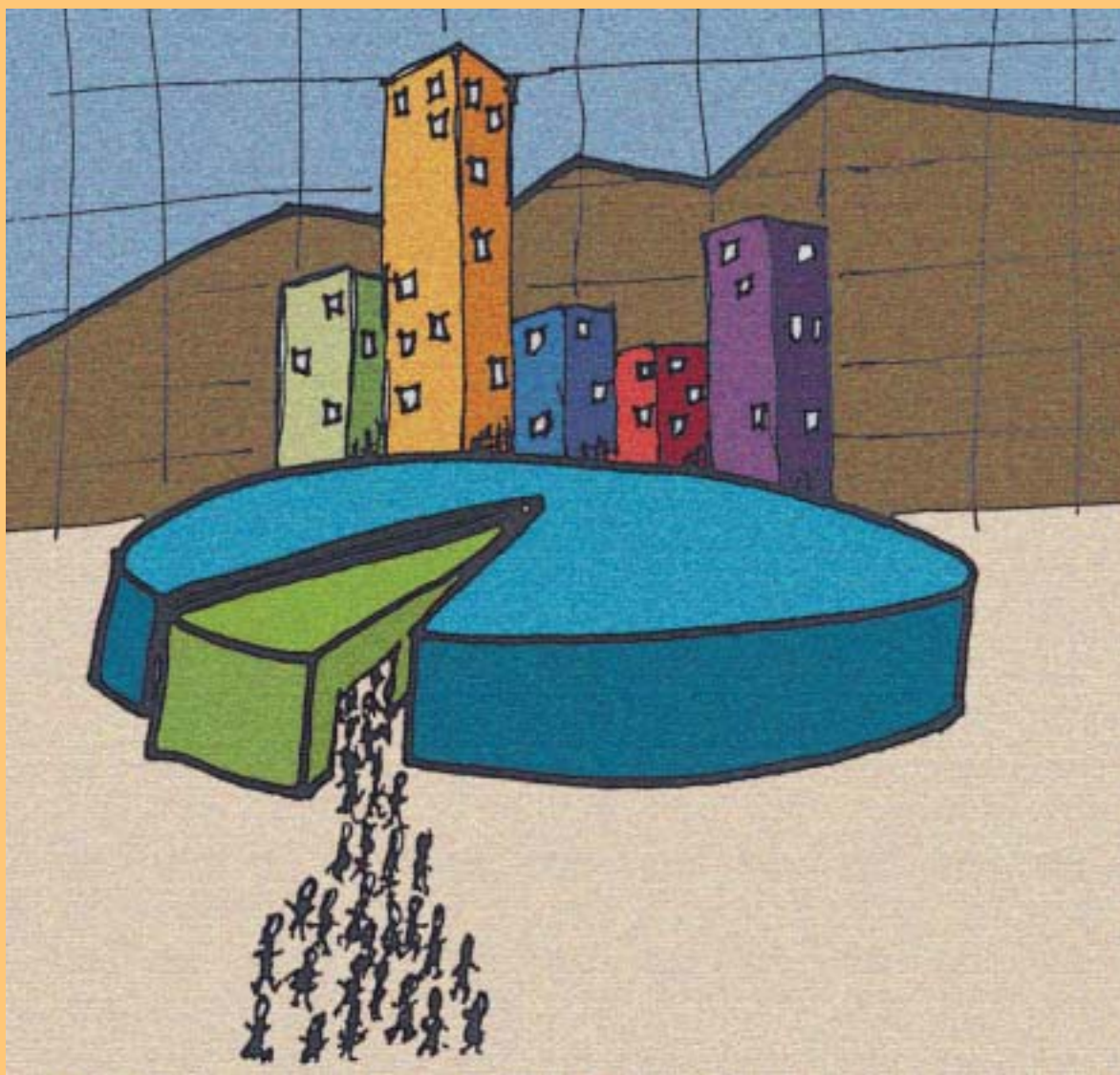




# Worker Health Chartbook, 2000

## Fatal Injury



DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health







# Worker Health Chartbook, 2000

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Department of Health and Human Services  
Centers for Disease Control and Prevention  
National Institute for Occupational Safety and Health

## DISCLAIMER

Mention of any company or product does not constitute endorsement by NIOSH. Some data have been changed since the September 2000 chartbook publication, including outdated Internet links.

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DHHS (NIOSH) Publication Number 2002-117

May 2002

## FOREWORD

The content of this booklet is taken from the *Worker Health Chartbook, 2000* (DHHS NIOSH Publication No. 2000-127), a comprehensive guide to surveillance data for work-related fatal and nonfatal injury and illness. The publication of the chartbook is an important step toward identifying and filling significant gaps in workplace injury and illness information. Several Federal agencies worked with NIOSH to compile data for the chartbook, using a variety of systems that track the nature, prevalence, and incidence of workplace injuries and diseases. These data help us identify new and emerging problems, analyze trends over time, target and evaluate the effectiveness of intervention efforts, and anticipate future needs and concerns. This booklet highlights fatal injury. It is intended for anyone interested in this topic, including occupational safety and health practitioners, policy makers, health care providers, educators, researchers, workers, and employers. The tracking of injury and illness is a cornerstone of prevention. We hope this booklet contributes to that effort.



Kathleen M. Rest, Ph.D., M.P.A.  
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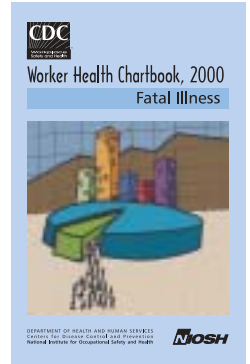
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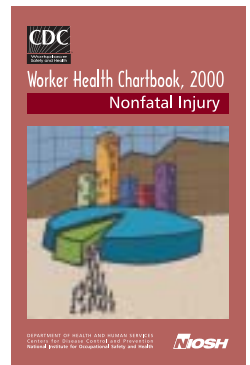
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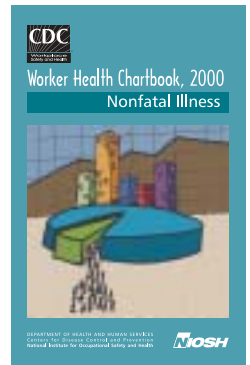
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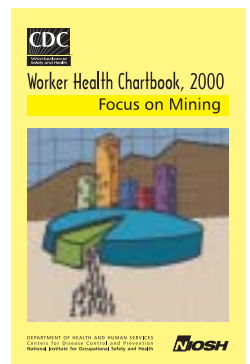
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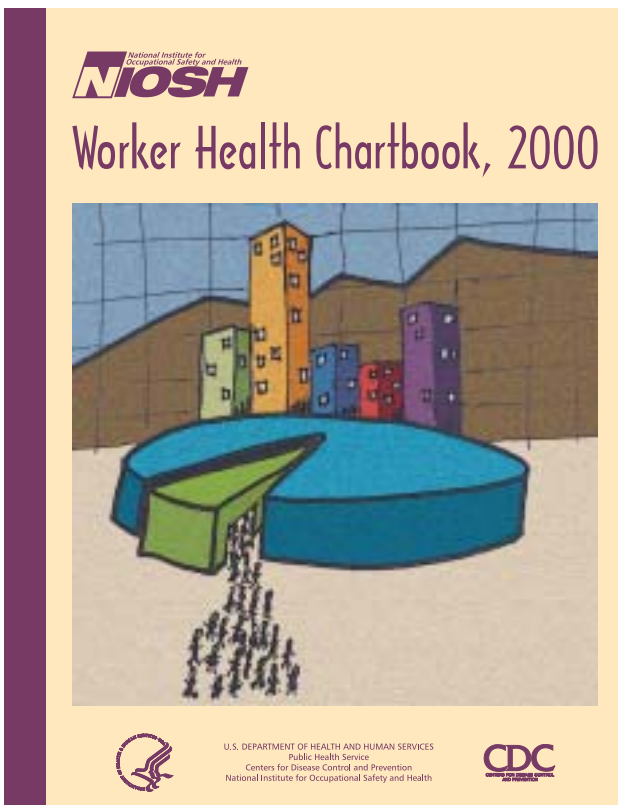
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## EXECUTIVE SUMMARY

Current occupational safety surveillance data reveal staggering human and economic losses associated with fatal occupational injury—about 17 workers were fatally injured on the job each day during 1997. Understanding and preventing such losses require focused efforts to quantify and track occupational fatalities and their associated conditions. Much work remains to be done despite overall decreases in fatal injuries in recent years.

Occupational injury fatality rates recorded by NIOSH in the National Traumatic Occupational Fatalities Surveillance System (NTOF) decreased substantially (43%) between 1980 and 1995, from 7.5 to 4.3 deaths per 100,000 workers. Injury fatality rates recorded by the U.S. Department of Labor in the Census of Fatal Occupational Injuries (CFOI) declined by 7% from 1992 to 1997.

Of the 6,238 fatal occupational injuries that occurred in 1997, 42% (2,605) were associated with transportation, excluding incidents that occurred while traveling to or from work. Most motor-vehicle-related fatalities (nearly 1,400) resulted from highway crashes. Homicides were the second leading cause of death, accounting for 14% of the total. The leading causes of death varied by sex, with motor vehicles being the leading cause for men and homicide the leading cause for women. Workers aged 65 and older had the highest rates of occupational injury death. Workplaces with 1 to 10 workers had the highest fatality rate (8.6 deaths per 100,000 workers), and workplaces with 100 or more workers had the lowest fatality rate (2 deaths per 100,000 workers). The highest numbers of fatalities occurred in construction, transportation and public utilities, and agriculture, forestry, and fishing industries. The highest fatality rates occurred in mining, construction, and agriculture, forestry, and fishing. The fatality rate in mining was more than five times the national average for all industries.





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## ABBREVIATIONS

BLS .....	Bureau of Labor Statistics
CFOI .....	Census of Fatal Occupational Injuries
DHHS .....	U.S. Department of Health and Human Services
FACE .....	Fatality Assessment and Control Evaluation
NFPA .....	National Fire Protection Association
NIOSH .....	National Institute for Occupational Safety and Health
NTOF .....	National Traumatic Occupational Fatalities Surveillance System

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# FATAL INJURY

## The Burden of Fatal Occupational Injuries

The National Institute for Occupational Safety and Health (NIOSH), the Bureau of Labor Statistics (BLS), and the States share responsibility for the surveillance of fatal occupational injuries. NIOSH conducts surveillance of these injuries through the National Traumatic Occupational Fatalities Surveillance System (NTOF), which contains information from death certificates managed by the 52 U.S. vital statistics reporting units and has fatality data from 1980 onward. In response to a National Academy of Sciences recommendation, BLS began compiling fatal occupational injury data in 1992 through its Census of Fatal Occupational Injuries (CFOI). Data for CFOI are obtained from various Federal, State, and local administrative sources, including death certificates, workers' compensation reports and claims, reports to regulatory agencies, medical examiner reports, police reports, and news items. Differences in NTOF and CFOI definitions and data collection and recording procedures may result in different fatality counts. The two programs are complementary, each having unique features that contribute to the surveillance of fatal occupational injuries. Appendix A in the *Worker Health Chartbook, 2000* [NIOSH 2000] details the methodological differences between the surveillance systems.

Data from NTOF indicate that 93,929 civilians in the United States were killed on the job from 1980 through 1995. The average annual fatality rate for this period was 5.3 per 100,000 workers. From 1980 through 1995, the number of deaths recorded by NTOF decreased by 28% (from 7,405 to 5,314), and the rate of death decreased by 43% (from 7.46 to 4.25 cases per 100,000 workers) (Figure 1). CFOI fatality counts exceeded those of NTOF by about 1,000 in the years reported in both surveillance systems (1992–1995) (Figure 2). Based on CFOI data, the rate of fatal occupational injuries declined by 7% between 1992 and 1997.

# FATAL INJURY

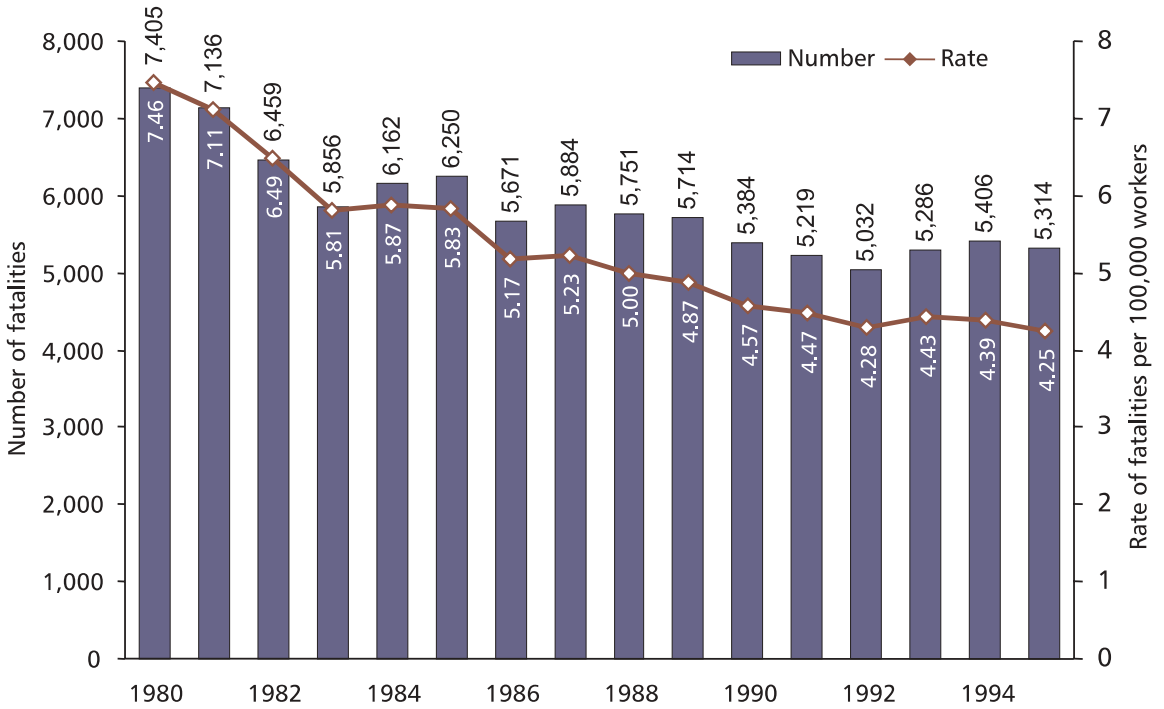


Figure 1. Number and annual rate of fatal occupational injuries, 1980–1995. (Source: NTOF [1999].)

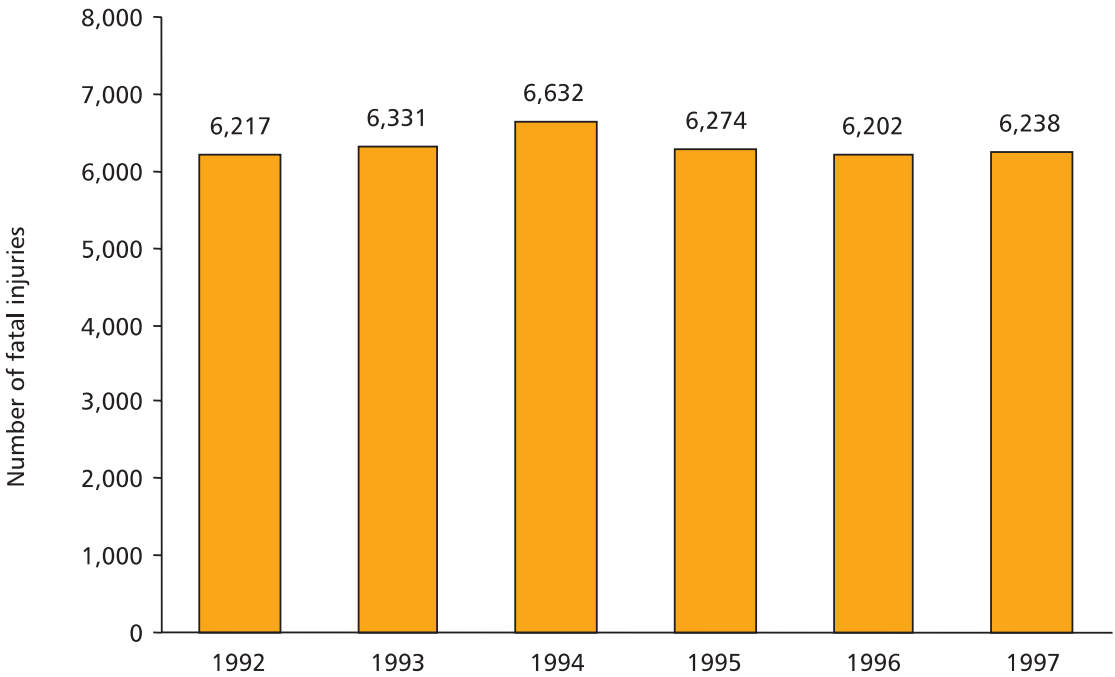
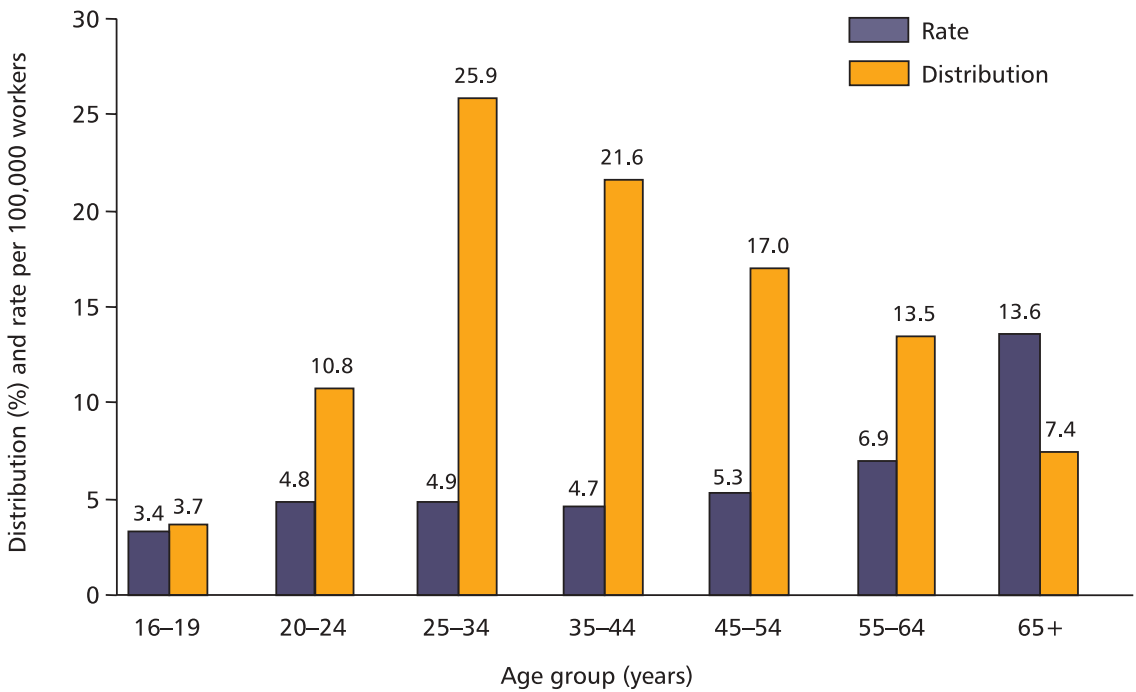


Figure 2. Number of fatal occupational injuries, 1992–1997. (Source: CFI [1999].)



### Fatal Injuries by Age and Race

The highest number of deaths recorded in NTOF from 1980 to 1995 occurred among workers aged 25 to 34 (Figure 3). CFOI data from 1992 to 1997 indicate that workers aged 35 to 44 had the highest number of fatal occupational injuries, similar to the share of employment for that age group. Rates of death recorded in NTOF were similar for the younger age groups, increased slightly in workers aged 55 to 64, and increased dramatically among workers aged 65 years and older (Figure 3). Death rates recorded in NTOF fell gradually from 1980 through 1995 for workers of all races (Figure 4).



**Figure 3.** Distribution and average annual rate of fatal occupational injuries by age group, 1980–1995. (Source: NTOF [1999].)

# FATAL INJURY

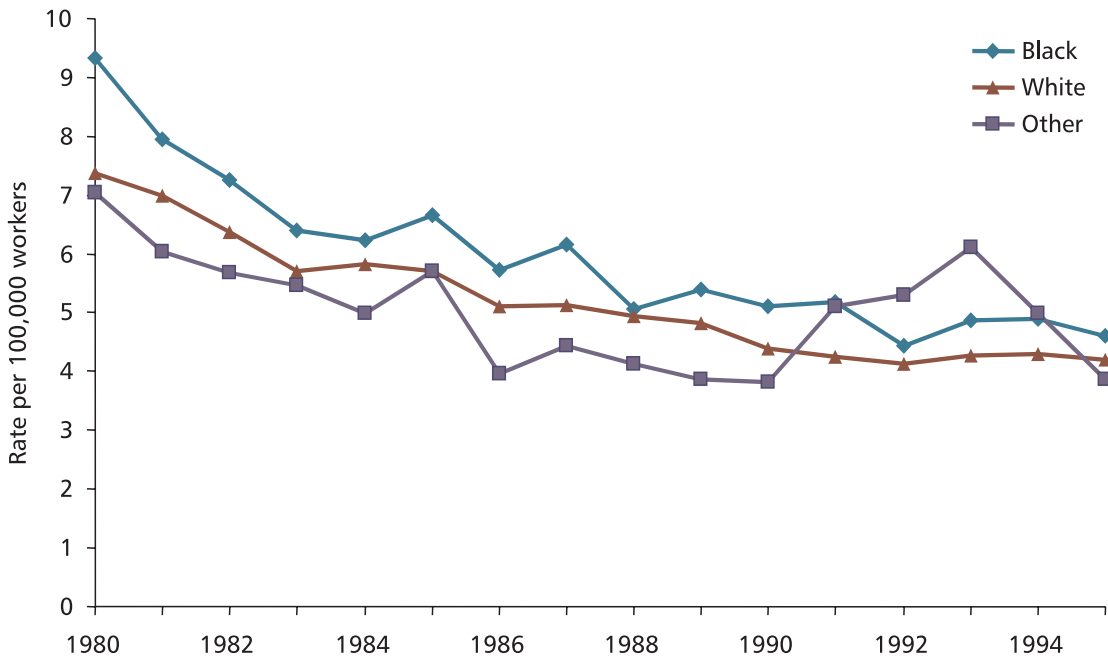


Figure 4. Rate of fatal occupational injuries by race, 1980–1995. (Source: NTOF [1999].)

## Fatal Injuries by Leading Cause

The leading causes of fatal occupational injuries recorded in NTOF from 1980 to 1995 were motor vehicle incidents, machine-related injuries, homicides, falls, and electrocutions (Figure 5). During that period, rates for deaths from all causes declined, although not always consistently. Male workers died most frequently from motor vehicle incidents, machine-related injuries, homicides, and falls; female workers died most frequently from homicides and motor vehicle incidents, followed by falls and machine-related injuries (Figure 6). CFOI data, which are classified differently from NTOF data, indicate that transportation incidents accounted for 42% of all fatal occupational injuries in 1997 (Figure 7). Highway-related motor vehicle crashes and homicides accounted for about one-third of the fatalities recorded in CFOI.

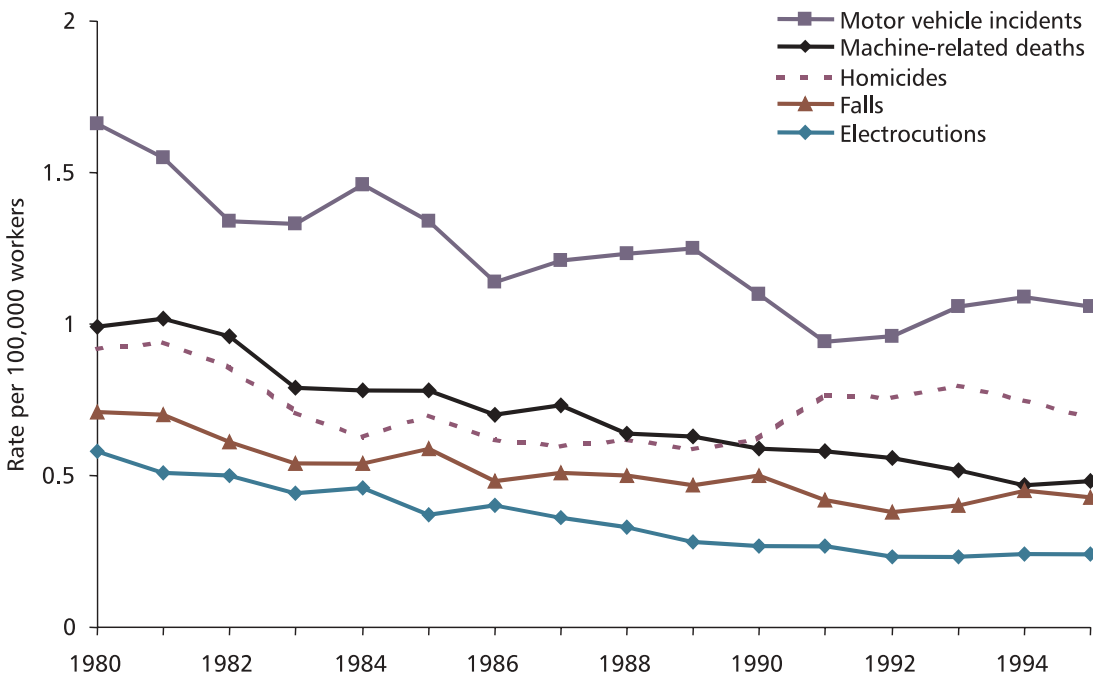
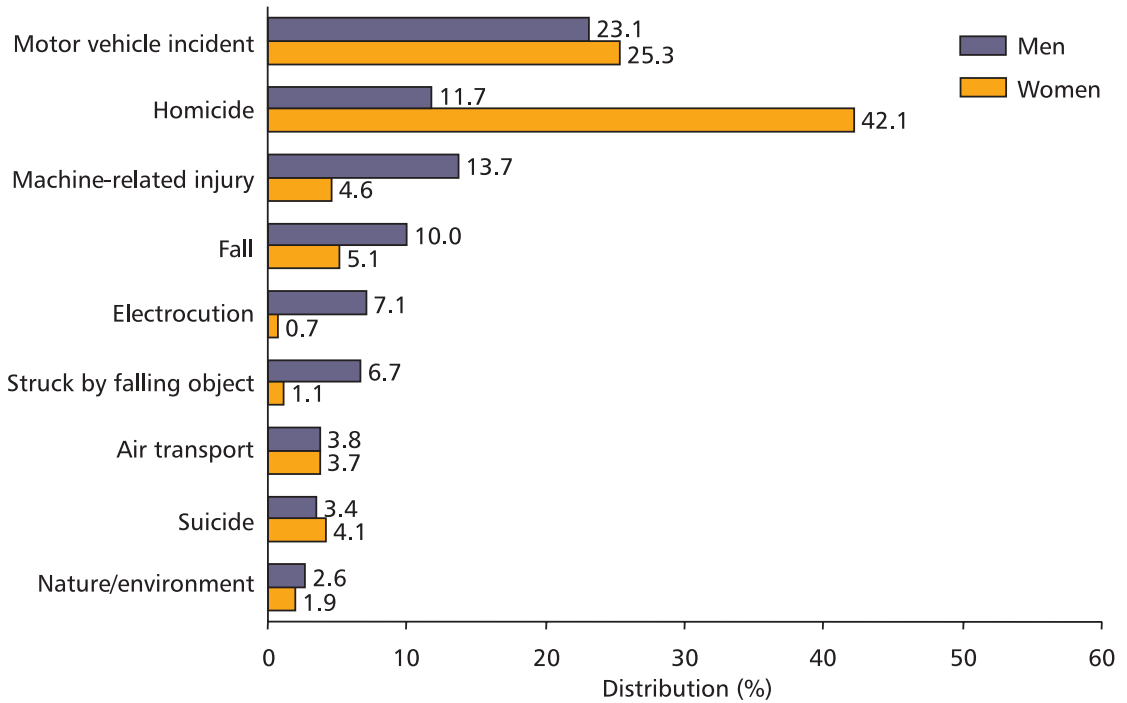
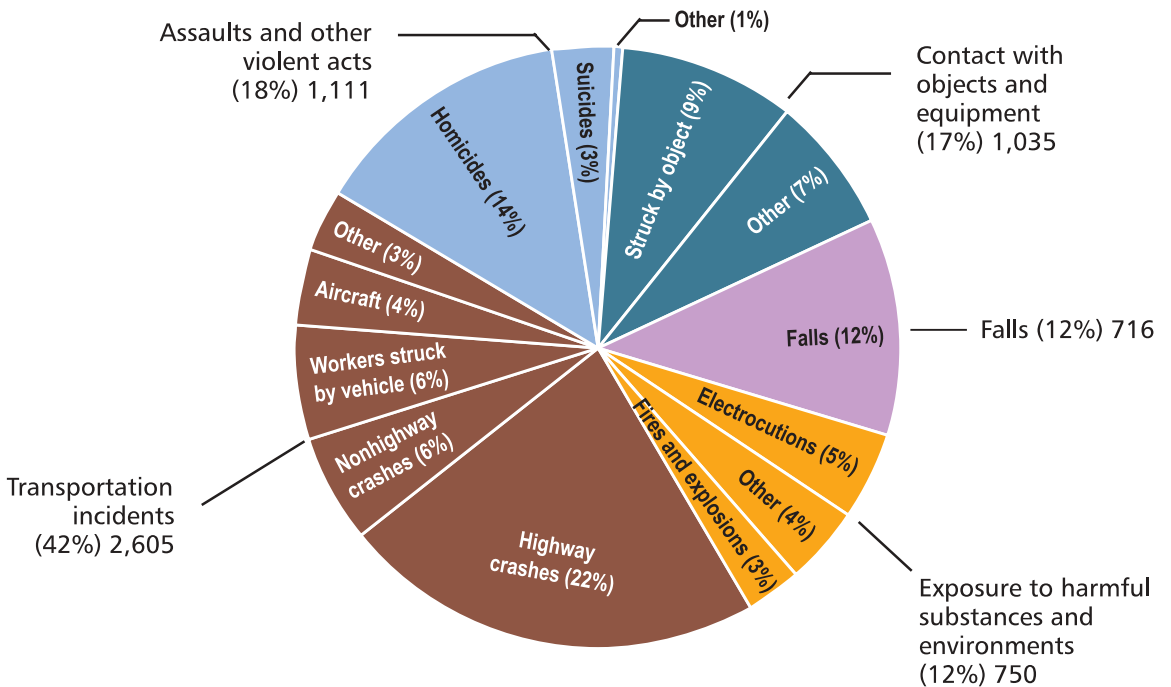


Figure 5. Rates of fatal occupational injuries by leading causes, 1980–1995. (Source: NTOF [1999].)

# FATAL INJURY



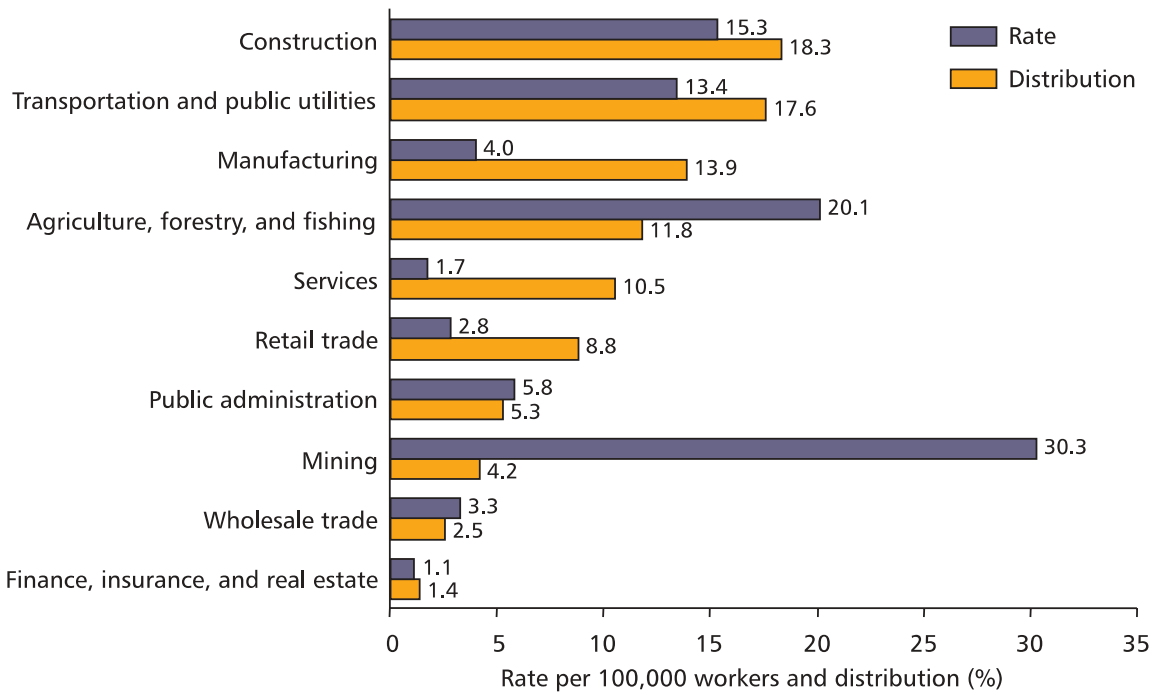
**Figure 6.** Distribution of fatal occupational injuries for male and female workers by selected causes of death, 1980–1995. Total deaths were 87,835 for male workers and 6,088 for female workers. (Source: NTOF [1999].)



**Figure 7.** Number and distribution of fatal occupational injuries in 1997, by event and exposure. An additional 21 fatalities were attributed to other events and exposures, including *bodily reaction and exertion*. (Source: CFOI [1999].)

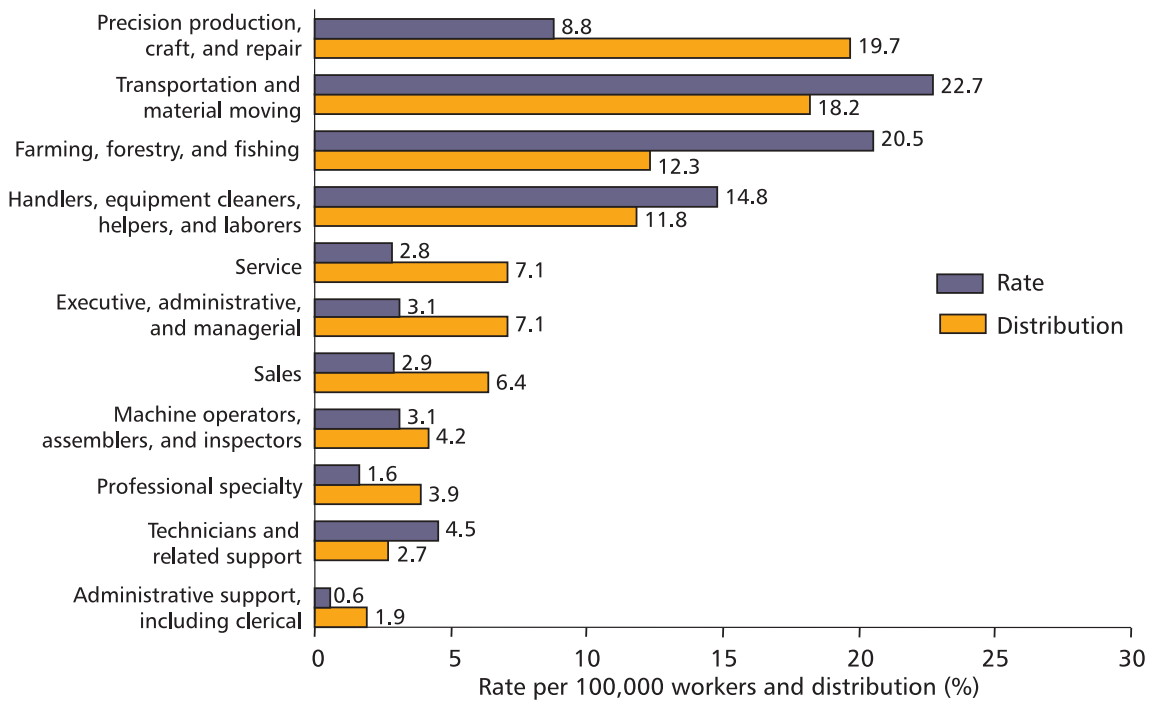
## Fatal Injuries by Industry and Occupation

NTOF classifies a fatality by the industry and occupation in which the worker was “usually” employed. By industry division, mining and agriculture, forestry, and fishing (followed by construction and transportation and public utilities), had the highest fatal occupational injury rates recorded in NTOF from 1980 to 1995. The most deaths occurred in construction, transportation and public utilities, and manufacturing (Figure 8). By occupational group, the highest rates of fatal injury occurred among transportation and agriculture, forestry, and fishing workers. Precision production, craft, and repair occupations (11% of the workforce) along with transportation workers (4% of the workforce) accounted for nearly 40% of the fatal occupational injuries from 1980 to 1995 (Figure 9).



**Figure 8.** Average annual rate and distribution (%) of fatal occupational injuries by industry division, 1980–1995. Total deaths were 93,929; 5.7% were not classified by industry. (Source: NTOF [1999].)

## FATAL INJURY



**Figure 9.** Average annual rate and distribution (%) of fatal occupational injuries by occupational group, 1980–1995. Total deaths were 93,929; 4.8% were not classified by occupation. (Source: NTOF [1999].)

CFOI classifies a fatality by the industry and occupation in which the worker was employed at the time of death. By industry division, construction accounted for the largest number of deaths recorded in CFOI in 1997, and mining had the highest fatality rate per 100,000 workers. Agriculture, forestry, and fishing ranked second in rate and third in number of fatal occupational injuries (Figure 10). By occupation, the largest number of fatalities occurred among truck drivers, farm occupations, sales occupations, and construction laborers (Figure 11). The leading causes of death for these groups were highway crashes and jackknifing for truck drivers, tractor-related injuries for farmers, homicides for sales occupations, and falls for construction laborers. The occupations with fatal occupational injury rates at least 10 times the national average of 4.8 per 100,000 workers include timber cutters, fishers, water transportation occupations, aircraft pilots, and extractive occupations (Figure 12).

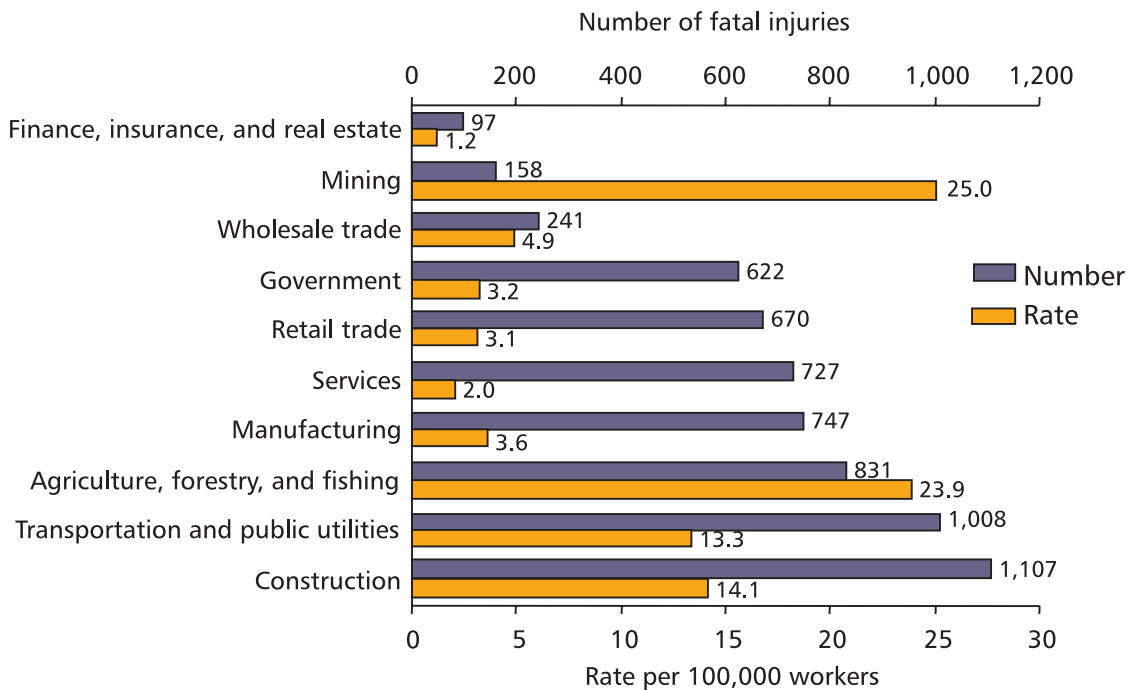
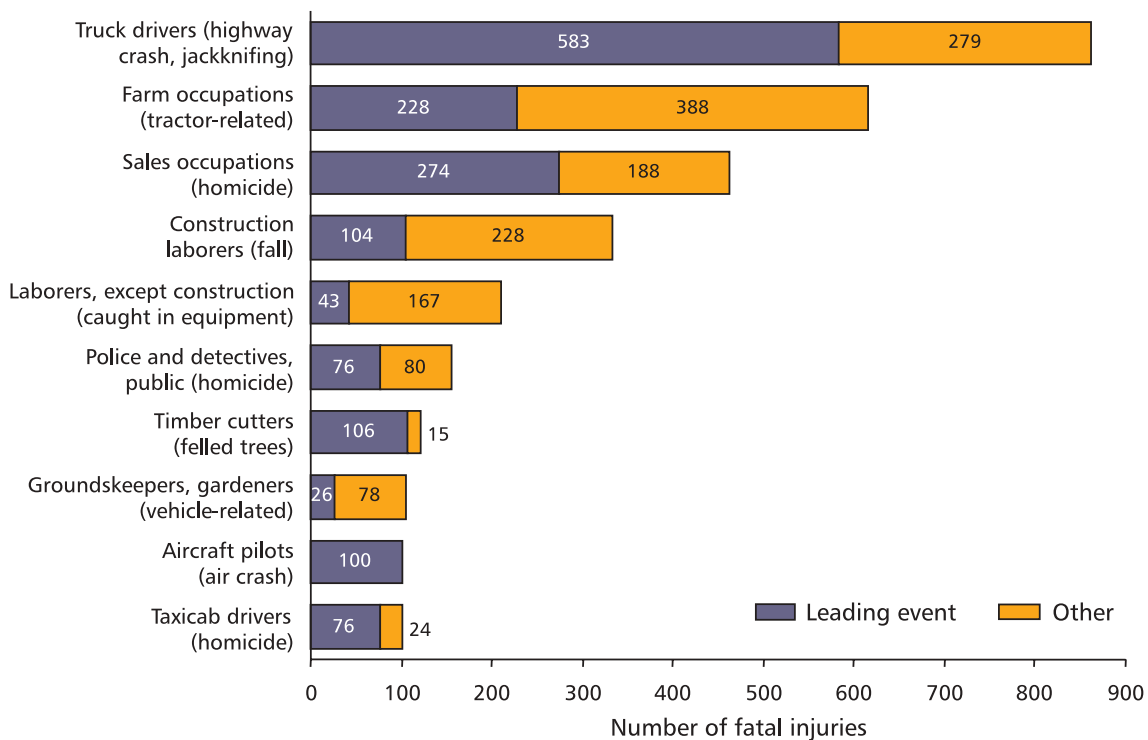
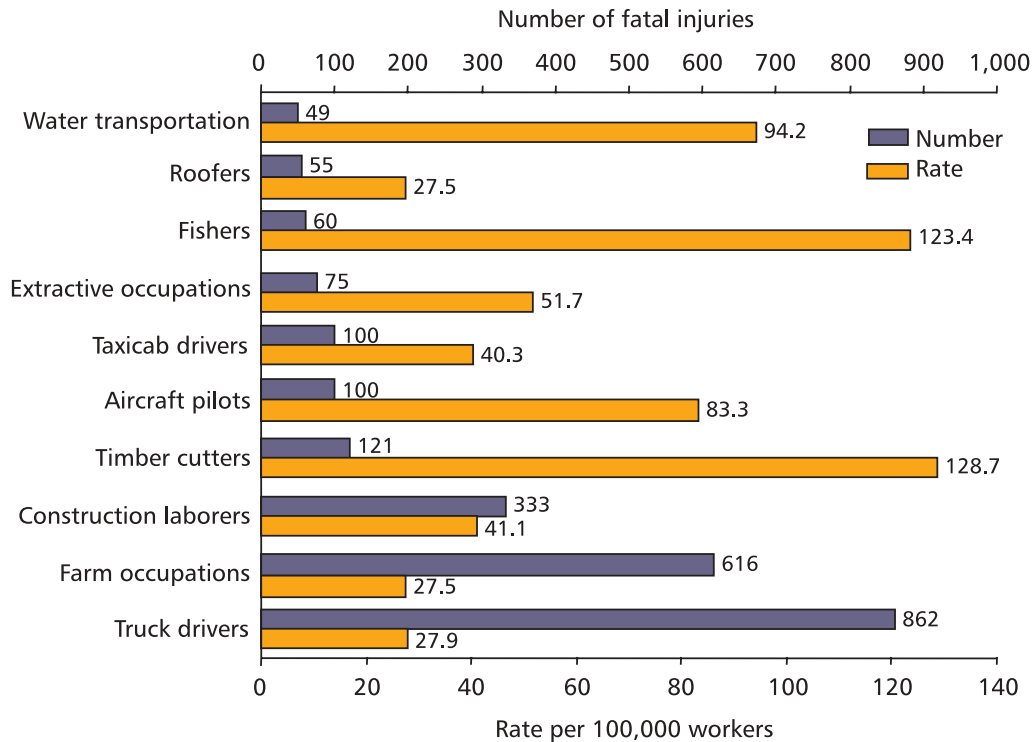


Figure 10. Number and rate of fatal occupational injuries by industry division, 1997. The total number of fatal occupational injuries was 6,238; the national rate was 4.8 per 100,000 workers. (Source: CFOI [1999].)

# FATAL INJURY



**Figure 11.** Number of fatal occupational injuries by selected high-risk occupations and leading event, 1997. The total number of fatal occupational injuries in 1997 for all occupations was 6,238. (Source: CFOI [1999].)



**Figure 12.** Number and rate of fatal occupational injuries per 100,000 workers in high-risk occupations, 1997. The national rate was 4.8 per 100,000 workers. (Source: CFOI [1999].)



Annual rates of fatal occupational injury by industry division for selected causes of death are shown in Figure 13 using NTOF data. Workers in mining and agriculture, forestry, and fishing had the highest rates of machine-related deaths, and workers in transportation and public utilities, mining, and agriculture, forestry, and fishing had the highest rates of work-related motor vehicle deaths. Workers in retail trade and public administration had the highest rates of work-related motor vehicle deaths. Workers in retail trade and public administration had the highest rates of workplace homicide.

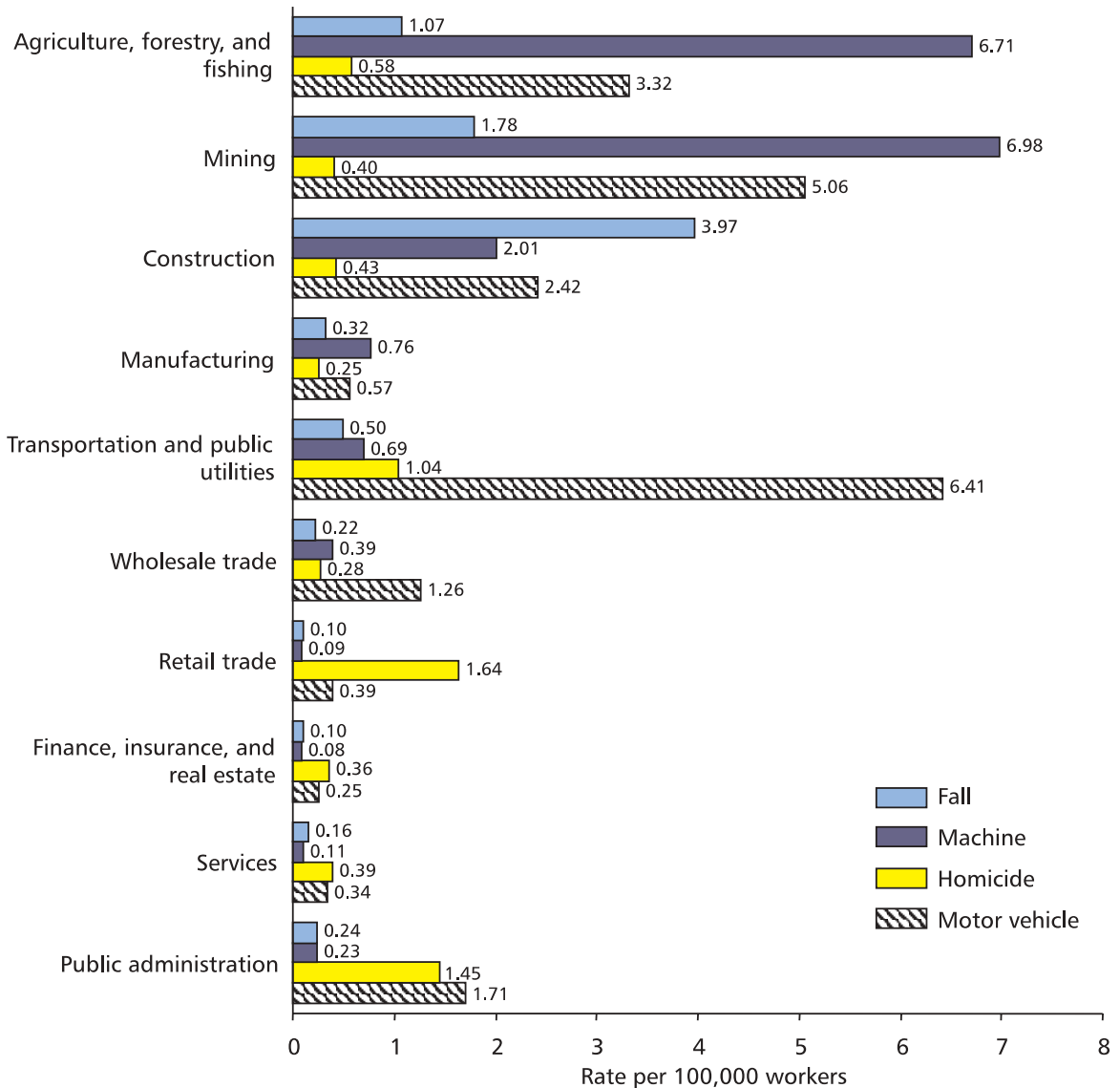


Figure 13. Average annual rate of fatal occupational injuries by industry division and selected causes of death, 1980–1995. (Source: NTOF [1999].)

### Fatal Injuries by State

NTOF data for 1980–1995 (based on the State listed on the death certificate) indicate that Alaska, Wyoming, and Montana had the highest fatal occupational injury rates (Table 1). California, Texas, Florida, and Illinois had the greatest number of fatal occupational injuries. CFOI data (based on the State in which the fatal incident occurred) indicate that California, Texas, Florida, and New York had the greatest number of fatal occupational injuries in 1997.

Table 1. Distribution and average annual rate of fatal occupational injuries by State listed on death certificate, 1980–1995

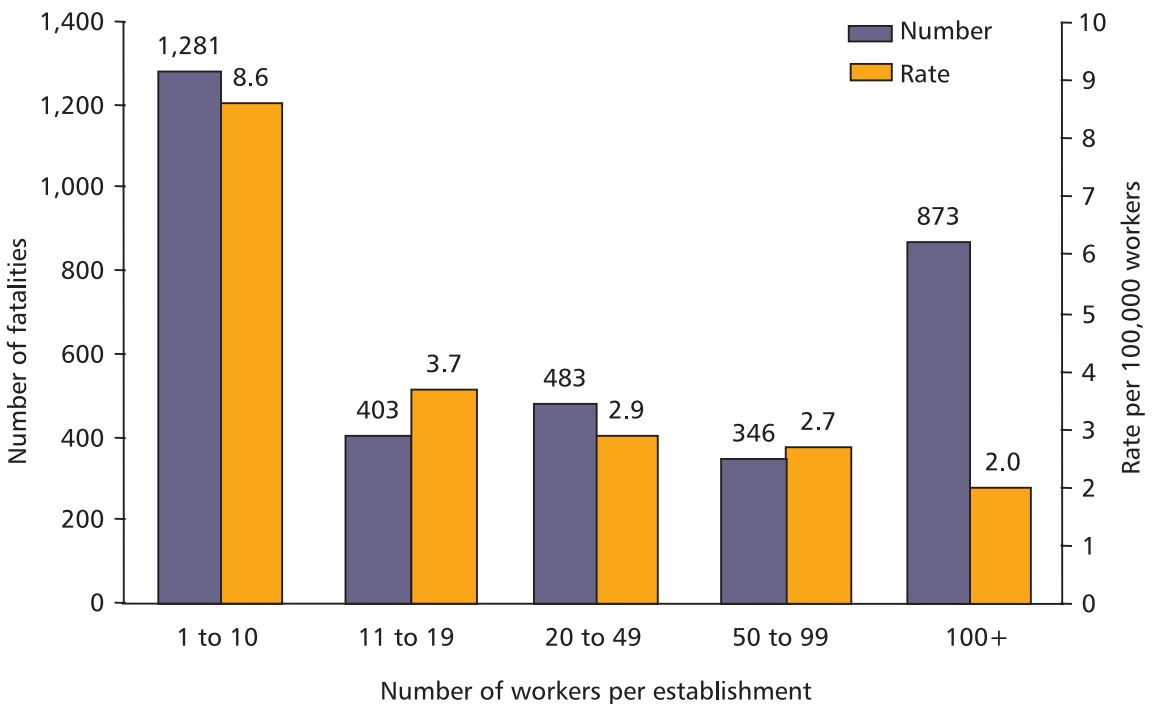
State	Deaths	Rate*	Rank	State	Deaths	Rate	Rank
Alabama	1,875	6.9	19	Montana	750	12.4	3
Alaska	916	25.2	1	Nebraska	1,005	8.0	13
Arizona	596	2.5	49	Nevada	732	8.4	9
Arkansas	1,340	8.3	10	New Hampshire	257	3.0	45
California	9,821	4.8	33.5	New Jersey	1,523	2.6	47
Colorado	1,642	6.3	22	New Mexico	769	7.7	15.5
Connecticut	445	1.7	51	New York	3,567	2.9	46
Delaware	205	4.0	40	North Carolina	2,691	5.5	29.5
District of Columbia	298	6.5	21	North Dakota	442	9.0	8
Florida	5,643	6.6	20	Ohio	2,659	3.4	42.5
Georgia	3,284	7.2	18	Oklahoma	1,329	5.8	25.5
Hawaii	353	4.5	37	Oregon	1,552	7.3	17
Idaho	787	10.8	4	Pennsylvania	3,927	4.7	35
Illinois	4,171	4.9	32	Rhode Island	193	2.6	48
Indiana	2,284	5.5	29.5	South Carolina	1,416	5.8	25.5
Iowa	1,374	6.2	23	South Dakota	496	9.2	7
Kansas	1,178	6.1	24	Tennessee	1,980	5.7	27
Kentucky	2,040	8.0	13	Texas	9,449	7.7	15.5
Louisiana	2,282	8.2	11	Utah	938	8.0	13
Maine	403	4.6	36	Vermont	195	4.4	39
Maryland	1,227	3.4	42.5	Virginia	2,541	5.5	29.5
Massachusetts	987	2.1	50	Washington	1,833	5.4	31
Michigan	2,437	3.7	41	West Virginia	1,145	10.5	5
Minnesota	1,092	3.1	44	Wisconsin	1,730	4.5	38
Mississippi	1,692	10.1	6	Wyoming	615	16.7	2
Missouri	1,823	4.8	33.5				

Source: NTOF [1999]

\*Per 100,000 workers.

### Fatal Injuries by Establishment Size

CFOI collects information about the number of workers in establishments where fatally injured workers were employed. In 1997, this information was available for 79% of all records for private sector wage and salary workers. Based on the available data, the highest rate of fatal occupational injury (8.6 per 100,000 workers) occurred in establishments with 1 to 10 workers, whereas the lowest rate (2 per 100,000 workers) occurred in establishments with 100 or more workers (Figure 14). Self-employed workers accounted for 20% of the fatal occupational injuries in 1997. The fatality rate of 11.7 cases per 100,000 workers for the self-employed was nearly two and a half times the rate of 4.8 per 100,000 for all wage and salary workers (public and private sector combined).



**Figure 14.** Number and rate of fatal occupational injuries in private sector wage and salary workers by employment size of establishment, 1997. The total number of fatal occupational injuries was 4,305. Employment size was not reported for 919 fatalities; these data could significantly change the above rates. (Source: CFOI [1999]. Employment data are from the *Employment and Wages Annual Averages, 1997* [BLS 1998].)

## Special Topics in Fatal Occupational Injury

### Fatal Injuries among Truck Drivers

Truck drivers suffered nearly 14% of the fatal occupational injuries during 1997 according to CFOI data. The number of fatalities among truck drivers has increased fairly steadily, from 699 in 1992 to 862 in 1997. Over the same period, the fatality rate increased from 26 to 28 per 100,000 workers. In 1997, more than 50% of the fatalities occurred in trucks with trailers or semitrailers (Figure 15), and more than 80% occurred in transportation-related incidents (Figure 16). Fatalities from jackknifing and from collisions increased by 16% and 9%, respectively, between 1996 and 1997. More than half of the fatal occupational injuries among truck drivers occurred on interstate highways, freeways, expressways, or other State or U.S. highways (Figure 17).

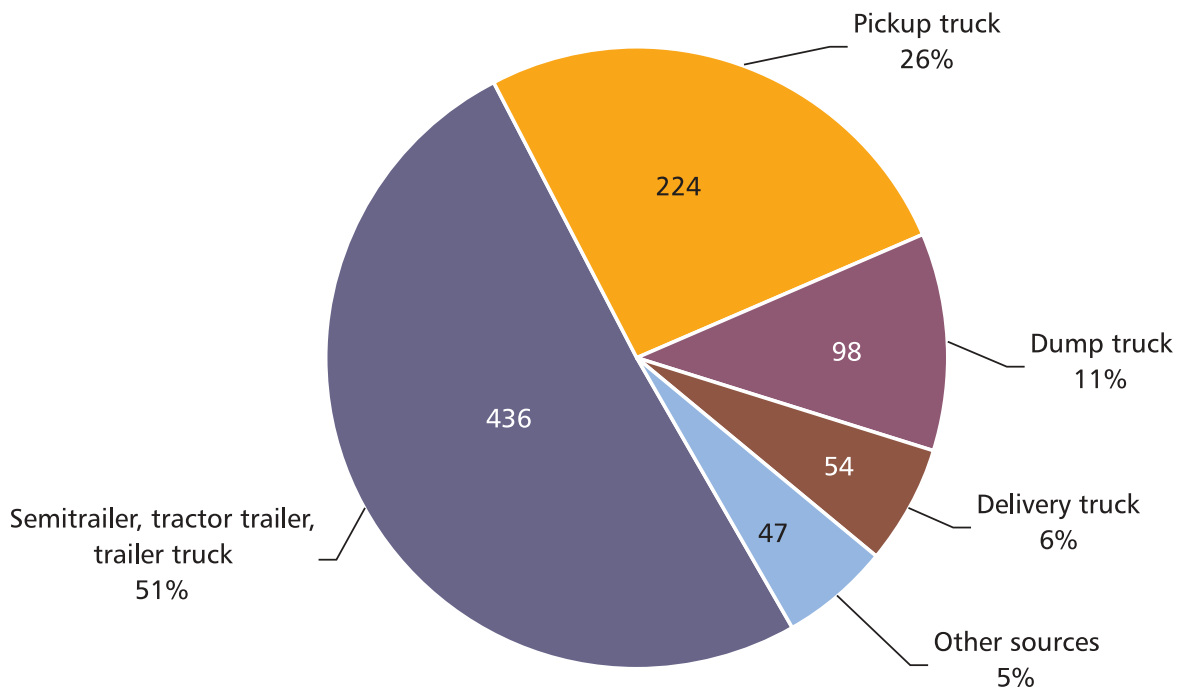


Figure 15. Number and distribution of fatal occupational injuries to truck drivers by source of fatal injury, 1997. (Source: CFOI [1999].)

# FATAL INJURY

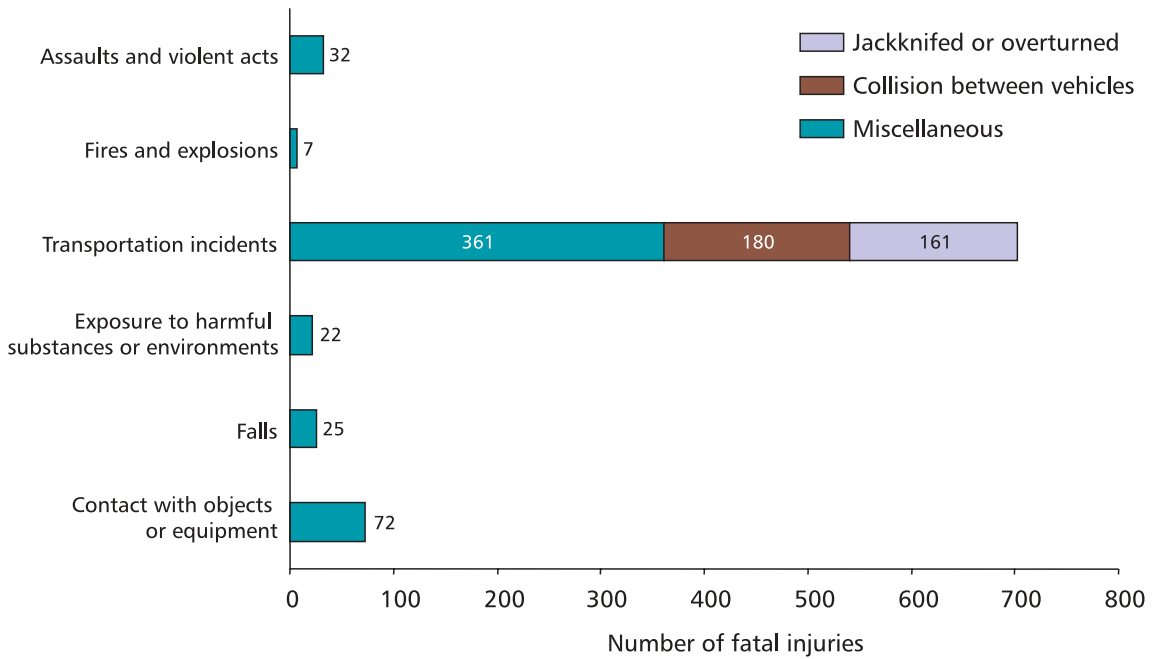


Figure 16. Number of fatal occupational injuries to truck drivers by event or exposure, 1997. (Source: CFOI [1999].)

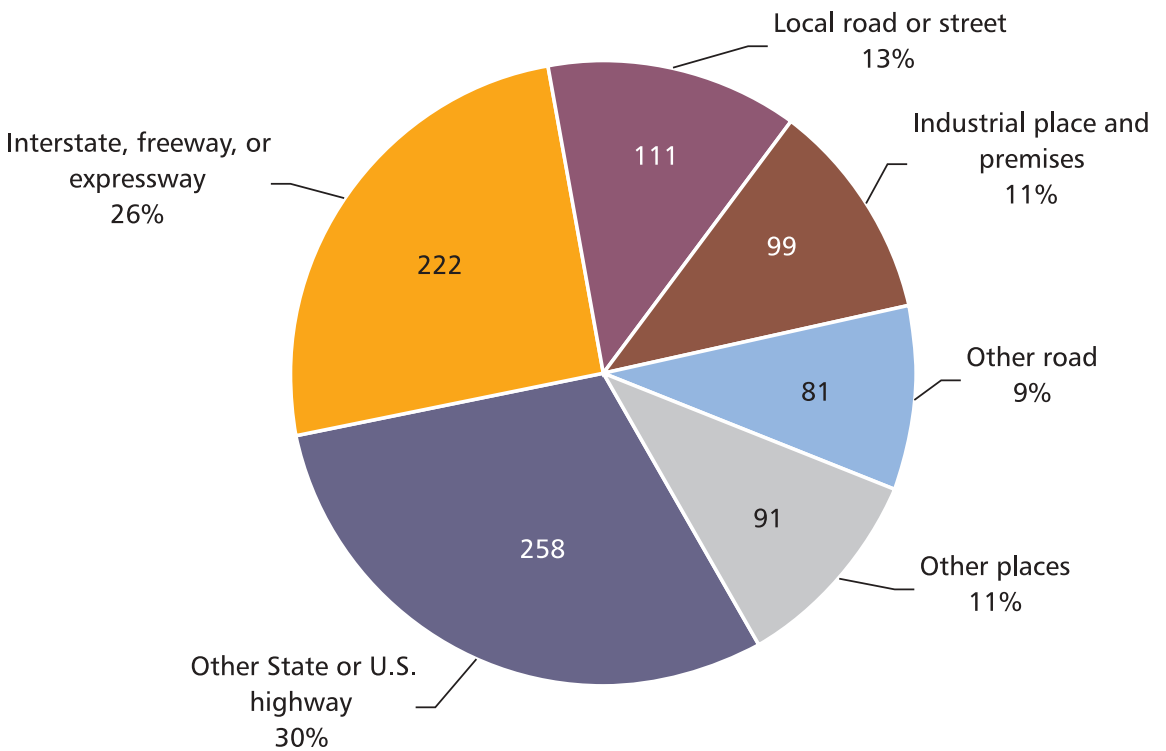
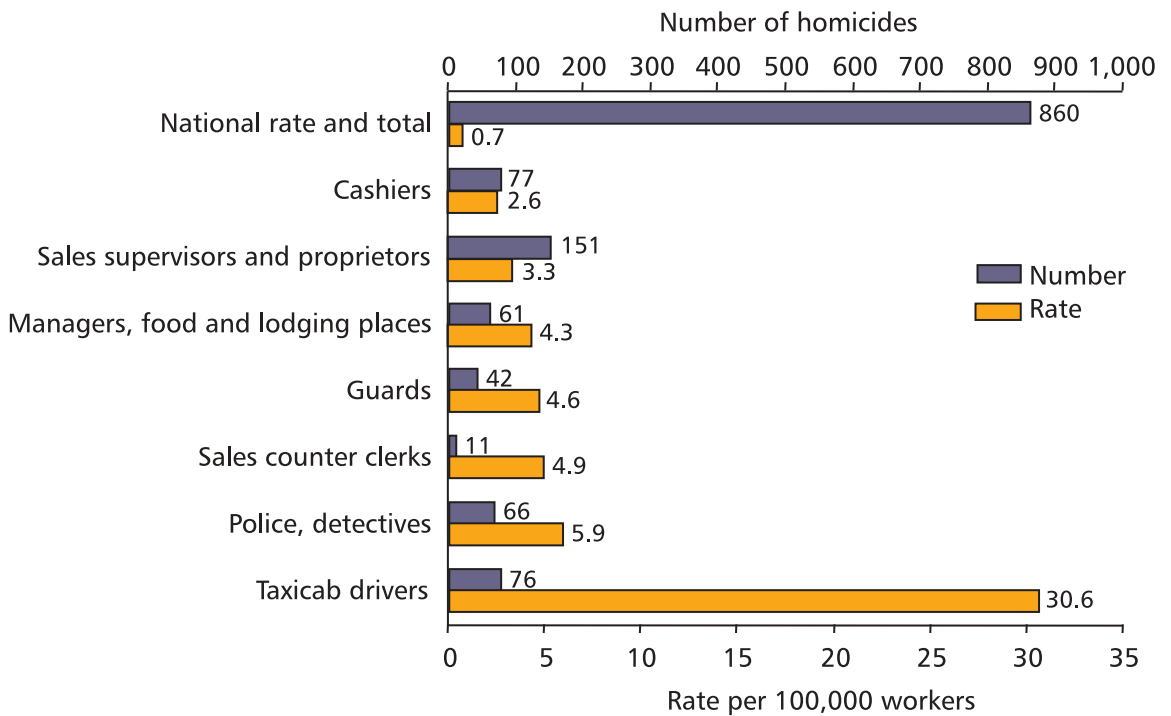


Figure 17. Number and distribution of fatal occupational injuries to truck drivers by location of fatal injury, 1997. (Source: CFOI [1999].)

## Homicides

Homicides, the second leading cause of fatal occupational injuries, declined by 7% from 1996 to 1997. Taxi drivers had the highest rate of homicide (Figure 18); the highest number of homicides occurred in retail trade in grocery stores and eating and drinking establishments (Figure 19). Eighty percent of workplace homicides resulted from shootings [CFOI 1999]. Robbery was the primary motive for occupational homicide when a motive could be ascertained from the source documents (Figure 20).



**Figure 18.** Number and incidence rate of homicides for high-risk occupations, 1997. (Source: CFOI [1999].)

# FATAL INJURY

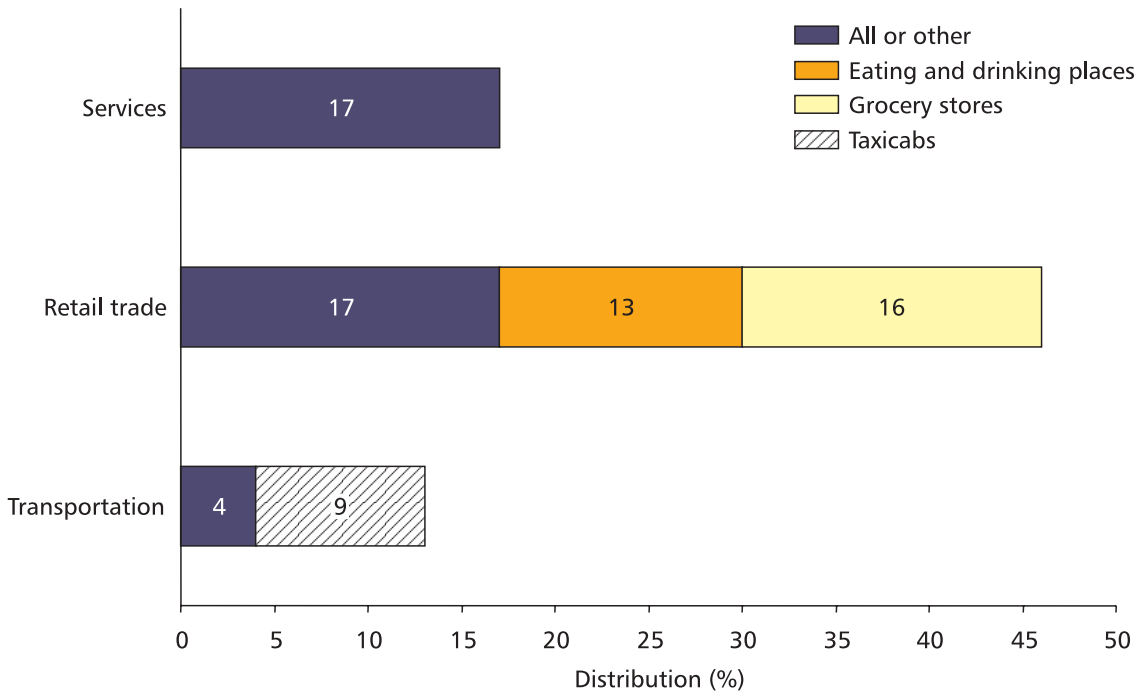


Figure 19. Distribution of homicides in high-risk industries, 1997. (Source: CFOI [1999].)

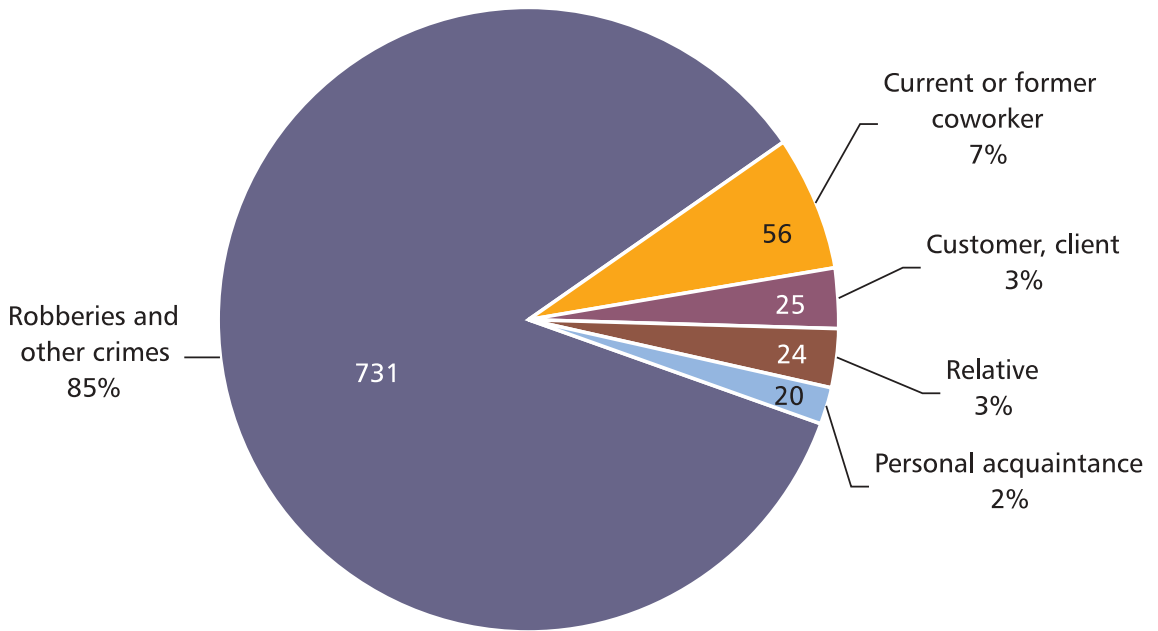


Figure 20. Number and distribution of work-related homicides, by circumstance or alleged perpetrator, 1997. (Source: CFOI [1999].)



## Fatal Falls

Falls were the fifth leading type of fatal occupational event in 1997, accounting for more than 700 deaths, or 12% of all fatal occupational injuries (Figure 7). Fatalities from falls recorded in the CFOI increased by more than 19% from 1992 to 1997. Falls to a lower level, including falls from roofs, were the major contributors (Figure 21). Approximately half of the falls occurred in the construction industry (Figures 22 and 23).

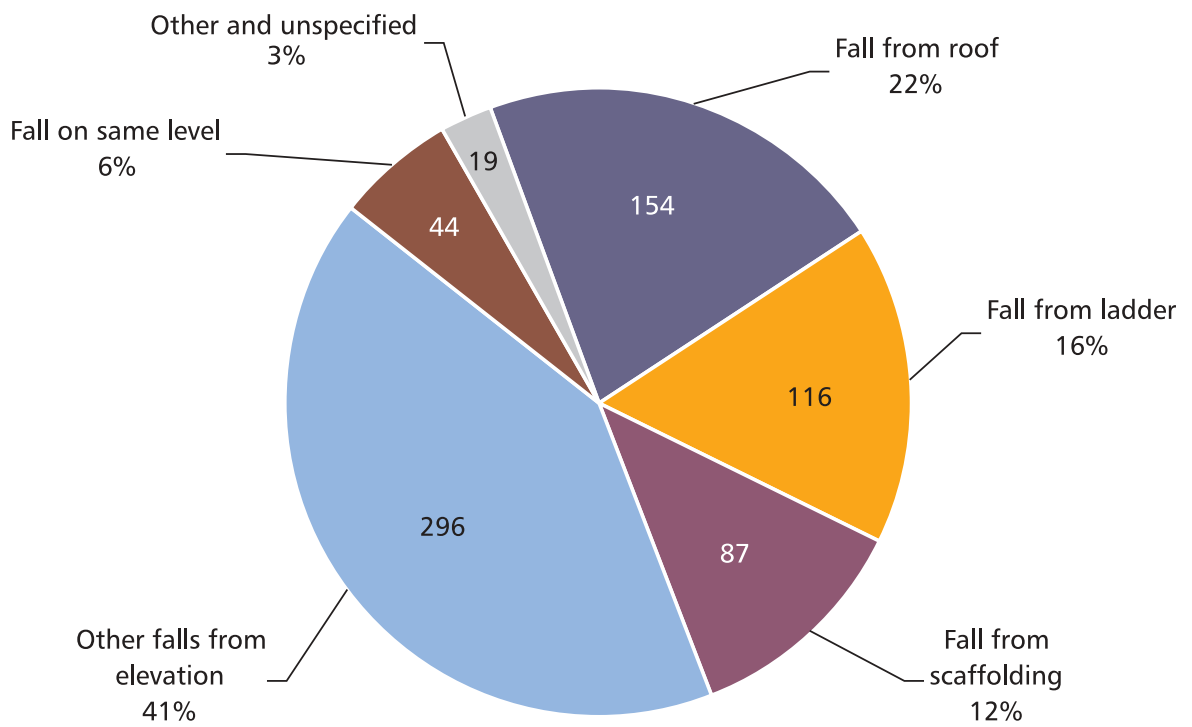


Figure 21. Number and distribution of fatal occupational falls by type of fall, 1997. (Source: CFOI [1999].)

# FATAL INJURY

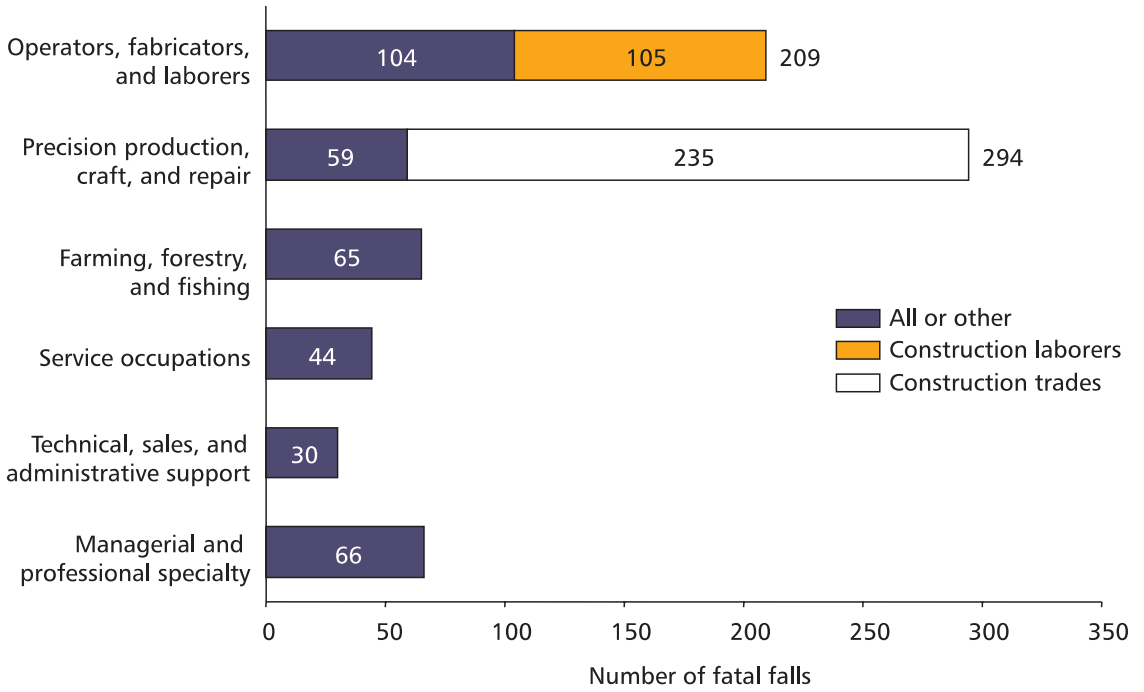


Figure 22. Number of fatal occupational falls by occupational group, 1997. (Source: CFOI [1999].)

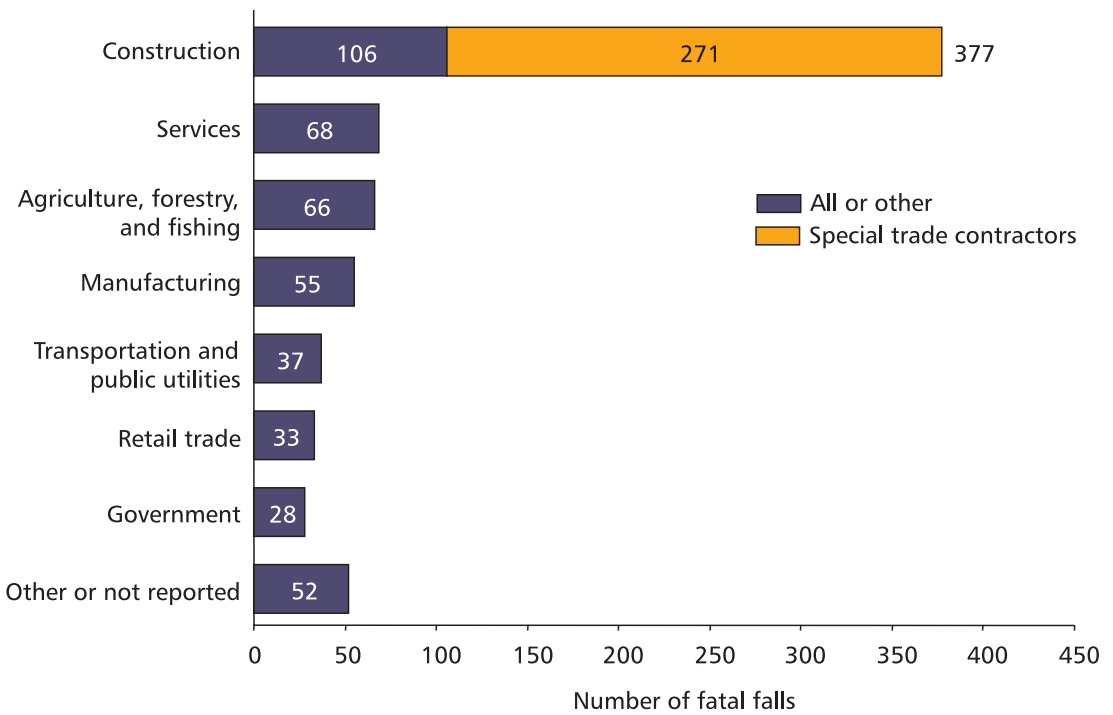
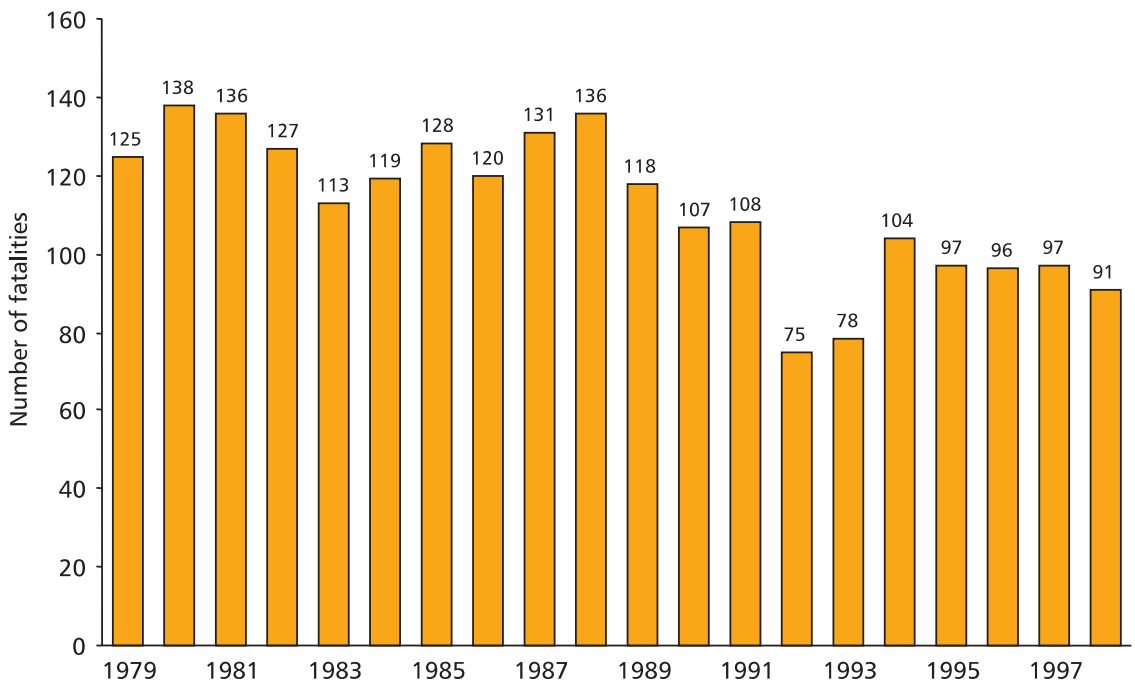


Figure 23. Number of fatal occupational falls by industry division, 1997. (Source: CFOI [1999].)

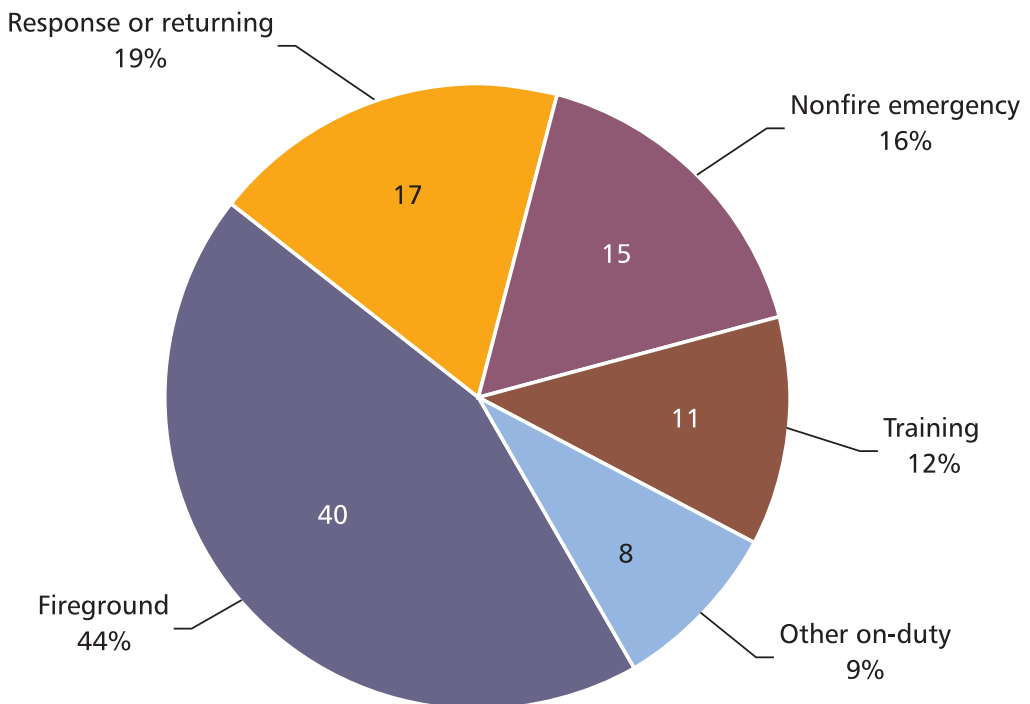
## Fire Fighter Fatalities

NIOSH began investigating all fire fighter fatalities in October 1998. The goal of this initiative is to examine the magnitude and characteristics of occupational deaths and severe injuries among fire fighters and to develop recommendations for injury prevention. The investigations are being conducted through the fatality assessment and control evaluation (FACE) model developed by NIOSH. For each case investigated, information is collected on factors associated with the fire fighter who died, the physical agents contributing to the death, and the environment. These factors are identified during three phases: pre-event, event, and post-event. The contributing factors are investigated in detail for each incident and are summarized in the investigation report along with recommendations for preventing future incidents. Additional information about the NIOSH fire fighter program and individual investigation case reports are available on the NIOSH Web site at [www.cdc.gov/niosh/firehome.html](http://www.cdc.gov/niosh/firehome.html).

The National Fire Protection Association (NFPA) and the U.S. Fire Administration estimate that an average of 112 fire fighters died on the job each year between 1979 and 1998 (Figure 24). In 1998, 44% of the fire fighter deaths occurred at the fireground. Another 35% occurred while responding to or returning from alarms or performing other nonfire emergency duties (Figure 25). Heart attacks (43%), internal trauma (23%), and asphyxiation (10%) were the most frequent causes of death in 1998 (Figure 26).



**Figure 24.** Number of fire fighter deaths, 1979–1998. Total number of deaths was 2,244. (Source: NFPA [Washburn et al. 1999].)



**Figure 25.** Number and distribution of fire fighter deaths by type of duty, 1998. Total number of deaths was 91. (Source: NFPA [Washburn et al. 1999].)

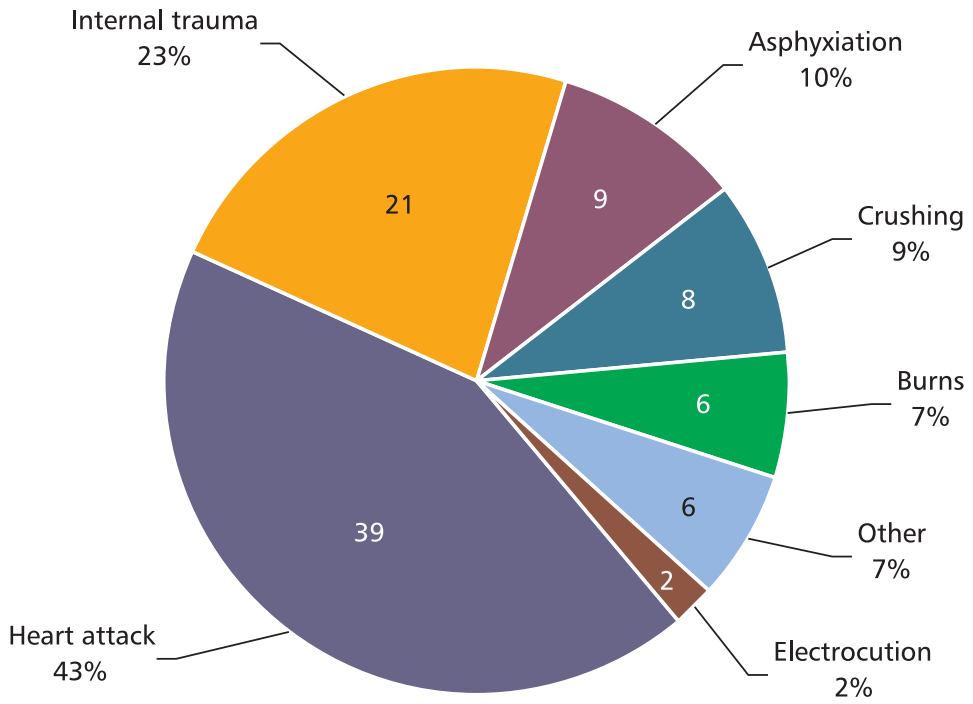


Figure 26. Number and distribution of fire fighter deaths by nature of injury, 1998. Total number of deaths was 91. (Source: NFPA [Washburn et al. 1999].)

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