

Serious Injuries Befall Workers Struck by Objects

BY MARTIN E. PERSONICK

Falling, flying, swinging, and rolling objects can result in deadly and disabling injuries in the workplace. In 1996, there were 579 work-related fatalities due to objects striking workers.¹ Some of the workers killed in this way included loggers and farmers struck while clearing trees, construction workers hit by beams and other building materials, and mechanics struck when vehicles slipped off jacks or repair racks. Although most workers survive being struck by objects, these contacts commonly incur injuries that involve days away from work. In 1995, the latest year for which such data are available, injuries of this type numbered about 270,00 in the private sector.² Workers struck seriously enough to miss work included food service workers cut by knives, material movers hit by containers of goods, and fabricators struck by nails, metal and wood chips, or other particles. This article summarizes some of the characteristics of fatal and lost-worktime injuries resulting from workers being struck by objects.

Fatal work injuries

A worker struck and killed by an object was one of the leading circumstances surrounding death in the workplace. Table 1 lists 9 events and exposures, each accounting for at least 5 percent of the 6,112 fatal work injuries counted in the BLS nationwide Census of Fatal Occupational Injuries for calendar year 1996. Objects striking workers ranked fourth among fatal events and exposures, with roughly the same share (10 percent) of total fatalities as workers who fell to their death from heights, which ranked third.

An object falling on a worker was, by far, the most common way to be struck and killed on the job, accounting for almost 70 percent of the 579 fatal incidents of that type in 1996. Next in frequency were the deaths of workers who were struck by a flying object or a rolling object, each category representing about 10 percent of the case total. In

Table 1. Number and percent of fatal work injuries by event or exposure, 1996

Event or exposure	Fatal work injuries	Percent of total fatal work injuries
Total fatalities	6,112	100
Highway incident	1,324	22
Homicide	912	15
Fall to a lower level	607	10
Struck by object	579	9
Nonhighway transportation incident	369	6
Worker struck by vehicle	349	6
Aircraft crash	329	5
Caught in, or compressed by, equipment or object	283	5
Contact with electric current	279	5
All other events, exposures	1,081	18

Table 2. Number and percent of fatal work injuries resulting from being struck by objects, 1996

Event	Fatal work injuries	Percent of total fatal work injuries
Total, struck by object	579	100
Struck by falling object	402	69
Struck by flying object	58	10
Dislodged flying object, particle	28	5
Discharged flying object, substance	24	4
Other or unspecified flying object	6	1
Struck by swinging or slipping object ..	36	6
Slipping handheld object	12	2
Other or unspecified swinging, or slipping object	24	4
Struck by rolling, sliding object on floor or ground level	54	9
Other or unspecified	29	5

1996, the number of fatalities from falling objects (402) was at its highest level since 1992, when the BLS nationwide fatality census was initiated. By contrast, that same year, all fatal work injuries declined to a 5-year low. Table 2 provides more details on the various ways in which objects struck workers and their percentage share of the total.

Martin E. Personick is an economist formerly with the Office of Safety, Health and Working Conditions, Bureau of Labor Statistics. Telephone (202) 606-6168.

Table 3. Occupations at "high risk" of being fatally struck by objects, 1996

Occupation	Fatalities (Over age 15)	Employment (thousands)	Fatalities per 100,000 workers
Total, struck by object	579	127,997	0.5
Timber cutting and logging	90	75	120.0
Farmers, except horticultural ..	44	1,112	4.0
Truckdrivers	44	3,019	1.5
Construction laborers	39	809	4.8
Nonconstruction laborers	29	1,334	2.2

Fatalities by occupation. In 1996, two major occupational categories each accounted for approximately a third of the workers struck and killed by objects: The first category was operators, fabricators, and laborers, and the second was farming, forestry, and fishing. (See chart 1.) Most of the remaining fatalities occurred in the precision production, craft, and repair category. Among individual occupations, timber cutters and loggers had an especially high risk of being struck and killed by objects. Their count of 90 deaths was more than double the number reported for either farmers, truckdrivers, or construction laborers, 3 other occupations with relatively high-risk rates.

Table 3 shows individual occupations with 5 percent or more of the 1996 fatal injuries resulting from objects striking workers. Employees in these occupations face a higher-than-average risk of these fatal injuries, as measured by the number of fatalities per 100,000 workers.

Fatalities by source (object). Trees and logs in their natural or unprocessed condition were the primary source of injury for 29 percent of all fatalities resulting from objects striking workers. Although most of the 167 workers struck and killed by falling trees or logs in 1996 were classified in timber cutting and logging occupations, several dozen tree-related deaths also occurred to workers who did not cut or clear trees on a daily basis, such as farmers, groundskeepers, truckdrivers, laborers, and carpenters.

Together, machinery, building materials, and vehicles accounted for nearly 40 percent of the primary objects cited when workers were fatally struck. Within these broad categories of objects, some specific sources included cranes and other material handling machinery, metal pipes, steel beams, dimensional lumber (e.g., 2x4's), trucks, and tractors. Other objects included: Containers, such as bales of hay, warehoused crates, and storage tanks; parts and materials unattached to machines and vehicles at the time of the incident, including pulleys, saw and fan blades, and tires; building structures, such as walls and gates; handtools; and bullets accidentally discharged in handling and cleaning guns. (See table 4 and chart 2.)

Lost-worktime injuries

Being struck and disabled by an object ranked second

Table 4. Primary source of fatal and disabling injuries to workers struck by objects, 1995-96

Primary source of injury ¹	Percent distribution		Median ⁴ workdays lost from a disabling injury
	Fatal ² injuries (n=579)	Disabling ³ injuries (n=270,369)	
All primary sources of injury ..	100	100	4
Containers	8	16	4
Machinery	13	7	5
Material-handling machinery ..	5	2	5
Parts and materials	22	25	4
Building materials-solid elements	12	11	4
Pipes, ducts, tubing	4	2	5
Structural metal materials	5	4	4
Wood, lumber	2	3	3
Machine, tool, and electric parts.....	4	3	4
Vehicle and mobile equipment parts.....	3	3	5
Persons, plants, animals, and minerals	31	4	4
Trees, logs	29	1	6
Structures and surfaces	4	6	5
Tools, instruments, and equipment	4	22	3
Vehicles	13	5	4
Trucks	6	1	4
Tractors	2	(⁵)	-
Other sources (bullets, metal chips).....	3	7	2
All other and nonclassifiable sources	(⁵)	7	-

¹ Identifies the object that directly produced or inflicted the injury.

² Based on data from the 1996 BLS Census of Fatal Occupational Injuries, which covered all workers in the private and public sectors: Wage and salaried, self-employed, and family members.

³ Based on data from the 1995 BLS Survey of Occupational Injuries and Illnesses, which covered just wage and salaried workers in private industries, excluding farms with fewer than 11 employees and private households. Disabling injuries are cases that resulted in days away from work, beyond the day of the incident.

⁴ Median workdays lost is the point at which half the injuries involved more and half involved fewer days. Dashes indicate that medians were not computed.

⁵ Less than 0.5 percent.

NOTE: Totals for major categories may include data for subcategories not shown separately. Because of rounding, percentages may not add to 100 percent.

behind overexertion among the ways in which private industry workers incurred injuries and illnesses involving days away from work. As estimated by the 1995 BLS nationwide Survey of Occupational Injuries and Illnesses, table 5 shows the six most prevalent events and exposures. Each made up at least 5 percent of the 2 million cases resulting in missed workdays beyond the day of the incident. Objects striking workers was cited for approximately 13 percent of all lost-worktime cases.

Two types of disabling contacts with objects stood out, falling objects and swinging or slipping objects. Together, they were two-thirds of the 270,000 lost-worktime cases resulting from objects striking workers in 1995. Flying objects accounted for another tenth. Table 6 includes more specifics on how the object struck the worker, based on the

Table 5. Number and percent of disabling injuries to workers by event and exposure, 1995

Event or exposure	Lost workday cases	Percent of total lost workday cases
Total cases with days away from work	2,040,929	100
Overexertion	559,938	27
Struck by object	270,369	13
Fall on same level	224,244	11
Struck against object	143,458	7
Fall to a lower level	104,801	5
Caught in, or compressed by, equipment or object	94,582	5
All other events, exposures	643,537	32

documentation of disabling incidents provided by employers participating in the BLS survey.

Nonfatal injuries by occupation. The occupational category of operators, fabricators, and laborers accounted for nearly half of the 270,000 lost-worktime cases in 1995 resulting from workers being struck by objects. Next in frequency was the precision production, craft, and repair category, with a fifth of the total, followed by the technical, sales and administrative support category and services category, each with approximately an eighth of the total.

The 10 occupations with the most lost-worktime injuries resulting from objects striking workers are shown in table 7. Together, they accounted for a third of the 270,000 total for such incidents. Individually, each occupation was cited in at least 5,000 cases of this type, the minimum used for this analysis. In addition, for each occupation, the table shows the chance of being struck and disabled by an object. For example, the chance of this type of injury is 1 out of 159 truckdrivers, double the national ratio for all occupations (1 in 352). Each occupation shown had a greater chance of injury than the national ratio, with non-construction laborers reporting the greatest chance (1 in 62).

Nonfatal injuries by source (object). Parts and materials and tools, instruments, and equipment categories were the two major sources of injury, accounting for nearly half of the lost-worktime injuries due to workers being struck by objects. (See table 4.) Within these broad categories, the most frequently cited individual objects included knives (21,800 cases); bars, metal panels, beams, and other structural metal materials (12,000 cases); fasteners, ropes, and ties (10,300 cases); wood and lumber (8,600 cases); vehicle and mobile equipment parts (7,900 cases); and machine, tool, and electric parts (7,200 cases). Containers, in particular, boxes, crates, and cartons accounted for another sixth of the injuries associated with objects striking workers. Many of the remaining objects that struck and disabled workers were classified in various categories: Machinery

Table 6. Number and percent of disabling injuries to workers struck by objects, 1995

Event	Struck by object cases	Percent of total struck by object cases
Total, struck by object cases	270,369	100
Struck by falling object	104,820	39
Struck by swinging or slipping object	73,637	27
Slipping handheld object (e.g., knife)	52,570	19
Swinging door or gate	13,068	5
Other or unspecified swinging, slipping object	7,999	3
Struck by flying object	30,912	11
Dislodged flying object, particle (e.g., drill bit)	14,587	5
Discharged flying object or substance (e.g., staple from staple gun)	7,593	3
Other or unspecified flying object or substance	8,732	3
Struck by rolling, sliding object on floor or ground level	7,832	3
Other or unspecified	53,168	20

(jacks and refrigerators, for example); structures and surfaces (especially doors); and vehicles (particularly carts, dollies, and handtrucks).

Objects striking workers resulted in workers missing a median of 4 workdays, the average for all injuries. Although a wide variety of objects struck and disabled workers, the resulting absence from work typically varied little by the offending source of injury.

Scope and method

The national Census of Fatal Occupational Injuries (CFOI) and the Survey of Occupational Injuries and Illnesses (SOII) differ markedly with regard to methods of data collection and worker coverage. CFOI uses diverse data sources to identify, verify, and profile all fatal work injuries. It obtains information about each workplace fatality (occupation and other worker characteristics, equipment being used, and circumstances of the event) by cross-referencing source documents, such as death certificates, workers' compensation records, and reports to Federal and State agencies. This method assures counts are as complete and accurate as possible.

SOII collects information from a random sample of about 250,000 establishments representing most of private industry. Unlike the fatality census, the survey excludes the public sector, the self employed, private households, and farms with fewer than 11 employees. In addition, worker and case characteristics are collected only for those workers sustaining injuries and illnesses that require missed workdays, beyond the day of the incident.

For more information on either the census or the survey, access the BLS Internet site at <http://www.bls.gov/oshhome.htm> or e-mail cfoistaff@bls.gov with your request.

Table 7. Ten occupations with the largest number of lost-worktime injuries due to objects striking workers, by chance of injury and leading objects producing the injury, private industry, 1995

Occupation	Lost-worktime injuries	Chance of injury ¹	Leading sources of injury (percent)
Total	270,369	1 in 352	
Nonconstruction laborers	20,132	1 in 62	Building materials (17), wood or lumber (8)
Truckdrivers	15,635	1 in 159	Building materials (13), containers (12)
Assemblers	8,292	1 in 147	Building materials (12), fasteners (11)
Construction laborers	8,128	1 in 87	Building materials (23)
Carpenters	7,823	1 in 114	Handtools (38), nails (13)
Welders and cutters	6,335	1 in 89	Building materials (24), metal chips (13)
Janitors and cleaners	6,234	1 in 231	Doors (10), particles (9)
Stock handlers, baggers	5,756	1 in 181	Boxes (20), knives (14)
Miscellaneous food preparers	5,647	1 in 86	Knives (20), carts (12)
Cooks	5,443	1 in 330	Knives (63)

¹ The chance of occupational injury was calculated as N/E, where:

N = The number of cases involving days away from work that were due to objects striking workers in a given occupational classification.

E = The number of wage and salaried employees, excluding private household workers, based on the Current Population Survey, unpublished 1995 annual averages for individual occupations.

NOTE: Lost-worktime injuries are cases involving days away from work beyond the day of the incident. All occupations had at least 5,000 lost work-time injuries due to objects striking workers in 1995.

Fatal and disabling event categories discussed throughout this article are described in detail in the 1992 BLS *Occupational Injury and Illness Classification Manual* listed under "Documentation" at the aforementioned site on the Internet. "Struck by object" is one of several categories within "contact with objects and equipment," one of seven specifically defined divisions within the event and exposure structure in the *Manual*.

The occupations of injured workers are coded from job titles usually indicated on the death certificate or other source documents in the case of fatalities, or, as in days-away-from-work cases, supplied by the employer. The 1990 Occupational Classification System, developed by the Census Bureau, was used to determine the appropriate individual occupational category.

There is more than one method of calculating fatality rates that measure the incidence of fatal work injuries for occupations. An hours-based rate measures the risk of

fatality per standardized length of exposure; an employment-based rate measures the risk to those employed during a given period of time, regardless of exposure time. Therefore, the employment-based rate does not account for differences between part-time and full-time workers because of the part-time workers' reduced exposure time. Hours-based measurements are especially useful in industry and occupational comparisons in which, during particular time periods, the number of workers at risk can vary. They do, however, include those hours when the worker is engaged in hazardous activities (e.g., felling trees) as well as those hours when relatively safe work is performed. The occupational fatality rates in this report were calculated using the employment estimates from the Current Population Survey (CPS)—a household survey. The CPS annual average employment estimates are based on the number of workers over 15 years old employed during the week of the 12th of the month.

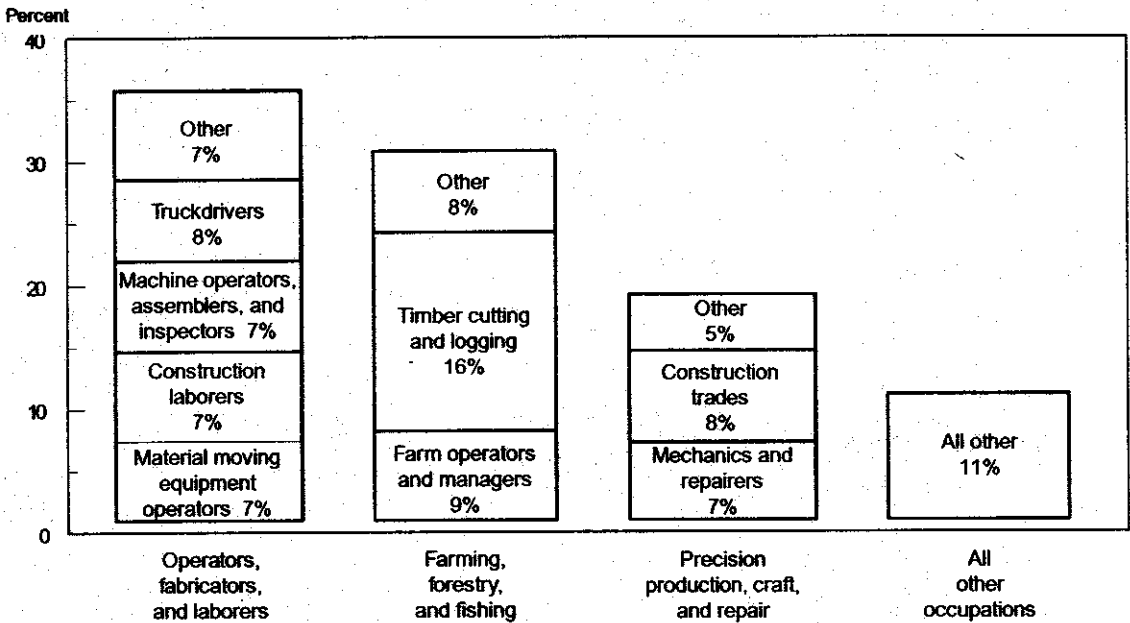
—ENDNOTES—

¹ "Struck by object" includes unintentional injuries produced by forcible contact or impact between the injured person and the source of the injury when the motion producing the contact is primarily that of the source of the injury rather than the person. Injuries to vehicle occupants, pedestrians, and other nonpassengers are excluded from this classification if they resulted from being hit or run over by a vehicle or mobile equipment during its normal operation (highway and other transportation incidents); stabbings, shootings, and other violence (where contact is intentional or of unknown intent); and

other "impact" injuries, such as workers falling on, striking against, or being caught in, compressed by, or crushed in equipment or objects.

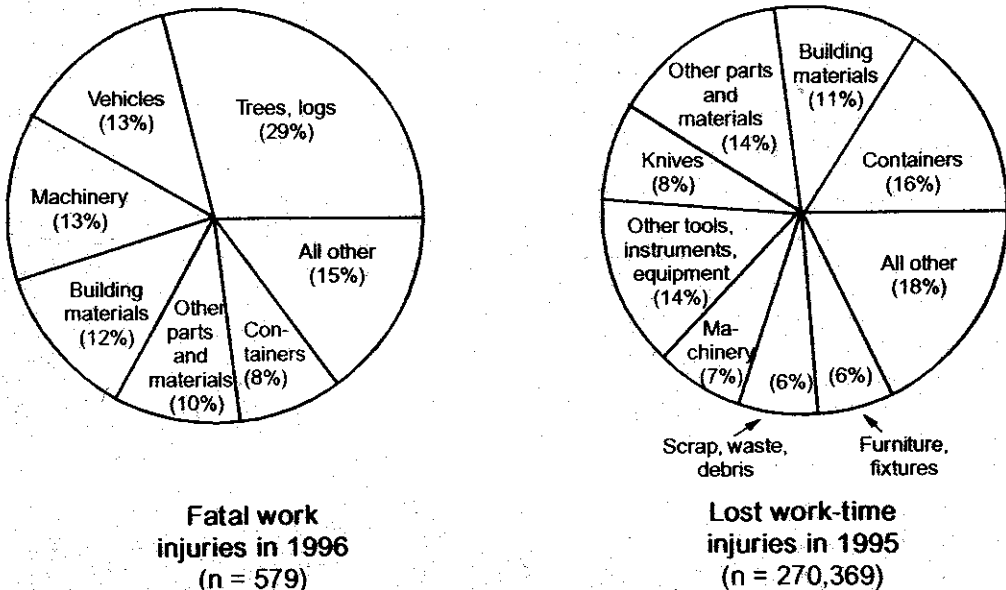
² Based on data from the 1995 BLS Survey of Occupational Injuries and Illnesses, which covered wage and salaried workers in private industries, excluding farms with fewer than 11 employees and private households. Disabling injuries are cases that resulted in days away from work, beyond the day of the incident.

Chart 1. Occupations of workers fatally struck by objects, 1996
(n=579)



SOURCE: Bureau of Labor Statistics, U.S. Department of Labor, National Census of Fatal Occupational Injuries, 1996.

Chart 2. Primary sources of fatal and lost-worktime injuries due to objects striking workers



SOURCE: Bureau of Labor Statistics, U.S. Department of Labor, National Census of Fatal Occupational Injuries, 1996 and Survey of Occupational Injuries and Illnesses, 1995