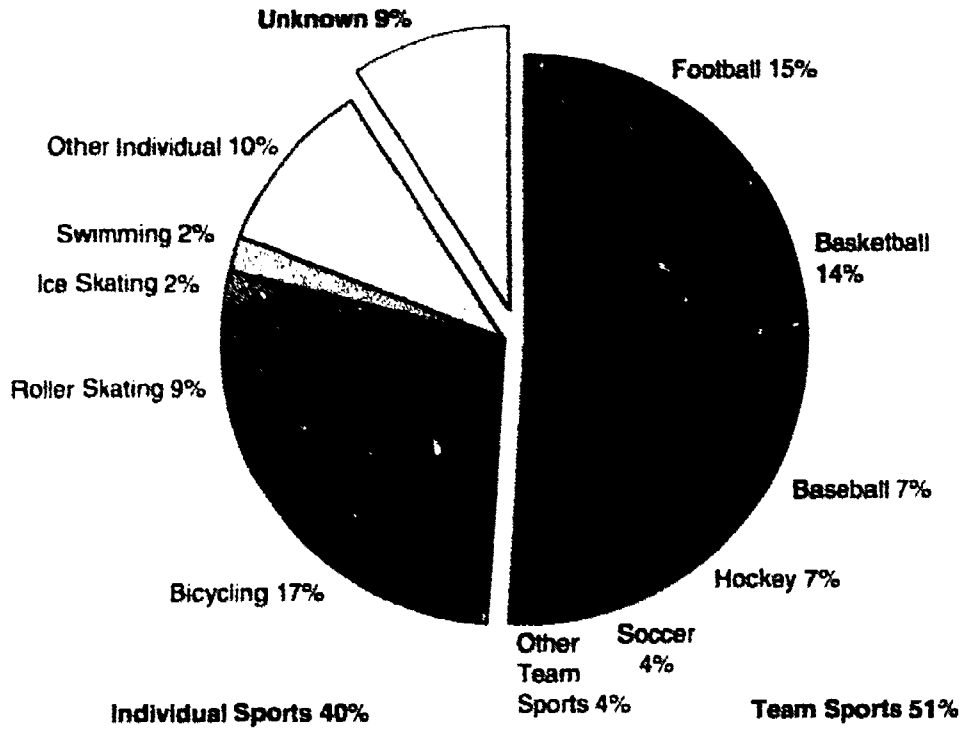


Figure 3.16

Percentage of Sports Injuries by Cause: Children 0–19 in Massachusetts, 1979–1982. Source: Massachusetts Department of Public Health, 1983.

Sports Injuries

Sports are the most frequent cause of injury for both male and female adolescents. While injuries from team sports are more frequent, injuries resulting from recreation and individual sports are generally more severe. Track and field, bicycling, horseback riding and ice skating entail higher risks for head injuries than contact team sports such as football. Sports-related injuries incur greater direct costs than other injuries due to a high rate of hospitalization and emergency room visits (Listernick et al., 1983).

Toys

From January 1989 to September 1990, 33 toy-related deaths were reported to the U.S. Consumer Product Safety Commission. Twenty of these deaths were choking incidents, nine involving balloons (a high-risk toy for young children). Toys that are hazardous to children include those with sharp edges and points, with small parts presenting a choking hazard or cords that can cause strangulation.

In 1989, an estimated 122,500 children under 15 years old were treated in emergency rooms for toy-related injuries. Three out of five of these injuries were to children under the age of 5.

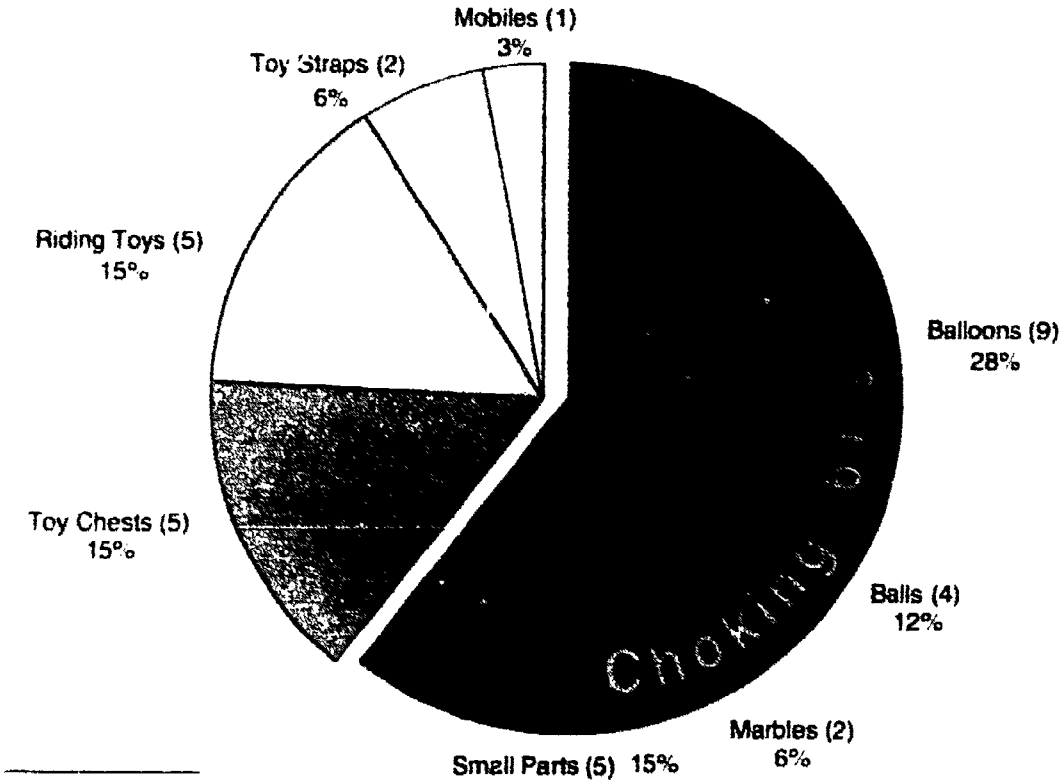
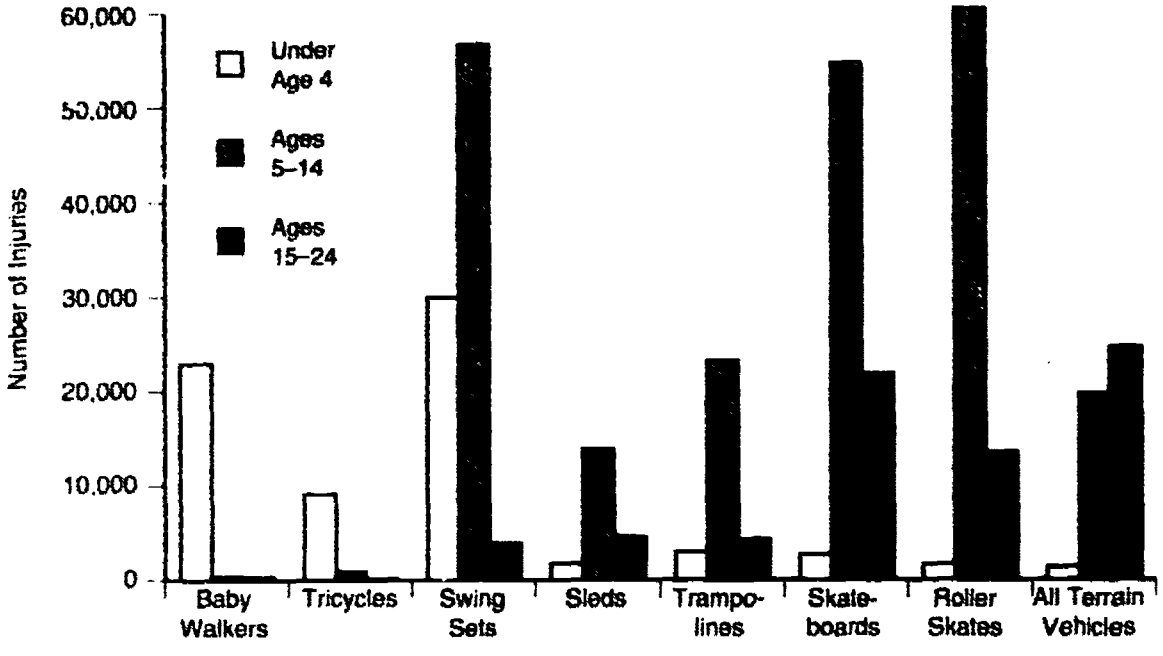


Figure 3.17

Reported Toy-Related Deaths by Type of Toy, January 1989–September 1990.
Source: U.S. Consumer Product Safety Commission, 1990b.



Because of their far greater magnitude, bicycle injuries are not included in this graph. They are depicted in Figure 3.6.

Figure 3.18

National Estimates of Injury Associated with Child and Youth Recreational Equipment, 1990. Source: U.S. Consumer Product Safety Commission, 1990c.

Recreational Equipment

Riding toys (scooters, tricycles, wagons, etc.) were associated with over one-third of all toy-related injuries. Children ages 5–14 are particularly vulnerable. Many of these injuries reflect a young child's lack of coordination, motor skills and cognitive ability to use such products safely.

An estimated 45,000 children, adolescents and young adults were injured riding all terrain vehicles (ATVs) in 1990. Most injuries involved the head and neck. Young people under age 16 should never ride adult-sized ATVs and should always wear a helmet.

SECTION IV
VIOLENCE

Violence has been defined as the use of force with the intent to harm oneself or another. Violence takes many forms including homicide, suicide, rape, domestic violence and child abuse. Most acts of violence occur between family, friends and acquaintances.

Historically, violence has been studied almost exclusively from the perspective of criminal justice with most efforts concentrated on attempts to curb violence or punish offenders. However, violence is now recognized as a major threat to the health and welfare of our Nation, particularly our Nation's children.

Public health professionals in all settings need to recognize the benefits of incorporating violence prevention strategies into their roles and settings.

Homicide

Homicide is the second leading cause of injury death among children and adolescents. In 1988, 9 children a day (3,290 children/year) were victims of homicide in the United States. Childhood homicides show two distinct patterns. Children under the age of 5 have a high homicide rate primarily due to parental and caretaker abuse and neglect. Adolescents have an extremely high rate resulting from arguments and crime involving peers, acquaintances and gangs (Christoffel, 1990).

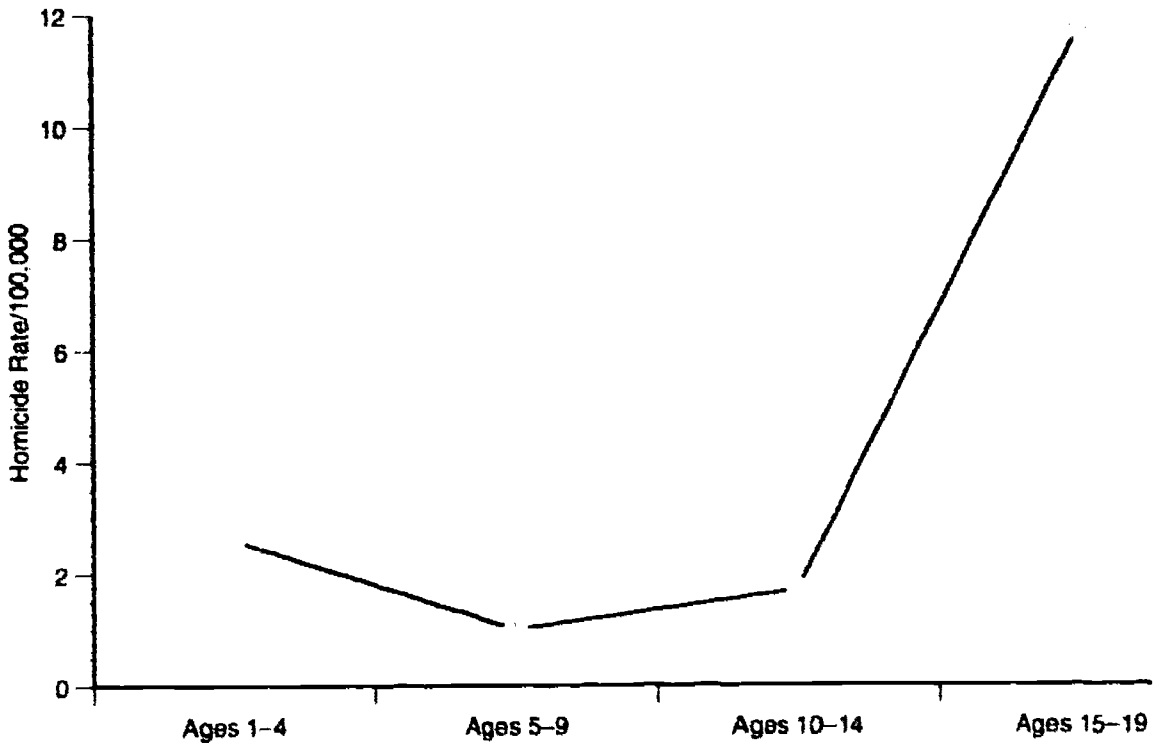


Figure 4.1

Homicide Rates/100,000 by Age Group: Children and Adolescents Ages 19 and Under, 1988. Source: Fingerhut, NCHS, 1988.

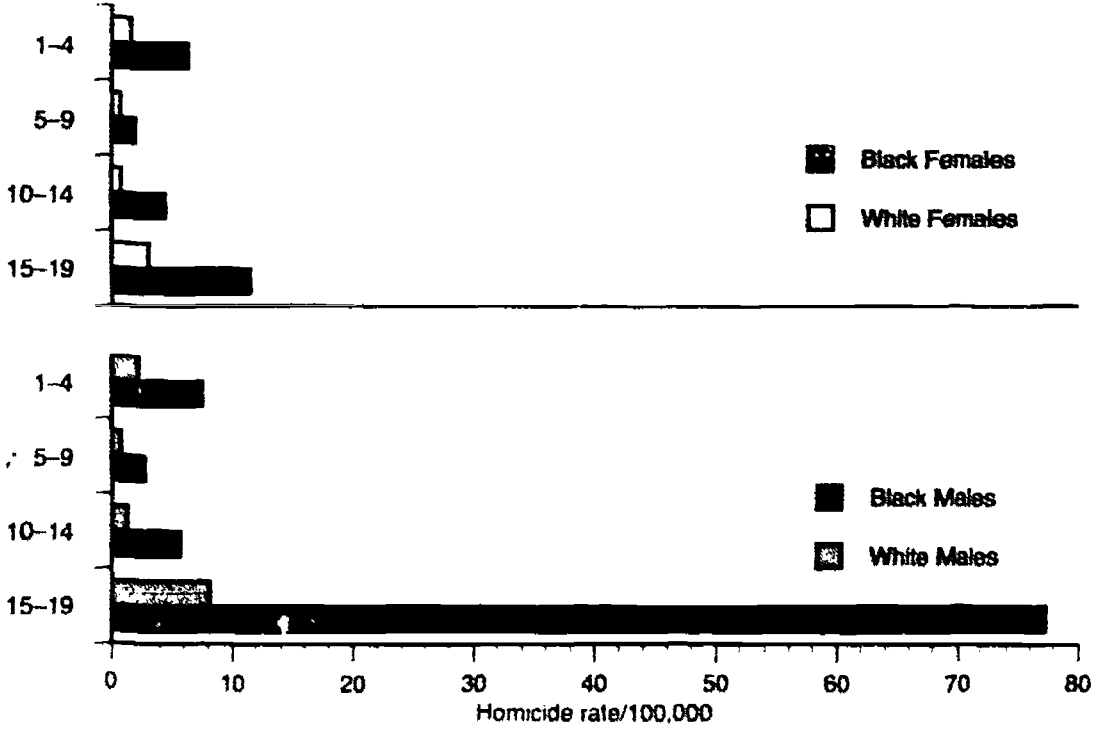


Figure 4.2
Homicide Rates/100,000 by Gender, Race and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

Homicide

Males are at a much greater risk for homicide than females. In 1988, among all children ages 19 and under, 7 out of 10 homicides involved males.

Overall, the homicide rate for black children is 6 times that for white children and is higher for all age groups regardless of gender. In no age group is this difference more staggering than males ages 15–19. Black males ages 15–19 are almost 10 times more likely to be victims of homicide than their white male counterparts.

Homicide

Firearms play a significant role in childhood mortality and morbidity. In 1988, 77% of the homicides in the 15–19 year old age group involved a firearm.

It is estimated that there are currently more than 200 million handguns, rifles and shotguns present in our communities (Bureau of Alcohol, Tobacco and Firearms, 1991).

In a national survey of school students, 48.1% of 10th grade males and 33.6% of 8th grade males answered yes when asked if they could obtain a handgun (American School Health Association et al., 1989).

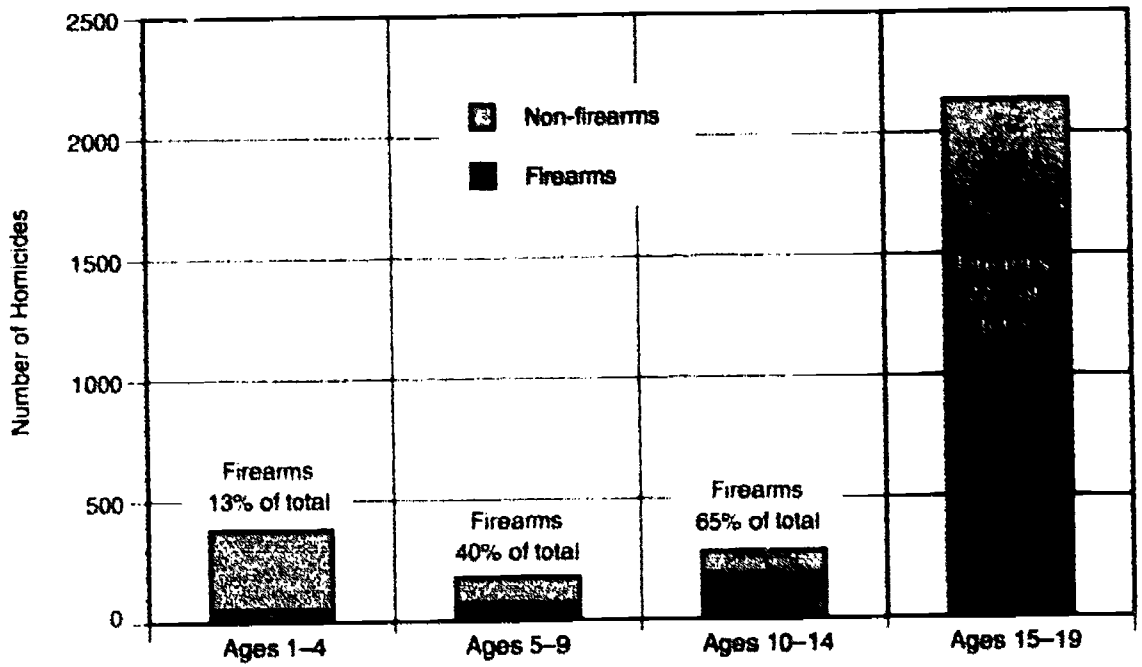


Figure 4.3
Number of Firearm vs. Non-Firearm Homicides by Age Group, 1988.
Source: Fingerhut et al., 1991.

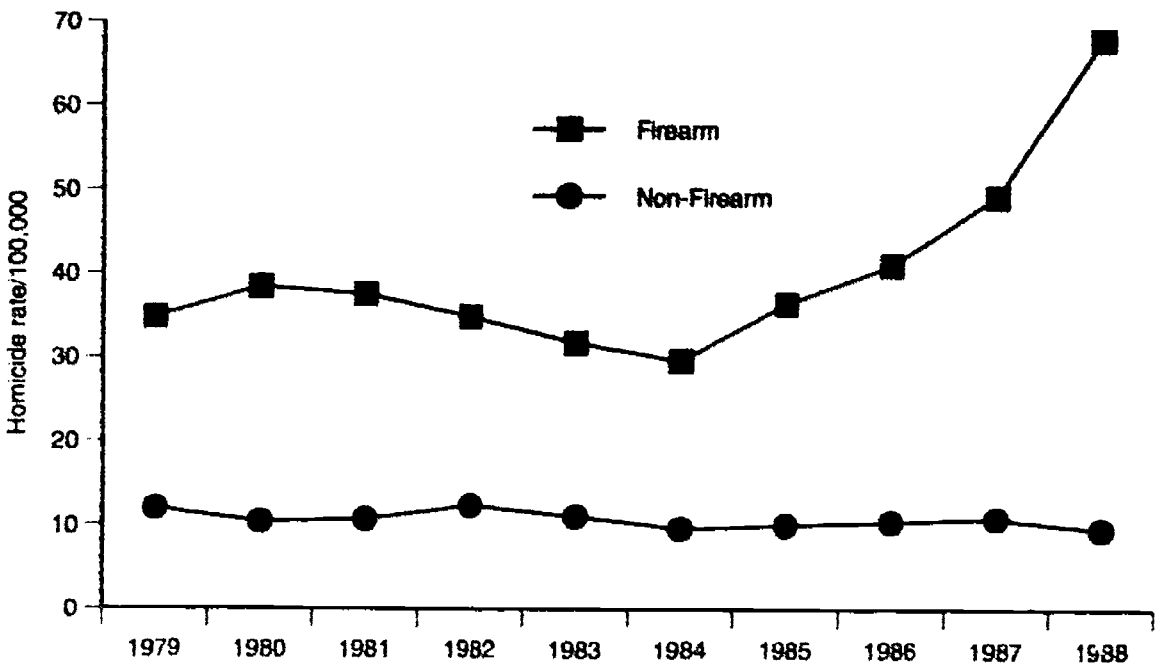


Figure 4.4

Firearm vs. Non-Firearm Homicide Rates/100,000: Black Males 15–19, 1979–1988. Source: Fingerhut et al., 1991.

Homicide

Homicide is the leading cause of injury death for black males ages 15–19. From 1984 to 1988, the firearm-related homicide rate for this group more than doubled.

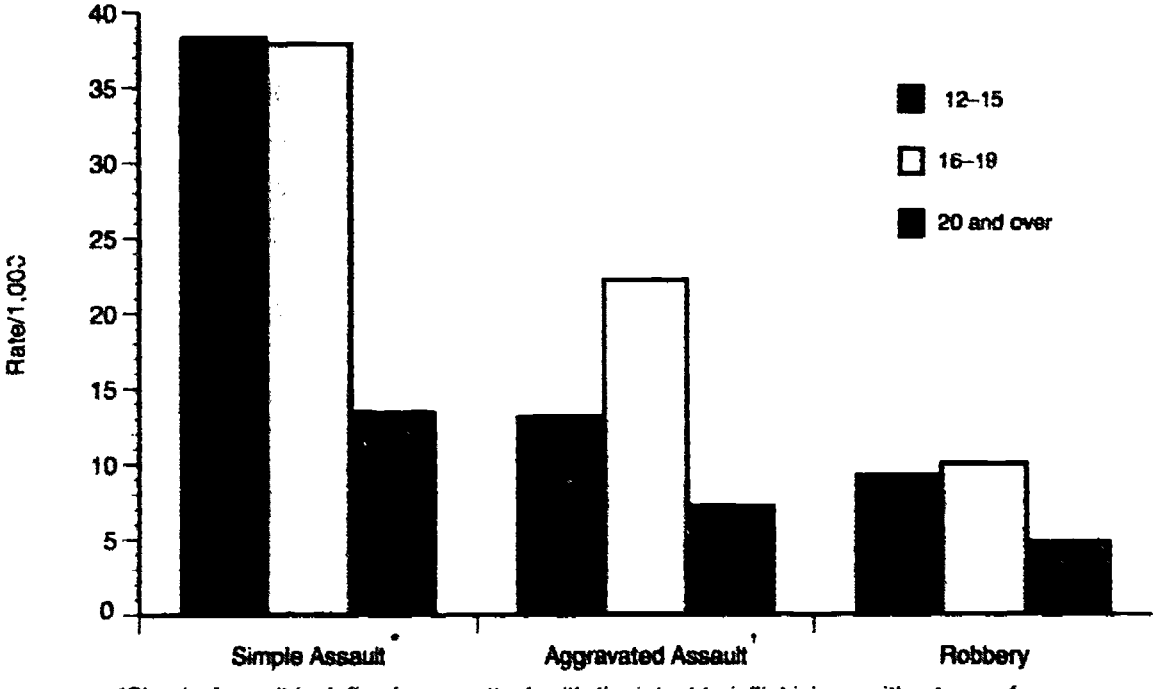
Poverty and inequality are thought to be major risk factors for homicide. "In fact, when poverty is controlled for, the excess risk among blacks virtually disappears" (Runyan, 1989).

Violent crimes against adolescents often involve casual acquaintances of the same gender, race and age. Effective interventions targeting this age group may thus benefit both victims and assailants.

Assault

The most recent National Crime Survey reveals that America's youth are more vulnerable than adults to both violent and property crime. "On average, every 1,000 teenagers experience 67 violent crimes each year compared to 26 for every 1,000 adults age 20 or older" (Whitaker and Bastian, 1991).

In a population-based study in Massachusetts, it was determined that annually 1 in 132 children (ages 0–19) received an intentional injury that required medical attention at a hospital. For every homicide there were 534 emergency room visits and 33 hospital admissions (Guyer et al., 1989).



*Simple Assault is defined as an attack with the intent to inflict injury, without use of a weapon
†Aggravated Assault is defined as an attack with the intent to inflict injury, usually with a weapon.

Figure 4.5
Average Annual Victimization Rate/1,000 by Age Group and Type of Crime, 1985–1988.
Source: Whitaker and Bastian, 1991.

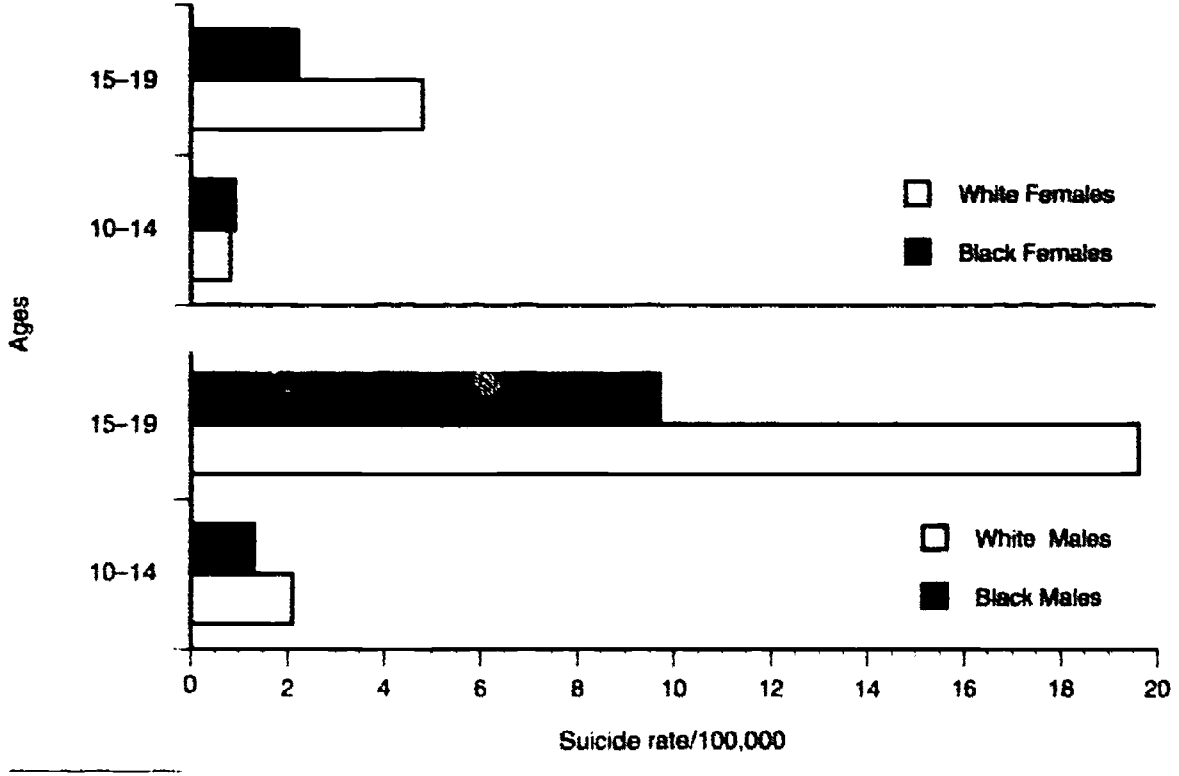


Figure 4.6
Suicide Rates/100,000 by Gender, Race, and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

Suicide

In 1988, 2,296 U.S. children (10–19 years old) committed suicide. This averages to more than six suicides per day throughout the year. Ninety percent of these suicides were among adolescents ages 15–19. Almost as many 15–19 year olds committed suicide in 1988 (2,059) as were victims of homicide (2,135).

White males ages 15–19 are a particularly high-risk group for suicide. This group is two times more likely to commit suicide than black males ages 15–19 and four times more likely than white females ages 15–19.

Suicide

Suicide rates have shown increases since 1960 among both 10–14 year olds and 15–19 year olds. Between 1960 and 1988 the suicide rates for males and females ages 15–19 increased threefold. Suicide also occurs in younger children (5–9 years) but the rate is very low.

Suicide among children and youth is often a very impulsive act done with little or no planning. A recent screening of adolescents 12–14 years old revealed that 1 in 25 males and 1 in 11 females experienced significant suicidal thoughts (Garrison et al., 1991).

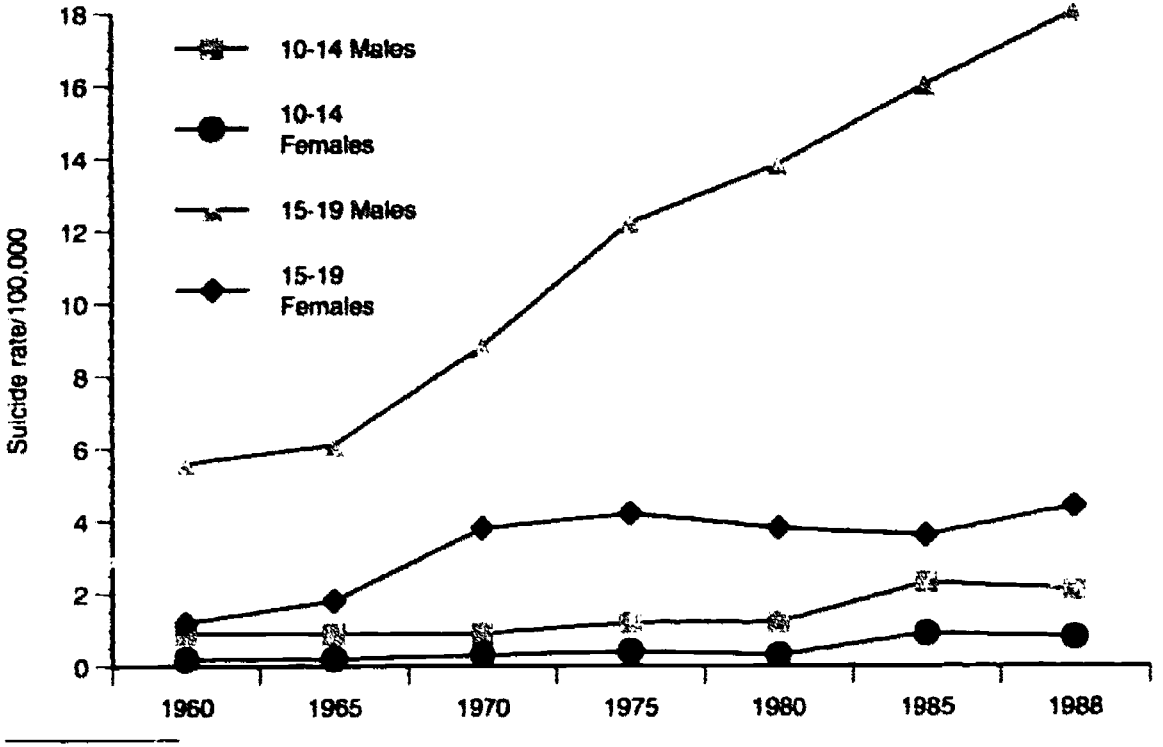


Figure 4.7
Suicide Rates/100,000 by Gender and Age Group, 1988.
Source: Fingerhut, NCHS, 1988; Leenaars and Lester, 1990.

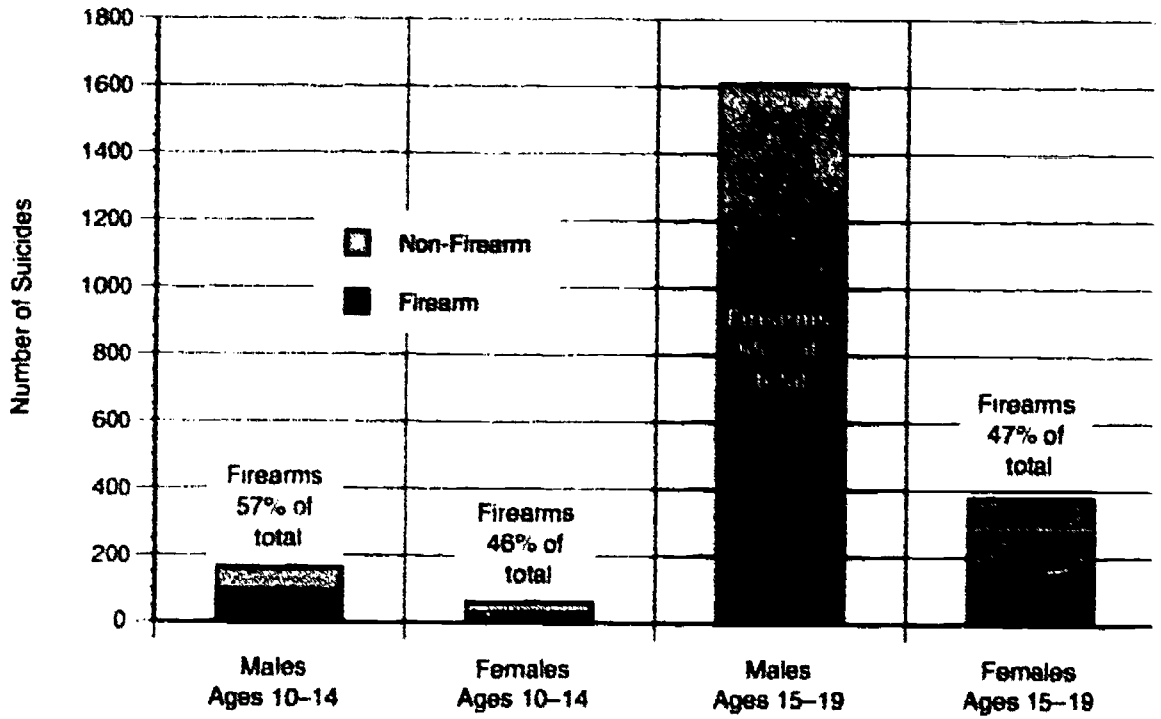


Figure 4.8

Number of Firearm vs. Non-Firearm Suicides by Gender and Age Group, 1988. Source: Fingerhut et al., 1991.

Suicide

Almost two times as many adolescent females as males report actually trying to hurt themselves (American School Health Association et al., 1989). However, it is estimated that females complete 1 out of every 25 suicide attempts while males complete 1 out of 3 attempts (Rosenberg et al., 1990).

Non-fatal suicide attempts most often involve intentional ingestions and cutting or stabbing (Guyer et al., 1989). The most frequent suicide methods among youth are use of a firearm, hanging and intentional poisoning (Holinger, 1990).

Child Abuse and Neglect

In 1986, an estimated 1,100 U.S children died as a result of child maltreatment. Eighty-nine percent (approximately 1,000 children) were 2 years old or younger.

Child maltreatment is generally divided into the two broad categories of child abuse and child neglect perpetrated by a parent or caretaker. Child abuse includes physical, sexual, and emotional abuse. Child neglect includes physical, emotional and educational neglect.

Using conservative estimates, more than 930,000 children nationwide experienced abuse or neglect in 1986.

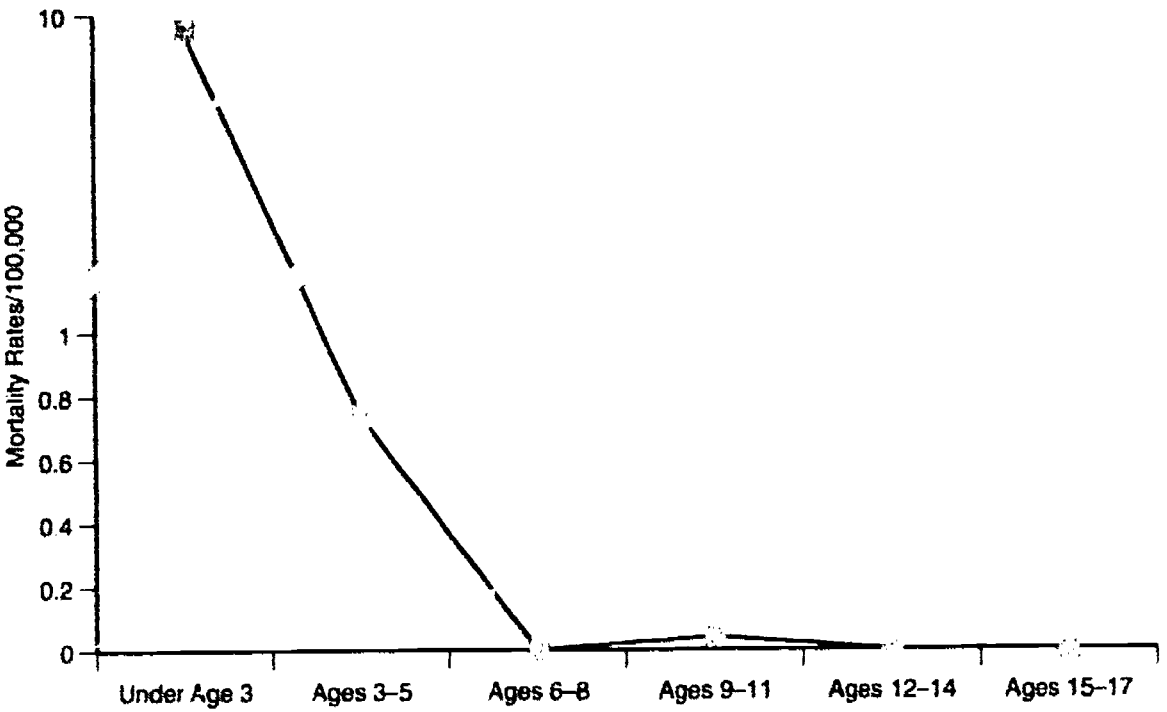


Figure 4.9
Estimated Mortality Rates/100,000 Resulting from Child Maltreatment by Age Group, 1986.
Source: National Center on Child Abuse and Neglect, 1988.

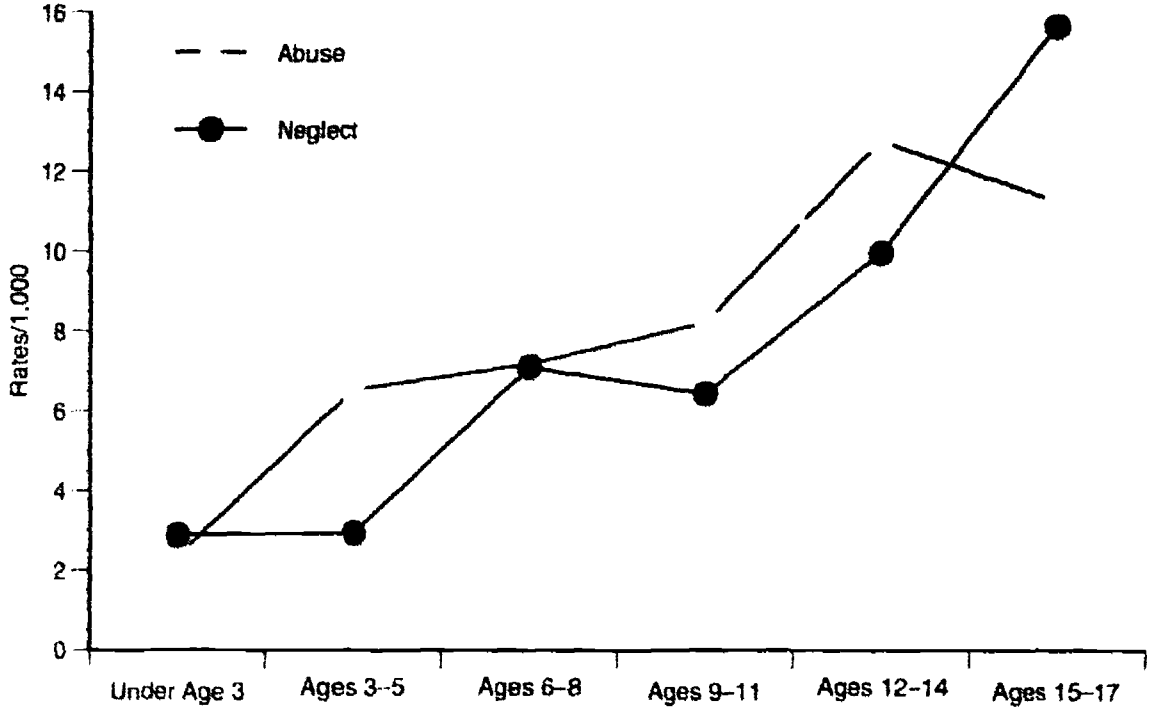


Figure 4.10
Estimated Rates of Child Abuse and Neglect/1,000 by Age Group, 1986.
Source: National Center on Child Abuse and Neglect, 1988.

Child Abuse and Neglect

Rates of non-fatal child abuse and neglect increase with age. Research indicates that children raised in abusive and neglectful environments are at high risk for physical and emotional health problems as well as developmental delays and school-related problems (Hochstadt et al., 1987).

Child abuse is also strongly linked to domestic violence. A study of 906 children living in battered women's shelters found that nearly 50% of the children were also victims of physical and sexual abuse (Layzer et al., 1986).

Child Abuse and Neglect

It is estimated that over 820,000 children experienced non-fatal injuries related to child maltreatment in 1986. Seventeen percent sustained serious injuries involving life-threatening conditions or potential long-term impairments. Moderate injuries persisted in observable form for at least 48 hours. Like the risk of maltreatment itself, the rate of non-fatal injury due to maltreatment increases with age.

Injury type is important in child abuse documentation. Even without an adequate injury history, child abuse can often be confirmed based on the nature of the injury and clinical symptoms (Kempe, 1962).

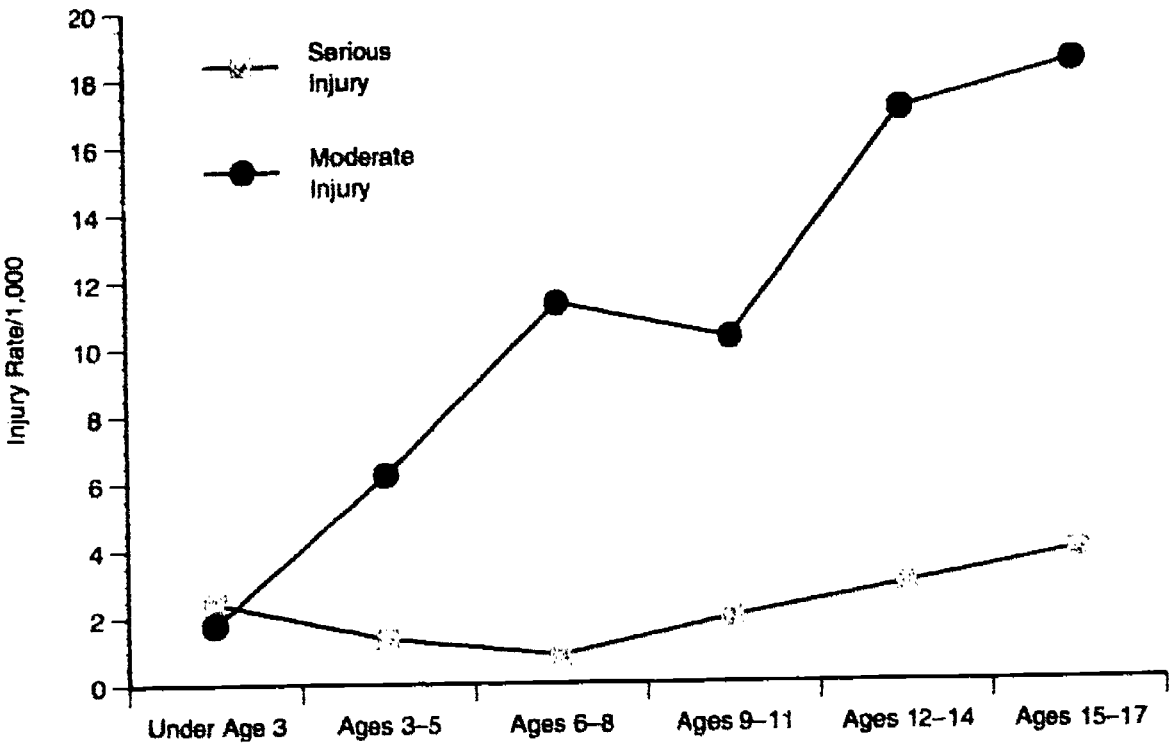


Figure 4.11

Estimated Injury Morbidity Rates/1000 as a Result of Child Maltreatment by Age Group, 1986. Source: National Center on Child Abuse and Neglect, 1988.

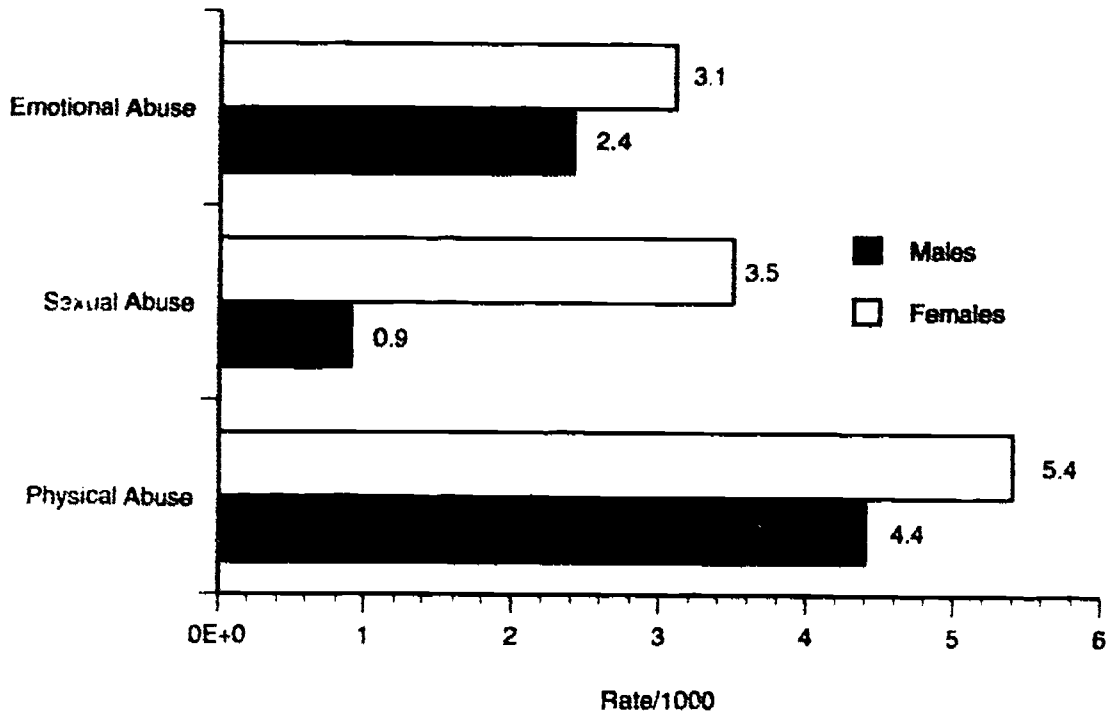


Figure 4.12
Rate of Abuse/1,000 by Type of Abuse and Gender, 1986.
Source: National Center on Child Abuse and Neglect, 1986.

Child Abuse and Neglect

Females suffer higher rates of abuse than males in all three abuse categories. Females are nearly 4 times more likely to be sexually abused than males.

Analysis of national data found no relationship between child maltreatment and race, but low income is a significant risk factor for both abuse and neglect. In 1986 children whose family income was less than $15,000 were 4 times more likely to be abused and over 7 times more likely to be neglected than children in higher income families.

Rape

Accurate rates of sexual assault among adolescents are extremely hard to obtain. One nationwide study of 1,725 adolescents estimates a rate of 9.2 rapes or attempted rapes involving violent force and/or the use of a weapon per 1,000 females ages 13–19 in 1978 (Ageton, 1983).

The vast majority of adolescent rapes occur between two people who know each other. One study of females ages 13–17 found that they were most commonly raped by a friend, acquaintance, or relative (Massachusetts Department of Public Health, 1990).

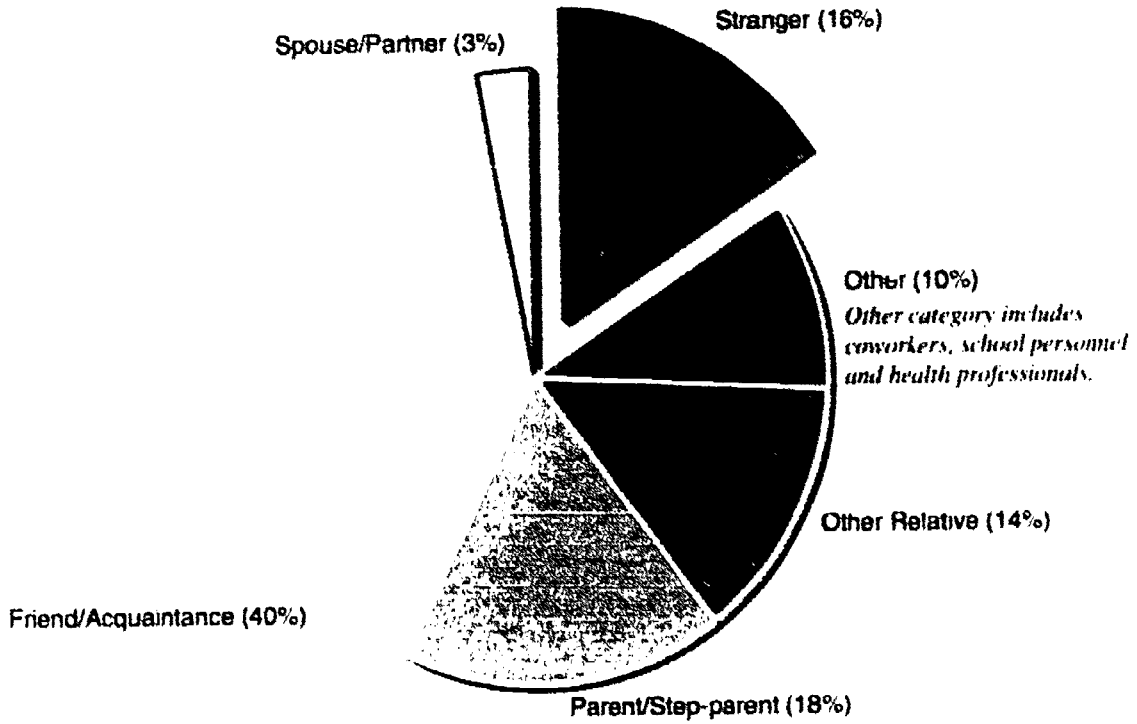


Figure 4.13
Relationship between Rape Victim (Ages 13–17) and Assailant, Massachusetts, 1985–1987.
Source: Massachusetts Department of Public Health, 1990.

SECTION V
INTERVENTIONS

Preventing Injury

Because children are at risk for different injuries at various ages, preventive efforts need to vary by age.

Injuries to children ages 0 to 4 years usually occur in settings controlled by their parents. Making products and the environment safer, building parental knowledge, and supporting families to minimize abuse and neglect can reduce injury rates.

For children, ages 5 to 9, and adolescents, ages 10 to 14, teaching skills that will keep them safe as pedestrians, bicycle riders and motor vehicle occupants will greatly reduce injuries. Other interventions include making school a safer place, providing safe play areas and protective sports equipment, including safety in neighborhood planning, and supporting families to minimize family violence.

For the mid to late adolescent, enforcing safety belt, motorcycle helmet, workplace, and alcohol consumption laws, limiting access to firearms, and developing conflict resolution skills to minimize interpersonal violence are of most benefit.

The prevention chart on the following pages gives an overview of where to intervene and on what topics. In conjunction with site-specific interventions, involving the general community and media will help to change societal norms to non-acceptance of injury and violence.

Figure 5.1 *Intervention Sites and Topics for Childhood Injury Prevention Programming*

Intervention Site	Prenatal	Birth	1-4 Years
Prenatal Care	Parenting Skills Training Parent Seat Belts Infant Safety Seats Ed Loans Home Safety		
Hospitals		Infant Safety Seats Loans	Gates
WIC Parenting Classes		Infant and Toddler Safety Seats	Toys Home Safety
Primary Health Care Settings		Infant and Toddler Safety Seats	Pedestrian Safe Home Safety
Homes			Home Safety, Toy Sa Motor Vehicle Safety Products
Schools			
Day Care Centers			Playground Safety
Worksites		Infant Safety Seats	Toys, Home Safety
Social Services Youth Services			Family Support
Local Law Enforcement		Infant and Toddler Safety Seat Laws	
Code Enforcement			Tap Water Regulators/Building Codes Smoke Detectors, Pool Fences, Gates
State and Federal Government			
Local Community			
Media		Infant Safety Seats	Toddler Seats

5-9 Years	10-14 Years	15-19 Years
	Bike Helmets	
Seat Belts Bicycle Safety, Helmets		Farm Machinery Recreational Safety Alcohol Counseling
Pedestrian Skills Bicycle Skills	Safe Playgrounds, Sports	Violence Reduction Ed Farm Machinery Enforcement of Child Labor Legislation
	Bike Helmets After School Programs	
	Enforcement of Child Labor Legislation, Training for Adolescent Emp[illegible]s	
	Seat Belt Laws	Suicide Crisis Centers Out-of-Home Care
		Motor Cycle Helmet Laws Alcohol Sales/Consumption Laws Handgun Storage and Control
	Reduce Televised Violence	Driver's License at 18 Handgun Control
	Bike Trails, Sidewalks Bike Helmet Legislation	
	Safe Off-Street Play Areas, Organized Sports	Server and Point-of-Sale Interventions
	Seat Belts Reduce Televised Violence Bike Helmets	
Safe Play Areas		Occupational Safety/Drinking and Driving

The Cost of Injury

The direct and immediate health care costs of non-fatal injuries to children have been estimated at $5.1 billion annually in 1987 dollars (Malek et al., 1991).

Falls account for the highest proportion of costs through age 14; for ages 5 through 14 many of the incurred costs are related to leisure time and sports activities. For older adolescents the costs incurred result primarily from motor vehicle occupant injuries and sports.

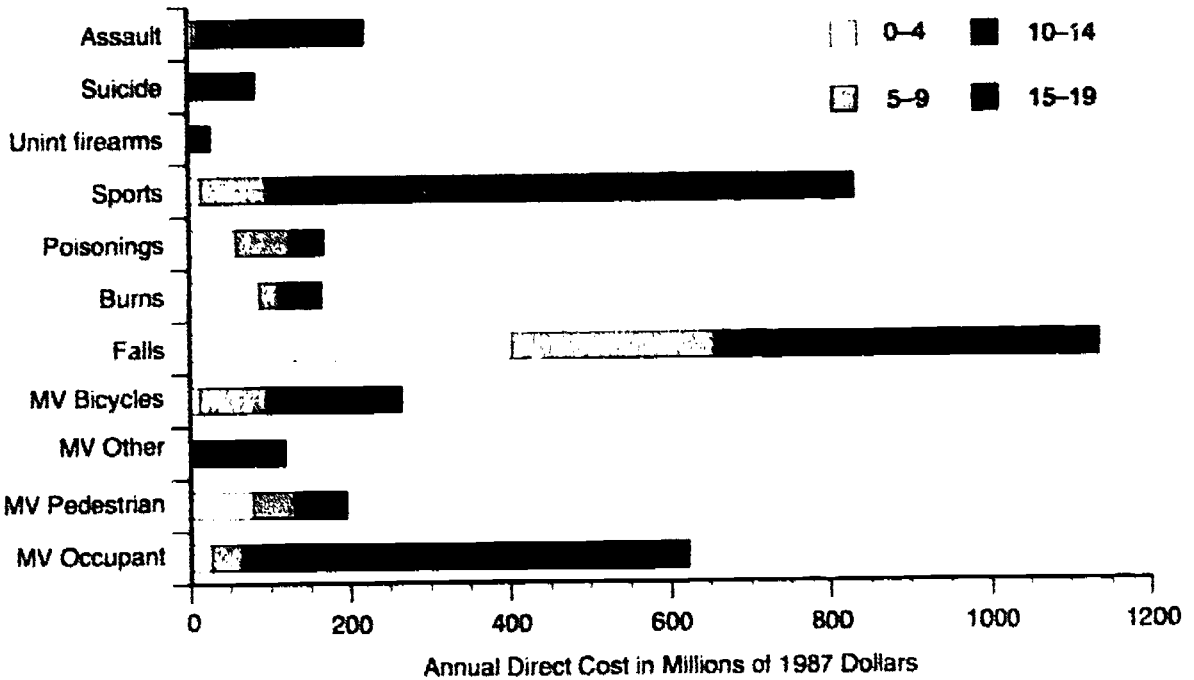


Figure 5.2
Annual Direct Medical Costs of Non-Fatal Childhood Injuries, by Age in Millions of 1987 Dollars. Source: Malek et al., 1991.

What You Can Do to Prevent Child and Adolescent Injury

As shown in this book, our children, and especially our adolescents, are at risk of dying or sustaining a long-term disability from preventable injuries. Reducing the shocking number of fatal and non-fatal injuries to our children, however, will require the concerted efforts of many sectors of the community. Our children need a safe place to develop and grow; we cannot accept less. Effective interventions for injury prevention require:

Planning and Prioritizing

- A broad-based coalition representing the community of interest;
- surveillance tools and methods to identify and monitor the number of injuries;
- the use of E codes to aid in the ascertainment of injury causes; and
- selection of priority areas for injury control.

Comprehensive Multifaceted Approach

- Evaluation of prevention strategies to determine effectiveness;
- dissemination and universal implementation of effective strategies;
- targeting of high-risk groups, such as low income; and
- incorporation of prevention messages and efforts into service systems for children and adolescents.

Institutionalization and Acceptance

- Coordination of local, State and Federal efforts;
- institutionalization of injury prevention programming;
- enforcement of existing legislation protecting children; and
- development of a societal norm of a 'safe childhood and adolescence.'

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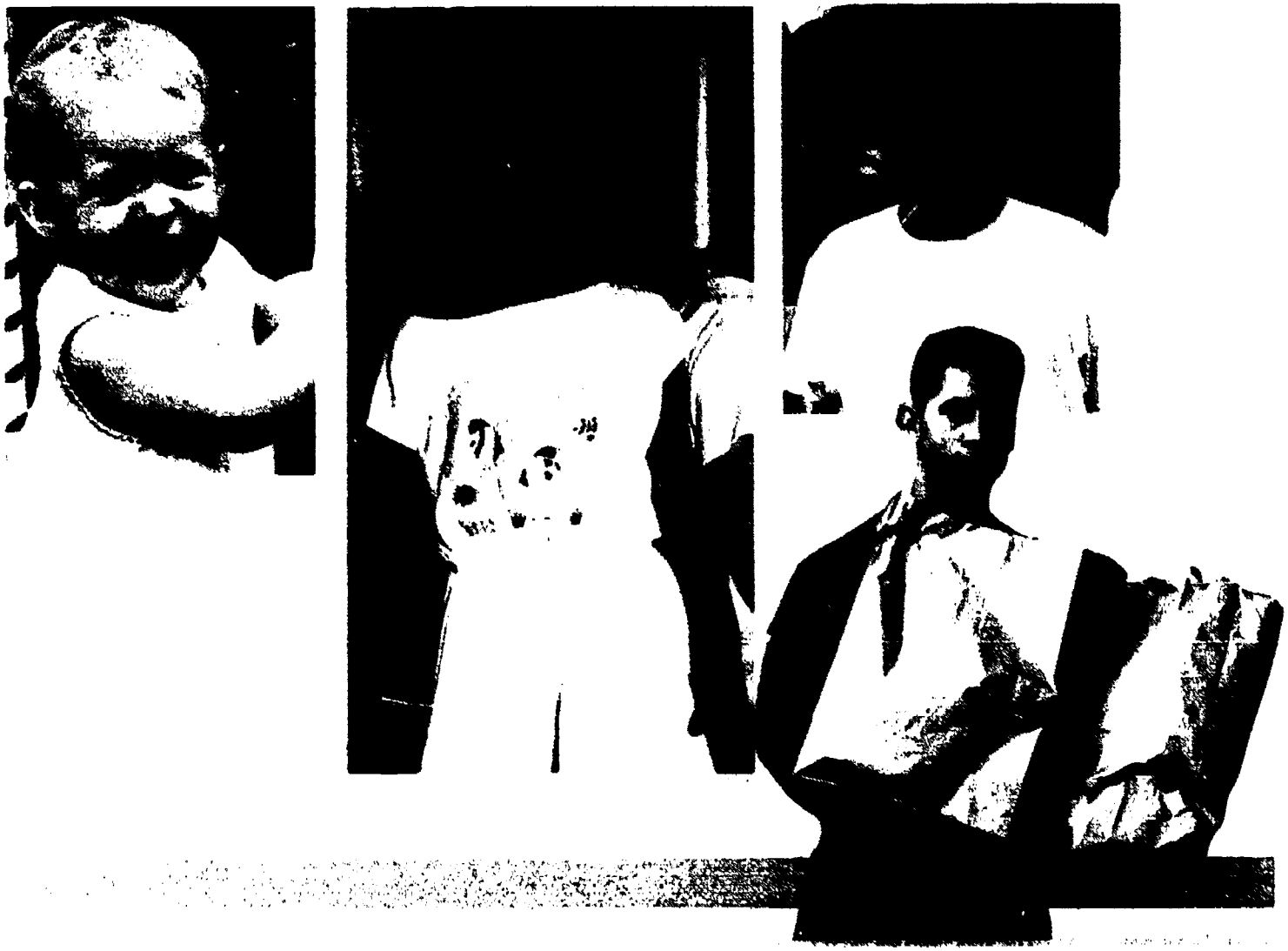
APPENDIX A: INJURY MORTALITY RATES

Figure A

Mortality Rates/100,000 Population by Injury Type and Age Group, 1988.
Source: Fingerhut, NCHS, 1988.

	Age Group			
Category of Injury (E Code)	**1–4**	**5–9**	**10–14**	**15–19**
All Injury Deaths (E800-999)	22.6	12.8	16.1	70.5
Motor Vehicle Occupant (E810-825 [.0,.1, .8])	3.0	2.2	3.3	23.8
Homicide (E960-978)	2.6	1.0	1.7	11.7
Other Motor Vehicle (E810-825 [.2-6, .9])	0.7	0.6	1.3	10.5
Suicide (E950-959)	NA	NA	1.4	11.3
Drowning (E910,830,832)	4.2	1.6	1.4	2.7
MV Pedestrian (E810-825 [.7])	3.1	2.9	1.8	2.2
Fire/Burns (E890-899, 924)	4.6	1.6	0.8	0.7
Unintentional Firearms (E922)	0.3	0.3	1.1	1.5
MV Bicycle (E810-825[.6])	0.1	0.8	1.1	0.7
Poisoning (E850-858)	0.4	0.1	0.2	1.0
Falls (E880-888)	0.4	0.1	0.2	0.6



159