



Health Care Costs Associated with Violence in Pennsylvania 1994

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Executive Summary

Violence is a recognized and significant issue in the United States and Pennsylvania. In the late 1980s and early 1990s, violence appeared to be increasing at an alarming rate. Consequently, several initiatives were undertaken either to explain the underpinnings of violence or to seek its prevention. Numerous prevention-based programs are currently underway in Pennsylvania.

Solving the problem of violence, though, is not simple. The assessment of violence is quite diverse. It means different things to different audiences. At its core, violence directly affects victims, perpetrators, and their families. Indirectly, violence affects the public through influences on the legal system, the medical system, the criminal justice system, state government, the legislature, and many social support agencies.

Studies of violence are marked by some well-known findings. These findings include the relationship of firearms to higher rates of homicides in the United States, and the role of unemployment, previous maltreatment, and drug and alcohol consumption as risk factors for violence.

Research in violence, though, is also marked by several debates and many situations where the burdens of violence are poorly characterized. Perhaps the strongest debate relates to how violence is defined. There are few agreed upon standards in this area. Several definitions of violence have been applied in the literature and amongst institutions in Pennsylvania. Perhaps the category of violence most poorly understood is domestic violence. In comparison to assessments of crime-related violence, we know relatively little about the impact of domestic violence. Such discrepancies in the assessment of violence limit the ability to study violence in a broad and comprehensive manner.

Several public health initiatives are ongoing to investigate the problems associated with violence. Among these are assessments of the economic impact of violence. Economic studies not only highlight the current costs related to violence, but also highlight what money might be saved if intervention programs are successful.

The objectives of this report are to identify the number of violent events that occurred in Pennsylvania for the year 1994, and to estimate the health care costs associated with these events.

The report adopts a broad definition of violence and focuses on the following major categories of violence; inter-personal violence including, homicide, aggravated assault, rape, and domestic abuse; self-directed violence, including completed and attempted suicide; and violence involving firearms. As the report details the health care costs associated with violence, it highlights some of the most severe aspects of violence in Pennsylvania.

Data for the report were gathered from a number of published and unpublished sources in the state to identify the incidence of violent events and their related health care costs. Data sources used to identify information specific to Pennsylvania include the Pennsylvania Health Care Cost Containment Council database on hospital admissions, the Pennsylvania Emergency Medical Transport database on ambulance runs, the Pennsylvania Trauma Systems Foundation data on trauma center admissions, and data on reported domestic abuse from the Pennsylvania Departments of Public Welfare and Aging, and the Pennsylvania Coalition Against Domestic Violence.

In 1994, there were 49,651 violent crimes reported to police departments in Pennsylvania. The rate of violent crime was 412 offenses per 100,000 population. This rate was highest in the Southeast Human Service Region (including Philadelphia County), and lowest in the Central Human Service Region (the counties of Central Pennsylvania).

Identifying the frequency of domestic violence is more problematic. State-based monitoring systems substantiated 7,038 cases of child abuse and 2,344 incidents of elder abuse. National data suggest that both estimates are under-reported. Spouse abuse represents another significant form of violence in Pennsylvania. In 1994, about 91,859 new individuals sought treatment and/or counseling in the network of women's shelters and domestic violence programs providing services in the state.

Self-directed violence posed a particular burden in Pennsylvania from the perspective of health care costs. Accurate data on the incidence of attempted suicide was not available, but 11,213 hospital admissions were related to self-directed violence. This represents 61% of all violence-related admissions. There were 1,328 completed suicides in Pennsylvania in 1994, nearly twice the number of homicides.

The best information on the health care costs of violence in Pennsylvania is that accounted for by hospital admissions. In 1994, a total of 18,652 violence-related admissions were identified. The total monetary charges for these admissions were \$233 million. The total monetary costs for these stays were \$86.3 million.

While the majority of overnight stays related to violence were attributed to self-directed violence, the majority of expenditures were attributed to inter-personal violence. On a per admission basis, the average cost of a hospital stay was \$6582 for inter-personal violence and \$3529 for self-directed violence.

The total hospital cost attributed to inter-personal violence in 1994 was \$46.7 million. Aggravated assaults accounted for \$42 million of this figure. It is not clear what the total hospital costs associated with domestic violence might be, as the use of E-codes to identify abuse was not widespread in 1994. One-hundred seventy-seven admissions, though, were related to child abuse; accounting for \$838,000 in costs.

Inter-personal violence was proportionally higher amongst males, African Americans, and persons with government-based health insurance coverage. Over \$28 million of the \$46.7 million total for inter-personal violence was paid for through public insurance sources.

Total hospital costs related to self-directed violence in 1994 was \$39.6 million. Attempted suicides accounted for \$37 million of this total. Self-directed violence was proportionally higher amongst females and Caucasians.

Hospital admissions related to the use of firearms in violence accounted for 10% of all identified events. However, nearly \$20 million was attributed to these admissions; roughly 22% of the total estimated costs of admissions.

The figure of \$86 million for an estimate of the health care costs associated with violence in Pennsylvania is an underestimate. It reflects only the costs associated with hospital admissions. While hospital costs generally make up a large portion of total health care costs, other health services, including long-term care and mental health care, may be important in the treatment of victims of violence.

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GLOSSARY, DEFINITIONS, AND ABBREVIATIONS

AAA	Agencies on Aging
ACISS	Allegheny County Injury Surveillance System, a review of hospital ED and inpatient records, as well as Coroner’s reports, for injuries from violence in Allegheny County, Pennsylvania.
APS	Adult Protective Services
BJS	Bureau of Justice Statistics
BRFSS	Behavioral Risk Factor Surveillance System; a survey of risk taking behavior in the US population undertaken by the Centers for Disease Control.
CPS	Child Protective Services
Direct Medical Costs	The value of health care resources used in providing services for subjects affected by violence or other conditions.
Domestic Violence	Violence amongst family members. Includes spouse abuse, child abuse, and elder abuse.
E-codes	External Cause of Injury Codes, a coding system for medical records which identifies the circumstances related to the cause of an injury.
EMS	Emergency Medical Services
GSW	Gunshot wound
HC4	Pennsylvania Health Care Cost Containment Council
ICE	International Collaborative Effort on Injury Statistics
Interpersonal Violence	Violence between individuals. Includes crime-related violence and domestic violence.
Intimate Partner Violence	Violence between spouses, ex-spouses, or boyfriends and girlfriends. Commonly referred to as domestic violence.
IPV	Intimate Partner Violence
NCANDS	National Child Abuse and Neglect Data System.
NCCAN	National Council on Child Abuse and Neglect.

NCEA	National Center on Elder Abuse. Provides information and a clearinghouse on elder abuse statistics for the United States.
NCHS	National Center for Health Statistics, maintains vital statistics system for the United States.
NCVS	National Crime Victimization Survey; a regular survey of the US population over age 12 years for self-reported events of assault/violence.
NEAIS	National Elder Abuse Incidence Study. Identifies the new cases of elder abuse in 1996 from state agencies and individuals within community agencies dealing with the elderly.
NEISS	National Electronic Injury Surveillance System, a surveillance of injuries using a sample of emergency departments across the country.
NHAMCS	National Hospital Ambulatory Medical Care Survey, a national survey of emergency department and other outpatient visits to short-stay hospitals.
NIS	National Incidence Survey of Child Maltreatment
NVAWS	National Violence Against Women Survey, a telephone survey of U.S. population 18 years and older for self-reported events of rape and assault between intimate partners.
NWS	National Women’s Study, a telephone survey of women 18 years and older
PCADV	Pennsylvania Coalition Against Domestic Violence. A statewide network of 65 community-based domestic violence programs.
PCCD	Pennsylvania Commission on Crime and Delinquency
PCVS	Pennsylvania Crime Victimization Survey, a telephone survey of the Pennsylvania population over age 18 years for self reported events of violence.
Perpetrator	A person committing an act of violence.
PTSF	Pennsylvania Trauma Systems Foundation. This agency maintains a registry of all patients seen in the Level I trauma centers in the state of Pennsylvania.
SCI	Spinal Cord Injury.
Self-Directed Violence	Violence inflicted on oneself. Includes suicides and suicide attempts.
SHR	Supplemental Homicide Report to the Uniform Crime Reporting Program. This form is completed by local police agencies on the events surrounding reported homicides.

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- SIVV**.....Study of Injured Victims of Violence; a supplement to the NEISS surveillance system designed to investigate the injuries of victims of violence presenting to emergency department in the US.
- TBI**.....Traumatic Brain Injury.
- UCR**.....Uniform Crime Reports; a crime reporting system maintained by the Federal Bureau of Investigation. In Pennsylvania, the State Police gather crime reports from local jurisdictions and compiles them for statewide figures.
- YRBS**.....Youth Risk Behavior Survey, a school-based survey designed to identify risk behaviors in students from grades 9-12.

Abstract

Objectives

To identify the number of violent events that occurred in Pennsylvania for the year 1994, and to estimate the health care costs associated with these events.

Methods

Data were gathered from several sources to identify the incidence of violence and related costs. The report focuses on the following categories of violence; homicide, aggravated assaults, rape, completed and attempted suicide, child abuse, partner abuse, elder abuse, and violence involving firearms. Health care items examined include paramedic runs related to assault, hospital admissions, referral sources for admissions, and trauma center admissions. Violent events were identified in medical systems by the use of E-Codes. Cost-to-Charge ratios were applied to recorded charges in the hospital database to identify costs.

Results

In 1994, an estimated 49,651 violent crimes were committed and an estimated 100,000 persons were victims of domestic violence. There were an estimated 90,000 emergency room visits, and 18,652 hospital admissions related to violence. The total charges listed for the hospital admissions were \$234 million. Related costs were estimated at \$86 million. The largest number of admissions was related to suicide attempts, but the largest cost was associated with crime-related violence. The estimated cost of firearm-related

the cost of violence was paid for by public insurance plans.

Costs Associated with Violence in

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Introduction

Violence captures our attention like few other human events. Accounts of murder, assault, and rape are a regular staple of newspaper and television reports; often the lead story. Violence is also a common element of mass entertainment via television or the cinema. As one result, a common perception is that the issue of violence is a growing problem in the United States.

Indeed, statistics on the frequency of crime in the early 1990s found that this was true, particularly amongst juveniles. More recently, though, data indicate a decline in crime-related violence (1). Still, the impact of violence is sizeable. Over 2 million Americans are victims of violent injury each year from crime (2), and the United States ranks first in the developed world in violent death rates (3).

Until recently, most discussions of violence focused exclusively on events related to crime. This focus excluded domestic violence and the impact associated with child abuse, spouse abuse, and elder abuse. Large numbers of individuals are now understood to be victims of domestic violence.

In response to the rising trend in crime and the Violence Against Women Act, a number of commissions and panels were established to examine causes and outcomes of crime and domestic violence in the United States.

Many professionals now believe that violence is preventable, and is no longer an inevitable experience. Several national objectives have been established in an effort to reduce the frequency and impact of violence.

Statewide, there are several programs underway in Pennsylvania to prevent or reduce the impact of violence. The State Legislature has been extremely active in this area (See box on next page). For example, the 1997-98 state budget included "\$1 million

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for grants to communities to develop strategies to address juvenile problems” and \$17 million for new or expanded correctional facilities. The budget also allocated increased federal funds to provide services to victims of domestic violence and to educate school-aged children about rape prevention.

The objective of this report is to systematically identify the relative frequency of violence in Pennsylvania, and to estimate the health care costs related to it. This information serves two purposes; (a) it identifies the impact of violence on the health care system in Pennsylvania, and (b) it provides information of relevance to the evaluation of violence prevention programs.

Background

Violence often appears to be an intractable problem in the United States. Crime, and specifically homicide, has been an important concern for Americans for many years. Concerns about violence have led to interest in finding better ways to prevent and control violence.

The federal government has set a series of objectives for the year 2000 that seek to reduce the frequency of violent and abusive behavior (4). Objectives for the year 2010 are currently under discussion (5). These objectives provide some direction to national policy decisions and set goals for violence prevention.

The prevention of violence requires good data on incidence, risk factors, and outcomes to identify if specific interventions are appropriate and effective. Research in violence, though, is marked by several debates and many situations where the burdens of violence are poorly characterized. There is considerable disagreement in the literature regarding the estimates of the incidence of violence, the risk factors related to violence, and the outcomes of violence. While a number of interventions to reduce violence are ongoing today, debates about the effectiveness of these and other interventions are common.

One reason why our understanding of violence is muddled is due to the diverse nature of violence. The assessment of violence means different things to different audiences. Relevant audiences may include criminal justice, social service, legal, medical, public health, and government officials, amongst others (including the public).

Incidence of Violence

Historically, most research and reports on violent behavior have focused on events related to crime. More recently, the public health community has recognized the problem of violence. Public health approaches to the prevention of violence look to identify the magnitude of the problem, identify populations at risk, identify elements associated with violence, and identify interventions to modify these elements (6).

The Pennsylvania Legislature and Juvenile Violence

Pennsylvania State Government has had an active interest in juvenile violence for many years. Much of this attention has focused upon the criminal justice system and juvenile offenders. The most significant legislation of the near term was the Pennsylvania Juvenile Justice Act of 1972. This act provided juveniles the right of due process and changed the reimbursement that counties received for housing juvenile offenders.

The Federal Juvenile Justice and Delinquency Prevention Act of 1974 influenced subsequent legislation in Pennsylvania. Act 148, passed in 1976, reorganized the funding for Pennsylvania’s youth services, and sought to develop community-based facilities for offenders. Act 41, passed in 1977, amended the PA Juvenile Justice Act. to increase Pennsylvania’s compliance to federal rules, by addressing the separation of juvenile and adult jails.

The State Legislature has also directed that data be collected on juvenile delinquency. Information is available through the juvenile courts, the Dept. of Public Welfare Detention Reports, the Bureau of Corrections County Jail Statistical Reports, and the Pennsylvania Uniform Crime Reports.

More recently, the House Select Committee on Violence was formed to examine the causes of violence in PA and review programs which have been successful in preventing violence. The conclusions and policy recommendations of this committee were published in a 1994 final report.

In 1993, the Senate directed that the Joint State Government Commission review the costs of violence in PA. Their report focused on juvenile violence and was published in 1995.

From the public health perspective, monitoring of the frequency of violence lays the foundation for nearly all efforts to reduce violence. Monitoring systems can identify the number of events that occur, the victims of violence and their characteristics, as well as the outcomes of violence.

Several monitoring systems for violence currently exist in the United States (see **Table 1**). Because of the diverse nature of violence, each monitoring system uses different methods to identify violent events. Violent crime, for example, is most often monitored through the Uniform Crime Reports (UCR) system. In Pennsylvania, all local police departments report episodes of violent crime to the Pennsylvania State Police, as part of this system (7). In 1994, about 50,000 violent crimes were recorded in the UCR system in Pennsylvania.

Another violent crime-based monitoring system is the National Crime Victimization Survey. In this system, a population sample is queried to determine the frequency of assault and its consequences. This is a markedly different monitoring activity than the UCR. Comparisons between the two systems found that crime-based monitoring fails to portray the impact of violence accurately. Less than one-half of all violent crimes are reported to the police (8). Further, it was also found that police-reported violence fails to account for a large degree of domestic violence (9).

Information on the frequency of violent events may also be located in several medical databases. Most often, encounters

related to violence are identified with External Cause of Injury Codes (E-codes). Not all episodes of violence, though, result in physical injury requiring medical care (8). Thus, the events identified in these systems are likely to reflect relatively severe cases.

The cornerstone of any type of monitoring system is the use of a definition for the event that you seek to identify. Several definitions of violence have been applied in the literature, in monitoring systems (**Table 1**), and amongst institutions in Pennsylvania. These include definitions from a criminal justice perspective, a domestic violence perspective, a medical perspective, and a sociological perspective, amongst others.

Overall, there are few agreed upon standards regarding the appropriate definition for violence. A review of the literature, though, finds that the general definition of violence has expanded over the years. The earliest reports considered violence primarily from the perspective of police-reported crimes. Recent works have broadened the characterization of violence considerably.

For example, in its 1993 report entitled, "Understanding and Preventing Violence" (6), the National Research Council focused upon violence defined as: "*behavior by persons against persons that intentionally threatens, attempts, or actually inflicts physical harm.*" By design, the authors of this report focused upon a definition that was wide-ranging, but also one that considered violent behavior of a criminal nature. This definition

does not include self-directed violence.

The broadest portrayal of violence belongs to the World Health Organization (10). Its working definition considers violence as "*the intentional use of force or power, threatened or actual, against oneself, another person, or a group or community, that results in, or has a high likelihood of resulting in injury, death, psychological harm, mal-development, or deprivation*".

The Cost of Violence

Recent initiatives from the Centers for Disease Control and Prevention indicate that information on the costs of violence is important to obtain. Why is it meaningful to identify the costs associated with violence? What relationship does it have with reducing the incidence of violence? Economic data are important to obtain for two primary reasons.

One, cost data are useful for identifying the impact of violence. The underlying reason for identifying descriptive incidence or prevalence data is to provide a better understanding of the magnitude of the problem. Economic data fulfill the same purpose, but often with more power, as policy-makers and politicians understand dollar figures better than epidemiological data.

Table 1. National Monitoring Systems for Violence

Source	Year	Method	Definition of Violence	Penn. Data?
NCVS ¹	Annual	National sample household survey conducted by the Bureau of Justice Statistics. Eligible persons (>12 years old) are interviewed on frequency of crime or assault in the previous 6 months. Includes data on physical injuries.	Self-reported Victimization	Yes
Vital Statistics	Annual	Death certificates recording the underlying and contributing causes of death. Maintained by the National Center for Health Statistics.	Death related to violence as determined by External Cause of Injury Codes	Yes
NHAMCS ²	1992, 1995-96	National probability sample survey of hospitals conducted by the National Center for Health Statistics; data collected on visits to emergency departments, outpatient clinics, and same day surgeries in non-Federal, short-stay, general hospitals	Medical encounters related to violence as determined by External Cause of Injury Codes	No
UCR ³	Annual	Reports of fatal and non-fatal violent crimes filed by local law enforcement agencies. Maintained by the Federal Bureau of Investigation. Violent crimes, including homicide, rape, aggravated assault, and robbery.	Crime-related violence	Yes
BRFSS ⁴	Annual	A probabilistic telephone survey of health risk behaviours that contribute to the leading causes of death in the population. It is maintained by the Centers for Disease Control. Includes questions on victimization from physical violence.	Self-reported Victimization	Yes
NEISS ⁵	Annual	A surveillance of injuries identified from emergency departments in a stratified, probability sample of 91 hospitals. This system is maintained by the Consumer Product Safety Commission.	Medical encounters related to violence as determined by External Cause of Injury Codes	No
SIVV ⁶	1994	A supplement to the NEISS designed to investigate in more detail the injuries sustained by victims of violence. Used a sample of 31 hospital emergency departments for this survey.	Medical encounters related to violence as determined by External Cause of Injury Codes	No

¹ [National Crime Victimization Survey](#)

² [National Hospital Ambulatory Medical Care Survey](#)

³ [Uniform Crime Reports](#)

⁴ [Behavioural Risk Factor Surveillance System](#)

⁵ National Electronic Injury Surveillance System

⁶ Study of Injured Victims of Violence

Two, cost data are now considered as necessary elements for the evaluation of intervention programs. Injury control and other health interventions are increasingly being judged by their value in improving health and in lowering health care costs. As more effort is being placed on interventions in violence, economic data highlight what money might be saved if intervention programs are successful.

Cost studies to define the economic magnitude of violence are varied. For several years, the only information available to describe the possible costs of violence was information on the costs associated with the criminal justice system. With the advent of E-codes, information on the hospital costs of violence became available (11,12).

As part of its 1993 report, the NRC commissioned a paper on the costs of violence. This paper (13) provided a comprehensive overview of the economic impact of violence. It characterized the costs of violence as including direct, monetary costs, and indirect, non-monetary costs. Examples of direct costs include property losses from violence, medical bills, productivity losses, and criminal justice system costs. Indirect costs include the impact of violence on pain, suffering, and quality of life.

Cohen, Miller, and Rossman concluded that the cost of violence in 1987 was quite large. The average cost attributed to murder was \$2.2 million per event; rape, \$54,000; robbery, \$19,000; and each assault, \$16,500. About 85% of these cost figures were

accounted for by non-monetary losses, while 15% are related to medical and lost productivity costs (see Figure 1).

Subsequent studies by Miller and Cohen (14,15), have estimated the national cost of crime-related violence at \$425 and \$450 billion per year. In their latest report (15), the monetary losses due to victimization was \$105 billion annually. When the value of pain, suffering, and reduced quality of life are added, this figure rises to \$450 billion. In this report, rape was the costliest crime; valued at \$127 billion. Domestic violence against adults was estimated at \$67 billion per year.

Costs in Pennsylvania

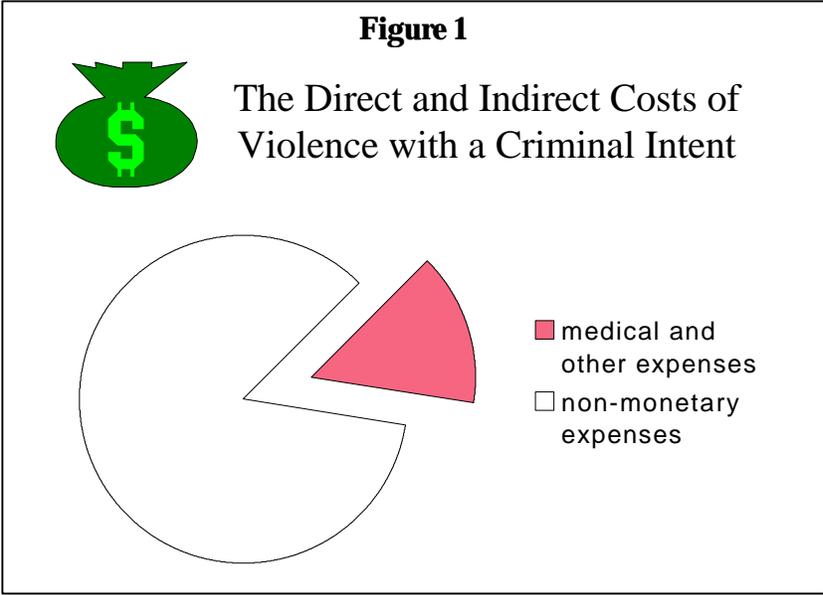
In Pennsylvania, four previous reports have included cost elements amongst their observations regarding the impact of violence to the state.

A previous study presented to the Blue Shield Institute (16)

estimated that the annual medical cost of violence in Pennsylvania was about \$435 million. The economic impact of domestic violence accounted for 75% of this figure. The estimates presented were derived, in many situations, by extrapolating national data on medical care use to the Pennsylvania population.

In another report, the Joint State Government Commission examined the cost of juvenile violence (17). The total monetary cost of juvenile violence in the state for 1993 was estimated at approximately \$1.1 billion. Medical care costs were estimated at \$227 million. When reduced quality of life is considered, the cost estimate rises to \$5.6 billion. The methods of this study followed the model of Miller and Cohen outlined above.

Forjuoh and associates included information on hospital charges related to violence in their report (18) on the impact of injuries in Pennsylvania. For the year 1994, total hospital charges related to assaults were \$135 million. The



average charge per stay for assaults was \$18,188. Total charges related to self-directed violence were \$98 million. The average charge per stay for self-directed violence was \$8782. This information was gathered from the Pennsylvania Health Care Cost Containment Council database on hospital admissions.

Very recently, the Pennsylvania Health Care Cost Containment Council compiled a report on hospital admissions related to gunshot wounds (19). For the year 1996, there were 1626 admissions related to firearms and due to assault in the state. The average charge for these visits was \$27,435. Over 73% of the purposely-inflicted admissions were among Philadelphia residents. The report also examined admissions due to self-directed violence. Overall, there were 162 admissions related to self-inflicted wounds. The average charge in this situation was \$34,999.

The following study seeks to identify the health care costs related to violence in Pennsylvania in the year 1994. By doing so, it expands upon the previous understanding of the medical costs related to violence in Pennsylvania. The following evaluation provides more details on the incidence and costs attributed to violence. It includes information on the characteristics of the victims of violence, what care they are likely to receive, and who pays for this medical care. Further, it portrays health care costs rather than health care charges.

Method

The project herein examines the impact of violence in Pennsylvania by focusing on two specific domains:

- (a) identifying the incidence (or frequency of new events of violence in Pennsylvania.
- (b) estimating the medical costs related to these events.

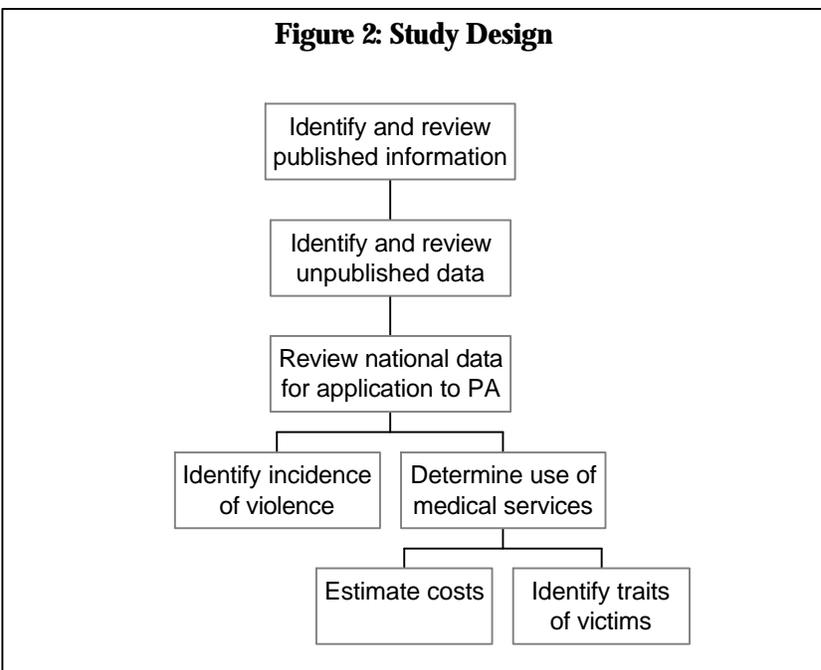
It follows several steps, as outlined in **Figure 2**, to identify and evaluate information for this purpose.

At the start of this project, it was not clear what types of information might be available to document the frequency and outcomes of violence in Pennsylvania. The reports of the Joint State Government Commission (17) and the Blue Shield Institute (16), for example, had relied heavily on national statistics to estimate Pennsylvania-

specific costs. Some statewide information specific to violence is widely available, including data on the number of homicides and suicides, and the number of crimes committed. Thus, the first step of the project was to examine these and other published reports.

The second step of the review was to search for and identify unpublished reports on the magnitude of violence in Pennsylvania. This information was supplemented with a review of several national data systems on violence to identify Pennsylvania-specific data.

The literature search sought to identify data on the incidence (number of victims) and the natural history (medical treatment, disability, mortality) of violence. Health care costs and the characteristics of the victims using health services were further identified from this data. At the time of this review, the most complete data available were for the year 1994.



Definition of Violence

For the purposes of this report, violence was defined as:

Behavior(s) by individuals that intentionally threaten, attempt, or inflict physical harm on oneself or onto others.

This definition is very similar to that applied in the most recent national reports, including the review of the National Research Council (6). Concepts of self-directed violence, however, have been added in this assessment. Including self-directed violence provides a more comprehensive overview of the violence issue. In addition, some investigators argue that many of the underlying mechanisms pertaining to violence against oneself are linked, theoretically, to violence directed against others (6).

In general, most studies of violence follow a criminal law or criminal justice perspective (6). This is due to the sophistication of and availability of data from the criminal justice system (6). It is not surprising, then, that a large number of the reports on the cost of violence have considered costs by categories of crime. The primary focus of this report, though, lies in the estimation of costs from the health care service perspective. This approach is very different from a criminal justice focus, as health care data systems monitor violence in a different format. One system considers police records, while the second considers medical records. Drawing links between the two is often hard to do.

Violent events were identified in the medical records systems by External Cause of Injury Codes

(E-codes). These codes allow for identification of the cause of an injury producing event requiring medical attention, and supplement medical diagnosis codes, which identify the medical reason for the visit. Data analysis focused on the following E-codes:

E950-959 – Suicide and self-inflicted injury, and

E960-969 – Homicide and injury purposely inflicted.

These codes capture a well-defined subset of intentionally inflicted injuries. It follows the most recent framework for presenting injury data (20,21). They exclude events related to legal intervention (police-initiated), and events classified as accidental. E-codes are also less conducive to an accurate portrayal of domestic violence. Domestic violence was not generally indicated by an E-code in 1994.

Figure 3 depicts the categories of violence that are reported on in this project. Several categories of crime are included to allow this report to have some comparability to earlier works. Firearm-related violence, self-directed violence, and domestic violence categories are included as well.

Data Sources

As expected, the availability of Pennsylvania-specific data to document the frequency and outcomes of violent events in general was sporadic. While information concerning homicides and suicides were found in accurate forms, relatively few

data were available to highlight the impact of less severe events. From the health care perspective, the review identified a sizable number of reports and data concerning trauma center and hospital admissions related to violence, fewer data regarding Emergency department visits, and very little information pertaining to outpatient visits, long-term health care costs, and domestic abuse. This is similar to reports on injury from all causes, in which the most severe events are better understood than incidents resulting in minor injury.

Major data sources used in this report include the following:

1. Pennsylvania State Police. The State Police maintain and report on Uniform Crime Report statistics on violent crime for Pennsylvania on an annual basis. Reported events of violent crime are recorded at the level of the local police departments. These agencies then report incidents of violent crime to the State Police. The State Police subsequently report UCR data to the Federal

Figure 3

Categories of Violence

- Inter-personal Violence
 - Homicide
 - Robbery
 - Rape
 - Aggravated Assaults
 - Domestic Violence
- Self-Directed Violence
- Firearm-related Violence

Bureau of Investigation. In 1994, 49,651 violent crimes were recorded in the UCR system in Pennsylvania. These include reported homicide, non-negligent manslaughter, rape, robbery, and aggravated assault events. Incidents involving the use of a firearm are also delineated.

The State Police also report on the number of crimes by county. These data have been examined relative to county-specific population figures to identify the incidence rate of violent crime by county in 1994. Incidence rates for various categories of crime and abuse are illustrated throughout the report by the use of county maps.

2. Behavioral Risk Factor Surveillance System (BRFSS) – Pennsylvania data. The Centers for Disease Control and Prevention annually surveys the U.S. population to identify the prevalence of lifestyle behaviors and changes in their frequency over time. Each individual state may, from time to time, supplement the standard survey with questions of their own to identify state-specific data. Information from the 1994 BRFSS was examined to identify Pennsylvania-specific data on assaults and firearms ownership (22,23). These data indicate that an estimated 555,000 possible assaults occurred in Pennsylvania in 1994.

3. Pennsylvania Department of Health. The department of health maintains vital statistics information for the state, including information on all

deaths occurring in the states' jurisdiction. By law, death certificates are filed to the state for each death occurring within Pennsylvania. Homicide and suicide events were identified from the vital statistics reports by using E-codes. In 1994, 739 homicides and 1328 suicides were recorded in this data system.

4. The Pennsylvania Health Care Cost Containment Council (HC4). The Health Care Cost Containment Council collects and maintains a dataset on admissions to general acute, psychiatric, rehabilitation, and children's hospitals in Pennsylvania. HC4 data includes demographic information, pre-hospital data, acute care data, outcome data, final anatomical diagnosis, and payer class.

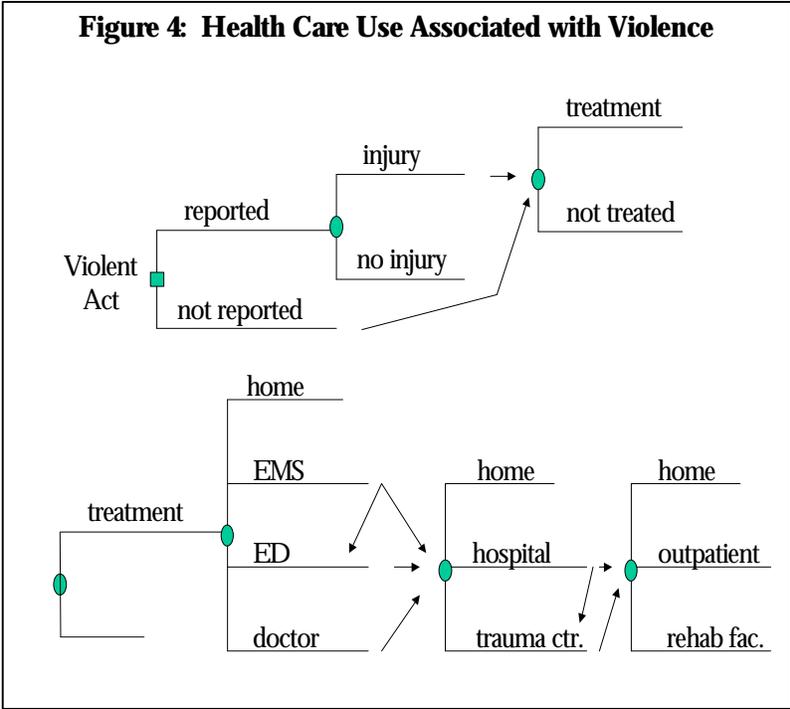
To examine admissions by category of violence, the following criteria were applied. Suicides were defined as admissions with E-codes of E950-959 and a discharge status of dead, while attempted suicides included cases with E-codes of E950-959 and a discharge status of alive. Assaults were defined as events with E-codes of E960, E960.2-966, E968-969, and a discharge status of alive. Homicides included admissions from assault and a discharge status of dead. Rape was identified as events with an E-code of E960.1. Child abuse was defined as admissions with E-codes of E967-967.9 or E968.4 and age less than 18 years.

Partner abuse victims were identified by E-codes of E967-969.9 and age greater than 18 years. Because E-coding for

partner abuse is relatively recent and was not standard practice in 1994, the number of partner abuse victims hospitalized with relevant injuries is underrepresented. Elder abuse was defined as any injury intentionally inflicted to a person 65 years of age or older. Injuries from firearms were identified by analyzing a variable which indicated what, if any, mechanism was used during violent events. Under these criteria, a total of 18,652 admissions were identified from the HC4 database as being related to violence.

The HC4 data set includes a number of variables to identify the referring source for the admission, the type of hospital, reason for hospitalization, and the discharge status and discharge location of the patient. This information was examined to identify, to the extent possible, the elements related to the natural history of violence in this setting. These elements are illustrated throughout the report by the use of a tree branch model as shown in **Figure 4**.

Briefly, the model considers the spectrum of a violent event, from its occurrence, whether or not it is reported to the police, whether it resulted in an injury, and whether medical attention was sought. Initially four categories of medical attention are considered; home care, emergency medical service care (paramedics), emergency department care, and outpatient physician care. Most victims will receive care at home and most will not require further medical consultation (8). However, severe injuries will require further care in the hospital setting. Afterwards, these individuals may be discharged to home or to another health care facility.



Admissions due to traumatic brain injury (TBI) and spinal cord injury (SCI) were also examined as past studies have shown both conditions to be quite costly. TBI and SCI associated injuries were identified through ICD-9CM codes.

Several demographic categories were examined to further characterize the violent events requiring hospital admission. Age, gender, race, length of stay, and payment source information for each patient was considered. Information on the resident county of the subject was incomplete. Thus, it was not possible to accurately identify county-specific costs related to violence. Further, available information from the database indicated that about 1-3 % of the hospital admissions were amongst out-of-state residents.

The HC4 dataset includes the name of the hospital at which the victim was treated and the health

care charges associated with each admission. Cost-to-charge ratios for each hospital in Pennsylvania were obtained from the Health Care Financing Admin. for the year 1994. These ratios were then applied to the charge data to estimate the costs associated with violence. In general, health care charges do not portray the actual cost of treatment, and usually over-estimate the economic burden of an event.

5. Pennsylvania Trauma Systems Foundation. The Pennsylvania Trauma Systems Foundation (PTSF) collects and maintains registry of the patients seen in Level I trauma centers in the state. The trauma center admissions represent, in theory, a subset of the HC4 hospital admissions. However, discrepancies exist between the datasets, because of differences in the diagnosis fields of each database. Elements contained in the PTSF database include

demographic data, pre-hospital data, acute care data, outcome data, anatomical diagnosis, and payor class. Violence-related data were identified from the registry via E-codes. In addition, the dataset contained a text variable that allowed us to classify cases of partner abuse. In 1994, 3185 admissions to trauma centers were identified in the registry. PTSF events reflect relatively severe injury events.

6. National Hospital Ambulatory Medical Care Survey (NHAMCS). The NHAMCS is a national survey of the factors underlying medical visits to the emergency departments (ED) and outpatient clinics of short-stay hospitals. We examined this source for data concerning emergency room visits in 1994. Categories of violence identified in NHAMCS include homicide, assault, suicide, and attempted suicide (24). This information was considered in unison with data from the department of health to estimate the number of ED visits related to violence in Pennsylvania. In 1994, the health department estimated 4,917,570 ED visits to Pennsylvania hospitals.

7. Pennsylvania Emergency Medical Service Trip Reports. Information on the use of emergency medical services in Pennsylvania was obtained from the Pennsylvania EMS data system to examine events related to violence. Trip reports are filed for each transport run than a licensed EMS agency makes. We examined the database to identify the type of incident recorded by the EMS personnel.

EMS Runs related to assault, stabbing, or shooting are included in this analysis. In 1994, 19,797 EMS runs were related to these categories.

8. Pennsylvania Department of Public Welfare ChildLine Registry. The Department of Public Welfare maintains a monitoring system for significant events of child abuse occurring in the state. Child abuse reports are generally filed to the state from medical, school, and day-care settings. Each report (CY-47 Form) filed is investigated to substantiate or refute the suspicion of abuse. In 1994, 23,722 cases were reported to the department, of which, 7038 were confirmed.

9. Pennsylvania Coalition Against Domestic Violence. The Coalition Against Domestic Violence provides information, services, and support to battered women in the state through affiliated centers/shelters. As part of this effort, it monitors the centers to identify the number of new and existing women seeking services. In 1994, 91,859 women sought services as “new victims” in the state.

10. Pennsylvania Department of Aging. The department of aging maintains a monitoring system to identify events and information related to elder abuse. Reports of suspected elder abuse are investigated by 52 agencies on aging across the state. Representatives investigate each report of elder abuse to determine if protective services are needed. Reporting of elder

abuse is voluntary. The majority of elder abuse reports to area agencies on aging are from health clinics, the general public, and family members of the elderly. In 1994, 7678 reports of need for protective services were received by area agencies on aging, of which, 2344 cases were substantiated.

11. Pennsylvania State Data Center. The data center maintains population data for the state of Pennsylvania. It serves as a distribution point for information from the U.S. Census Bureau. County, age, gender, and race-specific population estimates for 1994 are used throughout the report.

Implications

This report addresses the economic impact of violence in Pennsylvania using justifiable data on the frequency and cost of violence. For this reason, the focus of the report is on health care costs. This approach underestimates the total economic impact to the state. Costs related to lost work, property damage, the legal system, and quality of life are not estimated. It was our judgment that reliable and justifiable cost estimates on these items were not possible.

The best available data pertain largely to hospital costs associated with violence. Consequently, the study identifies relatively severe events. Yet, these events are also likely to incur the greatest expense. Throughout the report, we address the strengths of the data available, and identify the gaps that remain.

Interpersonal Violence in Pennsylvania

As described earlier, violence is often characterized in many different formats. For this presentation, we have chosen to portray violence by two common categories in the public health literature (10); interpersonal violence and self-directed violence. Interpersonal violence broadly characterizes intentional violent behavior between individuals. It incorporates concepts of both criminal violence and domestic abuse. Self-directed violence describes events against oneself.

We report first on the characteristics of violent crime in Pennsylvania; both overall and by specific crime categories. A description of the impact of domestic violence follows; with a focus on child abuse, spouse abuse, and elder abuse.

Violent Crime

Most of the current knowledge regarding violence originates from data systems that record crime, and the characteristics of victims and offenders (6). Through existing data systems, we understand that large numbers of Americans are victims of violent crime. Further, there is information that shows violent crime to be a serious threat to the health of the population, particularly urban youth and women in low-income households (25).

Two national data systems actively identify the frequency of violent crime; the Uniform Crime Reporting (UCR) program, and the National Criminal Victimization Survey (NCVS). The UCR is based upon reports of crime filed by the police. It defines violent crime as events related to murder and non-negligent manslaughter, rape, robbery, and aggravated assault (7). In 1994, 1,857,670 violent crimes were reported in the United States (26). Recent UCR program figures indicate that this number is declining (27).

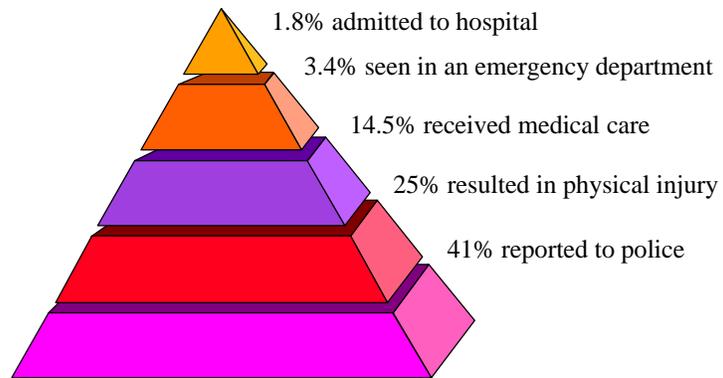
The NCVS surveys the general population over age 12 on crimes experienced in the previous 6 months. Violent crime in the NCVS includes attempted or completed events of assault, rape, sexual assault, or robbery (8). Homicide events are not included, as the NCVS is based upon a personal interview. However, the NCVS is able identify domestic abuse events. For the year 1994, the NCVS estimated that there were 10,860,000 violent crimes in the country (8). Violent crime rates, particularly the rate of

aggravated assault, have subsequently declined (28).

Because of its interview format, the NCVS also provides several interesting findings regarding the reporting of and injuries associated with violent crime. In general, the NCVS suggests that most incidents of violent crime are not reported to the police, that a smaller proportion of violent crimes result in injury, and that less than 15% receive medical attention (8). **Figure 5** outlines this nature of violent crime. The bottom of the pyramid illustrates the large number of crimes, which occur overall. The top of the pyramid portrays the comparatively small number of crimes associated with the use of medical care. Many individuals believe that these crimes represent “tip of the iceberg” events and identify more severe and more costly episodes.

In Pennsylvania, the best data available on the frequency of violent crime are those from the UCR program. Overall, there were 49,651 reported episodes of violent crime in 1994 (7).

Figure 5: The Pyramid of Violent Crime in the U.S. 1994



10,860,000 violent crimes

1994 NCVS

According to the UCR, violent crimes accounted for 13.1% of all serious crimes reported in Pennsylvania (Figure 6). Aggravated assault, 6.3%, and robbery, 5.8%, explained most of this portion, followed by rape, 0.8%, and murder, 0.2%.

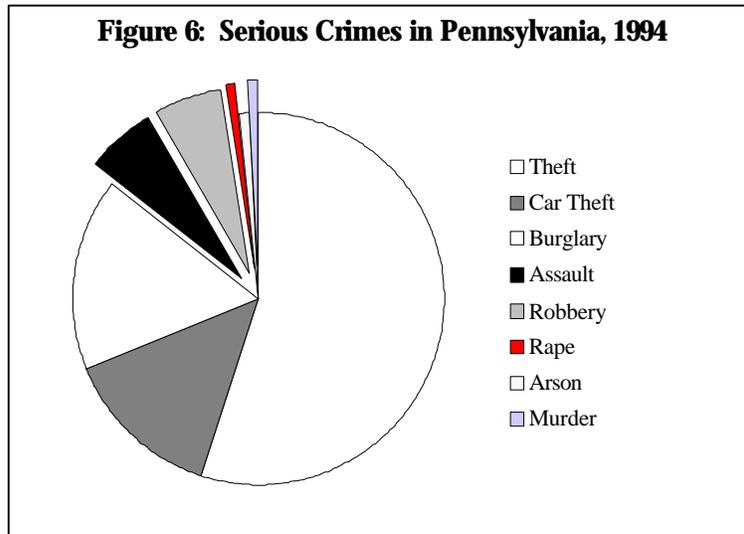
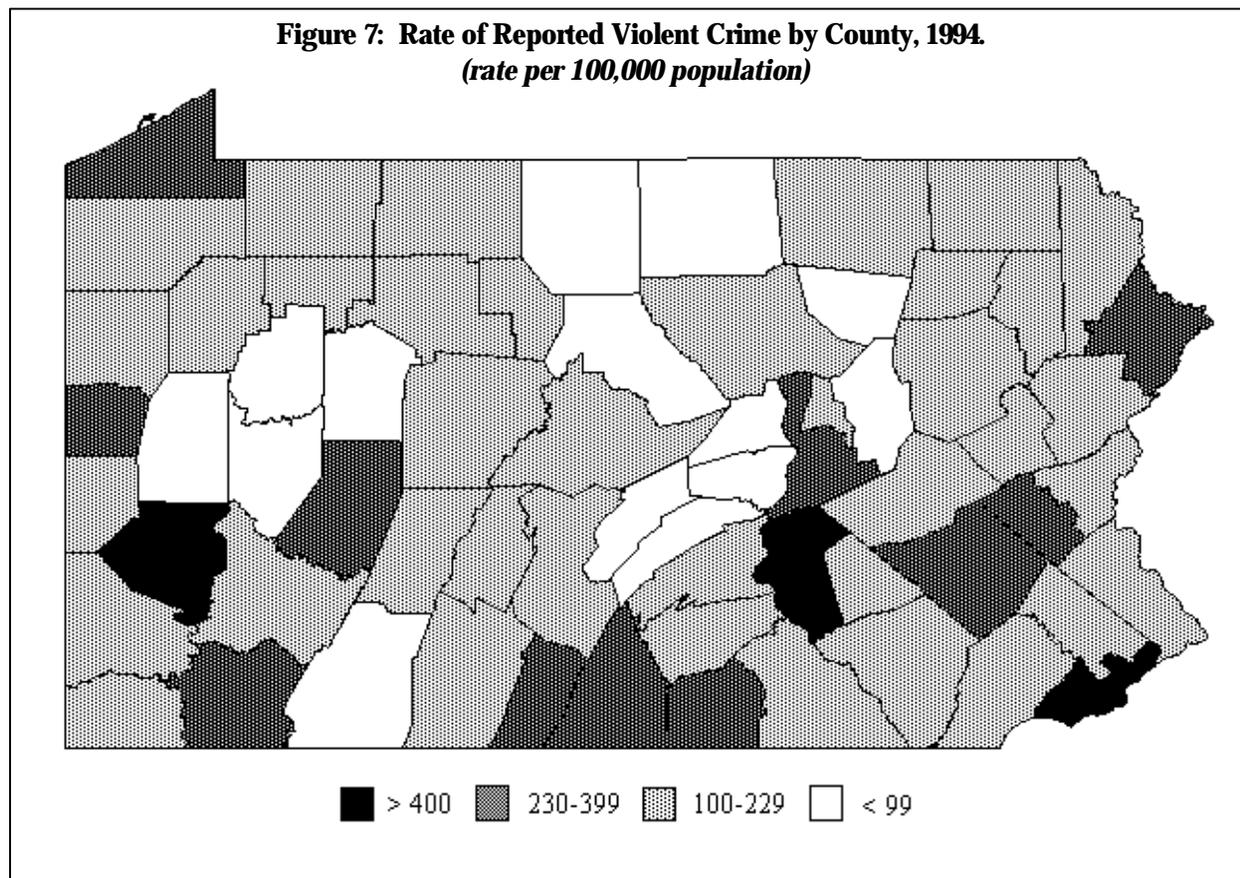


Figure 7 portrays the rate of violent crime by county of occurrence. This rate considers the number of violent crimes reported in a county by the population of that county. The highest rates (>400 events per 100,000 population) were observed in Philadelphia, Delaware, Dauphin, and Allegheny counties. All four of the counties were above the 95th percentile for violent crime in the state. These counties were also the only areas in the state to approach the national

rate of violent crime (713.6 events per 100,000 population) (26). Most areas, though, exhibited rates that were lower than seen on a national basis. The lowest crime rates were clustered in north central and western Pennsylvania.

In the legend for Figure 7, the rate of 230-399 crimes per 100,000 population represents the 80-94th percentile for the state. The rate of 200-229 crimes per 100,000 persons identifies areas in the 20-79th percentile. Counties with rates



below 100 crimes per 100,000 population were in the lowest quintile in the state.

Distinct demographic traits for the victims of violent crime in Pennsylvania were also observed. The UCR program in Pennsylvania actively collects information on the age, gender, and racial characteristics of victims of crime. Nearly all of the reporting police agencies (97%) provided this information in 1994 (7). **Figures 8, 9, and 10** portray this information graphically. Young males were the victims identified with the greatest frequency in 1994. By age, the highest percentage of victims were those individuals between the ages of 15-24 years, followed closely by persons aged 25-34 years. By race, the largest percentages of victims were Caucasians. However, when one considers the population of the state, African Americans are adversely represented in Pennsylvania as victims of violent crime.

Table 2 illustrates the demographic characteristics of crime victims from a different perspective; the risk of being a victim of a reported crime. This table considers the victim data reported by the Pennsylvania UCR program relative to the 1994 population estimates of each demographic group.

Overall, the risk of being a victim of violent crime in Pennsylvania was 1 in 261. However, the danger was heightened for African Americans (1 in 62), young adults between the ages of 15-24 years (1 in 103) and 25-34 years (1 in 143), and males (1 in 204).

Figure 8: Violent Crime Victims by age group, 1994, Pennsylvania

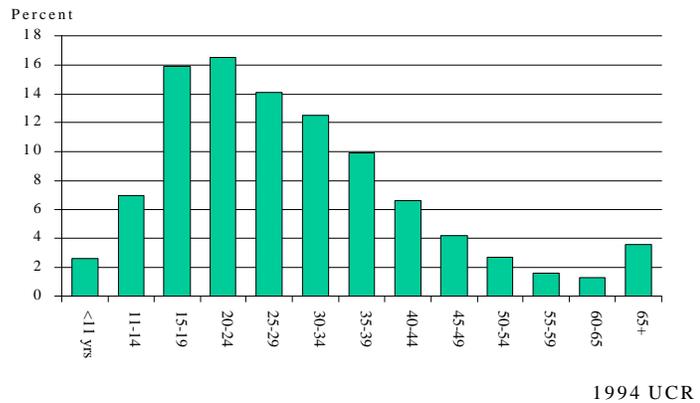


Figure 9: Violent Crime Victims by gender, 1994, Pennsylvania

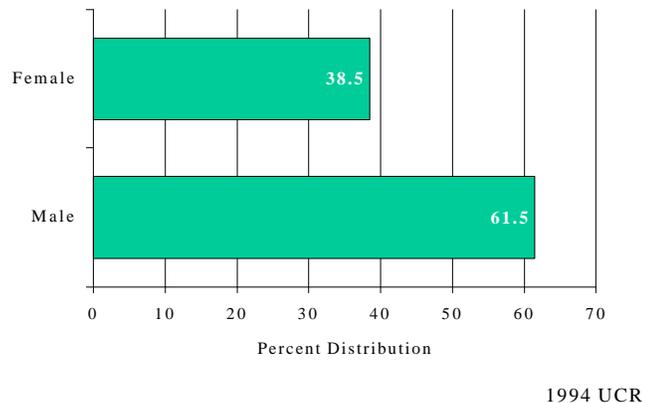


Figure 10: Violent Crime Victims by race, 1994, PA

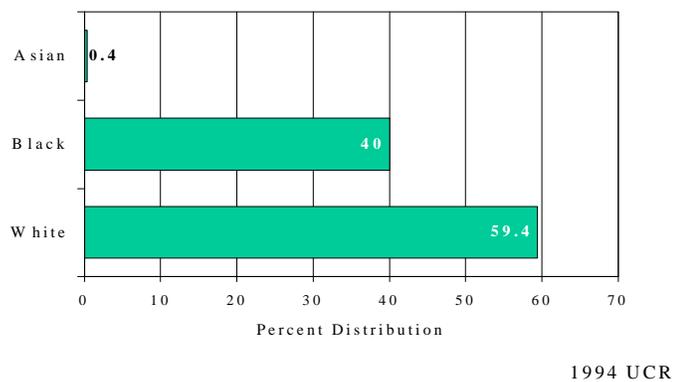


Table 2: Risk for Criminal Victimization in Pennsylvania, 1994 (reported crimes only)

OVERALL	1 in 261
Gender	
Males	1 in 204
Females	1 in 352
Age Group	
0-14 years	1 in 540
15-24 years	1 in 103
25-34 years	1 in 143
35-44 years	1 in 250
45-54 years	1 in 435
55-64 years	1 in 769
65+ years	1 in 1124
Ethnicity	
White	1 in 391
Black	1 in 62

Source: 1994 Pennsylvania UCR
1994 population estimates,
U.S. Census Bureau

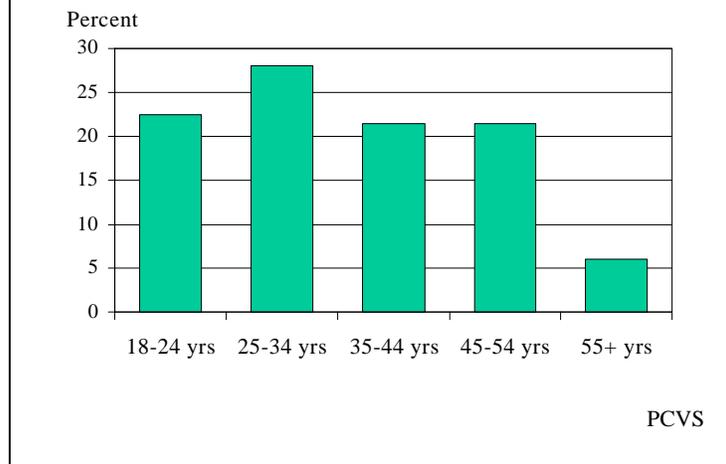
A second source of information on violent crime in PA is the 1996 Pennsylvania Crime Victimization Survey (PCVS) (29). This survey was conducted under the auspices of the Pennsylvania Commission on Crime and Delinquency (PCCD). It represents a telephone-based survey of 2554 households in Pennsylvania. The questions and methods of the PCVS are similar to those of the National Criminal Victimization Survey (8), except that only persons age 18 and older were surveyed in the PCVS.

In 1996, about 3% of the respondents to the PCVS indicated that they were victims of personal violence or the use of weapons in the previous 6 months (29). In a very crude sense, this suggests that at least 276,000 persons in Pennsylvania were victims of personal violence. The PCVS also found that less than one-half

(38%) of these individuals reported the related offense to the police. This observation is similar to the national findings reported by the NCVS.

Figure 11 illustrates the breakdown of PCVS-reported personal violence by age group. Higher percentages of reported violence were observed among those under age 35 years. In contrast to national data (8), the percent of victims under age 24 was lower than those aged 25-34 years.

Figure 11: Victims of Personal Violence by age group, Pennsylvania, 1996



Homicide

Psychologically, the most vivid and recognized images of violence are those that surround homicide. Murder and its consequences permeate local media coverage and many entertainment programs. Statistically, homicide represents the severest level of violence. In the United States, homicide is the twelfth leading cause of death overall, and strikingly high among the young (30). Homicide ranks as the second leading cause of death for persons aged 15-24 years. Among African American males, homicide is the fourth leading cause of death.

With respect to all forms of violence, the greatest wealth of evidence available in the literature is that related to homicide. There are several reasons for this, including the heightened attention of the police to homicides, and the involvement of state health authorities via death certification. Moreover, routine monitoring systems have been established to identify the frequency of homicide.

Issues in the Epidemiology of Homicide

Several aspects of the epidemiology of homicide are now well understood. These include identified risks to young males, African Americans, and individuals living within large, metropolitan cities, amongst others. Our knowledge of homicides and homicide victims has been gathered, primarily, from police reports and death certificates. The data systems underlying these

pieces of information, the Uniform Crime Report (UCR) Program and the Vital Statistics System, are important to highlight because they represent the first and longest running systems for monitoring violence.

The Uniform Crime Reporting Program is presently administered through the Federal Bureau of Investigation⁷. It relies upon police reports filed at the local level to describe the frequency of crime-related events and the circumstances surrounding them. Criminal homicide in the UCR includes (a) murder and non-negligent homicide, and (b) manslaughter by negligence. Murder and non-negligent homicide is the "unlawful, non-negligent killing of a human being by another," generally resulting from a fight, argument, assaults, or commission of a crime (7). Manslaughter by negligence is the "accidental killing of a human being by another," which results from the commission of an unlawful act or from a lawful act committed with gross negligence (7).

A supplemental homicide report is generally collected and filed for each homicide. This supplemental report includes information on the events related

to the homicide, including the mechanism of injury, the relationship of the victim to the offender, and the involvement of weapons. Some investigators have questioned the completeness of this information as the report is often submitted to the state authorities before the police investigation of the homicide has been completed.

In 1994, the UCR program reported 23,326 offenses of murder and non-negligent manslaughter in the United States (26). This represents a rate of 9.0 offenses per 100,000 population.

Vital statistics systems in the individual states are a second source of information on homicides. As one part of their public health mission, these systems routinely gather death certificates on all deaths occurring within their jurisdictions. This information is compiled and sent to the National Center for Health Statistics (NCHS), which publishes several reports on the number of deaths and leading causes of death.

In this system, homicide deaths are identified from a death certificate as the underlying or main cause of death. A physician or medical examiner generally makes this determination of cause of death after reviewing the events surrounding the death. Other types of information listed on the death certificate include the age, gender, and ethnicity of the victim, as well as a mechanism of injury for the homicide event. Some degree of bias may be involved in the study of homicides from death certificate reports, as the judgment of whether a death is a homicide or not may differ between medical examiners.

⁷ The FBI also administers another monitoring program called the National Incident-Based Reporting System (NIBRS). This system was developed in the late 1980s and provides more information on both victims and offenders. NIBRS is currently being implemented in several states and will likely replace the UCR program in the next century.

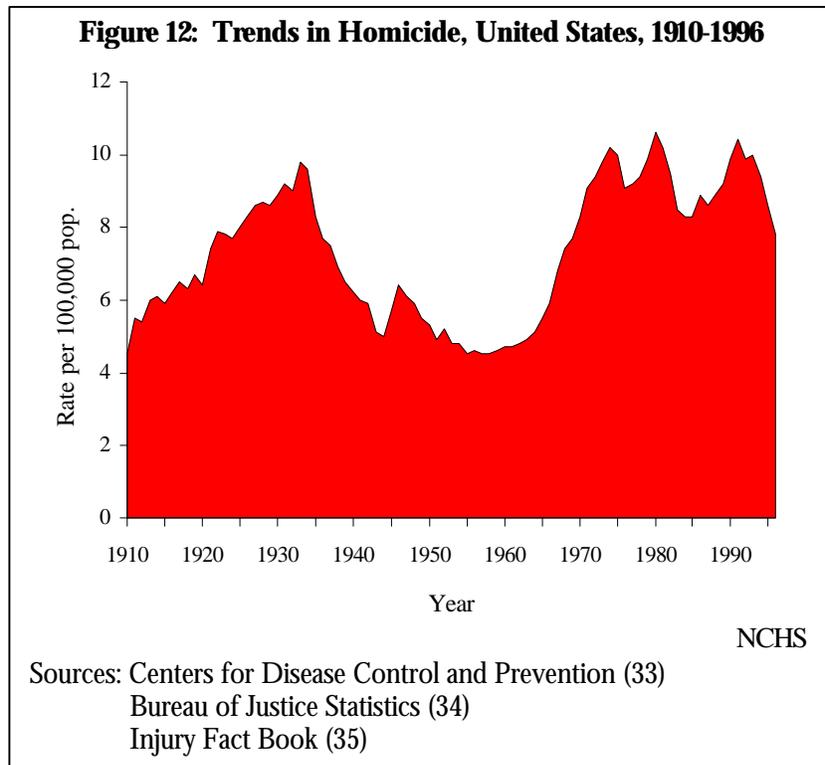
Data from the NCHS indicate a total of 24,547 homicide deaths in the United States in 1994 (31). Accidental deaths and deaths from legal intervention are not included in this figure. This represents an unadjusted rate of 9.4 homicide deaths per 100,000 population, and an age-adjusted rate of 10.1 deaths per 100,000 population.

Overall, the number of homicides identified from the UCR program was smaller than the number of homicides identified from death certificates. This pattern has been observed previously on a national scale for any given year (32). This finding was also observed for homicides in Pennsylvania in 1994. Part of the explanation for this discrepancy is that "justifiable homicides" are not included in the UCR data. Homicides classified as being outside of police jurisdictions are not included either.

Trends in Homicide

One strength of the UCR and vital statistics programs is the length of time in which these monitoring systems have been in place. This allows researchers to investigate if changes in the frequency of violence or homicide have occurred over time. **Figure 12** portrays the rate of homicide per 100,000 population from 1910-96⁸. In general, the homicide rate has followed the pattern of violent crime over time (32). Noted fluctuations in homicide have been observed

⁸ The rates presented are crude and are not adjusted for age differences over time. Some of the fluctuation in rates may be due to differences in age-composition of the population.



throughout the 20th century. The homicide rate has fluctuated throughout, with similar peaks in the early 1930's, 1980, and 1991. The lowest rates of homicide were observed in the late 1950s. At present, the homicide rate in the United States is in a period of decline; falling from 10.4 per 100,000 in 1991 to 7.8 per 100,000 in 1996.

International Comparisons

For some time, individuals have pondered the question of the degree of violence in the United States. Is the rate of violence higher in the U.S. compared to other countries? A recent effort by the International Collaborative Effort (ICE) on Injury Statistics provides some insight into this question (36). Collaborators from 11 countries furnished information on injury mortality, including E-code groupings. **Figure 13** highlights the annual homicide rate

for these countries for the most recent year(s) available (36). The difference between the United States and the other countries is striking, with the United States having a significantly higher rate of homicide than several other developed nations. A similar pattern was also observed in a study of homicide rates amongst children under age 14 years in the U.S. and 25 other industrialized nations (3).

Age, Gender, Ethnic, and SES Differences

Information from the UCR, the NCHS, and several other studies indicate that homicide is a major cause of death for the young, males, and African Americans. For 1991, death certificate statistics noted that 80% of all homicides occurred among individuals between the ages of 15-44 years (34). Among individuals aged 15-24 years, homicide is the second

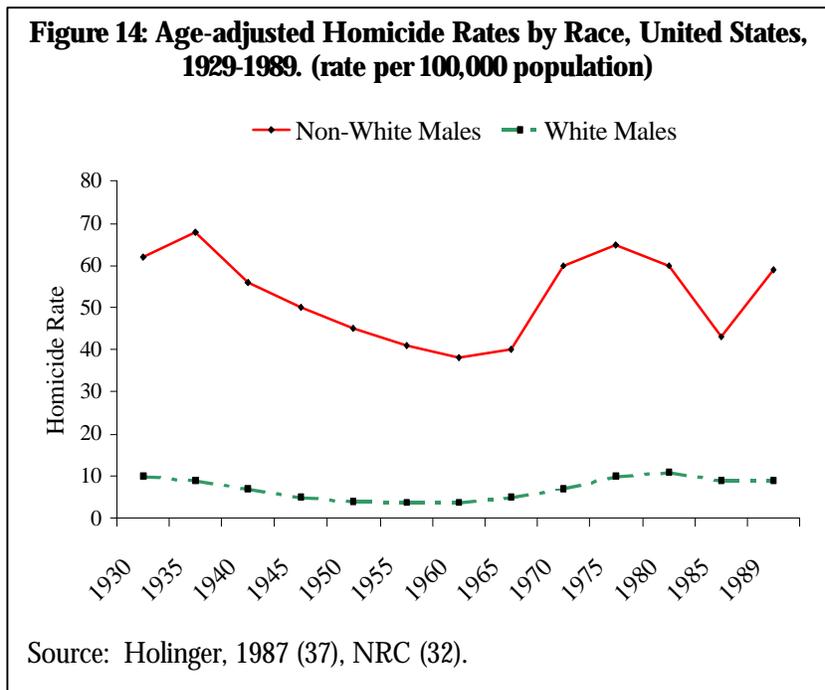
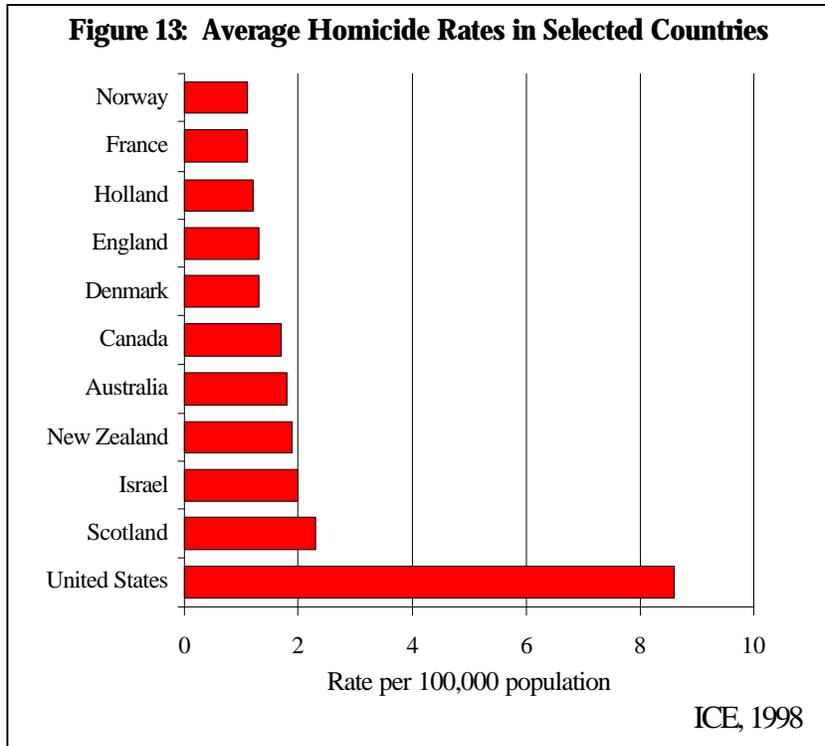
leading cause of death, trailing only deaths from motor vehicle accidents (30). Nearly 80% of the homicide victims in 1991 were male (34).

Large differences exist in the rate of homicides by race. African Americans, particularly African American males, are disproportionately the victims of homicide (32). Among African Americans aged 15-24, homicide is the leading cause of death. **Figure 14** illustrates this pattern. Further, this observation has existed for a number of years.

Several reports have demonstrated higher rates of homicide in large, metropolitan cities compared to suburban and rural areas (25,32,35,38). For example, data from the National Vital Statistics System indicates a homicide rate of 18.0 victims per 100,000 persons for metropolitan areas and a homicide rate of 6.1 per 100,000 for rural counties (25). Other characteristics of homicide victims have been noted. Homicide victims and offenders frequently share similar characteristics, including race, and often know each other (32). Further, studies evaluating recent trends in homicides have identified a greater use of guns in homicides, and the association of homicides with crack cocaine (36,38,39).

The Cost of Homicide

Violence and homicide have several consequences. These include physical and psychological injury, as well as lost earnings, pain and suffering, criminal justice system costs and other social costs (32). For homicide, physical



injuries are by definition the most severe. The monetary costs related to medical care, though, may be limited in scope because of the lethal nature of the event. Several victims die before entering the

medical system. The long-term costs of homicide are not direct to the victim, but indirect and affect families through lost future earnings and psychological impacts.

Three reports (13-15) provide the most depth regarding the costs of homicide. All three were conducted by the same authors, and followed essentially the same method. In this method, estimates of the incidence of homicide were considered in context to the average cost associated with a homicide event to determine total costs. Cost categories examined included medical costs, lost productivity (primarily lost workdays), and quality of life (or pain and suffering).

The total cost of homicide to the United States in 1987 was estimated at \$44 billion (13). The average cost per event was \$2.2 million. Of this figure, \$1.6 million was attributed to the pain and suffering of the victim, \$610,000 to lost productivity, and \$5370 to medical costs (13). An update of these figures to 1989 dollars estimated the average cost of homicide as \$2.4 million (14). The lifetime cost of incident events in 1987-90 was \$48 billion (14).

The third estimate (15) identified the average loss per homicide in the U.S. as 2.94 million in 1993 dollars. Of this figure, \$1.9 million was related to reduced quality of life factors, \$1 million to lost productivity, and \$16,300 to medical care costs. The total annual loss due to homicide was estimated to be \$93 billion.

All three estimates are based upon sound economic principles and assumptions. However, there is room for modification in future projects. Most notably, the health care costs related to homicide appear to be rather poorly defined. The health care cost estimates listed in the reports were not based

on homicide-specific studies, but rather on reports identifying fatal injuries.

Other studies of medical costs from selected hospital populations also exist. They provide a picture of the possible costs related to lethal violent events, but not a comprehensive assessment of the cost of homicide. For example, a study of gang-related violence in Los Angeles identified the median charge for 25 victims of homicide as \$6912 (40). This compares to a figure of \$5740 for survivors. The average length of stay was 1.7 days for homicide victims and 7.0 days for survivors. Another report of violence-related hospital admissions in the state of Arizona found a mean charge of \$7873 for 1076 admissions from homicide or assault (41). The average length of stay was 4.2 days. Homicide victims were not distinguished from assault survivors in this analysis. This is a common phenomenon in the violence literature.

Homicide in Pennsylvania

If you ask a group of professionals what they feel are the predominant factors in homicide, almost all will respond with a core set of factors; the availability of guns, drugs, gangs, etc. This response is largely based on national data and the press reports that reinforce them. However, national data on homicide often differ from local data (36).

We identified data from the Pennsylvania UCR program, the Pennsylvania vital statistics program, the Health Care Cost

Containment Council, and the Pennsylvania Trauma Systems Foundation to examine the characteristics of homicide in Pennsylvania. These sources provided information to describe the number of incident events in 1994 and the number of hospital admissions related to violence that ended in death. Information on the use of other types of health care services amongst homicide victims was not reliably documented, or readily available.

Incidence

Estimates of the incidence of homicide in Pennsylvania in 1994 are available from both the UCR program and death certificate information. The Pennsylvania Department of Health reported 739 homicides amongst state residents during 1994 (42). Data from the UCR program indicate that there were 703 homicides (murder and non-negligent manslaughter) in 1994 (7). This figure represents a rate of 5.8 homicides per 100,000 persons, or a homicide risk of 1 in 16,739.

The discrepancy between the UCR and death certificate figures is a notable difference in a relatively severe event. Several factors may account for this discrepancy. For example, the UCR data do not include justifiable homicides (14 events in 1994), or negligent manslaughter (32 cases in 1994) (7). Further, the department of health's report is limited to state residents only, while the UCR may include non-residents who are killed in the state of Pennsylvania.

Credible information exists from both the UCR and the department of health on the demographic characteristics of homicide victims. **Table 3** details the age, gender, and racial categories of victims in each source. A clear pattern emerges from the data. Males, the young (15-34 years), and African Americans appear with the frequency in the homicide statistics. Homicide risks are commensurately greater in these groups. For African Americans, the risk of becoming a victim of homicide in 1994 was 1 in 2640. Persons aged 15-24 years had a risk of 1 in 7269 and males in Pennsylvania had a homicide risk of 1 in 10,745.

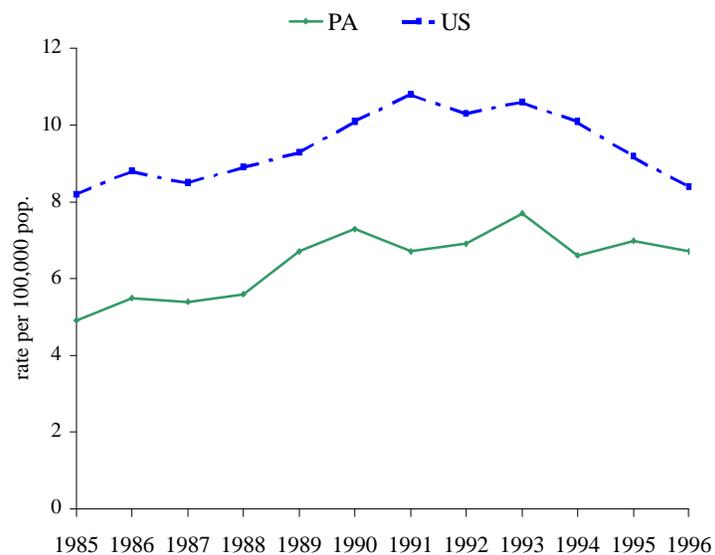
Table 3: Demographic Characteristics of Homicide Victims in Pennsylvania, 1994

	UCR	Vital Statistics
TOTAL	703	739
Age Group		
0-14 years	8.6%	7.8%
15-24 years	30.3%	29.3%
25-34 years	25.0%	25.6%
35-44 years	18.8%	19.3%
45-54 years	6.6%	6.7%
55-64 years	3.6%	3.8%
65-74 years	7.0%	7.5%
Gender		
Female	24.8%	26.0%
Male	75.2%	74.0%
Race		
African-American	61.2%	62.9%
Caucasian	38.8%	34.5%
Other	-	2.6%

Figure 15 portrays the relationship between homicide rates in Pennsylvania and the United States. Pennsylvania rates are consistently lower than U.S. rates over time. For the year 1994, the age-adjusted homicide rate for the U.S. was 10.2 per 100,000 population (31). In Pennsylvania, this figure was 6.6 per 100,000 population (42). **Figure 15** also illustrates an increase in the homicide rate in Pennsylvania from 1985-93 (42). The homicide rate declined thereafter from 1993-1996.

Independently, an increase, or “epidemic”, of homicide was also noted for Allegheny County for the years 1990-93 (43). Higher rates of homicide were observed amongst 15-24 year olds and black men during this period when compared to earlier times. Also noted in this epidemic was an increased number of events involving strangers in the victim-perpetrator relationship.

Figure 15: Age-Adjusted Homicide Rates, Pennsylvania and the United States, 1985-96

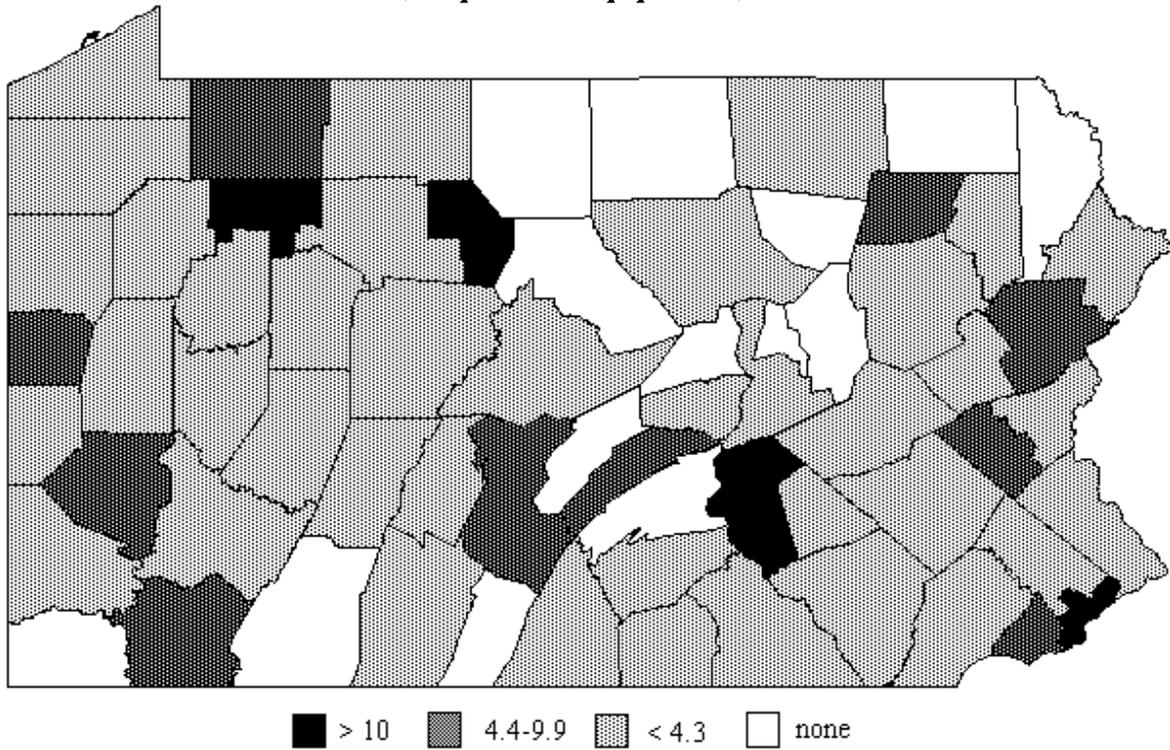


NCHS, PA Dept of Health

Homicide events are routinely recorded by the county of occurrence in the UCR program. **Figure 16** illustrates the rate of reported homicide events (per 100,000 population) by county. The highest rates of homicide

were observed in Philadelphia County followed by Dauphin County. Both areas had homicide rates exceeding 10 per 100,000. This rate was higher than that observed nationally; 9.0 per 100,000 inhabitants (26).

Figure 16: Reported Homicide Rates by County, Pennsylvania, 1994
(rate per 100,000 population)

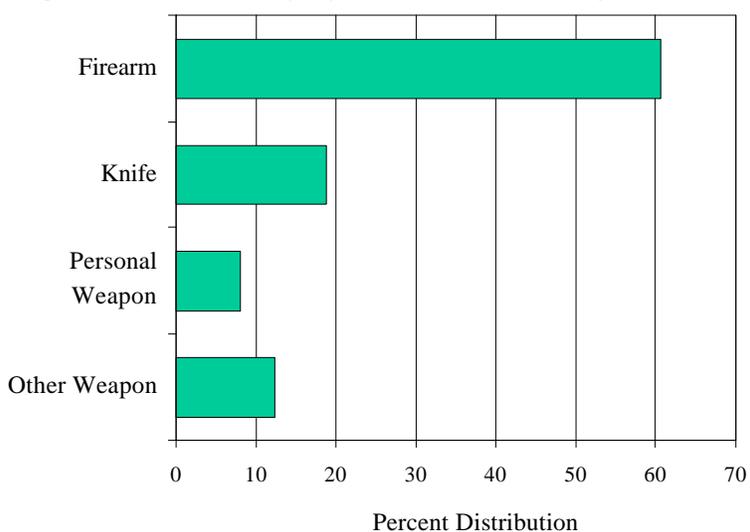


Forest and Cameron counties also had a higher rate of homicide, but this finding likely reflects their small population and the fact that only one homicide was recorded. The lowest rates of homicide were clustered in the northern counties of the state. The legend for **Figure 16** outlines homicide rates in the 0-20th percentile for the state (no events), the 21st-79th percentile (0.6-4.3 per 100,000), the 80th-94th percentile (4.4-9.9 per 100,000), and above the 95th percentile (>10 per 100,000).

Another observation of the Allegheny County study on trends in homicide (44) was the association of firearms with homicide epidemic periods. Increases in the rate of homicide were accompanied by an increase in the percentage of homicides involving a firearm. Data from the

UCR program indicate that over 60 percent of the homicides in Pennsylvania in 1994 involved a firearm (**Figure 17**). This was significantly larger than the other listed mechanisms of homicide.

Figure 17: Homicide by Type of Weapon, Pennsylvania, 1994



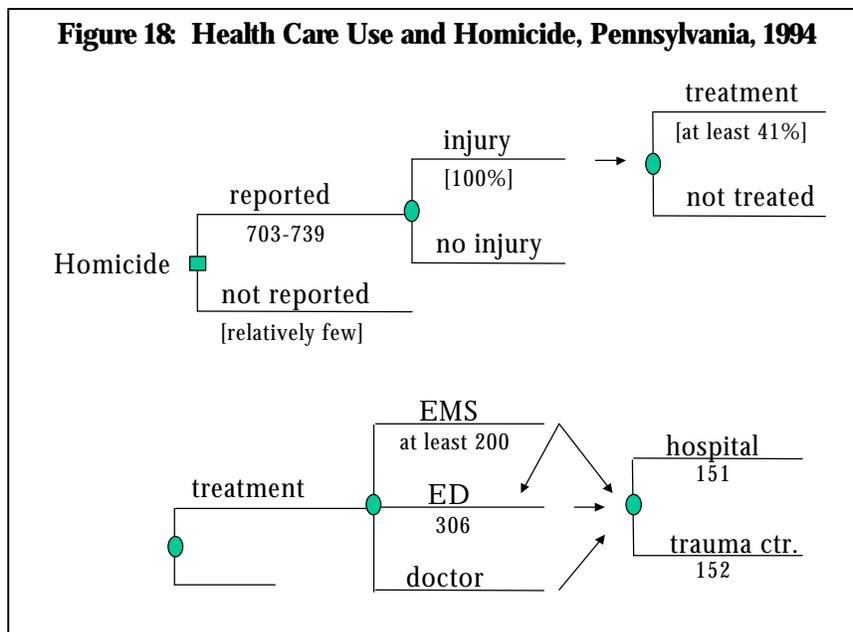
Health Care Use

Figure 18 sketches the likely use of health care services by homicide victims. Homicides are severe events. Most are reported and captured by surveillance systems. Injuries are necessarily incurred by all victims. However, not all victims of homicide will survive long enough to require the use of medical care. For those that do, it is likely that all will be seen in a hospital outpatient or inpatient setting.

The most reliable information at hand to characterize the use of health care services was pertinent to the use of inpatient facilities and trauma centers by homicide victims. We examined the data systems of the Pennsylvania Trauma Systems Foundation (PTSF) and the Pennsylvania Health Care Cost Containment Council (HC4) to identify these services. We also examined the use of emergency medical services (EMS) and emergency department facilities by the homicide victims in these data systems.

In 1994, PTSF data indicate that there were 306 homicide cases seen in trauma centers in Pennsylvania. Homicides in this database were identified from visits related to assault (E960-E969) that were discharged as deceased. Using a similar definition, we identified 151 hospital admissions related to homicide in the Pennsylvania HC4 data. Of the 306 PTSF events, 154 pertained to individuals who were dead on arrival or who died in the emergency department of the trauma center. Approximately 152 individuals were admitted to an inpatient unit.

Figure 18: Health Care Use and Homicide, Pennsylvania, 1994



The inpatient data of the PTSF should be captured, in theory, within the HC4 data. By design, the Pennsylvania HC4 captures information on all overnight admissions to Pennsylvania hospitals. This catchment area includes the Level I trauma centers included within the PTSF registry. The difference (one additional stay) noted in the PTSF inpatient data may be due to coding discrepancies within the data, or to differences in the operational definition of an event in each system.

The PTSF data indicate that less than one-half of the homicides seen in Pennsylvania in 1994 may have required the use of hospital-based medical services. More victims may have been seen by EMS personnel or paramedics. Of the 306 victims seen in a trauma center, 65.2% were transported to the facility by ambulance or fire rescue services. Nearly 30% were brought to the trauma center by the police.

Hospital Admissions

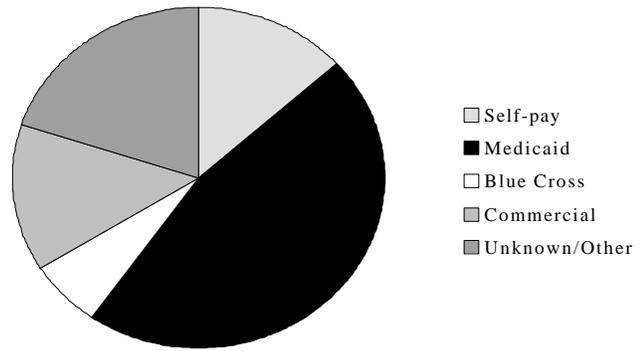
Both the PTSF and HC4 data indicate that only 20-25% of the victims of homicide in Pennsylvania used inpatient hospital services. Nearly all (93%) of the victims were admitted to the hospital through emergency department facilities (HC4 data). Three percent of the HC4 admissions were transferred from another hospital, which suggests that some of the admissions noted may be multiple admissions for the same person.

Selected demographic traits of the subjects with hospital admissions in the PTSF and HC4 databases are highlighted in **Table 4**. Reflecting the patterns seen for homicide overall, there was a majority of admissions amongst males, persons aged 15-34 years, and African-Americans. The greatest disagreement between the PTSF and HC4 data pertained to the financial payor for the listed hospital stays. Given the financial underpinning of the HC4 data, though, its information on

Table 4: Demographic Characteristics of Hospital Admissions Related to Homicide, Pennsylvania, 1994

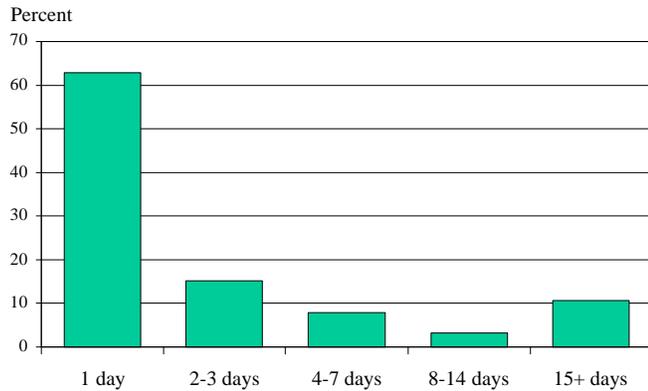
	HC4	PTSF
TOTAL	151	152
Age Group		
0-14 years	4.6%	--
15-24 years	31.1%	34.5%
25-34 years	26.5%	28.4%
35-44 years	25.2%	20.9%
45-54 years	5.3%	6.8%
55-64 years	2.6%	4.7%
65+ years	4.7%	4.7%
Gender		
Female	13.2%	10.5%
Male	86.8%	89.5%
Race		
African-American	58.5%	71.9%
Caucasian	32.4%	22.6%
Other	9.1%	5.3%
Payor Source		
Self-Pay	15.5%	45.0%
Commercial insurer	24.0%	17.9%
Government plan	60.5%	37.1%

Figure 19: Payment Source for Hospital Admissions related to Homicide, Pennsylvania, 1994



PA HC4

Figure 20: Length of Stay in Homicide Admissions, Pennsylvania, 1994



insurance is likely to be the most accurate. Many of the admissions were paid for through government insurance programs (60.5%).

Specific details on the insurance program paying for the HC4 admissions are shown in **Figure 19**. Almost one-half of the 151 visits were paid through the state Medicaid program. One person in eight had no insurance coverage.

The average length of stay for the homicide admissions in the HC4 database was 5.8 days. However, most victims died within one day of the admission (**Figure 20**). PTSF data indicate that hospitalized homicide victims spent 3.9 days in a trauma center overall and 2.9 days in an intensive care unit. Over 70 percent of the trauma center admissions died within one day.

Health Care Costs Related to Homicide

In 1994, total health care charges (excluding physician fees) for the 151 homicide-related admissions in the HC4 data system were \$8,119,135. Estimated costs for these stays totaled **\$2,807,608**. The average cost per hospital admission was \$18,593. This figure is much higher than the estimates of medical care costs related to homicide identified in previous studies (13-15).

The average charge for a hospital stay related to homicide in 1994 was \$53,769. The average estimated cost per admission was \$18,593.

Aggravated Assault

While homicide represents the most severe aspect of violent crime, aggravated assault and robbery represent the most frequent forms of violent crime. We review the magnitude of serious assault in Pennsylvania first, followed by an assessment of robbery.

Assault is a broad ranging term encompassing events ranging from simple street fights to those involving weapons, or those resulting in injury. Some individuals also include the threat of physical force as a form of assault. This review is focused upon the more severe end of the assault spectrum; representing aggravated assault. Several categories of aggravated assault exist, including crime-related assault, gang violence, school violence, domestic assault and assaults against the elderly.

Issues in the Epidemiology of Assault

Our understanding of the epidemiology of victims of assault is fairly complete. Many of the known characteristics of assault are similar to those of homicide. These include identified risk factors such as young age, male sex, and African American race. What is less understood is the profile of perpetrators of assaultive violence. Many investigators claim that victims are often perpetrators at some point in time, but few reports on the characteristics of perpetrators exist.

Much of the available information on the victims of assault originates from two national surveys; the Uniform Crime Reporting System and the National Crime Victimization Survey (NCVS). Other studies focusing on assaults in local populations (most often gang violence) exist, but the overall message being circulated regarding assaults in the United States is heavily influenced by these two national surveys.

As noted before, the UCR System and the NCVS consider violence and assault from different perspectives. The UCR identifies police-reported events and the NCVS identifies victim-reported events in persons age 12 years or older. Both the UCR and the NCVS differentiate between aggravated and simple assaults. The violent crime index of the UCR, however, only includes aggravated assaults.

By definition, aggravated assault in the UCR program includes "unlawful attacks by one person upon another with the intent to inflict bodily injury" (7). Unsuccessful attempts are included in this classification if a weapon is involved in the attack. Moreover, attempted murders fall under this categorization.

In 1994, the UCR program identified 1,113,179 aggravated assaults in the United States (26). This represents a rate of 427.6 offenses per 100,000 population. The latest data available for 1998 noted far fewer events (n=974,402) than in 1994. The rate of aggravated assault, in fact, has declined by nearly 16 percent since 1994 (44).

The National Crime Victimization Survey (NCVS) considers an aggravated assault to be an "attack or attempted attack with a weapon, or an attack without a weapon that results in serious injury (8). Serious injuries include broken bones, lost teeth, internal injuries, loss of consciousness, or any injury requiring two or more days in hospital.

For 1994, the NCVS identified 2,478,000 aggravated assaults in the United States (8). This figure translates to a rate of 1160 victimizations per 100,000 persons age 12 years or older. Of the 2.5 million events, about 679,000 were estimated to involve an injury. Individuals were threatened with a weapon in 1.8 million of the assaults. Overall, 52% of the assaults were reported to the police (8). A higher proportion (61%) of injured victims, though, reported the assault to the police.

Marked changes in NCVS recorded crimes have occurred since 1994. The latest data for 1998 estimate a total of 1,674,000 aggravated assaults in the United States (45). The associated rate of victimization declined by 37% in this time (45). About 547,000 events in 1998 involved an injury.

The estimates of the UCR and NCVS provide disparate conclusions regarding the frequency of aggravated assaults. Distinct methodological differences between the sources likely account for this difference. Most notably, the UCR data only consider events reported to the police. The NCVS has clearly shown that many events are never reported to the authorities.

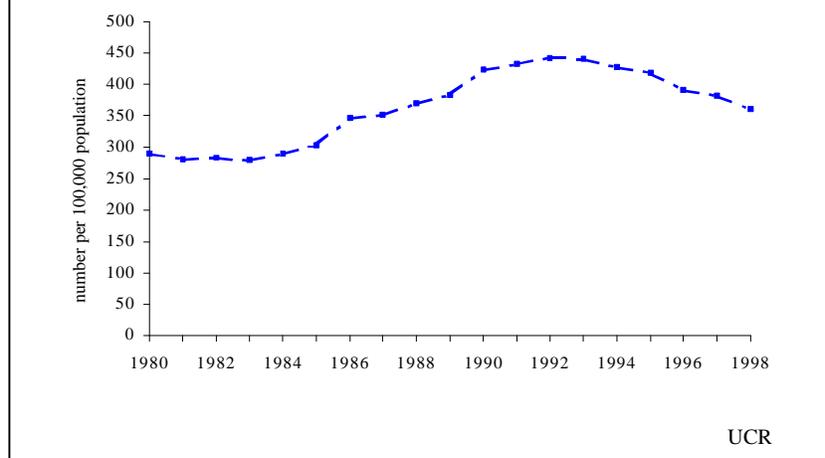
Other differences between the surveys exist as well (although their influence on the estimates are not likely to be as large). For example, the police compile the UCR data, while the NCVS is based upon a personal interview with the victim. UCR data are usually identified closer in time to the crime event, while the NCVS considers all crimes within the previous six months (8, 32). There is also evidence that some crimes are reported to the police, but not on the NCVS (32).

Trends in Aggravated Assault

One question of common interest today regards the change in frequency of violent crime. Are aggravated assaults increasing, decreasing, or stable over time? The data of the UCR and the NCVS provide some information on this issue, although the veracity of the trends can be called into debate. **Figure 21** displays the rate of aggravated assault in the United States recorded by the UCR program. The number of assaults per 100,000 population increased markedly from 1983-1993, and declined thereafter (46). The largest declines have been observed in the most recent years, 1997 and 1998. These data suggest that the rate of assault in the United States fluctuates significantly.

Evidence from the National Crime Survey (28) and the NCVS (45), however, suggests that the fluctuation in the frequency of aggravated assault may not be as large as that shown by the UCR. For example, the rate of assault declined in the National Crime Survey from 12 events per 1000 persons age 12 or older in 1975 to 10 events in the mid 1980's (28).

Figure 21: Aggravated Assault Rates, United States, 1980-1998



The assault rate was stable at that point, until the period 1990-1993, when a slight increase was observed (back to 12 per 1000 persons). Thereafter, the rates have declined markedly to 7.5 assaults per 1000 persons in 1998 (45).

There is some dispute regarding the accuracy of the count of aggravated assaults over time by the UCR program. A comparison of NCVS and UCR violent crime data by Rand, et.al. (28), found that crime reporting rates were stable over time from 1973-1995 in the NCS and NCVS, but that the number of crimes reported by police rose significantly. The authors suggest that the increasing rate of crime recorded in the UCR may be due to better record systems in police offices and better reporting of crime data to the FBI.

A dispute of another kind has recently erupted in Philadelphia regarding UCR data. The Philadelphia Inquirer has documented a series of problems with police crime statistics. Most notably, figures on the number of violent crimes, including aggravated assault, robbery and

rape, have not been recorded accurately for a number of years. In a practice called "going down with crime", the Philadelphia police have downgraded several crimes to less serious categories. An outline of several headlines from the reports of the Inquirer is shown in the box, "*Down with Crime*". Further information is available at the following website; <http://www.philly.com/packages/crime>.

Risk Factors for Aggravated Assault

The risk for aggravated assault differs markedly by several demographic, socio-economic, and residential characteristics. **Table 5** outlines the rate of victimization from aggravated assault reported in the NCVS. In general, assault rates are higher in males, the young, African-Americans, the poor, and city residents (8). Age has been suggested as one of the strongest predictors for violent victimization (32). Juveniles, in particular, are often viewed as the primary perpetrators for many forms of violence. These data show that the young are also the

DOWN WITH CRIME

September 25, 1997 **Trust us: Mayor's math just does not add up.** "The Philadelphia Police Department has been misrepresenting the number of city crimes to the state police and the FBI..."

October 18, 1997 **Philadelphia's crime data discarded by FBI** "The FBI, citing problems with how Philadelphia police count crime, is purging Philadelphia statistics for the last year and a half from it's national surveys of crime."

July 26, 1998 **Timoney throws out crime stats as faulty.** "Random checks found as many as 4,000 major offences unreported over the last 6 months."

November 1, 1998 **How to cut city's crime rate: Don't report it.**

November 3, 1998 **Rendell: Crime numbers will rise.** "Mayor Rendell said yesterday that Philadelphia faced a painful period in which counting crime honestly and accurately would drive up the city's crime rate, at lease on paper."

Table 5: Selected Demographic Characteristics of Aggravated Assault Victims, NCVS United States, 1994
(Number of assaults per 1000 persons age 12 or older)

Overall	11.6
Gender	
Male	15.3
Female	8.1
Age Group	
12-15 years	22.2
16-19 years	33.7
20-24 years	26.6
25-34 years	13.7
35-49 years	7.6
50-64 years	3.3
65+ years	1.2
Race	
White	10.9
Black	16.6
Income Group	
<\$15,000	16.5
\$15,000+	10.6
Residence	
Urban	14.8
Suburban	11.0
Rural	9.2

primary victims of violence. In the 1994 NCVS, individuals aged 16-19 years were at the greatest risk for aggravated assault victimization. The assault rates for 20-24 year olds and 12-15 year olds were also high.

Gender and race are two other strong predictors for victimization from aggravated assault. In the NCVS, males were nearly twice as likely as females to be victims of this form of violence. The risk for African-Americans was 1.5 times higher than that for Caucasians. This finding was evident for both black males and black females (**Table 7**).

Poverty is another strong predictor for violent crime in the United States. In fact, racial differences and other characteristics of crime often tend to be negated (as predictors for violence) when poverty is included in the equation (32). The 1994 NCVS found evidence that victimization rates from aggravated assault are highest in the poor. Compared to households with annual income levels over \$15,000, individuals in

households with lower incomes were 1.5 times more likely to be a victim of an assault (8). Rates were highest (20.5 per 1000 persons) among persons in households with income levels below \$7,500 per year.

The victim-perpetrator relationship was also assessed in the NCVS. In 1994, 60.8% of the aggravated assaults involved a stranger; a person unknown to the victim. Violent encounters with relatives or friends, though, were more likely to result in an injury (8).

Weapons are frequently involved in aggravated assaults (by nature of the definition of aggravated assault). In the NCVS, victims reported weapon involvement in 95% of the events. Firearms were present in 35% of the events (8). A slightly different pattern of weapon involvement was noted in the UCR program. In 1994, weapons were involved in 24% of all reported aggravated assaults (**Figure 23**). Firearms accounted for 24% of all events (51).

Violence in Schools

Much attention recently has been paid to the issue of violence in schools; particularly violence related to firearms in schools. Several shooting events have garnered national attention, most notably the multiple deaths at Columbine High School. These events are, thankfully, rare, but they raise obvious questions over the frequency of violence in schools. Is it at a higher point now than ever before? Is violence a daily event in schools? What are the characteristics of victims and perpetrators of school-related violence?

Answers to these questions can be gleaned from several sources. These sources include a review of fatal violent events, the Youth Behavior Risk Survey (47), and the School Crime Supplement to the NCVS (48). Kachur, et.al., examined homicides and suicides occurring on school grounds (as well as those occurring to and from school). Eighty-five homicides were identified between 1992-1994 (49). This number represents less than 1% of all homicides in school-aged children. Most of the victims (74%) were students. More recently, 173-homicide and suicide incidents were identified from 1994-98 (50). While the rate of school related violent deaths declined from that found for 1992-1994, incidents with multiple victims increased. Further details are available from the School Safety Center website (<http://www/nssc1.org/savd/savd.pdf>).

The Youth Risk Behavior Survey (YRBS) is a high school based survey of risk behaviors. In 1997, 7.4% of the high school students surveyed reported being threatened or injured with a weapon while at school. Boys reported higher frequencies of this form of violence than girls (10.2% vs. 4%) (51). Nine percent reported carrying a weapon to school during the preceding 30 days. Nearly 15% had been in a physical fight at school. Both fighting and weapon carrying declined significantly between 1991 and 1997 (47).

The School Crime Supplement focuses on crimes against students aged 12-19 years while at school (48). Overall, violent victimization at school increased slightly from 3.4% in 1989 to 4.2% in 1995 (48).

Table 6 illustrates the characteristics of the victims of violence at school in 1995. Higher frequencies of abuse were noted amongst males, blacks, and those in public schools. School violence was highest among the young (**Figure 22**). This may be due to a larger number of fist fights in the younger crowd.

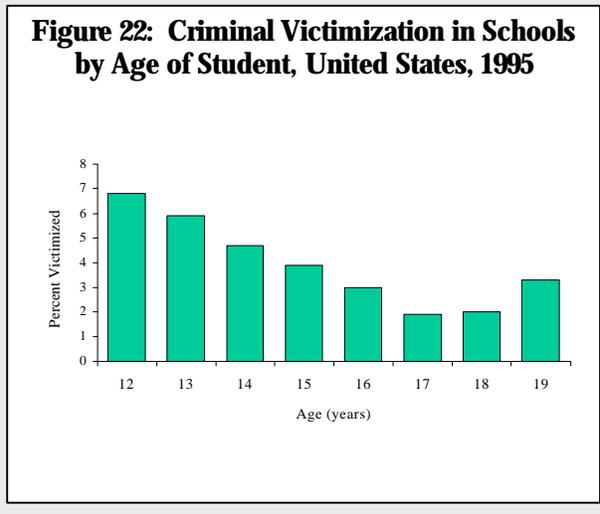


Table 6: Percent of Students Reporting Criminal Victimization at School by Selected Characterizations, United States, 1995

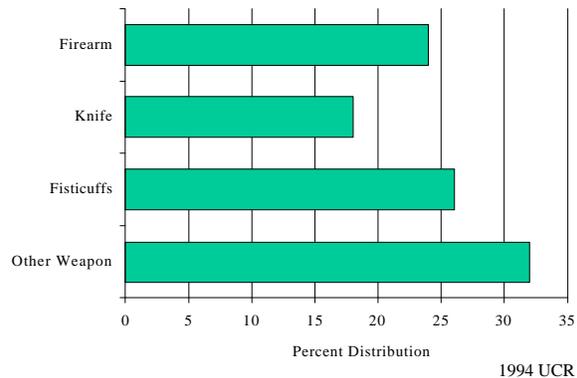
	Percent Victimized
Total	4.2
Student gender	
Male	5.1
Female	3.3
Student race/ethnicity	
White	4.1
Black	5.1
Hispanic	3.9
Student place of residence	
Central city	4.7
Suburbs	4.4
Nonmetropolitan area	3.5
School type	
Public	4.4
Private	2.3
Student reports of street gangs at school	
Yes	7.5
No	2.7
Do not know	3.7
Student reports of seeing a student with a gun at school	
Yes	12.4
No	3.8

Table 7: Aggravated Assault Rates by Race, United States, 1994
(number per 1000 persons 12 yrs and older)

Black Males	20.6
White Males	14.6
Black Females	13.3
White Females	7.4

Source: National Crime Victimization Survey

Figure 23: Weapon Involvement in Aggravated Assaults, United States, 1994



The Cost of Aggravated Assault

Great interest remains in estimating the economic costs associated with crime in the United States. This interest lies in the potential that economic estimates have for influencing or changing policies regarding the victims and offenders of crime. Economic data outline the impact of crime much more forcefully than crime statistics alone. In addition, cost information clearly illustrates the potential money to be saved in successful crime prevention programs.

Several possible outcomes may arise from aggravated assault from the victims' perspective. These include health care consequences from any injuries received during the assault or the psychological impact of the event, lost earnings from time spent away from work as a result of the assault, and the potential for a diminished quality of life (e.g. living in fear). Economic costs may be assigned to all of these consequences. There is some debate, though, over the methods to use in

assigning costs, particularly when trying to estimate the value of pain and suffering from the event or a diminished quality of life.

Health Care Use

There are relatively few reports on the health care consequences of aggravated assault. Existing studies usually consider assaults, in general, and do not provide data specific to aggravated assault. This observation is due to the manner in which medical records identify acts of violence. Categories of violence are not often distinguished in medical records. Violence is generally identified in medical databases by the use of external cause of injury codes (E-codes). The codes for assault (E960-E969) do not distinguish aggravated assaults from simple assaults⁹.

Three national estimates on the use of emergency department services by assault victims exist. Data from the National Hospital

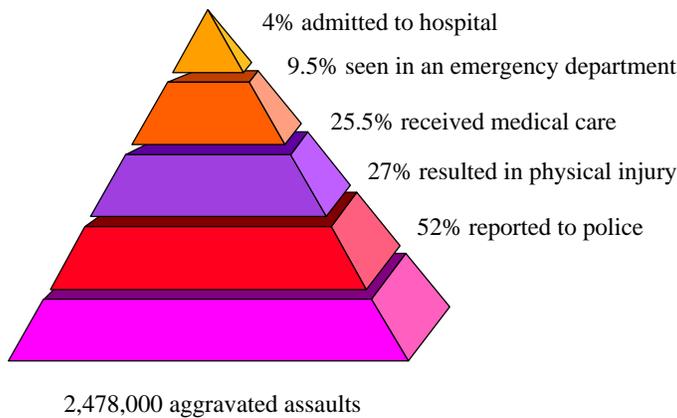
⁹ They also may include homicide events in situations where the person has died from their injuries.

Ambulatory Medical Care Survey (NHAMCS) suggests that there were 1.55 million emergency department visits related to assault in 1992 (52) and 1.45 million visits in 1994 (24). Another report based on the Study of Injured Victims of Violence (SIVV) estimated 1.33 million emergency department visits from assault in 1994 (53).

Further information on the frequency of injury from aggravated assault and the resultant use of health care services is available in the National Crime Victimization Survey. **Figure 24** outlines the outcomes related to aggravated assaults in 1994. The figure graphically illustrates the consequences that happen in greater number at the bottom of the pyramid and those which occur less frequently at the top of the pyramid.

In 1994, roughly one-quarter of the 2.5 million assaults reported had associated physical injuries (8). Most of those cases received medical attention, although the site of care differed. About 10% of the victims of aggravated assault (n=235,000) were treated in an emergency department (8). Four

Figure 24: The Pyramid of Aggravated Assault in the United States, 1994



1994 NCVS

Table 8: Estimates of the Annual Cost for Assault in the United States

Cohen (54)	\$ 75 billion
Cohen (13)	\$103 billion
Miller (14)	\$112 billion
Miller (15)	\$ 93 billion

All estimates in 1993 dollars, adjusted by the consumer price index

percent of the victims had severe injuries that required an overnight stay in hospital. Comparisons between the NCVS and the SIVV by Rand (53), suggest that the NCVS data may underestimate the use of health services by victims of aggravated assault.

Economic Cost

At present, no cost estimates exist to describe the economic impact associated with aggravated assault. Four reports (13-15,54), though, have estimated the costs related to assaults overall. These studies include both simple assaults and aggravated assaults in their analysis. **Tables 8 and 9** outline the results of four reports; providing an overview of the total annual costs related to assaults in the United States (**Table 8**), and a summary of the average cost per assault (**Table 9**).

Estimates of the annual cost of assaults range from \$75-112 billion per year (in 1993 dollars). The majority of this cost is accounted for by the impact of pain and suffering and quality of life. The

Table 9: Estimates of the Cost per Victim of Assault in the United States (1993 dollars)

	Total Cost	Medical Cost	Value of Pain and Suffering
Cohen (54)	\$16,100	--	\$6,594
Cohen (13)	\$21,000	\$195	\$10,541
Miller (14)	\$17,194	\$814	\$8,018
Miller (15)	\$9,400	\$501	\$7,800

medical care costs related to injuries from assault account for a small proportion of the total cost (**Table 9**).

These figures are all based upon victimization data gathered from the National Crime Survey for the years 1985-1990. The studies used roughly the same methods to calculate costs. All considered costs related to health care, lost productivity, pain and suffering, victim services, police services, and diminished quality of life. Some methodological differences exist between the reports. For example, the data sources used to calculate the medical and pain and suffering costs differ between the reports. The earlier reports by Cohen also excluded series victimizations (15).

Detailed reports on the hospitalization charges related to assaults also exist. They suggest that the medical costs for severe cases of assault are not trivial. For example, a review of all hospital admissions in the state of Arizona for 1989 identified 1076 overnight stays related to assault (defined as E960-E969). The average charge for each admission was \$7,873 (11). By nature of the definition of assault applied in this report, homicide victims were not distinguished from assault survivors. However, due to the severity of the injuries incurred, most of the admissions are likely to arise from aggravated assaults.

Reports by Luna (55) and Robicsek (56) examined the financial charges for assault victims

seen in a trauma center. For the period October 1989 – September 1990, Robicsek found 4,874 visits related to assault (defined as E960-E969). The vast majority of these cases (n=4106) were treated in the emergency department of the trauma center and released (56). The average charge for these visits was \$184. Several individuals (n=768) had serious injuries that required an overnight stay in the hospital. Assault survivors were hospitalized for 14.4 days (56). Amongst all assault admissions (both assault and homicide), the average charge for an admission was \$8,194. A similar type of study by Luna, et.al. (55), noted 342 hospital admissions to one trauma center in Seattle, Washington over a one year period. The average charge per admission was \$4,419.

Aggravated Assault in Pennsylvania

To examine the impact of aggravated assault in Pennsylvania, we searched for information on (a) the frequency in which these cases occurred in the state and, (b) any associated health care encounters. What we found is that there is far more information available regarding assaults, in general, and very little information specific to aggravated assaults. While crime-specific data are distinguished by the Pennsylvania UCR program, all available health care data group simple assaults together with aggravated assaults. The following text presents all of the relevant information, so that some general conclusions can be drawn regarding the economic impact of violence from assaults in the state.

Incidence

Estimates on the frequency of assault in Pennsylvania vary by the source of information used. Two general sources of information on assault exist; the Pennsylvania UCR program, and the Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) survey. The UCR program provides the only information specific to aggravated assault. The Pennsylvania Crime Victimization Survey (PCVS) also has documented the frequency of personal violence in the state. We have reported previously (page 15) that PCVS data indicate that there were about 276,000 victims of personal violence in Pennsylvania for the year 1996.

The BRFSS is a telephone-based health survey of the US population administered by the Centers for Disease Control and Prevention. In 1994, several questions in the Pennsylvania sample addressed physical violence. To assess the frequency of physical violence, participants were asked if they had been “hit, slapped, pushed, or kicked by another person or hit by them with an object or weapon” (22). This definition of physical violence is quite broad, and captures many minor events, but it also captures some of the elements of assault classified by the UCR program and the NCVS. Overall, 5.6% of the adults surveyed in Pennsylvania reported being a victim of physical violence in 1994 (22). This figure translates to 555,328 assault victims amongst all of the adults in the state. Twelve percent of the victims reported being hurt in the physical attack by a weapon.

More specific information on the number of criminal assaults in the state is documented by the Pennsylvania UCR program. In 1994, there were 23,941 aggravated assaults in the state (7). This figure represents a rate of 198.7 aggravated assaults per 100,000 persons. In addition, there were 58,126 other assaults recorded by the UCR. These events include offenses categorized as simple assaults and assault and battery (7). They are classified as Part II offenses by the UCR.

Table 10 outlines the risk for aggravated assault in Pennsylvania by gender, age, and race. Uniform Crime Report data on the victims of aggravated assault suggest that males, young adults (15-34 years old), and African-Americans are at heightened risk for serious assault (7). The risk appears greatest for African-Americans. In 1994, one person in 134 in this community was a victim of aggravated assault. For all state residents, the risk level was 1 in 535.

Table 10: Characteristics of Victims of Aggravated Assault, Pennsylvania, 1994 (rate per 100,000 persons)

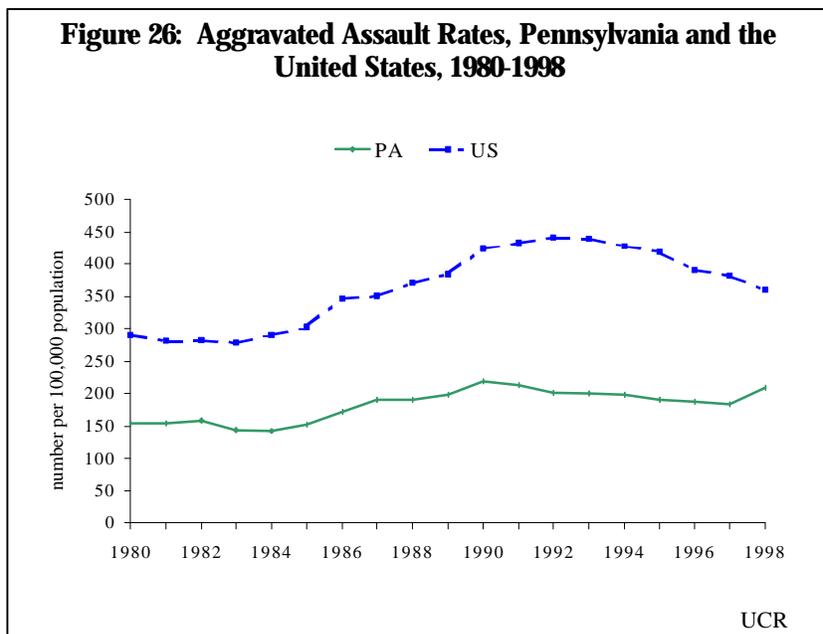
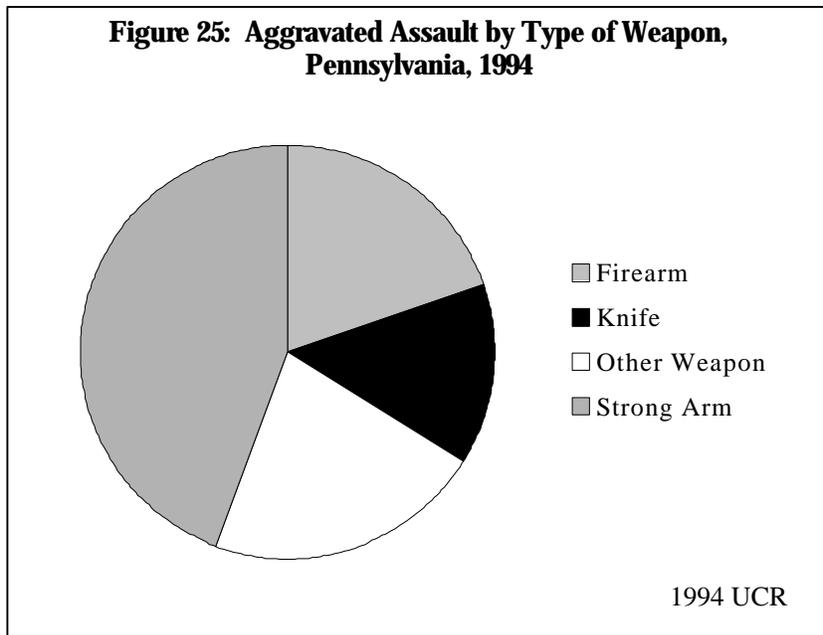
<i>Overall</i>	198.7
Gender	
Male	248.6
Female	129.6
Age Group	
0-14 years	86.2
15-24 years	491.6
25-34 years	375.1
35-44 years	204.4
45-54 years	97.9
55-64 years	39.6
65+ years	16.6
Race	
White	129.3
Black	745.1

Most aggravated assaults in Pennsylvania involved some type of weapon. Data from the UCR program indicate that the type of weapon involved was evenly distributed between firearms, knives and other cutting instruments, and other weapons, including clubs and blunt objects. Fisticuffs or bodily force were associated with 44% of the reported events (**Figure 25**).

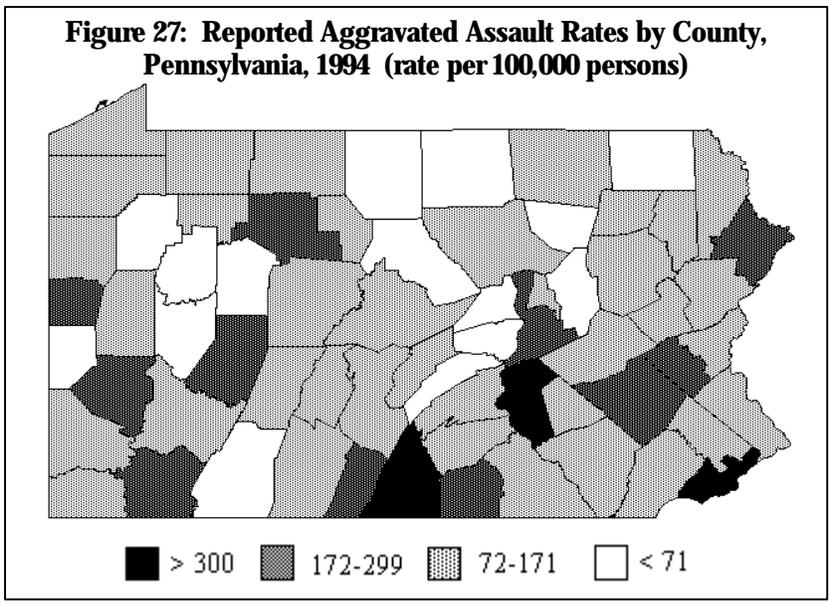
Does aggravated assault occur more frequently in Pennsylvania than in the United States? **Figure 26** suggests that the opposite observation is true. Aggravated assaults occur much less frequently in Pennsylvania than in the United States as a whole. The data presented, though, are not adjusted for differences in the age distributions of the Pennsylvania and United States populations. Aggravated assault differences between the groups are likely to be smaller when this effect is considered, although the rate will likely remain much lower for Pennsylvania.

Figure 26 also illustrates the recent trends in aggravated assaults in the state. Police-reported events in Pennsylvania increased from 1985-1990, but declined thereafter. In 1998, however, the rate appears to increase again (209 assaults per 100,000). This finding almost entirely reflects the increased reporting of aggravated assaults by the Philadelphia police department in 1998 (See [Box: Down with Crime, Page 25](#)).

While crime statistics for Philadelphia were likely to be underestimated in 1994, **Figure 27** shows that Philadelphia County still had one of the highest rates of aggravated assault in the state.



Dauphin, Delaware, and Franklin County also had assault rates above the 95th percentile for the state. The legend outlines aggravated assault rates in the 0–20th percentile for the state (<71 assaults per 100,000 persons), the 21st–79th percentile (72-171 per 100,000), the 80th–94th percentile (172-299 per 100,000), and above the 95th percentile (>300 events per 100,000 persons).



Health Care Use

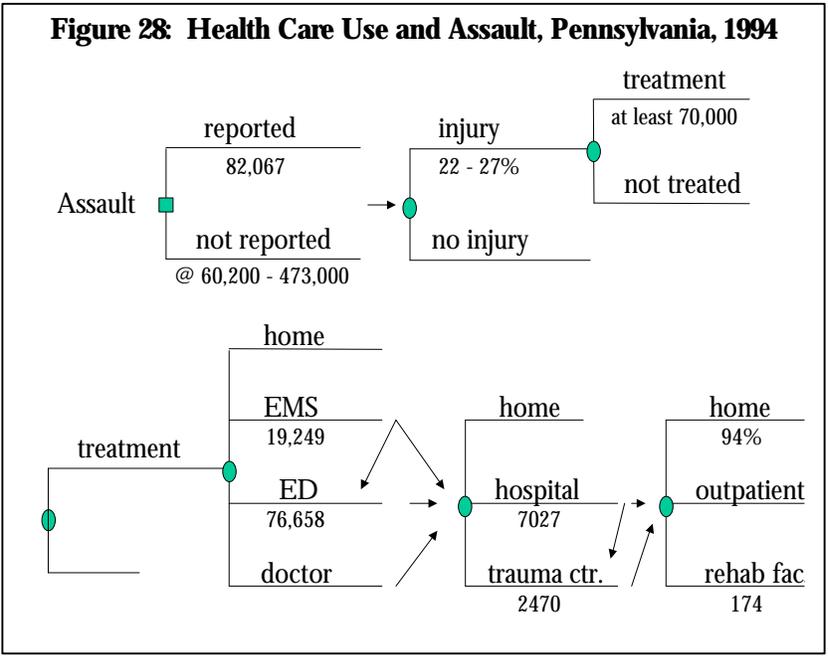
Figure 28 outlines the likely scenario of health service use by assault victims in Pennsylvania. Again, the analysis includes both simple assault and aggravated assault victims. Exact information on the number of victims of assault, the number requiring medical care, and the type of health services used is not yet available in most states, including Pennsylvania. Existing studies, though, provide some indication to the possible importance of the issue. Data from the NCVS, for example, suggest that 22% of simple assaults involve minor injury and 27% of aggravated assaults result in injury (8). Nearly all of the assaults that result in significant injury require medical treatment of some type (8). In Pennsylvania, data from the BRFSS indicate that 12.9% or close to 72,000 persons sought medical care from an emergency department, doctor, or other facility hospital in 1994 due to physical violence (22).

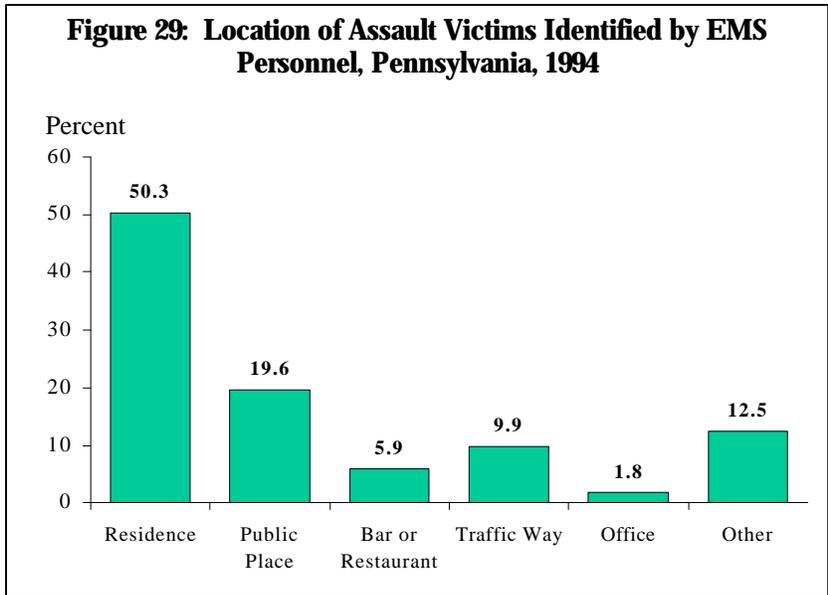
The specific location where medical care is received may vary. Most cases, though, will either initially be treated at home (often not requiring the services of a medical professional), by a paramedic, in a hospital emergency department, or a doctor's office (8). We examined information from the Pennsylvania Department of Health, the Pennsylvania Trauma Systems

Foundation (PTSF), and the Pennsylvania Health Care Cost Containment Council (HC4) to characterize the use of these services, as well as the number of overnight hospital stays related to assault. Visits related to assault in both the PTSF and the HC4 data systems were identified through the use of the external cause of injury codes, E960-E969.

Emergency Medical Services

Statistics from the database of the Emergency Medical Services division in the Department of Health indicate that 19,249 ambulance trips were related to assault in 1994. This figure includes 15,384 trips specifically coded as assault-related and 3,865 trips for shootings or stabbings. The majority of the victims (63%) seen by paramedics were male. The average age of the victims was 30 years. Specific details regarding the location responded to by EMS personnel are displayed in **Figure 29**. About one-half of the EMS





trips were made to a private residence. The remaining trips were made to largely public locations, including bars and restaurants, streets, and offices.

Emergency Department Visits

There are no direct data that outline the number and characteristics of emergency department visits from assault in Pennsylvania. However, reports from Rand (53) and Stussman (24) suggest that assaults account for between 1.42% and 1.56% of all emergency department visits in the United States, respectively. In 1994, there were approximately 4,917,550 ED visits in the State of Pennsylvania (Dept. of Health data). If the proportion of ED visits related to assault in Pennsylvania is similar to that for the United States, then there were between 69,800 and 76,658 ED visits in the state from assault.

Hospital Admissions

The most complete data available to characterize healthcare use from assault are those

describing the number of overnights stays in Pennsylvania hospitals. In 1994, the HC4 data system recorded 7,027 admissions

related to assault¹⁰. The PTSF data indicate a total of 2,470 admissions to trauma centers in the state due to assaults. Most of the patients (82%) were admitted to the hospital through an emergency department (HC4 data). Physicians referred 15% of the admitted patients. Hospital transfers accounted for only 1.5% of all the HC4 admissions.

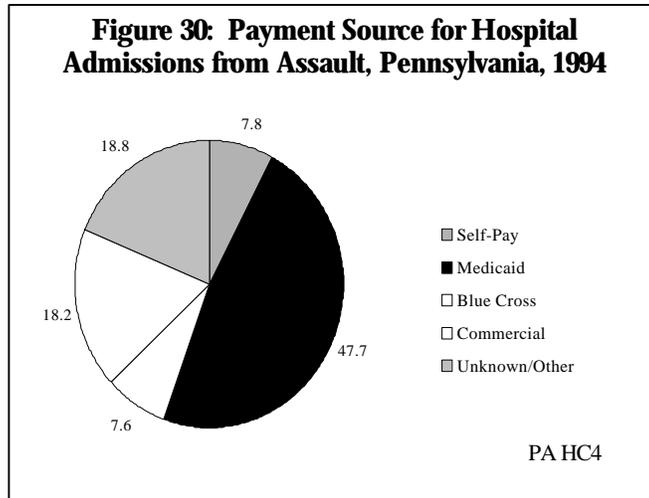
Table 11 shows the demographic traits of the subjects admitted to hospital for assault-related injuries. As suggested by the crime statistics, hospitalized cases due to assault were overwhelming focused on the young, males, and African-Americans. Men had higher rates of admission than women across all age groups, except those over

Table 11: Demographic Characteristics of Persons Admitted to Hospital for Assault, Pennsylvania, 1994

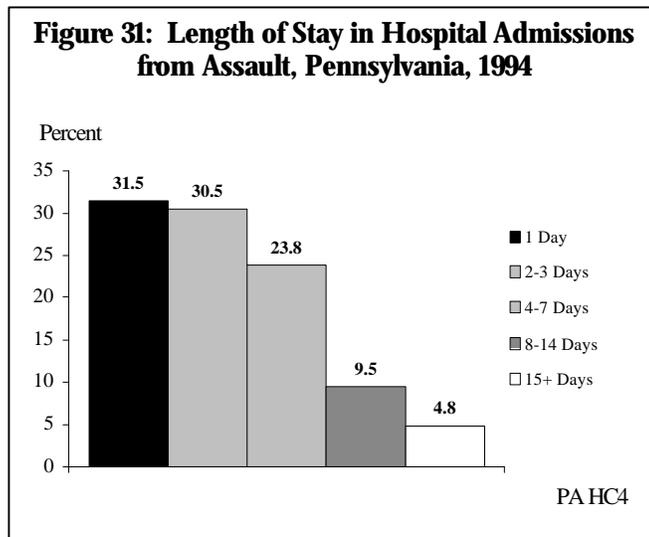
	HC4	PTSF
TOTAL	7027	2470
Age Group		
0-14 years	2.6%	2.0%
15-24 years	31.8%	33.8%
25-34 years	30.7%	31.1%
35-44 years	21.8%	20.8%
45-54 years	7.6%	7.3%
55-64 years	2.7%	2.9%
65+ years	2.8%	2.1%
Gender		
Female	17.8%	14.0%
Male	82.2%	86.0%
Race		
African-American	58.5%	68.1%
Caucasian	33.0%	28.5%
Other	8.5%	3.4%
Payor Source		
Self-Pay	8.9%	28.4%
Commercial insurer	29.4%	22.8%
Government plan	61.7%	48.8%

¹⁰ Rape and child abuse event are excluded from this figure.

80 years of age (HC4 data). African-Americans had consistently higher admission rates than Caucasians at all ages. Most hospital visits related to assaultive violence in 1994 were paid for by government insurance programs. Nearly 50% of the admissions were financed through the state Medicaid program (Figure 30). Commercial insurers covered one-quarter of the admissions identified.



The average length of stay associated with assault admissions in the HC4 data was 4.9 days. Most of the admissions, though, had a duration of stay of 3 days or less (Figure 31). Statistics from the PTSF show that trauma center patients spent an average of 7.8 days, overall, of which an average of 1.6 days was spent in an intensive care unit. It is very likely that the PTSF admissions reflect more severe cases of injury than the HC4 admissions.



Potential Long-Term Impact of Injuries from Assault

The long-term consequences of physical violence characterized as assault are not yet understood for victims in Pennsylvania. It seems evident from the literature that the most serious forms of assault will have long-term implications, particularly with respect to mental and physical health needs and the criminal justice system (15). With respect to the health care impact, there is some limited evidence available from the HC4 and PTSF data systems. For example, 52 admissions to rehabilitation institutes related to assault were noted in the HC4 database. The average length of stay for these admissions was 28.1 days. Nearly all (87%) of the rehabilitation

center admissions were transferred into the center from another hospital. The PTSF registry reported that 144 patients were discharged to rehabilitation centers.

Also, traumatic brain injury and spinal cord injury are two severe conditions that often require long-term care. Of the acute care admissions recorded, the HC4 had evidence that 1,396 overnight stays (20%) involved some type of brain/head injury. Fewer cases of spinal cord injury (n=52) were noted. In the PTSF registry, 551 of the 2,470 assault cases had a brain or head injury. These data

suggest that further medical care will be required for a significant number of hospitalized assault victims.

Health Care Costs Related to Assault

In general, no comprehensive information exists on the health care costs of assaults in Pennsylvania. The only information available to document costs is that contained within the HC4 data systems. No direct data are available to consider costs related to EMS, emergency department, or long-term care. In 1994, total health care charges for

assaults in the HC4 data were over \$123 million (\$123,138,476). Total costs, though, were estimated to be much lower. When applying cost-to-charge ratios to the HC4 data, the estimated total cost of hospital admissions for assault was \$42 million (\$42,055,414). The average cost per admission for an assault was \$5,985. This figure does not appear to differ markedly from estimates presented in earlier reports (11,56)¹¹.

The average charge for a short-term hospital stay related to assault in 1994 was \$17,524. The average estimated cost was \$5,985 per admission.

Much higher charges and costs were observed for the 52 assault-related admissions to rehabilitation institutes in the HC4 data system. Total charges for these cases were \$3.5 million, or \$67,793 per case. Total estimated costs amounted to \$1.3 million, or \$25,058 per admission.

Another publication (18) has also outlined the hospital charges in Pennsylvania for injuries from assault. This report from the Pennsylvania Department of Health examined Pennsylvania Health Care Costs Containment Council data. For 1994, the total hospital charges identified for 7,439 assaults were \$135 million (18). This total is slightly higher than we report here. The Department of Health estimate, though, includes estimates for child abuse, rape, and long-term rehabilitation center care within it, whereas the estimates above have excluded these categories of assault-related charges.

¹¹ After considering adjustments for the year of study and health care charges.

Robbery

Robbery represents another significant form of criminal violence in the United States. In 1994, robbery was the second most common violent crime (32), trailing only aggravated assault in frequency. Robbery, in its purest form, represents the attempt to take possession of an article of value by force from a person. This action often involves a weapon (8), and carries long-term implications related to physical and mental health. Unfortunately, existing data systems do not characterize the health burden of robbery very well. This paper, then, reviews the current facts known regarding the frequency of robbery and the characteristics of robbery victims. Discussion of several published cost estimates for robbery is also presented. There remains, however, no reliable data on which to estimate the economic burden of robbery in Pennsylvania.

Issues in the Epidemiology of Robbery

Robbery is one of the major components of violent crime in the United States today. As such, most active systems for monitoring crime distinguish robbery statistics in their reports. Today, most of the current statistics available on robberies in the United States originate from the police reports of the Uniform Crime Report (UCR) program and the interviews of the National Crime Victimization Survey (NCVS).

Robbery in the UCR program is defined as “the taking or attempt to take anything of value from the care, custody, or control of a person by force or threat of force and/or by putting the victim in fear” (7). The most common form of robbery involves a person-to-person victimization on the street. Other events included under this definition include bank, convenience store, and gas station robberies amongst other business sites (7).

In 1994, the UCR program identified 618-949 robberies in the United States (26). Considering the U.S. population, this figure represents a rate of 238 robberies per 100,000 persons. As evident for homicides and aggravated assaults, the number of robberies has declined significantly since 1994. The latest data available for 1998 indicate a total of 446,625 offenses (44). The robbery rate declined over 30 percent in this period to 1654 offenses per 100,000 persons.

Robbery in the NCVS involves several situations that are more detailed. By definition, robbery is “a completed or attempted theft of property or cash by force or threat of force directly from a person with or without a weapon, regardless of whether an injury occurs”. Six categories of robbery are highlighted in the reports of the NCVS (8), including:

- a. Completed robbery, with or without injury;
- b. Completed robbery with injury;
- c. Completed robbery without injury;
- d. Attempt to take property without success, with or without injury;
- e. Attempted robbery without injury;
- f. Attempted robbery with injury.

In 1994, the NCVS recorded 1.3 million robberies, for a crime rate of 6.1 per 1000 persons aged 12 and older (8). Broken down by category, there were 795,000 completed robberies and 504,000 attempted robberies. Nearly one-third of the completed or attempted robberies resulted in an injury (completed: 288,000; attempted: 122,000). Overall, 55% of the recorded robberies were reported to the police (8). Completed robberies and those involving an injury were more likely to be reported to the police.

The most recent data from the NCVS for the year 1998 also indicates that the number of robberies in the United States has declined. In that year, the NCVS estimates that there were 886,000 completed and attempted robberies (45). The rate of victimization from robbery declined by 36% from 1994 to 1998. Fewer injuries from robberies were also noted in 1998. About 240,000 offenses involved an injury. Robberies involving an injury have declined more dramatically (43-50%) than robberies overall (45).

Differences in the number of robberies between the UCR and NCVS systems (UCR: 618,949 vs. NCVS: 1,299,000) and the rate of robbery appear to be large. However, the NCVS data (55% of the crimes are reported to the police) suggest that the difference is due primarily to the variance in the methods between the programs.

Robbery Trends

Evidence from both the UCR and NCVS show that the frequency of robbery changes over time. In general, these changes tend to follow the pattern observed for all violent crimes, as recorded in each data system. Both the UCR (46) and NCVS (45, 28) indicate that robbery rates declined in the early 1980's, increased for the period of 1985-1993, and have declined thereafter. Large declines were noted in both data systems for the latest two years (1997 and 1998).

Risk Factors for Robbery

Victims of successful and attempted robberies appear to have the same demographic, social, and economic traits as victims of other violent crimes.

Table 12: Characteristics of Robbery Victims, NCVS, United States, 1994
(Number of robberies per 1000 persons age 12 or older)

Overall	6.1
Gender	
Male	8.1
Female	4.1
Age Group	
12-24 years	11.7
25-49 years	6.1
50+ years	1.9
Race	
White	4.8
Black	14.0
Income Group	
<\$15,000	8.7
\$15,000+	4.9
Residence	
Urban	10.9
Suburban	5.1
Rural	2.6

The rate of victimization from robbery in the NCVS is shown in **Table 12**. Young males, particularly young black males, have the highest victimization rates from robbery (8). Higher rates were also observed among the poor and city residents in the 1994 NCVS. Persons living in an urban residence had a victimization rate two times higher than those living in suburban homes, and four times higher than persons in rural residences.

Data from the NCVS indicate that the overwhelming majority (77%) of robberies occur among strangers (8). In other words, the perpetrator was a person that the victim did not know, or had not seen before. This high proportion of stranger involvement appears to be a characteristic unique to robberies. Other violent crimes, including aggravated assault, homicide, and rape, have more involvement between friends, acquaintances, and relatives (8).

Perhaps one reason for high involvement of strangers is that robberies tend to occur in public places. **Figure 32** highlights the

location of robberies in the United States as categorized by the UCR. Most robbery crimes occur on the street or at places of business. Far fewer events occur in residences. Commercial businesses at heightened risk for robbery in 1997 appear to be convenience stores, gas stations, and banks (57).

The Cost of Robbery

The social and economic consequences of robbery, as described in the literature, include categories, such as health care costs, lost time from work, criminal justice system costs, and pain and suffering, amongst others. Four studies (13-15,54) outline the respective costs related to robbery. These reports estimate that the annual cost of robbery lies between \$11-27 billion (**Table 13**). The latest report by Miller, et al., (15) indicates that over 70% of the estimated cost of robbery is accounted for by the value assigned to the pain and suffering arising from robberies. Health care costs made up only 5% of the estimated total.

Figure 32: Location of Robberies in the United States, 1997

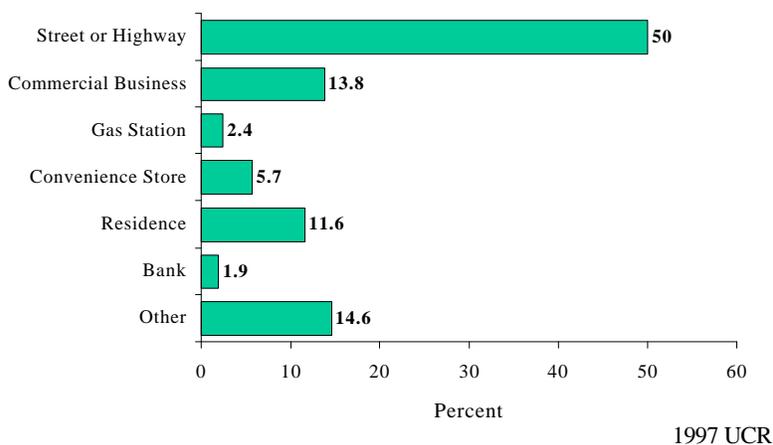


Table 13: Estimates of the Annual Cost of Robbery in the United States

Cohen (54)	\$ 18 billion
Cohen (13)	\$ 26 billion
Miller (14)	\$ 27 billion
Miller (15)	\$ 11 billion

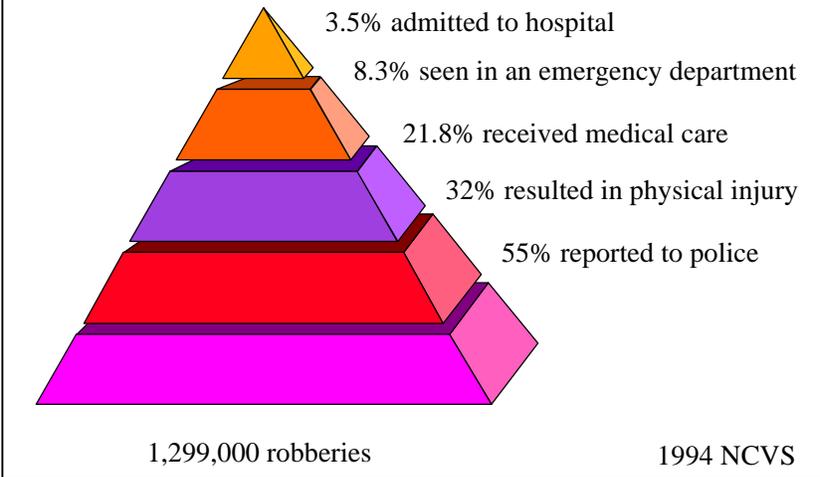
All estimates in 1993 dollars, adjusted by the consumer price

Health care costs related to robbery remain difficult to quantify. Medical record systems, for example, often do not distinguish the type of crime involved that produce an injury. At this time, the NCVS is the best source for information on health care utilization related to robberies. In the NCVS, victims of robberies are asked to detail any associated health care encounters and economic losses (58). This method is currently the only way to meaningfully assess health care statistics related to robbery.

Figure 33 outlines the health care outcomes related to robbery in 1994. Of the 1.3 million reported robberies, about 410,000 involved an injury. Most injured victims (n=283,000) sought care from a medical professional. About 8% of all robbery events (38% of all events receiving medical care) had an associated emergency department visit (8). Fewer individuals (3.5%) required an overnight stay in hospital.

Another report based on surveillance for emergency department visit related to violence noted a total of 22,000 emergency department visits from robbery in 1994 (53). This figure from the SIVV is significantly lower than

Figure 33: The Pyramid of Robbery in the United States, 1994



that reported in the NCVS. The authors suggest that some robbery events may have been misclassified as assaults (53). This illustrates the difficulty of identifying crime-specific cases from medical data sources. This problem was encountered despite the establishment of a system to identify violence in emergency departments.

Robbery in Pennsylvania

At present, there is little information available to outline the frequency of robbery in Pennsylvania and its associated outcomes. Crime-specific data are currently only distinguished by the Pennsylvania UCR program. No health care data exist for robberies in the state.

In 1994, there were 22,010 robbery events reported by the UCR program for the state of Pennsylvania (7). The associated rate of robbery was 182.7 offenses per 100,000 persons. Reported robberies have declined in the state

since this time. In 1998, there were 19,102 robberies reported by Pennsylvania police departments (59). The decline in robbery, though, was only evident for 1997 and 1998 (**Figure 34**). The rate of robbery remained high from 1990-1996 in the state. While recent declines have been noted in Pennsylvania (and robbery rates are lower in Pennsylvania compared to the United States, as a whole), the decline in robbery rates for the state has been much slower than that seen in the United States (**Figure 34**).

Reasons for this observation are not clearly understood at this time. Several factors could potentially influence the recent robbery trends in Pennsylvania and the United States. They include the general under-reporting of violent crime in Philadelphia, possible changes in the record systems of the police departments (statewide and nationally), or a real change in crime rates between the areas.

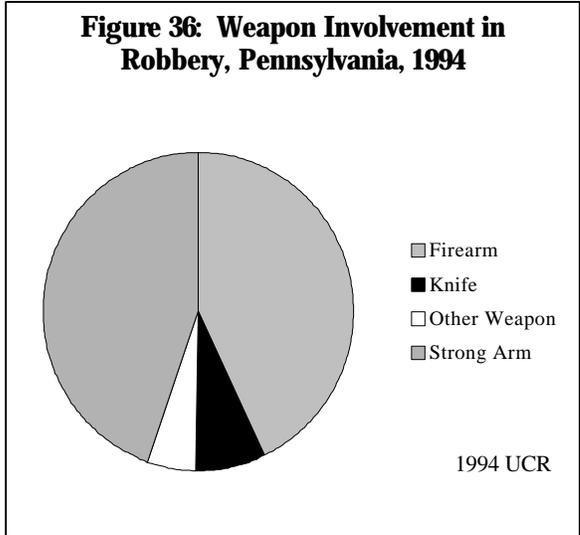
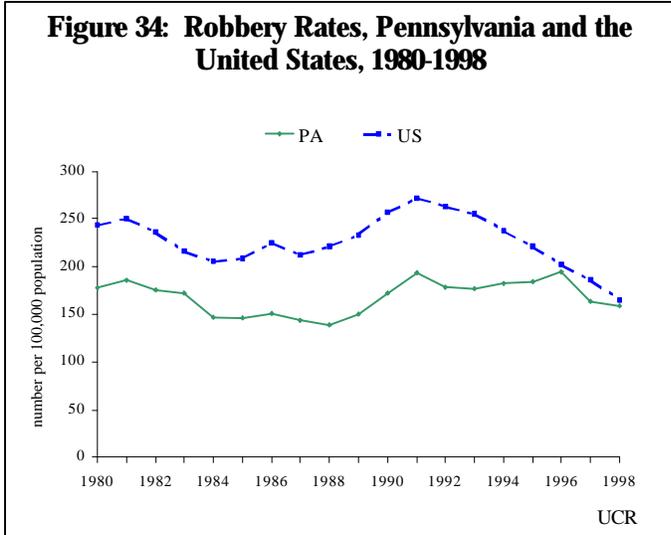


Table 14 outlines the risk for robbery in Pennsylvania by age, gender, and race. A familiar pattern appears again. In the UCR data, males, African-Americans, and persons aged 15-34 years had the highest robbery rates in the state (7). Again, the risk was markedly higher amongst African-Americans.

recorded in the UCR) by county. Robbery events were higher in Southeastern Pennsylvania and areas in western Pennsylvania (Allegheny, Erie, Fayette, and Lawrence counties). Rates were highest in Philadelphia, Allegheny, Dauphin and Delaware counties. Outlined rates mark the counties in the 95th, 80th-94th, 21st-79th, and 0-20th percentile for the state.

one-half of the robberies involved strong-arm tactics. Firearms were used in 44% of robbery offenses in Pennsylvania in 1994 (7).

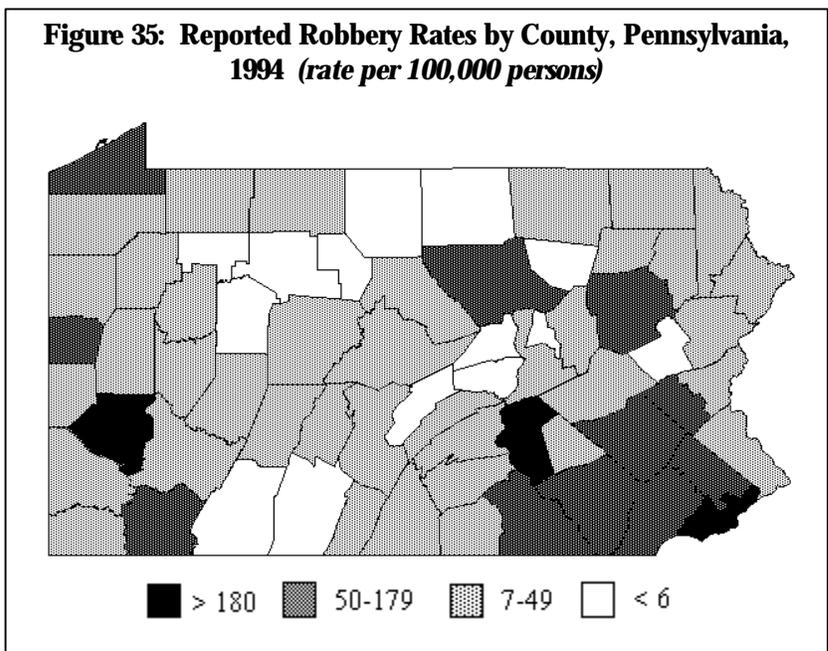
The health care costs related to robbery in Pennsylvania are not known.

Reported robbery rates also differed markedly by location in Pennsylvania. **Figure 35** shows the reported rate of robbery (as

About one-half of the reported robberies in the state involved in a weapon (**Figure 36**). The other

Table 14: Characteristics of Robbery Victims, PA, 1994 (rate per 100,000 persons)

<i>Overall</i>	<i>182.7</i>
Gender	
Male	228.4
Female	105.8
Age Group	
0-14 years	63.0
15-24 years	383.7
25-34 years	279.4
35-44 years	174.2
45-54 years	124.2
55-64 years	88.2
65+ years	69.0
Race	
White	104.6
Black	740.5



Rape

Another major category of violent crime in the United States today is forcible rape. Historically, society has ranked forcible rape as the second most important violent crime, trailing only homicide in importance, and preceding robbery and aggravated assault (32). While rape ranks as a major crime, several issues limit our understanding of the frequency and outcomes of rape. Most notably, questions remain over the number of rapes committed, as many offenses are never reported (60), and definitions of rape vary from narrow to broad categorizations of this crime. This review examines these and other issues in more detail and overviews the existing information that describes the impact of rape.

Issues in the Epidemiology of Rape

While several aspects of the epidemiology of rape are now well known, some uncertainty still exists regarding the incidence and prevalence of rape. Published estimates on the number of victims and number of rape offenses vary greatly. Two factors generally account for this disparity. First, no standard definition of rape has been used in the published literature. Second, the methods for assessing rape differ meaningfully by study.

Much of the uncertainty surrounding the number of rapes in the United States is due to differences in the definition of

rape applied between studies. Recent estimates for the frequency of rape have been published by four sources: the UCR, the NCVS, the National Violence Against Women Survey (NVAWS), and the National Women's Study (NWS). While each data source has captured the concept of forced sexual intercourse as a component of rape in their definitions, there are subtle and major variances in the definition of rape applied (see [Box: Methods Underlying the National Estimates of Rape](#)). For example, two of the data sources only consider rapes against women (the UCR and NWS), and most exclude rapes against children. Attempted rapes are included in all of the sources. However, the classification of attempted rape may differ, as the NCVS and NWS include verbal threats of rape in their classifications.

Nuances of this sort exist throughout the published literature on rape. Debates exist regarding even the term "sexual intercourse". The NCVS, NVAWS, and NWS consider vaginal, anal, or oral sex as sexual intercourse. The UCR vaguely identifies "carnal knowledge" as the offense of importance. This leaves a great deal of room for discretion or variance on the part of the police officer who is dealing with the crime. As evident from the actions within the Philadelphia Police Department, this may lead to misclassification of rape as sexual assault. The NCVS is the only data source that distinguishes sexual assault from attempted rape.

Methodological differences exist between the reports as well. Of most importance is the

distinction between the UCR (based on police reports) and the other surveys (based on reports by the victim). Data from the NCVS and NWS demonstrate that 68–84% of all rapes and attempted rapes are never reported to the police (8,62). There also is some suggestion that the rape counts of the NCVS may be under-represented (15,32). Tjaden and Thoennes argue that differences in estimates between the NCVS and NVAWS may be due, in part, to differences in the questions used to screen for rape victimization (61). The NCVS uses two questions, while the NVAWS used five questions.

National Estimates of Rape and Sexual Assault

Reports on the frequency of rape indicate that between 100,000 and 1 million rapes are committed each year (8,26,61,62). The lowest rape figures originate from the UCR program. The highest numbers are those derived from the NVAWS.

In 1994, the UCR program identified 102,216 forcible rapes or attempts reported to the police in the United States (26). This number translates to a rate of 39.3 offenses per 100,000 persons. The latest data published for 1998 notes few rapes (n=93,103) and a lower rate of offense (34.4 per 100,000 persons) (44). From 1994 to 1998, the forcible rape rate declined by 12 percent.

The National Crime Victimization Survey (NCVS) provides the most detail regarding rape and sexual assault in the United States. For 1994, the NCVS estimates that 168,000 rapes were committed against men

Methods Underlying the National Estimates of Rape

<u>Data Sources</u>	<u>Definition of Rape</u>	<u>Data Collection Method</u>
Uniform Crime Report (44)	Forcible rape is the carnal knowledge of a female forcibly and against her will. Assaults or attempts to commit rape by force or threat of force are included. Statutory rape and other sex offenses are excluded.	Police reports and records.
National Crime Victimization Survey (8)	Forced sexual intercourse. Force may be from psychological coercion or physical force. Sexual intercourse means vaginal, anal, or oral penetration by the offender or from a foreign object. Includes attempts or verbal threats of rape, and considers male as well as female victims.	Self-report. Persons age 12 years and older were contacted through a sampling of U.S. households.
National Violence Against Women Survey (61)	Forced vaginal, oral, and/or anal sex.. Includes attempts and male as well as female victims.	Self-report. Women age 18 years and older were contacted through a national telephone survey.
National Women's Study (62)	Vaginal intercourse, oral and anal sex, and/or other sexual penetration by force, threat of force, or lack of consent.	Self-report. Women age 18 years and older were contacted in an longitudinal telephone survey.

and women age 12 or older; for a victimization rate of 80 per 100,000 persons (8). Further, an estimated 149,000 attempted rapes were noted in the NCVS. Fewer attempted rapes were reported to the police (20%) than observed for completed rapes (32%) (8).

The NCVS also considered sexual assault in its design. By definition, sexual assault was classified as "an attack or attempted attack involving unwanted sexual contact between victim and offender". Sexual assaults in the NCVS may or may not involve force and include acts such as grabbing or fondling, as well as verbal threats (8). In 1994, about 117,000 sexual assaults were noted.

Declines in rape and attempted rape from 1994 to 1998 were also noted in the NCVS. The latest data from the NCVS estimate a total of 110,000 rapes and 89,000 attempted rapes in 1998 (45). The rate of victimization (number of offenses per 100,000 persons age 12 and older) for rape and attempted rape declined 29% and 43% respectively during this time (45). In contrast, the frequency of sexual assault changed very little from 1994 to 1998.

Both the UCR and NCVS provide ongoing estimates for the frequency of rape and/or sexual assault in the United States. In addition to these regular monitoring systems, other one-time surveys have been undertaken

to identify the importance of rape. These types of surveys include the National Violence Against Women Survey (NVAWS) and the National Women's Study (NWS). Both reports utilized telephone surveys to identify victims of rape and assault. The NVAWS survey was conducted from November 1995 to May 1996 (61). The NWS was originally conducted in 1990 (62), with follow-up interviews of the cohort in 1991 and 1992 (15).

Estimates from the NVAWS outline both the lifetime and annual risk for rape. Considering the lifespan of the respondents, the NVAWS found that 1 out of every 6 women in the United States has been a victim of an attempted or completed rape (61).

The lifetime risk was considerable smaller for men (1 male out of every 33 was a victim).

On an annual basis, the survey found that 0.3 percent and 0.1 percent of the female and male respondents, respectively, reported a completed or attempted rape (61). Number-wise, these figures translate to 302,100 female victims and 92,700 male victims. The NVAWS also found that many victims were raped more than once in the 12-month period. Thus, about one million rape victimizations were estimated to occur in this year period (876.100 among women and 111,300 among men).

Data from the NWS for 1990 indicate that 683,000 women were forcibly raped. This estimate of the number of victims of rape is substantially higher than reported in the NVAWS and NCVS. The broad definition of rape applied in this study probably accounts for much of this difference.

Trends in Rape

Indications of a recent decline in rape raise interest in learning more about changes in rape over longer periods. Looking at information on the incidence of rape and if it changes over time can provide clues to identify reasons for a decline or increase. Studies of trends, though, require data that identify events with similar definitions and similar methods at each point in time. This information is typically available from ongoing monitoring systems, such as the UCR and the NCVS.

Unfortunately, information on the incidence of rape has not generally been collected with similar measures or accuracy over time. This situation limits the usefulness of existing rape data. Consider the incidence estimates of the UCR as an example. The number of forcible rapes per 100,000 women did not change a great deal from 1980 (71 per 100,000 women) to 1995 (72 per 100,000 women) (Figure 37) (46). Does this mean that rape rates have been stable over time? Perhaps, but if you consider that reporting by police has improved over time, it could mean that rates have gone down with time. The true answer is not known, although the recent decline appears to be real.

Another example is provided by the NCVS. Existing data suggest that rape victimization rates have declined over the last 25 years (28). In 1992, however, the methods for ascertaining rape and sexual assault were significantly altered. The classification of rape, thus, probably changed over time. Questions exist about the comparability of the estimates before and after 1992.

Characteristics of Rape Victims

The search to identify factors associated with rape has been underway for many years. One finding has little dispute that the majority of rape offenses involve males assaulting females. Much work has focused on identifying reasons why men rape women. Indeed, several theories of rape exist. The most widely held theory is that rape represents an attempt for a male to exert power over a female. Other theories suggest that the availability and frequent viewing of pornography leads to rape. The latest theory maintains that rape has a strong genetic component (63).

Several demographic and socio-economic characteristics have been identified amongst rape victims. Table 15 show the rate of victimization in the NCVS from rape and sexual assault (combined) for 1994. High rates of rape and sexual assault are seen among the young, those with low household incomes, and city residents (8). In contrast to other violent crimes, there appears to be little or no association between rape and racial groups (8,60).

Figure 37: Trends in the Rate of Forcible Rape Known to Law Enforcement Agencies, United States, 1980-1995

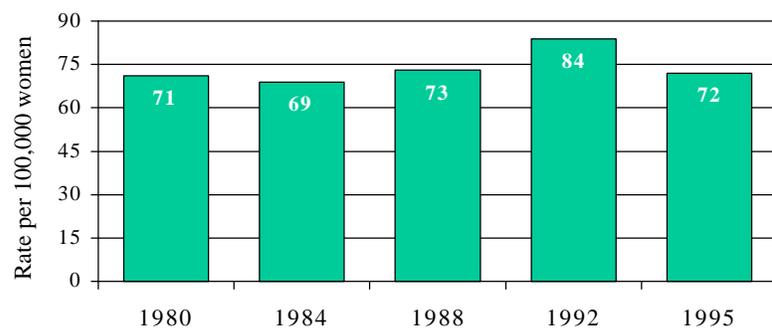


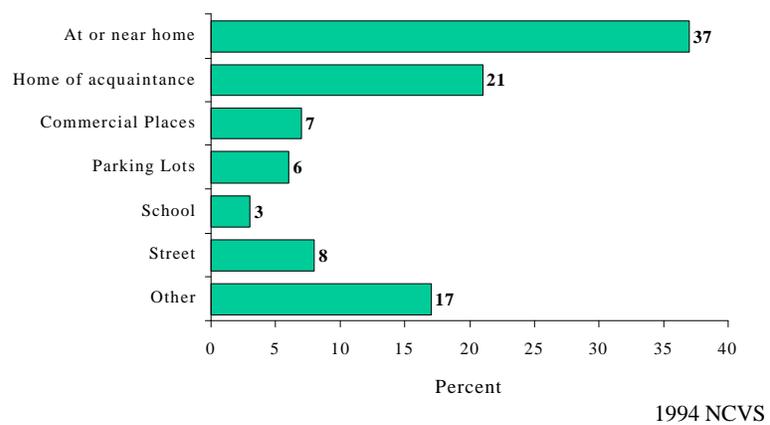
Table 15: Characteristics of Rape and Sexual Assault Victims, NCVS, United States, 1994
(Number of rapes per 1000 persons age 12 or older)

Overall	2.0
Gender	
Male	0.2
Female	3.7
Age Group	
12-24 years	4.4
25-49 years	2.1
50+ years	0.1
Race	
White	1.9
Black	2.7
Income Group	
<\$15,000	4.7
\$15,000+	1.3
Residence	
Urban	2.7
Suburban	1.8
Rural	1.7

One of the most striking findings emanating from all of the rape reports is that an extraordinary percentage of rape victims are children (60). Evidence from police reports indicates that about one-half of all rape victims were under age 18 years at the time of the rape or attempt to rape (60, 64). In the NCVW, the highest rates of rape and sexual assault are seen among 16-19 year olds (5.1 per 1000 persons), followed closely by 20-24 year olds (8). No information is available in the NCVS to document rapes in children under age 12 years.

Poverty appears to be another strong factor linked to rape and sexual assault victims. In 1994, the highest victimization rates for rape

Figure 38: Reported Location of Rape/Sexual Assault in the United States, 1994



and sexual assault were observed amongst victims living in households with annual incomes of less than \$7,500 (rate: 6.7 per 1000 persons age 12 years and older) (8).

Evidence from the 1994 NCVS suggests that most rapes or sexual assaults tend to occur in the home of the victim or at the home of a friend or acquaintance. **Figure 38** outlines the locations where rapes and sexual assaults occurred as described by the victims. Nearly 60% of the incidents were in or near a residential location; most often the victim's own home (8).

Given the location of most rapes, it is not surprising, then, that high proportions of rapes involve perpetrators who are known to the victim. In the NCVS, 77% of all completed rapes in 1994 involved a perpetrator that was known to the victim (8). This proportion was smaller for victims of attempted rape (60%) and sexual assault (51%). Preliminary data from the NIBRS system of the FBI indicate that direct family members are most likely to be involved in rapes among victims

under age 12 years (64). Strangers are more likely to be involved in attacks on victims over age 18.

Weapons are infrequently involved in rapes and sexual assaults. Firearms, for example, were present in only 6% of the events in 1994 (8). Firearms were used as a weapon in only 17% of all murders involving sexual assault between 1976-1994 (60). Overall, approximately 200 murders each year in the United States involve rape or sexual assault as the principal circumstance underlying the murder (60).

The Cost of Rape

Several outcomes may arise from rape. These include acute effects such as unwanted pregnancies (65), physical injury (9, 66) and the development of sexually transmitted diseases (66, 67). A plethora of long-term sequelae have also been associated with rape. These include mental health disorders (68), depression (68), substance abuse (69) and sexual dysfunction (70), among others.

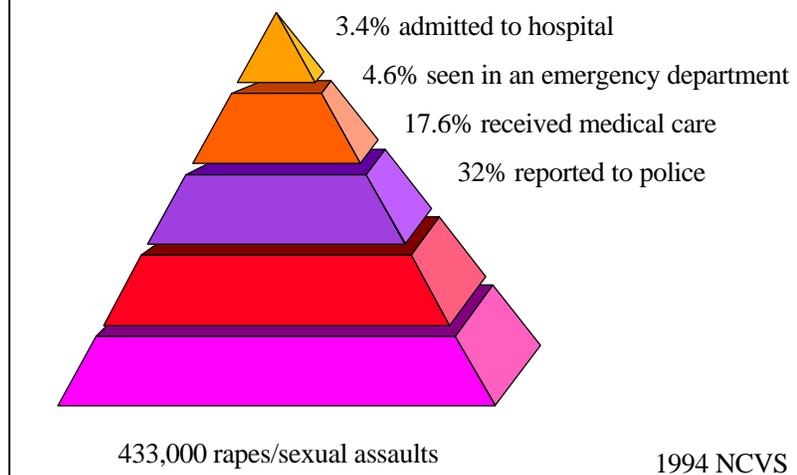
Health Care Use

The health care consequences of rape are not yet clearly understood. Several victims of rape, though, do not seek immediate medical attention in the aftermath of their attack (8). **Figure 39** illustrates the medical outcomes of rape as reported to the NCVS in 1994. Victim reports in the NCVS indicate that 18% (n=76,040) of the 433,000 rapes, attempted rapes, and sexual assaults in the U.S. involved medical care treatment (8). Most of the medically treated events were not seen in hospital settings. About 5% of all rape/sexual assault offenses had an associated emergency department visit (n=20,000). Three percent of the victims had severe injuries that required an overnight stay in hospital.

One other national estimate on the number of emergency department visits related to rape has been published. The report, based on the SIVV, estimates that there were 65,100 ED visits related to rape in 1994 (53). About one-third of the visits were in children under age 12 years.

The estimates of emergency department use from the SIVV are significantly higher than those from the NCVS. Factors accounting for this difference are probably centered on the methodological differences between the reports. In the SIVV, rapes and sexual assaults were identified in the emergency department by either patient self-report, hospital personnel, or other persons knowledgeable to the cause of injury (53). Events in the NCVS were based on victim

Figure 39: The Pyramid of Rape in the United States, 1994



reports and the perception of the victim that the offense was criminal in nature (53). In addition, the SIVV was specifically implemented to improve the national estimates of “difficult to measure” violence, such as rape (53). As a result, professionals in the SIVV institutions were probably actively searching for events of this nature.

The accounts of the NCVS and SIVV focus on health care utilization patterns in the short-term; (i.e. the medical treatment of injuries from the assault). Koss and colleagues (71) argue that such a focus underestimates the true health care costs attributable to criminal victimization. The long-term implications of rape, particularly with respect to mental health, suggest that the available information may portray only a small part of the consequences of rape. Unfortunately, there is very limited information available to describe the possible scope of this issue. Koss, et.al., examined the physician utilization patterns of 15 rape victims enrolled in an HMO

(71). They found that rape victims increased their use of physician services by 18% in the year of the crime.¹² In the year following the crime, rape victims increased physician visits by 56%.¹² Physician use was also higher two years after the crime (by 31%).

Economic Impact

Estimating the economic impact of rape is a difficult task. The best cost estimates, in general, are those that consider all of the major consequences of a disease or injury. The estimates should be based upon information that originates from surveys or studies of representative samples of persons with the disease or injury. It is preferable, though not necessary, that this information has application to a wide geographic area. While fairly reliable information exists to detail the short-term consequences of

¹² As compared to their patterns of use in the two years preceding the crime.

rape, there remains a general lack of population-based data on the long-term effects of rape.

At present, four studies provide an estimate of the potential economic costs related to rape (13-15,54). Short-term costs, including the healthcare consequences of physical injuries and lost earnings to the victim, are generally well estimated in these studies. Each report is largely based upon the prevalence, incidence and injury figures of the NCVS or its precursor, the National Crime Survey. This is generally the most comprehensive source for crime data on a national basis. The latest report from Miller, however, uses prevalence information from the NWS (15), as the period of study was at the same time as the change in methodology in the NCVS.

Estimates of the long-term costs related to rape, including mental health care costs and the value related to victims services, are more problematic. Each study used secondary data sources, for example, to estimate the cost of mental health sources, since the NCVS did not directly assess mental health care use.

Table 16 shows the annual estimated costs related to rape in the United States. The estimates from each of the reports have been adjusted to 1993 dollars¹³ to allow for some comparison. Three of the estimates are very similar and suggest that the cost of rape is in the range of \$10–12 billion per year. The most recent study, though, has a markedly higher cost estimate, \$127 billion per year (15). This discrepancy is notable,

because the four reports have followed similar methods in assessing costs. Miller, et.al. (15), suggests that the higher cost figure is due to a higher estimate for the number of rapes in the NWS, and the application of a higher average cost per incident (**Table 17**).

Table 16: Estimates of the Annual Cost of Rape in the United States (1993 dollars)

Cohen (54)	\$ 12 billion
Cohen (13)	\$ 10 billion
Miller (14)	\$ 12 billion
Miller (15)	\$127 billion

Table 17: Estimates of the Cost per Victim of Rape in the United States (1993 dollars)

	Total Cost	Medical Cost	Value of Pain and Suffering
Cohen (54)	\$68,500	--	\$58,372
Cohen (13)	\$68,800	\$478	\$42,291
Miller (14)	\$55,486	\$6,384	\$ 9,532
Miller (15)	\$87,000	\$2,700	\$81,400

The bulk of the costs related to rape are accounted for by the value associated with intangible items, such as pain and suffering arising from the crime, and a diminished quality of life (**Table 17**). Medical care costs (including mental health care costs) comprise a small proportion of the total cost.

Another estimate of the cost of rape in the short-term (within 6 months of the crime) also exists. Data from the 1992 NCVS indicate that the average economic loss associated with rape in this time frame was \$234 (58). Total losses for victims estimated at \$33 million. These figures include medical expenses, time lost from work and the pay lost, and the value of any property or cash lost from the crime. The losses reflect information reported by victims in the survey.

Rape in Pennsylvania

We examined the impact of rape in Pennsylvania by searching for crime-specific information on the frequency of rape and any related health care encounters. The most comprehensive data of this sort was available from two sources, the Pennsylvania UCR program and the hospital data maintained by the Pennsylvania Health Care Cost Containment Council (HC4). The category of rape can be identified in medical databases through the external cause of injury code: E960.1.

Incidence

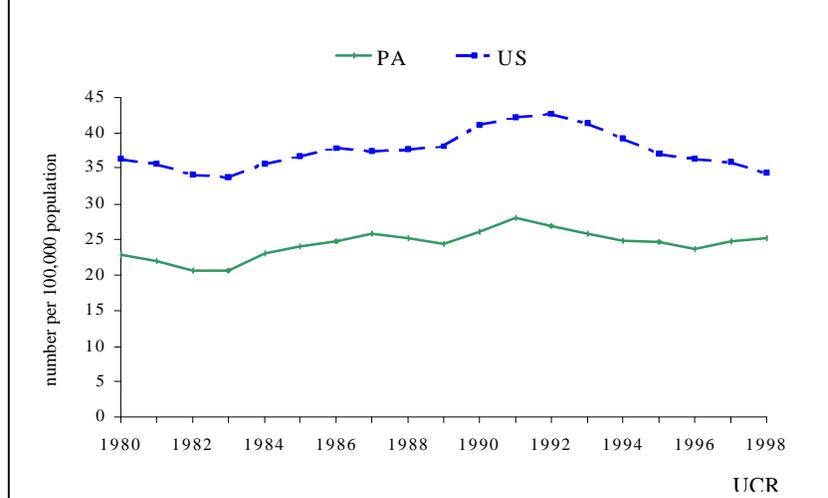
In 1994, there were 2,997 forcible rapes or attempted rapes reported to local police jurisdictions in the state (7). The associated rate of offense was 24.9 rapes per 100,000 persons. This rate of frequency has been fairly stable for the last 20 years in Pennsylvania (**Figure 40**). In

¹³ Using the consumer price index.

1998, there were 3,030 offenses recorded in the UCR program (59). Rape rates also appear to be lower in the state than in the United States as a whole.

Table 18 identifies the characteristics of rape victims in Pennsylvania. The risk for rape was primarily focused on women and the young in Pennsylvania in 1994. These relationships have also been reported in the NCVS and the national UCR program. Rape rates were particularly elevated for the young. More than one-half of the victims were under age 20 at the time of the offense (**Figure 41**) (7). For 1992, about 1 out of every 3 reported rapes were in victims under age 16 (64). About 1 in 4 rape victims were under age 15 years. Thus, child rapes are of particular concern for the state (on the basis of UCR data). It is important to point out, though, that many rapes are never reported to the police. Data from the NCVS suggests that older rape victims report the crime less frequently than younger victims (8).

Figure 40: Rape Rates, Pennsylvania and the United States, 1980-1998



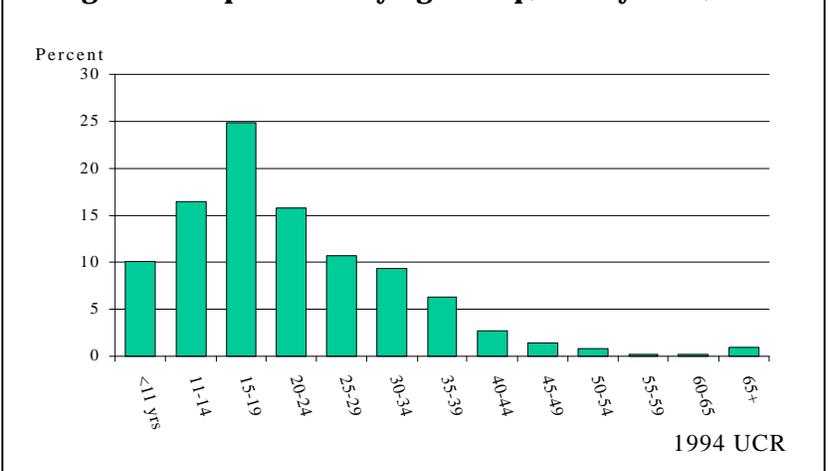
The UCR data also suggest that the risk for rape is particularly elevated in the African-American community in Pennsylvania. This is somewhat surprising, as the NCVS suggests that there is no racial difference in rape or attempted rape (8). The noted rape rate for African-Americans (82.4 per 100,000 persons) so elevated that it suggests that the racial difference in Pennsylvania is real.¹⁴

Police reported rapes also differ by geographic location in Pennsylvania. **Figure 42** illustrates the rate of reported rape and attempted rapes (per 100,000 persons) by county. Philadelphia and Dauphin counties had the highest reported rates of rape. Both areas had event rates exceeding 40 per 100,000 persons. This level is similar to the national rate of rape reported by the UCR (26). The Philadelphia County rate

Table 18: Characteristics of Rape Victims, PA, 1994 (rate per 100,000 persons)

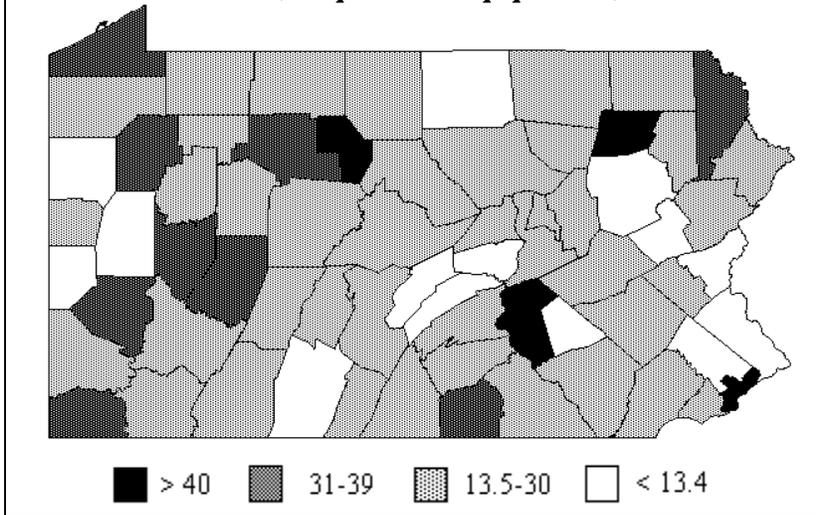
<i>Overall</i>	24.9
Gender	
Male	3.6
Female	45.7
Age Group	
0-14 years	33.7
15-24 years	78.8
25-34 years	35.0
35-44 years	14.4
45-54 years	4.7
55-64 years	1.2
65+ years	1.5
Race	
White	19.6
Black	82.4

Figure 41: Rape Victims by Age Group, Pennsylvania, 1994



¹⁴ Even when you factor in that blacks are more likely to report rapes than whites.

Figure 42: Reported Rates of Rape by County, Pennsylvania, 1994 (rate per 100,000 population)



is the highest in the state even with the likely under-reporting of crimes by the Philadelphia police. Cameron and Wyoming counties also had raised rape rates. This observation, though, likely reflects their small population. The legend for Figure 42 outlines rates in the 0-20th percentile for the state (<13.4 offenses per 100,000 persons), the 21st-79th percentile (13.5-30.9 events per 100,000 persons), the 80th-94th percentile (31-39 per 100,000), and above the 95th percentile.

Health Care Use

Data sketching the health care consequences of rape in Pennsylvania are very limited. Despite the presence of a code to classify rape in medical data systems (E960.1), the number of rapes identified in this manner appears to be extremely low. Only five admissions related to rape were identified in the PTSF registry for 1994. Slightly more events (n=29) were found in the Pennsylvania Health Care Cost Containment Council (HC4) data.

Information from the National Crime Victimization Survey suggests that there should be about 300 hospital admissions related to rape in the state in 1994.¹⁵

It is difficult to draw any meaningful conclusions from the 29 admissions noted in the HC4 system. Eight of the 29 admissions were associated with inpatient psychiatric care facilities, which highlights the potential long-term implications of rape. By gender, 83% of the overnight stays were amongst females. The average age of the subjects hospitalized was 40.7 years. Twenty percent of the admissions were for persons age 65 years and older. This observation contrasts markedly with the information on police-reported crimes. It suggests that several events among the young are being classified as due to other causes. Factors leading to

¹⁵ This figure was derived using PA UCR data and those of Figure 39. It assumes that national data pertain to Pennsylvania.

this result may include the lack of recognition of rape by medical professionals, the failure of the patient to disclose rape, and the miscoding of rapes.

Health care costs from the 29 rape admissions in 1994 totaled \$188,964. The average length of stay was 9.2 days, and was likely skewed by the patients admitted to psychiatric hospitals. Available information is poor, but indicate that the average charge for a hospital stay for rape was \$16,586 in 1994. The average estimated cost was \$6,516 per admission.

Use of Social Services

Several victim service programs exist in the United States (14). These programs provide a range of services to rape victims, including counseling, shelter and legal assistance. The Pennsylvania Coalition Against Rape maintains a statewide network of 52 rape crisis centers to provide services to rape victims. In FY 1997-98, these centers provided services to 11,247 adult rape victims, and 8,327 child victims (72). Slightly more individuals received help in FY 1998-99 (11,896 adults and 8,286 children). These data indicate that several more women are victims of rape in Pennsylvania than reported by the UCR program.

Domestic Violence

Violence very frequently takes place in the home. As Gelles notes, "people are more likely to be killed, physically assaulted, hit, beat up, slapped or spanked in their own homes by other family members than anywhere else, or by anyone else, in our society" (73). In the onslaught regarding violence from crime, we often lose the perspective that a large degree of violence takes place in the home. Further, the centuries old desire to maintain a family unit leads to a general under-reporting of this problem.

Domestic violence is characterized by physical violence, threats, neglect, intimidation, etc. against a family member or close associate. It includes categories such as child abuse, spouse abuse, or elder abuse. Domestic violence does not discriminate. Evidence indicates that it can occur in all ages, all races, all income levels, education levels, and religions. Often, it can occur in more than one form in a family, such as both child and spouse abuse. The personal impact of domestic violence can be far reaching; influencing both short-term and long-term events in the lives of victims. The societal impact of domestic violence may be equally as large, with police forces spending considerable time answering domestic calls, and social service agencies spending large sums on foster care, in-home interventions, shelters, and counseling, amongst others.

The following sections outline what we currently know and understand regarding domestic violence in Pennsylvania. We report first on the information concerning child maltreatment. This is followed by a discussion and description of the information available on intimate partner violence and elder abuse respectively.

Child Maltreatment

Until recently, discussions of violence focused exclusively on events related to crime. This focus excluded domestic violence and the impact associated with child abuse, spouse abuse, and elder abuse. Yet, significant numbers of individuals are now understood to be victims of domestic violence. For child abuse, the latest data suggest that the number of maltreated children in the United States has grown from 1.4 million in 1986 to 2.8 million in 1993 (74).

Many professionals believe that child abuse and neglect is preventable. National goals have been established in *Healthy People 2000* in an effort to reverse the rising incidence of maltreatment of children. The epidemiology of child abuse, though, remains relatively under-developed, and there is some question regarding the possible effectiveness of prevention programs. Because of epidemiologic limitations in child abuse, our understanding of the economic impact of child abuse is poor.

Issues in the Epidemiology of Child Abuse

Much debate surrounds the current estimates of the incidence of child abuse and the risk factors pertaining to both victims and perpetrators. Several recent initiatives, though, have taken place to improve our understanding of child abuse. On a national level, the greatest developments have been focused on the gathering of reported cases of child abuse from child protection agencies, and the initiation of surveys to assess the incidence and prevalence of maltreatment. These actions are important to note from an injury perspective, because they represent some of the first, large scale, monitoring activities for child abuse.

In 1974, the National Council on Child Abuse and Neglect (NCCAN) established two national data collection and analysis programs to monitor child abuse in the U.S., the National Incidence Study (NIS) and the National Child Abuse and Neglect Data System (NCANDS). The NIS represents a series of surveys authorized by the federal government and focused on identifying cases of abuse from a sample of professionals located at sites and services that deal with children (e.g. schools, hospitals, day care centers, the police). Three surveys have been undertaken in 1979, 1986, and 1994, respectively.

The NCANDS represents a compilation of data gathered from the 50 states on cases of abuse reported to state authorities.

Pennsylvania, and the other states, are required to comply with data collection directives set forth by NCCAN. This has led to increased consistency in the definition and subsequent monitoring of child abuse at the state level. In 1995, these agencies investigated nearly 2 million reports of abuse and neglect (75). Of this figure, more than 1 million children were identified as victims of abuse or neglect. This represents a rate of 15 events per 1,000 children in the U.S. About 1000 children died as a result of their maltreatment.

From an epidemiology perspective, cases of child abuse identified from sources such as child protection services (CPS) agencies underestimate the incidence of maltreatment. Child abuse and neglect cases often are unreported and unnoticed (76). Data from the Third National Incidence Study indicate that CPS agencies investigated only 28 percent of the children identified as victims of abuse in the survey (by the harm standard) (74). Only 44 percent of the victims were investigated in the NIS-2 (74). Reported cases of abuse that are substantiated are also usually the most severe cases of abuse (77).

The NIS-3 offers a somewhat different perspective on child abuse when compared to the NCANDS. It includes children who were investigated by CPS in addition to children not reported to CPS. Over 1.5 million children were estimated as being abused or neglected in the United States during 1993 by NIS-3 (using the harm standard). This reflects an estimated incidence rate of 23.1 per 1000 children or 1 child in every 43 in the U.S. Incidence

rates for abuse (physical, sexual, and emotional) were estimated at 11.1 per 1000 children, and the rates for neglect at 13.1 per 1000 children.

The consequences of child abuse and neglect are extremely serious. In the best study available, researchers followed 1,575 child abuse victims over 20 years (78). They reported several long-term effects of child abuse, including mental health concerns (depression and suicide attempts), educational problems (inadequate cognitive functioning, extremely low IQ, and poor reading ability), health and safety issues (alcohol and drug problems), and occupational difficulties. Malinosky-Rummell and Hansen (79) also found a strong relationship between child abuse and mental health service use. Somatization, anxiety, depression, dissociative disorders, and self-injuries, including suicide, were common to victims of child abuse.

Definitions

One of the pressing issues in the child abuse literature is the lack of a standard definition of abuse. Most researchers agree that child maltreatment pertains to persons under the age of 18 years. Beyond that, the literature is marked by a variety of definitions. For example, the NCANDS includes maltreatment cases where there is evidence to confirm maltreatment or reason to suspect maltreatment (75). The NIS-3 indicates a definitive case of child abuse when a physical act or lack of action on the part of a perpetrator results in demonstrable harm or endangerment to a child (74).

Several factors may explain the lack of standardization in the definition of child abuse. In the clinical setting, the diagnosis of maltreatment has been termed by some as “a judgment call” (77). Abuse cases presenting for treatment may look similar in symptoms and injuries to normal trauma cases. While common signs have been advocated to cause a professional to suspect abuse (80) (e.g. physical histories inconsistent with an accidental cause or inconsistent with the explained cause by the parent), other indications are not so clear cut for abuse (e.g. delay in seeking care, parental denial of injuries). These indications do not always confirm that abuse was the precipitating cause of the injury.

Also of note is that the definition of maltreatment has expanded over the years. Early reports considered only physical injuries from abuse. Today, a broader scope involving physical abuse, neglect, sexual abuse, and emotional abuse exists (77). The National Center on Child Abuse and Neglect classifies maltreatment by the following categories; physical injury, sexual abuse, neglect, and emotional abuse (81).

Physical Abuse: the infliction of physical injury as a result of punching, beating, kicking, biting, burning, shaking, or otherwise harming a child. The parent or caretaker may or may not of had intent to harm the child.

Child Neglect: failure to provide for the child’s basic needs. Neglect can be physical, educational, or emotional.

Sexual Abuse: includes fondling, incest, rape, sodomy, intercourse, exhibitionism, and commercial exploitation through prostitution or the production of pornographic materials.

Emotional Abuse: includes acts or omissions by the parents or caretakers that have caused, or could cause serious behavioral, cognitive, emotional, or mental disorders.

In Pennsylvania, The Department of Public Welfare defines maltreatment in a roughly similar fashion. A victim of child abuse is *an individual, younger than 18 years, who has sustained serious physical, mental, or sexual injury, or serious physical neglect as a result of acts or omissions by a parent, paramour of the parent, person residing in the same home as the child, or a person responsible for the child's welfare* (82). Data on general neglect are not routinely collected in the child abuse registry.

The Cost of Child Abuse

Cost studies to define the economic magnitude of child abuse are relatively uncommon. Unlike other injury categories, where a number of cost estimates exist, few reports are available to quantify the costs related to injuries from child maltreatment.

What is understood is that the impact of child maltreatment affects a broad range of areas. In addition to the health care services needed for the treatment of abuse and neglect cases, there are resources associated with investigating reports of abuse, providing child protective services,

foster care, and family preservation services. In the long-term, there are costs related to the psychological and criminal outcomes of abuse victims, and the related loss of future earnings.

Most of the economic data available regarding child abuse focus on expenditures for child protective and/or child welfare services. The American Humane Association has examined the estimated cost of basic child protective services. For 1993, the national cost associated with investigations of abuse was \$1.7 billion (83). The national estimate for in-home services provided by CPS was \$1.2 billion. Information on the expenditures for these items in selected states is also available. Expenditures for county-based child abuse programs in Pennsylvania in 1994 exceeded \$24 million (82).

Far less is known about the health care costs related to injuries from child maltreatment. Even for the reports that have been published, the cost estimates cited are wide ranging. For example, investigators have estimated the annual costs of hospitalization for children with serious physical injury from abuse. For the 23,648 injured cases identified in 1983, this cost amounted to \$20 million (84). Subsequent rehabilitation expenses were \$7 million. For the 143,300 cases identified in NIS-2, the estimated cost of hospitalization amounted to \$792 million (83).

In a literature review examining the cost of domestic child abuse, Farestad, et al., estimated that the annual cost of hospitalization, alone, for victims of child abuse is in excess of \$792 million (85). The

cost of providing lay counseling to abused children and their families for one year was estimated at \$815 million. The cost for placement of abused children and adolescents in in-patient mental health facilities was estimated at \$2.8 billion per year.

Two more recent reports have focused on victims identified from medical settings. Meyer, et al. (86), estimated the annual cost of emergency department services for child abuse victims at \$1633 per person. Irazuzta, et al. (87), noted an average daily charge of \$5,294 for victims admitted to a pediatric ICU.

What is clear from the literature is that there have been few rigorous investigations of the economic costs related to child abuse. Further, the methodology of existing reports is crude, resulting in widely varying estimates.

Child Maltreatment in Pennsylvania

Several sources of information were examined to assess the impact related to child maltreatment in Pennsylvania. Systematically, we sought to gather information on the incidence (number of victims), outcomes, and the use of medical services for treatment of the injuries from abuse (including hospital care, outpatient physician visits, rehabilitation, and emergency response).

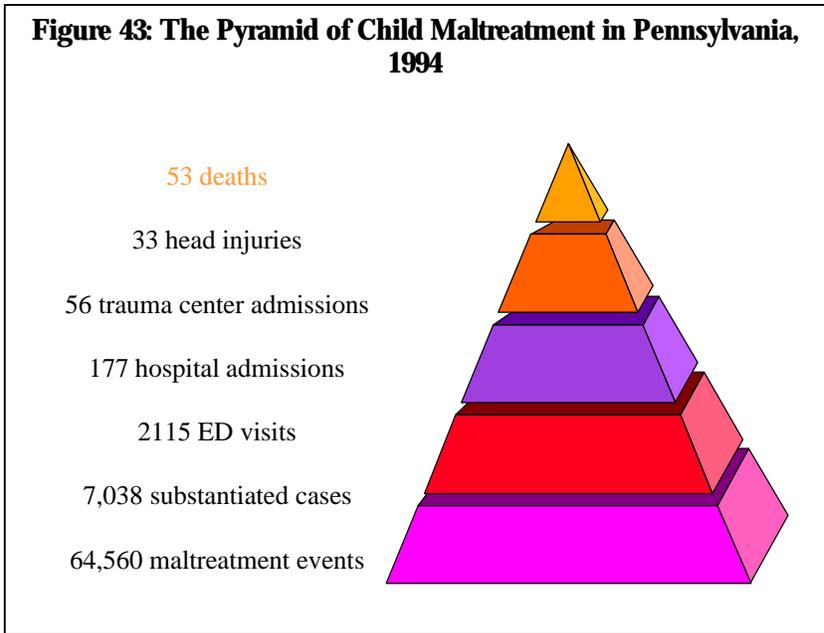
Major sources of data identified on child maltreatment include information from the Pennsylvania Department of Public Welfare (which maintains reports of substantiated and reported cases of abuse), the Health Care Cost Containment Council (which maintains a database of all hospital admissions in Pennsylvania), and the Pennsylvania Trauma Systems Foundation (which maintains a trauma registry of patients admitted to all Level I trauma centers in Pennsylvania).

Several pieces of information were not readily available without an in-depth data collection process. For example, we were unable to obtain information on outpatient physician visits related to maltreatment, or state-specific visits to emergency departments. Information on the long-term outcomes related to abuse could not be reliably documented.

We were, however, able to obtain information on the number of cases reported to state authorities, as well as the number of hospital visits related to physical abuse (defined by E-codes) and their costs. The information concerning the cost of hospitalization from abuse represents unique data in the child abuse literature.

Incidence

Figure 43 outlines the injury pyramid for events related to physical child abuse and neglect in Pennsylvania for the year 1994. We present the injury pyramid to graphically portray the data available on child maltreatment. It illustrates the nature of maltreatment by its likely



magnitude of severity. Less severe events occur more frequently in number and appear at the bottom of the pyramid. Severe events, such as those requiring hospitalization or resulting in death, occur much less frequently in number and are highlighted at the top of the pyramid.

For 1994, the most reliable data on the incidence of child maltreatment are those published by the PA Department of Public Welfare (82). The ChildLine and Abuse Registry records all reports of suspected abuse received by the state. In 1994, 23,722 reports of suspected maltreatment were received at ChildLine and investigated. Of these events, 7,038 substantiated cases of child abuse were identified, affecting 6,671 kids. This represents a rate of 3.0 per 1,000 children. The breakdown of cases by category is shown in **Table 19**.

Demographic information on the substantiated cases of maltreatment was available. By

Table 19. Substantiated Reports of Maltreatment in Pennsylvania by Type of Abuse, 1994

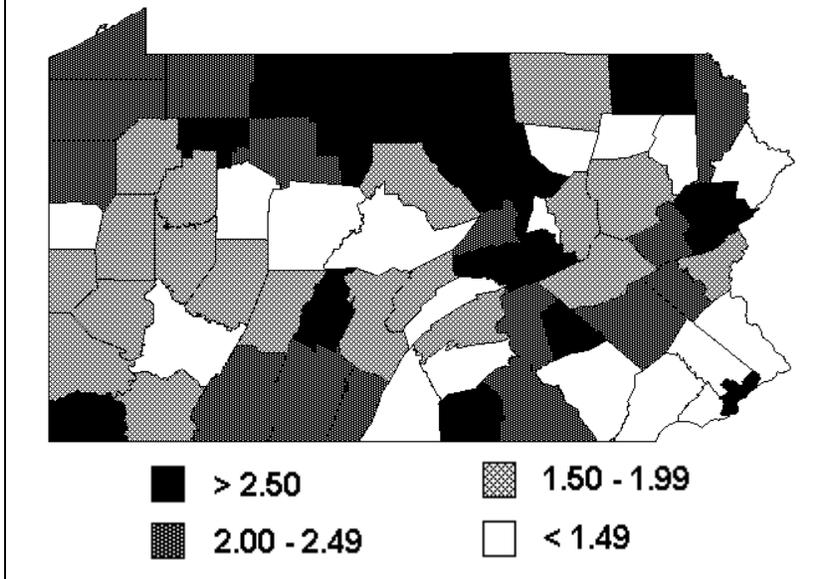
PHYSICAL ABUSE	3,243
NEGLECT	397
SEXUAL ABUSE	3,448
DEATHS	53

gender, girls were more likely to be victims of abuse than were boys (61% of the cases were girls, 39% boys). The average age of the child abuse victims in the registry was 9 years.

Of the 7,038 reported cases, there were 11,339 injuries recorded – 4,646 physical injuries, 108 mental injuries, 6,144 sexual injuries, and 441 cases of physical neglect.

Incident events were also examined by the county of residence of the victim. **Figure 44** displays the incidence rate of new cases of abuse in 1994. Data on the number of new cases of abuse

Figure 44: Incidence of new cases of child abuse (substantiated) by county, 1994 (rate per 1000 population < 18 years)



and neglect substantiated through investigation by the state and the population of the county by age (<18 years) were applied to derive this figure. The highest rates of maltreatment were observed in Philadelphia county and several north-central counties. The lowest rates of maltreatment were clustered amongst the suburban counties of Philadelphia.

maltreatment in Pennsylvania. The extent to which abuse is understated is not clear. If one applies the published incidence rate of 23.1 events per 1000 children found in the NIS-3 to the Pennsylvania population (n=2,794,810 < 18 years), then this suggests that there may be up to 64,560 cases of maltreatment; a considerably higher estimate than

Corroborative evidence for the high rate of child abuse in Philadelphia County can be found in an independent report examining injuries from violence in eleven emergency departments in inner city Philadelphia. Data from the Philadelphia Injury Prevention Program (88) indicates a child abuse injury rate of 3.28 per 1000 children in this setting.

The figures published by the Department of Public Welfare are the most reliable estimates for child abuse on a statewide basis. However, they are likely to underestimate the frequency of

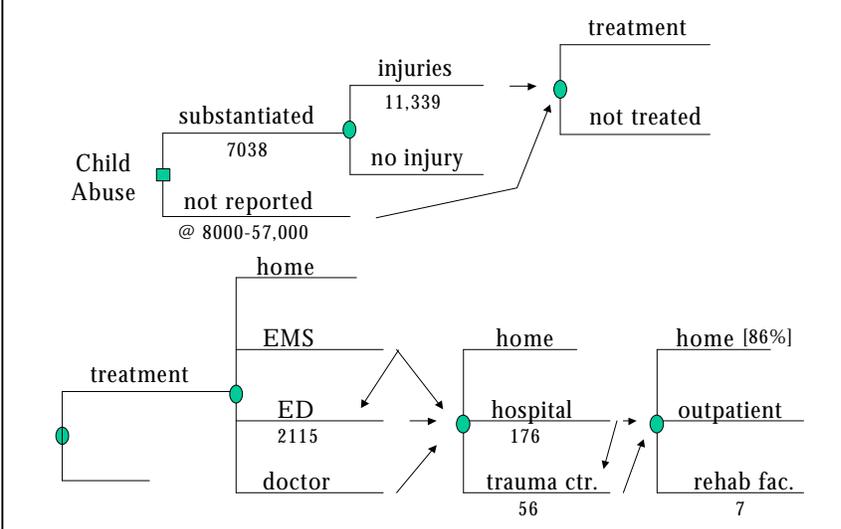
that found through the Childline registry. However, the NIS-3 data may not be appropriate for Pennsylvania rates.

A report from the Joint State Government Commission (17) suggests that the number of significant cases of abuse and neglect may be roughly two times higher than that reported by the Childline registry. If this estimate is accurate, then the number of maltreatment cases in the state in 1994 may be close to 15,000.

Health Care Use

Figure 45 outlines the model of health care use associated with child abuse for the events identified. Treated injuries arising from abuse were the focus of this report, and likely are more easily identified through existing data systems. Information, though, was not available to characterize the use of services related to abuse at all of the noted sites. The best available information is that related to hospital and trauma center admissions.

Figure 45: Health Care Use and Child Abuse, Pennsylvania, 1994



Emergency Department Visits

In general, there is limited evidence regarding the frequency of ED visits from child maltreatment in Pennsylvania. Information from the Department of Health indicates that there were 4,917,550 ED visits overall in 1994, but this number does not distinguish violence-related events from illness-related events. Findings from a recent Bureau of Justice report (53) suggest that 2.9% of all ED visits related to violence in the United States result from parents committing the violence. If this data is considered in the context of all ED visits, then parental abuse may account for 0.043% of all ED visits. Under this assumption, there were an estimated 2115 hospital emergency department visits related to child abuse in Pennsylvania in 1994. This number could differ to the extent that the US data on violence are applicable to Pennsylvania. Also, the Bureau of Justice figure does not distinguish child abuse from other forms of violence, and may include parental violence against children over 18 years old.

Hospital Admissions

Information on hospital admissions related to child maltreatment was available from two sources; the Health Care Cost Containment Council (HC4), and the Pennsylvania Trauma Systems Foundation (PTSF). The HC4 data encompass admissions to short-term, psychiatric, and rehabilitation hospitals in the state. The PTSF data include patients seen in trauma centers throughout the state.

For 1994, there were 177 hospital admissions for physical abuse (classified as events with the E-code; E967) in the HC4 dataset. All but one of these visits were to short-term, acute care facilities. One visit was linked to a rehabilitation institute.

The vast majority of the short-term admissions (63%) were referred from emergency departments (Figure 46). Another 21% were referred from physician offices. Thus, the victims listed in the hospital data set used resources and incurred expenses beyond those documented here.

The demographic traits associated with the 176 hospital admissions are highlighted in Table 20. Overall, there was a preponderance of admissions amongst males. Further, the mean age of the persons admitted was 2.8 years. A remarkable insurance source result was noted with nearly three-quarters of the admissions being paid from governmental sources. These findings are substantially different from those reported from the Pennsylvania ChildLine Registry. In this source, maltreatment was most often associated with females and persons aged 9 years. This

Figure 46: Referral Source for Overnight Admissions related to Child Maltreatment, PA, 1994

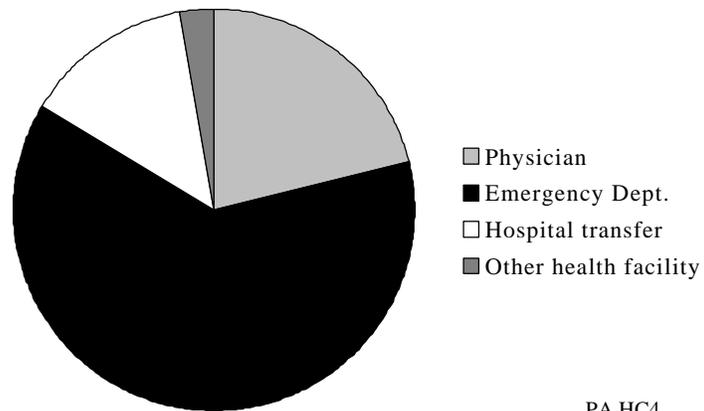


Table 20: Demographic Characteristics of Short-Term Hospital Stays for Child Maltreatment, Pennsylvania, 1994

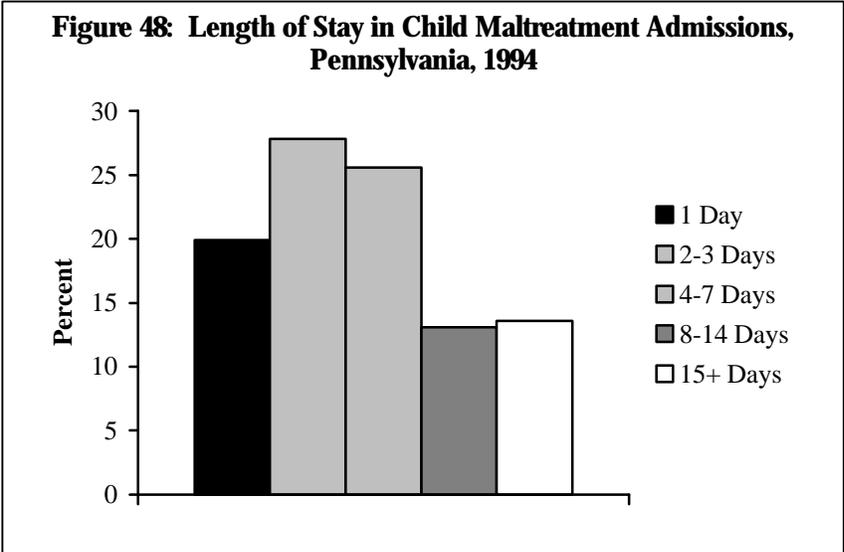
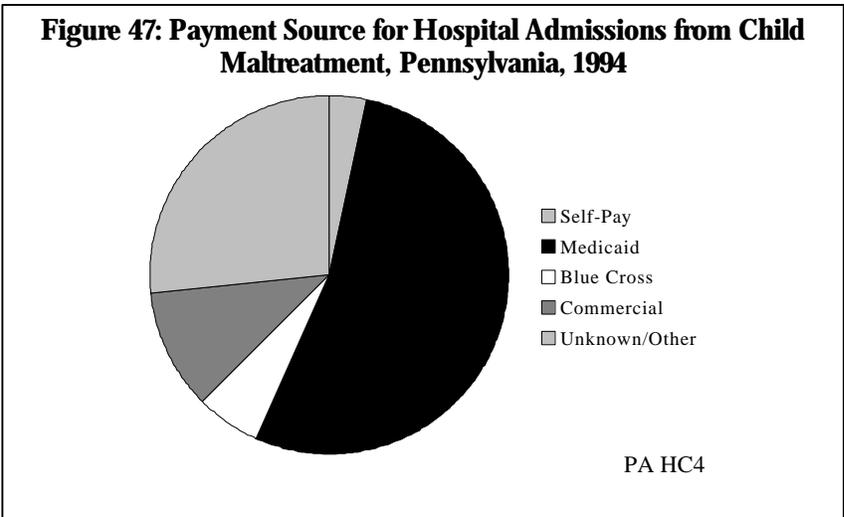
	Frequency	Percent
Gender		
Males	110	62.5%
Females	66	37.5%
Ethnicity		
White	76	47.2%
Black	67	41.6%
Hispanic	16	9.9%
Other	2	1.2%
Payor Source		
Non-government insurer	35	26.9%
Government program	95	73.1%

difference may be due to a greater severity of events in the hospital dataset and its focus on physical abuse rather than sexual abuse. The age finding (most admissions occurring in young children) is in agreement with several national studies on physical child abuse.

The specific insurance payor for the listed hospital admissions is shown in **Figure 47**. Over one-half of the stays were listed as being paid through the State Medicaid program. Roughly, one-quarter (27%) did not have one of the noted insurance carriers, or had missing information.

The average length of stay for the hospital admissions was 7.8 days. **Figure 48** depicts the distribution of length of stay in this group. The majority of patients stayed in hospital between 2-7 days. With respect to discharge status, 86% of the persons/admissions listed were discharged to home, 1.7% were transferred to another hospital, 10.2% were sent to another health facility, and 2 individuals died. It was not possible to determine how many individuals were sent home or placed into a foster home at the time of hospital discharge.

Information from the Pennsylvania Trauma Systems Foundation (PTSF) database indicates that 56 individuals under age 18 were admitted to Level I trauma centers for child abuse (E967) in the state in 1994. The age and gender breakdown of these admissions was similar to that seen in the HC4 data. The average length of stay in the trauma center was 7.3 days overall and 1.9 days in intensive care. Nearly 80% of those in the database were discharged to their



family home or a foster home. Seven persons were sent to a rehabilitation institute following their stay in a trauma center.

There are limitations inherent to the hospital data that may influence their interpretation. Primarily, the admissions detailed here were identified through external cause of injury codes (E-codes). Overnight stays related to maltreatment may be undercounted through this system. It is not clear if admissions for child neglect always include E-codes. Secondly, the 177 hospital stays in the HC4 database might not

represent unique admissions. About 14% of the admissions were listed as transfers from another hospital. It was not possible to distinguish hospital events that may have been linked.

Potential Long-Term Impact of Maltreatment

Exact information on the long-term impact of physical child abuse is not clear. PTSF and HC4 data show that 33 and 44 of the admissions, respectively, involved a head injury. Many of these cases may require further treatment beyond the initial hospitalization.

Also, the Department of Public Welfare reported 53 deaths from child abuse in 1994. Information on the discharge status of patients in the PTSF trauma registry showed 6 deaths from abuse, and HC4 data indicated that there were 2 deaths from child abuse.

Health Care Costs Related to Maltreatment

The most reliable information regarding the health care costs associated with child abuse is that included within the HC4 data. Total health care charges (excluding physician fees) for the 177 hospital admissions in this database were \$1,983,435. However, charge data overstate the likely costs associated with hospital stays. To account for this observation, we applied hospital cost-to-charge ratio data available from the Medicare system to the charges reported by the hospitals. In this scenario, the total cost related to the 177 maltreatment admissions was \$837,781; averaging \$4733 per admission.

The noted cost estimates differ from an estimate of the cost of child abuse in the report "The Cost of Juvenile Violence in Pennsylvania" (17). In this report, the total cost of maltreatment was placed at \$1.25 billion for the year 1993 (Table 21). The majority of these costs were attributed to quality of life losses. However,

The average charge for a hospital admission related to child abuse in 1994 was \$11,206. The average estimated cost per admission was \$4733.

estimated medical care costs were \$75 million. Much higher than we report here.

Several factors account for the difference. One, the number of maltreatment cases in the Joint Commission report was roughly two times higher than that reported in the ChildLine registry. Two, most of the health care costs included in the joint commission report were attributed to sexual abuse (Table 22). The data contained within the HC4 database likely represents physical abuse and neglect events.

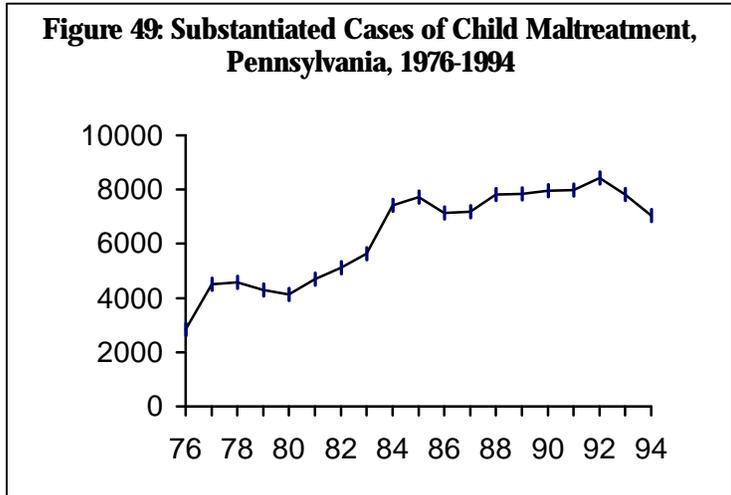
Three, there are real differences between the studies in the methods used to estimate costs. The HC4 figures are specific to the information identified from the individual hospitals. Whereas, in the joint commission report, national cost data were applied to Pennsylvania cases.

Four, there were more substantiated cases noted in 1993 than in 1994 within the ChildLine data, suggesting that the incidence of maltreatment was higher in

1993 (Figure 49). In general, there is some debate regarding trends in the incidence of abuse. In Pennsylvania, there appears to be a decline in the number of significant cases of abuse from 1992 forwards. The general decline in substantiated maltreatment has continued to the year 1998. However, the conclusion that child abuse is declining has been criticized because of possible differences in reporting methods over time.

Category	Cost
Total Cost	\$1,250,000,000
Medical Care	\$ 74,517,000
Earnings Lost	\$ 52,185,000
Public Program	\$ 29,702,000
Property Damage	\$ 172,000
Quality of Life	\$1,093,730,000

Sexual Abuse	\$47,200,000
Physical Abuse	\$22,400,000
Mental Abuse	\$ 1,600,000
Neglect	\$ 3,100,000



Intimate Partner Violence

Violence against women is an issue of serious concern in the United States today. There is increasing recognition of the impact of violence against women by husbands, partners, or boyfriends. Several recent events have heightened the awareness of the public to the consequences of such violence. These polarizing events include the murder of Nicole Brown Simpson and the passage of the Violence Against Women Act. The Violence Against Women Act (89) was passed by the U.S. Congress in 1994. It established greater criminal penalties for perpetrators of domestic abuse, an increased awareness of law enforcement agencies to violent crimes against women, increased protection of victims of domestic violence, and increased resources for studies of domestic violence.

This new emphasis on domestic violence reflects, in many ways, a reversal from a longer pattern of societal indifference. For many years, women were little noticed as victims of family violence (73). Police calls regarding fights between husbands and wives were overlooked. Medical visits for injuries from domestic violence were not identified or not discussed.

Understanding the significance of domestic violence can be extremely difficult. Several hundred studies exist on the subject. Advocacy groups and others with an interest in violence against women have published

various factsheets on the frequency and impact of domestic violence. Each study and each factsheet says something different. Sorting through all of the information is mind numbing.

As an example, consider that several different terms have been used to connote or imply domestic abuse. These expressions include “violence against women”, “spouse abuse”, “intimate partner violence”, “domestic violence”, and “marital violence”, amongst others. Considerable debate exists over what each term actually means (90). The term “violence against women”, for example, has been used to describe all acts of violence against women, or only those committed by a family member. Some descriptions of domestic violence only include abuse by a husband or partner currently living in the household. Others include abuse by ex-spouses and boyfriends.

Consider also that the categories of violence included in published reports can vary widely. Some studies assess only physical assaults. Others include physical and sexual violence, while some also consider psychological intimidation. One of the first tasks in reading through the domestic violence literature is to decipher what type of violence is involved and how intimate partners have been defined.

The following presentation focuses primarily on one form of violence against women; Intimate Partner Violence. This focus recognizes two well known facts regarding violence against women. One, that in the vast majority of cases the perpetrators are males. Two, that, as noted before, most

situations of violence occur in the home by spouses or live-in partners. It goes further, though, by recognizing the abuse which occurs in informal relationships (dates), and that associated with ex-spouses, ex-partners, and boyfriends.

Issues in the Epidemiology of Intimate Partner Violence

Several estimates of the frequency of violence between intimate adults exist. Given the nature of intimate partner violence (IPV), though, it remains difficult to ascertain its true incidence and prevalence, or characterize its consequences. Violence between intimates often occurs in private and is difficult to record. Persons who are the victims of intimate partner violence may not perceive this act as a crime, or may not report it because of shame or fear of reprisal. Medical professionals often fail to recognize it as an underlying factor in the use of health care services.

Two fundamental issues influence most of the estimates reported on the frequency of domestic violence. First, various definitions of domestic or intimate partner violence have been applied in the studies conducted. Second, the methods of measuring violence have differed significantly. Thus, the published prevalence rates for domestic violence vary greatly and depend upon the definitions and methods applied.

An illustration of this point can be seen in **Tables 23 and 24**. They show that most reports are based on either a population-based

Table 23. Estimates of the Frequency of Domestic Violence Against Women seen in Medical Settings

Study	Sample Size	Definition and Method	Trauma from Abuse	One year Prevalence	Lifetime Prevalence
McCauley (91)	1952	Physical and sexual abuse reported in physician practices		5.5%	33%
Gin (92)	453	Physical and sexual abuse and threats by current partner reported in internal medicine clinics		14%	28%
Goldberg (93)	492	Physical abuse reported in an urban emergency department			22%
Dearwater (94)	3455	Physical or sexual abuse reported in community hospital emergency departments	2.2%	14.4%	36.9%
McLeer (95)	412	Physical abuse identified in trauma patients in urban emergency department	30%		
Abbott (96)	648	Physical abuse or threats reported in urban, acute care emergency departments and clinics	2.7%	15.3%	54.2%
Muelleman (97)	9057	Physical trauma identified in ten emergency departments	3.1%		

Table 24. Estimates of the Frequency of Domestic Violence Against Women Identified in Population Surveys

Study	Sample Size	Setting	Definition	Method	One year Prevalence
Straus (98)	2143	U.S.	Physical abuse determined by response to conflict tactics scale by married or cohabiting couples	Personal interview	12.1% overall 3.8% severe
Straus (99)	3520	U.S.	Physical abuse determined by response to conflict tactics scale by married or cohabiting couples	Telephone survey	11.6% overall 3.4% severe
Commonwealth Fund (100)	2500	U.S.	Physical abuse determined by response to conflict tactics scale by current partners	Telephone survey	8.4%
NCVS (101)	100,000	U.S.	Physical abuse in women twelve years of age and older	Personal interview	0.8%
NVAWS (61)	8000	U.S.	Physical and sexual assault by current or former intimate partner	Telephone survey	1.5%
Schafer (102)	1635	U.S.	Physical abuse determined by response to conflict tactics scale by married or cohabiting couples	Personal interview	5.2% - 13.6%
UCR (103)		U.S.	Fatal violence between intimate partners	Police reports	0.002%
Buehler (104)	3130	GA	Physical violence by current or former intimate partner	Telephone survey	6%
Hale-Carlsson (105)	692	NY	Physical violence by current or former intimate partner	Telephone Survey	5.6%

survey, or on surveys of patients attending a medical care site. The questions asked to quantify violence vary in each setting. Some reports examined only violence associated with that corresponding medical visit, while others considered violence within the last year, or within a lifetime.

The category of violence surveyed often differs. Some reports consider only physical violence, while others also include sexual assaults. A few studies have included an all-encompassing definition of abuse by considering physical and sexual abuse, threats, and psychological intimidation. Another note of distinction is the setting in which the violence took place. Some reports consider only marital violence (events between intimates currently living together), while other reports also include events by ex-spouses and ex-friends.

Nuances affect each of the definitions and methods chosen. For example, physical violence may represent a more severe form of abuse than psychological intimidation or threats of violence. Thus, it may be expected to occur less frequently. Evidence suggests that about one-half of the victims of physical abuse are injured as a result of the action (101). Not all of the women who are injured will seek medical care. Thus, measures that record physical or sexual violence in the medical setting will undercount the total number of domestic violence events. Reports on marital violence will underestimate rates of intimate partner violence because they exclude events occurring outside of the home.

National Estimates of Intimate Partner Violence

Several surveys of representative samples of the U.S. population now exist (**Table 24**). These surveys generally provide the best information available on the frequency and consequences of intimate partner violence. The latest data indicate that between 1 and 4 million women are victims of intimate partner violence each year (100,101).

The first extensive studies to investigate the frequency of domestic violence against women in the United States were those conducted by Straus and Gelles. The National Family Violence Survey in 1975 (98) and the National Family Violence Survey in 1985 (106) assessed conflicts between men and women who were married or living together as a couple. Both surveys defined violence by responses to the Conflict Tactics Scale. This scale investigates how the respondents deal with interpersonal conflicts, and query the use of reasoning, verbal aggression, or physical aggression as resolution tactics (107). The physical aggression topics cover violence ranging from being pushed, grabbed, shoved or slapped; to being kicked, bit, punched, choked, threatened with a weapon, or victimized by a weapon. The Conflict Tactics Scale forms the basis for most of the national surveys on domestic violence.

Straus and Gelles found, in both surveys, that 11-12% of the women interviewed were physically attacked by an intimate partner at least once in the last year (98,99,106). More severe forms of

violence (being kicked, bit, punched, choked, threatened with a weapon, or the use of a weapon) were reported by 3-4% of the women. This represents an estimated 1.8 million women (108). Interestingly, the rates of wife-to-husband violence were comparable to the rates reported for husband-to-wife violence. Straus and Gelles (99) suggest that the consequences (i.e. injuries) and reasons for the violence (i.e. self-defense) are likely to be different in this scenario of IPV.

Several government-based surveys now document rates of intimate partner violence¹⁶. These information sources include the National Crime Victimization Survey, the Uniform Crime Reporting program, the National Incident Based Reporting System, and the National Violence Against Women Survey.

The most widely used instrument is the National Crime Victimization Survey (NCVS). In the NCVS, about 100,000 persons age 12 or older are surveyed regarding their exposure to crime and the consequences of crime. This information is then used to estimate criminal victimization rates at the national level. Survey respondents reporting criminal victimization involving personal contact are further queried about their relationship to the perpetrator (101).

The NCVS has gathered data on criminal victimization for several years. It has been criticized extensively, though, for its inability

¹⁶ This development came from the enactment of the Violence Against Women Act in 1994.

to distinguish domestic violence. In 1993, the NCVS was redesigned to produce more accurate reporting of violence by current or former intimates (9). The new, redesigned survey data indicate that, on average, nearly one million violent victimizations involve an intimate partner each year¹⁷ (101). Women are more often the victims of intimate partner violence than men. Of the million odd events observed in each year from 1992-1996, women were the victims in 85% of the cases. Approximately 8 in 1000 women reported being a victim of violence from an intimate partner (101). **Table 25** outlines the data available from the NCVS to describe IPV in 1994.

The prevalence rates of intimate partner violence reported in the NCVS are much lower than the rates identified in the surveys using the Conflict Tactics Scale. This finding is probably due to a difference in the populations surveyed. The NCVS included all women in its interview process, many of whom may not be in relationships. Several of the other surveys focused on couples as the subjects of their reports.

Figure 50 outlines the reported outcomes of IPV. In general, large numbers of abusive events are not brought to the attention of judicial or medical authorities. Data from the NCVS suggests that only one-half of the women who were victimized by an intimate partner contacted the police regarding the event. Further, about one-half of the women sustained an injury from IPV, but only 10% of the

Table 25: Violent Victimization by Intimate Partners in the United States

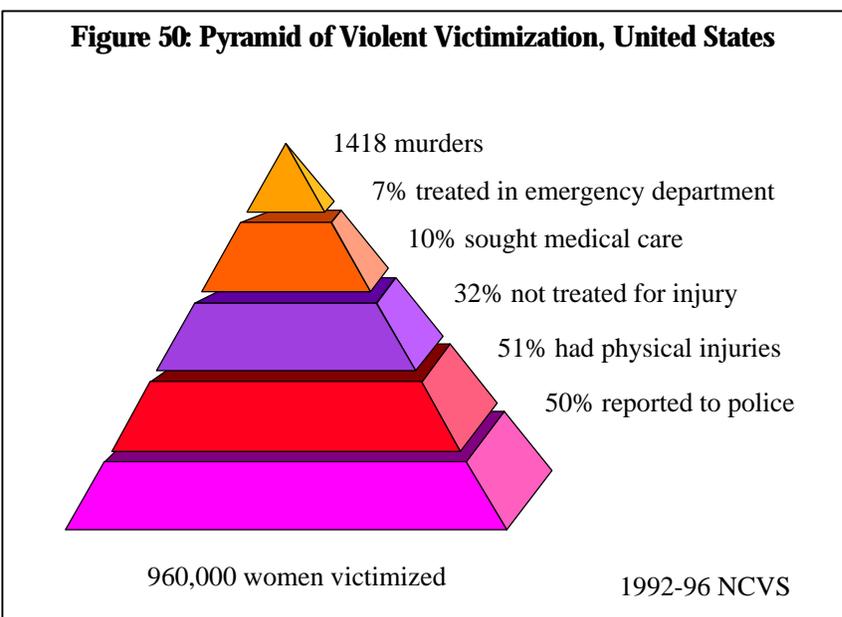
	1994	1996
Number of Violent Victimization		
Females	1,003,167	837,899
Males	176,168	147,896
Rate of Victimization (<i>per 1000 pop.</i>)		
Females	9.1	7.5
Males	1.7	1.4

Note: Victimization include violent events (murder, rape, sexual assault, robbery, aggravated assault, simple assault) identified in the National Crime Victimization Survey and Supplementary Homicide Reports.
Source: Greenfeld (101)

women sought treatment in a medical facility (101).

Information on the frequency of homicide involving intimates is available from the Uniform Crime Reporting Program. In the UCR program, an attempt is made to collect supplementary information for each homicide reported by local law enforcement agencies. A Supplementary Homicide Report (SHR) is completed by the local agencies and includes information on the events related to the

homicide, including the mechanism of injury, the relationship of the victim to the offender, and the involvement of weapons. Information about perpetrator is available for about 70% of all homicides (103). Some investigators, though, have questioned the completeness of this information since the report is often submitted to the state authorities before the police investigation of the homicide has been completed.



¹⁷ The actual average number observed was 960,000.

The latest report available using Supplementary Homicide Report data (103) indicates that about 11% of all murder and non-negligent manslaughter cases involve violence between intimate partners¹⁸. Again, the victims of intimate murders are predominantly female. Between 1976 and 1996, roughly 29% of all female homicide victims were murdered by an intimate in comparison to 6% of all male victims (103).

In 1994, there were 2,097 murders attributed to intimate partners. Female victims accounted for 1,405 of the cases. The most recent estimate for 1996 indicates that there were 1,809 intimate murder victims, of which about 75% were female (101).

Another crime-based source of information on family violence is the National Incident-Based Reporting System (NIBRS). At this time, NIBRS is collecting detailed information on incidents of violent crime from 14 states (130). In contrast to the UCR program, information is collected on victim-offender relationships for all crimes. By definition, familial violence includes murder, rape, sexual assault, robbery, assault, aggravated assault, or intimidation offenses against a family member. The definition of a family member used by NIBRS includes current and immediate family relationships, such as spouses, children, parents, in-laws, step-parents, and step-children. It does not include boyfriends, ex-boyfriends, or ex-spouses (130).

¹⁸ An intimate partner was defined as a spouse, ex-spouse, common law spouse, same sex partner, boyfriend, or girlfriend.

Overall, NIBRS data indicate that family relationships accounted for 23 percent of the violent crimes reported to police in 1998 (130). Twelve percent of all violent crimes involved spouses. The victims of family violence were predominantly female (71% of all victims).

The National Violence Against Women Survey (NVAWS) provides the most recent information on the prevalence of violence against women (61). The survey was based upon the telephone interviews of 8,000 women and 8,005 men aged 18 years and older in 1995 and early 1996. Participants were queried about their experiences with rape, physical assault, and stalking.

Women were significantly more likely than men to report being a victim of intimate partner violence (61). About 25% of women and 8% of men reported ever being raped and/or physically assaulted by a spouse, ex-spouse, cohabiting partner, boyfriend, girlfriend, or date (**Table 26**). This survey also provides an estimate of the annual incidence of these events; 1.5% of

women and 0.9% of men reported being raped and/or physically assaulted at some time during the previous 12 months by an intimate partner (61).

With respect to stalking, the NVAWS found that 4.8% of women and 0.6% of men were stalked by an intimate partner (spouse, ex-spouse, cohabitating partner, ex-partner, date, or former date) at some point in their life (109). Further, a strong link between stalking and violence was observed. Over eighty percent of the women, who were stalked by an intimate partner, were also physically assaulted by that partner. Thirty-one percent were sexually assaulted (109).

Estimates of Intimate Partner Violence in Medical Settings

Other sources for information on the prevalence of IPV are the surveys of women presenting to hospital emergency departments or medical practices for treatment. **Table 23** lists several of the most recent reports from these venues. The reports indicate that 2-3% of the women coming to an

Table 26: Lifetime and Past Year Prevalence of Rape or Physical Assault from an Intimate Partner by Gender of Victim, National Violence Against Women Survey

Type of Violence	In Lifetime	
	Women	Men
Rape	7.7%	0.3%
Physical Assault	22.1%	7.4%
Rape and/or Physical Assault	24.8%	7.6%
	In Previous 12 months	
	Women	Men
Rape	0.2%	-
Physical Assault	1.3%	0.9%
Rape and/or Physical Assault	1.5%	0.9%

emergency department were in the emergency department for the direct treatment of injuries from physical IPV (94,96,97). One study by McLeer (95) suggests a higher rate, 30%, but it surveyed trauma patients, while other reports included all women seen in the emergency department.

In four of the studies, the women were also asked about any episodes of domestic violence in the previous year. Between 6% and 15% of the women reported such an episode of IPV. This range is slightly higher than that observed in the population-based surveys. Perhaps most intriguing are the estimates obtained regarding the lifetime prevalence of IPV. Published estimates suggest that large proportions (22-54%) of women have been victimized by an intimate partner at some point in their lives.

Health care settings are becoming increasingly popular as a source for surveys and queries of domestic violence. The general thought is that health care venues are an excellent source for identifying victims of abuse. One, most women see a health care provider on a regular basis. Two, the women can be interviewed in private, without the presence of their intimate partner. Three, health care professionals may encounter victims of abuse when they present for treatment of injuries (110). However, one should be cautious in drawing wide-ranging conclusions from these data sources. As illustrated in **Figure 50**, most victims of abuse do not seek medical care for the injuries received from IPV. Those that do seek care may fail to report the true cause of the injury (93,110,111).

Trends in Intimate Partner Violence

Is intimate partner violence increasing or decreasing over time? Are we now in the midst of an epidemic of domestic violence? These are intriguing questions, but the true answers are largely unknown. While it is a common perception that domestic violence is higher now than it has ever been, there is very little scientific evidence to support this claim. The belief that domestic violence is at record levels may be due to the increased awareness of intimate partner violence brought about by the Violence Against Women legislation.

To understand if changes in violence are taking place, one must examine information from regular monitoring systems. These systems should identify the frequency of violence with similar definitions over time. At this point, the National Crime Victimization Survey (NCVS) and UCR programs are the only

systems that provide regular information on the frequency of IPV. Data from the NCVS indicate that the rate of violent victimization of women by an intimate declined between 1992-1996; from 9.8 to 7.5 per 1000 women (**Figure 51**) (101).

If one examines homicides by intimate partners, alone, the picture changes slightly. From 1977 to 1992, the homicide rate for females changed very little over time (112). There was a steady decline, though, in the murder rates of males (**Figure 52**). These data include homicides committed by current spouses, ex-spouses, boyfriends, or girlfriends. They exclude murders by common-law spouses and same sex partners.

International Rates of Intimate Partner Violence

Violence against women is a worldwide issue. It is a major cause of female morbidity and mortality in several countries (113). Particular attention is now being

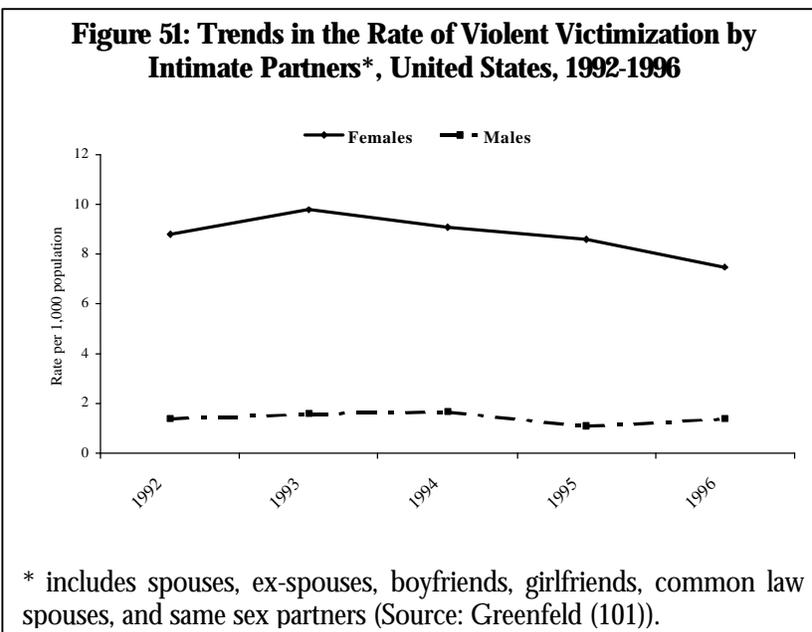
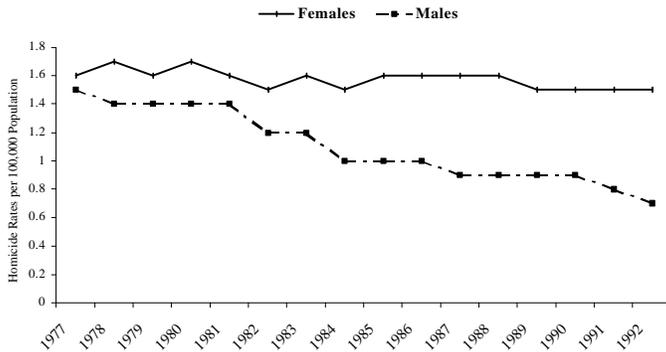


Figure 52: Trends in the Rate of Homicides by Intimate Partners, United States, 1977-1992



Source: Bureau of Justice Statistics. Domestic Violence; Violence Between Intimates, 1994 (112).

directed to the issue of gender-based violence by the United Nations. Several initiatives have begun in the last five years to recognize the institutionalization of violence against women in many areas of the world. These efforts are worthwhile, but often lead to the perception that violence against women only exists in certain cultures. While existing research data are limited in number and scope, a recent review of the studies available suggests that 30-50% of women around the world have been battered in their lifetimes (113). These data refer to women in both developed and developing nations.

Risk Factors Associated with Intimate Partner Violence

A great deal of emphasis is currently being placed on identifying the characteristics of both the victims and perpetrators of intimate partner violence. Such efforts have the potential to provide direction to future prevention programs. Advocacy groups often point out that domestic violence does not discriminate and affects women of

all ages, races, religions, and income groups. While this is certainly true, there have been several strong correlations noted between IPV and demographic and socio-economic factors.

To date, most studies indicate a strong link between gender and IPV. Women are, more often than not, the victims of intimate partner violence (101). The perpetrator of the violence appears to differ by the level of severity of intimate partner violence. Non-lethal assaults appear to be more frequently committed by current or former boyfriends (Table 27). Information from the NCVS indicates that 54% of all crimes against women by intimate partners were committed by current or former boyfriends (9). The victim-

offender relationship is quite different for homicides by intimates. In the NCVS, current husbands accounted for the largest proportion, 63%, of intimate murders against women (Table 28) (103).

Other noted characteristics have been associated with domestic violence. In general, intimate partner violence appears to occur more frequently among young women (9,91,93,94,96,101, 105,114), lower-income women (9,92,94,101,104,114), those with lower levels of education (9,93,114), divorced or separated women (9,91,92), and women living in urban areas (101). Considerable debate exists over the relationship between race and IPV. In general, higher rates of IPV are found among African Americans (101,114,115). The argument, though, exists over whether this finding is a function of ethnicity or the underlying lower levels of income noted in the women identified.

Table 27: Victim/Offender Relationship, Nonfatal Intimate Crimes Against Women, United States, 1992 - 1993

Assailant	%
Spouse	32%
Ex-spouse	15%
Boyfriend/girlfriend	54%

Table 28: Victim/Offender Relationship, Intimate Murders, United States, 1976-1996

Assailant	Female Victims		Male Victims	
	Number	%	Number	%
Spouse	19,892	(63%)	12,686	(62%)
Ex-spouse	1,466	(5%)	746	(4%)
Boyfriend/girlfriend	9,902	(32%)	6,879	(34%)

Table 29 illustrates recent data from the NCVS on the rate of victimization by age, race, income, and location of residence. Young women appear to be particularly prone to being victims of intimate violence. Women between 16 to 24 years of age reported the highest rates of intimate violence, with about 1 out of every 50 women in this age range being a victim of intimate violence (9,101). This high level of victimization was also observed among women living in households with income levels below \$7500 per year. The rate of IPV, though, appears to decrease as household income increases.

The highest rates of intimate partner victimization appear to occur among women who are separated or divorced from their partners. In the 1992-93 NCVS, women who were separated reported an assault rate of 82 per 1000 women (9). This rate was markedly higher than that reported for women who were divorced (23.0 per 1000 women), never married (12.0 per 1000 women), currently married (2.7 per 1000 women) or widowed (1.9/1000 women).

Several links between psychosocial characteristics and intimate partner violence have also been reported. There is some suggestion, for example, that domestic violence rates are higher for women with prior episodes of IPV (96), or women who were abused as a child (91). Excessive alcohol use by both the victim and perpetrator was associated with domestic violence in the studies by McCauley (91) and Abbott (96). Higher levels of depression, anxiety, and somatization in victims of abuse have been found,

as well as a greater frequency of suicide attempts (91,96,116). Links between home violence and pregnancy have been reported (117,118).

The Cost of Intimate Partner Violence

The consequences of intimate partner violence, physically, socially, and economically, are diverse. Women who report IPV to criminal justice or medical authorities often require a broad range of services. These services include acute medical care, long-term mental health care, the provision of alternate housing, childcare, and police and judicial interventions (119). Women who do not report IPV will not be a part of this process. However, they, as well as women who do report IPV, are likely to have significant psychological and employment disruptions, including higher rates of absenteeism (112), poorer work habits (119,120), and job losses (120).

In this scenario, it is easy to envision that the burdens of IPV on victims, families, and society are significant. However, there is very little concrete data available to demonstrate the seriousness of this problem (119). This lack of information hinders most efforts to evaluate domestic violence programs and interventions.

The best information available on the impact of domestic violence is that reported from the redesigned National Criminal Victimization Survey. Roughly one million women are affected by IPV each year according to the

Table 29: Average Annual Rate of Non-Lethal Violent Victimization by an Intimate Partner, United States, 1992-96

Victim characteristic	Rate per 1,000 population
Age	
12-15 years	2.6
16-19 years	20.1
20-24 years	20.7
25-34 years	16.5
35-49 years	7.2
50-64 years	1.3
65+ years	0.2
Race	
White	8.2
Black	11.7
Other	5.6
Household income	
<\$7,500	21.3
\$7,500-14,999	12.3
\$15,000-24,999	10.4
\$25,000-34,999	7.2
\$35,000-49,999	5.8
\$50,000-74,999	4.4
\$75,000+	2.7
Residence	
Urban	10.0
Suburban	7.9
Rural	8.0

Source: National Crime Victimization Survey

NCVS. Of this figure, 70% reported being physically attacked and 30 % reported attempted or threatened attacks (101). Fifty-percent of the one million women victimized sought police intervention (**Figure 50**) and 10 percent sought medical care services. At least 16% of the women sought help from a victims services agency. Although one may argue over the magnitude of the numbers involved, the data clearly point out that many women are using little or no judicial, medical, or social services.

Injuries from domestic violence are a common focus of previous reports on the impact of IPV. Injuries appear to be a frequent outcome of episodes of domestic violence. Nearly one-half of the victims identified in the NCVS, for example, reported an injury from an attack (**Figure 50**). Other reports by Buehler (104), Berrios (121), Forjuoh (122), and Coben (123) also indicate high rates of injuries. Facial injuries appear to be the primary reporting symptom for women seeking care.

Despite a high frequency of injury resulting from IPV, several studies suggest that very few women seek medical intervention for the treatment of their injuries. Of the women reporting injuries in the NCVS, only 20% sought treatment in a health care facility (101). In another report (104), only 34% of the women injured sought medical care. Similarly, in another investigation of women enrolled in batterer intervention programs, around 39% of the women reported seeking medical care and 5% reported being hospitalized as a result of injuries from abuse (123).

This relatively low rate of use of medical services could be due to a couple of factors. One, many of the injuries may not be severe in nature. Over 60% of the women in the NCVS reported that they did not treat the injury obtained (suggesting minor events). About 8% of the women reported that they received serious injuries, such as broken bones, internal injuries, being knocked unconscious, or any injury requiring at least two days in a hospital (101). Coben, et al. (123) identified a greater degree of health care use with an increasing number of injuries.

Two, many women may actively refrain from using services. Whether due to fears of reprisal or feelings of guilt, it appears that some victims forego care for their injuries. At present, there is little information to quantify the extent of this phenomenon. However, there is evidence to suggest that women often try to hide the reasons for treatment when they do decide to get treatment (93,111).

Currently, there remains some debate over the number of women seeking treatment in an emergency department facility. About 70,000 women in the NCVS reported seeking care in an emergency room for injuries from IPV (101). Estimates from the Study of Injured Victims of Violence (SIVV), though, put this figure at a much higher level. In the SIVV, about 243, 000 women were treated in an emergency department for an injury from an intimate partner (53).

Differences in study design and methods likely account for this discrepancy noted. The SIVV was conducted as a supplement to the National Electronic Injury Surveillance System (NEISS). As part of the survey, emergency department records were examined to identify injuries, the intent underlying the injury, and the person who inflicted the injury (53). This approach differs from the NCVS where participants were asked to recall emergency department events. Information about the perpetrator was missing for about one-third of the cases identified in the SIVV (53). Thus, even the SIVV figure may be an underestimate of the true impact of IPV.

Economic Cost

Estimates to quantify the dollars and cents impact of IPV are sparse. This finding is not unexpected given that there is considerable debate regarding the appropriate figures to apply to the core elements of a cost study. These elements include the prevalence of IPV, the number using health services, the number using social services, the extent of lost productivity, and the impact of IPV upon other family members (119).

Most information on the costs associated with domestic violence arises from local institutions or domestic violence advocates. A study conducted at the Rush Medical Center in Chicago, for example, found an average annual charge for emergency department services among abused women of \$1633 per person (86). In Minneapolis/ St. Paul, a review of identified victims of domestic violence in a health plan found that IPV victims had \$2000 more in health care claims, annually, than did a random sample of general female enrollees (124).

The cost of housing women in an emergency shelter was reported at \$68 per person per day by a victim's service agency in Philadelphia (119). Other estimates based upon the budgets of domestic violence centers and shelters also exist. While these data are useful within their individual settings, efforts to extrapolate their meaning to a larger scale are inappropriate. Studies of representative samples of victims are necessary in this situation.

Presently, the National Criminal Victimization Survey (NCVS) provides the only information on the costs of IPV derived from representative samples of abused women. Recent versions of the NCVS have included a series of questions to detail the medical expenses, property losses, and lost pay related to domestic violence. Medical expenses examined include hospital and physician bills, medicines, therapies, and other injury-related expenses.

Table 30 details the latest NCVS estimates for the cost of intimate partner violence against women. Victims of non-lethal intimate violence incurred financial losses of \$150 million per year from 1992 to 1996. Medical expenses accounted for 40% (\$61.8 million) of all costs. Property losses, 44%, and lost pay (\$17 million) account for the remainder (101).

Another study (15) estimated an even higher cost for domestic violence. Miller used data from several sources (101,106) to identify the tangible (medical cost, lost productivity, property losses, public services for victims) and intangible (pain, suffering, and lost quality of life) costs of IPV. The total aggregate cost for domestic violence was reported to be \$67 billion per year (15). This was based upon an incidence estimate of 2.3 million victims of domestic crime. About \$1.8 billion was related to medical expenses, \$7 billion to other tangible costs, such as property losses and diminished productivity, and \$ 58 billion was due to a diminished quality of life. The quoted figure for pain and suffering clearly dominates the overall estimate.

Table 30: Estimates for the Annual Cost of Intimate Partner Violence Against Women, United States, 1992-1996

Type of expense or loss	% experiencing expense or loss	Estimated total annual loss
Medical expenses	6.0%	\$61,800,000
Cash loss	1.1%	\$4,900,000
Property		
Loss	4.3%	\$30,300,000
Repair	5.8%	\$10,500,000
Replacement	5.3%	\$24,300,000
Lost pay from:		
Injury	4.3%	\$10,800,000
Other causes	2.8%	\$6,900,000
TOTAL		\$148,500,000

Source: National Crime Victimization Survey (101)

A comparison of the impact of medical expenses between the reports of Greenfield (101) and Miller (15) finds a large difference (\$62 million vs. \$1.8 billion). Part of the difference is due to the use of different estimates for injured victims in the reports. Greenfield's cost figures are based upon an estimate of 58,000 victims, while Miller's figures are based upon an estimate of 2.3 million victims. There is some suggestion also that the medical expenses in the NCVS may be underestimated (101), particularly when compared to the estimates arising from the Study of Injured Victims of Violence.

Intimate Partner Violence in Pennsylvania

In many respects, one could argue that we know more about domestic violence in Pennsylvania than in any other location. Several investigations of the use of medical services have been conducted in Pennsylvania locations. A large, well-organized network of women's centers, the

Pennsylvania Coalition Against Domestic Violence, exists and is expanding its services.

In other respects, one could argue that we still know very little about the impact of IPV in Pennsylvania. Statewide estimates of the prevalence of intimate partner violence do not exist. Data to detail the use of inpatient hospital services by victims of domestic violence are poorly defined. What we do know is the frequency of homicides among intimates, the relative frequency of the use of emergency department services in Philadelphia and Pittsburgh by victims of violence, and the numbers of victims who have used the services of a shelter or women's center.

Incidence/Prevalence

There are no estimates of the frequency in which intimate partner violence occurs in Pennsylvania. Extrapolations from the National Violence against Women Survey suggest that about 72,700 women in Pennsylvania may have been raped or physically

assaulted in the previous year by an intimate partner¹⁹. It is not clear, though, if these national incidence data directly apply to women in Pennsylvania.

The only population-based information available for the state is the analysis of homicides between intimate partners. The Pennsylvania State Police regularly provide information about homicides related to domestic violence through the UCR program. For 1994, data indicate that there were 61 homicides in Pennsylvania by spouses, boyfriends, or girlfriends. Homicides committed by ex-spouses, common law spouses, same sex partners, or former boyfriends/girlfriends are not included in this figure. Females accounted for close to 70% of the victims noted (**Table 31**). These numbers translate to homicide rates of 0.87 per 100,000 females aged 18 and older, and 0.44 per 100,000 males aged 18 and older.

Health Care Use

Over time, three independent research groups have gathered information on the use of emergency department services by battered women. The first report by McLeer and Anwar (95) examined the causes for injuries in female trauma patients seen in the Medical College of Pennsylvania Hospital ED. Records for every fourth case were reviewed for the entire year in 1977. Battering was identified in 124 of the 412 cases (30%) examined. This is an overly high rate of IPV, and the 30%

¹⁹ NVAWS figure of 1.5% raped or assaulted times n=4,846,071 female population ≥ 18 years.

Table 31: Victim/Offender Relationship, Intimate Murders, Pennsylvania, 1994

Assailant	Female Victims	Male Victims
Spouse	22	6
Boyfriend/girlfriend	20	13

Source: Pennsylvania UCR Program

figure has been widely cited in many descriptions of IPV. However, the high rate is most likely due to the setting involved; i.e. trauma patients only, young patients, and inner city patients.

The second set of information from ED settings arises from the surveillance conducted in 1987-90 as part of the Philadelphia Injury Prevention Program. Eleven inner city Philadelphia hospitals were included in a surveillance system for injuries (125). High rates of violence against women were identified from this surveillance; on the order of 21 to 33 events per 1000 women (125,126). Rather limited information, though, was available on the perpetrator of this violence. For instance, data on the perpetrator was known for only 19% of the 645 cases of violence identified in 1987 (125), and 31% of the 500 cases identified for 1990 (126). In both years, husbands or boyfriends were attributed as the perpetrator in 60% of the known events.

The third study examined intimate partner abuse in women treated at six community hospital emergency departments in Western Pennsylvania (94). Women 18 years and older receiving services at the EDs were anonymously surveyed about physical, emotional, and sexual abuse. Of the 3,455 women completing the survey, 2.1% reported that they were at the ED

that day because they were hurt by their intimate partner (husband, ex-husband, boyfriend, former boyfriend). Around 31% reported ever being emotionally or physically abused by an intimate partner and 12 % reported being abused in the past year (94).

Information regarding the use of inpatient hospital services for domestic violence is poorly defined in Pennsylvania and many other locations. A review of the Pennsylvania Health Care Cost Containment Council database for 1994 identified only 5 admissions related to abuse (defined as E-code 967). More cases (n=71) were found in the Pennsylvania Trauma Systems Foundation registry. These cases were identified by examining a text only variable in the database for descriptions of intimate partner violence. Intimate partner violence was found more frequently by this means than by using E-codes. The inability to identify domestic violence cases through E-codes in medical databases is now a well-known fact (127). It highlights the limitations of such data sets in IPV research.

The health care costs of IPV in Pennsylvania are not yet known.

Use of Social Services

The enactment of the Violence Against Women legislation in 1994 has led to the noted development of several criminal justice and victims services programs in Pennsylvania. The Stop Violence Against Women Program, for example, is currently being administered through the Pennsylvania Commission on Crime and Delinquency. Federal funding to the program has led to the establishment of domestic violence policies and procedures in local police departments and district attorney's offices in 30 jurisdictions (128). A statewide registry of protection from abuse orders is now also operational through the Pennsylvania State Police. At present, there are about 72,000 valid orders in the registry²⁰.

The Pennsylvania Coalition Against Domestic Violence (PCADV) has now grown into a statewide network of 65 community-based domestic violence programs. Included amongst the intervention services offered by these programs are 24-hour hotlines, crisis centers, individual and group counseling/support, and emergency housing shelters. Approximately 91,859 new adults received services through these domestic violence programs in 1994. Of this number, 88,579 were women, and the majority of were Caucasian (**Table 32**). Also, a total of 5,457 adults were housed in domestic violence shelters in 1994 for an overall figure of 78,942 days.

A more recent initiative of the Pennsylvania Coalition Against Domestic Violence is the development of a medical advocacy program in a set of hospitals throughout the state. The program seeks to enhance the identification of cases of abuse in the health care setting and increase the use of support and education for victims once they are identified (129). Five sites have been funded in Allegheny, Montgomery, Luzerne, Columbia, and Erie county facilities. Over a five year period from 1994-1999, more than 3500 victims of IPV were identified in these sites.

Table 32: Characteristics of Persons Receiving Services from Domestic Violence Programs in Pennsylvania, 1994

TOTAL	91,859
Gender	
Female	96.4%
Male	3.6%
Race	
African- American	30.0%
Caucasian	63.4%
Other	6.5%

²⁰ Personal communication, Pennsylvania State Police

Elder Abuse

The third major segment of family violence is the maltreatment of older persons by other family members or immediate caretakers. Elder abuse has been characterized as an unrecognized or under-recognized problem (131,132). It certainly has received less attention and lower levels of resources than both child maltreatment and spouse abuse (133). However, many believe that the burdens of elder abuse will increase into the future as the number of older Americans increases.

Common images surrounding elder abuse describe victims as most often being mistreated in nursing homes or by resentful children. The true characteristics of elder abuse, though, are not clearly known. Very few investigations of elder abuse have been undertaken. Further, the accurate portrayal of abuse is complicated by several social and institutional barriers (133).

Elder abuse is generally described in the literature as the mistreatment or neglect of an elderly individual by a family member or caretaker; often a child or spouse. The following sections outline the current understanding of this maltreatment. We also address the frequency and consequences of crimes committed against the elderly. While this characterization does not technically fit the definition of domestic violence, it portrays another aspect of victimization of the elderly.

Issues in the Epidemiology of Elder Abuse

Probably less is known about elder abuse than any other category of abuse. A U.S. Congress report on elder abuse (134) suggests that 4-5% of elderly Americans experience some kind of mistreatment each year; between one and two million victims. However, the true incidence and prevalence of elder abuse is difficult to quantify. Again, common issues to family violence arise.

For example, most incidents of elder abuse are not reported to social, justice or medical authorities. Overall, it has been estimated that only one in five cases of elder abuse are reported (135). Several reasons may explain this under-reporting of elder abuse. Maltreatment within families may be kept hidden by the family. Persons who are the victims of elder abuse may not report the abuse. They may be embarrassed, may not know where to turn for help, or may not have the capacity to seek help.

Detection and report of elder abuse by medical professionals is inordinately low. Several studies suggest that physician reports account for only 2% of all reports of suspected elder mistreatment (132,136,137). Roughly 17% of all cases are reported by health care professionals (138). These findings are significant, as medical professionals are often the only individuals (outside of family members) to have access to a frail older person.

Recognition of elder abuse may be hindered by a lack of knowledge of the warning signs of mistreatment (139), or by the lack of uniform definitions for elder mistreatment (132). While elder abuse may be broadly categorized as the mistreatment or neglect of an older person by a family member or caretaker, it can assume many different forms. Physical abuse is the most easily recognized form of elder abuse (139). Other categories of abuse include psychological abuse, neglect, financial abuse, self-neglect, or sexual abuse. Definitions for each of these categories vary widely among research studies and state social service agencies.

The National Elder Abuse Incidence Study (NEAIS) provides, perhaps, the defacto standards for defining elder abuse. This study was funded to identify the number of new cases of abuse in the United States in 1996 (140). The NEAIS identified seven categories of mistreatment to be of interest: physical abuse, sexual abuse, psychological abuse, neglect, self-neglect, abandonment, and financial exploitation (140). These categories were defined as:

Physical Abuse: the use of physical force that may result in bodily injury, physical pain, or impairment. Physical punishments of any kind were examples of physical abuse.

Sexual Abuse: non-consensual sexual contact of any kind with an elderly person.

Emotional or Psychological Abuse: the infliction of anguish, pain, or distress.

Financial or Material Exploitation: the illegal or improper use of an elder's funds, property, or assets.

Abandonment: the desertion of an elderly person by an individual who had physical custody or otherwise had assumed responsibility for providing care for an elder person with physical custody of an elder.

Neglect: the refusal or failure to fulfill any part of a person's obligations or duties to an elder.

Self-neglect: the behaviors of an elderly person that threaten his/her own health or safety. The definition of self-neglect excludes a situation in which a mentally competent older person (who understands the consequences of his/her decisions) makes a conscious and voluntary decision to engage in acts that threaten his/her health or safety.

Most debates on the definition of elder abuse focus on the issue of neglect (141). The most recognizable form of neglect is the situation where a caretaker of family member responsible for the care of an older person fails to meet that individual's needs (e.g. starvation). However, questions often arise over who is responsible for the care of an older person, or what their responsibilities should be (141).

Even more contentious is the issue of self-neglect. Many researchers argue that episodes of self-neglect are inappropriately characterized as events of elder abuse. Typically, an event of self-neglect describes an older person who lives independently, but this person cannot provide for his or

her own needs (142). A common example is a person with advanced dementia living alone. The argument is that there is no direct involvement of another family member in this situation. The category of self-neglect, though, is often included in elder abuse statistics because most state agencies for adult protective services include it in their classification. These agencies are responsible for providing services to all adults with unmet needs, whether intentional or unintentional.

Incidence and Prevalence

Information regarding the incidence and prevalence of elder abuse is evolving; with improvements over time as the recognition of elder maltreatment grows. Exact figures on the frequency of maltreatment are not available. Estimates of the prevalence of abuse range from 3-10% of all persons over age 65 years (134,135,140,143). Numerically, anywhere between 450,000 to 2 million persons have been estimated to be victims of maltreatment.

The most quoted figure for elder abuse suggests that 4-5% of the older population is mistreated each year (134). This estimate is contained in a 1991 report by the House Select Committee on Aging in the US Congress. The manner in which it was derived is not clear.

Significant scientific attribution is given to the study by Pillemer and Finkelhor (143). In this report, over 2000 older residents in Massachusetts were interviewed randomly on their experiences with physical abuse, psychological abuse, and neglect.

Physical abuse and psychological abuse in this study was determined from responses to the Conflict Tactics Scale (CTS). Neglect was defined as involving situations of a caretaker's failure to assist an elder (143).

Overall, 3.2% of the subjects indicated that they had been a victim of some form of maltreatment since turning age 65 years. By category, 2% reported physical violence, 1.1% reported chronic verbal aggression, and 0.4% neglect. Other studies from Canada and Great Britain reported similar findings (144,145).

The National Elder Abuse Incidence Study (NEAIS) provides the only national estimate of the incidence of elder abuse for the United States. In the NEAIS, information was gathered from a representative sample of 20 counties in 15 states on the abuse, neglect, and self-neglect characteristics of non-institutionalized elders²¹ (140).

The NEAIS collected data from two sources to derive national estimates of elder abuse and neglect. These sources included reports from the local Adult Protective Services (APS) agency responsible for monitoring the safety of elders in each county, and reports from "sentinels". Sentinels were individuals identified within community agencies (e.g. law enforcement, hospitals, elder care providers, and financial institutions) who had frequent contact with the elderly and the ability to identify elder abuse. The NEAIS did not seek to measure abuse or neglect of

²¹ 60 years of age and older

elders who were isolated or had limited contact with community organizations (140).

Two estimates of elder maltreatment are available from the NEAIS; one that includes events of self-neglect, and one that excludes self-neglect. Overall, the NEAIS found 551,011 elder abuse victims in 1996 (140). Excluding self-neglect, about 450,000 elderly persons in domestic settings were abused and/or neglected (**Table 33**). There were 138,980 cases of self-neglect. Of the total number of cases of abuse and neglect identified, 84% were not reported to an APS agency. This is clear evidence that officially reported cases of elder abuse underestimate the incidence of elder maltreatment.

Table 34 details the distribution of abuse and neglect cases (excluding self-neglect) substantiated by APS agencies. Almost half of the substantiated reports involved neglect. Emotional and psychological abuse and financial/material exploitation each accounted for a larger portion of elder abuse than did physical abuse (140).

The determination that a report of suspected abuse or neglect is unfounded by APS agencies does not mean that elder abuse or neglect did not occur. In some cases, the burden of proof required by states may not have been met despite there being reason to suspect maltreatment. In 1996, 236,479 total reports of domestic elder abuse, neglect, and/or self-neglect were investigated by APS agencies. Of these reports, 115,110 (48.7%) were substantiated. If self-neglect

Table 33: Estimates of abuse, neglect, and self-neglect of persons 60 years and older, United States, 1996

	Reported by Sentinels	Reported to and Substantiated by APS	TOTAL*
All Mistreatment	435,901	115,110	551,011
Abuse and Neglect	378,983	70,942	449,924
Abuse	355,218	47,069	402,287
Neglect	147,035	35,333	182,368
Self-Neglect	81,635	57,345	138,980

* Row totals do not sum to overall total, as more than one type of abuse was reported for some cases. Cases of elder abuse reported by both an APS agency and a sentinel are included in the APS total, whereas the cases included in the sentinel total are those reported solely by sentinel agencies.

Table 34: Types of elder abuse and neglect substantiated by Adult Protective Services (APS) Agencies, United States, 1996

Type of Maltreatment	Number of Reports	%
Physical Abuse	18,144	25.6%
Neglect	34,525	48.7%
Emotional/psychological abuse	25,142	35.4%
Financial/material exploitation	21,427	30.2%
Abandonment	2,560	3.6%
Sexual abuse	219	0.3%
Other	994	1.4%
Total	70,942	

is excluded, 47% of suspected cases were substantiated (140).

The NEAIS did not consider institutionalized persons in its estimates of elder abuse. One area of concern to the public and the media has been the abuse of patients in long-term care facilities. Pillemer and Moore (146) sought to identify this type of abuse using a telephone survey of a random sample nurses and nurses aides in 31 long-term care facilities. Of those surveyed, 36% reported seeing at least one incident of physical abuse and 81% had seen at least one incident of psychological abuse in the previous year. Ten percent

reported that they had committed at least one act of physical abuse in the prior year. Forty percent reported they had committed psychological abuse of a patient within the preceding year. The most frequently reported behavior was yelling at a patient (146).

Trends

Information on the changes in the incidence of elder abuse over time is very limited. There has not been a concerted effort to examine these changes over time. Much of this is due to the general unawareness of elder abuse and neglect, and conflict over its definition.

The aging population, though, will increase the number of individuals at risk for abuse. As an example, a study by the National Center on Elder Abuse found that there was a steady increase in the reports of domestic elder abuse in the U.S. This number increased from 117,000 reports in 1986 to 241,000 reports in 1994 (131). How much these changes in the number of reports reflect true changes in incidence versus population changes, or increased awareness and reporting of abuse is unclear.

Risk Factors Associated with Elder Maltreatment

The factors that place an older person at risk for maltreatment are not entirely known. Existing reports suggest that advancing age, frailty, low income, and cognitive impairment may be important characteristics of mistreated persons. Rigorous evaluations of these factors and others, though, have not been carried out to any large extent.

Advancing age has been found as a related factor in many studies. Data from the NEAIS show that among substantiated cases of elder abuse and neglect, persons 80 years of age and older were more likely to be victims of abuse. **Table 35** portrays the distribution

of categories of abuse and neglect by age group. Given that those age 80 years and older represent only 19% of the elderly population, they account for a disproportionate share of elder abuse and neglect. In general, the younger age groups accounted for the smallest percentages of abuse/neglect, while making up the largest percentage of this population (140).

The NEAIS also characterized victims according to gender, race/ethnicity, and income. The majority of victims in all categories of abuse (except for abandonment), were female. While women made up 58% of the U.S. population over 60 in 1996, they accounted for 71.4% of physical abuse, 60% of neglect, and 76.3% of the emotional or psychological abuse reported against elders (140). African-American elders were over-represented among cases of neglect, financial exploitation, and emotional or psychological abuse. There also appears to be some income disparity among victims of elder abuse and neglect, with more cases among the poor (140,147).

Other factors found to be associated with elder abuse and/or neglect include physical frailty (140,141), being in poor health, living with someone else, social

isolation, and cognitive impairment and depression (141).

The characteristics of perpetrators of domestic elder abuse were also evaluated by the NEAIS. Analysis of the substantiated cases of elder abuse indicated that family members were the most common perpetrators, accounting for almost all (90%) of the cases of domestic abuse and neglect. Adult children made up the largest category of perpetrators (47.3%), and spouses were the second largest category (19.3%). Perpetrators reported by sentinels were similar to those in the APS data (140).

Table 35: Victims of Elder Abuse and Neglect by Age Group, United States, 1996

Age Group	Neglect	Emotional	Physical	Financial	Abandonment
60-64 years	2.3%	10.8%	5.5%	3.1%	18.4%
65-69 years	5.9%	9.5%	9.8%	9.4%	0.0%
70-74 years	24.1%	14.1%	17.8%	10.8%	3.0%
75-79 years	15.9%	24.3%	23.3%	28.7%	58.8%
80+ years	51.8%	41.3%	43.7%	48.0%	19.8%

Source: Substantiated Reports, National Elder Abuse Incidence Study (140)

Criminal Violence Against the Elderly

It remains difficult to accurately portray the frequency and impact of elder maltreatment. Much more information, though, is known about the frequency and consequences of crimes and assaults committed against the elderly.

National Estimates

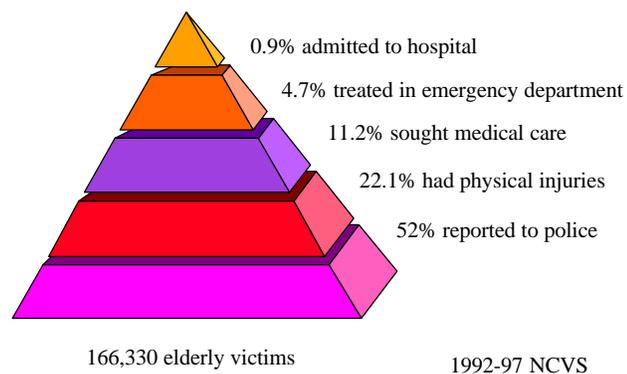
Nationally, information on elderly victims of violent crime is available from the NCVS and the UCR Program. In general, older persons are much less likely to be victims of violent crime than any other age group (148,149). In 1994, the rate of violent crime against person age 65 or older was 5.3 per 1000 population (150). This compares to a rate of 54.3 per 1000 population for all persons over age 12, and 117.7 per 1000 population for persons age 12-24 years. Most criminal acts against the elderly remain, non-violent, property crimes.

For the period 1992-1997, there was an average of 166,330 crimes of violence per year among persons over age 65 (**Figure 53**) (150). The most frequent violent crime in this age group was simple assault (n=87,050), followed by robbery (n=40,950), aggravated assault (n=34,050), rape (n=3,280), and homicide (n=1000). Both fatal and non-fatal violent crimes have declined substantially over time for the elderly. Homicide rates have declined from 5.6 per 100,000 persons in 1973 to 2.7 per 100,000 in 1997 (150). Non-fatal violence, including assault, robbery, and rape, has fallen from 9 events per 1000 persons over age 65 in 1973 to 4.5 events in 1997 (148-150). Considering possible risk factors for violent crime in the elderly, higher rates of homicide and non-lethal violence were noted among older men, African-Americans, and Hispanics (150).

While the NCVS methodology does not measure categories of abuse or maltreatment, information is now gathered concerning the acquaintance of the perpetrator of the crime. Relatives or intimate family members were responsible for 10% of the non-lethal incidents (n=15,040) and 26% of the murders observed (n=260) between 1992-1997 (150).

Figure 53 outlines the injury pyramid for violent crime against the elderly in the United States for 1992-1997. Slightly more than 50% of the violent events committed against the elderly were reported to the police (150). This frequency is higher than that observed for persons aged 12-64 years (42%). Injuries were associated with 22% of the crimes found in the NCVS (150). This rate was lower than that seen for persons aged 12-24 years, but similar to the observation for persons aged 25-64 years. Of those injured, about one-half sought some form of medical treatment; with most persons being seen in hospital emergency departments.

Figure 53: Pyramid of Annual Violent Crime Against the Elderly, 1992-1997



Pennsylvania

Statewide, crime and assault data are available from the Uniform Crime Reporting Program and the Pennsylvania Crime Victimization Survey (PCVS). Again, violent crime in Pennsylvania occurs much less often in the elderly than in other age groups. Data from the PCVS, for example, demonstrates that while persons aged 55 years and older comprise 39% of the population in the state, they account for only 6% of all cases of personal violence (29).

Table 36 summarizes the frequency of violent crimes against the elderly in Pennsylvania as identified by the UCR program (7). In 1994, there were 49 homicides recorded in the state (7), representing a homicide rate of 2.6 per 100,000 persons over age 65 years. This rate is comparable to that observed nationally.

Rape, robbery, and aggravated assault all occurred with less frequency in older persons in the state when compared to the experience in younger age groups. The identified rates of non-lethal crime in Pennsylvania were much lower than reported nationally by the NCVS. This finding is probably due to the difference in methodology between the NCVS and UCR surveys.

At present, there is limited information available regarding the economic impact of criminal violence against older persons in Pennsylvania. Data from the Pennsylvania HC4 indicate there were 220 hospital admissions related to violence against the elderly in Pennsylvania. Almost all (94%) of the cases were assault victims.

The demographic characteristics of the subjects in short stay hospitals (n=213) are highlighted in **Table 37**. The majority of admissions were among males, persons 65 to 74 years of age, and Caucasians. African-Americans, though, are over-represented relative to the Pennsylvania population. Given the age of this patient population, it is not surprising that government programs were the insurance source category for almost all of the hospital admissions.

The majority of victims (76.5%) were admitted to the hospital through ED facilities. A notable 20.2% were referred to hospitals by physicians. The average length of stay associated with hospital admissions related to violence against the elderly was 7.8 days. The majority of patients (70.8%) were discharged to home, while 25% were sent to other health facilities. In 1994, the total health care charges for the 213 short-stay admissions were \$4,357,354. Total costs were \$1,534,170.

Table 36. Violent Crime Against the Elderly in Pennsylvania, 1994

	Number	Proportion of all Events	Rate*
Homicide	49	7%	2.6
Rape	28	0.9%	1.5
Robbery	1310	6%	68.8
Aggravated Assault	315	1.3%	16.6

Source: Pennsylvania Uniform Crime Reports

* Rate per 100,000 persons 65 years and older. Pennsylvania population 65+ in 1994 was 1,902,962 (151).

Table 37: Demographic Characteristics of Hospital Admissions Related to Assaults Against the Elderly, Pennsylvania, 1994

Total Admissions	213
Age	
65-69 years	30.9%
70-74 years	20.5%
75-79 years	19.1%
80-84 years	15.0%
85+ years	14.5%
Gender	
Female	45.5%
Male	54.5%
Race	
African-American	27.4%
Caucasian	66.8%
Other	5.8%
Payor Source	
Self-Pay	2.1%
Non-government insurer	5.2%
Government program	92.7%

Elder Maltreatment in Pennsylvania

Estimates of the incidence of elder abuse and neglect in Pennsylvania are available from the Department of Aging. Under the Older Adults Protective Services Act, area agencies on aging (AAA) in Pennsylvania are required to process reports of older adults (60 years of age and older) who need protective services. However, since reporting of elder abuse and neglect is voluntary, the estimates of elder abuse provided by these data are likely an underestimate of the problem. The definitions of abuse and neglect in Pennsylvania are similar to those used in the NEAIS. However, Pennsylvania also includes reports of abuse and neglect in institutional settings.

During fiscal year (FY) 1994-95, there were 7,678 reports of suspected elder maltreatment received by area agencies on aging. Of these events, 2,344 cases (31%) were substantiated²². The distribution of substantiated reports across categories of abuse and neglect is shown in **Table 38**. Self-neglect accounted for the largest portion (44%) of the events. Around 25% of the cases involved some sort of abuse; 17% physical abuse, 7% emotional abuse, and 1% sexual abuse (152).

Demographic information on the substantiated cases of abuse and neglect cases in Pennsylvania appears to be similar to that reported nationally. The oldest old in Pennsylvania experiences a

disproportionate share of elder abuse. Persons aged 75 years and older accounted for 63% of the substantiated cases of elder abuse and neglect in FY 1994-95. Similarly, 68% of substantiated cases were female. Approximately 83% of the cases were Caucasian, and 17% were African American (152). The category of self-neglect is included in this information, and may skew comparisons with national data slightly.

The Department of Aging also collects information on the alleged perpetrators and the residence of the victims where the abuse occurs. In FY 1994-95, family members were the most common perpetrators, abusing elders three times as often as non-relatives. Around 54% of the perpetrators were male. Most of the victims (85%) of abuse and neglect lived in the community. However, while only 5% of the elderly in Pennsylvania live in long-term care facilities, they accounted for 11% of substantiated cases of elder abuse and neglect (n=258)(152).

Table 38. Substantiated Elder Abuse and Neglect in Pennsylvania by Type of Maltreatment, FY 1994-95

Type of Maltreatment	%
Physical abuse	16.8
Caretaker-neglect	18.9
Self-neglect	43.9
Emotional abuse	7.4
Financial exploitation	14.5
Abandonment	1.7
Sexual abuse	0.7
Other	5.8

Source: Penn. Dept. of Aging

Economic Costs Related to Elder Abuse

The total economic cost of elder abuse in Pennsylvania is not yet known. There are few reports, for example, on the health care, social, and justice system costs related to this form of violence.

Information about social spending related to elder abuse is available from the Department of Aging. During FY 1994-95, protective services expenditures in Pennsylvania totaled \$7,081,475. This money was used to maintain protective services programs, including, but not limited to, receiving and investigating reports of suspected abuse and neglect, assessing clients, developing service plans, and coordinating follow-up services. The service most often provided to clients was legal assistance. However, in terms of economic resources, the largest dollar amount was spent on personal care, followed in order by legal assistance, home delivered meals, placement, home support, day care, attendant care, transportation, and home health (152).

The health care costs related to elder abuse in Pennsylvania are not yet known.

²² More recent data for FY 1997-98 found 8175 reports filed and 2060 cases substantiated.

Self-Directed Violence in Pennsylvania

In the following sections, the focus of this report on the impact of violence in Pennsylvania shifts from events of interpersonal violence (aggression by one or more persons against another) to events of self-directed violence (acts against oneself). This portrayal follows the format presented in the public health literature which often categorizes intentional violence in two forms; interpersonal or self-directed.

Self-directed violence refers, more commonly, to suicides and suicide attempts. Throughout history, suicide has been viewed from a negative perspective or perceived as a taboo subject. When compared to interpersonal violence, self-directed violence receives considerably less media attention, and far fewer resources for preventive interventions. Significant research, though, has emerged on the topic over the last decade. Several public health professionals now argue that suicide should be viewed as a preventable event (153), and many believe that suicide represents an intentional act with underlying mechanisms similar to other forms of violence (6).

We report first on the information regarding completed suicides in Pennsylvania. A description of the impact of attempted suicide follows.

Completed Suicide

Suicide is generally defined as "the act of taking one's own life voluntarily and intentionally" (154). It often is viewed as a form of psychological dysfunction, and in many cultures is perceived negatively. Suicide, though, represents a significant public health burden in the United States. Although homicide receives much more attention, suicide represents a more common cause of death from violence. Overall, suicide is the 9th leading cause of death in the United States (155). It is the third leading cause of death for persons aged 15-24 years and 25-34 years.

While suicide depicts a severe health outcome (i.e. death), it is not always identified completely in existing data systems. Questions regarding intent and societal pressure to protect surviving family members lead to several ramifications for epidemiologic studies of its frequency and economic studies of its cost. These issues are further explored in the following sections.

Issues in the Epidemiology of Suicide

The study of suicide events in many respects can be thought of from the perspective of an hourglass. For some individuals, the hourglass is half-full. For others, it is half-empty. With regard to suicide, there are many

findings in the literature that are well received. For example, we know that both the young and the old are at heightened risk for suicide, and that firearms are strongly linked to these events. On the other hand, there remains much more to learn.

Most of our current knowledge regarding the epidemiology of suicide has been gathered from death certificate information. Suicides are identified on death certificates through the use of external cause of death codes (E950-E959).

The manner in which death certificates are collected, though, raises questions about the completeness of suicide statistics. Generally, physicians or medical examiners judge the available information and determine the medical cause of death to list on the death certificate. The certificates are then forwarded to the vital statistics systems in the individual states, compiled, and sent to the National Center for Health Statistics.

It is generally acknowledged that suicide statistics underestimate the true number of suicides (156). Estimates suggest that the incidence of suicide may be underestimated by 10-50% (157,158). Several possible reasons for this have been put forth. First, there may be inadequate information on which to base the determination of suicide. If there is no communication from the victim that the death was self-inflicted, or if the victim's family withholds information needed to make the determination, the death may be erroneously classified as a homicide, accident, or undetermined cause (159). The

stigmatized nature of suicide as well as prohibitive clauses in life insurance policies may influence suicide coding in these situations.

Second, the judgment of whether a death is a suicide may differ between physicians and medical examiners. Third, whether a death is ruled a suicide may be influenced by the method used for suicide (156). For example, when shooting is the cause of death, there are objective criteria that can be used (e.g., trajectory of the bullet) to make the determination of suicide. On the other hand, judgments regarding deaths from unobserved falls have fewer objective criteria upon which they can be based. Lastly, there may be no record of some suicide deaths if the bodies are not found (e.g., as might occur with drowning) (159).

Data from the NCHS indicate a total of 30,903 suicide deaths in the United States in 1996 (33). This represents an unadjusted rate of 11.65 suicide deaths per 100,000 population, and an age-adjusted rate of 10.83 deaths per 100,000 population.

Trends in Suicide

The long history of collecting vital statistics information on deaths and reasons for death allows for investigations into the trends in suicide over time. **Figure 54** illustrates the rate of suicide per 100,000 population from 1933-1996. Suicide rates peaked during the 1930s, during the economic depression, then declined sharply in the 1940s. Rates then increased from the mid-1950s until 1980. The overall

suicide rate has remained relatively steady in recent years.

Is this interpretation of **Figure 54** straightforward? The data show, quite clearly, that suicide rates can change; most notably due to dire economic circumstances. However, it is not clear if the propensity for recording suicides on death certificates also changed over time. Physicians in the 1930s, for example, may have been more prone to attribute some deaths to suicide. Dramatic differences in rates, though, probably are real differences.

Age, Gender, Ethnic, and Other Risk Factors for Suicide

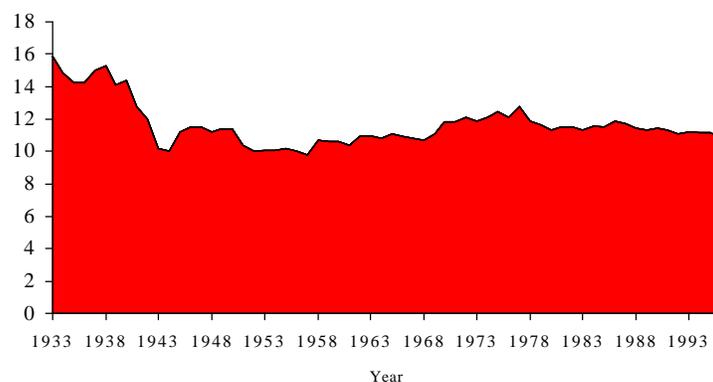
Several risk factors have been noted for completed suicides. For example, large gender differences exist in suicide rates. Suicide rates are strikingly higher among males compared to females, and this difference persists throughout all of the age groups. In 1996, the age-adjusted suicide rate for males was 19.26 per 100,000 versus 4.06

per 100,000 for females. This difference has been fairly consistent over time. Similar differences between the sexes are also observed within whites, African Americans, and other races in the U.S (33).

By age, suicide rates tend to increase as age increases. Although the rates for adolescents and young adults are lower than all other adult age groups, suicide contributes significantly to death in the young. Additionally, suicide deaths among the age groups between 15 and 44 years of age make up the largest percentage of total suicide deaths (**Figure 55**). Suicide is the third leading cause of death for people 15-24 years of age in the U.S (37,155). Among younger persons, suicide rates tend to be higher among older adolescents and young adults aged 20-24 years than among teenagers between the ages of 15-19 years (160).

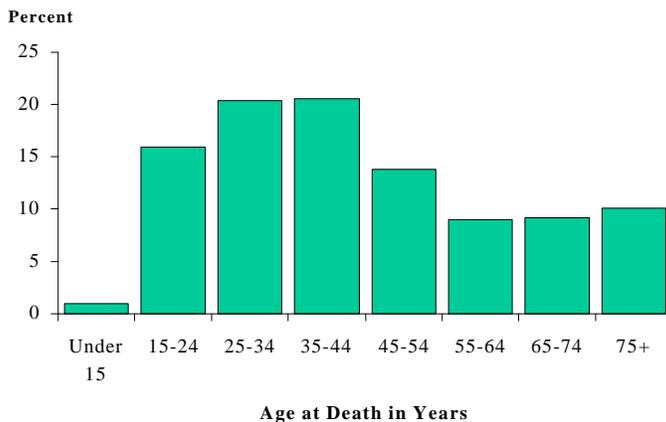
Age-specific suicide rates, though, remain highest among the elderly. Among older persons in

Figure 54: Age-Adjusted Suicide Rates in the United States, 1933-1996 (rate per 100,000 population)



Sources: Holinger (37)
Centers for Disease Control and Prevention (33)

Figure 55: Suicide Deaths by Age Group, United States, 1994



Source: Centers for Disease Control and Prevention (33)

the U.S., suicide was the third leading cause of injury-related death in 1992 (161). Further, suicide rates among those 65 years of age and older have increased since 1980 (162). The largest relative increases occurred among person 80-84 years of age and in men.

In 1996, approximately 90% of all suicides in the U.S. were among whites and 7% among African Americans. Over time, white males have consistently had the highest suicide rates and have accounted for the highest proportion of all suicides. African American males also have elevated suicide rates, though not nearly at the same level as for Caucasian males. The age-adjusted suicide rates (per 100,000) in 1996 were 19.06 for white males, 11.84 for African American males, 10.79 for other males, 4.38 for white females, 4.08 for other females, and 1.96 for African American females (33).

Trends within age and race groups have been observed. Of note is the increase in suicide rates observed among African

Americans 15-19 years old (163). During the period between 1980 and 1992, suicide rates in this group more than doubled from 3.6 per 100,000 to 8.4 per 100,000, but have since declined to 6.7 per 100,000 in 1996.

Some evidence of a urban/rural relationship to suicide also exists; although it's exact meaning has not yet been teased out. Data from the National Vital Statistics System shows slightly higher age-adjusted suicide rates in non-metropolitan areas compared to metropolitan areas: 12.8 versus 10.8 per 100,000 in 1995 (30). This relationship was strongest for firearm suicide, 8.9 compared to 6.1 per 100,000 (30).

Other factors linked to deaths from suicide include seasonality (more suicides in spring and summer) (164); marital status (divorced and widowed persons at greater risk) (165); previous suicide attempts; mental disorders (166); and a tendency to engage in impulsive violence (167). Risk factors for suicide among younger persons differ from those among older persons. Youth risk factors include substance abuse; mental

illness; impulsive, aggressive, and antisocial behavior; a history of violence and family disruptions; and severe stress in school or social life (168). Suicide among older persons is associated with a higher prevalence of alcohol abuse and depression, social isolation, use of highly lethal methods (169), and fewer attempts per completed suicide (170).

Firearms and Suicide

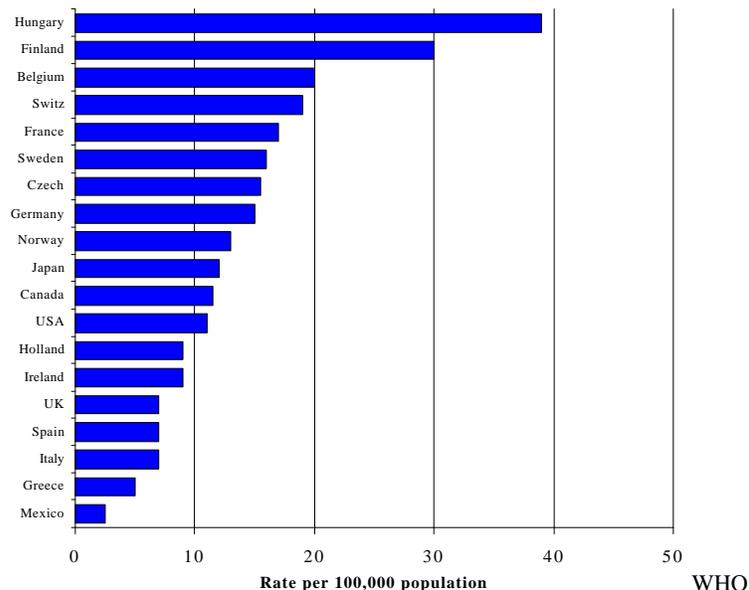
Perhaps the strongest risk factor linked to suicides in the United States is the mechanism of injury associated with the event. Almost 60% of all suicides are committed with a firearm (33,155). Firearms are the most common method of suicide for both men and women, although more men than women choose this method. The second most common method of suicide for men is hanging; for women it is overdose (161).

Suicide death rates related to firearms are higher than non-firearm suicide rates for all age groups. This difference is more pronounced in the older age groups (33). Amongst persons 65 years of age and older, nearly 9 out of 10 firearm-related deaths were suicides (30). Additionally, from 1980 to 1992, the firearm-related suicide rate for persons 65 years of age and older increased by 24%, from 10.6 to 13.1 per 100,000 (161). Among 15-19-year-olds, firearm-related suicides accounted for 81% of the increase in the suicide rate from 1980-1992 (163).

International Comparisons

Marked differences exist in suicide around the world. A 1993 report based on the World Health Organization (WHO) mortality database provides one look at the comparison of suicide internationally (171). For the years 1990-92, suicide mortality rates varied significantly (**Figure 56**). The United States falls roughly in the middle of the reported range of suicide rates. For virtually all countries, suicide rates are higher among men than women. The ratio of males to females is above 3 for most countries (171). Additionally, suicide among the young is one of the five leading causes of death in many countries (171).

Figure 56: Average Suicide Rates in Selected Countries



Source: Diekstra (171)

The Cost of Suicide

Currently, there is very little information available about the costs associated with death from suicide. Operationally, the costs of interest include the health care costs associated with the medical treatment of suicide events, the impact of lost future earnings, and psychological impacts on surviving family members. Monetary costs related to medical care are likely to be small because of the fatal nature of the event. One study, for example, found that most individuals (80%) were deceased before coming to the attention of a trauma center (56). Amongst those surviving to reach a medical center, the limited data available suggests that most subjects die soon thereafter. Luna et al., followed victims of intentional injury admitted to a regional trauma center from 1985-86 (55). There were 44 admissions for

trauma as a result of suicide, and 13 of these died as a result of the injuries they sustained. The average length of stay was 2 days for suicide completers and 17.5 days for suicide attempters. The average hospital charge for the suicide-related deaths was \$4422.

Suicide in Pennsylvania

Do patterns of suicide differ in Pennsylvania when compared to the experience of the United States? We sought to answer this question and estimate the health care costs associated with completed suicide by examining information from several statewide sources, including the Pennsylvania Department of Health Vital Statistics program, the Health Care Cost Containment Council (HC4), and the Pennsylvania Trauma Systems Foundation. These sources

provided information describing the number of incident events in 1994 and the number of hospital admissions related to suicides that ended in death. Information on the use of other types of health care services among those committing suicide was not readily available.

Incidence

The best estimates regarding the incidence of suicide in Pennsylvania in 1994 are those available from the Pennsylvania Dept. of Health Vital Statistics program. Using death certificate information, the department of health reported 1,326 completed suicides among state residents during 1994 (42). This figure represents a rate of 10.25 suicides per 100,000 population, and was the lowest rate recorded for suicides in Pennsylvania since 1981 (172).

A description of the demographic characteristics of persons who committed suicide is shown in **Table 39**. Proportionally, more suicides were noted for males, Caucasians, and the young. These data outline the distribution of suicide victims among the total group committing suicide. It does not distinguish the frequency of suicide in the male population of Pennsylvania, or the African American population.

Another approach to identify the burdens of suicide is to examine death rates. Rates consider the number of events divided by the total population. When one considers suicide death rates, the details for Pennsylvania are slightly different. In 1994, males had markedly higher age-adjusted death rates for suicide than females (17.7 deaths per 100,000 population versus 3.4 deaths)(173).

Total	1326
Age Group	
0-14 years	0.7%
15-24 years	14.9%
25-34 years	20.6%
35-44 years	20.4%
45-54 years	13.3%
55-64 years	9.6%
65-74 years	10.6%
75+ years	9.9%
Gender	
Female	17.0%
Male	83.0%
Race	
African-American	7.6%
Caucasian	91.0%
Other	1.4%

Source: Centers for Disease Control and Prevention (173)

Age-adjusted suicide rates were roughly similar for Caucasians and African Americans (10.3 suicides per 100,000 population for Caucasians vs. 9.2 suicides per 100,000 population for African Americans)(173). However, death rates showed sizeable difference by age group (**Table 40**). Men over age 75 years had remarkably higher suicide rates than any other age group, including males between 20 and 34 years of age.

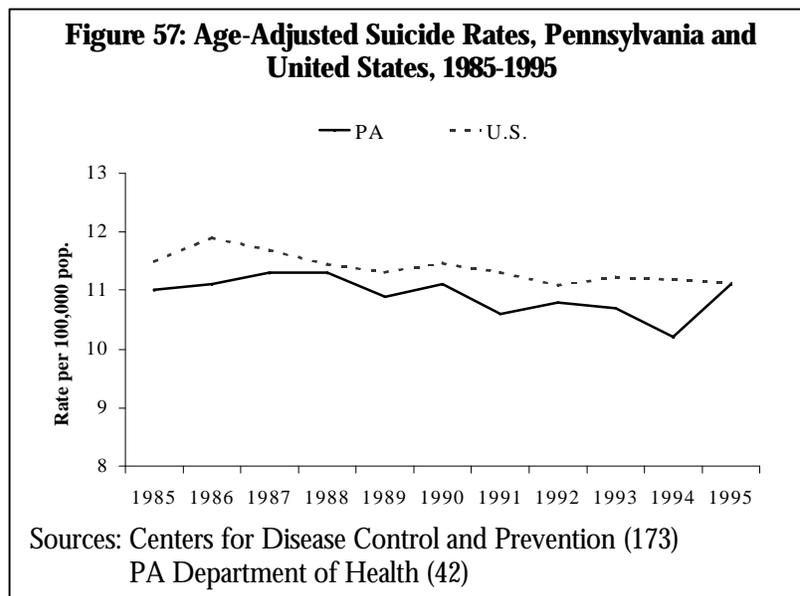
Figure 57 depicts the relationship between suicide rates in Pennsylvania and the United States. Over time, age-adjusted suicide rates in Pennsylvania have been almost identical to U.S. rates, and at times have dropped slightly below U.S. rates. In 1994, the age-adjusted suicide rate for the U.S. was 11.19 per 100,000-population (33). In Pennsylvania, the rate for the same years was 10.2 per 100,000 pop. (42).

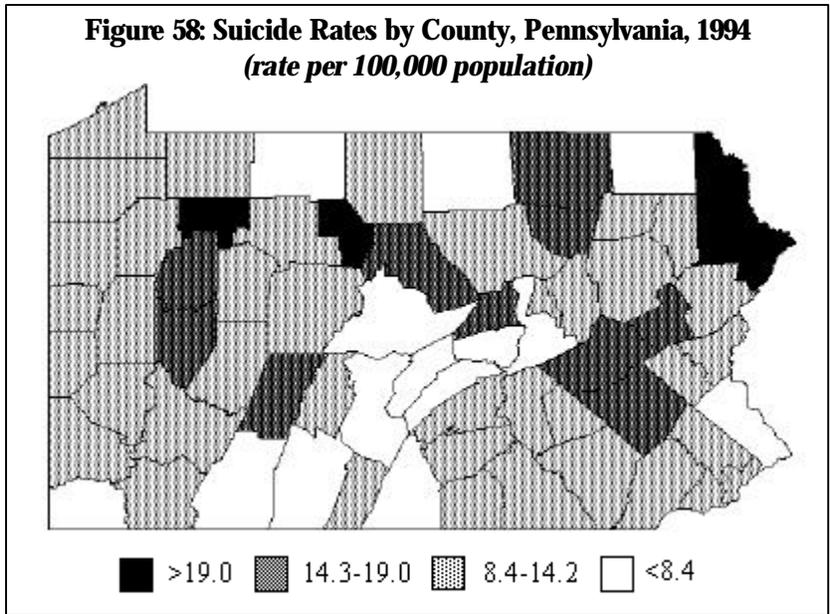
Table 40: Age-Specific Suicide Death Rates per 100,000 population, by Gender, Pennsylvania, 1994

Age	Male	Female
10-14 years	1.92*	0.50*
15-19 years	14.96	1.59*
20-24 years	29.36	2.96*
25-34 years	26.98	4.27
35-44 years	22.64	5.90
45-54 years	19.94	5.65
55-64 years	20.58	4.40
65-74 years	25.59	3.49
75-84 years	34.49	4.25*
85+ years	47.77	4.86*

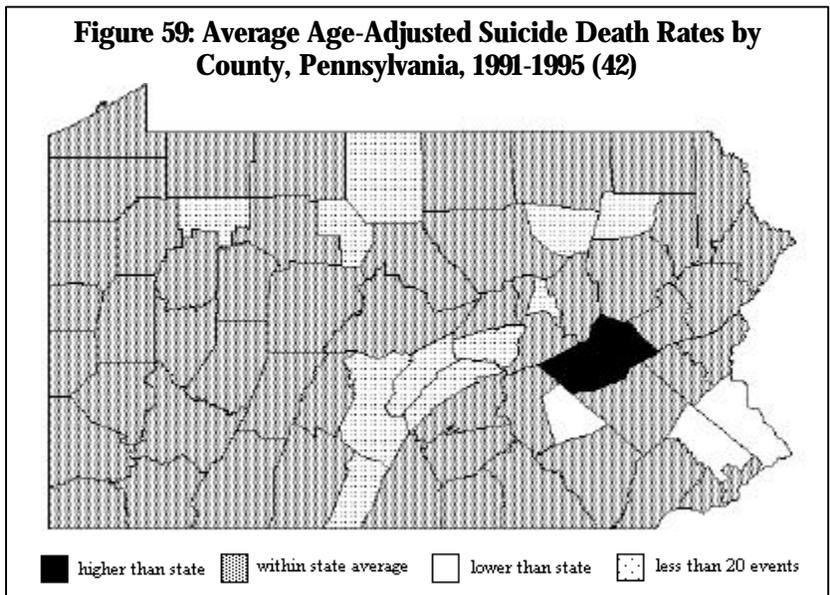
* unreliable due to small number of cases
Source: Centers for Disease Control & Prevention (173)

Suicide rates in 1994 by county are illustrated in **Figure 58**. These data represent the number of suicides reported for each county by the Pennsylvania Department of Health Vital Statistics program divided by the population estimate for each county. Four counties (Cameron, Forest, Pike and Wayne) exhibited extremely high rates (above the 95th percentile). A number of counties showed fairly

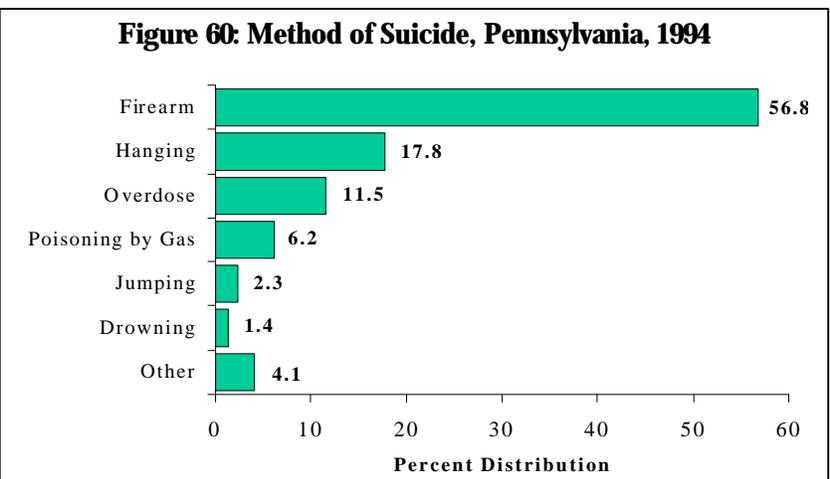




low rates of suicide, most notably Bucks County (7.58 deaths per 100,000 population). It is difficult, though, to reliably interpret the differences between the counties in **Figure 58**. Suicides are relatively rare events, and suicide rates may change meaningfully in some areas with a change of only one or two events.



To address this possible shortcoming, **Figure 59** depicts the annual-age-adjusted death rates for suicide by county over a five-year period (1991-1995). This longer time frame provides more stability to the estimates reported. In addition, the age-adjustment method can account for possible age differences in the county populations. In general, suicide rates across the state do not vary significantly. Schuylkill County was the only county found to have an average age-adjusted death rate for suicide significantly higher than the state rate. Significantly lower death rates were observed in Bucks, Lebanon, and Montgomery counties (42).



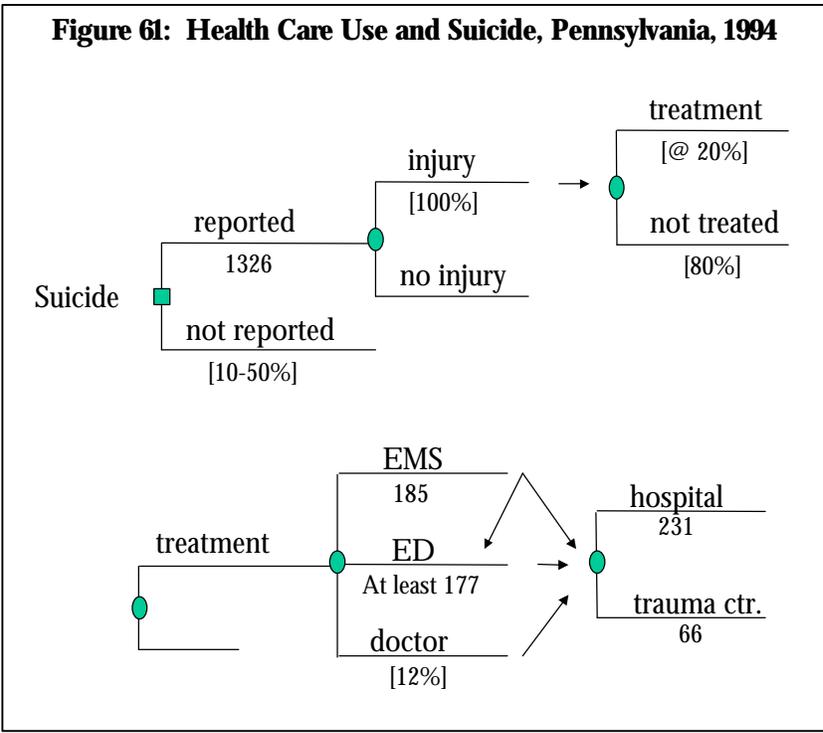
As was noted for the entire U.S., firearm-related suicides account for the highest proportion of suicide deaths in Pennsylvania (**Figure 60**). The department of health reported that 57% of suicide deaths were firearm-related in 1994. The second leading mechanism for suicide was hanging, followed by overdoses.

Health Care Use

Information on the use of health care services by individuals committing suicide is difficult to obtain. Most reports do not distinguish between successful and unsuccessful suicide events. The

most reliable statistics are those related to overnight hospital admissions and the use of Level I trauma centers. Data on discharge status (i.e. deceased) was available from the registers of both the Pennsylvania Trauma Systems Foundation (PTSF) and the Pennsylvania Health Care Cost Containment Council to characterize events related to completed suicide. We also examined admissions data in these registers to describe the use of emergency department facilities.

Figure 61 illustrates the information available on the use of health services in Pennsylvania by those with completed suicide. Completed suicides represent a severe form of self-directed violence. While most are likely to be discovered because of the lethal nature of the event, there is evidence that suggests that all will not be reported as suicides. By definition, all victims necessarily incur injuries. However, not all will survive long enough to require the use of health care services. The data available indicate that most successful suicide events may not be seen in health care settings.



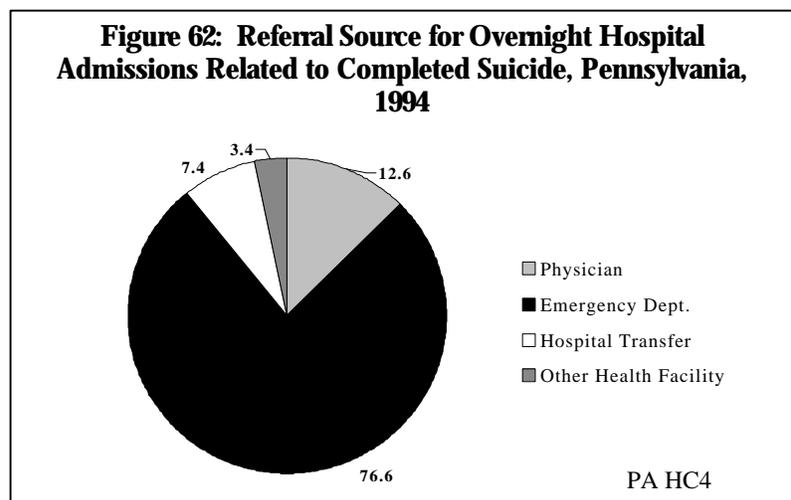
the events noted, 72% were reported as involving a firearm, 85% of the victims were male, and 85% occurred in a residence. The average age of the victims was 44 years. This information is not likely to account for all completed suicides transported by EMS personnel in the state. Patients who survived until reaching the hospital would not be identified in this source.

Hospital Admissions

In 1994, the Pennsylvania Health Care Cost Containment Council data indicate that only 17% of cases of completed suicide used inpatient hospital services. The majority of these cases (76.6%) were admitted to the hospital through emergency departments (**Figure 62**). Twelve percent were seen beforehand in

Emergency Medical Services

The computerized ambulance trip reports submitted to the Pennsylvania Department of Health Emergency Medical Services group suggest that at least 185 events were due to completed suicide in 1994. Associated events were defined as ambulance runs where "self-infliction" was listed as a contributing factor in the reason for the visit, and the patients were identified as "dead-on-arrival". Of



physician's offices. Just over 7% of the admissions were transferred from another hospital, which suggests that some of the admissions reported in the HC4 data may be multiple events for the same individual.

Overall, there were 231 hospital admissions related to suicide in the Pennsylvania HC4 data. Suicides were defined as visits with the admission codes E950-959 that were discharged as deceased. Pennsylvania Trauma Systems Foundation data indicate that there were 93 completed suicide cases seen in trauma centers. Of these events, 27 were individuals who were dead on arrival at the trauma center, or who died in the emergency department service of the center. Sixty-six individuals were admitted to an inpatient unit, and died thereafter.

The characteristics of the subjects with hospital admissions in the PTSF and HC4 databases are highlighted in **Table 41**. The majority of admissions were among Caucasians and males. The proportion of male to female patients, though, was much higher in the PTS4 database and more closely reflected the patterns seen for suicide overall. The data sources also showed different age distributions. While the hospital admissions reported by the PTSF are heavily concentrated in the age groups between 15 and 44 years of age, hospital admissions identified in the HC4 data tend to be older. This indicates that the typical suicide patients listed in each database are quite different. Trauma centers appear to be seeing more severe cases. The HC4 data suggest that proportionally more women and the elderly are admitted to hospital

Table 41: Demographic Characteristics of Hospital Admissions Related to Suicide, Pennsylvania, 1994

	HC4	PTSF
Total	231	66
Age Group		
0-14 years	1.3%	--
15-24 years	15.1%	24.2%
25-34 years	18.6%	31.8%
35-44 years	14.3%	15.2%
45-54 years	10.0%	7.6%
55-64 years	8.7%	7.6%
65+ years	32.0%	13.6%
Gender		
Female	39.8%	13.6%
Male	60.2%	86.4%
Race		
African-American	7.4%	13.6%
Caucasian	85.7%	81.8%
Other	2.6%	4.5%
Payor Source		
Self-Pay	7.1%	23.4%
Non-government insurer	39.1%	21.9%
Government program	53.8%	54.7%

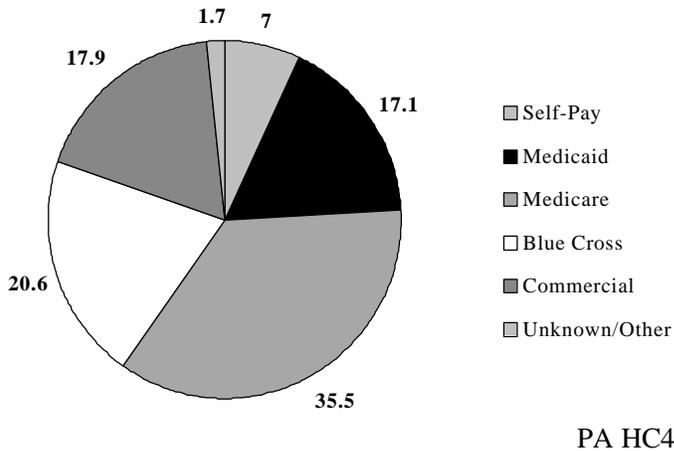
than men and the young. This provides an indication that suicide events among most women and the elderly may be "less lethal", in the sense that they are likely to survive to the point of reaching a hospital. Further evidence for this can be found by looking at the information regarding the mechanism underlying the suicide. For subjects in the HC4 database, 67% of the completed suicides were related to poisoning, and 18% were related to firearms. This finding varies markedly from that observed for all suicides in the state shown in Figure 60. Data from the PTSF indicate that 84% of completed suicides seen in trauma centers in 1994 were firearm-related.

It is not surprising then, that the payor source listed for the admissions also differed between the PTSF and HC4 data. While

the majority of admissions in both the PTSF and HC4 registers were paid for through government insurance programs, there were more patients in the self-pay category for the trauma centers. **Figure 63** shows the insurance payor listed for HC4 hospital admissions from completed suicides. Most admissions were paid for by public insurance plans, with Medicare paying for the highest number of admissions. The state Medicaid program paid for 17% of the admissions.

The average length of stay for suicide admissions in the HC4 data was 7.4 days. The majority (42%) of cases died within one day of admission (**Figure 64**). Data from the PTSF indicate that those completing suicide spent an average of 3.8 days in a trauma center overall and 2.2 days in an intensive care unit.

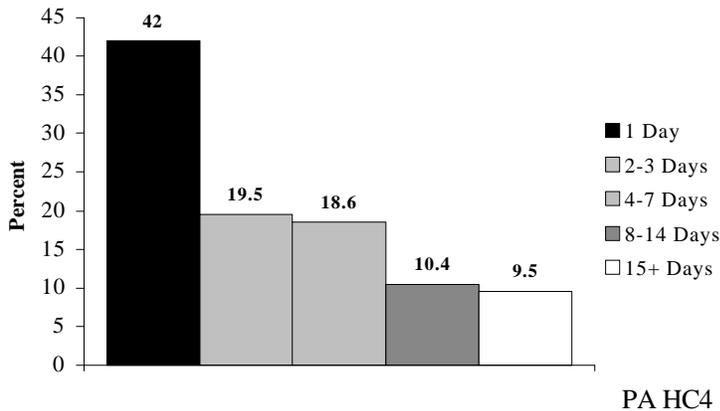
Figure 63: Payment Source for Hospital Admissions from Completed Suicide, 1994



Health Care Costs Related to Suicide

The only information regarding the health care costs related to deaths from suicide in Pennsylvania is that included within the HC4 data system. In 1994, total health care charges for the 231 hospital admissions related to deaths from suicide were \$6,379,763. Estimated costs for these overnight stays totaled \$2,413,178. The average cost incurred per stay was \$10,447, a figure lower than that estimated for homicides.

Figure 64: Length of Stay in Hospital Admissions Related to Completed Suicide, Pennsylvania, 1994



The average charge for a hospital admission related to suicide in 1994 was \$27,618. The average estimated cost per admission was \$10,447.

Attempted Suicide

Attempted suicide represents another form of self-directed violence. By definition, it considers actions or behaviors where an individual voluntarily and intentionally tries to end his or her life. These actions, however, are unsuccessful. Attempted suicide is a significant public health and mental health issue in the United States. Suicide attempts outnumber actual suicides, and can result in noteworthy levels of morbidity and economic cost. Affected individuals are heavy users of general medical and psychiatric care services.

Identifying attempted suicides in data systems remains a difficult task, and there is little routine monitoring for these acts. However, investigating attempted suicide can be insightful because it can provide clues to preventing future suicides. Attempted suicide is a major risk factor for subsequent attempts; many of which will be successful. Noted behaviors also exist among affected individuals, such as talking about suicide before making an attempt, and using methods in suicide attempts that make recovery possible.

The Epidemiology of Attempted Suicide

Investigations into the frequency and characteristics of attempted suicide are varied. No standard data systems exist to identify attempted suicide events.

Much of our knowledge of these events is based upon clinical and community-based studies. Clinical studies generally include subjects attending a psychiatric clinic or hospital. While the information gathered from these settings has been helpful, it may not provide an accurate overview of attempted suicide within the general population. Not all suicide attempts, for instance, are seen within a health care setting. Thus, community-based studies are likely to provide a more complete description of the scope of suicide attempts.

One such community-based study is the Epidemiologic Catchment Area (ECA) Study conducted by the National Institute of Mental Health from 1980 to 1985 (174). This study interviewed 18,571 adults living in five communities; New Haven, Baltimore, St. Louis, Los Angeles, and the Piedmont region of North Carolina. Data were collected in face-to-face interviews using the Diagnostic Interview Schedule. Persons were considered to be suicide attempters if they answered yes to the question, "Have you ever attempted suicide?". Analysis of the data found an overall lifetime prevalence of attempted suicide of 2.9% (174). This figure continues to be the best data on the prevalence of suicide attempts among adults in the United States.

Information on attempted suicide among high school students is available from the Youth Behavior Survey conducted by the Centers for Disease Control. The survey is administered to a representative sample of students in grades 9-12 in all 50 states, the District of Columbia, Puerto Rico, and the

Virgin Islands. Over 16,000 students were surveyed in 1997. At this time, 7.7% of the students indicated that they had attempted suicide at least once in the 12 months preceding the survey (175).

There are no national data on attempted suicide among persons under 15 years of age. Some smaller scale studies, though, do exist. For example, the prevalence of suicide attempts in children 12-14 years of age was assessed in a study of seventh and eighth grade students in a southeastern U.S. community in 1986. This study found the prevalence of suicide attempts was 1.9% (176). In Oregon, hospitals are required to report suicide attempts resulting in injury among children 17 years of age and younger. A report from the Oregon Adolescent Suicide Attempt Data System indicates a nonfatal suicide attempt rate during of 196.6 per 100,000 population in children 10-17 years of age (177). This report covers the time period from 1988 to 1993.

International Comparisons

Do suicide attempts differ in frequency around the world? Information on this question is rather limited. The best data available are those from the World Health Organization Multicentre Study on Parasuicide. This study was designed, in part, to generate epidemiological information about attempted suicide in several European communities (178). It provides comparable international data on the prevalence of attempted suicide. Attempted suicide rates ranged from a low of 45 per 100,000 population for males in Guipuzcoa, Spain to a

high of 314 per 100,000 population for males in Helsinki, Finland (Table 42). Amongst females, the rates ranged from 69 per 100,000 population in Guipuzcoa to 462 per 100,000 in Cergy-Pontoise, France. Rates were higher among women than among men, and higher in the younger age groups as compared to the older age groups. Averaged over the 16 centers, the female to male ratio of suicide attempts was 1.5 to 1.

Age, Gender, Ethnic, and Other Risk Factors for Attempted Suicide

Unlike completed suicide, attempted suicide occurs with much greater frequency among women than among men (179). An analysis of data from the Epidemiologic Catchment Area Study found that the lifetime prevalence of suicide attempts was higher in women than men: 4.2% versus 1.5% (174). Data from the 1997 Youth Risk Behavior Survey indicate that female students were significantly more likely than male students to have attempted suicide, with 11.6% of the female students reporting a suicide attempt in the previous year as compared to 4.5% of the male students (175). This gender difference was observed for all races, with the gender difference being statistically significant for white and Hispanic students.

The age patterns observed for attempted suicide also differ from those observed for completed suicide. In general, higher rates of suicide are observed in the young.

The Epidemiologic Catchment Area Study found a significantly

Table 42: Average, Age-Adjusted Rates of Attempted Suicide by Gender and Geographic Location, 1989-1992 (rate per 100,000 population)

	Males	Females
Average	136	186
Bern	115	152
Cergy-Pontoise	223	462
Emilia Romagna	53	112
Guipuzcoa	45	69
Helsinki	314	246
Innsbruck	81	107
Leiden	82	132
Odense	172	195
Oxford	251	323
Padova	61	103
Sor-Trondelag	147	191
Stockholm	153	229
Szeged	186	213
Umea	96	150
Wurzburg	66	102

Source: Schmidtke (127)

higher prevalence of suicide attempts among those 25 to 44 years of age as compared to those greater than 44 years of age. The lowest prevalence was observed amongst persons over 65 years of age (174).

Large differences in attempted suicide rates do not appear to exist between racial/ethnic groups in the United States. Initial findings from the ECA Study suggest no significant difference in lifetime prevalence of attempted suicide by race/ethnicity (174). Analysis of data from the Youth Behavior Risk Survey found that Hispanic students (10.7%) were more likely to have attempted suicide in the previous year than were Caucasian students (6.3%). Approximately 7.3% of the African American students surveyed reported an attempt of suicide for the same year (175).

Other factors thought to be linked with attempted suicide include socioeconomic status (174,178) (greater prevalence among lower SES persons); marital status (174) (divorced persons at greater risk); unemployment (174); psychiatric disorders (174,180); major depression (176,181); and previous suicide attempts (177,182,183).

A second analysis of data from the Epidemiologic Catchment Area study examined factors associated with attempted suicide over a 1-2 year period (181). Table 43 outlines the factors found to be significantly associated with attempted suicide. The odds ratio represents the risk for attempted suicide in a person with the noted characteristic relative to the risk in a person without that characteristic. For example, the estimated risk of attempted suicide for a separated or divorced person

Table 43: Risk Factors Associated with Attempted Suicide

Characteristics	Reference Category	Estimated Odds Ratio
Baseline sociodemographic and social role factors:		
Twelve or more school grades completed	0-11 years	0.25
Presently working for pay	Not working	0.31
Separated/divorced	Not separated/divorced	5.95
Drug use during period of suicide attempt:		
Heavy drinking	Absent	11.43
Alcohol abuse-dependence	Absent	15.87
Psychiatric disturbances during period of attempt:		
Major depression	Absent	15.48
Manic episode	Absent	14.5

were 5.95 times greater than that for a person not separated or divorced. Several factors were associated with suicide attempts, including marital status, unemployment, lower levels of education, psychiatric disturbances, and the consumption of alcohol at the time of the attempt (174). This analysis did not find a significant association between gender and attempted suicide.

Numerous studies of attempted suicide suggest that the mechanism or method of attempt differs from that seen in completed suicide. A review of studies on attempted suicide between 1960 and 1971 reported that poisoning was the most frequently used method, accounting for 65% to 95% of all attempts (184). Poisoning in this situation generally refers to an overdose of drugs. More recently, information from the WHO/EURO study showed that

poisoning was the most prevalent method of attempted suicide in the 16 European communities surveyed (178). Sixty-four percent of males and 80% of females chose this method. As age increased in females, poisoning decreased slightly. A report from Oregon (177) found that the ingestion of drugs accounted for 75.5% of all attempts during 1988-1993. Females chose this method more frequently than males.

The Cost of Attempted Suicide

An understanding of the nature and consequences of attempted suicide suggests that several cost items are of interest, including general medical care costs, mental health care costs, indirect costs related to lost productivity, and intangible costs related to the impact on other family members.

Presently, there are few accounts in the published literature on these items. The information that does exist generally focuses upon the health care use related to injuries and poisonings from suicide attempts.

Injuries and health care use among young people have been evaluated in several studies and reports. Data from the 1997 Youth Risk Behavior Survey indicated that 2.6% of the students surveyed reported having made a suicide attempt during the previous year that resulted in an injury, poisoning, or overdose that had to be treated by a doctor or nurse (175). A study looking at attempted suicide in college students assessed the prevalence of injury or illness, medical care use, and hospital admissions as a result of attempted suicide. Of the 72 students reporting ever attempting suicide (out of 694 survey respondents), 32 suffered an injury

or illness as a result of an attempt, 18 sought medical care as a result of the attempt, and 7 were admitted to a hospital (185).

Another study evaluated the characteristics and clinical outcomes of self-inflicted pediatric injuries in children under 15 years of age admitted to trauma centers. The average length of hospital stay for these patients was 10.6 days. Over half of the patients who were alive at discharge had an impairment in communication, cognition, or self care functions (186).

Estimates of the medical costs related to attempted suicide were published in two reports that followed victims admitted to regional trauma centers (55,56). In a study by Luna, et al., a total of 44 admissions for trauma as a result of suicide were noted (55). Thirteen individuals died as a consequence of the injuries they sustained. The average length of stay for those attempting suicide and discharged alive was 17.5 days. The related average hospital charge was \$17,197. Sixteen of the 26 persons surviving their suicide attempt were discharged to other services or facilities.

In the second study, Robicsek, et al., 362 cases of attempted suicide were observed (56). Two-hundred fifty-six persons were treated and released from the emergency department of the facility and accrued charges of \$68,518 (or \$268 per visit). The remaining cases (n=119) were hospitalized and accrued charges of \$1,028,610 (or \$8644 per visit).

Attempted Suicide in Pennsylvania

Identifying the frequency and costs of attempted suicide in Pennsylvania is an elusive task. There are no regular surveillance systems specifically focused on these events in the state. In most situations, suicide-related data do not distinguish between completed and attempted events.

We examined information from three primary sources to identify the use of health care services for suicide attempts. These sources included the Pennsylvania Emergency Medical Services data, the Pennsylvania Health Care Cost Containment Council (HC4) data, and the Pennsylvania Trauma Systems Foundation (PTSF) data. They provide a description of the events that were identified to the respective health care providers in 1994. It is likely that these data do not account for all of the suicide attempts in the state.

Incidence/Prevalence

There are no estimates of the incidence or prevalence of attempted suicide in Pennsylvania. The only population-based information available is from the Youth Risk Behavior Survey carried out in Philadelphia as part of the school-based study described earlier. Analysis of this data for 1997 indicates that 10.5% of students in grades 9-12 reported having attempted suicide at least once in the year prior to the survey (175). This figure was higher than that observed nationally. A larger proportion of females (13.7%) than males (7.2%) attempted suicide. Suicide attempts that resulted in an injury or poisoning

and were treated by a doctor or nurse were reported by 3.4% of the students surveyed in Philadelphia (175).

Health Care Use

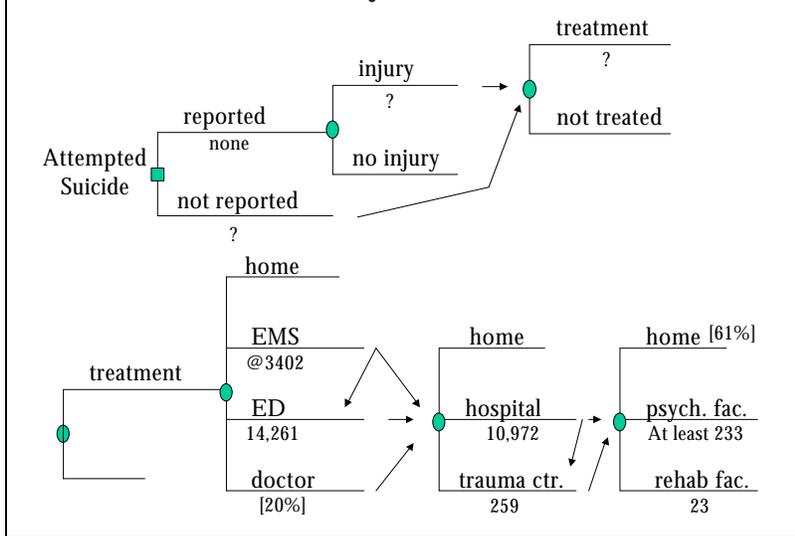
Figure 65 illustrates what is currently known about the use of health care services by those attempting suicide in Pennsylvania. Presently, there are no available statistics on the number of suicide attempts in the state, the proportion of these events that result in injury or poisoning, and the proportion which require medical intervention.

More information is available to characterize the use of health care services. We examined statistics from the Department of Health to identify emergency medical services and emergency department visits related to suicide. It was not possible, though, to distinguish successful and unsuccessful attempts with certainty from these sources. Better information was available to characterize the use of inpatient facilities and trauma centers, as well as the services used prior to and after these inpatient admissions. Attempted suicides in both the PTSF and HC4 data systems were defined as visits with suicide codes (E950-959) that listed a discharge status indicating the survival of the patient.

Emergency Medical Services

Statistics on the number of ambulance trip runs in the state are available through the Department of Health and their Emergency Medical Services (EMS) division. This group collects a variety of information on all ambulance runs

Figure 65: Health Care Use and Attempted Suicide, Pennsylvania, 1994



for assessing the quality of patient care, assuring that licensing requirements are met, and for research (187). We examined the reports where EMS personnel indicated that "self-infliction" was a contributing factor in the trip, and where the patient was alive. In 1994, 3402 trips met this criteria. Eighty percent of these cases were transported to a medical facility. Also, of note, was that 40% (n=1378) of the trips listed the suspected illness as either poisoning/overdose or a behavioral condition. Forty-percent of the patients were women. The average age for the patients was 34 years.

Emergency Department Visits

In general, there is limited direct evidence on the frequency of emergency department (ED) visits due to attempted suicides. The Department of Health has information to indicate that there were 4,917,550 ED visits from all causes in the state in 1994. The National Hospital Ambulatory Medical Care Survey indicates that

0.29% of all emergency department visits in the country were related to suicide and self-inflicted injury (24). By applying the data from both sources, there were an estimated 14,261 ED visits in the state related to suicide. This figure, though, assumes that the use of EDs in the state will be similar to that for the United States as a whole. The US data also do not distinguish between attempted and completed events.

Hospital Admissions

Inpatient hospital stays for attempted suicides represent a significant burden to the state of Pennsylvania. In 1994, the Health Care Cost Containment Council data indicate 10,972 hospital admissions related to attempted

suicide. These stays account for nearly 60% of all violence-related admissions in the state. Around 75% of attempted suicide cases were admitted to the hospital through emergency department facilities, while a physician referred another 20% to the hospital. Only 259 cases of attempted suicide were identified in the trauma center registry (PTSF).

Table 44 details the demographic characteristics of persons with hospital admissions related to attempted suicide. The majority of hospital admissions in both the HC4 and PTSF databases are among persons 15-44 years of age, and Caucasians. There was a striking difference in the gender distribution of patients in the two databases. Hospital admissions reported by the PTSF were

Table 44: Demographic Characteristics of Hospital Admissions Related to Attempted Suicide, 1994

	HC4	PTSF
TOTAL	10,972	259
Age Group		
0-14 years	4.7%	1.5%
15-24 years	24.5%	17.4%
25-34 years	25.0%	30.9%
35-44 years	20.5%	25.1%
45-54 years	9.7%	11.2%
55-64 years	4.8%	6.6%
65+ years	10.8%	7.3%
Gender		
Female	58.2%	26.3%
Male	41.8%	73.7%
Race		
African-American	14.0%	18.8%
Caucasian	81.2%	78.0%
Other	4.7%	2.0%
Payor Source		
Self-Pay	5.3%	15.2%
Commercial insurer	39.9%	39.9%
Government plan	54.7%	44.9%

predominantly male (73.7%), while almost 60% of the admissions in the HC4 data were female. The high proportion of male patients reported by the PTSF likely reflects a greater injury severity resulting from suicide attempts among males and could be related to differences between the sexes in method of suicide attempt. While less than 1% of hospital admissions for attempted suicide in the HC4 database were firearm-related, 29% of such admissions in the PTSF registry were firearm-related. Males have been observed to use firearms to attempt and commit suicide more frequently than females (33,155,163,165).

Poisoning is the method of attempted suicide most frequently used in Pennsylvania. This finding is consistent with the information available from other studies in the United States. Data from the health care cost containment council show that an overdose of drugs accounted for 86% of the attempts admitted to hospitals in Pennsylvania (**Figure 66**).

The majority of hospital admissions for attempted suicide were paid for through government insurance programs. **Figure 67** details the insurance payor listed for the HC4 hospital admissions related to attempted suicides. Expenses in almost one-half of the admissions were paid for by either Medicare or Medicaid, with the state Medicaid program paying for 32% of the admissions.

The distribution of the length of stay associated with hospital admissions related to attempted suicide was somewhat skewed from that seen for other acts of violence. Generally, patients had longer stays for attempted suicides.

Figure 66: Method of Suicide Attempt in Hospital Admissions, Pennsylvania, 1994

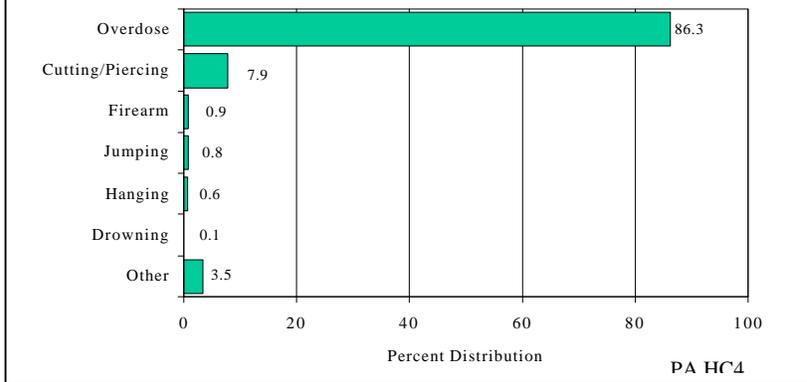


Figure 67: Payment Source for Hospital Admissions from Attempted Suicide, Pennsylvania, 1994

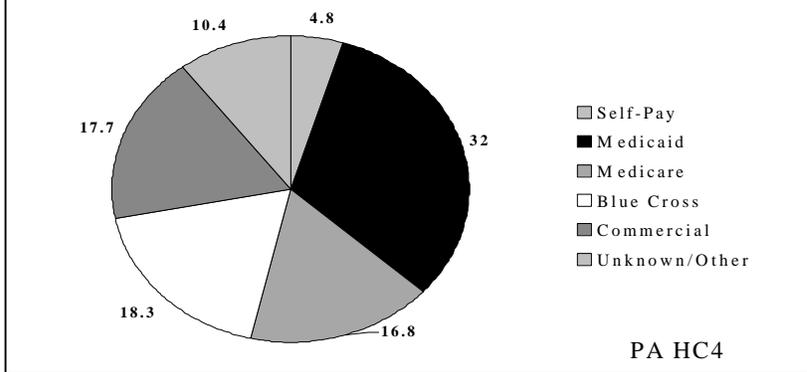
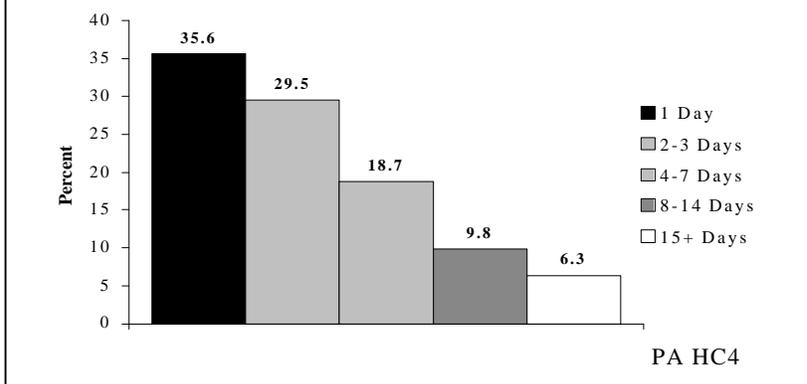


Figure 68: Length of Stay in Attempted Suicide Admissions, Pennsylvania, 1994



In the HC4 data, the average length of stay was 4.8 days. Several of the admissions listed in this data source (n=223) were long-term stays in psychiatric

facilities for care subsequent to a suicide attempt. Still, a large number of patients, 35.6%, were discharged within one day (**Figure 68**). Pennsylvania Trauma System

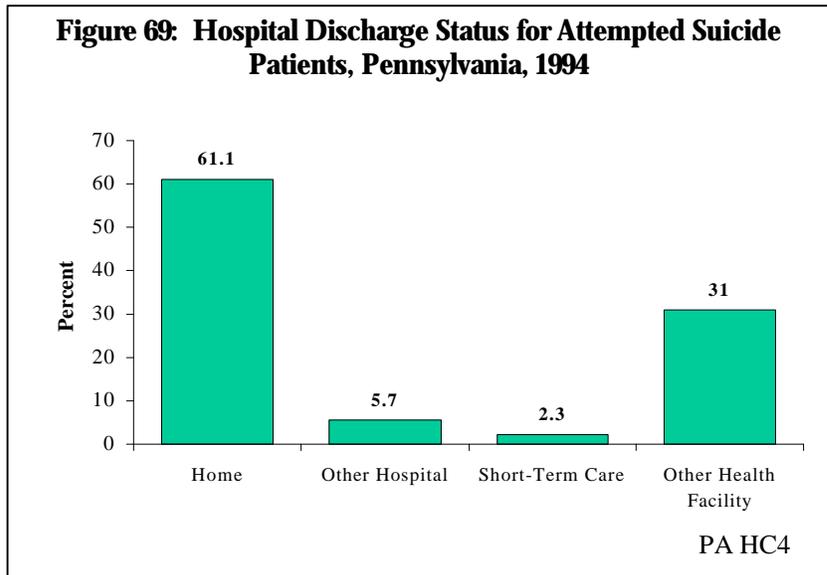
Foundation data indicate that hospitalized patients spent an average of 12.8 days overall in a trauma center, and 2.9 days in an intensive care unit.

Potential Long-Term Impact of Attempted Suicide

In general, the long-term impact of injuries and poisonings from attempted suicide is not clear. The length of stay data, though, suggest that this impact could be quite sizable. According to information from the HC4 database, large percentages of patients (39%) were not discharged from the hospital to their homes, but instead were sent to another health care facility (Figure 69). It is probable that most of these facilities were psychiatric units, rather than rehabilitation centers. Only 10 admissions to rehabilitation centers were indicated in the HC4 data, with 23 being reported in the PTSF registry. Forty-four subjects in the PTSF data set had indications for a traumatic brain injury. Nearly all of these patients are likely to require further treatment beyond initial hospitalization.

psychiatric care visits was \$8309. This figure is very similar to that reported by Robicsek (56). However, charge data usually overstate the likely costs related to a visit. By applying cost-to-charge ratio data for each institution, we estimated that the costs related to these admissions were \$36,591,584, or \$3335 per visit. Total health care charges for the 10 patients admitted to rehabilitation centers were \$919,569, with an estimated cost of \$574,083.

Figure 69: Hospital Discharge Status for Attempted Suicide Patients, Pennsylvania, 1994



Health Care Costs Related to Attempted Suicide

The only information available regarding the health care costs related to attempted suicide in Pennsylvania is that included in the HC4 data system. In 1994, total health care charges for the 10,972 hospital admissions related to attempted suicide were \$91,171,195. The average charge per admission for these acute and

Overall, the average charge for a hospital admission related to attempted suicide in 1994 was \$8386. The average estimated costs per admission was \$3384.

Firearm Related Violence in Pennsylvania

The category of violence that receives the greatest attention in the United States is firearm-related violence. Deaths from gunshot wounds have been a concern for a number of years. In 1994, injuries from firearms were the ninth leading cause of death in the United States and the fourth leading cause of years of potential life lost before age 65 (188). By the year 2003, it has been predicted that firearm-related deaths will exceed motor-vehicle-related deaths to become the leading cause of injury death in the United States (189).

Firearm-related injuries may arise from a variety of events, including homicides, suicides, accidental shootings, gunshot wounds from police intervention, and events of an undetermined origin. Most reports on firearm violence, though, generally focus on homicides and suicides (for fatal events) or assaults and attempted suicides (for nonfatal events). These reports also generally define firearms as guns that involve a powder charge. This definition excludes BB guns, pellet guns, and air guns²³. The sections below outline our understanding of the impact of firearm-related violence in the United States and Pennsylvania.

²³ The terms, "guns" and "firearms" will be used interchangeably in this section. Except where noted, a reference to guns will assume a weapon involving a powder charge.

Issues in the Epidemiology of Firearm-Related Injuries

Catastrophic events, such as the Columbine High School shootings, highlight the potential severe outcomes of firearm violence. These types of disasters are rare, but they have led to significant changes in public opinion and the introduction of several legislative initiatives. This phenomenon is a bit ironic, because the evidence outlining the impact of gun violence has been known for several years.

Our best understanding of the impact of violence in the United States pertains to homicide and suicide incidents involving firearms. Vital statistics programs in each of the individual states remain the main source of information on deaths from firearm injuries. These programs maintain death certificate registries. Firearm deaths are identified on death certificates through the use of External Cause of Injury Codes. The firearm deaths of interest to this report include those related to criminal violence (homicide; E965.0-E965.4), and self-inflicted violence (suicide; E955.0-E955.4).

Overall, a significant number of firearm-related deaths occur in the United States each year. In 1996, there were a total of 34,040 firearm-related deaths recorded in the United States from all causes (33). Of these deaths, 32,203 were related to violence. Further, the largest proportion of firearm violence deaths is from suicide rather than homicide. In 1996, there were 14,037 homicides and 18,166 suicides involving firearms.

When considering the population of the United States in 1996, these numbers translate to an overall age-adjusted death rate of 12.2 firearm-related deaths from violence per 100,000 population. The age-adjusted mortality rate for homicides involving firearms was 5.91 deaths per 100,000 population. The age-adjusted rate for firearm-related suicide was 6.29 deaths per 100,000 population.

Gun involvement appears to be one of the primary factors associated with deaths from violence in the United States. In 1996, firearm use was noted in 68% of all homicides recorded and 59% of all suicides (33).

The lethal nature of firearms is further highlighted in several studies investigating factors related to successful suicide attempts. In one report using emergency department records, Annet and colleagues (190) found that 78% of the suicide attempts involving firearms were fatal. A similar degree of lethality was observed amongst teenagers attempting suicide in Oregon (177). Another study by Kellerman, et.al. (191) noted that over 90% of firearm-related suicide attempts are fatal.

The degree of lethality associated with firearms used in criminal violence appears to be much lower. In general, nonfatal firearm injuries from assaults outnumber firearm homicides. Annet, et. al. (190) estimate that there are 3.3 firearm-related injuries from assault for every one homicide involving a firearm. An analysis by Max and Rice (192) suggests that there are 5.4 nonfatal firearm injuries for every fatal firearm injury.

Non-Fatal Firearm Events

The frequency of non-fatal firearm events related to crime in the United States is regularly monitored by the Uniform Crime Reporting (UCR) program and the National Crime Victimization Survey (NCVS). Each monitoring system provides a different estimate regarding the significance of the problem. The UCR program focuses upon crimes reported to the police. The NCVS considers nonfatal crimes that are reported to the police, as well as those that are not reported.

In 1997, the UCR program noted that there were more than 200,000 aggravated assaults in the United States involving a firearm. Another 200,000 robberies involved a firearm (193). Information on the number of injuries arising from these crimes was not available.

Estimates from the NCVS show that close to 1.3 million or 29% of surveyed, nonfatal violent crimes in 1994 involved the use of a firearm (194). Differences in the use of firearms were noted by crime category. For example, 6% (n=25,980) of the rapes/sexual assaults, 31% (n=402,690) of the robberies, and 35% (n=867,300) of the aggravated assaults noted involved the use of a firearm (8). The proportion of these firearm-related crimes that resulted in injury was not provided. However, an analysis of NCVS data for 1987-1992 found that 17% of victims of nonfatal firearm-related crimes were injured. Of those injured in gun crimes, 3% suffered gunshot wounds. Most of the injuries recorded (61%) were minor in nature (194).

Trends in Firearm-Related Injuries

Firearm violence deaths in the United States have changed substantially over time, but now appear to be relatively stable; hovering between 12-14 deaths per 100,000 population. Available statistics from 1930 to the present indicate that both firearm homicide and suicide rates were at their highest points in the 1930s (about 13 deaths per 100,000 population). Thereafter, these rates declined substantially during the Second World War and remained low (8 deaths per 100,000) until the early 1960s. Firearm homicide and suicide rates nearly doubled from the early 1960s to the early 1980s (35).

More recent trends in firearm-related mortality are illustrated in **Figure 70**. Age-adjusted mortality rates for firearm-related homicide and suicide are presented separately as well as combined. Over this time period, firearm suicide mortality rates were relatively stable, whereas firearm homicide rates dropped slightly in

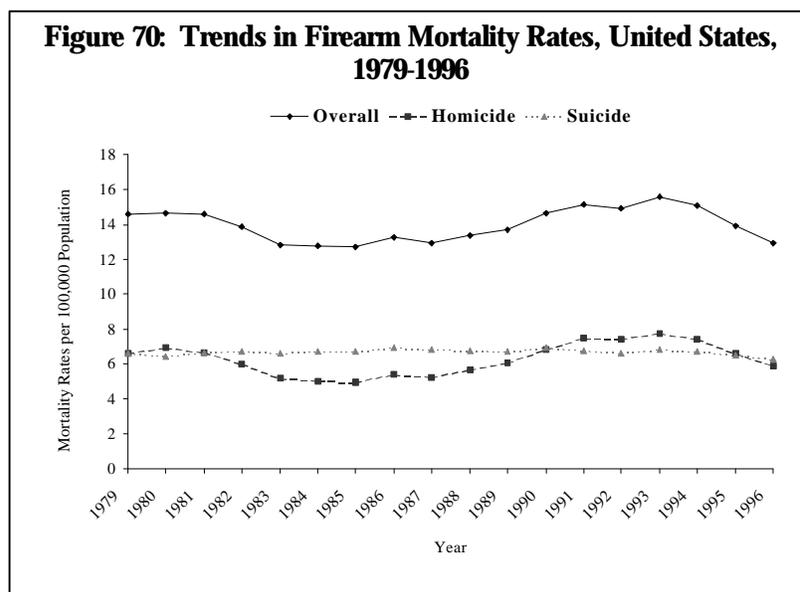
the early to mid-1980s, increased in the late 1980s, and began to decrease again around 1994 (33).

A study analyzing data from the NEISS and the National Vital Statistics System describes recent trends (June 1992 through May 1995) in fatal and nonfatal firearm-related injuries in the U.S. This study found that the rate of firearm-related assaultive/legal intervention injury and death peaked in 1993 and declined thereafter (195).

Reasons for the fluctuation in firearm deaths are widely debated. Population demographics, the number of guns, illegal drug markets, Hollywood films, and gun control initiatives, have all been suggested as factors in the rise and decline in the observed rates. Exact answers to this question are not yet known.

International Comparisons

How do the rates of firearm-related injuries in the United States compare to those in other countries? Although there are no



reports comparing nonfatal firearm injuries, there are several that examine fatal events. All suggest extremely high rates for the United States.

In a recent report from the International Collaborative Effort (ICE) on Injury Statistics, a striking difference was observed between firearm mortality rates in the U.S. and 10 other countries (36). The death rate from all firearm-related injuries in the U.S. (about 14 deaths per 100,000 population) was more than twice the rate of any other country. This difference between the U.S. and the other countries was most evident when examining homicides involving firearms. Rates in the U.S. were substantially higher (5.9 deaths per 100,000 population) than in the other countries (0.1 to 0.7 deaths per 100,000). Firearm suicide rates in the U.S. (7 deaths per 100,000 population) were also higher than in other areas (range: 0.3 to 5.1 deaths per 100,000), although the difference here was not as pronounced (36).

Another report compared the firearm-related mortality of the U.S. and 35 other countries (196). This report examined vital statistics system data from 26 high-income and 10 upper-middle-income countries. The overall age-adjusted firearm mortality rate for the U.S. exceeded all other high and upper-middle income countries. **Figure 71** highlights the range of overall age-adjusted firearm mortality rates among high-income countries. The firearm mortality rate for the U.S. was more than double that of the country with the next highest rate, Northern Ireland.

Firearm homicide rates ranged from none in Mauritius to 10.35 deaths per 100,000 population in Mexico. At 7.11 deaths per 100,000 population, the U.S. firearm homicide rate lies in the upper end of this range and was the highest among high-income countries. The U.S. also had the highest firearm suicide rate (6.30 deaths per 100,000 population) among all countries (196).

Similar patterns of homicide and suicide mortality involving firearms were observed in a study focused on children under 15 years of age (3). The firearm homicide and suicide rates in the U.S. were 10-16 times higher than that observed in 25 other industrialized countries (3).

Age, Gender, Ethnic, and SES Differences

Injury deaths from firearm use are found in all gender, race and age groups, but appear with greater frequency in males, young adults,

and African-Americans. Young African-American males appear to be at greatest risk (197).

Firearm homicide is the most common cause of death among African-American males 15 to 24 years of age (198). While African-Americans males make up 7% of the U.S. population aged 15-24 years, they account for nearly 60% of all gun-related homicides in this age group (199).

Figure 72 illustrates the difference in firearm homicide rates between white and African-American males. Overall, firearm homicide rates are markedly higher for African-American males, and reached a peak rate of 57.1 deaths per 100,000 population in 1993. This figure has subsequently declined. Age-adjusted firearm homicide rates in 1996 were 42.18 deaths per 100,000 population for African American males and 4.93 deaths per 100,000 population for white males (33).

Figure 71: International Comparison of Firearm Mortality Rates

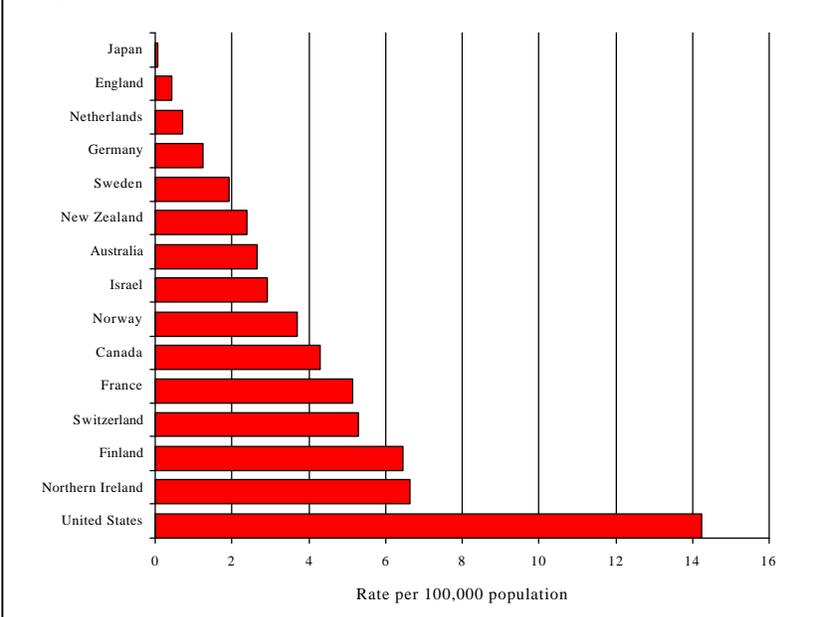


Figure 72: Age-Adjusted Firearm Homicide Rates by Race, United States, 1979-1996

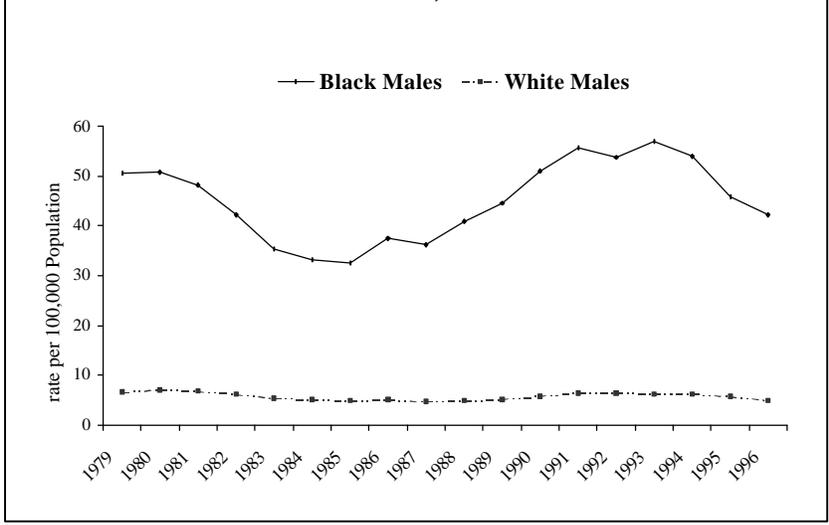


Figure 73: Firearm Homicide Deaths by Age Group, United States, 1994

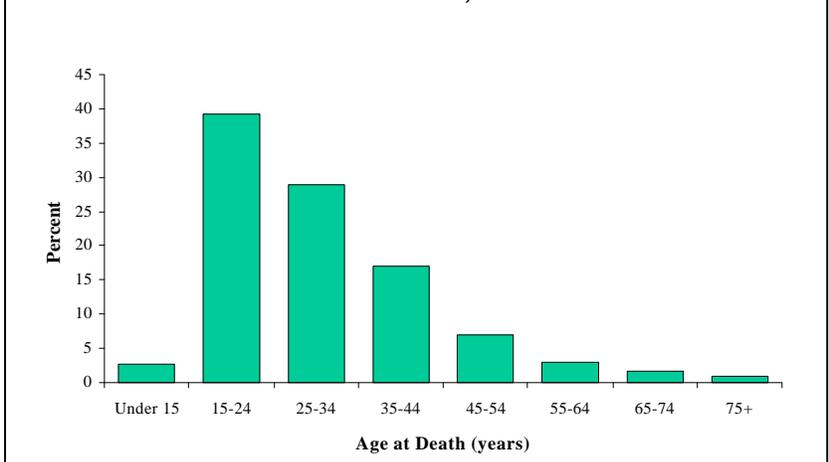
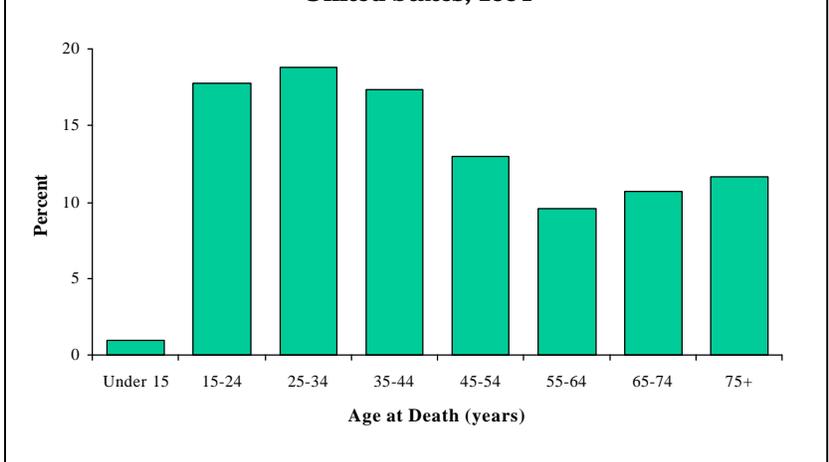


Figure 74: Firearm Suicide Deaths by Age Group, United States, 1994



Firearm-related deaths from violence occur most frequently among the young. In 1994, roughly 40% of all homicides involving a firearm occurred among persons 15-24 years of age; almost 70% occurred among persons 15-34 years of age (**Figure 73**) (33). That same year, almost 90% of homicide victims 15-19 years of age were killed with a firearm (200,201).

Although the largest proportion of firearm suicides is observed among persons less than 45 years of age, the age difference for suicides is not as pronounced as that for homicides. Close to 40% of all firearm suicides are among persons 15-34 years of age (**Figure 74**) (33). Nearly 20% of the suicide events, though, were among persons 65 years of age or older. Most deaths (90%) involving firearms in this older age group are suicides (30).

The young, males, and African Americans are also more frequently the victims of nonfatal firearm injury from crime. **Table 45** compares the demographic characteristics of fatal and nonfatal firearm crime victims. Nearly half of nonfatal firearm crimes occur to persons between 15 and 24 years of age (30,190).

Several studies have reported an increased risk of firearm homicide (202) and suicide (191,203) in homes where guns are present. It has been estimated that 44 million Americans own nearly 200 million guns (204). The Youth Risk Behavior Survey (YRBS) reported that in 1997, 5.9% of high school students had carried a gun at least one day during the month preceding the survey (175).

Table 45: Demographic Characteristics of Fatal and Nonfatal Firearm-Related Injury Victims, United States, 1992-93

Characteristics	Fatal	Nonfatal
Male	86.0 %	87.0 %
White	69.1 %	30.7 %
African American	28.9 %	48.1 %
Hispanic	—	11.2 %
0-14 years old	2.4 %	4.0 %
15-24 years old	27.8 %	43.8 %
25-34 years old	24.0 %	27.7 %
35-44 years old	16.5 %	15.7 %
45+ years old	29.3 %	8.8 %

Source: 1992 Vital Statistics, CDC Emergency Department Firearms Injury Surveillance Study (30,190,205)

Health Care and the Cost of Firearm Injuries

Health Care Use

Information on the injuries arising from firearm violence and the associated use of health care resources is available from selected medical databases and surveys. Most studies on the issue focus either on visits to emergency departments (ED) or hospital admissions. Nearly all of the reports emphasize injuries from criminal violence, and often exclude self-directed violence (i.e., suicide).

National estimates for the number and characteristics of nonfatal firearm-related injuries treated in emergency departments are available from several sources. These include the National Electronic Injury Surveillance System (NEISS), the Study of Injured Victims of Violence, and the National Hospital Ambulatory Medical Care Survey.

Annest, et. al. (190) examined NEISS data from June 1992 to May 1993 to identify cases of firearm-related injury. NEISS data are collected from a random sample of 91 hospital emergency departments in the U.S. Medical records are routinely examined in these institutions to identify product-related injuries. In June 1992, firearms (defined as a weapon using a powder charge to fire) were included in this surveillance system.

Overall, the authors estimated that 99,025 persons were treated in this time frame in an emergency department for nonfatal firearm-related injuries. This represents a rate of 38.6 persons with firearm-related injuries per 100,000 population. Approximately 58% of the persons injured were victims of assault, 20% were victims of unintentional shootings, and 5% were suicide attempts. The intent underlying the remaining cases could not be determined (190).

The Study of Injured Victims of Violence (SIVV) has recently been conducted as a supplement

to the NEISS in 31 hospital emergency departments. Overall, the SIVV estimated that 1,417,500 persons with nonfatal crime-related injuries were seen in hospital emergency departments in 1994. Firearms were used in 60,900 of these cases, BB/pellet guns in 9,400 cases, and 15,300 cases involved the victim being hit with a gun (53).

Another source of information about firearm-related injuries is the National Hospital Ambulatory Medical Care Survey (NHAMCS). In the NHAMCS, information is collected from a representative sample of emergency departments and outpatient clinics in non-Federal, short-stay hospitals in the U.S. In 1992, firearms were the cause of injury for approximately 112,000 visits to emergency departments. This represents a rate of 40 firearm injury visits per 100,000 population. The 112,000 visits consisted of both intentional and unintentional firearm injuries, and those of unknown origin. Both fatal and nonfatal injuries were included (52).

Available evidence suggests that most persons treated in emergency departments for gunshot wounds are subsequently admitted to the hospital for further care. Data from the SIVV, for example, indicate that 60% of gunshot wound victims treated in the ED were admitted to the hospital (53). An analysis of NCVS data for 1987-1992 found that more than half of gunshot wound victims were hospitalized. Most were in the hospital for less than one-week (194). Annest and colleagues estimate that 57% of the victims of nonfatal firearm injury from violence were hospitalized after being treated in the emergency

department (190). About 60% were brought to the ED by emergency medical services, ambulances, or rescue squads (190).

Economic Cost

There are, in general, relatively few assessments of the economic costs of violence. Most of the existing reports, though, have considered the impact related to firearms. These reports are reviewed, in brief, in the following section.

Reports on the cost of firearm violence can be grouped into two categories; those focusing on costs from a nationwide perspective, and those focusing on the costs identified within a single hospital institution or community. The majority of the published studies have taken the latter perspective.

Table 46 highlights the key findings from three reports identifying the impact of firearm violence in the United States. The most frequently cited report is that written by Max and Rice (192). They estimated that the costs of firearm related injuries in the United States in 1990 were \$20.4

billion. This estimate included \$1.4 billion in direct health care and related costs, \$1.6 billion in lost productivity from injury-related morbidity, and \$17.4 billion in lost productivity from premature death. The average cost, including both direct and indirect costs, for one person hospitalized for firearm injuries was \$33,000.

Miller and Cohen's estimate of the cost of gunshot wounds examined costs by category of intent. They estimated that the total costs of gunshot wounds in 1992 was \$126 billion (1993 dollars) or \$736,000 per victim. This includes costs associated with medical care, public services, work-loss, and lost quality of life. Assaults/homicides were estimated to cost \$70 billion, of which \$2 billion were medical costs. Costs associated with suicide/attempted suicide were \$47 billion in total costs and \$0.6 billion in medical costs. Per patient, suicide related gunshot wounds were the most expensive; the cost per case for suicide/attempted suicide was \$1,910,000 as compared to \$702,000 per case for assaults/homicides (206).

A recent report by Cook and colleagues (207) outlined only the medical costs associated with gunshot injuries. The authors estimated that the total lifetime medical cost of gunshot wounds in 1994 was \$2.3 billion. The average cost per injury was close to \$17,000. Firearm injuries due to assaults accounted for 74% of the total cost estimated. Roughly one-half (49%) of the medical costs accrued were paid for from public insurance sources.

Cost estimates at the state and local levels are detailed in **Table 47**. These cost estimates provide a sense of the scope of the economic burden of firearm-related injuries. The studies, however, were conducted over several years. Each employed different methods to define firearm-related visits and to estimate costs. Thus, the cost estimates are not directly comparable.

Two studies evaluated costs associated with firearm injuries resulting from assaults/homicides (212,215), whereas the rest included all categories of intent. Of note, the studies consistently found that public funds (Medicare, Medicaid, other government

Table 46: National Estimates of the Cost of Firearm Violence

Study	Year	Direct Costs (\$ billions)	Indirect Costs (\$ billions)	Other Costs (\$ billions)	Total Costs (\$ billions)
Max and Rice (192)	1985	0.9	13.5	-	14.4
	1990 (update)	1.4	19.0	-	20.4
Miller and Cohen (206)	1992	3.1	37.4	85.8 (quality of life)	126.3
Cook, et. al. (207)	1994	2.3	-	-	-

Table 47: Local and Institution-based Estimates of the Cost of Firearm Violence

Study	Year	Number of Cases	Length of Stay	Average Charge per Case
Ordog, et. al. (29)	1978-92	34,893 ED visits	-	\$944
		13,608 hospital admissions	11.5 days	\$17,688
		3,031 readmissions	8.6 days	\$5200
Martin, et. al. (30)	1984	131 hospital admissions	6.2 days	\$6,915
Wintemute & Wright (31)	1984-85	250 hospital admissions	8.2 days	\$13,190
		31 readmissions	4.7 days	\$ 6,310
				\$14,982 (all events)
Mock, et. al. (32)	1986-92	1,116 hospital admissions	8.2 days	\$14,541 (hospital) \$4,233 (physician)
Ryan, et. al. (33)	1988-89	107 hospital admissions	9.4 days	\$14,931
Payne, et. al. (34)	1989-90	686 hospital admissions	6.8 days	\$7,932
Kizer, et. al. (35)	1990-92	750 hospital admissions	6.5 days	\$52,271 (charge) \$13,794 (cost)
Tellez, et. al. (36)	1991-93	243 hospital admissions	5 ± 8 days	\$9,536 (cost)

funds, and bad debt written off by the hospitals) accounted for 76-98% of hospital charges for firearm injuries (208-213).

Most of the studies listed in **Table 47** discuss the costs associated with the acute hospitalization of firearm injury victims. Two studies, though, have attempted to estimate costs over a longer time frame. In the first study, Wintemute and Wright (210) estimated the long-term hospital charges associated with firearm injuries for persons initially hospitalized at a California medical center from January 1984 through June 1985. These cases were subsequently followed through June 1989 by medical record review. Of the 250 persons initially hospitalized with firearm injuries, 31 (12.4%) had further admissions (71 in total). Taking into account all initial and subsequent hospitalizations, the average cost per hospitalization was \$14,982. The average cost of initial hospitalization was \$13,190, and the median cost was \$5,996.

On average, subsequent hospitalizations were less costly at \$6,310 per hospitalization.

Ordog and colleagues (208) reviewed the medical records of all patients treated at a Los Angeles County trauma center from January 1978 through December 1992. This study investigated costs for all patients treated for firearm injuries treated in the ED, whereas the Wintemute study only included patients that were admitted to the hospital. Of the 34,893 persons initially treated, 1,745 (5%) were either dead on arrival or died in the ED, 13,608 (39%) were hospitalized, and 3,031 were rehospitalized. The study suggests that the average cost for initial hospitalization (per patient) was \$17,688. Subsequent admissions averaged \$5200 per person.

As is common in health care cost studies, almost all of the studies in **Table 47** either used hospital charges as a proxy for costs or derived a cost estimate

from hospital charges. Because of cost shifting and pricing practices within institutions, charges often do not reflect actual costs for health care resources used. The study by Kizer and colleagues (214) was unique in that it was one of the few to estimate the actual cost of inpatient medical care for firearm-related injuries.

In this report, eligible cases were identified from a medical record review of all patients with firearm injuries admitted to a California hospital from 1990-92. Researchers were able to link the medical and financial records for 750 (95%) of the 787 patients admitted for firearm-related injuries. The average hospital charge per admission was \$52,271: 3.8 times the estimated average cost of \$13,794. While the hospital lost an average of \$6,980 for each uninsured patient, it gained \$28,557 for each patient covered by a health maintenance organization or other managed care plan, and \$13,621 for each patient privately insured or

receiving worker's compensation. Uninsured patients accounted for 66% of the admissions (214).

Firearm Injuries in Pennsylvania

To examine the characteristics of firearm injuries in Pennsylvania, we identified information from the Pennsylvania vital statistics program, the Pennsylvania UCR program, the Health Care Cost Containment Council (HC4), and the Pennsylvania Trauma Systems Foundation (PTSF), and the Pennsylvania Emergency Medical Services group. These sources provided information about the number of incident events in 1994, EMS transports, and the number of hospital admissions associated with firearm injuries. Information on the use of other types of health care services was not readily available.

Incidence

Estimates for the number of deaths associated with firearms are available from both UCR and death certificate information. For 1994, information in the U.S. mortality database indicates that 498 firearm homicide deaths and 757 firearm suicide deaths were reported for Pennsylvania (173). The age-adjusted firearm homicide rate in Pennsylvania was 4.7 deaths per 100,000 population. For firearm suicide deaths, this rate was 5.8 per 100,000-population (173). These figures are slightly lower than that reported nationally.

Data from the UCR program indicate that firearms were used in 431 homicides in 1994 (7). This

translates to a rate of 3.6 firearm homicides per 100,000 population.

As observed nationally, the majority of homicides and suicides in Pennsylvania involve a firearm. In 1994, about sixty-seven percent of all homicides and 57% of all suicides were firearm-related (42).

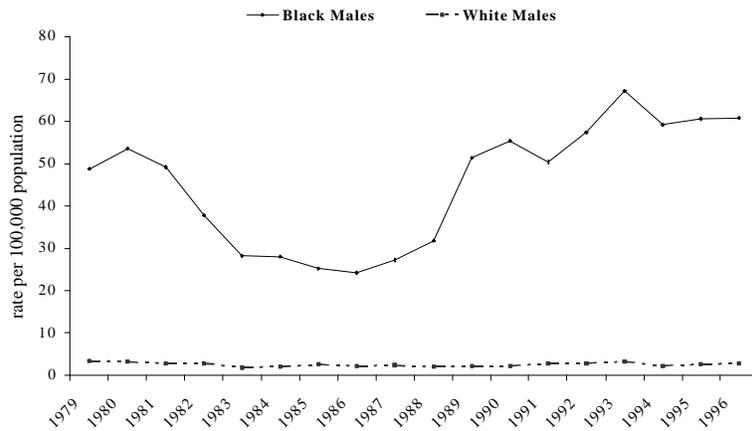
Table 48 outlines the age, gender, and race characteristics of firearm homicide and suicide victims in Pennsylvania. Several clear patterns are notable. Firearm deaths in Pennsylvania occur most frequently among males and the young. In 1994, almost 70% of the firearm homicides were among persons under 35 years of age. Distinct racial differences were also apparent. While firearm suicides occurred most frequently among Caucasians, the majority of firearm homicides were among African Americans.

Figure 75 illustrates the difference in firearm homicide rates between African American and Caucasian males in Pennsylvania (173). Over time, firearm homicide rates have been markedly higher for African-American males than for Caucasians. The differences observed (rates between 15-30 times higher in the African American male population) are very different from the national data, and suggest that an epidemic of firearm homicide violence exists amongst African-American males in Pennsylvania. Trends in firearm homicide rates also differ by race. In the past two decades, firearm-related homicides have remained stable among Caucasian males. Rates among African-American males, though, have changed more abruptly. A general decline in mortality was seen for a period of time in the early 1980s. Then, a substantial increase was observed,

Table 48: Demographic Characteristics of Victims of Firearm Homicide and Suicide in Pennsylvania, 1994

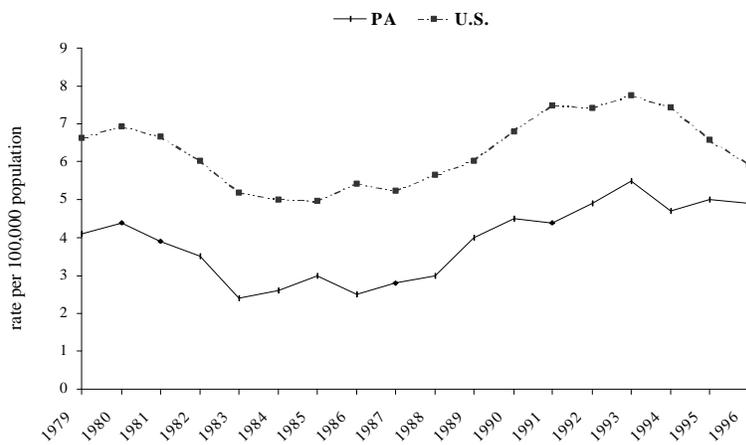
	Homicide & Suicide	Homicide	Suicide
TOTAL	1,255	498	757
Age Groups			
0-14 years	1.4%	2.8%	0.5%
15-24 years	25.7%	38.2%	17.6%
25-34 years	22.9%	28.5%	19.2%
35-44 years	18.4%	18.5%	18.4%
45-54 years	8.9%	5.6%	11.1%
55-64 years	7.4%	3.0%	10.3%
65-74 years	8.3%	2.4%	12.2%
75+ years	6.9%	1.0%	10.8%
Gender			
Female	12.2%	16.1%	9.6%
Male	87.8%	83.9%	90.4%
Race			
African American	31.7%	68.7%	7.4%
Caucasian	67.1%	29.3%	91.9%
Other	1.2%	2.0%	0.7%

Figure 75: Age-Adjusted Firearm Homicide Rates by Race, Pennsylvania, 1979-1996



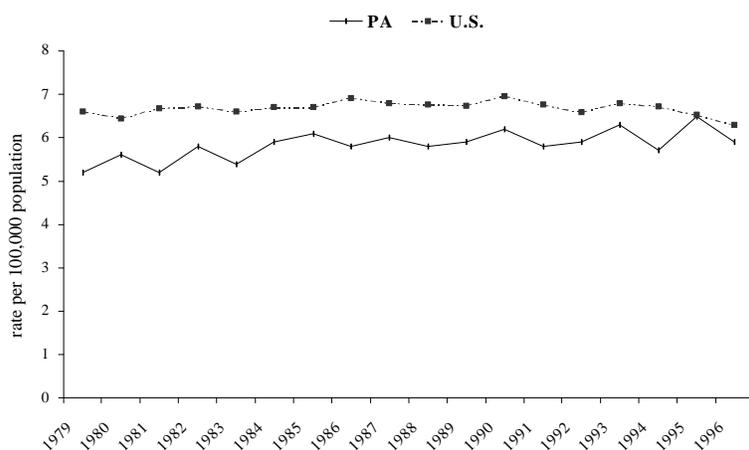
starting in 1988 and reaching a peak rate of 67.2 deaths per 100,000 population in 1993. The current firearm homicide rate remains quite high (1996; 60.2 deaths per 100,000 population).

Figure 76: Age-Adjusted Firearm Homicide Rates, Pennsylvania and the United States, 1979-1996



Figures 76 and 77 illustrate the overall relationship between firearm homicide and suicide rates in Pennsylvania and the United States. In contrast to the data regarding homicides in African-American males, the firearm homicide rates in Pennsylvania are generally lower than those observed for the U.S. In recent years, however, these rates have come closer together because of a significant decline in the U.S. rate and the lack of change in the Pennsylvania rate. Firearm-related suicide rates in Pennsylvania have also been consistently lower than the U.S. rates. The relative difference between the two areas, though, is smaller than that observed for homicides (33,173).

Figure 77: Age-Adjusted Firearm Suicide Rates, Pennsylvania and the United States, 1979-1996



Information on the frequency and characteristics of nonfatal firearm injuries in Pennsylvania is limited. The Pennsylvania UCR program provides some information on the number of crimes committed with a firearm. The 1994 data, for example, indicate that 9,479 robberies (43% of all robberies) and 4,717 aggravated assaults (20% of all such assaults) involved a firearm (7).

A report from the Allegheny County Injury Surveillance System (ACISS) provides a breakdown and description of firearm injuries and fatalities for that community. ACISS is an active surveillance system for firearm-related injuries occurring in Allegheny County. Data for the surveillance is

collected from the local coroner's office and the emergency departments of the four local trauma centers. In 1996, a total of 100 fatal injuries and 300 nonfatal injuries were observed (216). There were 49 homicides (county rate: 3.7 per 100,000 population), mostly among males (88%) and African Americans (82%). Approximately 70% of the firearm homicide victims were between 15 and 24 years of age. Forty-eight firearm suicides were identified; of which 96% were male and 94% were white. Of the nonfatal firearm injuries, 69% were from assaults and 3% were self-inflicted (216). The remainder were either due to accidental causes or not classifiable as to cause.

The number of firearm injuries observed in 1996 was less than that reported in a similar study evaluating firearm injuries for Allegheny County for 1994. Data for this study was collected from death certificates and an active surveillance of EDs in the county's 24 acute-care, general hospitals. A total of 669 firearm-related injuries were identified, of which 155 were fatal and 514 were nonfatal. All but two of the fatalities resulted from violence (78 homicides, 75 suicides)(217).

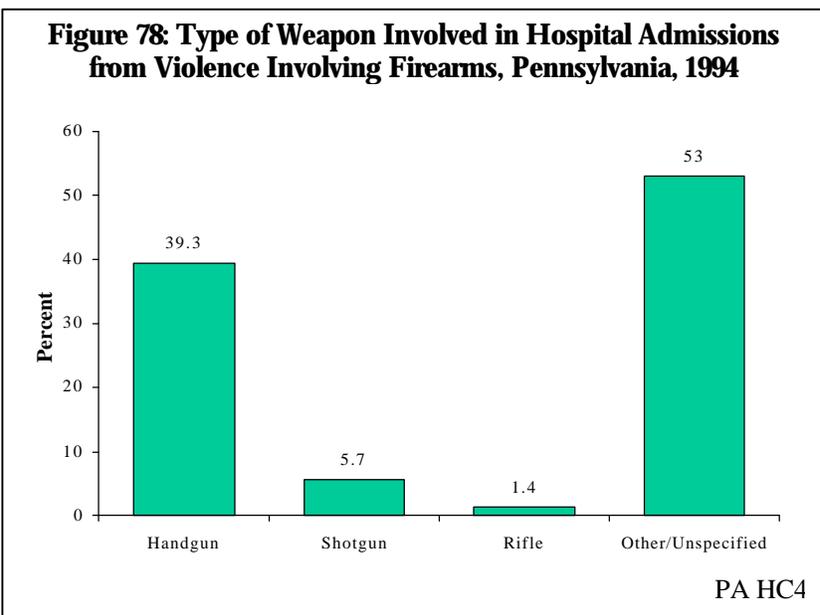
Having some understanding of the type of firearm used in violent acts may be useful for developing intervention strategies to prevent future events. Data from the UCR program show that, in 1994, handguns were used in 91% of all murders involving a firearm. Shotguns and rifles were used in 5% and rifles in 3% of all firearm homicides (7). Data from the Health Care Cost Containment Council show that handguns were related to at least 39.1% of the

hospital admissions from firearm violence in 1994 (**Figure 78**). More often, though, the type of weapon used was not identified. In Allegheny County, handguns were used in about 96% of the firearm homicides in 1996 (216).

Using data from the Behavioral Risk Factor Surveillance System (BRFSS), another study estimated that firearms were present in 37% of homes in Pennsylvania in 1994. Of the households with a gun present, 23% contained a single firearm and 76% had two or more firearms. Handguns were present in 19% of the homes with firearms. Among households with just one firearm present, 40% had a handgun (23).

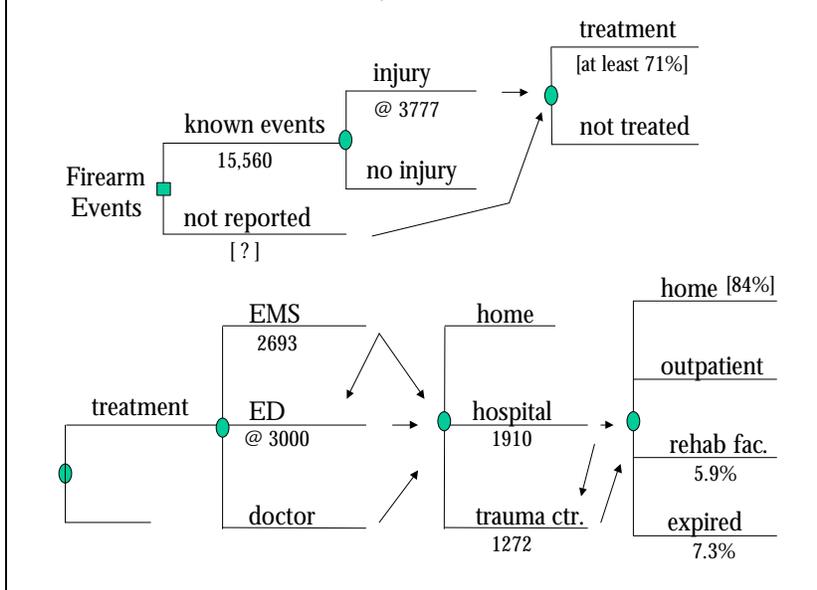
Health Care Use

Figure 79 portrays the likely use of health services by those injured by a firearm as a result of violence. Information available from the vital statistics program of the Department of Health, the UCR program of the Pennsylvania State Police, and the hospital discharge register of the Pennsylvania HC4 indicate that there were approximately 15,560 known events of firearm violence in Pennsylvania in 1994. There likely were more events, but they did not come to the attention of the police or medical authorities. Within this 15,560 figure, we estimate that about 3777 events resulted in an injury²⁴.



²⁴ Assume all homicides, suicides, and attempted suicides resulted in injury. Assume 17% of nonfatal crime resulted in injury (194).

Figure 79: Health Care Use and Firearm-Related Injuries, Pennsylvania, 1994



1,431 firearm-related injuries from violence in Pennsylvania trauma centers. These injuries were identified from visits related to homicide, suicide, attempted suicide, and assault. Visits with the following E-codes (E955.9-0.4, E965.0-0.4) were selected for study. Using a similar definition, 1,910 hospital admissions were identified in the Pennsylvania

Table 49: Demographic Characteristics of Victims of Firearm Violence Seen by Emergency Medical Services, Pennsylvania, 1994

TOTAL	2,693
Age Group	
0-14 years	5.7%
15-24 years	36.8%
25-34 years	23.6%
35-44 years	15.1%
45-54 years	7.4%
55-64 years	3.6%
65+ years	7.8%
Gender	
Female	11.8%
Male	88.2%
Incident Type	
Suicide	14%
Assault	86%

Available data suggests that the majority of the injured victims of firearm violence sought treatment from a medical professional. Most of the victims appear to have used the services of EMS personnel and hospital emergency departments in some form. For example, extrapolations from national data suggest that there were between 2000-3000 emergency department visits.

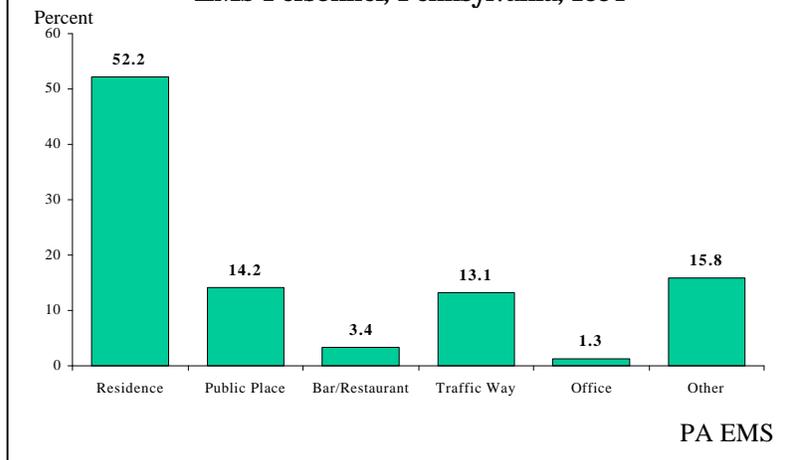
shown in **Figure 80**. The majority of the EMS calls were to a residence (52%).

Hospital Admissions

The most comprehensive information available to characterize health care use was that for inpatient facilities and trauma centers. In 1994, Pennsylvania Trauma System Foundation database recorded

Information from the Pennsylvania Emergency Medical Services (EMS) data system indicates that 2693 ambulance or rescue trips were related to firearm violence in 1994. Eighteen percent of these victims were dead on arrival and 57% were ultimately transported. Over 70% of the victims seen by paramedics were under 35 years of age, and most were male (**Table 49**). Relative few of the ambulance trips were related to self-inflicted injury. Specific details regarding the location of the incidents responded to by EMS teams are

Figure 80: Location of Firearm Injury Victims Identified by EMS Personnel, Pennsylvania, 1994



Health Care Cost Containment Council (HC4) data. Of the 1,431 PTSF events, 159 pertained to persons who were dead on arrival. The remaining 1,272 were admitted to an inpatient unit.

Table 50 details the proportion of the identified inpatient or trauma center firearm injuries by the category of violence. Assaults accounted for the largest portion of firearm-related injuries from violence in both datasets. The number of firearm homicides was much higher in the PTSF database. The 159 cases that were dead on arrival to the trauma center probably account for a large part of this difference.

Hospital admissions related to firearm violence primarily represent nonfatal events. Vital statistics, EMS, PTSF, and HC4 data suggest that most fatal events involving firearms do not survive to the point where inpatient hospital services are required. Only 28% of firearm homicide victims and 6% of firearm suicide victims in Pennsylvania used inpatient hospital services.

The vast majority of the victims admitted to hospital for firearm injuries entered the hospital via an emergency department (94%). Hospital transfers accounted for only 1.3 % of the admissions.

Table 50: Firearm-Related Injuries by Category of Violence, Hospital Admissions and Trauma Centers in Pennsylvania, 1994

	HC4	PTSF
TOTAL	1,910	1,431
Assault	87.0%	72.1%
Homicide	4.9%	17.3%
Attempted Suicide	5.7%	5.2%
Suicide	2.4%	5.5%

Thus, the chance for multiple admissions for the same person in the database is likely to be low.

The descriptive characteristics of the subjects who were hospitalized are highlighted in **Table 51**. Again, the majority of the admissions were among African Americans, males, and persons 15 to 34 years of age. Most events appear to be paid for through government insurance sources. Payor source was the only descriptive characteristic that differed in any major way between the HC4 and PTSF data. Insurance information, though, is probably most accurately recorded in the HC4 database.

Figure 81 provides more detail about the payor listed as the financial source for the HC4 hospital admissions. Of note was

that the state Medicaid program paid for the majority (53%) of the admissions.

The average length of stay for the HC4 admissions associated with firearm violence was 6.5 days. Most of the admissions had a duration of 3 days or less (**Figure 82**). Data from the PTSF show that hospitalized patients spent an average of 9.5 days in a trauma center overall, of which an average of 2.4 days was spent in an intensive care unit. Among the 1,272 trauma center patients admitted to hospital, 166 (13%) died in hospital. Their average length of stay was 2.4 days, whereas the average length of stay for trauma center patients discharged alive was 10.6 days. The HC4 data identified 136 (7%) patients who died in hospital.

Table 51: Demographic Characteristics of Hospital Admissions from Violence Involving Firearms, Pennsylvania, 1994

	HC4	PTSF
TOTAL	1,910	1,272
Age Group		
0-14 years	2.2%	2.0%
15-24 years	48.2%	45.0%
25-34 years	28.0%	29.5%
35-44 years	13.2%	14.8%
45-54 years	4.8%	4.4%
55-64 years	1.5%	2.3%
65+ years	2.0%	2.0%
Gender		
Female	7.9%	8.7%
Male	92.1%	91.3%
Race		
African-American	71.6%	75.2%
Caucasian	17.9%	21.6%
Other	10.6%	3.2%
Payor Source		
Self-pay	10.3%	32.0%
Non-government insurer	26.6%	22.5%
Government program	63.2%	45.5%

Figure 81: Payment Source for Hospital Admissions from Violence Involving Firearms, Pennsylvania, 1994

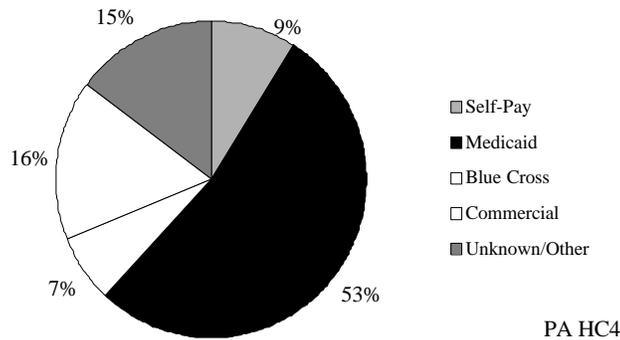
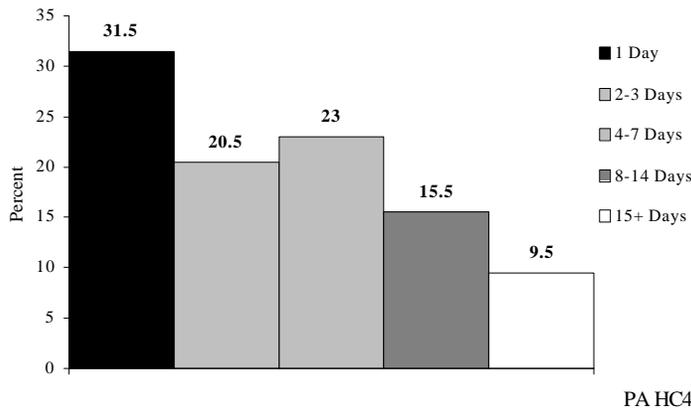


Figure 82: Length of Stay in Hospital Admissions from Violence Involving Firearms, Pennsylvania, 1994



Potential Long-Term Impact of Firearm Injuries

The long-term impact of firearm violence in Pennsylvania is not known. All indications, though, suggest that there are meaningful long-term costs related to gun violence. Items such as the criminal prosecution of perpetrators and the continued treatment of victims, for example, carry costs. Published reports in other locations (208,210) indicate that 10-20% of the victims seen in hospital for firearm injuries will be re-hospitalized at a later time. It was not possible to identify these events in the Pennsylvania data.

There was some evidence in the Pennsylvania data regarding the long-term use of health care services. The HC4 database, for example, noted 9 admissions to rehabilitation centers. The PTSF registry reported 91 patients discharged to rehabilitation centers. Additionally, 112 of the admissions in the HC4 database were discharged to another health care facility. PTSF and HC4 data show that 232 and 156 of the admissions, respectively, had indications of a traumatic brain injury in the patient. Most of these cases are likely to require further treatment beyond the initial hospitalization.

Health Care Costs Related to Firearm Injuries from Violence

The only information available regarding the health care costs related to firearm injuries from violence in Pennsylvania is that included within the HC4 data system. In 1994, total health care charges for the 1910 hospital admissions were \$60,137,813. Total costs, estimated by applying hospital-specific cost-to-charge ratios, amounted to \$19,728,804. The average cost per admission for a firearm injury was \$10,329. This figure is similar to other published estimates in the literature from other geographic areas (Table 47).

Table 52 outlines the estimated costs for Pennsylvania admissions by the category of firearm violence. Distinct differences in the average cost for an admission were found. The estimated average cost for a homicide admission was nearly twice that seen for assaults or suicides. The costs associated with attempted suicide were also high. Both the PTSF and the HC4 data show that the longest length of stay was for persons who attempted but did not complete suicide.

The average charge for a hospital stay related to firearm violence in 1994 was \$31,486. The average estimated cost was \$10,329 per admission.

More recent information on the cost of gunshot wounds has been compiled by the Pennsylvania HC4 at the request of Representative Dwight Evans (19). This report outlined the number of inpatient hospitalizations resulting from gunshot wounds and associated hospital charges for Philadelphia County. The average charge for a gunshot wound hospitalization was \$29,682. Self-inflicted gunshot wounds were the most costly at \$59,344 per hospitalization. The average charge for an assault-related gunshot wound hospitalization was \$29,489. A substantial portion of the gunshot wound hospitalizations in Pennsylvania in 1994 occurred in Philadelphia County; around 58% of all gunshot wound hospitalizations, and 72% of assault-related gunshot wound hospitalizations occurred in Philadelphia County.

Table 52: Estimated Costs for Hospital Admissions from Firearm Violence by Category of Violence, Pennsylvania, 1994

	Number of Admissions	Average Length of Stay (days)	Average Cost per Admission (\$)
Assault	1662	6.31	9,766
Homicide	94	3.31	17,128
Attempted Suicide	108	14.00	13,898
Suicide	46	3.04	8,425

Source: Pennsylvania Health Care Cost Containment Council

Economic Impact of Violence in Pennsylvania

Throughout this report, we have been describing the incidence of various categories of violence in Pennsylvania, the associated contact with health care professionals due to violence and its subsequent costs. Several findings have emerged from this work. Foremost, is the realization that the assessment of violence is quite diverse. Many different definitions of violence have been applied in the literature and amongst institutions in Pennsylvania. Violence has been defined from a criminal perspective, from a domestic perspective, from a medical perspective, and from a sociological perspective, amongst others.

This section of the report summarizes the overall impact of violence in the state, using the information compiled from the previous, category-specific, presentations. It attempts to answer the question of "What is the cost of violence in Pennsylvania?"

In doing so, it should be understood that the very nature of violence makes it a difficult task. For example, violent events measured through the criminal system are not always comparable to events seen in the health care system. As a result, previous attempts at estimating the impact of violence have chosen one perspective as their primary focus.

The most notable effort in this area was that published by the National Research Council in their series, "*Understanding and Preventing Violence*". The report by Cohen, Miller, and Rossman (13) examined the cost of violence from a criminal/justice perspective. The medical, legal, social, and indirect costs attributable to specific crimes were detailed. An outgrowth of this work is a publication by the Joint State Government Commission in Pennsylvania entitled, "*The Cost of Juvenile Violence in Pennsylvania*" (17). It adopted a similar perspective and estimated the costs associated with specific crimes.

While the criminal justice perspective is the most common, it often neglects other important categories of violence; namely domestic violence and self-directed violence (suicide). Most injury professionals, and several other policy-makers, today, look to address violence in a more comprehensive fashion, and include crime-related, domestic, and self-directed violence in their assessments. We have chosen this perspective here for our presentation.

The Incidence of Violence in Pennsylvania

Several data sources were examined to obtain information on the burden of violence in Pennsylvania. The most widely available estimates are shown in **Table 53**. Crime-related data are published annually by the State Police as one part of the Uniform Crime Report system. In 1994, there were 49,651 violent crimes reported to police departments in

Pennsylvania (7). Violent crimes include murder, non-negligent manslaughter, rape, robbery, and aggravated assault. Statewide, the rate of violent crime was 412 offenses per 100,000 population. This rate was highest in the Southeast Human Service Region (which includes Philadelphia), and lowest in the Central Human Service Region (comprising the counties of central Pennsylvania).

Other state agencies maintain reporting systems to document violence-related deaths (Department of Health), child abuse (Department of Public Welfare), and elder abuse (Department of Aging). These sources provide distinct estimates for the likely incidence of violent events in the state. Because of the reporting requirements for these events, the estimates provided by the agencies are probably the most reliable available for these categories. However, there is evidence from national studies that reporting systems for child abuse and elder abuse vastly underestimate the incidence of these events.

Other estimates for the frequency of violence exist, such as those based upon state and national surveys. For example, estimates from the Behavioral Risk Factor Surveillance System (BRFSS) for Pennsylvania, suggest that there could have been as many as 555,000 assaults in the state in 1994. As part of the survey, respondents were asked if they had been a victim of physical violence as a result of being either hit, slapped, pushed, or kicked by another person (22). The Pennsylvania Crime Victimization Survey suggests that there may have been up to 276,000 victims of

Table 53: Summary of Published Estimates of the Frequency of New Violent Events, Pennsylvania, 1994

Violence Category	Incidence Estimate	Data Source
Inter-personal Violence		
Homicide	703 – murder 32 – neg. manslaughter 739	PA Uniform Crime Reports PA Dept. of Health
Aggravated Assault	23,941	PA Uniform Crime Reports
Rape	2,997	PA Uniform Crime Reports
Robbery	22,010	PA Uniform Crime Reports
Child Maltreatment	7,038	PA Dept. of Public Welfare
Intimate Partner Abuse	91,859	PA Coalition Against Domestic Violence
Elder Abuse	2,344	PA Dept. of Aging
Self-directed Violence		
Completed Suicide	1,328	PA Dept. of Health
Firearm-related Deaths	1,305	PA Dept. of Health

personal violence in the state in 1996. These events include crimes against an individual or those involving the use of a weapon (29).

Estimates from the National Incidence Survey of Child Maltreatment (a federal survey of violence directed towards children from caregivers) suggest that there may have been up to 64,000 cases of child abuse in the state. Similarly, projections from the National Violence Against Women Survey indicate that about 72,700 women a year in the state may be raped or physically assaulted by an intimate partner. All four of these examples are based upon self-reported information and define violence in a more liberal fashion than the systems of the state agencies. In this sense, they may represent an upper limit to the possible impact of violence in Pennsylvania.

There are very few data on the frequency of some categories of violence in Pennsylvania. There remains more to learn about the incidence of attempted suicide,

spouse abuse, and elder abuse. While crime figures indicate a total of 2997 rapes in 1994 in Pennsylvania, most investigators believe that this figure vastly underestimates the incidence of rape and attempted rape.

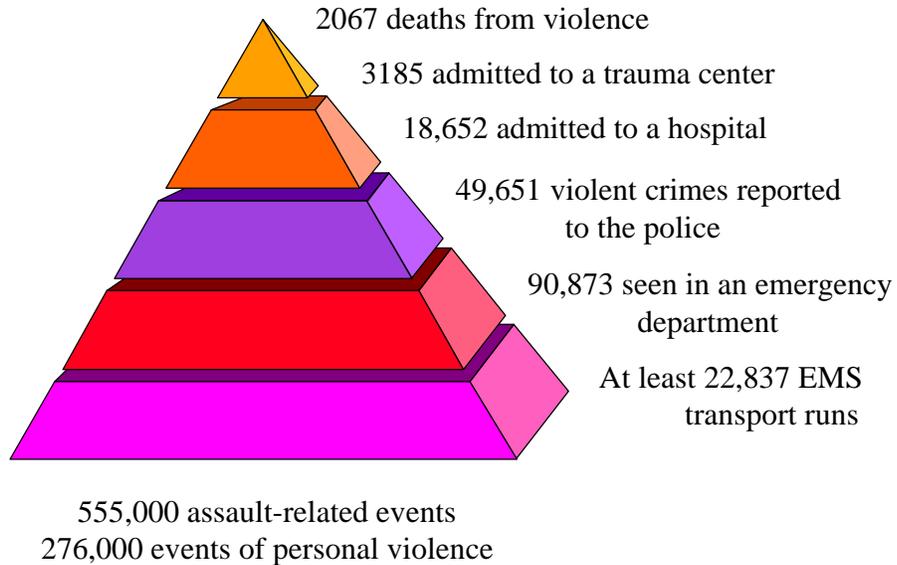
Health Care Use Related to Violence in Pennsylvania

Estimates on the use of medical services related to violence were available through several state-based organizations; including the Pennsylvania Health Care Cost Containment Council, the Pennsylvania Trauma Systems Foundation, and the Pennsylvania Emergency Medical Services group. We linked medical events to violence, primarily, through the use of External Cause of Injury codes (E-codes). Specifically, we examined visits with the presence of E-codes E950 – E969. The emergency medical services' data, though, do not include E-codes. For this information, we included

events with a reported incident type related to an assault, shooting, or stabbing. By this definition, the EMS data excludes violence involving other mechanisms of injury.

Figure 83 outlines the spectrum of violence in Pennsylvania in 1994; portraying the estimated frequency of violence, its' associated use of health care services, and the number of fatal events. Available information indicates that most victims of violence do not use health care services in response to an episode of violence. Several incidents, though, did come to the attention of medical professionals. Our scan of the EMS information for 1994, for example, identified 22,837 ambulance runs related to an assault, shooting, stabbing, or self-inflicted injury. Information from the National Hospital Ambulatory Medical Care Survey (a federal survey of the reasons for emergency department and outpatient department use) and the Pennsylvania Department of

Figure 83: Health Care Use and Violence in Pennsylvania, 1994



Health²⁵ suggest that over 90,000 emergency department visits in the state were related to violence.

The most reliable information on the use of medical care related to violence is that regarding hospital admissions. In 1994, there were 18,652 hospital admissions from violence identified from the Pennsylvania Health Care Cost Containment Council information, and 3185 associated admissions to trauma centers identified from the Pennsylvania Trauma Systems Foundation. The vast majority of the patients hospitalized for violence were discharged to their homes (about 72%), but there were, at a minimum, 174 admissions identified as involving the need for subsequent care at a

rehabilitation facility. There is evidence, then, that some cases of violence will require continuing intensive medical care beyond the treatment for the initial injury.

Injury research professionals often categorize violence into two distinct groups; inter-personal violence (which includes crime-related events and domestic

violence), and self-directed violence (suicides and attempted suicides). **Table 54** illustrates the use of medical services within these two categories of violence. Distinct patterns of health care use were observed. In general, a large number of emergency department visits are related to interpersonal violence. Several hospital admissions for self-directed

Table 54: Use of Health Care Services by Type of Violence Pennsylvania, 1994

	Inter-personal Violence	Self-directed Violence
Number of EMS runs	19,249	3,588
Number of ED visits	76,658	14,261
Number of hospital admissions	7,439	11,213
Number of trauma center admissions	2,831	352
% discharged to home	91%	60%
Number of admissions to rehabilitation facilities	At least 151	At least 23

²⁵ Total number of emergency department visits in Pennsylvania in 1994 was equal to 4,917,570.

violence were observed. However, most of the admissions to a trauma center (which reflect severe events) were due to interpersonal violence. A difference in discharge status by type of violence was also observed. Persons admitted for self-directed violence were more likely to require further medical care than those admitted for interpersonal violence. This likely is due to the provision of follow up treatment in a psychological facility or clinic for persons inflicting harm upon themselves.

Costs Related to Violence

Several types of economic costs are likely to arise from violence. These costs may comprise the legal and incarceration expenses associated with criminal violence. They may include the medical care costs associated with the treatment of injuries from violence. They may include the indirect costs of violence, such as the loss of productivity from both victims and perpetrators. Characterizing the costs related to these and other consequences of violence can be both complex and problematic.

A widely published framework for estimating the cost of violence is that of Cohen, Miller, and Rossman (13). This framework places a great deal of emphasis upon the indirect costs of violence. Proportionally, indirect costs often swamp other cost items at a ratio of 85%:15%. While indirect costs are important to consider in identifying the impact of violence, there are many debates taking place amongst economists about the most appropriate costs to include as indirect costs, and about the best method to measure them. Further, it is difficult to characterize costs specific to Pennsylvania from this framework. Much of the information, which forms the basis for the estimates of Cohen, Miller, and Rossman, is taken from national databases. This information may not be appropriate to extrapolate to the Pennsylvania setting.

For these reasons, we have focused our efforts towards identifying the direct health care costs related to violence. We report here on the most defensible estimates that can be characterized specific to Pennsylvania.

The best information on the health care impact of violence in Pennsylvania is that related to hospital admissions. The Pennsylvania Health Care Cost Containment Council data include information on the billed charges related to the admission. An estimate of the cost associated with each visit was subsequently determined by applying Medicare cost-to-charge ratios to this charge data. Cost data are preferred over charge data in this setting, because they more accurately characterize the resources used for the treatment of a particular condition or injury. Hospital charges include the direct costs related to treatment, but may also include an assessment to recover the costs of unpaid patient accounts (11).

As noted above, the majority of overnight stays related to violence were attributed to self-directed violence (60%: 40%; **Figure 84**). From an economic point-of-view, though, the picture changes. The majority of expenditures were due to inter-personal violence rather than self-directed violence (54%: 46%; **Figure 84**). On a per admission basis, the average charge and average cost was roughly two times higher for inter-personal

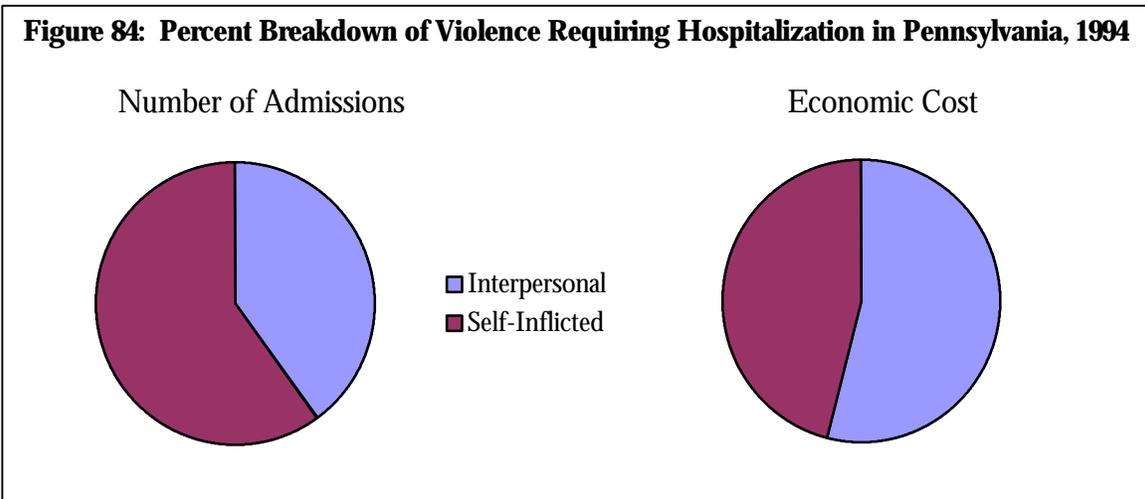


Table 55: Impact of Violence-Related Hospital Admissions in Pennsylvania, 1994 (\$)

Type of Violence	Number of Admissions	Total Charges	Total Costs
Inter-personal Violence	7439	135,298,402	46,732,408
Homicide	151	8,119,135	2,807,608
Aggravated Assault	7,079	126,663,692	43,358,404
Rape	29	480,985	188,963
Child Maltreatment	177	1,983,435	837,781
Elder Mistreatment	220	4,519,863	1,608,062
Self-Directed Violence	11,213	98,470,526	39,578,845
Completed Suicide	231	6,379,762	2,413,178
Attempted Suicide	10,982	92,090,764	37,165,666
Firearm-Related	1919	60,428,015	19,880,732

violence (Average Charge: \$18,187 vs. \$8,781; Average Cost: \$6,282 vs. \$3,529) than for self-directed violence.

A breakdown of the costs and charges associated with the various types of violence is provided in **Table 55**. Total hospital costs related to interpersonal violence in Pennsylvania in 1994 were estimated at \$46,732,408. The costs related to self-directed violence sum to \$39.5 million. While admissions related to firearms comprise only 10% of all events, they account for nearly \$20 million or roughly 22% of the total estimated costs of admissions from violence.

It is important to note that the specific figures included in the table for the categories of interpersonal violence do not sum to the aggregate figure of \$46 million, as some of the violent events fit into more than one category. Violence against the elderly, by definition, is made up of the admissions for assault in persons over age 65 years. Also, two admissions for child abuse were also included in the homicide category since they resulted in death.

The costs and charges of violence-related admissions have also been categorized by four basic demographic characteristics of the population using hospital services: age, gender, race, and insurance status. **Tables 56 and 57** highlight the distribution of costs and charges by these demographic characteristics for inter-personal violence and self-directed violence, respectively.

There are several observations to note from these tables. Inter-personal violence was proportionally higher amongst males, African Americans, and those with government-based, health insurance providers. Average costs per admission were also higher for persons with government insurance plans. In contrast, self-directed violence was proportionally higher amongst females and whites. While more women were admitted for suicides and suicide attempts than men, the average cost per admission was markedly lower for females than for males. The impact of self-directed violence appears to be evenly distributed between public and private insurance programs. For both inter-personal and self-directed violence, average costs increase with advancing age.

Higher costs in some demographic categories may be due to a higher frequency of events (such as assaults in African Americans), but they may also be due to other factors. Comparison of costs between the categories may be affected by individual patient factors. Persons with other existing medical conditions in addition to violence may require greater lengths of stay in hospital. This could explain the higher average costs observed for the elderly. A much stronger influence, though, would be differences by category in the severity of injury. Average costs, for example, were higher for admissions involving a traumatic brain injury (Inter-personal violence: \$7,082 vs. \$6,074; Self-directed violence: \$10,598 vs. \$3,453). These admissions often require longer lengths of stay.

Other Medical Costs

Our figure of \$86 million for the health care costs associated with violence in Pennsylvania is an underestimate. It reflects only the costs of overnight hospital stays identified as being related to violence. It does not include costs

Table 56: Impact of Hospital Admissions from Interpersonal Violence by Selected Demographic Characteristics, Pennsylvania, 1994

Interpersonal Violence					
	Number of Admissions	Total Charges (\$)	Avg. Charge per Stay (\$)	Total Costs (\$)	Avg. Cost per Stay (\$)
Gender					
Males	6065	115,251,071	19,002	39,642,493	6,536
Females	1372	19,973,095	14,557	7,074,004	5155
Age					
0-15 years	364	4,340,159	11,923	1,653,885	4,543
16-64 years	6855	126,438,379	18,444	43,470,460	6,341
65 years +	220	4,519,863	20,544	1,608,062	7,309
Race					
White	2410	34,855,855	14,463	13,064,222	5,420
African American	4155	84,477,587	20,331	28,108,200	6,764
Hispanic	490	10,167,708	20,750	3,388,265	6,914
Asian	41	1,168,871	28,509	370,774	9,043
Other	76	1,583,495	20,835	566,039	7,447
Insurance Source					
Public	3996	81,975,421	20,514	28,371,615	7,100
Private	2461	37,040,477	15,050	13,111,918	5,327

Table 57: Impact of Hospital Admissions from Self-Directed Violence by Selected Demographic Characteristics, Pennsylvania, 1994

Self-Directed Violence					
	Number of Admissions	Total Charges (\$)	Avg. Charge per Stay (\$)	Total Costs (\$)	Avg. Cost per Stay (\$)
Gender					
Males	4728	49,292,559	10,425	19,643,214	4,154
Females	6482	49,172,953	7,586	19,934,294	3,075
Age					
0-15 years	515	3,075,687	5,972	1,345,265	2,612
16-64 years	9439	81,034,624	8,585	32,339,969	3,426
65 years +	1259	14,360,215	11,406	5,893,610	4,681
Race					
White	8642	73,831,554	8,543	30,053,120	3,477
African American	1477	15,851,558	10,732	5,970,043	4,042
Hispanic	387	3,177,383	8,210	1,253,599	3,239
Asian	40	283,397	7,084	115,543	2,888
Other	70	586,389	8,376	237,275	3,389
Insurance Source					
Public	5535	53,596,121	9,683	21,313,551	3,850
Private	4585	37,812,303	8,246	15,476,937	3,375

For the 18,652 admissions identified in 1994, the total charges listed for hospital admissions from violence were **\$233,768,929**. Total costs for these admissions were **\$86,311,253**.

for events where an E-code was not specified. More importantly, it does not include the cost of outpatient physician services, emergency department care, paramedics, and other health professionals. This estimate, then, reflects only one aspect of the health care costs related to violence in Pennsylvania.

Data from the HC4 data set and other sources suggest, indirectly, that emergency department and paramedic services are meaningful components in the care of victims of violence. **Figure 85** portrays the referral source for the Pennsylvania hospital admissions related to violence. Most often, individuals were seen in an emergency department prior to their admission. Between 15-20% of the cases were referred by a physician. In a separate analysis, we identified nearly 23,000 EMS runs related to violence.

Potential Long-Term Costs Associated with Violence

There are also likely to be important long-term costs attributed to violence. Long-term costs are often quite difficult to gather, in practice. There are several clues from our evaluation, though, that suggest that the cost of follow on care after the initial treatment for the violence event is not inconsequential. For example, of the 18,652 admissions observed, 63 were listed among known rehabilitation facilities, as opposed to short-term, acute care facilities.

Also, a number of individuals were discharged from the hospital to other long-term care institutions, skilled nursing facilities, or outpatient clinics. **Table 58** outlines the discharge status of the admissions listed in the HC4 data system for events due to violence. Roughly 85-95% of the overnight stays related to assaults and child maltreatment were discharged to a home or

foster home environment, with the remaining 5-15% being sent to other health care facilities for continuing care. Some categories of violence, though, appear to have markedly different long-term care treatment patterns. For example, there was a much higher use of other health facilities for admissions listed as attempted suicides. Only 61% of these events were sent home from the hospital. A similar pattern was observed for victims of rape, and violence against the aged.

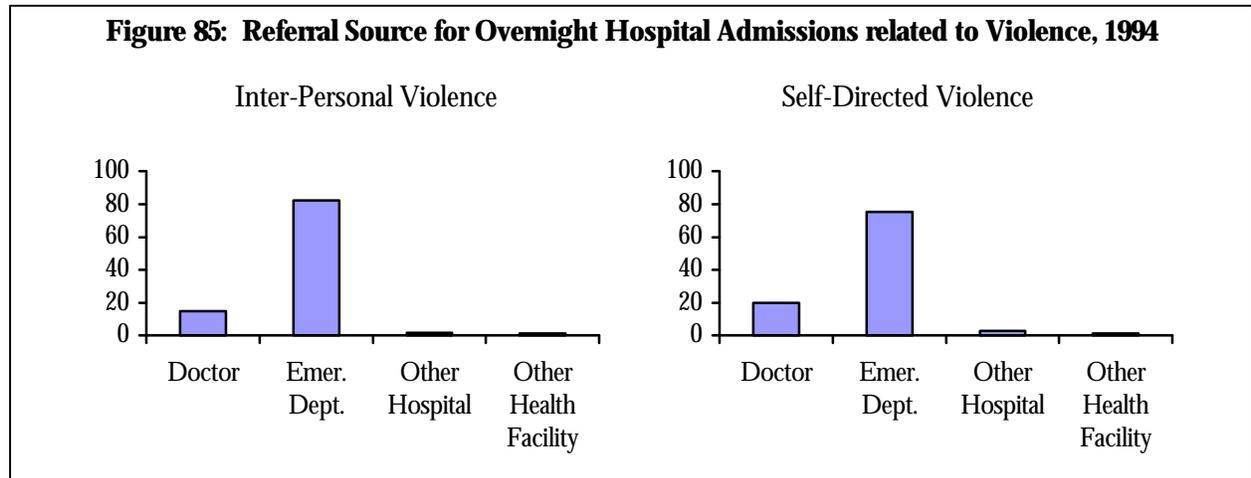


Table 58: Discharge Site of Hospital Admissions from Violence in Pennsylvania, 1994

Type of Violence	% sent home	% sent to another hospital	% sent to a short-term care facility	% sent to another type of health facility
Assault	93.5	1.2	11.1	4.3
Rape	72.4	6.9	3.4	17.2
Child Abuse	86.4	1.7	0.6	10.2
Elder Abuse	70.8	0.9	12.2	12.7
Attempted Suicide	61.1	5.7	2.3	30.9
Firearm Violence	84.4	1.8	0.6	5.9

Summary

Violence is a significant concern in the United States today. It impacts upon Pennsylvanians in more ways than one often imagines. It affects not just the criminal justice system, but also the insurance system and public finances. Social services, clinical health care services, and public health services are influenced as well. The objective of this report was to outline the burden of violence in Pennsylvania. Particular focus was placed upon identifying the number of violent acts occurring in the state and their associated health care costs. We are hopeful that this effort will draw attention to the importance of criminal, domestic, firearm, and self-directed violence in Pennsylvania, and illustrate areas where violence prevention efforts might be best suited.

This report concludes that known criminal violence in Pennsylvania affected one out of every 261 persons in 1994. Estimates on the frequency of domestic violence in Pennsylvania are not yet clearly known. Information on the number of

individuals receiving social services for child abuse, spouse abuse, and elder abuse, though, suggests that its impact is meaningful. About one person in 12 in Pennsylvania had associated state or domestic violence agency use. Violence involving firearms affected fewer individuals (n=15,560), but was quite lethal. We estimate that one event in twelve resulted in a death. Little is known regarding the incidence of self-directed violence.

Complete information on the health care costs of violence in Pennsylvania is not yet available. Data on the costs associated with hospital admissions, though, indicate that approximately \$86 million was spent in 1994 on stays related to violence. As inpatient hospital costs often reflect significant expenses, it is likely that the \$86 million estimate captures a large percentage of the health care costs related to violence.

Distinct patterns in the incidence of violence and health care costs were noted for certain population groups. Criminal violence and costs were proportionately higher amongst males and African-Americans. Domestic violence appears to be proportionately higher in females.

Self-directed violence was higher among females and Caucasians. Health care costs were overwhelmingly paid for through publicly financed insurance systems.

The health care cost estimate for violence in Pennsylvania published here is lower than that reported in two previous studies. An earlier study from the Blue Shield Institute (16) estimated medical care costs at \$435 million in the state. Another report from the Joint State Government Commission estimated the medical care costs for juvenile violence at \$227 million (17). It is our opinion that these reports have markedly over-estimated the health care cost of violence. Both of the communications were based heavily upon national data on the cost of violence. This report is based upon Pennsylvania-specific data arising from the Pennsylvania Health Care Cost Containment Council.

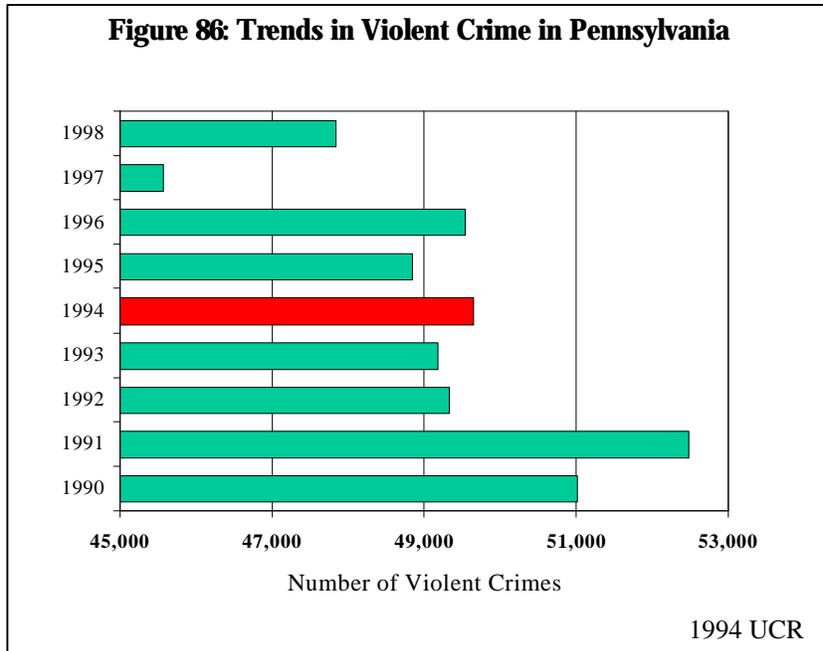
This report is nearly identical to another study published by the Pennsylvania Department of Health (18). Both this study and the report by Forjuoh and colleagues (18) examined data from the Pennsylvania hospital

discharge database, and both estimate the health care charges of violence at \$233 million in 1994. This report, though, provides more detail regarding the characteristics of the hospital admissions related to violence, and portrays health care costs in addition to charges.

Information from the Pennsylvania HC4 was also used for a report on the impact of gunshot wounds in the state (19). For the year 1996, there were 1626 assault-related admissions involving firearms. The average total charge for each admission was \$27,435 (19). Both of these figures are lower than those identified in 1994. We report here a total of 1756 admissions involving assaults and firearms. The average charge per admission in 1994 was close to \$31,000.

This comparison illustrates, in part, the dynamic nature of violence. Available evidence indicates that the incidence of violence changes from year to year. **Figure 86** shows the number of reported violent crimes in Pennsylvania from 1990-1998. It suggests that the number of acts of criminal violence have declined over time. A decline in the frequency of violence will most likely also signal a decline in the health care costs related to violence.

The most recent data available from the Pennsylvania Health Care Cost Containment Council hints that the health care costs for violence in Pennsylvania may have declined from 1994 to 1997. Preliminary data for the year 1997 indicate a total of 14,100 admissions from inter-personal



and self-directed violence²⁶. Total health care charges for these events sum to \$189 million.

While the incidence or frequency of violence may change from year to year, available evidence suggests that the characteristics of the victims of violence remain the same. Reports from both the National Crime Victimization Survey and the Uniform Crime Reporting program indicate little change in the age, gender, race, or economic characteristics of victims in the United States or Pennsylvania (7,8,45,59). Hospital charges for violence also appear to be heavily focused on public payment sources (11,56).

Comparisons with national data indicate that criminal violence occurs less frequently in Pennsylvania than in the United States. Homicide rates in Pennsylvania are markedly lower

than observed nationally. Suicide rates in Pennsylvania, on the other hand, are similar to the rates for the U.S. It is not clear how domestic violence in Pennsylvania compare to other areas.

Within Pennsylvania, criminal violence rates were higher in urban areas than in rural areas. This finding follows the general pattern reported nationally by the NCVS (8). Philadelphia and Dauphin Counties had particularly high rates of crime in 1994. Homicide and rape reports in these areas met or exceeded national rates. Suicide rates do not vary markedly by geographic area, although Schuylkill County appears to have the highest rate of suicide in the state. There is limited information available to assess differences in domestic violence rates. Existing data suggest that reported and substantiated cases of child abuse are more frequent in Philadelphia and the north central counties of the state.

²⁶ Pennsylvania Department of Health personal communication

Comparing violence rates across the state offers an opportunity to further identify the possible factors underlying violence. One would expect areas with high rates of violence, for example, to have different characteristics than areas with low rates. This approach, though, assumes that the assessment of violence has been done in a similar fashion between the regions. The recent articles concerning crime reports in Philadelphia indicate that this assumption may not be true in Pennsylvania. There also is concern that the reporting and investigation of child and elder abuse may vary by region.

Other possible limitations may influence the findings reported here. Several methodological issues underlie hospital discharge databases, including that of the Pennsylvania Health Care Cost Containment Council. Of concern is that information in the hospital data sets (a) may not be uniform between hospitals, (b) do not distinguish persons with more than one admission for the same event, and (c) includes out-of-state residents (218). In Pennsylvania, the year 1994 marked the first time that hospitals were required to assign external cause of injury codes (E-codes) for all injury related admissions. Department of Health data indicate that E-code assignment was variable in that year (18). Between 86% and 92% of the injury events were actually coded. Thus, the hospital violence data reported here may undercount the actual number of events seen in 1994.

The reported cost estimates also include persons with hospital re-admissions for the same injury, and some out-of-state residents

receiving care in Pennsylvania institutions. Hospital re-admissions, though, are less of a factor for costs studies than incidence studies. In cost reports, investigators seek to identify all of the resources used. In contrast, incidence studies wish to identify unique events of violence. The HC4 data are used throughout this report to consider health care costs related to violence, rather than the incidence of violence.

It is not clear how many out-of-state residents may be included in the cost estimates of this report. Conversely, we also do not know how many state residents are excluded from the report because they were treated elsewhere. Information from the Pennsylvania Health Care Cost Containment Council suggests that the influence of out-of-state residents may be small. Over 96% of the hospital admissions (all causes) in 1995, for instance, were amongst state residents.

The definition of violence varies markedly throughout the published literature. This report defined violence as behavior that intentionally threatened, attempted, or inflicted physical harm to another person or oneself. There are some categories of violence that were easily captured under this definition, including homicide and suicide. However, we had difficulty in identifying relevant data for other categories, such as rape, intimate partner violence, and elder abuse. Other categories of possible violence were purposely excluded because of questions over whether they fit the scope or nature of societal violence. These categories included injuries from legal intervention, and injuries whose

cause could not be determined (whether accidental or purposely inflicted).

A major facet of this report was the focus on the health care costs of violence. Cost estimates, in general, have received much attention over time, because they can illustrate the relative importance of a disease or issue (such as violence) quite clearly. The reasons for undertaking a cost study may vary widely. Some are completed for the intent of advocacy for certain political policies or positions. Some studies are conducted to identify possible areas for priority setting in prevention programs or basic research. Other studies are undertaken to estimate the burden of a disease/condition. This report has taken the perspective of identifying the possible health care burden of violence in Pennsylvania. We certainly hope, though, that the identified characteristics of violence illustrate possible areas for future interventions.



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