

# The Prevalence of Back Pain, Hand Discomfort, and Dermatitis in the US Working Population

## ABSTRACT

**Objectives.** The purpose of the study was to provide the health care and public health communities with national prevalence estimates of selected conditions in the US working population.

**Methods.** National prevalence estimates of self-reported conditions among working people were calculated from data collected for the 1988 Occupational Health Supplement to the National Health Interview Survey.

**Results.** The highest prevalence estimates were found among occupational groups. For example, the prevalence of back pain due to an injury at work among truck drivers was 6.7%; back pain due to repeated activities at work among mechanics and repairers of heavy equipment and machinery was 10.5%; hand discomfort among operators of machines that process metal, plastic, stone, and glass was 23.5%; and dermatitis due to contact with substances at work among physicians, dentists, nurses, pharmacists, and dietitians was 5.6%.

**Conclusions.** A substantial proportion of these conditions among occupational groups with the highest prevalence estimates are occupational in origin. These prevalence estimates identify occupations in which efforts are needed to prevent these conditions. (*Am J Public Health*. 1994;84:1780-1785)

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### Introduction

Work-related illnesses and injuries account for a sizable proportion of morbidity and disability in the United States. The Bureau of Labor Statistics estimated that 6 753 000 work-related illnesses and injuries occurred in 1990. This translates into 8.8 episodes per 100 full-time workers.<sup>1</sup> However, no reliable estimates exist for the prevalence of common, yet frequently disabling, occupational conditions or their prevalence by occupation.

The 1988 Occupational Health Supplement, part of the National Health Interview Survey, was used to determine the prevalence of selected conditions in the US working population. The supplement contains data about various conditions, including back pain, hand discomfort, and dermatitis. The National Institute for Occupational Safety and Health selected these conditions for the following reasons:<sup>2</sup> (1) they are common; (2) a relatively high proportion of them is attributable to work;<sup>3</sup> (3) they can be identified from self-reports on interviewer-administered questionnaires; and (4) they are amenable to prevention strategies.<sup>4,5</sup>

The purpose of the analysis reported here was to provide the public health and health care communities with the prevalence of selected conditions in the US working population for specific occupational groups.

### Methods

The National Health Interview Survey is a continuous national survey designed to interview a statistical sample of US citizens living in addressed dwellings, excluding citizens living in institutions and on military bases.<sup>6</sup> As a supplement to this survey, the National Institute for Occupa-

tional Safety and Health (NIOSH) and Bureau of Labor Statistics sponsored a special survey on occupational health in 1988, the Occupational Health Supplement.

For the Occupational Health Supplement, one person 18 years or older was randomly selected from each family in each sample household and interviewed in person, with no proxy responses. Interviews were completed on 44 233 persons. The noninterview rate was 8.5%, with approximately 3.8% resulting from respondent refusal and the remainder from researchers' failures to obtain interviews within the time allotted.<sup>7</sup>

Only adults who had worked any time during the 12 months before interview were asked questions about the selected health conditions. The number of people in the sample who met this criteria for employment was 30 074. Work was defined as work at a job or business, including unpaid work in family businesses or farms. Work performed around the interviewee's house was excluded.

The Occupational Health Supplement conditions covered here are back pain, hand discomfort, and dermatitis. Definitions for conditions were restricted

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**Editor's Note.** See related editorial by Patrick (p 1723) in this issue.

TABLE 1—Prevalence (in Percentage) of Back Pain, Hand Discomfort, and Dermatitis in the US Working Population

	Back Pain from Injury at Work, % <sup>a</sup> (SE) <sup>b</sup>	Back Pain from Repeated Activities at Work, % (SE)	Hand Discomfort, % (SE)	All Dermatitis, % (SE)	Dermatitis from All Substances, % (SE)	Dermatitis from Substances at Work, % (SE)
<b>Gender</b>						
Females	1.7 (0.1)	3.6 (0.2)	12.5 (0.3)	12.4 (0.3)	3.1 (0.2)	1.7 (0.1)
Males	3.2 (0.2)	5.2 (0.2)	9.2 (0.3)	10.2 (0.3)	2.5 (0.2)	1.7 (0.1)
<b>Age</b>						
< 30 y	2.0 (0.2)	3.8 (0.3)	6.8 (0.4)	10.5 (0.4)	2.8 (0.2)	1.8 (0.2)
30–44 y	3.1 (0.2)	5.1 (0.3)	10.4 (0.3)	12.4 (0.3)	3.2 (0.2)	2.0 (0.2)
45–64 y	2.5 (0.2)	4.6 (0.3)	15.3 (0.6)	10.3 (0.4)	2.2 (0.2)	1.2 (0.2)
≥ 65 y	1.2 (0.4)	2.0 (0.5)	15.6 (1.2)	10.1 (1.0)	1.6 (0.6)	0.6 (0.3)
<b>Race</b>						
White	2.6 (0.1)	4.6 (0.2)	11.1 (0.3)	11.8 (0.3)	2.9 (0.1)	1.7 (0.1)
Black	2.6 (0.3)	3.9 (0.5)	9.1 (0.7)	6.6 (0.5)	2.1 (0.3)	1.5 (0.3)
Other	1.0 (0.4)	3.4 (1.0)	6.3 (1.0)	9.7 (1.1)	2.0 (0.7)	0.8 (0.3)
<b>Occupation (Frequency<sup>c</sup>)</b>						
Managers in governmental, medical, educational, protective, and funeral organizations (n = 1 377 585)	1.2 (0.7)	3.2 (1.4)	8.5 (1.8)	14.8 (2.5)	3.9 (1.4)	0.9 (0.7)
Managers in personnel, purchasing, marketing, real estate, and other business activities (n = 10 546 889)	1.6 (0.3)	2.8 (0.4)	8.9 (0.7)	12.3 (0.8)	2.3 (0.4)	1.2 (0.3)
Financial managers, accountants, auditors, actuaries, and people in related occupations (n = 3 138 263)	0.3 (0.2)	0.5 (0.3)	7.6 (1.1)	12.8 (1.4)	1.0 (0.4)	0
Lawyers, legal assistants, judges, and legislators (n = 1 133 493)	0.9 (0.9)	0.8 (0.6)	5.9 (1.8)	13.5 (2.8)	1.0 (0.5)	0.3 (0.3)
Architects, engineers, and people in related occupations (n = 3 489 829)	1.4 (0.5)	1.4 (0.4)	7.6 (1.2)	13.3 (1.3)	4.2 (0.8)	2.7 (0.7)
Physical, computer, chemical, and biologic scientists, and people in related occupations (n = 2 572 773)	0.7 (0.4)	1.4 (0.5)	6.6 (1.4)	15.2 (1.4)	3.0 (0.8)	1.4 (0.5)
People in psychological, sociological, and religious occupations (n = 1 636 438)	3.4 (1.2)	1.1 (0.5)	8.9 (1.5)	12.7 (1.7)	1.6 (0.8)	0.5 (0.5)
People in writing, artistic, and performing occupations (n = 2 476 150)	2.8 (0.8)	3.1 (0.8)	14.3 (1.8)	12.7 (1.4)	2.7 (0.7)	1.3 (0.5)
Physicians, dentists, nurses, pharmacists, dieticians, and people in related occupations (n = 2 728 071)	4.2 (1.1)	3.8 (0.8)	10.7 (1.3)	14.2 (1.5)	6.7 (1.0)	5.6 (0.9)
Health care therapists, technologists, technicians, and assistants (n = 4 064 230)	4.4 (0.9)	7.3 (1.0)	12.4 (1.3)	14.2 (1.3)	4.8 (1.0)	3.5 (0.7)
Postsecondary school teachers and librarians (n = 1 866 043)	1.0 (0.4)	0.7 (0.4)	10.4 (1.6)	15.8 (1.9)	4.0 (1.0)	1.4 (0.6)
Elementary and secondary school teachers (n = 3 684 250)	1.4 (0.4)	1.8 (0.5)	7.6 (1.1)	13.0 (1.2)	1.7 (0.4)	0.4 (0.2)
Pre-elementary school teachers and people in child care occupations (n = 1 592 139)	1.2 (0.9)	2.5 (0.7)	8.5 (1.5)	12.2 (1.7)	3.0 (1.0)	2.2 (0.9)
Computer and communications operators and clerks (n = 2 046 652)	0	1.4 (0.6)	12.0 (1.9)	12.6 (1.6)	2.7 (0.9)	0
Scheduling, distribution, and checking clerks and agents (n = 3 963 236)	3.1 (0.7)	4.1 (0.7)	10.6 (1.1)	8.6 (1.1)	1.2 (0.4)	0.4 (0.2)
Secretaries (n = 4 562 645)	0.3 (0.2)	0.8 (0.3)	9.2 (1.0)	10.8 (1.0)	2.0 (0.5)	0.3 (0.2)
General office supervisors and clerks (n = 4 216 392)	0.5 (0.2)	2.1 (0.5)	11.2 (1.1)	11.2 (1.1)	1.7 (0.4)	0.6 (0.3)
Bookkeeping, accounting, and auditing clerks (n = 2 317 985)	0.2 (0.2)	1.4 (0.5)	10.3 (1.5)	10.5 (1.6)	1.3 (0.5)	0.4 (0.2)
People in financial records processing and in related occupations (n = 2 116 382)	0.3 (0.3)	1.9 (0.7)	10.5 (1.7)	10.8 (1.5)	2.8 (0.7)	0.5 (0.3)

(Continued)

TABLE 1—Continued

	Back Pain from Injury at Work, % <sup>a</sup> (SE) <sup>b</sup>	Back Pain from Repeated Activities at Work, % (SE)	Hand Discomfort, % (SE)	All Dermatitis, % (SE)	Dermatitis from All Substances, % (SE)	Dermatitis from Substances at Work, % (SE)
<b>Occupation (Frequency<sup>c</sup>) continued</b>						
People in sales supervising, buying, and promotional occupations (n = 4 194 602)	1.2 (0.4)	4.6 (0.8)	7.8 (1.0)	9.3 (1.2)	0.8 (0.3)	0.2 (0.2)
People in sales and related occupations (n = 11 039 733)	1.1 (0.3)	2.8 (0.4)	8.1 (0.6)	12.4 (0.8)	2.3 (0.3)	0.8 (0.2)
Food servers and related occupations (n = 2 149 442)	1.4 (0.7)	5.6 (1.2)	10.3 (1.7)	9.9 (1.4)	3.0 (0.7)	1.3 (0.5)
People in food preparation occupations (n = 3 594 843)	2.7 (0.9)	5.6 (1.0)	11.9 (1.6)	10.4 (1.2)	3.6 (0.7)	2.8 (0.7)
People in cleaning and building service occupations (n = 3 977 895)	4.9 (0.8)	6.3 (1.0)	13.5 (1.4)	8.1 (1.0)	3.1 (0.5)	2.4 (0.5)
People in personal service occupations (n = 1 614 773)	1.4 (0.7)	8.3 (1.9)	14.3 (1.9)	13.2 (1.8)	5.5 (1.5)	4.9 (1.3)
Firefighters, police officers, and people in other protective service occupations (n = 2 408 413)	4.8 (1.1)	2.1 (0.7)	8.0 (1.4)	9.4 (1.3)	0.9 (0.5)	0
People in agriculture, forestry, fishing, and related occupations (n = 3 937 177)	4.1 (0.8)	7.5 (1.2)	11.2 (1.2)	8.8 (1.1)	2.3 (0.6)	2.1 (0.6)
People in construction trades and other construction occupations (n = 6 612 161)	5.3 (0.8)	10.1 (1.0)	15.9 (1.2)	8.4 (0.8)	3.6 (0.6)	2.6 (0.6)
Mechanics and repairers of vehicles, engines, and heavy equipment and machinery (n = 3 710 165)	4.6 (0.9)	10.5 (1.3)	10.2 (1.3)	10.9 (1.2)	3.7 (0.8)	3.5 (0.8)
Mechanics and repairers of electrical, electronic, and other equipment (n = 1 262 625)	4.4 (1.4)	9.0 (2.8)	11.2 (1.9)	11.2 (2.1)	3.3 (1.1)	2.2 (1.0)
People in craft and precision production occupations (n = 4 013 782)	3.5 (0.7)	5.0 (0.9)	12.7 (1.4)	12.0 (1.2)	4.3 (0.8)	3.1 (0.7)
Operators of machines that process metal, plastic, stone, or glass (n = 1 569 608)	3.5 (1.3)	9.2 (1.9)	23.5 (2.5)	12.3 (1.9)	3.8 (1.4)	2.9 (1.4)
Operators of machines that process wood, paper, textiles, or leather (n = 2 285 654)	2.8 (0.8)	6.0 (1.1)	17.8 (2.4)	9.2 (1.4)	3.6 (0.9)	3.0 (0.9)
Operators of machines that process various or unspecified materials (n = 3 050 861)	3.8 (0.8)	6.5 (1.1)	14.6 (1.6)	8.0 (1.2)	3.3 (0.7)	3.2 (0.7)
Production laborers, helpers, handlers, and cleaners (n = 3 338 448)	3.0 (0.8)	7.0 (1.1)	9.3 (1.4)	8.5 (1.2)	2.1 (0.8)	1.6 (0.7)
Assemblers and people in hand-working occupations (n = 2 046 663)	4.0 (1.2)	5.8 (1.1)	21.9 (2.5)	10.5 (1.4)	3.0 (0.8)	2.7 (0.7)
Operators of extractive, mining, material-moving, and related equipment (n = 1 627 762)	5.6 (1.4)	10.4 (2.1)	12.6 (2.4)	8.7 (1.8)	2.0 (0.7)	1.7 (0.7)
People in bus, motor vehicle, rail, ship, and air transportation occupations (n = 1 438 998)	2.8 (1.4)	3.5 (1.2)	8.2 (1.7)	12.2 (2.2)	2.9 (1.1)	1.2 (0.9)
Truck drivers (n = 2 829 150)	6.7 (1.1)	7.5 (1.3)	9.0 (1.4)	7.0 (1.1)	2.5 (0.7)	1.7 (0.6)
Total working population (n = 126 232 200)	2.5 (0.1)	4.5 (0.2)	10.7 (0.2)	11.2 (0.2)	2.8 (0.1)	1.7 (0.1)

<sup>a</sup>12-month prevalence.

<sup>b</sup>Standard error.

<sup>c</sup>Frequency (weighted to national estimate) in occupational group only—not a denominator for any of the condition outcomes.

by the questionnaire.<sup>8</sup> Back pain was defined as self-reported pain in any region of the back that occurred every day for a

week or more during the 12 months before interview and that was not due only to menstruation. Hand discomfort

was defined as self-reported pain, burning, stiffness, numbness, or tingling in the hands, wrists, or fingers that occurred for

6 or more consecutive days or 19 or more nonconsecutive days during the 12 months before interview and that was not due entirely to an injury such as a cut, sprain, or broken bone. Dermatitis was defined as self-reported dermatitis, eczema, or other red inflamed skin rash that occurred for 3 or more days during the 12 months before interview.

The 12-month prevalence was calculated for each of two back pain and three dermatitis outcomes and for one hand discomfort outcome. The prevalence was calculated for back pain due to an injury and back pain due to repeated activities only if the injury or activity occurred on the current or most recent job. An injury was defined as a single injury caused by slipping, falling, twisting, lifting something incorrectly, or being involved in a car accident. Repeated activities were defined as repeated lifting, pushing, pulling, bending, twisting, or reaching. People who reported back pain due to any injury were not included in the prevalence for back pain due to repeated activities. Because of the questionnaire design, the prevalence of hand discomfort was calculated regardless of work-relatedness. Also calculated were the prevalence estimates for dermatitis, dermatitis due to contact with substances, and dermatitis due to contact with substances on the current or most recent job, referred to here as "contact with substances at work." These categories are not mutually exclusive. The relationship of conditions to events, activities, and exposures at work was taken from the self-report of interviewees.

The "most recent job" in the 12 months before interview was coded using the 1980 Bureau of the Census occupation codes.<sup>9</sup> These three-digit codes were combined into 39 occupational groups according to similarity of occupational activities. The three-digit codes that were included in each group are available from the authors.

The complex statistical design of the National Health Interview Survey necessitates the use of special computer software that can appropriately weight data from complex multistage samples. The survey design does not permit statistically valid calculations when sample data are not weighted.<sup>6</sup> For this analysis, standard errors were calculated using SUDAAN<sup>10</sup> software and are shown for all prevalence estimates. Differences among prevalence estimates were not tested statistically, although the reader can use the standard errors to compare prevalence estimates.

## Results

The 12-month prevalence estimates of back pain due to an injury at work and back pain due to repeated activities at work; hand discomfort; and dermatitis, dermatitis due to contact with substances, and dermatitis due to contact with substances at work by gender, age, race, and occupation are shown in Table 1. Highlights of the results follow.

### Back Pain

The overall 12-month prevalence of back pain due to an injury on the most recent job was 2.5% or 2.62 million working people in the United States. Occupational groups with the highest prevalence of injury-related back pain were truck drivers (6.7%); operators of extractive, mining, and material-moving equipment (5.6%); and people in construction trades and other construction occupations (5.3%). The overall prevalence of back pain due to repeated activities on the most recent job was 4.5%, which represents 4.75 million US workers. The highest prevalence estimates among occupational groups were 10.5% for mechanics and repairers of vehicles, engines, and heavy equipment; 10.4% for operators of extractive, mining, and material-moving equipment; and 10.1% for people in construction trades and other construction occupations.

### Hand Discomfort

The prevalence of work- and non-work-related hand discomfort among people recently working was 10.7% or 11.6 million workers. The occupations with the highest prevalence of hand discomfort were operators of machines that process metal, plastic, stone, and glass (23.5%); assemblers and people in hand-working occupations (21.9%); and operators of machines that process wood, paper, textiles, and leather (17.8%).

### Dermatitis

The prevalence of dermatitis among people recently working was 11.2%, which represents 13.7 million workers. The prevalence of dermatitis due to contact with substances was 2.8% or 3.09 million workers, and the prevalence of dermatitis due to contact with substances at work was 1.7% or 1.87 million workers. Three occupational groups that had the highest prevalence of dermatitis due to contact with substances at work were physicians, dentists, nurses, pharmacists, and dieti-

tians (5.6%); people in personal service occupations (4.9%); and health care therapists, technologists, technicians, and assistants (3.5%).

## Discussion

In cooperation with NIOSH, the National Center for Health Statistics published results from the 1988 Occupational Health Supplement.<sup>7</sup> The analysis reported here focuses on the work-related aspects of the selected conditions—back pain, hand discomfort, and dermatitis—and shows more detailed results by occupation.

To date, estimates of the magnitude and distribution of occupational illnesses and injuries in US workers have come primarily from the Bureau of Labor Statistics annual survey<sup>1</sup> and state workers' compensation claims.<sup>11,12</sup> The Bureau of Labor Statistics survey is based on employer reports recorded on federally mandated forms. These data are presented as national annual incidence rates for broad categories of injuries and illnesses by industry. Although state workers' compensation programs require physician verification of claims, they are limited to workers who seek payment for medical care or lost work time. The wide variation in programs from state to state makes it impossible to prepare national reports of workers' compensation claims.

In 1988, the Bureau of Labor Statistics survey reported that the annual incidence rate of "skin diseases or disorders" was 7.7 per 10 000 full-time US workers.<sup>13</sup> An analysis of Ohio workers' compensation claims for 1980 to 1984 indicated an average annual claims rate for occupational skin diseases of 2.4 per 10 000 employees.<sup>11</sup> Earlier workers' compensation data from California showed that at least 90% of all occupational skin disease cases were contact dermatitis (i.e., inflammatory skin reactions caused by contact with exogenous chemicals or substances).<sup>14</sup> The analysis of the Occupational Health Supplement reported here found a self-reported 12-month prevalence of dermatitis due to contact with substances at work of 1.7% or 170 cases per 10 000 US workers in 1988. A prevalence rate should be higher than an incidence rate because more chronic cases are included. But a more likely explanation of why the Bureau of Labor Statistics and workers' compensation incidence rates are lower is that only the most severe cases had been recorded.

Developing similar comparisons of national estimates for both back pain and hand discomfort are particularly difficult. Before 1994, the Bureau of Labor Statistics survey did not report back and hand conditions separately. Some recently analyzed state workers' compensation data show the 1990 rate of lost-time claims from back strains and sprains in Ohio to be 0.5% (personal communication, Dr Lucy Peipins, March 4, 1994) and the 1988 to 1991 rate of accepted claims for back conditions in Washington to be 2.4% (personal communication, Dr Barbara Silverstein, February 8, 1994). The analysis reported here showed a 12-month prevalence of 7% for self-reported back pain due to injury or repeated activities (nonoverlapping categories) on recent jobs. These rates for back conditions were less divergent than those for skin conditions. The cost of back conditions motivate people to file claims. Mean cost estimates in the 1980s for lower back pain claims ranged from \$5739 to \$7004 per case.<sup>15</sup>

Comparable estimates for hand discomfort are scarce, and the estimates that do exist come from old data. In an analysis of the 1971 to 1975 National Health and Nutrition Examination Survey,<sup>16</sup> the estimated prevalence of self-reported musculoskeletal wrist and finger symptoms in all US adults was 9.9%—no hand results were given. From the 1988 Occupational Health Supplement, the prevalence of similar symptoms in the hands, wrists, and fingers was 10.7%. These two national estimates, which are more than 15 years apart, are very close.

The Occupational Health Supplement has several limitations. Its primary limitation is that the occurrence and source of conditions are self-reported. Interview surveys generally do not confirm the presence or validate sources of conditions. A review of studies that compared self-reported chronic conditions during the National Health Interview Survey with physicians' records and results of special clinical examinations concluded that there was a high level of underreporting and a smaller, but considerable, level of overreporting.<sup>17</sup> The levels of underreporting and overreporting varied widely by diagnostic category of chronic disease. For the Occupational Health Supplement, the condition severity criteria used in questionnaire design as well as the condition definitions used in this analysis minimized overreporting.

Another limitation of the Occupational Health Supplement is that self-

reporting of a health condition's relationship to work also can be underreported or overreported. Back pain immediately following a single acute injury at work most likely will be attributed to activities on the job. However, when back pain occurs as the result of repeated work activities, erroneous attribution to confounding diseases and activities can occur.

Delayed onset of back pain caused by repeated work activities and dermatitis from occupational exposures can result in both patient and physician not recognizing these conditions' occupational origin.<sup>18</sup> While this circumstance can result in underreporting, differential awareness of occupational hazards can result in overreporting among workers who have increased awareness of such hazards.<sup>19</sup>

Another limitation of the Occupational Health Supplement is its inability to determine the prevalence of back pain, hand discomfort, and dermatitis conditions in US adults who were not recently employed. The questionnaire was not designed to ask this population about these conditions. Without this information, analysis of the work-related burden of these conditions in the entire US population is lacking.

Finally, the Occupational Health Supplement's dependence on occupational codes as a surrogate for exposure classification is a major limitation because exposure even within very detailed codes differs. The analysis reported here was designed as an overview of all occupational groups, and some specificity of occupational definition is lost. This was offset, however, by grouping occupational codes for jobs that involve similar work activities. Also, because we chose to form 39 groups, much specificity was retained and all occupations were still presented.

For each condition analyzed, there was considerable variation in the prevalence by occupation. Some of the elevated prevalence estimates of certain conditions, such as hand discomfort in machine operators and assemblers and back pain in people in construction trades and other construction occupations, are consistent with current hypotheses that occupational factors are associated with these conditions. Other prevalence estimates, such as higher rates of dermatitis due to contact with substances at work in health care workers, may be the result of differential recognition and reporting. Given the variation in the prevalence among occupational groups, it is reasonable to conclude that a substantial proportion of these

conditions are occupational in origin among groups with the highest prevalence estimates. Therefore, the prevalence estimates reported here identify occupations in which efforts are needed to reduce and prevent these common occupational conditions. □

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