

Work-related multiple-fatality incidents

Multiple-fatality work-related incidents claim the lives of 1 out of 10 fatally injured workers and include some of the worst occupational catastrophes: air crashes, bombings, fires, and explosions; using multiyear data, the Bureau of Labor Statistics takes a first-time-ever look at this infrequently occurring phenomenon

Dino Drudi and Mark Zak

Nine out of every 10 fatally injured workers die in an incident in which they are the only decedent. In these instances, there is one fatal incident and one fatality associated with it. But for the remaining 10 percent of worker fatalities, the fatal incident claimed the lives of more than one worker. These incidents are of particular interest to safety professionals and hazard researchers because the prevention of each such incident translates into the preservation of multiple lives.

The Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI)¹ identified 1,109 instances in which two or more workers died of injuries sustained in the same job-related incident during the 1995–99 period. These incidents claimed the lives of 2,949 workers. Although multiple-fatality incidents account for only 4 percent of all fatal incidents, nearly 10 percent of fatally injured workers die therein. As the following tabulation shows, almost three-quarters of these incidents involve only two fatalities, but the nine worst catastrophes claimed a total of 266 workers' lives:

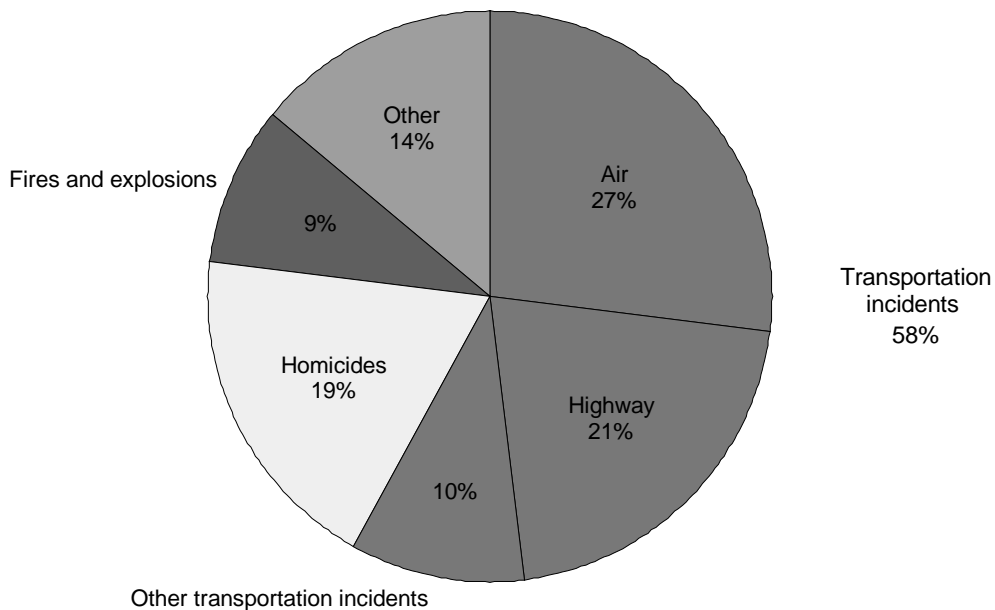
<i>Fatalities per incident</i>	<i>Incidents</i>	<i>Fatalities</i>
Total	1,109	2,949
2	828	1,656
3	157	471
4	71	284
5 to 9	44	272
10 or more ...	9	266

One way to measure multiple-fatality incidents is by the average number of fatalities per incident. Overall, multiple-fatality incidents average three fatalities per incident. Federal Government multiple-fatality incidents average four fatalities.

The number of multiple-fatality incidents is relatively stable from year to year; from 1995 to 1999 it averaged 222, with each year varying from this average by less than 15 percent. But, because a single incident, such as a commercial jetliner crash or the bombing of a major building, might involve a large number of fatalities, the number of associated fatalities fluctuates from year to year to a greater extent than does the number of multiple-fatality incidents.² By combining data

Dino Drudi and Mark Zak are economists in the Office of Safety, Health, and Working Conditions, Bureau of Labor Statistics.
E-mail: drudi.dino@bls.gov or zak.mark@bls.gov

Chart 1. How workers die in multiple-fatality incidents, 1995–99



SOURCE: Bureau of Labor Statistics, Census of Fatal Occupational Injuries.

for 5 years, any such fluctuations can be sufficiently mitigated to ensure a meaningful analysis. As the following tabulation shows, the number of associated fatalities in each of the 5 years from 1995 to 1999 varies less than 20 percent from the 590 annual average for this period:

Year	Fatality incidents	Fatalities
1995–99	1,109	2,949
1995	231	694
1996	194	551
1997	222	540
1998	227	550
1999	235	614
Average	222	590

How workers die in multiple-fatality incidents

Chart 1 illustrates how workers die in multiple-fatality incidents. Nearly three-fifths die in various kinds of work-related transportation incidents, almost half of which are air crashes and nearly two-fifths of which are highway incidents. Homicides, accounting for one-fifth of deaths in multiple-fatality incidents, are next. Fires and explosions account for less than one-tenth of such fatalities.

Multiple-fatality incidents occur in varying degrees in almost all event or exposure categories,³ but in some such categories they account for larger or smaller shares than overall. Table 1 shows, for selected event or exposure categories, the percentage of overall incidents involving more than one fatality and the percentage of overall fatalities attributable to such incidents. To illustrate, multiple-fatality transportation incidents make up 5 percent of fatal transportation incidents overall and account for 13 percent of workers who die in transportation incidents. Because multiple-fatality incidents, by definition, involve two or more fatalities, the percentages of fatalities associated with such incidents are larger, for each event or exposure category, than the corresponding percentages of multiple-fatality incidents.

Table 1 shows that three-fifths of workers who die in air crashes, three-fifths who perish in water vessel casualties, and three-tenths who die in fires do so in incidents claiming the lives of more than one worker, whereas multiple-fatality incidents are rare for contact with objects and for falls. Nevertheless, some injury categories in which a high proportion of worker fatalities is associated with multiple-fatality incidents do not involve a high number of overall worker fatalities. Water vessel casualty fatalities and fire fatalities, for example, each account for less than 2 percent of overall fatalities. Conversely, some situations are highly unlikely to involve multiple fatalities.⁴

Table 1. Multiple-fatality incidents as a percentage of overall fatal incidents, and fatalities as a percentage of overall fatalities, by selected event or exposure, 1995-99

[Percent of total for event or exposure]

Event or exposure	Incidents	Fatalities
Multiple fatalities	4	10
Fires and explosions	11	26
Fires	13	30
Explosions	10	22
Transportation incidents	5	13
Air crashes	33	61
Water vessel casualties	36	61
Head-on highway collisions	9	17
Assaults and violent acts	4	11
Exposure to harmful substances	3	7
Contact with hot objects or substances	8	16
Confined spaces ¹	13	24
Contact with objects and equipment	1	2
Contact with overhead power lines	5	10
Nontrenching cave-ins, avalanches ...	14	24
Collapsing structures	8	17
Falls	1	2

¹ Includes fatalities which occurred in structures that do not meet the definition of permit-required confined spaces contained in Occupational Safety and Health Administration regulations.

Even though multiple-fatality incidents, by definition, involve two or more fatalities, it is possible for subcategories of such incidents to average fewer than two fatalities per incident. For example, for the “worker struck by a vehicle, mobile equipment” category, in which there were only 50 fatalities spread over 27 incidents (or 1.85 fatalities per incident), the average was fewer than 2 fatalities per incident. Such an outcome is, however, possible only because of the characteristics of the fatalities constituting each multiple-fatality incident. For instance, suppose a truckdriver runs over a road crew member and then collides with a jersey barrier, killing them both. In this multiple-fatality incident involving two workers, there was only one in each of the two occupations involved.⁵ A murder-suicide is similar: there is usually only one suicide in multiple-fatality murder-suicides, because the perpetrator murders one or more others and then commits suicide.

Transportation incidents. Chart 1 and table 2 show that nearly three-fifths of multiple-fatality incidents and fatalities involve transportation, due primarily to head-on highway collisions and incidents involving air and water vessels. Other highway incidents, nonhighway incidents, and pedestrian fatalities actually account for a smaller share of

fatalities in multiple-fatality incidents than their shares of overall fatalities.

As the following tabulation shows, although there are more multiple-fatality highway incidents than multiple-fatality air crashes, air crashes account for more fatalities:⁶

Transportation mode	Incidents	Fatalities
Total	641	1,709
Aircraft	248	805
Highway vehicle	284	633
Watercraft	60	161
Rail vehicle	24	54
Pedestrian struck by vehicle	27	50

The reason for the prominence of air crashes in multiple-fatality counts is that aircraft average three decedents per multiple-fatality incident, compared with two for multiple-fatality highway incidents. Of the 9 incidents involving 10 or more fatalities, for example, 7 were air crashes. More than one worker is killed in a third of all work-related fatal aircraft incidents, whereas three-fifths of all aircraft-related work fatalities take place in multiple-fatality incidents.

Collisions account for about half of highway incidents and fatalities overall, but two-thirds of multiple-fatality highway incidents and fatalities. Half of multiple-fatality highway collisions involve vehicles moving in opposite directions (head-on collisions), compared with a third for single-fatality incidents, whereas noncollision incidents, such as jackknifings, account for a smaller share of multiple-fatality highway incidents than single-fatality highway incidents. Multiple fatalities may be more likely to result from head-on collisions because they place the occupants of both vehicles at risk of fatality and because the speed with which the vehicles collide is the sum of the speeds at which each is traveling.

As with air crashes, multiple-fatality water-vessel incidents average three decedents per incident. Workers in water vessels are especially vulnerable to multiple-fatality incidents because they usually have multiperson crews and they operate far from assistance in often hostile seas. In icy water without a wet suit, hypothermia can result in death in 6 or 7 minutes. Accordingly, Alaska accounted for one-quarter of the multiple-fatality water-vessel fatalities.

Multiple-fatality incidents are particularly prevalent in vessel casualties.⁷ More than one-third of incidents involving vessel casualties are multiple-fatality incidents, which constitute three-fifths of all fatalities from vessel casualties. Of the 252 overall vessel-casualty fatalities, 153 were attributable to 56 of the 155 overall vessel-casualty incidents. Sinkings and capsizings associated with 43 of those 56 incidents accounted for 119 of the 153 fatalities.

Assaults and violent acts. Assaults and violent acts account

Table 2. Multiple-fatality occupational injuries by event or exposure, 1995–99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Total	1,109	100	2,949	100
Transportation incidents	641	58	1,709	58
Highway	284	26	633	21
Collision between vehicles, mobile equipment	184	17	417	14
Reentrant collision	3	—	17	1
Moving in same direction	23	2	51	2
Moving in opposite directions, oncoming	98	9	206	7
Moving in intersection	36	3	79	3
Moving and standing vehicle, mobile equipment—in roadway	10	1	18	1
Moving and standing vehicle, mobile equipment—side of road	5	—	10	—
Vehicle struck stationary object or equipment in roadway	3	—	6	—
Vehicle struck stationary object or equipment on side of road	46	4	95	3
Noncollision	48	4	106	4
Jackknifed or overturned—no collision	36	3	79	3
Ran off highway—no collision	9	1	19	1
Nonhighway (farm, industrial premises)	3	—	6	—
Aircraft	248	22	805	27
Worker struck by vehicle, mobile equipment	27	2	50	2
Worker struck by vehicle, mobile equipment in roadway	10	1	16	1
Worker struck by vehicle, mobile equipment on side of road	14	1	22	1
Worker struck by vehicle, mobile equipment in parking lot or nonroad area	6	1	12	—
Water vehicle	60	5	161	5
Collision	5	—	13	—
Explosion, fire, n.e.c.	4	—	13	—
Fall from or on ship or boat	4	—	7	—
Sinking, capsized water vehicle	43	4	119	4
Railway	24	2	54	2
Collision between railway vehicles	10	1	21	1
Collision between railway vehicle and other vehicle	13	1	29	1
Assaults and violent acts	208	19	611	21
Homicides	207	19	575	19
Hitting, kicking, beating	6	1	11	—
Shooting	190	17	409	14
Stabbing	11	1	19	1
Assaults and violent acts by person(s), n.e.c.	6	1	136	5
Suicide, self-inflicted injury	34	3	34	1
Contact with objects and equipment	55	5	113	4
Struck by object	16	1	30	1
Struck by falling object	11	1	20	1
Caught in or crushed in collapsing materials	37	3	78	3
Excavation or trenching cave-in	10	1	21	1
Other cave-in or landslide	9	1	18	1
Caught in or crushed in collapsing structure	13	1	29	1
Falls	25	2	53	2
Fall to lower level	25	2	53	2
Fall from scaffold, staging	7	1	14	—
Fall from building girders or other structural steel	9	1	21	1
Fall to lower level, n.e.c.	6	1	11	—
Exposure to harmful substances or environments	91	8	198	7
Contact with electric current	39	4	81	3
Contact with overhead power lines	33	3	67	2
Struck by lightning	3	—	6	—
Contact with temperature extremes	6	1	15	1
Contact with hot objects or substances	5	—	11	—
Exposure to caustic, noxious, or allergenic substances	29	3	61	2
Inhalation of substance	28	3	59	2
Inhalation in enclosed, restricted, or confined space ¹	21	2	43	1
Inhalation in open or nonconfined space	6	1	14	—
Oxygen deficiency	17	2	40	1
Drowning, submersion	13	1	31	1

See footnotes at end of table.

Table 2. Continued—Multiple-fatality occupational injuries by event or exposure, 1995–99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Depletion of oxygen in other enclosed, restricted, or confined space ¹	3	—	7	—
Fires and explosions	93	8	265	9
Fires—unintended or uncontrolled	53	5	155	5
Fire in residence, building, or other structure	38	3	110	4
Forest, brush, or other outdoor fire	5	—	15	1
Explosion	41	4	110	4
Explosion, unspecified	2	—	6	—
Explosion of pressure vessel or piping	12	1	33	1

¹ Includes fatalities which occurred in structures that do not meet the definition of permit-required confined spaces as defined by Occupational Safety and Health Administration regulations.

NOTE: Totals for major categories may include subcategories not shown separately. Percentages may not add to totals because of rounding.

Dashes indicate less than or equal to 0.5 percent; n.e.c. = not elsewhere classified.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, in cooperation with State, New York City, District of Columbia, and Federal agencies, Census of Fatal Occupational Injuries.

for about one-fifth of multiple-fatality incidents and fatalities, slightly more than for fatalities overall. The category includes 173 multiple-homicide incidents claiming 535 workers' lives, plus 34 murder-suicides claiming an additional 40 workers' lives beyond the assailants who committed suicide in these incidents. The association between the victim and the perpetrator or the circumstances associated with the crime could be determined in more than two-thirds of work-related multiple-fatality homicides. The following tabulation summarizes these associations or circumstances:

<i>Association of perpetrator to victim or circumstance associated with crime</i>	<i>Percent of multiple-fatality work-related homicides</i>
Total (number = 575)	100
Association determined	70
Robber	24
Igniter of bomb or explosion	20
Coworker	19
Spouse (present or former), relative, or acquaintance	4
Customer or client	3
Association not determined	30

Overall, coworkers make up under one-tenth of all work-related homicide perpetrators, but are a fifth of multiple-fatality homicide perpetrators; robbers are a third of work-related homicide perpetrators, but only a quarter of multiple-fatality homicide perpetrators.⁸

Fires and explosions. Fires and explosions account for less than one-tenth of multiple-fatality incidents and fatalities. These 93 incidents claimed the lives of 265 workers.

The “fires and explosions” category, perhaps better than any other event or exposure category, illustrates how multiple-fatality incidents are atypical of the fatal-injury experience as a whole. Fires and explosions account for only 3 percent of overall work fatalities, thereby ranking as the smallest major event or exposure category among the six for which the Bureau of Labor Statistics routinely reports fatality data.⁹

But as table 2 shows, the “fires and explosions” category ranks third in the percentage of multiple fatalities, with 9 percent. Three other categories—exposure to harmful substances or environments, contact with objects or equipment, and falls—have fewer fatalities. Most strikingly, however, as table 1 shows, the “fires and explosions” category ranks first among major event categories with regard to the percentage of overall worker fatalities attributable to multiple-fatality incidents.

Other events or exposures. Exposure to harmful substances or environments accounts for less than one-tenth of multiple-fatality incidents, but, because this category averages only two decedents per incident, it accounts for an even smaller share of the fatalities in multiple-fatality incidents.

Falls, which constitute one-eighth of overall fatalities, account for a negligible share of multiple-fatality incidents and fatalities.

Factors underlying multiple-fatality incidents

The fatal event or exposure, such as the air crash, head-on highway collision, robbery-murder, explosion, or structural collapse, is the most consistent factor underlying the multiple-

fatality phenomenon. Except for murder-suicides, very rarely does the fatal event or exposure differ for the individual fatalities within a multiple-fatality incident.

In six-sevenths of multiple-fatality incidents, the workers involved work in the same or similar industries, while in two-thirds of multiple-fatality incidents, those involved work in the same or similar occupations. These ratios suggest that the industries in which workers are employed, more so than their particular occupations, are the more important factor in multiple-fatality incidents.

Industry and occupation. Most industries, especially in the private sector, are composed of workers in many different occupations.¹⁰ Tables 3 and 4 illustrate, respectively, the number and percent distribution of multiple-fatality incidents and fatalities, by industry and occupation. Various kinds of jobs, as determined by industry and occupation, are particularly prone to multiple-fatality incidents.

Among civilian and military airplane pilots and navigators—an occupation with the third-highest overall fatality rate—there were 176 multiple-fatality incidents involving 271 fatalities. Half of all airplane pilot and navigator work fatalities took place in multiple-fatality incidents. Because pilots and passengers in some sort of work status often perish in the same incident, fewer than two pilots, on average, perish per multiple-fatality incident. Over the study period, public transportation attendants averaged more than 6 fatalities per multiple-fatality incident, due largely to a single air crash claiming more than two dozen flight attendants, a job falling into the occupational category of public transportation attendants. Of the 6 multiple-fatality incidents involving this occupation, 5 involved flight attendants, claiming 37 of them, plus 14 pilots and 26 workers in other occupations.

The air transportation industry accounts for 1 percent of overall fatalities and employment. But, as table 3 shows, it accounts for 8 percent of multiple-fatality incidents and 7 percent of fatalities in such incidents. Because nonscheduled air transportation, which usually involves smaller aircraft and crews, averages fewer than 2 fatalities per multiple-fatality incident, that industry accounts for seven-tenths of the multiple-fatality incidents in air transportation, but only half of the associated fatalities. In contrast, because scheduled air transportation averages 5 fatalities per incident, it accounts for almost as many fatalities in multiple-fatality incidents as does nonscheduled air transportation, yet with only a quarter as many multiple-fatality incidents as nonscheduled air transportation. Often, other fatalities in air transportation incidents are passengers who are present on the aircraft in connection with their jobs in other industries.¹¹

Sometimes, air crashes can cause multiple-fatality incidents to account for a substantial segment of fatalities in industries unrelated to air transportation, but which might

involve frequent travel. Air crashes predominate, for example, in research, development, and testing services, an industry in which multiple-fatality incidents account for nearly a third of the worker fatalities, and in engineering and architectural services, in which they account for more than a sixth. Of the 157 fatalities in these two components of engineering and management services, 15 multiple-fatality incidents account for 33 fatalities—19 of which occurred in multiple-fatality air crashes. Even in industries with low fatality counts, multiple-fatality air crashes can account for a high share of the industry's overall fatalities. For example, of the 39 fatalities in mailing, reproduction, and stenographic services, 11 multiple-fatality air crashes accounting for 15 fatalities made up two-fifths of the industry's fatalities.

In contrast, even though taxicab driver is an occupation with a very high fatality rate, due largely to homicides (typically during robberies),¹² multiple-fatality incidents are rare because taxicab drivers usually work alone. Of the 422 taxicab driver fatalities from 1995 to 1999, only 9 occurred in multiple-fatality incidents.

For the most part, multiple-fatality incidents distribute somewhat evenly among industries. In only a few industries, for various reasons, do they stand out as involving a substantially larger share of fatalities than the overall share.

For example, catastrophic fires and explosions may be particularly endemic to some industries. Fires and explosions account for four-fifths of fatalities in multiple-fatality incidents in the chemicals and allied products industry. Similarly, petroleum refining accounts for nearly all the fatalities from multiple-fatality incidents in the petroleum and coal products industry; three-quarters of those fatalities were due to fires. A quarter of the worker fatalities in chemicals and allied products, and a fifth of those in petroleum and coal products, are in multiple-fatality incidents. Of the 262 fatalities in these two industries, 69 are attributable to 27 multiple-fatality incidents. Of the 40 fatalities in explosives and fireworks manufacturing, 26 can be attributed to 8 multiple-fatality incidents, all from fires and explosions.¹³

Of the 164 fatalities in the motor vehicles and equipment and the aircraft and parts manufacturing industries, one-fifth are attributable to 13 multiple-fatality incidents accounting for 35 fatalities. Almost a quarter of worker fatalities in aircraft and parts manufacturing, and a third of those in motor vehicle and car body manufacturing, occurred in multiple-fatality incidents.

Multiple homicides were particularly prevalent in used-car dealerships during the study period. Of the 60 fatalities in this industry, one-fifth are attributable to 6 multiple-fatality incidents accounting for 12 fatalities—10 of which were homicides. By contrast, there were only 14 homicides among the remaining 48 single-fatality incidents.

Railroading is an industry in which a high proportion of workers is clustered into a few jobs specific to the industry.

Table 3. Multiple-fatality occupational injuries by industry, 1995-99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Total	1,109	100	2,949	100
Private industry	938	85	2,290	78
Agriculture, forestry, and fishing	119	11	287	10
Agricultural production—crops	24	2	55	2
Fruits and tree nuts	7	1	25	1
Fruits and tree nuts, n.e.c.	1	—	13	—
General farms, primarily crop	8	1	16	1
Agricultural production—livestock	18	2	37	1
Livestock, except dairy and poultry	9	1	19	1
Beef cattle feedlots	3	—	6	—
Beef cattle, except feedlots	4	—	9	—
Dairy farms	3	—	6	—
Poultry and eggs	3	—	6	—
Agricultural services	30	3	57	2
Crop services	11	1	19	1
Crop planting and protecting	7	1	14	—
Animal services, except veterinary	3	—	5	—
Farm labor and management services	3	—	5	—
Landscape and horticultural services	12	1	24	1
Landscape counseling and planning	4	—	9	—
Lawn and garden services	4	—	8	—
Ornamental shrub and tree services	4	—	7	—
Fishing, hunting, and trapping	49	4	133	5
Commercial fishing	47	4	128	4
Finfish	17	2	47	2
Shellfish	22	2	63	2
Miscellaneous marine products	3	—	7	—
Hunting, trapping, game propagation	2	—	5	—
Mining	35	3	76	3
Metal mining	3	—	6	—
Coal mining	6	1	11	—
Bituminous coal and lignite mining	4	—	7	—
Oil and gas extraction	21	2	50	2
Oil and gas field services	19	2	46	2
Drilling oil and gas wells	5	—	11	—
Oil and gas field services, n.e.c.	13	1	31	1
Nonmetallic minerals, except fuels	5	—	9	—
Sand and gravel	3	—	5	—
Construction	166	15	339	11
General building contractors	24	2	45	2
Residential building construction	8	1	16	1
Single-family housing construction	5	—	10	—
Residential construction, n.e.c.	3	—	6	—
Nonresidential building construction	13	1	23	1
Nonresidential construction, n.e.c.	10	1	19	1
Heavy construction, except building	45	4	92	3
Highway and street construction	14	1	26	1
Heavy construction, except highway	31	3	66	2
Bridge, tunnel, and elevated highway	3	—	6	—
Water, sewer, and utility lines	13	1	26	1
Heavy construction, n.e.c.	15	1	34	1
Special trade contractors	97	9	200	7
Plumbing, heating, and air-conditioning	5	—	11	—
Painting and paper hanging	7	1	14	—
Electrical work	14	1	27	1
Masonry, stonework, tile setting, and plastering	11	1	22	1
Masonry and other stonework	7	1	14	—
Plastering, drywall, and insulation	4	—	8	—
Roofing, siding, and sheet metal work	11	1	21	1
Concrete work	5	—	10	—
Miscellaneous special trade contractors	42	4	87	3
Structural steel erection	8	1	17	1
Excavation work	5	—	8	—
Wrecking and demolition work	5	—	10	—
Special trade contractors, n.e.c.	21	2	46	2

See footnotes at end of table.

Table 3. Continued—Multiple-fatality occupational injuries by industry, 1995-99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Manufacturing	133	12	290	10
Food and kindred products	12	1	20	1
Meat products	4	—	6	—
Apparel and other textile products	5	—	9	—
Lumber and wood products	11	1	18	1
Logging	4	—	7	—
Sawmills and planing mills	4	—	—	—
Sawmills and planing mills, general	3	—	6	—
Furniture and fixtures	5	—	8	—
Household furniture	5	—	8	—
Printing and publishing	5	—	8	—
Chemicals and allied products	20	2	54	2
Industrial inorganic chemicals	3	—	6	—
Drugs	2	—	7	—
Medicinals and botanicals	2	—	7	—
Industrial organic chemicals	3	—	8	—
Miscellaneous chemical products	8	1	26	1
Explosives	4	—	8	—
Chemicals and chemical preparations, n.e.c.	4	—	18	1
Petroleum and coal products	7	1	15	1
Petroleum refining	6	1	14	—
Rubber and miscellaneous plastics products	4	—	8	—
Miscellaneous plastics products, n.e.c.	4	—	8	—
Stone, clay, glass and concrete products	6	1	12	—
Concrete, gypsum, and plaster products	4	—	8	—
Ready-mixed concrete	3	—	6	—
Primary metal industries	13	1	31	1
Blast furnace and basic steel products	6	1	17	1
Blast furnaces and steel mills	4	—	12	—
Iron and steel foundries	4	—	10	—
Gray and ductile iron foundries	2	—	6	—
Fabricated metal products	8	1	17	1
Miscellaneous fabricated metal products	3	—	7	—
Industrial machinery and equipment	10	1	21	1
Construction and related machinery	3	—	7	—
Electronic and other electronic equipment	3	—	6	—
Transportation equipment	19	2	49	2
Motor vehicles and equipment	8	1	24	1
Motor vehicles and car bodies	5	—	13	—
Motor vehicle parts and accessories	2	—	5	—
Aircraft and parts	5	—	11	—
Ship and boat building and repairing	3	—	8	—
Transportation and public utilities	252	23	528	18
Railroad transportation	16	1	31	1
Railroads	16	1	31	1
Local and interurban passenger transportation	11	1	15	1
Local and suburban transportation	8	1	11	—
Trucking and warehousing	100	9	182	6
Trucking and courier services, except air	96	9	174	6
Local trucking, without storage	16	1	23	1
Trucking, except local	73	7	132	4
Public warehousing and storage	3	—	6	—
Water transportation	14	1	36	1
Deep sea foreign transportation of freight	4	—	11	—
Water transportation of passengers	1	—	5	—
Deep sea transportation of passengers, except by ferry	1	—	5	—
Water transportation services	8	1	18	1
Towing and tugboat services	4	—	10	—
Transportation by air	91	8	199	7
Air transportation, scheduled, and air courier services	18	2	84	3
Air transportation, scheduled	16	1	81	3
Air transportation, nonscheduled	65	6	99	3
Airports, flying fields, and services	10	1	16	1
Transportation services	5	—	12	—
Passenger transportation arrangement	2	—	5	—

See footnotes at end of table.

Table 3. Continued—Multiple-fatality occupational injuries by industry, 1995-99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Freight transportation arrangement	2	—	5	—
Communications	8	1	11	—
Electric, gas, and sanitary services	21	2	42	1
Electric services	8	1	18	1
Combination utility services	3	—	7	—
Electric and other services combined	2	—	5	—
Sanitary services	6	1	11	—
Refuse systems	6	1	11	—
Wholesale trade	42	4	79	3
Wholesale trade—durable goods	25	2	49	2
Motor vehicles, parts, and supplies	4	—	5	—
Professional and commercial equipment	2	—	8	—
Hardware, plumbing and heating equipment	4	—	10	—
Machinery, equipment, and supplies	8	1	11	—
Miscellaneous durable goods	4	—	9	—
Scrap and waste materials	3	—	5	—
Wholesale trade—nondurable goods	17	2	30	1
Groceries and related products	8	1	16	1
Farm-product raw materials	2	—	5	—
Retail trade	128	12	261	9
General merchandise stores	7	1	11	—
Department stores	4	—	6	—
Food stores	28	3	54	2
Grocery stores	24	2	46	2
Automotive dealers and service stations	17	2	31	1
New- and used-car dealers	3	—	5	—
Used-car dealers	6	1	12	—
Apparel and accessory stores	4	—	13	—
Family clothing stores	2	—	9	—
Furniture and homefurnishings stores	5	—	12	—
Furniture and homefurnishings stores	3	—	8	—
Eating and drinking places	41	4	82	3
Eating places	31	3	61	2
Drinking places	5	—	9	—
Miscellaneous retail	27	2	56	2
Liquor stores	4	—	9	—
Miscellaneous shopping goods stores	7	1	15	1
Sporting goods and bicycle shops	3	—	7	—
Nonstore retailers	7	1	17	1
Direct selling establishments	4	—	12	—
Fuel dealers	3	—	6	—
Retail stores, n.e.c.	4	—	5	—
Finance, insurance, and real estate	29	3	77	3
Depository institutions	8	1	30	1
Savings institutions	3	—	6	—
Credit unions	2	—	19	1
Insurance carriers	3	—	6	—
Insurance agents, brokers, and service	4	—	9	—
Real estate	9	1	18	1
Real estate operators and lessors	5	—	11	—
Nonresidential building operators	3	—	5	—
Real estate agents and managers	3	—	6	—
Holdings and other investment offices	2	—	7	—
Miscellaneous investing	1	—	6	—
Services	170	15	335	11
Hotels and other lodging places	3	—	7	—
Hotels and motels	3	—	7	—
Personal services	5	—	8	—
Business services	51	5	83	3
Mailing, reproduction, stenographic	11	1	15	1
Miscellaneous equipment rental and leasing	5	—	7	—
Personnel supply services	11	1	20	1
Help supply services	11	1	20	1
Computer and data processing services	5	—	5	—

See footnotes at end of table.

Table 3. Continued—Multiple-fatality occupational injuries by industry, 1995–99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Miscellaneous business services	15	1	28	1
Detective and armored car services	7	1	15	1
Automotive repair, services, and parking	11	1	20	1
Automotive repair shops	8	1	13	—
Top, body, and upholstery repair shops and paint shops	3	—	5	—
General automotive repair shops	3	—	6	—
Miscellaneous repair services	4	—	9	—
Miscellaneous repair shops	4	—	9	—
Motion pictures	3	—	7	—
Amusement and recreation services	19	2	40	1
Producers, orchestras, entertainers	5	—	9	—
Miscellaneous amusement, recreation services	14	1	31	1
Health services	20	2	39	1
Nursing and personal care facilities	3	—	5	—
Hospitals	8	1	17	1
General medical and surgical hospitals	7	1	13	—
Legal services	13	1	21	1
Educational services	15	1	24	1
Colleges and universities	2	—	5	—
Schools and educational services, n.e.c.	9	1	13	—
Social services	3	—	7	—
Child day care services	2	—	5	—
Membership organizations	12	1	24	1
Religious organizations	9	1	18	1
Engineering and management services	20	2	39	1
Engineering and architectural services	9	1	18	1
Engineering services	3	—	6	—
Architectural services	3	—	5	—
Surveying services	3	—	7	—
Research and testing services	6	1	15	1
Government ¹	214	19	659	22
Federal Government (including resident Armed Forces)	84	8	378	13
Transportation and public utilities	3	—	7	—
Public administration	79	7	368	12
Executive, legislative, and general government	2	—	97	3
Justice, public order, and safety	4	—	7	—
Public order and safety	4	—	7	—
Police protection	4	—	7	—
Environmental quality and housing and administration of economic programs	11	1	28	1
National security and international affairs	60	5	232	8
National security	60	5	232	8
State government	54	5	106	4
Construction	6	1	10	—
Heavy construction, except building	6	1	10	—
Highway and street construction	6	1	10	—
Services	13	1	26	1
Educational services	8	1	15	1
Colleges and universities	8	1	15	1
Social services	3	—	7	—
Public administration	33	3	66	2
Justice, public order, and safety	16	1	30	1
Public order and safety	16	1	30	1
Police protection	13	1	23	1
Finance, taxation, and monetary policy	1	—	5	—
Administration of human resources	2	—	5	—
Environmental quality and housing and administration of economic programs	11	1	20	1

See footnotes at end of table.

Table 3. Continued—Multiple-fatality occupational injuries by industry, 1995–99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Local government	81	7	170	6
Construction	3	—	5	—
Heavy construction, except building	3	—	5	—
Transportation and public utilities	4	—	8	—
Electric, gas, and sanitary services	4	—	8	—
Services	13	1	22	1
Educational services	7	1	13	—
Elementary and secondary schools	5	—	10	—
Public administration	64	6	135	5
Executive, legislative, and general government	8	1	17	1
Executive and legislative combined	3	—	8	—
Justice, public order, and safety	53	5	113	4
Public order and safety	53	5	113	4
Police protection	22	2	37	1
Fire protection	31	3	73	2
Environmental quality and housing and administration of economic programs	3	—	5	—

¹ Includes fatalities to workers employed by governmental organizations regardless of industry.

NOTE: Totals for major categories may include subcategories not shown separately. Percentages may not add to totals because of rounding. Dashes

indicate less than or equal to 0.5 percent; n.e.c. = not elsewhere classified.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, in cooperation with State, New York City, District of Columbia, and Federal agencies, Census of Fatal Occupational Injuries

The 35 fatalities in 18 multiple-fatality incidents, accounting for one-fifth of railroading's overall fatalities, are composed almost entirely of workers in a few rail transportation occupations, such as locomotive operator or train conductor.¹⁴ Accordingly, the 15 multiple-fatality incidents involving rail transportation occupations account for 27 of the 113 fatalities in this group of occupations. Almost all were transportation incidents, such as collisions between rail vehicles or derailments.

Fishers and loggers typically have maintained the highest overall fatality rates, exchanging places as the most deadly job from year to year. Yet, their multiple-fatality experiences are radically different. A multiple-fatality incident is rare among timber-cutting and logging occupations.¹⁵ The 584 timber-cutting and logging fatalities include only 5 multiple-fatality incidents with 8 associated fatalities. Fishers, including fishing vessel captains and officers, by contrast, make up 1 percent of overall fatalities, but 4 percent of fatalities in multiple-fatality incidents. Fishing's 44 multiple-fatality incidents account for 122 of the 339 fisher fatalities during the 5-year study period. Almost all of the fishing fatalities are the result of water-vessel incidents, mostly vessel casualties.

Similarly, among water transportation occupations, the 13 multiple-fatality incidents accounting for 32 fatalities make up one-sixth of fatalities in this occupation group, which includes ship captains, mates, sailors, deckhands, and marine

engineers, except on fishing boats. As with fishing, most of these deaths involve vessel casualties. Likewise, of the water transportation industry's 189 fatalities, 36 occurred in 14 multiple-fatality incidents.

Firefighting occupations account for 31 multiple-fatality incidents involving 72 fatalities. Fires and explosions claimed the lives of 52 of the 72 firefighters who died in multiple-fatality incidents, with most of the rest of these fatalities occurring in transportation incidents.

Although managerial and professional specialty occupations have a very low fatality risk overall, one-sixth of fatally injured workers in these occupations die in multiple-fatality incidents. This phenomenon appears to be widely spread through the various managerial and professional specialty categories, driven by the disproportionately high incidence of transportation fatalities and homicides and suicides among these workers. While managerial and professional specialty occupations account for one-ninth of overall occupational fatalities, they make up one-fifth of multiple-fatality transportation incidents and one-third of multiple-fatality homicides and suicides. For example, the legal profession, with a fatality rate a mere fraction of the overall rate, is very safe. Nevertheless, 14 multiple-fatality incidents involving 20 fatalities account for more than a quarter of the 74 work-related fatal injuries to lawyers, mainly air crashes in which workers in other occupations also died.

Table 4. Multiple-fatality occupational injuries by occupation, 1995–99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Total	1,109	100	2,949	100
Civilian occupations				
Total	1,058	95	2,726	92
Managerial and professional specialty occupations	266	24	531	18
Executive, administrative, and managerial occupations	183	17	327	11
Administrators and officials, public administration	7	1	28	1
Financial managers	11	1	12	–
Managers, marketing, advertising, and public relations	10	1	12	–
Administrators, education and related fields	5	–	6	–
Managers, food serving and lodging establishments	32	3	36	1
Managers, properties and real estate	7	1	13	–
Managers and administrators, n.e.c.	101	9	151	5
Management-related occupations	32	3	59	2
Accountants and auditors	12	1	18	1
Other management-related occupations	22	2	41	1
Professional specialty occupations	112	10	204	7
Engineers, architects, and surveyors	24	2	46	2
Architects	4	–	6	–
Engineers	20	2	40	1
Electrical and electronic engineers	8	1	10	–
Engineers, n.e.c.	5	–	12	–
Mathematical and computer scientists ⁸	1	9	–	–
Computer systems analysts and scientists	7	1	8	–
Natural scientists	10	1	13	–
Biological and life scientists	4	–	5	–
Health diagnosing occupations	5	–	6	–
Health assessment and treating occupations	17	2	28	1
Registered nurses	11	1	14	–
Therapists	4	–	6	–
Physician's assistants	2	–	7	–
Teachers, postsecondary	5	–	8	–
Teachers, except postsecondary	13	1	15	1
Teachers, n.e.c.	10	1	11	–
Social, recreation, and religious workers	11	1	21	1
Social workers	4	–	8	–
Clergy and religious workers	7	1	13	–
Lawyers	14	1	20	1
Writers, artists, entertainers, and athletes	25	2	34	1
Photographers	11	1	13	–
Designers, musicians, composers, actors, and other artists, performers, and related workers	9	1	13	–
Athletes	2	–	5	–
Technical, sales, and administrative support	290	26	536	18
Technicians and related support occupations	173	16	273	9
Health technologists and technicians	12	1	14	–
Health technologists and technicians, n.e.c.	11	1	13	–
Engineering and related technologists and technicians	11	1	14	–
Electrical and electronic technicians	5	–	6	–
Surveying and mapping technicians	3	–	5	–
Science technicians	5	–	9	–
Technicians, except health, engineering, and science	159	14	236	8
Airplane pilots and navigators	146	13	215	7
Technicians, n.e.c.	11	1	13	–
Sales occupations	102	9	177	6
Supervisors and proprietors, sales occupations	53	5	74	3
Sales representatives, finance and business services	9	1	19	1
Securities and financial services sales occupations	1	–	9	–
Sales representatives, commodities except retail	13	1	15	1
Sales representatives, mining, manufacturing, and wholesale	13	1	15	1
Sales workers, retail and personal services	43	4	68	2

See footnotes at end of table.

Table 4. Continued—Multiple-fatality occupational injuries by occupation, 1995–99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Civilian occupations—continued				
Sales workers, other commodities	14	1	19	1
Sales counter clerks	3	—	5	—
Cashiers	18	2	25	1
Street and door-to-door sales workers	2	—	9	—
Administrative support occupations, including clerical	35	3	86	3
Supervisors, administrative support occupations	3	—	7	—
Secretaries, stenographers, and typists	5	—	11	—
Information clerks	7	1	13	—
Records processing occupations, except financial	4	—	10	—
Mail and message distributing occupations	4	—	7	—
Material recording, scheduling, and distributing clerks	6	1	10	—
Stock and inventory clerks	3	—	6	—
Miscellaneous administrative support	6	1	19	1
General office clerks	2	—	8	—
Administrative support occupations, n.e.c.	4	—	5	—
Service occupations	141	13	309	10
Protective service occupations	81	7	176	6
Firefighting and fire prevention occupations, including administrators and supervisors	31	3	72	2
Administrators and supervisors, firefighting and fire prevention occupations	6	1	10	—
Firefighting occupations	30	3	62	2
Police and detectives, including supervisors	38	3	82	3
Supervisors, police, detectives, and correctional institution officers	6	1	6	—
Police and detectives, public service	27	2	55	2
Sheriffs, bailiffs, and other law enforcement officers	9	1	15	1
Correctional institution officers	2	—	6	—
Guards, including supervisors	14	1	22	1
Guards and police, except public service	11	1	18	1
Service occupations, except protective and household	61	6	133	5
Food preparation and service occupations	27	2	40	1
Waiters and waitresses	4	—	5	—
Cooks	13	1	16	1
Miscellaneous food preparation occupations	4	—	6	—
Health service occupations	4	—	7	—
Nursing aides, orderlies, and attendants	4	—	7	—
Cleaning and building service occupations, except household	20	2	30	1
Janitors and cleaners	16	1	24	1
Personal service occupations	14	1	56	2
Guides	5	—	10	—
Public transportation attendants	6	1	39	1
Farming, forestry, and fishing	115	10	269	9
Farming operators and managers	23	2	33	1
Farmers, except horticultural	14	1	21	1
Managers, farms, except horticultural	9	1	12	—
Other agricultural and related occupations	52	5	101	3
Farm occupations, except managerial	39	4	74	3
Supervisors, farmworkers	5	—	5	—
Farmworkers	37	3	69	2
Related agricultural occupations	14	1	27	1
Groundskeepers and gardeners, except farm	8	1	18	1
Animal caretakers, except farm	4	—	5	—
Forestry and logging occupations	7	1	11	—
Timber cutting and logging occupations	5	—	8	—
Fishers, hunters, and trappers	45	4	124	4
Fishers, including vessel captains and officers	44	4	122	4
Precision production, craft, and repair	212	19	361	12
Mechanics and repairers	66	6	98	3
Supervisors, mechanics and repairers	9	1	12	—
Mechanics and repairers, except supervisors	61	6	86	3
Vehicle and mobile equipment mechanics, repairers	31	3	42	1
Automobile mechanics	6	1	10	—
Bus, truck, and stationary engine mechanics	3	—	5	—

See footnotes at end of table.

Table 4. Continued—Multiple-fatality occupational injuries by occupation, 1995-99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Civilian occupations—continued				
Aircraft engine mechanics	10	1	11	—
Heavy equipment mechanics	9	1	13	—
Electrical and electronic equipment repairers	8	1	12	—
Electronic repairers, communications and industrial equipment	7	1	11	—
Miscellaneous mechanics and repairers	17	2	25	1
Office machine repairers	1	—	6	—
Specified mechanics and repairers, n.e.c.	6	1	9	—
Not-specified mechanics and repairers	6	1	6	—
Construction trades	107	10	184	6
Brickmasons, stonemasons, tile setters, including supervisors	3	—	5	—
Carpet installers, carpenters, drywall installers, including supervisors	13	1	20	1
Electricians and electrical power installers and repairers, including supervisors	24	2	42	1
Painters, paperhangers, and plasterers, including supervisors	8	1	15	1
Plumbers, pipefitters, steamfitters, including supervisors	13	1	20	1
Supervisors, n.e.c.	16	1	17	1
Concrete and terrazzo finishers	3	—	5	—
Roofers	5	—	8	—
Structural metal workers	9	1	18	1
Construction trades, n.e.c.	14	1	25	1
Extractive occupations	24	2	33	1
Drillers, oil wells	7	1	8	—
Mining machine operators	6	1	9	—
Mining occupations, n.e.c.	9	1	11	—
Precision production occupations	36	3	46	2
Supervisors, production occupations	19	2	23	1
Precision metalworking occupations	11	1	13	—
Machinists	5	—	6	—
Plant and system operators	7	1	8	—
Operators, fabricators, and laborers	370	33	697	24
Machine operators, assemblers, and inspectors	66	6	114	4
Machine operators and tenders, except precision	39	4	66	2
Metalworking and plasticworking machine operators	3	—	6	—
Machine operators, assorted materials	32	3	51	2
Furnace, kiln, and oven operators, except food	5	—	9	—
Miscellaneous machine operators, n.e.c.	8	1	12	—
Machine operators, not specified	12	1	16	1
Fabricators, assemblers, and handworking occupations	30	3	44	1
Welders and cutters	23	2	34	1
Assemblers	7	1	10	—
Transportation and material moving occupations	204	18	368	12
Motor vehicle operators	155	14	267	9
Truckdrivers	137	12	242	8
Driver—sales workers	8	1	8	—
Busdrivers	4	—	5	—
Taxicab drivers and chauffeurs	6	1	9	—
Transportation occupations, except motor vehicles	28	3	59	2
Rail transportation occupations	15	1	27	1
Railroad conductors and yardmasters	8	1	10	—
Locomotive operating occupations	10	1	15	1
Water transportation occupations	13	1	32	1
Ship captains, mates, sailors, and deckhands, except fishing boats	12	1	29	1
Material moving equipment operators	29	3	42	1
Operating engineers	11	1	14	—
Hoist and winch operators	4	—	9	—
Industrial truck and tractor equipment operators	4	—	5	—
Miscellaneous material moving equipment operators	4	—	6	—
Handlers, equipment cleaners, helpers, and laborers	138	12	215	7
Construction laborers	68	6	111	4
Freight, stock, and material handlers	17	2	21	1
Stock handlers and baggers	8	1	9	—
Freight, stock, and material handlers, n.e.c.	7	1	10	—

See footnotes at end of table.

Table 4. Continued—Multiple-fatality occupational injuries by occupation, 1995–99

Characteristics	Multiple-fatality incidents		Fatalities	
	Number	Percent	Number	Percent
Civilian occupations—continued				
Vehicle washers and equipment cleaners	3	—	5	—
Laborers, except construction	42	4	66	2
Nonclassifiable occupations	20	2	23	1
Military occupations .				
Total	56	5	223	8
Technical, sales, and administrative support	31	3	57	2
Technicians and related support occupations	31	3	57	2
Technicians, except health, engineering, and science	31	3	56	2
Airplane pilots and navigators	31	3	56	2
Precision production, craft, and repair	5	—	8	—
Mechanics and repairers	5	—	8	—
Mechanics and repairers, except supervisors	5	—	7	—
Vehicle and mobile equipment mechanics, repairers	5	—	7	—
Aircraft engine mechanics	5	—	6	—
Military occupations (Armed Forces), n.e.c.	39	4	152	5

NOTE: Totals for major categories may include subcategories not shown separately. Percentages may not add to totals because of rounding. Dashes indicate less than or equal to 0.5 percent; n.e.c. = not elsewhere classified.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, in cooperation with State, New York City, District of Columbia, and Federal agencies, Census of Fatal Occupational Injuries.

In the same vein, multiple fatality incidents account for one-third of work fatalities involving photographers; these 11 multiple-fatality incidents produced 13 fatalities—all air crashes, typically involving aerial photography, in which 9 pilots and 4 workers in other occupations also perished. Exhibit 1 lists selected occupations with high proportions of multiple-fatality cases and notable characteristics, if any, associated with these occupations.

Multiple-fatality incidents generally do not play prominent roles in factory-type production jobs. An exception is furnace, kiln, and oven operators, except food: of the 31 fatalities involving this occupation, 9 resulted from 5 multiple-fatality incidents in which 4 workers in other occupations also perished. Not surprisingly, these incidents involved primarily fires and explosions. Similarly, of 58 fatally injured assemblers, 10 died in 7 multiple-fatality incidents in which 11 workers in other occupations also perished.

Some occupations that might be expected to have high incidences of multiple fatalities in fact do not. The construction trades, for example, account for one-tenth of overall fatalities, but a much smaller proportion of fatalities in multiple-fatality incidents. Despite images of mine-tunnel collapses and mine explosions, only 9 mining machine operators and 11 miscellaneous mining workers perished in multiple-fatality incidents out of the 215 fatalities suffered by workers in these two occupations during the 5-year study period. Even though extractive occupations have high fatality rates, they merely mirror multiple-fatality aggregate trends,

as does mining as an industry. Mine-tunnel collapses are often thought of as multiple-fatality catastrophes, but only a quarter of fatalities among mine workers in such collapses occurred in multiple-fatality incidents. Similarly, although truckdrivers have high fatality rates and experience more job fatalities than any other occupation, only 6 percent of those fatalities occurred in multiple-fatality incidents.

Government. As the following tabulation shows, all levels of government claim a larger share of multiple-fatality incidents and associated fatalities than does the private sector:¹⁶

	Overall fatalities, percent	Multiple-fatality incidents		Associated fatalities	
		Number	Percent	Number	Percent
Private industry	90	938	85	2,290	78
Government	10	214	19	659	22
Federal ...	3	84	8	378	13
State	2	54	5	106	4
Local	5	81	7	170	6

Note that government accounts for 10 percent of overall fatalities, but twice that share of multiple-fatality incidents and associated fatalities.

1. Federal Government. As table 3 illustrates, national security accounts for more than two-thirds of the multiple-fatality incidents in the Federal Government and three-fifths of the

Exhibit 1. Selected occupations with high proportions of worker fatalities taking place in multiple-fatality incidents, 1995-99

Three-tenths or more of overall worker fatalities in the following occupations took place in multiple-fatality incidents:

Occupation	Notable characteristics
Hunting and other kinds of guides	All transportation incidents
Photographers	All air crashes, typically involving aerial photography
Accountants and auditors	None
Information clerks	None

One-quarter of overall worker fatalities in the following occupations took place in multiple-fatality incidents:

Occupation	Notable characteristics
Lawyers	Mainly air crashes
Financial managers	Two-thirds were homicides
Miscellaneous administrative support occupations	None
Administrators in education and related fields	None
Science technicians	None
Miscellaneous technicians ¹	None
Engineers and architects	Mostly air crashes

A share substantially larger than the overall share of worker fatalities in the following occupations took place in multiple-fatality incidents:

Occupation	Notable characteristics
Health assessment and treating occupations	None
Mathematical, computer, and natural scientists	None
Clergy and religious workers	None
Secretaries, stenographers, and typists	None
Registered nurses	All were air crashes, most involving helicopter ambulances or rescue efforts
University and other postsecondary teachers	None
Artists, except photographers	None

¹ Includes air traffic controllers, broadcast equipment operators, computer programmers, numerical control tool programmers, paralegals and other legal assistants, and miscellaneous technicians other than health, engineering, and science technicians.

associated fatalities. The Federal Government averaged more than four fatalities per multiple-fatality incident and accounted for the most fatalities associated with multiple-fatality incidents of any level of government, even though it has the lowest employment of all three levels.

Multiple-fatality incidents are common in the military. The 56 multiple-fatality incidents involving military personnel account for 223 fatalities, constituting 5 percent of multiple-fatality incidents and 8 percent of associated fatalities. Military occupations account for just under 1 percent of employment and just under 2 percent of overall work fatalities.¹⁷

As the following tabulation shows, vehicles are associated with virtually all of the military fatalities, with aircraft accounting for virtually all of the vehicles:

<i>Kind of vehicle</i>	<i>Number of fatalities</i>
Total	223
Vehicles	210
Aircraft	194
Fixed wing	68
Rotary wing	117
Motor vehicles	16

Rotary-wing aircraft, primarily helicopters, account for nearly twice as many military fatalities in multiple-fatality incidents as do fixed-wing aircraft. Because seven-eighths of military fatalities involve aircraft, military multiple-fatality incidents average 4 decedents per incident.

2. *State government.* Multiple-fatality incidents and associated fatalities are more widely dispersed in State government than they are in the Federal Government. Police protection accounts for the most fatalities from multiple-fatality incidents. These 23 State police fatalities arising from 13 multiple-fatality incidents represent more than one-fifth of overall State police protection fatalities.

3. *Local government.* Fire protection accounts for the largest number of multiple-fatality incidents and fatalities in local government, with more than one-third of multiple-fatality incidents and two-fifths of associated fatalities. Police protection accounts for the second-largest number. Although there are more multiple-fatality local police protection incidents and fatalities than in State government, the 37 local police protection fatalities arising from 22 multiple-fatality incidents account for less than one-tenth of local police protection fatalities. It is not clear why so much larger a proportion of State police protection fatalities occurs in multiple-fatality incidents compared with the proportion of local police protection fatalities; the underlying character-

istics of multiple-fatality incidents for both categories of worker is a similar mix of homicides and auto and air crashes.

Another surprising finding is the prevalence of multiple-fatality incidents in the public administration of environmental quality, housing, and economic programs. After all levels of government are aggregated, data show that there were 53 fatalities arising from 24 multiple-fatality incidents. These 53 fatalities account for almost one-fifth of this category's fatalities. Air crashes account for almost half of these fatalities, homicides for almost a quarter.

THIS ARTICLE REPRESENTS THE FIRST TIME that the Bureau of Labor Statistics has examined multiple-fatality incidents. A few general conclusions can be reached. First, multiple-fatality incidents occur in varying degrees in almost all event or exposure categories, but in some they make up larger or smaller shares of the category's overall fatalities. Second, except in the case of murder-suicides, very rarely does the fatal event or exposure differ among the individual victims of the same multiple-fatality incident. Third, most multiple-fatality incidents involve workers in the same or similar industries and occupations. Finally, multiple-fatality incidents are a unique phenomenon: in most major respects, the fatal events or exposures underlying the circumstances under which they occur and the kinds of jobs in which they are most prevalent often do not reflect the fatal injury experience as a whole. □

Notes

¹ The Census of Fatal Occupational Injuries (CFOI) program, which has collected occupational fatality data nationwide since 1992, uses diverse data sources to identify, verify, and profile fatal work injuries. Information about each workplace fatality (occupation and other worker characteristics, circumstances of the event, and other cases arising out of the same incident) is obtained by cross-referencing source documents, such as death certificates, workers' compensation records, media accounts, and reports to Federal and State agencies. This approach ensures that counts are as complete and accurate as possible. CFOI data do not include data on fatal work illnesses. For purposes of this article, CFOI data for 1995–99 were used.

² For example, in 1995, both the number of fatalities in the "10 or more fatalities per incident" category and the number of fatalities in the Federal Government were significantly greater than the average, due to the bombing of a Federal building that resulted in more than a hundred work-related fatalities.

³ The event or exposure describes the manner in which the injury was produced or inflicted. For further explanation, see Guy Toscano, Janice Windau, and Dino Drudi, "Using the BLS Occupational Injury and Illness Classification System as a Safety and Health Management Tool," *Compensation and Working Conditions*, June 1996, pp. 19–28.

⁴ Even though virtually every kind of fatal event can involve multiple fatalities, the event or exposure categories in which multiple-

fatality incidents are rare include sudden stop or start noncollision highway incidents; some nonhighway and railway vehicle incident categories; assaults by animals; being struck by a flying, swinging, or slipping object; being compressed or pinched by rolling, sliding, or shifting objects; falling down stairs or steps; falling from the floor, dock, or ground level; falling from a roof; falling from a nonmoving vehicle; falling from piled or stacked materials; jumping to a lower level; falling on the same level; coming into contact with the electric current of a machine, a tool, an appliance, a light fixture, wiring, a transformer, or some other electrical component; ingestion of a substance; needle sticks; venomous bites; and ignition of one's clothing from a controlled heat source. Multiple fatalities are underrepresented, although less so, among, for example, suicides; workers caught in running equipment or machinery; and workers coming into contact with electric currents other than in overhead power lines. Falls from scaffolds, too, rarely claim more than one worker's life. Even excavation or trenching cave-ins show no greater propensity to result in multiple-fatality incidents than events or exposures overall: during the 5-year study period, the 10 excavation or trenching cave-ins in which more than one worker was killed claimed 21 of the 213 workers involved in these kinds of fatalities.

⁵ Another example illustrating this concept is as follows: suppose that, in 4 of 5 multiple-fatality head-on collisions involving truckdrivers, the truckdrivers of both vehicles were killed, but in the fifth only one truckdriver was killed, because the fatally injured driver of the other truck

was a carpenter driving between construction sites; then those five multiple-fatality incidents involved nine truckdrivers and one carpenter, so the average number of fatally injured truckdrivers is 1.8 (that is, 9 truckdrivers ÷ 5 incidents = 1.8 truckdrivers per incident).

⁶ Figures for separate categories may not sum to totals because of incidents involving more than one transportation mode and categories that are not shown separately.

⁷ Vessel casualties include sinkings, capsizings, and vessel explosions and fires.

⁸ Eric F. Sygnatur and Guy A. Toscano, "Work-related Homicides: The Facts," *Compensation and Working Conditions*, spring 2000, p. 5. Also noteworthy is that better information seems to be available on multiple-fatality homicides, reducing the share for which a victim-perpetrator association or circumstance associated with crime is undetermined. Whether this is due to better documentation being available or to the particular mix of victim-perpetrator associations or circumstances associated with crime is unknown.

⁹ The only smaller categories are bodily reaction and exertion (which includes overexertion and repetitive motion) and the category titled "nonclassifiable," each of which averaged under a dozen fatality cases per year.

¹⁰ As used in this context, the term *industry* refers to industries listed in the *Standard Industrial Classification Manual* (Office of Management and Budget, 1987), and *occupation* refers to occupations listed in the *Census of Population Alphabetical Index of Occupations* (Bureau of the Census, 1990), as modified by the Bureau of Labor Statistics.

¹¹ For further information about air transportation occupational fatalities, see Peggy Suarez, "Flying Too High: Worker Fatalities in

the Aeronautics Field," *Compensation and Working Conditions*, spring 2000, pp. 39–42.

¹² Andrew T. Knestaut, "Fatalities and Injuries Among Truck and Taxicab Drivers," *Compensation and Working Conditions*, fall 1997, pp. 55–60. This occupation also includes chauffeurs.

¹³ Although the industry titled chemicals and chemical preparations, not elsewhere classified (see table 3), involves a disparate range of manufactures, such as lemon and eucalyptus oil, writing ink, soil-testing kits, napalm, and flares, the vast majority of the fatalities in that industry, including virtually all the multiple-fatality incidents, involved fireworks manufacturing.

¹⁴ For purposes of the analysis in this paragraph, commuter railroads and subway and trolley transit operations within Standard Industrial Code 411, "Local and Suburban Transportation" have been combined with Standard Industrial Code 40, "Railroad Transportation."

¹⁵ The timber-cutting and logging category also includes supervisors of forestry and logging workers.

¹⁶ Figures for separate categories may not sum to totals because of incidents involving more than one sector and categories that are not shown separately.

¹⁷ To be included in the fatality census, the incident leading to the death must have occurred within the territorial limits of one of the 50 States or the District of Columbia or within the 200-mile offshore economic zone. Incidents that occur in international airspace or waters may be included if a State, the District of Columbia, or the U.S. military issues a death certificate. Incidents occurring in a foreign country are excluded.

APPENDIX: Identifying work-related multiple fatalities

This appendix explains the mechanics of identifying and reporting work-related multiple-fatality data. Each work-related fatality data record that the Census of Fatal Occupational Injuries (CFOI) processes carries a multiple-fatality data field. This field is filled with blanks or zeros for single-fatality incidents. For multiple-fatality incidents, each jurisdiction participating in the CFOI assigns a natural number code to each fatality associated with each particular multiple-fatality incident in that jurisdiction during that year. This code must be unique within that jurisdiction for that year. As long as all work fatalities associated with an incident carry the same unique code, jurisdictions are generally free to choose their numbering system.

To illustrate, usually jurisdictions number their multiple-fatality incidents ordinally by date. For example, the three fatalities associated with the first multiple-fatality incident in a particular jurisdiction in a given year might be assigned the code "1"; the two associated with the next such incident might initially have been assigned the code "2," except that the jurisdiction later ascertained that one of the decedents was not in a work status and deleted the "2." By this time, however,

an incident involving five decedents, four of whom later were confirmed as being in a work status, might already have been assigned the code "3." In that event, jurisdictions usually leave the "3" on the cases associated with this incident, even though there no longer would be any cases with the code "2."

For purposes of the analysis in this article, these codes were appended to the jurisdiction code and the year in order to create unique codes for each multiple-fatality incident. Nevertheless, because very little attention previously had been paid to the multiple-fatality phenomenon, a large number of errors had to be addressed. To identify these errors, cases were sorted by jurisdiction, date and time of incident, county of incident, age of decedent, and event or exposure category. For example, for those cases with a multiple-fatality code that had no corresponding associated fatality, either they had to be deleted (cases called "orphans") or matching codes had to be assigned to the associated fatality or fatalities that were missing them (cases called "widows"). Sometimes, blocks of cases had to be disentangled because jurisdictions had assigned the same code to cases from different multiple-fatality incidents.