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Work-Related Injuries in Minors

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Since 1938, federal child labor laws have restricted employment of persons under 18 years old, in part to protect them from hazardous occupations. Workers' compensation claims reported to the Supplementary Data System of the Bureau of Labor Statistics were examined to define the current status of occupational injuries among minors. Data tapes from 1980 to 1983 were searched to identify all current claims for injuries and illnesses occurring in 1980 in persons under age 18. Injury rates were calculated using information about employment in 1979 available from the 1980 census. In the 24 states included in this study, 23,823 claims were reported for persons less than 18 years old. Of these claims, approximately 10% were from persons under age 16. Rates of injuries in 16- and 17 year olds were 12.6 per 100 full-time male workers and 6.6 per 100 full-time female workers. Serious injuries included fractures, dislocations, and amputations, accounting for 5.8%, 0.7%, and 0.6% of cases, respectively. California, the only state that coded whether injuries resulted in fatalities, reported 12 deaths in this age group. Machines and vehicles, many of which are restricted under child labor laws, accounted for 8.3% and 5.8% of claims. These data suggest that persons under age 18 years are not adequately protected from occupational injury. Further attention and, possibly, new preventive strategies are needed.

Key words: occupational injuries, child labor, workers' compensation

INTRODUCTION

To protect children from oppressive working conditions, the Fair Labor Standards Act of 1938 proscribes employment in specific hazardous occupations for teenagers under age 18 years and limits the hours of work per week for 14 and 15 year olds [U.S. Department of Labor, 1984; 1985]. Under the Act, the U.S. Department of Labor has categorized 17 occupational and industry settings as hazardous and has placed special restrictions on agriculture. Hazardous occupations include those that involve manufacturing and storing of explosives, mining, logging and sawmilling, excavation, demolition, manufacture of brick and tile, slaughtering and meat-

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packing, roofing operations, exposure to radioactive substances, motor vehicle driving, and use of many power-driven machines. All states have child labor laws.

Despite these restrictions on employment and their intent to prevent occupational injuries in the young, young workers participate extensively in the work force and there is evidence that they are frequently the victims of injury at work [Nilsen, 1984; Coleman and Sanderson, 1983]. Data from the National Electronic Injury Surveillance System (NEISS) have shown that the number of work-related injuries treated in hospital emergency rooms among 16 and 17 year olds is substantial. In 1982, the rate of occupational injuries in this age group was 8.2 and 3.0 per 100 full-time workers for males and females, respectively. This rate of injury was higher than in all age groups except 18 and 19 year olds [Coleman and Sanderson, 1983].

In order to examine the risk of work-related injuries in persons less than 18 years old in another surveillance data system and to characterize them by occupation, industry, and characteristics of the injury, we examined workers' compensation claims reported to the Supplementary Data System (SDS) of the Bureau of Labor Statistics (BLS).

MATERIALS AND METHODS

The Supplementary Data System provides information from workers' compensation claims from states in a cooperative program with the Bureau of Labor Statistics. The primary source of information is a first report of illness or injury, which employers and insurance carriers submit to state workers' compensation agencies. States that participate in the program code the information in a uniform manner and submit computer tapes to the Bureau of Labor Statistics each year. Information available in the data system include age, sex, occupation, industry, nature and source of the injury or illness, part of body affected, and type of event causing the injury or illness [U.S. Department of Labor, Bureau of Labor Statistics, 1982].

Reports from states vary according to the minimum number of days of disability or days lost from work required for submitting workers' compensation claims. In addition, some states only submit all current claims, others only submit closed cases, i.e., cases for which a final determination has been made, and other states submit both a closed case file and a current case file.

In this analysis, SDS data tapes from 1980, 1981, and 1983 were searched to identify all claims from persons 17 years old or younger for injuries or illnesses that occurred in 1980. SDS data were not available for 1982. Only data from states that submitted current claims (i.e., not closed cases) and included age were used. States were excluded if they did not submit tapes for all three years unless all cases that occurred in 1980 were included in that year's file. All workers' compensation claims for events occurring in 1980 were used. These included claims for illnesses as well as injuries even though illnesses are a very small proportion of total claims.

Estimates of the population of 16 and 17 year olds at risk for work-related injuries by numbers of hours worked were obtained from the 1980 Census Public-Use Microdata Sample tapes for each state [U.S. Department of Commerce, Bureau of the Census, 1983]. The number of hours worked in 1979 for persons aged 17 and 18 years in 1980 was used to estimate the number of hours worked when aged 16 and 17 years. Because federal and some state and local government employees are not covered by workers' compensation, workers in public administration were not in-

cluded in this analysis. These data were not available for persons less than 16 years old. Rates for injuries and illnesses resulting in workers compensation claims were calculated and expressed as rates per 100 full-time workers.

RESULTS

A total of 23,823 workers' compensation claims for injuries and illnesses occurring in 1980 in workers 17 years old and younger were reported by the 24 SDS states included in this study. Table I shows the distribution of claims by age and sex of the workers. The majority of claims were from 16 and 17 year olds (30.4% and 59.5%, respectively). Only 1.3% of claims were from individuals less than 14 years old. Claims from male workers accounted for 72% of the cases.

In Tables II through V, workers' compensation claims from the total group of workers aged less than 18 years from the 24 SDS states are examined by several characteristics reported in the data system. These are presented separately for the total group, for persons 15 years old and younger by sex, and for 16 and 17 year olds by sex.

The types of injury or illness reported in workers' compensation claims are described in Table II. The category of cuts, lacerations, and punctures (36.5%) was the type of injury most frequently reported, followed by sprains and strains (17.3%). More serious injuries included fractures, dislocations, and amputations, which accounted for 5.8%, 0.7%, and 0.6% of the total cases, respectively. Sprains and strains, and burns accounted for a higher proportion of injuries in females than males in both age groups. Cuts, lacerations, and punctures were more frequently reported in males.

A description of the source of injuries reported in these claims is shown in Table III; unpowered hand tools, working surfaces, and the category boxes, barrels, containers, and packages were reported most frequently (13.2%, 10.6%, and 10.4%, respectively). Machines and vehicles were the source of injury for a significant proportion of claims (8.3% and 5.8%, respectively).

Occupations of workers submitting claims are shown in Table IV. The most frequently listed occupations were service workers (46.2%) and laborers (23.4%). Occupation as a service worker was more frequent in girls, while occupation as a laborer was more frequent for boys in both age groups. A higher proportion of claims in children less than 16 compared to 16 and 17 year olds were from sales workers.

Table V shows the number and percent distribution of claims by major industry divisions. Claims for injuries occurring in retail trade and service industries were the

TABLE I. Number and Percent of Workers' Compensation Claims From Persons 17 Years Old and Younger by Sex and Age, 24 SDS States, 1980

	No.			Percent		
Age (Years)	Males	Females	Both sexes	Males	Females	Both sexes
13	236	70	306	1.4	1.0	1.3
14	440	146	586	2.6	2.1	2.5
15	1,075	432	1,507	6.3	6.4	6.3
16	5,210	2,031	7,241	30.5	30.0	30.4
17	10,086	4,097	14,183	59.2	60.5	59.5
Total	17,047	6,776	23,823	100.0	100.0	100.0

TABLE II. Number and Percent of Workers' Compensation Claims From Person 17 Years Old and Younger by Age, Sex, and Nature of Injury, 24 SDS States, 1980

	Number					Percent				
		≤ 15 years old		16 and 17 years old			≤ 15 years old		16 and 17 years old	
Nature of injury	Total	Male	Female	Male	Female	Total	Male	Female	Male	Female
Cut, laceration, puncture	8,702	719	193	6,021	1,769	36.5	41.0	29.8	39.4	28.9
Sprains, strains	4,132	211	129	2,356	1,463	17.3	12.0	19.9	15.4	23.4
Contusion, crushing, bruise	3,060	221	94	1,840	905	12.8	12.6	14.5	12.0	14.8
Burns	2,312	85	58	1,363	806	9.7	4.8	9.0	8.9	13.2
Fracture	1,377	161	39	973	204	5.8	9.2	6.0	6.4	3.3
Scratches, abrasions	840	65	24	613	138	3.5	3.7	3.7	4.0	2.3
Dislocations	176	5	7	100	64	0.7	0.3	1.1	0.6	1.0
Amputations	144	13	2	115	14	0.6	0.7	0.3	0.8	0.2
All others	3,080	271	102	1,915	765	13.1	15.7	15.7	12.5	12.9
Total	23,823	1,751	648	15,296	6,128	100.00	100.00	100.00	100.00	100.00

TABLE III. Number and Percent of Workers' Compensation Claims From Persons 17 Years Old and Younger By Age, Sex, and Source of Injury, 24 SDS States, 1980

	Number					Percent				
		≤ 15 years old		16 and 17 years old			≤ 15 years old		16 and 17 years old	
Source of injury	Total	Male	Female	Male	Female	Total	Male	Female	Male	Female
Handtools, not powered	3,151	241	78	2,216	616	13.2	13.8	12.0	14.5	10.0
Working surfaces	2,526	221	93	1,371	841	10.6	12.6	14.4	9.0	13.7
Boxes, barrels, containers, packages	2,476	111	55	1,567	743	10.4	6.3	8.5	10.2	12.1
Machines	1,967	122	37	1,248	560	8.3	7.0	5.7	8.2	9.1
Vehicles	1,380	133	40	978	229	5.8	7.6	6.2	6.4	3.7
Glass items	1,003	84	16	721	182	4.2	4.8	2.5	4.7	3.0
Food products	995	26	23	614	332	4.2	1.5	3.6	4.0	5.4
Furniture, fixtures, furnishings	900	63	30	480	327	3.8	3.6	4.6	3.1	5.3
Buildings and structures	721	48	39	384	250	3.0	2.7	6.0	2.5	4.1
Liquids	722	36	20	397	269	3.0	2.1	3.1	2.6	4.4
Bodily motion	595	40	27	311	217	2.5	2.3	4.2	2.0	3.5
Wood items	584	49	9	460	66	2.4	2.8	1.4	3.0	1.1
Heating equipment	476	9	11	282	174	2.0	0.5	1.7	1.8	2.8
Other person	487	20	13	144	310	2.0	1.1	2.0	0.9	5.1
All others	5,840	548	157	4,123	1,012	24.5	31.3	24.2	27.0	16.5
Total	23,828	1,751	648	15,296	6,128	100.00	100.00	100.00	100.00	100.00

TABLE IV. Number and Percent of Workers' Compensation Claims From Persons 17 Years Old and Younger By Sex, Age, and Occupation, 24 SDS States, 1980*

	Number					Percent				
		≤ 15 years old		16 and 17 years old			≤ 15 years old		16 and 17 year old	
Occupation	Total	Male	Female	Male	Female	Total	Male	Female	Male	Female
Professional and managers	365	33	21	180	131	1.5	1.9	3.2	1.2	2.1
Sales workers	693	119	38	261	275	2.9	6.8	5.9	1.7	4.5
Clerical workers	1,373	25	41	751	556	5.8	1.4	6.3	4.9	9.1
Craftsmen	978	106	14	788	70	4.1	6.0	2.2	5.2	1.1
Operatives, except transport	2,147	120	28	1,587	412	9.0	6.8	4.3	10.4	6.7
Transport equipment operatives	205	18	5	163	19	0.9	1.0	0.8	1.1	0.3
Laborers, except farm	5,583	519	101	4,373	590	23.4	29.6	15.6	28.6	9.6
Farm workers	1,243	195	47	878	121	5.2	11.1	7.2	5.8	2.0
Service workers	11,015	597	344	6,156	3,918	46.2	34.1	53.0	40.2	63.9
Not reported	221	19	9	157	36	0.9	1.1	1.4	1.0	0.6
Total	23,823	1,751	648	15,296	6,128	100.00	100.00	100.00	100.00	100.00

*Workers in public administration not included.

TABLE V. Number and Percent of Workers' Compensation Claims From Persons 17 Years Old and Younger by Sex, Age, and Industry, 24 SDS States, 1980

Industry	Number					Percent				
		≤ 15 years old		16 and 17 years old			≤ 15 years old		16 and 17 years old	
	Total	Male	Female	Male	Female	Total	Male	Female	Male	Female
Agriculture, foresty, fishing	1,451	198	41	1,059	153	6.1	11.3	6.3	6.9	2.5
Mining	72	4	0	63	5	0.3	0.2	0.0	0.4	0.1
Construction	889	76	4	778	31	3.7	4.3	0.6	5.1	0.5
Manufacturing	2,163	201	48	1,533	381	9.1	11.5	7.4	10.0	6.2
Transportation, communication, electric, gas and sanitary services	293	23	4	231	35	1.2	1.3	0.6	1.5	0.6
Wholesale trade	930	67	22	699	142	3.9	3.8	3.4	4.6	2.3
Retail trade	11,832	489	232	7,509	3,602	49.7	27.9	35.8	49.1	58.8
Finance, insurance, real estate	279	24	7	188	60	1.2	1.4	1.1	1.2	1.0
Services	4,969	502	222	2,704	1,541	20.9	28.7	34.3	17.7	25.2
Public administration	882	151	67	499	165	3.7	8.6	10.3	3.3	2.7
Not classified	63	16	1	33	13	0.3	0.9	0.2	0.2	0.2
Total	23,823	1,751	648	15,296	6,128	100.00	100.00	100.00	100.00	100.00

most common (49.7% and 20.9% of claims, respectively). Proportionally, these industries were listed more frequently for girls than boys. Agriculture, services, and public administration were listed more frequently for the younger age group.

To describe the risk of injury by major industry divisions, rates of claims per 100 full-time workers were calculated for nine states that did not require a minimum number of days of disability. Rates, calculated only for 16 and 17 year olds, are shown in Table VI. Rates ranged from 6.5 per 100 full-time workers in transportation to 14.6 per 100 full-time workers in service and trade industries in males. In females, rates ranged from 1.4 per 100 full-time workers in finance, insurance, and real estate industries to 7.8 per 100 full-time workers in trade industries. Overall, rates were 1.9 times higher in males compared to females.

DISCUSSION

The SDS data provide information about the occupation and industry of injured workers and descriptions of the injury itself—the nature of the injury, its source, and some information about how it occurred. In this study, the distribution of cases by occupation and industry reflects in large part the kinds of jobs that are available to teenage workers. For example, the majority of employed 16 and 17 year olds work in the retail trade and service industries. Approximately one half of the claims were from workers in the retail trade industry, and 21% were from workers in service industries. Approximately one-third of claims were from persons employed as service workers in eating and drinking establishments. In the nine states requiring no minimum number of days of disability, rates of injury were 11.5 and 9.4 per 100 full-time 16- and 17-year-old employees in trade and service industries, respectively, for both sexes combined. The rates of injury for workers of all ages, reported in the Bureau of Labor Statistics Annual Survey, were 7.4 and 5.2 per 100 full-time workers in these industries [U.S. Department of Labor, 1982]. These data show that the trade and service industries are not without considerable risk to 16- and 17-year-old employees.

Information about the nature of the reported injuries shows that many injuries, such as scratches and bruises, are minor. However, many injuries are more serious; fractures accounted for 6% of claims. The proportions of injuries resulting in ampu-

TABLE VI. Rates of Workers' Compensation Injuries and Illnesses per 100 16- and 17-Year-Old Full-time Workers by Major Industry Division and Sex in States Requiring No Disability Days, 9 SDS States, 1980

Major industry Division	Males		Females	
	Rate	No. of Claims	Rate	No. of Claims
Agriculture	8.4	689	7.2	95
Mining	8.2	48	5.5	3
Construction	7.2	445	3.3	22
Manufacture	9.6	979	5.1	240
Transportation	6.5	146	2.8	28
Trade	14.6	5,125	7.8	2,382
Finance	10.9	113	1.4	40
Services	14.6	1,756	5.7	971
Total[a]	93.2	9,625	43.2	3,883

[a]Total excludes public administration.

tations and dislocations (0.6% and 0.7%, respectively) are similar to the proportions reported in the NEISS surveillance of occupational injuries treated in hospital emergency rooms for the total working population (unpublished data). California, the only state in this analysis that coded whether injuries resulted in fatalities, reported 12 deaths occurring in 1980 in persons less than 18 years old.

There are limitations in the data presented here. First, the extent of occupational disease and injury occurrence is greatly underestimated by workers' compensation data. Workers may not be covered by a state compensation plan, may not miss a sufficient number of work days to qualify for a claim, or may receive compensation for lost time and medical expenses from sources other than workers' compensation. Factors such as working parttime or in a temporary job may also influence whether a compensation claim is submitted. A Department of Labor study indicates that only 15% of workers severely disabled by occupational injuries receive workers' compensation benefits [U.S. Department of Labor, 1980]. Second, injury rates were only calculated for nine states that did not require a minimum number of days of disability for compensation. These rates are not necessarily representative of the risk of occupational injuries in other parts of the country. Although it is likely that there is some misclassification because of coding errors, this is not an important consideration when comparing categories with large numbers.

Despite these limitations, these workers' compensation data provide solid evidence that occupational injuries in minors continue to be a substantial public health problem. These results are compatible with information from NEISS. For example, the analysis of NEISS data reported by Coleman and Sanderson [1983] found that the rate of work-related injuries resulting in emergency room care was 8.2 and 3.0 per 100 full-time workers in 16- and 17-year-old males and females, respectively. In our analysis, injury rates were 12.6 per 100 full-time male workers and 6.6 per 100 full-time female workers in the nine states that did not require lost work days for compensation of injuries. One would expect the rate of hospital-treated injuries to be lower than the rate of injuries reported to workers' compensation agencies in states where only injuries that require medical treatment are compensated, since not all injuries are serious enough to require hospital emergency treatment.

The conclusion, based on SDS and NEISS data, that occupational injuries in minors persist is supported by anecdotal reports from officials of the Wage and Hour Division of the Employment Standards Division of the Department of Labor [U.S. Department of Labor, 1971]. Their report "Working Children" describes several serious and fatal accidents among children working in proscribed occupations. For example, there were several fatal accidents among children working in logging operations and children using forklifts. A 16-year-old boy working as a roofer's helper fell off a scaffold resulting in an injury to his spinal cord that left him permanently paralysed from the chest down. This report also describes two hand amputations in two boys who were operating meat grinders.

The occurrence of work-related injuries in persons less than 18 years old represents a failure of prevention and suggests inadequacies in the protection of working children and adolescents. Several approaches may be utilized for improved intervention and prevention. First, descriptive studies such as the one reported here and more comprehensive epidemiologic studies of occupational injuries in the young should be used to evaluate the effectiveness of current laws that proscribe work in hazardous occupations. Although the Supplementary Data System has limited speci-

ficity, it does provide information about occupation, industry, and source of injury, which may be useful in some situations. The source of injury listed in claims from workers in eating and drinking establishments was from knives in 14.7% of cases and from the category of machines including shears, slitters, and slicers in 7.9% of cases. This information may be helpful in evaluating whether use of knives and slicers in eating and drinking establishments should be included as a hazardous occupation. However, more specific studies of occupational injuries in the young are needed to evaluate thoroughly whether accidents occur in proscribed industries and to determine if new hazardous occupations should be added to the proscribed list. In addition, future studies should examine the importance of such factors as the number of hours worked per week, the time of day of work, and working while attending school.

Second, active surveillance of occupational injuries in minors should be instituted at federal and state levels. A serious or fatal work-related injury should be viewed as an occupational sentinel health event, that is, a preventable disease, disability, or untimely death whose occurrence serves as a warning signal that the quality of preventive health measure may need to be improved [Rutstein et al., 1983]. Workers' compensation claims, hospital visits, school absences, physicians' reports, and other sources of information about occupational injuries could be used to identify serious and fatal injuries in working children and adolescents. Follow-up investigations of these cases could identify areas where preventive strategies could be improved.

Physicians and school authorities also have the opportunity to contribute to the prevention of occupational disease and injury in young workers. Job applicants under age 18 years generally must have parental permission as well as permission from a school authority; a physical examination is also routinely required under many state laws. Physicians in this role are acting in the field of occupational medicine and should use information about hazards and demands of particular jobs in evaluating whether job applicants are fit for employment. Physicians and school authorities who give permission for minors to work should have complete information about jobs that are prohibited under current laws. These authorities should question job applicants about their potential jobs and insure that they will neither be working in proscribed occupations nor in other unproscibed yet hazardous situations.

Employers of minors should apply the same safety standards for young, temporary workers that they do for older and full-time, permanent employees. Efforts should be made to provide adequate training in health and safety for these young workers.

In conclusion, this analysis of workers' compensation claims reported to the Supplementary Data System shows that although persons younger than age 18 years work under regulations that are aimed at reducing exposures to hazardous working conditions, a significant number of injuries occur in this age group. Further attention and new preventive strategies are needed.

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