

Occupational safety and health

Occupational injuries among young workers

Despite regulations, young workers are exposed to some of the same hazards as older workers, resulting in injuries and deaths; transportation incidents cause the most fatal occupational injuries

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Young workers face considerable occupational risks. Fatality counts dropped for many age groups between the two 5-year periods in 1993–2002, but increased 34 percent for workers aged 14 and 15 years. Fatalities for young workers aged 14 to 17 increased in the construction, services, and government industries and decreased in retail trade. Child labor laws are designed to protect young workers from participating in dangerous jobs, but some hazardous occupations (work on a family farm, for example) are outside the scope of such laws.

This article updates a previous study of injuries and fatalities among young workers covering the 1992–97 period.¹ That study concluded that young workers are exposed to some of the same hazards as older workers, despite regulations.² This study compares fatalities among young workers during two time periods: 1993–97 and 1998–2002.³ The study also compares data for nonfatal injuries and illnesses among young workers with data for all workers. A snapshot of youth employment in recent years is discussed, and fatality data totals for 2003 and 2004 are presented.

About the data

Young workers are defined here as workers 17 years old and younger. Data from the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) were used for the fatality comparisons. These data cover workers of all ages and all types of employment, including pub-

lic sector, self-employment, and unpaid work for a family farm or business. Data from the BLS Survey of Occupational Injuries and Illnesses (SOII) were used to look at nonfatal incidents among young workers in private wage and salary jobs. Employment data are from the Current Population Survey (CPS), a joint endeavor between the Census Bureau and BLS, and the BLS National Longitudinal Survey of Youth (NLSY).

Fatality rates were calculated using the CPS hours-at-work data for years 1994 through 2004. The CPS produces data for individuals aged 15 years and older. Therefore, rates were calculated for youths 15 to 17 years old and represent the number of fatal injuries per 100,000 full-time equivalent workers.

Youth employment

Studies have shown that children work extensively in their teen years and even earlier. Using data from the National Longitudinal Survey of Youth 1997 (NLSY97), the BLS *Report on the Youth Labor Force* reported that half of those interviewed responded that they had engaged in some sort of paid work activity at age 12—mostly involving either babysitting or yard work.⁴

The proportion of children with paid jobs increases with age. By ages 14 and 15, the percentage of those working at some type of job increased to 57 and 64 percent, respectively. The study also reported that the type of work performed also changes as one grows older. Whereas only 24 percent held an “employee-

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type” job (that is, they had an ongoing relationship with a particular employer) when aged 14, this percentage rises to 38 percent for 15-year-olds. Employee-type work among 14- and 15-year-olds included work in eating and drinking places, entertainment and recreation services, construction, grocery stores, newspaper publishing and printing, landscape and horticultural services, agricultural production, elementary and secondary schools, building services, automotive repair, and private households. As with 12-year-olds, freelance work among 14- and 15-year-olds included babysitting and yard work.⁵

Another study compared work activities of high schoolers in employee-type or wage and salary jobs during the school year.⁶ Slightly less than one-fourth (23 percent) of freshmen (typically, 14-year-olds) worked at some point during the school year. This percentage rises with each successive grade. By senior year (typically, youths aged 17), the proportion of those working in employee-type jobs during the school year rises to three of four. Not surprisingly, older youths also tend to work longer hours. Only 24 percent of freshmen working during the school year worked more than 20 hours a week, while 56 percent of employed seniors averaged more than 20 hours.

The number of teen workers aged 16-17 years has been declining. The annual average employment for 16- and 17-year-olds for 2004 was 2.2 million, down from 2.8 million in 2000, although there has been an increase in the number of self-employed workers among this age group. Hours at work for 16- and 17-year-olds have also declined, from a weekly average of 19.7 in 2000 to 18.0 in 2004.⁷

Laws restricting child labor

The Federal law regulating child labor, the Fair Labor Standards Act (FLSA) of 1938, is intended to protect youths from working in hazardous conditions and to ensure work does not interfere with a youth’s education.⁸ These regulations limit the extent and type of work youths under 18 years old can perform. Regulations differ by age, with fewer restrictions for those aged 16 and 17 in nonagricultural work. Regulations set limits on the hours that those younger than age 16 may work on school days and nonschool days, both during the school year and when school is dismissed for vacation.

Persons younger than age 18 also are restricted from working in certain hazardous occupations or performing hazardous tasks. These restrictions are embodied in the Hazardous Occupations Orders and regulate work in mining, logging and sawmilling; certain manufacturing work; roofing, excavation, and demolition; driving; and use of certain types of powered equipment.⁹

Workers younger than 16 are limited to performing certain duties in retail, food service, and gasoline service establishments. Nonagricultural workers younger than age 14 are limited to the following work, which are exempt from Federal youth employment provisions:

- working for parents in occupations other than manufacturing and mining and occupations deemed hazardous;
- working as actors or performers in movies, theatrical, radio, or television productions;
- delivering newspapers to consumers;
- working at home making wreaths composed of certain materials; and
- working on a casual basis using family lawnmower to cut neighbors’ grass, babysitting, or performing minor chores around private homes.

There also are exemptions for youths working in certain apprenticeship and vocational education programs.

Rules differ between agricultural and nonagricultural employment, with regulations being less restrictive in agricultural work than in other industries. Youths in agriculture may perform tasks deemed hazardous at a younger age; may perform any activity if working on a farm owned or operated by their parents; and may work during school hours at age 16 or if employed on the parents’ farm. In addition, there are no restrictions on the number of hours 14- and 15-year-olds can work in nonhazardous jobs outside of school hours.

Minors younger than age 16 working on farms other than those owned or operated by their parents are restricted from operating tractors having over 20 power-take-off horsepower; riding as a passenger or outside helper on a tractor; driving a motor vehicle while transporting passengers; operating and assisting in operating certain other powered equipment; working near animals with newborns; working from ladders or scaffolds more than 20 feet high; working in certain potentially oxygen-deficient environments such as silos; and handling certain hazardous substances.

In addition to Federal laws, each State has its own child labor laws, which may be more or less restrictive than provisions of the Federal regulations. If both the State and Federal laws apply to the same situation, the more stringent standard must be obeyed. A State’s standard may also apply if the business or farm does not meet coverage requirements of the Fair Labor Standards Act. To be covered by FLSA, the business must have annual gross volume of sales of \$500,000 or the worker in question must have duties involving interstate commerce including shipping, receiving, or recording transactions

for goods for interstate commerce. Some States extend coverage to all businesses regardless of revenues, and some State laws cover newspaper carriers and child actors, who are exempt under the FLSA.¹⁰ A few States, Maine and Massachusetts for example, prohibit all workplace driving by workers younger than age 18, and some States, such as Florida and Oregon, restrict them from operating certain farm machinery. In contrast, several States either exempt agricultural employment entirely or do not identify it as a covered employment, and some States have exemptions related to working with a specific crop.

Many States also require work permits or proof of age. These are typically issued by either the State Labor Department, a local social service agency, or a local school district. Some States require a physician to sign the work permit.¹¹

Several other State and Federal laws apply to youth employment, even if not specifically designed to protect young workers. Federal and State occupational safety and health laws apply to workers of all ages, although some activities are exempt. The Occupational Safety and Health Administration (OSHA) covers safety and health issues among the working population. Coverage is generally limited to private-sector wage and salary workers, Federal Government workers, and some State and local government employees. Workers on farms with fewer than 11 employees are excluded from OSHA coverage, as are the self-employed in unincorporated businesses and workers in the family business. State motor vehicle laws restrict driving to certain ages, and many States have adopted graduated licensing programs, which also restrict the number and ages of passengers allowed in vehicles operated by young drivers.

In addition to regulations, many other initiatives have been implemented to stem the occurrence of youths' injuries and illnesses at work. The Department of Labor initiative *YouthRules!*, launched in May 2002, was created with a goal to generate child labor law awareness in the public eye. Information is tailored to various user groups; separate sections are available for teens, parents, employers, and educators.¹²

Several private-sector organizations have programs targeted at diminishing hazards to young workers in agriculture. For example, the 4-H Federal Extension Service Training Program, which is referenced in the Child Labor Requirements in Agricultural Occupations (Bulletin 102), provides certification in tractor and farm machine operation for 14- and 15-year-olds. Another example is the North American Guidelines for Children's Agricultural Tasks, developed by the National Children's Center for Rural Agricultural Health, designed to assist parents in assigning farm tasks that are appropriate for their child's developmental level and skill. Recommendations cover tasks, such as animal care, haying operations, and tractor use.

Occupational fatalities to youths

Counts of fatal work injuries among workers 17 years of age and younger were fairly steady between 1992 and 2000—averaging 68 per year. (See chart 1.) Fatality counts began to fall in 2001, then fell again in 2002, so that the 2002 count was 44 percent below that recorded for 2000—the year with the highest total since the BLS fatality census started collecting data in 1992. The fatality total for youths increased again in 2003, mainly due to a rise in fatalities among workers younger than 16, and then declined again so that the 2004 count of 37 was the low for the series. Fatality counts for all workers combined fell during the late 1990s and early 2000s, but the decline was not as dramatic. These counts fell 17 percent, from the high of 6,632 in 1994 to the series low of 5,534 in 2002.

Fatality rates for U. S. workers aged 15 and older while at work trended down during the last 10 years by an annual average decline of 3 percent.¹³ However, for workers aged 15 to 17, the annual average decline was slightly less than 1 percent. (See chart 2.) Fatality rates for ages 15 and older declined 15 percent from 1994 to 1998. However, the fatality rate for youth jumped back up in 1999, to 3.8 injuries per 100,000 full-time equivalent (FTE) workers—the highest ever recorded by the census. By the year 2002, the youth fatality rate dropped to 2.3 injuries per 100,000 FTE workers, a decline of almost 40 percent. In the most current data, youths aged 15 to 17 years recorded a fatality rate of 2.7 injuries per 100,000 FTE workers in 2004.

Workers aged 15 years had a fatality rate of 4.7 fatalities per 100,000 workers during the 1994–2004 period, while workers aged 16 to 17 had a rate of 3.0 fatal injuries per 100,000 workers. Additionally, workers aged 15 experienced a 9-percent average annual increase in fatality rate, while those aged 16 and 17 experienced slightly more than a 1-percent average annual decline. In fact, most age groups experienced a decline of between 1 and 5 percent in the 11-year period.

A different view of fatal work injury rates emerges when age categories are grouped by 5-year periods (1994–98 and 1999–2003). (See table 1.) While overall worker fatality rates declined by 14 percent between the two time periods, rates for 15- to 17-year-olds declined by a mere 6 percent. As a result, fatality rates for workers 15 to 17 years old approached those for young adult workers aged 18 to 34 during 1999–2003.

Fatalities by event and activity

Transportation incidents accounted for more than half of the 304 fatalities among young workers during the 1998–2002 period. (See table 2.) Fatalities from transportation-related

Chart 1. Fatal work injuries to youths 17 and younger, by year, 1992–2004

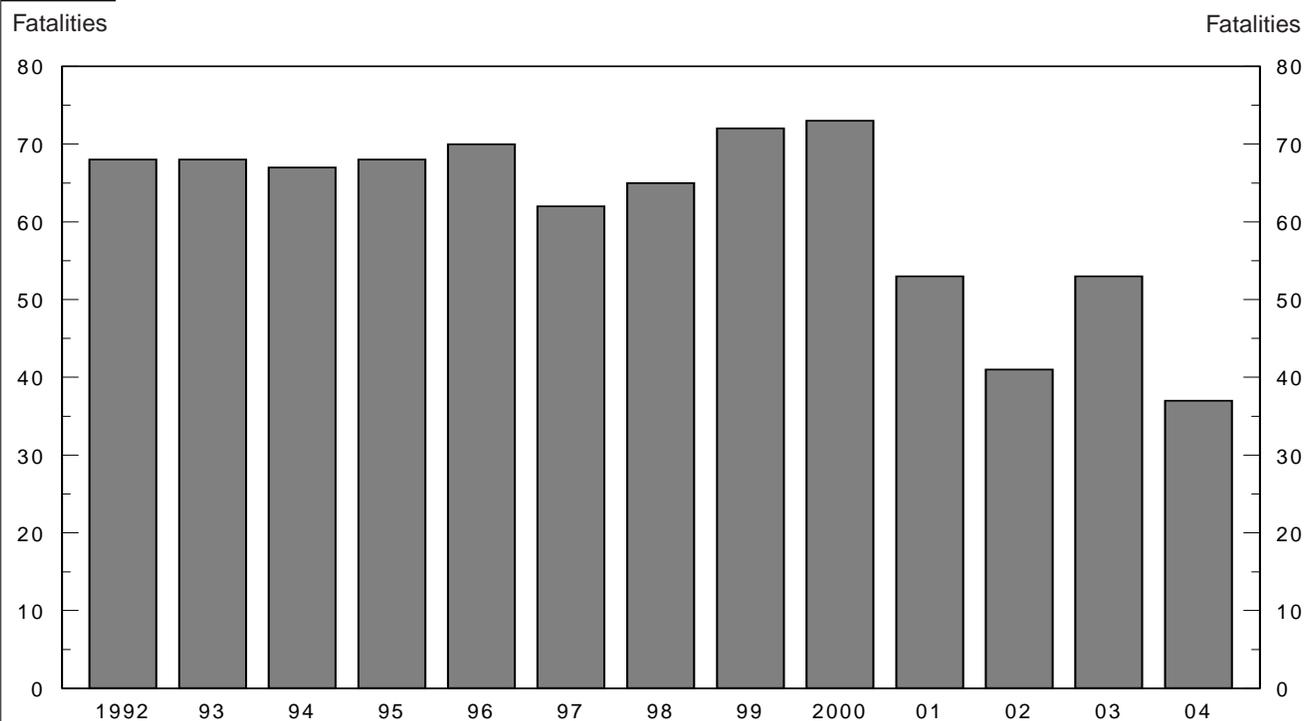


Chart 2. Fatal work injury rates by year, U.S. workers 15 and older, 1994–2004

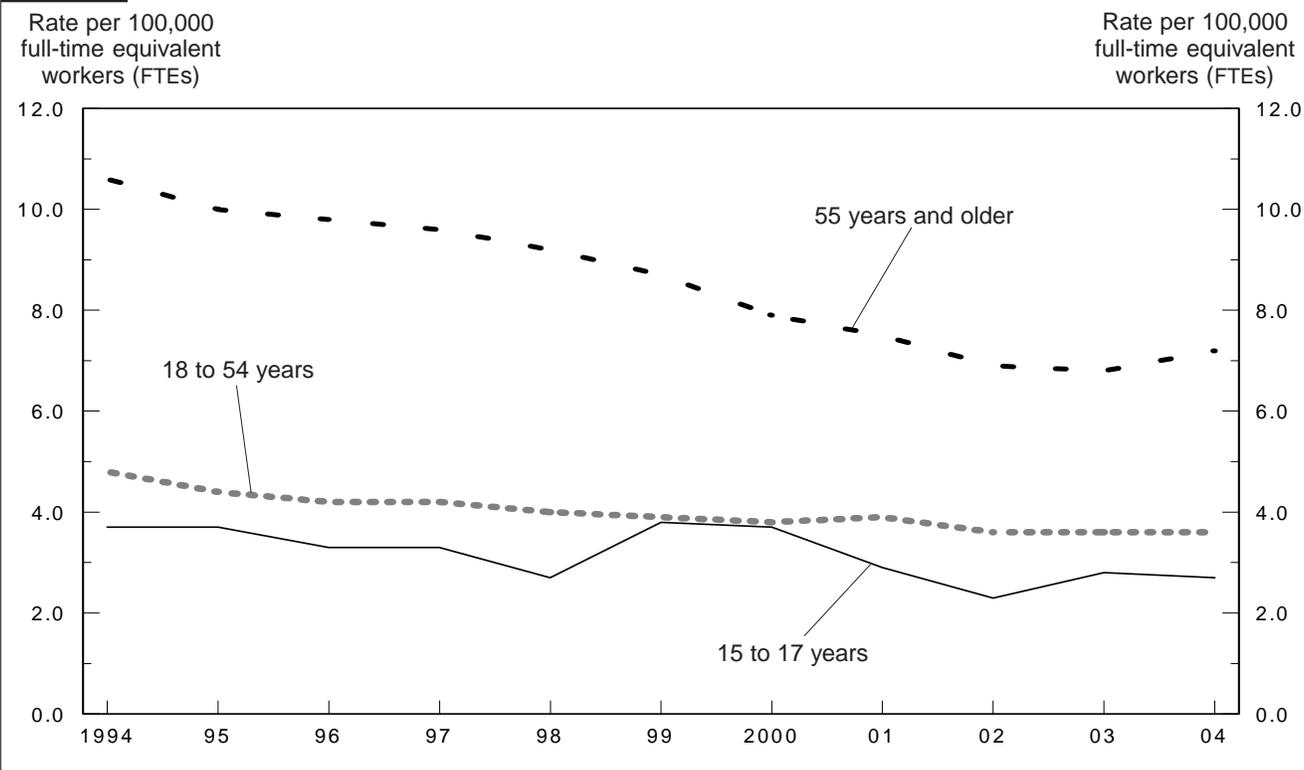


Table 1. Fatal occupational injury rates of civilian workers by age group, 5-year periods from 1994–2003

Age group	1994–2003	1994–98	1999–2003
All ages, 15 and older	4.6	4.9	4.2
15 to 17 years	3.2	3.3	3.1
18 to 19 years	3.7	4.0	3.4
20 to 24 years	3.7	3.9	3.5
25 to 34 years	3.8	4.1	3.4
35 to 44 years	4.1	4.3	3.8
45 to 54 years	4.5	4.9	4.1
55 to 64 years	6.4	7.5	5.5
65 years and older	18.2	20.1	16.7

Table 2. Fatal occupational injuries of U.S. workers aged 17 years and younger, by selected events, 5-year periods, 1993–97 and 1998–2002

Event	1993–97	1998–2002
Total	335	304
Transportation incidents	138	157
Highway	63	67
Collision between vehicles, mobile equipment	21	22
Noncollision	31	37
Jack-knifed or overturned	24	27
Nonhighway	35	54
Fall from moving vehicle, mobile equipment	4	5
Fall from and struck by vehicle, mobile equipment	10	17
Overturned	20	23
Worker struck by vehicle, mobile equipment	21	27
Water vehicle	8	6
Railway	8	—
Assaults and violent acts	66	44
Homicides	57	32
Suicide, self-inflicted injury	—	6
Assaults by animals	7	6
Contact with objects and equipment	68	50
Struck by object	30	16
Caught in or compressed by equipment or objects	20	22
Caught in running equipment or machinery	14	15
Caught in or crushed in collapsing materials	15	12
Excavation or trenching cave-in	4	5
Caught in or crushed in collapsing materials n.e.c.	9	6
Falls	21	25
Fall from roof	9	9
Fall from scaffold, staging	—	4
Exposure to harmful substances or environments	34	24
Contact with electric current	17	15
Exposure to caustic, noxious, or allergenic substances	7	—
Drowning, submersion	7	5
Fires and explosions	7	3

NOTE: Dashes indicate no data or data that do not meet publication criteria. Totals may include subcategories not shown separately. n.e.c = not elsewhere classified.

incidents rose by 14 percent from the previous 5-year period. The increase in these fatalities resulted from increases in vehicle-related incidents occurring on highways and in off-roadway areas (such as on farms and industrial premises) and from workers struck by vehicles.

Assaults and violent acts comprised 14 percent of the total in the 1998–2002 period. Fatalities among young workers resulting from homicides decreased considerably from the previous 5-year period. The count for 1998–2002 represented a 44-percent drop from the homicide total for 1993–97, mirroring the declining national trend in workplace homicides. The fatality total resulting from contacts with objects and equipment also decreased during the two periods, primarily due to a drop in fatal injuries from young workers being struck by objects.

Fatal falls increased slightly over the previous period, resulting from an increase in falls from scaffolds. On the contrary, there was almost a 30-percent drop in young worker fatalities from exposures to harmful substances and environments—mostly resulting from a decrease in fatalities from inhaling harmful substances and from being in oxygen-deficient environments. Young worker fatalities from fires and explosions also declined between the two periods.

Table 3 presents fatal injuries to young workers by age and work activity at the time of the event. The youngest decedents, those younger than 14, were fatally injured in incidents that almost entirely involved vehicles or farm machinery. About one-fourth of these workers were fatally injured while operating farm vehicles and machinery. More diverse work activities were associated with older youths fatally injured at work. Twelve percent of workers aged 16 to 17 years incurred a fatal injury while driving an automobile or truck, and an additional 12 percent were fatally injured while tending a retail establishment, mostly due to homicides.

The work activities reported between 1993 and 1997 generally mirrored those reported between 1998 and 2002 with nearly all activities resulting in fewer fatal injuries. Fatal injuries to young workers while tending and caring for animals decreased by 64 percent from the 1993–97 period to the 1998–2002 period, and a 62-percent decline was reported for fatal injuries to youths tending retail establishments. Also, a 39-percent decline was reported for youths driving automobiles, and a 26-percent decline was reported for youths operating farm vehicles and machinery.

Alternatively, fatal injuries associated with some activities were reported to increase in the 1998 through 2002 period. More than twice as many youths were fatally injured while installing building materials in this 5-year period, compared with the previous 5 years. Most of these fatalities occurred on construction sites. Additionally, youth riding on

Table 3. Fatal occupational injuries for U.S. workers aged 17 and younger by work activity, 1993–2002

Work activity	Younger than 18 years	Younger than 14 years	14 to 15 years	16 to 17 years
Total count, all activities	639	121	131	387
Percent, all activities	100	100	100	100
Operating farm vehicle or machinery	12	25	18	6
Tending retail establishment	9	2	5	12
Driving automobile or truck	9	6	—	12
Physical activity (includes walking, sitting, running, and climbing ladders or stairs)	6	5	3	8
Riding in automobile or truck	7	7	7	7
Riding on farm vehicle	4	16	4	—
Cleaning or washing	4	—	6	4
Installing	3	—	—	4
Animal care tending	2	6	—	2
Walking in or near roadway	2	—	4	2
Loading or unloading (packing, unpacking) materials	2	—	—	2
Driving bicycles or motorcycles	1	—	2	—
Riding on a boat	1	—	2	1

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farm vehicles as a passenger or outside helper incurred 17 percent more fatal injuries in the latter period, most resulting from workers falling from and being struck by the very same farm vehicles. Riding on other types of vehicles and walking in or near roadways also resulted in increases in young worker deaths between the two periods.

Fatal injuries by industry

Agriculture, forestry, and fishing accounted for two-fifths of the fatal injuries among young workers in the 1998–2002 period, followed by construction and retail trade. (See table 4.)

Agriculture, forestry, and fishing. Agriculture, forestry, and fishing is one of the most hazardous industries and consistently ranks among the top two industries with the highest overall fatality rates. The industry is a major contributor of fatalities to young workers and accounted for 41 percent of the fatal work injuries to youth during the 1998–2002 period. States with the highest counts of young worker fatalities in this industry were Ohio, California, New York, Wisconsin, Illinois, and Montana. Comparing fatalities in the 5-year periods, 1993–97 and 1998–2002, Ohio and California reported large increases whereas Kansas, Minnesota, and Pennsylvania had large decreases.

About half of the fatal injuries to youths in agriculture, forestry, and fishing occurred to those working in crop production, and about one-fourth occurred in livestock production, half of which were dairy farms. Youths working in landscaping and commercial fishing each incurred about 6 percent of the fatalities among youths in the industry division.

Almost 60 percent of the fatalities in the industry occurred to youths who worked on the family farm; family farmworkers accounted for almost one-fourth of the total among all youths killed at work during 1998–2002.

Almost two-thirds of the young-worker fatalities in agriculture, forestry, and fishing occurred to workers under age 16. The number of fatalities in this age group declined from 87 to 79 over the two periods.

About two-thirds of the young-worker fatalities in agriculture, forestry, and fishing resulted from various types of transportation incidents. While overall fatalities in the industry declined by 7 percent over the period, compared with the 1993–97 period, fatalities resulting from transportation incidents rose by 17 percent. The increase was seen in incidents on both public roadways and farmland. Most of the increase can be attributed to riding as a passenger in a truck and, to a lesser extent, riding on a tractor. Tractors were involved in nearly one-fourth of youth fatalities between 1993 and 2002, although fatalities occurring while operating or using machinery declined by half from the former 5-year period to the latter. By contrast, young worker fatalities involving all-terrain vehicles and horse-drawn vehicles each increased by a large percentage between the two periods.

Various types of incidents involving contacts with objects, equipment, and animals decreased between the two periods, particularly being struck by objects and being caught in running equipment or machinery. Fatalities related to animal assaults also declined. To the contrary, electrocutions doubled between the two periods, and accounted for 5 percent of the fatalities among young farmworkers during the 1998–2002 period.

Some of the agriculture-related fatalities presented appear to have resulted from work activities deemed to be hazardous

Table 4. Fatal occupational injuries of U.S. workers aged 17 years and younger by selected industries, 1993–97 and 1998–2002 periods

Industry	1993–97	1998–2002
Total	335	304
Private sector	325	287
Agriculture, forestry, and fishing	134	125
Agriculture production—crops	69	65
Agriculture production—livestock	41	30
Dairy farms	21	14
Agricultural services	16	12
Landscape and horticultural services	9	8
Fishing, hunting, and trapping	4	7
Construction	48	54
General building contractors	6	8
Heavy construction, except building ..	12	12
Special trade contractors	30	34
Roofing, siding, and sheet metal work	7	8
Manufacturing	17	19
Transportation and public utilities	9	5
Wholesale trade	12	—
Retail trade	72	40
Food stores	15	8
Eating and drinking places	35	19
Miscellaneous retail	12	6
Services	25	38
Business services	—	10
Amusement and recreation services ..	4	10
Government	10	17

NOTE: Dashes indicate no data or data that do not meet publication criteria. Totals may include subcategories not shown separately.

and, therefore, prohibited by the Hazardous Occupations Orders for agriculture. For example, workers under age 16 are restricted from operating many types of farm machinery unless doing so for a family farm or after completing a bona fide training program. Yet, one-fifth of fatalities to young agricultural wage earners occurred among youths operating machinery. Another fifth were incurred while riding on farm vehicles, another regulated activity.

Construction. The construction industry reports more job-related fatalities each year than any other industry and typically has fatality rates three times the all-industry average. This industry accounted for 18 percent of the fatalities among young workers in the 1998–2002 period, slightly less than its 22-percent share of fatal injuries among all workers. The number of fatalities to youths in construction rose 12 percent from the previous 5-year period. Of the 54 youths fatally injured while working in construction in the 1998–2002 period, 42 were wage and salary workers, 7 worked in the family business, and 5 were self-employed. Texas and Arizona had the highest totals, with six and four fatalities to young workers in the construction industry, respectively.

Although youths younger than age 16 are only allowed to perform office or sales tasks away from the actual construc-

tion site while working in the industry, they made up 10 of the 54 fatally injured youths in construction—a 67-percent increase over the 1993–97 period. Hispanics and Latinos accounted for 35 percent of the fatally injured youths in construction—another marked rise over the period.

Falls and transportation incidents together accounted for almost two-thirds of the fatalities among young construction workers in the 1998–2002 period—about the same proportion as for construction workers of all ages. Although youths younger than 18 are generally prohibited from working in roofing operations, about half of the falls were a result of installing or repairing roofs.¹⁴ Nine of the young workers in construction were driving some type of vehicle at the time of the injury. About half of these youths were 16 at the time, despite the fact that driving by young workers is restricted to 17-year-olds. In addition, four of the fatalities resulted from excavations or trenching cave-ins, although performing excavation work is prohibited for workers under age 18.¹⁵

Retail trade. Retail trade accounted for 40 (13 percent) of the young workers' deaths in 1998–2002. Ninety percent of the young retail trade workers killed in the 1998–2002 period worked for wages and salary; only 10 percent worked in the family business. Male workers comprised 80 percent of the young worker fatalities, and most of the young workers were 16 or 17 years old.

The number of fatalities to young retail trade workers in the 1998–2002 period declined 44 percent from the previous 5-year period. A 51-percent decrease in workplace homicides accounted for much of the decline, but fatalities from other types of events fell as well. Still, homicides comprised about half the young workers' fatalities in these industries. The decline was noticeable throughout the various retail trade industries.

Transportation-related incidents comprised about a third of the total, and in about half of these incidents the young decedent was driving the vehicle. Eating and drinking places, which are noted for employing large numbers of youths younger than age 18, accounted for half the fatalities of youths in retail trade. Young worker fatalities in these establishments fell by 46 percent between the two periods, primarily as a result of the drop in workplace homicides.

Services. Service industries also accounted for 13 percent of the fatalities occurring among young workers during the 1998–2002 period. Their fatalities in these industries were 52 percent higher than the 1993–97 period. Texas (six fatalities) and Pennsylvania (five) had the highest totals. Young women and workers under age 16 accounted for a higher proportion of the fatally injured young workers in services than in most of the other industries. Female workers accounted for 26 percent of

the fatally injured youths in services, and workers younger than 16 accounted for 37 percent of the total.

Most of the youths (89 percent) were wage and salary workers. Business services (including building maintenance) and amusement and recreation services together accounted for more than half the fatalities among young-workers in services during the period. In both business services and amusement and recreation, fatalities among young workers more than doubled between the two study periods. Transportation incidents, assaults and violent acts, contact with objects and equipment, and falls also increased. In more than half of the transportation-related incidents that occurred during the 1998–2002 period, the deceased was operating the vehicle, many of which were golf carts or other off-road vehicles.

Manufacturing. The manufacturing industry accounted for 19 fatalities among young workers in the 1998–2002 period—a little more than 6 percent of the total. These fatalities occurred in lumber and wood products (which includes logging and sawmills); stone, clay, glass, and concrete products; and printing and publishing. The five fatalities in printing and publishing were carriers delivering newspapers—about the same number as in the previous period. Four of the five fatalities were passengers in vehicles that were involved in traffic incidents. The six fatalities in lumber and wood products represented a slight increase over the 1993–97 period, and the four fatalities in stone, clay, glass and concrete products was an increase over the previous period when there were no fatalities in this industry.

Transportation and public utilities. The five fatalities recorded in transportation and public utilities industries during the 1998–2002 period represented a 44-percent drop from that reported in 1993–97. Four of the fatalities occurred in trucking and warehousing, and four of the decedents were either self-employed or working in the family business.

Wholesale trade. There was a dramatic drop in fatalities among youths working in wholesale trade during the 1998–2002 period. The 12 fatalities in the 1993–97 period were primarily workers in wholesale motor vehicle parts and supplies and farm product raw materials.

Government. There was a 70-percent increase in the number of fatalities to youths working for government agencies between the two periods—mostly resulting from a single multifatality incident. Over the entire 1993–2002 period, two-thirds of the young-worker fatalities in government resulted

from transportation-related incidents. Many of the decedents were volunteers or trainees in firefighting, the military, or social services.

Demographic characteristics

Fatal work injuries to youths dropped by 9 percent between the two periods. Most of the decline was in fatalities of young wage and salary workers. However, fatalities to youths who were self-employed or working in freelance jobs rose slightly during the period. Generally, these workers are not covered by child labor laws. The number of fatalities to workers in family businesses remained about the same over the two periods.

Male workers accounted for 89 percent of the fatally injured youths in the 1998–2002 period—about the same percentage as for fatalities to workers of all ages. Fatalities to young male and female workers both declined over the two periods. Fatalities to female workers fell 30 percent, and fatalities to young male workers declined 6 percent. Similar to worker fatalities of all ages, fatalities to young female workers resulted mainly from transportation-related incidents and from homicides, whereas fatalities to young male workers resulted from more diverse types of events. Still, half of the fatalities among young male workers occurred in vehicle-related incidents. Other major contributors to fatalities among young males were various contacts with objects and equipment (such as being struck by objects and being caught in running equipment or collapsing materials), homicides, falls, and electrocutions.

Non-Hispanic whites made up 69 percent of the fatalities among young workers during the 1998–2002 period. Their fatalities dropped by about 20 percent from the 1993–97 period. By contrast, work fatalities among Hispanic youths, which rose from 37 to 66, nearly doubled as a share of fatal work injuries to youths. The increase was most pronounced in agriculture, forestry, and fishing where the count more than tripled—from 6 in the 1993–97 period to 21 in the 1998–2002 period. Transportation-related incidents and falls accounted for the increase. Fatalities among young black workers remained the same (17 fatalities) during the two periods and accounted for 6 percent of the total for the 1998–2002 period. The number of work-related fatalities to young Asian, Native Hawaiian, or Pacific Islanders dropped dramatically from 13 to 4 between the two periods.

Overall, workers younger than 16 accounted for more than two-fifths of the fatalities among young workers in the 1998–2002 period. Moreover, the drop in young-worker fatalities was not evenly distributed throughout the individual age groups. Fatal injuries among workers aged 14 and 15 rose by one-third between the two periods. The tabulation below

shows fatal occupational injury totals of the 1993–1997 and 1998–2002 periods, by age:

Age	1993–97	1998–2002
Total	335	304
13 and under	72	49
14–15	56	75
16–17	207	180

Aged 13 and younger. In the 1998–2002 period, 78 percent of the fatalities among workers aged 13 and younger occurred in family businesses or farms, and 86 percent occurred in the agriculture, forestry, and fishing industries. Deaths among workers aged 13 and younger in this industry declined by about one-fourth from the previous 5-year period. The decrease was notable in both crop production and in dairy farms.

The decline in the number of fatalities in this age group spanned various other industries as well. (See table 5.) The nine deaths among these young workers in the manufacturing and retail industries that occurred between 1993 and 1997 were primarily to newspaper carriers.¹⁶ Deaths among these workers declined substantially in the 1998–2002 period.

Transportation incidents accounted for almost three-fourths of the fatal events among workers 13 and younger during the 1998–2002 period. (See table 5.) Although the total number of fatalities resulting from transportation incidents remained the same as in the previous 5-year period, fatalities caused by falling from and subsequently being struck by a vehicle or mobile equipment more than doubled from the 1993–97 period to the 1998–2002 period. They accounted for about one-fourth of the fatalities among this age group. These cases typically involved a fall from a tractor or other farm machinery and subsequently being struck or run over by the vehicle or attached equipment. Several workers were riding in the back of the truck, farm wagon, or tractor as an outside helper at the time of the incident—an activity prohibited for some workers.

By contrast, there was marked improvement in the number of workers 13 and younger who were fatally injured from various contacts with objects and equipment. From 1993 through 1997, deaths among young farmworkers resulting from being caught in running equipment typically occurred because of clothing caught in an auger or other farm equipment. Deaths attributed to being caught in collapsing materials during that period predominantly resulted from grain engulfments. Few such incidents were recorded in the latter 5-year period among this age group.

Aged 14 and 15. Unlike the other age groups, worker deaths among 14- and 15-year-olds rose substantially between the two time periods. This rise affected most of the

Table 5. Fatal occupational injuries for U.S. workers aged 13 and younger by selected industries and events, 1993–97 and 1998–2002 periods

Category	1993–97	1998–2002
Industry		
Total	72	49
Agriculture, forestry, and fishing	57	42
Agriculture production—crops	36	26
Agriculture production—livestock	19	9
Dairy farms	10	—
Construction	3	—
Manufacturing	3	—
Retail trade	6	—
Services	3	—
Event		
Total	72	49
Transportation incidents	36	36
Highway	12	9
Jack-knifed or overturned	7	7
Nonhighway	15	22
Fall from and struck by vehicle	6	13
Overturned	5	4
Worker struck by vehicle	7	4
Assaults and violent acts	9	6
Homicides	4	3
Animal assaults	5	3
Contact with objects and equipment	19	4
Struck by object	5	—
Caught in running equipment	5	—
Caught in or crushed in collapsing materials	7	—
Fires and explosions	3	—

NOTE: Dashes indicate no data or data that do not meet publication criteria. Totals may include subcategories not shown separately.

demographic groups among 14- and 15-year-old workers—different types of employment groups (wage and salary workers, workers in the family business or farm, and the self-employed); both male and female workers; and the various race/ethnic groups. Florida, Montana, Pennsylvania, and Wisconsin each had increases of three or more fatalities between the two time periods.

The increase in fatalities was also evident among most of the major industry groups employing 14- and 15-year-olds. (See table 6.) Fatality totals among 14- and 15-year-old workers doubled in the construction, manufacturing, and service industries. The 14- and 15-year-olds killed in construction during the 1998–2002 period were performing construction-related jobs at the time, although regulations limit these workers to performing office and sales work even when employed by businesses run by their parents. Fatalities that occurred in services primarily resulted from transportation-related incidents, and to a lesser extent, homicides. Fatalities among 14- and 15-year-old workers also rose substantially in agriculture, forestry, and fishing. Fatalities in this industry accounted for almost half the fatalities among workers in this age group during the 1998–2002 period.

Table 6. Fatal occupational injuries for U.S. workers aged 14 and 15 by selected industries and events, 1993–97 and 1998–2002 periods

Category	1993–97	1998–2002
Industry		
Total, all industries	56	75
Private industry	53	70
Agriculture, forestry, and fishing	30	37
Construction	3	8
Manufacturing	3	6
Retail trade	9	5
Services	5	13
Government	3	5
Event		
Total	56	75
Transportation incidents	23	36
Highway	7	12
Jack-knifed or overturned	4	4
Nonhighway	10	14
Overturned	9	9
Worker struck by vehicle	—	8
Assaults and violent acts	10	10
Homicides	9	7
Contact with objects and equipment	12	19
Struck by object	3	7
Caught in running equipment	5	5
Caught in or crushed in collapsing materials	—	5
Falls	—	5
Falls from roof	—	4
Exposure to harmful substances or environments	10	5
Contact with electric current	6	4

NOTE: Dashes indicate no data or data that do not meet publication criteria. Totals may include subcategories not shown separately.

The rise in fatalities among this age group was also spread throughout the various event categories: transportation incidents (highway incidents, nonhighway incidents, and workers struck by vehicles); contacts with objects and equipment (struck by objects and caught in collapsing materials); and falls (falls from roofs). (See table 6.) The number of fatal assaults and violent acts stayed the same, and the number of fatalities from exposures to harmful substances and environments dropped.

Many of the 14- and 15-year-olds had been operating powered vehicles either on or off the roadway prior to the incident. Fifteen workers had been operating tractors or other mobile equipment, and four were driving off-road vehicles. Others were operating other types of powered equipment. Most of the decedents were working for the family farm and, thus, were exempt from Federal child-labor regulations, although the fatalities may have been covered under State child-labor regulations or motor vehicle laws.

Aged 16 and 17. Fatal injuries to 16- and 17-year-old workers declined by 13 percent over the two periods.

While fatalities among wage and salary workers decreased by 21 percent, fatal injuries doubled among self-employed 16- and 17-year-olds and rose by more than one-third among those working for the family business or farm.

As in the other age groups, fatalities among 16- and 17-year-old Hispanic workers rose between the two periods, accounting for 28 percent of this age group who were fatally injured at work during the 1998–2002 period.

Agriculture, forestry and fishing and construction together accounted for half of the fatal injuries among 16- and 17-year-old workers in the 1998–2002 period. (See table 7.) Fatality counts for these two industries and manufacturing remained about the same for 16- and 17-year-old workers between the two periods. Worker fatalities among this age group declined in the transportation and public utilities, wholesale trade, and retail trade industries, but increased in services and public-sector industries.

Most of the decline in fatalities among this age group was accounted for by homicides and events involving workers being struck by objects, such as falling trees and machinery parts. (See table 7.) By contrast, fatal injuries from several other types of events rose between the two periods. Event categories that experienced increases in fatalities among this age group included vehicle overturns—both on and off public roadways; falls from moving vehicles and equipment; being caught in running equipment; falls from scaffolds; and self-inflicted injuries. Both driving a vehicle and riding as a passenger or outside helper on a vehicle resulted in an increase of fatalities among this age group. Of those driving or operating powered vehicles or mobile equipment, 17 were aged 16 years and 29 were aged 17 years at the time of the fatality.

Nonfatal injuries in 2003

The nonfatal injury and illness data from the BLS Survey of Occupational Injuries and Illnesses (SOII) cover private wage and salary workers and exclude workers on small farms (fewer than 11 employees), self-employed individuals, and family workers. Demographic data, including age of the injured worker, and data for characteristics about the incident are available for injuries and illnesses involving one or more days away from work. As did the Census of Fatal Occupational Injuries (CFOI) data, industry data for the 2003 SOII used the 2002 NAICS (North American Industry Classification System) and are, therefore, not comparable to earlier years.¹⁷

About 9,000 workers younger than age 18 incurred injuries and illnesses in 2003 that resulted in days away from work (lost workdays). Sprains and strains accounted for almost one-third of these injuries and illnesses—a smaller

Table 7. Fatal occupational injuries for U.S. workers aged 16 and 17 by selected industries and event, 1993–97 and 1998–2002 periods

Category	1993–97	1998–2002
Industry		
Total, all industries	207	180
Private industry	200	169
Agriculture, forestry, and fishing	47	46
Agriculture production—crops	19	19
Agriculture production—livestock	10	9
Agricultural services	13	12
Fishing	3	4
Construction	42	44
General building contractors	4	8
Heavy construction, except building	10	10
Special trade contractors	28	26
Manufacturing	11	11
Lumber and wood products	4	4
Transportation and public utilities	9	5
Trucking and warehousing	6	4
Wholesale trade	10	—
Retail trade	57	34
Food stores	9	8
Eating and drinking places	33	15
Services	17	24
Business services	—	5
Automotive repair, services, and parking	3	3
Amusement and recreation services	3	9
Government	7	11
Event		
Total	207	180
Transportation incidents	79	85
Highway	44	46
Collision between vehicles	19	18
Jack-knifed or overturned	13	16
Nonhighway	10	18
Fall from moving vehicle	—	3
Overturned	6	10
Worker struck by vehicle	14	15
Assaults and violent acts	47	28
Homicides	44	22
Contact with objects and equipment	37	27
Struck by object	22	8
Caught in running equipment	4	9
Caught in or crushed in collapsing materials	6	7
Excavation or trenching cave-in	4	5
Falls	18	18
Falls from roofs	9	5
Falls from scaffolds	—	3
Exposure to harmful substances or environments	22	18
Contact with electric current	11	10
Drowning, submersion	5	5
Fires and explosions	4	3

NOTE: Dashes indicate no data or data that do not meet publication criteria. Totals may include subcategories not shown separately.

proportion than for all workers. Heat burns and cuts and lacerations each accounted for about one-seventh of the total, notably higher than for all workers, as shown in the following tabulation:

<i>Nature of injury or illness</i>	<i>Percent of cases to workers 17 and under</i>	<i>Percent of cases to all workers</i>
Total	100	100
Sprains and strains	32	43
Heat burns	15	1
Cuts, lacerations	14	7
Bruises, contusions	9	9
Fractures	8	7
Other	22	32

Among the major body parts affected by these injuries, the back incurred 17 percent of the injuries among young workers, fingers incurred 13 percent, and legs and multiple body parts were reported in 10 percent of the cases. Multiple upper extremities, such as hand and finger or hand and arm, were affected in 9 percent of the injuries to young workers.

Falls on the same level accounted for the greatest number of cases with days away from work among young workers in 2003—about 18 percent of the total. (See table 8.) Overexertion and contact with temperature extremes each accounted for about 15 percent of the cases among workers younger than 18. The overexertion injuries primarily resulted from lifting various objects, and almost all of the contacts with temperature extremes resulted from contact with hot objects or substances. Being struck by objects brought about another 14 percent of the cases—about half of which were swinging or slipping objects, such as knives or other sharp objects and swinging doors. Being struck by falling or flying objects comprised almost 5 percent of the cases. About 8 percent of the injuries were brought about by bodily reactions, such as when one is reaching or bending or attempting to break a fall.

Among industries, accommodation and food services accounted for 40 percent of the 9,010 injuries and illnesses with days away from work among young workers in private wage and salary jobs during 2003. (See table 8.) Most of these injuries occurred in the food service and drinking places industry. Retail trade was another big contributor of nonfatal injuries to young workers in 2003, accounting for one-fourth of the total—with food and beverage stores accounting for about half of the total within retail trade. Construction, health care and social assistance, and transportation and warehousing each accounted for 5 percent to 6 percent of the total.

Data summary

BLS data suggest noteworthy fatality risk among younger workers, particularly those in the earlier teen years. While fatalities among many age groups dropped between the two 5-year periods (1993–97 and 1998–2002), fatalities among 14- and 15-year-olds rose by 34 percent. As a result, rates for young

Table 8. Nonfatal injuries and illnesses with days away from work for U.S. workers aged 17 and younger, by selected events and industries, private sector, 2003

Category	Number of cases to workers 17 and younger	Percent of cases to workers 17 and younger	Percent of cases to all workers
Event			
Total	9,010	100	100
Contact with objects and equipment	2,650	29	26
Struck against object	550	6	7
Struck by object	1,220	14	13
Caught in or compressed by equipment or objects	750	8	4
Rubbed or abraded by friction or pressure	60	1	1
Falls	2,210	25	20
Falls to lower level	530	6	6
Falls on same level	1,600	18	13
Bodily reaction and exertion	2,210	25	42
Bodily reaction	760	8	11
Overexertion	1,340	15	26
Repetitive motion	70	1	4
Exposure to harmful substances or environments	1,640	18	4
Contact with temperature extremes	1,360	15	2
Exposure to caustic, noxious, or allergenic substances	270	3	2
Transportation incidents	120	1	4
Worker struck by vehicle	100	1	1
Assaults and violent acts	150	2	2
Assaults and violent acts by person	120	1	1
Animal assaults	40	—	—
Industry (NAICS)			
Total	9,010	100	100
Construction	500	6	12
Manufacturing	290	3	17
Retail trade	2,270	25	14
Food and beverage stores	1,110	12	3
General merchandise stores	550	6	3
Gasoline stations	160	2	1
Motor vehicle and parts dealers	150	2	2
Transportation and warehousing	440	5	10
Health care and social assistance	550	6	14
Arts, entertainment, and recreation	380	4	1
Accommodation and food services	3,560	40	7
Accommodation	180	2	2
Food services and drinking places	3,380	38	5
Professional and business services	240	3	8

NOTE: Counts for cases of occupational injuries and illnesses involving days away from work are rounded to the closest ten. Dashes indicate the figure is less than 0.5 percent. NAICS is the North American Industry Classification System. Totals may include subcategories not shown separately.

workers approached those for workers aged 18 to 34 during the 1999–2003 period.

Fatalities among young workers increased in construction, services, and government between the 5-year periods. Young worker deaths from vehicles overturning, workers falling and being struck by vehicles, and workers on foot being struck by vehicles increased between the two periods. Deaths from homicides, being struck by objects, and exposures to harmful substances and environments went down.

Decreases in fatal workplace injuries were recorded in retail trade industries, including fewer homicides in food stores and eating and drinking places. Most of the decreases were recorded for workers aged 16 to 17 years. Wholesale trade establishments also recorded fewer fatalities to workers less than 18 years of age.

While many of the fatalities in the study appear to have resulted from activities prohibited by child labor laws, others, such as those occurring to family farm workers, fell outside the scope of current child labor regulations. Nevertheless, fatalities among young workers have decreased in the last few years, averaging 46 per year between 2001 and 2004—a marked improvement over the average of 68 in the 1990s. Similarly, fatality rates for workers aged 15 to 17 have improved—ranging from 2.3 to 2.9 fatalities per 100,000 full-time equivalent (FTE) workers between 2001 and 2004.

Among young private-sector wage and salary workers in nonagricultural industries, nonfatal injuries with days away from work occurred primarily in food-service industries and retail trade. These nonfatal injuries also occurred while employed by construction, transportation and warehousing, and health care and social assistance establishments. □

Notes

¹ See Janice Windau, Eric Sygnatur, and Guy Toscano, "Profile of work injuries incurred by young workers," *Monthly Labor Review*, June 1999, pp. 3–10.

² *Ibid.*

³ Although fatality data for 2003 and 2004 were available at the time the article was prepared, those data were compiled using a different industrial classification system from the data for previous years. Industries in the 2003–04 data were classified according to the 2002 North American Industry Classification System (NAICS), while those in the 1992–2002 data are based on the 1987 Standard Industrial Classification (SIC) system. The classification schemes are not comparable. Data presented in this article exclude the fatalities related to the events of September 11th, 2001.

⁴ See Chapter 3, "A detailed look at employment of youths aged 12 to 15," in the *Report on the Youth Labor Force*, Bureau of Labor Statistics, 2000.

⁵ The NLSY97 defines employee-type work as work in which the youth has an ongoing relationship with a particular employer, making it nearly equivalent to wage and salary work. Freelance-type work is defined as work that involves doing one or a few tasks without a specific "boss." For more information, see the definitions section in the January 31, 2003, NLSY97 news release on the Internet at <http://www.bls.gov/nls/nlsy97r4.pdf>.

⁶ See "Work activity of high school students: data from the National Longitudinal Survey of Youth 1997," released by BLS on April 27, 2005, on the Internet at [bls.gov/news.release/pdf/nlsyth.pdf](http://www.bls.gov/news.release/pdf/nlsyth.pdf).

⁷ Employment and hours-at-work data are Current Population Survey annual average data for 2000 and 2004. Annual average employment data by age and class of worker are published for the previous year in the January issue of *Employment and Earnings*, table 15. The hours-at-work data are unpublished.

⁸ See "Child Labor Requirements for Nonagricultural Occupations Under the Fair Labor Standards Act (Child Labor Bulletin 101)" and "Child Labor Requirements in Agricultural Operations Under the Fair Labor Standards Act (Child Labor Bulletin 102)."

⁹ Rules concerning the operation of compacting equipment, on-the-job driving, cooking, and work performed on roofs were recently updated and are available on the Internet at <http://www.dol.gov/opa/media/press/esa/ESA20042526.htm>. Some of these changes were recommended in the "National Institute for Occupational Safety and Health (NIOSH) Recommendations to the U.S. Department of Labor for Changes to Hazardous Orders," May 3, 2002. Other NIOSH recommendations in the document included removing some of the exemptions for apprentices and student learners; requiring tractors to be equipped with rollover protection structures (ROPS) and requiring seatbelt use; prohibiting all work in silos and grain bins; adding some of the agricultural Hazardous Orders to those for nonagricultural occupations; and adding commercial fishing, railroad and water transportation, all construction occupations, and all work at heights to the Hazardous Orders.

¹⁰ Tables summarizing various State child labor laws are available on the Internet at <http://www.youthrules.dol.gov/resources.htm>.

¹¹ Recent research looking at the effectiveness of work permits was done in Los Angeles, California. High school students were asked a series of questions about their jobs and knowledge of child labor laws. The study found that students without work permits were more likely to perform hazardous tasks than those with permits. The results were published in an article titled "Role of work permits in teen workers' experiences," in the June 2002 issue of *American Journal of Industrial Medicine*.

Another article, "Protecting the Health and Safety of Working Teenagers" by Harriet Rubenstein, et al in *American Family Physician*, August 1999, provides physicians with suggestions for opening a dialogue with the teenager about the type of work and hours involved in the job to more effectively prevent youths from performing hazardous tasks.

¹² See the *Youth Rules!* Web site on the Internet at <http://www.youthrules.dol.gov/>.

¹³ Fatality rates were calculated for civilian workers of all ages 15 and older for this article. These rates were calculated using hours worked from the Current Population Survey (CPS) converted to full-time equivalent workers using a 2,000-hour work year. Thus the rate of fatalities per 100,000 full-time equivalent workers = (fatalities/hours) x 200,000,000. Rates in table 1 are presented for different 5-year periods (1994–98 and 1999–2003) than fatality counts presented elsewhere in the article. The CPS introduced a major redesign of the survey beginning in 1994; data for previous years are, therefore, not strictly comparable. The fatality rate calculation used here differs from that used to create rates used in CFOI's production releases. Those rates are calculated based on annual average employment data from the CPS. Some rates published by CFOI include data for the military. The CPS employment data for civilian workers are then supplemented with employment data for the resident military provided by the Department of Defense.

¹⁴ The rule concerning youths working in roofing operations has been recently expanded to prohibit youths from performing other work on or about roofs, such as installing or repairing satellite dishes or air conditioning equipment on roofs. Exemptions to the rule apply to youths in certain apprenticeship and training programs. For more information, see the DOL new youth employment rules issued on December 16, 2004, on the Internet at http://www.dol.gov/esa/regs/compliance/whd/CL_Roofing.pdf.

¹⁵ Although CFOI collected data does not provide enough information to definitely determine if a fatality was covered under the Federal child labor laws, a study that covered teenage fatalities occurring between 1984 and 1998 concluded that approximately one-half of the construction fatalities studied were in violation of existing child labor regulations. See Anthony Suruda et al, "Fatal Injuries to Teenage Construction Workers in the US," *American Journal of Industrial Medicine*, Vol. 44, 2003, pp. 510–14.

¹⁶ Newspaper carriers are classified in either the printing and publishing industry in manufacturing or in direct selling establishments in the retail trade industry.

¹⁷ Another break in series occurred between 2001 and 2002 with the new OSHA recordkeeping requirements. Prior to 2002, occupational injury and illness totals for cases with days away from work had been declining for young workers under age 18. They rose from 7,920 in 2002 to 9,010 in 2003.