Traumatic Occupational Fatalities in the Retail Industry, United States 1992–1996

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Background *Retail is a growing economic sector and employs an increasing number of the overall workforce, yet little is known about the incidence and characteristics of work-related deaths in the retail industry.*
Methods *Workplace deaths were examined using the Census of Fatal Occupational Injuries from 1992 through 1996. Occupational fatality rates were calculated by age, gender, and type of establishment, and characteristics of occupational deaths in the retail industry were compared to other industries.*
Results *Liquor stores had the highest work-related fatality rates in the retail industry. The two leading causes of death in the retail industry were violence (69.5%) and motor vehicle crashes (19.3%). Females, younger, minority, and foreign-born workers were more likely to be killed in retail than other industries. Deaths in the retail industry were more likely to be in small businesses, after normal business hours, and in urban settings.*
Discussion *Workers in the retail industry were at lower risk of most types of workplace deaths but had a markedly increased risk of violent death than workers in other industries.* Am. J. Ind. Med. 35:186–191, 1999.   © *1999 Wiley-Liss, Inc.*

KEY WORDS: occupational; fatality rates; injuries; violence; epidemiology

INTRODUCTION

Although the retail industry is not traditionally thought of as being a high hazard industry, approximately 11% of all work-related deaths in the United States since 1992 have been retail workers [Toscano and Windau, 1996]. Retail is a large and growing sector as measured both in the number of workers and annual revenue. Since 1992, retail has employed over 22 million workers annually and has had a general increase in the number employed. In many metropolitan areas, the retail and service sectors are replacing other traditional industries, such as manufacturing, as the leading employers. As this trend continues the number of occupational deaths to retail workers will increase.

The retail employee population has several unique characteristics related to certain types of work-related deaths. Unlike the overall job market, which historically has been about 66% male, over half of retail sector workers are female. From 1992–1995, the retail sector employed an annual average of 11,783,112 females, which is 5% higher than the average of 11,203,698 males. The retail sector also employs a high proportion of young and elderly workers. Since 1992, the retail sector has employed an average of over 3.6 million workers under the age of 20, as well as approximately 700,000 workers over the age of 65. These sex and age characteristics are important when considering work-related deaths because women, younger, and older workers have different risk factors for work-related death and injury than other workers [Jenkins et al., 1992; Kraus, 1987; Kraus et al., 1996].

Workers in the retail industry are at higher risk for certain causes of work-related deaths. Retail workers in some sectors have been identified as having a high risk for work-related death since the 1970s [Crowe and Bull, 1975],

TABLE I. Average Occupational Death Rates per 100,000 Retail Workers by Age and Gender United States, 1992–1996

	1992		1993		1994		1995		1996	
	Number	**Rate[a]**	**Number**	**Rate[a]**	**Number**	**Rate[a]**	**Number**	**Rate[a]**	**Number**	**Rate[a]**
Total	738	3.27	796	3.43	808	3.46	680	2.97	671	2.97
Gender										
Male	622	5.74	661	5.84	654	5.70	561	5.01	555	5.12
Female	116	1.00	135	1.14	154	1.29	119	1.02	116	0.99
Age[b]										
16–19	36	1.06	39	1.17	40	1.09	44	1.10	34	1.00
20–24	85	2.13	89	2.16	91	2.10	64	1.59	68	1.70
25–34	190	3.22	186	3.14	185	3.24	165	2.96	146	2.47
35–44	165	3.89	190	4.36	180	4.11	151	3.62	129	3.04
45–54	132	5.11	128	4.45	160	5.44	123	4.25	141	5.46
55–64	85	4.97	105	5.66	92	5.56	75	4.84	90	5.26
65+	44	6.02	58	8.20	59	8.69	58	8.88	62	8.49

[a]Rate per 100,000 retail employees.
[b]One case in 1996 had an unknown age and was excluded from age categories.

and in the 1980s researchers recognized the high incidence of workplace homicide among clerks in convenience stores [Castillo and Jenkins, 1994; Erickson, 1996]. Contact with the public, exchange of money, and working late at night place retail workers at high risk of workplace assault [CDC, 1993]. Working with store inventories introduces the risk of falls and being hit or crushed by objects. Many retail services involve transportation and local or long distance deliveries, which place workers at risk of work-related transportation deaths. This study examined the incidence rates and types of deaths in the retail sector in the United States from 1992–1996 in order to enumerate the incidence and identify characteristics of work-related deaths that differ between the retail and other industries.

MATERIALS AND METHODS

Workplace injury deaths in the United States from 1992 through 1996 were examined from the Census of Fatal Occupational Injuries (CFOI). The CFOI, maintained by the Department of Labor, Bureau of Labor Statistics, is the most comprehensive national surveillance system of work-related deaths available. Cases are identified through death certificates, medical examiner records, worker's compensation claims, media reports, and OSHA reports. At least two of these sources must corroborate each death. Work-related deaths are reported to the BLS from a designated agency in each state and the District of Columbia, usually the Department of Industrial Relations.

The retail industry includes Standard Industrial Codes (SIC) 520 through 599. Types of retail establishments were

subdivided by SIC into building materials and garden supplies (SIC 52X); general merchandise stores (SIC 53X); food stores (SIC 54X); automotive dealers, supplies, and service stations (SIC 55X); apparel and accessory stores (SIC 56X); home furnishing stores (SIC 57X); eating and drinking places (SIC 581); drug and proprietary stores (SIC 591); liquor stores (SIC 592); and other retail (SIC 590, 593–599). Eating places were not further subdivided because the fourth digit coding is often not accurately coded because of missing information. Deaths in drinking establishments were reviewed individually but were not separated in rate calculations because the denominator was not readily available to four-digit subclassification.

For rate calculations, the number of workers for the years 1992–1996 was determined from the Current Population Survey (CPS). The CPS is an annual survey of approximately 57,000 households conducted by the U.S. Bureau of the Census to determine demographic and employment information, among other items. Information from the survey is weighted to the population based on 10-year census counts to determine annual estimates of the workforce. The CPS data were stratified by age, gender, and SIC code.

Logistic regression was used to examine characteristics of workplace deaths compared with other industries. Models were run independently for each characteristic using SAS software [SAS, 1995]. Characteristics of CFOI deaths including age, gender, type of business, and type of event were compared between retail and other industries.

TABLE II. Occupational Death Rates for the Retail Sector by Year

	1992		1993		1994		1995		1996	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Total	738	3.27	796	3.43	808	3.46	680	3.00	671	2.97
Building and garden supply	30	3.00	32	3.44	43	5.31	37	3.97	40	4.29
General merchandise	27	1.09	26	0.95	33	1.28	18	0.68	25	0.89
Food supplies	212	5.74	227	5.80	237	6.41	190	4.97	173	4.69
Automotive supply and dealers	117	5.22	139	5.93	123	5.23	123	5.54	98	4.36
Apparel and accessory	22	1.89	23	1.69	12	0.94	19	1.80	11	0.94
Home furnishings	13	1.20	25	1.96	34	2.39	21	1.61	32	2.57
Eating and drinking establishments	191	2.74	202	2.84	184	2.51	164	2.33	167	2.40
Drug stores	4	0.61	8	1.35	7	1.12	6	1.00	7	1.06
Liquor stores	24	16.82	23	18.30	23	18.89	21	18.73	17	11.78
Other retail	98	3.05	90	3.05	112	3.60	81	2.59	101	3.61

RESULTS

Work-related fatality rates in the retail industry increased slightly from 3.27 deaths per 100,000 workers in 1992 to 3.46 in 1994, then decreased to 2.97 in 1995 and 1996 (Table I). For all years, the fatality rate for males was approximately five times that of females. The male rate was highest in 1993, with 5.84 deaths per 100,000 workers, and decreased to 5.12 in 1996. The female fatality rate peaked at 1.29/100,000 in 1994, then hit a 5-year low in 1996, with less than one fatality per 100,000 workers. In each of the 5 years examined, rates increased with increasing age and were significantly elevated for those over age 65. Rates among those over age 65 increased from 6.02/100,000 in 1992 to a peak of 8.88/100,000 in 1995, then decreased slightly to 8.49/100,000 in 1996. Workers over age 65 were the only age group to show a consistent increase over time. Rates among those aged 25–34, which included both the largest number of workers and number of deaths, ranged between 3.14 in 1993 and 2.96 in 1995.

Liquor stores had a significantly higher fatality rate than all other retail establishments ($P < 0.01$) (Table II). Fatality rates among liquor store workers were over 16 per 100,000 workers each year except 1996, and rates were highest in 1995 with 18.89 deaths per 100,000 workers. Rates in 1996 fell sharply, due to an increase in the number of reported liquor store workers and a decrease in the number of deaths. Food supply stores, which includes grocery stores and markets, had the second highest rates, with a range from 4.97 to 6.41 per 100,000 workers. Automotive supply and dealers, which includes gas stations, also showed high rates, with a range of 5.23 to 5.93 per 100,000 workers. Although eating and drinking establishments had the second largest number of deaths and their employees are considered to be at very high risk, the rates ranged between 2.33 and 2.84 and were lower than the average for the retail industry. These

TABLE III. Types of Occupational Deaths Among Retail Industries Workers United States, 1992–1996

	Violence		Transportation		Other	
	N	Percent	N	Percent	N	Percent
Total	2,564	69.5	711	19.3	417	11.3
Building and garden supply	38	20.9	71	39.0	73	40.0
General merchandise	70	54.3	30	23.3	29	22.5
Food supplies	907	87.3	77	7.4	55	5.3
Automotive supply and dealers	304	50.7	194	32.3	102	17.0
Apparel and accessory	72	82.8	12	13.8	3	3.4
Home furnishings	64	51.2	39	31.2	22	17.6
Eating and drinking establishments	717	79.0	116	12.8	75	8.2
Drug stores	15	46.9	14	43.8	3	9.4
Liquor stores	107	99.1	0	0.0	1	0.9
Other retail	270	55.9	158	32.7	55	11.4

rates do not reflect the differentially greater risk for workers in certain types of eating and drinking establishments, such as bars and fast food. The number of deaths among workers in drinking establishments increased by almost 50% in 1996 compared with the four previous years, which is the greatest increase found in any category over this 5-year period. General merchandise and drug stores both had low work-related fatality rates.

The proportion of deaths due to violence, transportation, and other causes is shown in Table III. Violence, which is comprised of homicide, suicide, and undetermined manner, was responsible for 69.5% and transportation for 19.3% of all retail industry deaths, and for all but two sectors these two causes accounted for over 80% of deaths. Violence was

not only the leading cause of death but also represented over 50% of all deaths in all retail sectors except drug stores and home and garden supply stores. Over 80% of deaths were related to violence in apparel and accessory and food supply stores, and violence accounted for 99.1%, all but one death, in liquor stores.

Transportation deaths were most frequent in drug stores (43.8%) and were also common in home and garden supply (39.0%), home furnishing (31.2%), and automotive supply and dealers (32.3%) (Table III). The businesses with a higher proportion of transportation deaths probably have the highest exposure to road use of the retail industries due to delivery services or automotive testing.

Home and garden supply stores, in which 40.1% of deaths were related to neither violence nor transportation, had a higher proportion of deaths due to falling objects (19.6%), exposure, such as to electric current or a harmful chemical (9.1%), and falls (8.4%) than other retail types. Falling objects were responsible for over 6% and fires for over 3% of deaths among automotive supply and dealers and general merchandise workers. These causes of death were much less frequent among workers in other retail settings.

The violent death rate for males (3.8/100,000 workers) exceeded that of females (0.8/100,000 workers) (Table IV). However, violence was the cause of 76.1% of all female deaths but only 68.1% of male deaths. The rate of violent work-related death increased with increasing age and was highest for workers over age 65 (4.8/100,000 workers).

In the 5-year period, 94.0% of violent deaths in the retail industry were homicides, for a rate of 2.14 homicides per 100,000 workers. Suicides accounted for 5.9% of violent deaths for a rate of 0.13 per 100,000 workers. Suicides were most frequent in the home furnishing and home and garden supply industries. The nature of suicide at work is largely undefined, and these are considered in the database when the coroner or other source has indicated that the suicide is at work or work-related. The manner for one violent death was unspecified.

Among homicides with a known perpetrator, 83.7% were perpetrated by a robber or occurred during some type of criminal activity (Table IV). The perpetrator was a customer or client in 6.3% of homicides, an employee or ex-employee in 5.5%, and a personal acquaintance in 4.4%. In 35.7% of the events, the perpetrator and motivations were not established or there was not enough detail included in the report to determine the correct category. Shootings comprised 83.7% of all homicides, with stabbings, hitting/kicking, and other means each comprising less than 10% of deaths.

Characteristics of Work-Related Deaths in Retail Compared to Other Industries

Although rates for deaths in the retail industry were higher for males, deaths in the retail industry were 2.92 times more likely to involve females than deaths in other

TABLE IV. Characteristics of Fatalities due to Violence in the Retail Industry United States, 1992–1996

Characteristic	N	Percent	Rate*
Gender			
Male	2,077	81.0	3.8
Female	487	19.0	0.8
Age group			
16–19	121	4.7	0.7
20–24	273	10.7	1.4
25–34	620	24.2	2.1
35–44	587	22.9	2.8
45–54	481	18.8	3.7
55–64	308	12.0	3.6
65+	174	6.8	4.8
Type of violence			
Homicide	2,411	94.0	2.1
Suicide	152	5.9	0.1
Undetermined	1	.04	N/A
Perpetrator of homicide			
Known perpetrator	1,559	64.7	N/A
Criminal activity (e.g., robbery)	1,292	82.9	
Customer/client	98	6.3	
Employee/ex-employee	86	6.2	
Personal acquaintance	73	4.7	
Unknown	852	35.3	N/A
Type of Homicide			
Shooting	2,017	83.7	N/A
Stabbing	215	8.9	
Hitting/kicking	90	3.7	
Other	89	3.7	

*Average annual rate per 100,000 workers from 1992–1996.

industries combined (95% CI 2.64–3.22) (Table V). Workers under the age of 20 who were killed were 2.08 times more likely to be working in retail (95% CI 1.76–2.44), while workers over the age of 65 were slightly less likely to be working in the retail industry (OR = 0.92; 95% CI 0.81–1.05). Work-related deaths among retail workers were 2.14 times more likely to be among minorities (95% CI 1.98–2.31) and 3.56 times more often foreign-born (95% CI 3.21–3.87) than deaths in other industries combined. The odds ratios from this multivariate model control for all variables in the model, so these results indicate that both minority status and foreign birth act independently to increase risk.

Deaths in the retail industry were significantly more likely to occur after normal business hours, defined as 8:00 AM to 6:00 PM (OR = 2.56; 95% CI 2.39–2.74) and slightly more likely to occur in small businesses, which were defined as those having fewer than 20 workers (OR = 1.20; 95% CI 1.12–2.29). Retail deaths were less likely to occur in rural

TABLE V. Characteristics of Occupational Deaths in Retail Compared to Other Industries United States, 1992–1996

Factor	Odds ratio	95% Confidence interval
Female	2.92	2.64–3.22
Under age 20	2.08	1.76–2.44
Age 65 and over	0.92	0.81–1.05
Victim: foreign born	3.54	3.21–3.87
Victim: minority	2.14	1.98–2.31
Small business[a]	1.20	1.12–1.29
After normal business hours[b]	2.56	2.39–2.74
Rural area	0.71	0.67–0.75
Violence-related death	14.45	13.36–15.61
Transportation-related death	0.31	0.28–0.33

[a]Less than 20 employees.
[b]Before 8:00 AM and after 6:00 PM.

areas (OR = 0.71; 95% CI 0.67–0.75). Retail deaths were 14.45 times more likely to be related to violence than deaths in other industries (95% CI 13.36–15.61) but significantly less likely to be related to transportation (OR = 0.31; 95% CI 0.28–0.33).

DISCUSSION

Violence is the predominant cause of death among retail workers, and retail workers have a significantly higher rate of violent death than the general workforce. The highest work-related fatality rates in the retail industry were found among liquor store workers, who died almost exclusively from homicide. In states that do not have state-owned liquor stores, liquor stores tend to be small businesses with few employees and long hours, are rarely members of large corporations, which may devote resources to safety, such as convenience stores and gas stations, and are often located in high crime areas. These factors may contribute to higher homicide rates. The greatest increase in deaths over the 5-year period was in drinking establishments, in which work-related deaths increased by 50% from 1995 to 1996. The causes of this increase have not yet been explained. Death rates and the proportion of deaths due to violence were lower for general merchandise, home furnishing, and drug stores. General merchandise and home furnishing stores tend not to be open during late-night hours, are often large establishments, and are often associated with other businesses, such as in shopping malls. These characteristics might reduce the risk of violence to workers.

Previous research has indicated that although workplace homicide rates for males were higher than for females, females who were killed at work were more likely to be victims of homicide than other causes [Alexander et al., 1994]. This study has similar findings for the retail industry,

and further shows that women killed at work were more likely to have been working in retail than in all other industries combined. Although work-related death rates increased with age and were highest for workers over age 65, multivariate analysis indicated that deaths among those over age 65 were less likely to be in the retail industry compared to all other industries combined. However, younger workers were overrepresented in retail deaths compared to deaths in other industries. This finding is consistent with research that has found that younger workers are likely to work in the retail sector and are at high risk for nonfatal injury. Minorities have previously been identified as having an increased risk for work-related death, especially homicide [Sullivan and Yuan, 1995]. Work-related fatalities to minorities and foreign-born workers were more likely to be in the retail industry, although this finding could be a reflection of the overall distribution of workers. Working late at night and working in small businesses, both of which have been identified as risk factors in previous research [CDC, 1993; Kraus et al., 1996], were factors leading to higher deaths in the retail industry compared to other industries combined.

Odds ratios in this analysis did not control for the overall distributions of workers by industry and must be interpreted as comparisons of deaths in different industries rather than as true risk estimates. These comparisons, however, do indicate distinct trends of work-related deaths in the retail industry compared with deaths in other industries.

The work-related fatality rates presented are estimates and could have significant error due to unstable estimates. In weighted surveys of large populations, such as the Current Population Survey, common events are more likely to be sampled and rare events less likely. This sampling error leads to overestimation of common events and underestimation of rare events. Since retail is a common industry of employment, the number of workers in the retail industry may be overestimated, and overestimating the number of retail workers would lead to an underestimation of work-related fatality rates because of a differentially increased denominator. A more stable rate estimate would be hours worked, which would control for part-time employment and would allow for control of hours of higher risk, such as evening and night hours. Such data were not available at the national level for this analysis. Despite potential error in population counts of workers, trends over the 5-year period should be valid comparisons because the sampling error was not likely to differ significantly over each year.

Although the CFOI is the most comprehensive surveillance system of work-related fatalities, some misclassification may occur. Determining which deaths are truly work-related is a difficult task and case ascertainment may vary by state. Previous research has indicated that measurement of work-related deaths using the death certificate has low

sensitivity but high specificity [Kraus et al., 1995], leading to underestimates of the actual number of work-related deaths. Furthermore, homicides were especially prone to misclassification as non-work related [Kraus et al., 1995; Peek-Asa et al., 1997; Stout and Bell, 1991]. Since retail deaths were more likely to be related to violence, misclassification of deaths as non-work related may be higher in the retail than in other industries. Among work-related homicides, however, robbery-related events may be more likely to be classified as work-related than other types of homicides, such as domestic violence occurring in the workplace. Homicide in the retail industry is predominantly robbery-related, which may lead to a more accurate counting of homicides than in industries with predominantly domestic-related events. The misclassification in both the numerator and denominator of the rate calculations indicates that the work-related fatality rates presented are likely an underestimate of the actual rates.

Despite the potential for misclassification, this analysis presents compelling data that workers in the retail industry are much more likely to be victims of homicides while at work than the general workforce. Prevention efforts in the retail sector have primarily focused on convenience stores and have not traditionally focused on other retail sectors. Success in preventing workplace violence has been reported in convenience stores. Among the components of prevention programs are procedures to limit available cash, with appropriate signs in place, increasing visibility and lighting, and employee training [Erickson, 1996; Hunter, 1990; Jeffery, 1971; Jeffery et al., 1987]. However, specific components of prevention programs have not been evaluated and few efforts have been made to introduce programs in settings other than convenience stores. Efforts to identify, implement, and evaluate successful prevention programs which are based on scientific research data will help decrease the work-related homicide rate.

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