

Occupational Skin Diseases, United States

Results From the Bureau of Labor Statistics Annual Survey of Occupational Injuries and Illnesses, 1973 Through 1984

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• The overall incidence rates, numbers, and proportions of occupational skin diseases recorded in the Bureau of Labor Statistics Annual Survey of Occupational Injuries and Illnesses, from 1973 through 1984, were reviewed, and a detailed analysis of occupational skin diseases recorded in the 1984 Annual Survey was performed. Overall incidence rates and numbers of cases declined from 1973 through 1983, but increased slightly in 1984. The major industrial divisions of agriculture and manufacturing have consistently had the highest rates and numbers of cases, respectively; skin diseases have accounted for almost two thirds of all occupational illnesses within agriculture. In the 1984 Annual Survey, 11 industries were ranked in the "Top 15" for both incidence rates and numbers of cases, at the two-digit Standard Industrial Classification level. At the four-digit level for manufacturing, four industries were also ranked in the "Top 15" for both indexes. This analysis has identified industries toward which research efforts should be directed to characterize those occupational activities or exposures most responsible for these higher risks.

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The skin, with its extensive surface directly exposed to the environment, is particularly susceptible to injuries or diseases related to the workplace. The National Institute for Occupational Safety and Health has ranked dermatologic disorders among its list of "Top Ten" occupational conditions against which increased preventive efforts should be

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directed.¹ Total annual costs for occupational skin diseases (not including skin injuries) due to lost productivity, medical care, and disability payments have been estimated in the range of \$222 million to \$1 billion.²

For editorial comment see p 1557.

Summaries of the Annual Survey have been published yearly³ since its inception, and have generally included data on estimated numbers of cases and rates of occupational skin diseases for the major industrial divisions of the Standard Industrial Classification (SIC) coding system. However, the only detailed analysis of occupational skin diseases recorded in the Annual Survey, which summarized data collected from 1972 to 1976, was published in 1979.⁴ To update our knowledge and identify current high-risk industries of employment, we have reviewed the results of incidence rates, numbers, and proportions of occupational skin diseases recorded in the Annual Survey from 1973 through 1984, and have performed a detailed analysis of the 1984 Annual Survey.

MATERIALS AND METHODS Annual Survey of Occupational Injuries and Illnesses

We reviewed all data on occupational skin diseases recorded in the Annual Survey of Occupational Injuries and Illnesses,⁵ for the years 1973 through 1984. This survey is based on a representative, random, probability sample of approximately 280 000 employers in private industry, selected by the Bureau of Labor Statistics (BLS) across all 50 states, the District of Columbia, and US territories and possessions. The survey covers the US civilian private sector-working population but excludes public administration sector employers (federal, state, and local government), farms engaged in agricultural production with fewer than 11 employees, private household industries, and self-employed individuals. Participation in this survey is

mandatory for selected companies. To protect the confidentiality of selected employers (a legal requirement of the Annual Survey), the BLS cannot release identities of participants or publish data that might inadvertently lead to identification.

Data on work-related injuries and illnesses are obtained directly from the Occupational Safety and Health Administration (OSHA) 200 Log and Summary of Occupational Injuries and Illnesses for the previous calendar year, which provides data on the occurrences of all occupational injuries, seven types of occupational illnesses (including skin diseases), and number of lost workdays for each injury or illness. Estimates of total employee hours worked are obtained on a supplemental form provided by the BLS to each sampled company or business during the survey year. Similar data for employers whose safety and health are covered by the Mine Safety and Health Administration and the Federal Railroad Administration are provided by these respective agencies. For record-keeping purposes, an occupational illness has been defined as any abnormality or condition that resulted from any exposure in the work environment other than a one-time exposure that involved a single incident (injury); all illnesses, even those that required first aid only, must be recorded on the OSHA 200 Log.

The BLS uses the SIC to classify business establishments according to their principal business activities or products.⁶ Although designed primarily for use in economic surveys, the SIC has been adapted by many federal and state agencies that collect occupational health statistics. This classification system divides all business establishments into ten major industrial divisions: (1) agriculture, forestry, and fishing; (2) mining; (3) construction; (4) manufacturing; (5) transportation, communication, electric, gas, and sanitary services; (6) wholesale trade; (7) retail trade; (8) finance, insurance, and real estate; (9) services; and (10) public administration. More detailed information about the major industrial divisions is obtained by subclassifying them with 2-, 3-, and 4-digit codes, according to more precise descriptions of their principal business activities or products. The survey sample is designed to provide reliable estimates at the four-digit level for manufacturing SICs and at the two-digit level for nonmanufacturing SICs.

The survey records only new illnesses that are recognized during the reporting year (incidence) and does not measure continuing conditions from previous years (prevalence). Incidence rates are calculated by dividing the number of reported illnesses by the total number of employment hours worked, then expressed per number of full-time employees, where one full-time employee equals 2000 hours worked during the survey year (40 hours per week \times 50 weeks).

The BLS requires that the relative SEs (RSEs) (the RSE is calculated by dividing the SE by the mean rate, and then multiplying by 100) satisfy certain standards of reliability and precision before it publishes data from the survey. These standards specify that the RSE not exceed 15% for manufacturing SICs or 20% for nonmanufacturing SICs for total injuries or total combined illnesses, nor should it exceed 60% for specific illness totals (eg, skin diseases). We have not reported estimates that do not meet these standards.

Calculations of Incidence Rates, Percent Distributions, and Relative Rates

All incidence rates for occupational skin diseases within various industries were calculated according to the meth-

ods of the BLS as described above, using total numbers of reported cases and estimates of total employee hours worked. For each major industrial division, we calculated the percentages of all illnesses within the division attributable to skin diseases (percent distribution) and the rates relative to the other major divisions. Relative rates were calculated by dividing the incidence rate of occupational skin diseases within a division for a given year by the incidence rate for all other divisions combined in the same reporting year.

Ranking by Rates and Numbers

For the 1984 survey year (the most recent year for which data were available when this analysis was performed), we determined the relative rankings for the "Top 15" industries, at the two-digit level, according to incidence rates and numbers of estimated cases. Since the survey provided sufficient data at the four-digit level for manufacturing, we also determined the "Top 15" high-risk industries at this level of subclassification, again based on relative rankings by rates and numbers of cases.

RESULTS

Table 1 lists the estimated incidence rates and numbers of cases for occupational skin diseases from 1973 through 1984, by major industrial divisions. The overall incidence rates declined from a high of 16.2/10 000 full-time workers in 1973 to a low of 6.2/10 000 full-time workers in 1983. Although greatest in manufacturing, this decline occurred across all major industrial divisions, except mining. However, inspection of 1984 data suggests that this gradual decline may be ending; overall rates rose to 6.3/10 000 workers, and only the major divisions of agriculture and services showed declines. In 1984, the highest rate occurred in agriculture (28.5), which was more than double the rate in manufacturing (12.3). However, between one half and two thirds of all occupational skin diseases occurred within the manufacturing division.

In Table 2, we have compared the percent distributions and relative rates attributable to occupational skin diseases for the major industrial divisions. From 1973 through 1983, the total proportion of occupational illnesses within all private sector industries attributable to skin diseases remained relatively constant (between 40% and 45%), but fell to 34% in 1984. Agriculture has consistently had the highest proportion of illnesses attributable to skin diseases among the major industry divisions, with skin diseases accounting for almost two thirds of all occupational illnesses in agriculture since 1978. Skin diseases accounted for approximately 50% of all illnesses recorded in manufacturing industries until 1979; since then, the proportion attributable to skin diseases has steadily declined and was only 32% in 1984. The proportions in other industry divisions have remained relatively constant. Only agriculture and manufacturing have had relative risks consistently greater than one; in 1984, the relative rates were 4.7 and 3.1, respectively.

Tables 3 and 4 list the number of cases, incidence rates, and relative rankings for the "Top 15" two-

Table 1.—Incidence Rates and Numbers of Occupational Skin Diseases by Major Industry Divisions: Private Sector, United States, 1973 Through 1984*

Year	All Divisions		Agriculture		Mining		Construction		Manufacturing		Transportation		Wholesale/Retail Trade		Finance		Services	
	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.
1973	16.2	89.2	40.2	3.2	8.6	0.2	13.5	4.3	31.2	60.2	10.3	4.5	4.5	6.2	2.2	0.8	10.1	9.8
1974	15.7	89.4	36.2	3.5	3.9	0.3	14.7	4.5	31.4	60.5	8.9	4.0	5.3	7.6	2.4	0.9	7.8	8.1
1975	13.6	74.4	31.0	3.0	3.7	0.3	13.9	4.1	26.9	46.7	9.5	4.0	4.4	6.2	1.3	0.5	9.0	9.7
1976	12.8	71.6	50.6	3.1	3.7	0.3	9.9	3.0	26.2	47.3	7.7	3.3	4.0	5.8	1.4	0.5	7.5	8.3
1977	12.4	73.0	44.3	2.9	5.4	0.4	9.8	3.2	24.6	46.2	8.8	3.9	3.5	5.3	1.6	0.6	8.8	10.3
1978	10.7	65.9	38.2	2.2	5.9	0.5	9.1	3.3	21.6	42.1	7.3	3.3	3.2	5.1	1.6	0.7	7.1	8.7
1979	10.5	67.9	40.6	2.3	5.5	0.5	9.2	3.5	20.6	41.6	7.3	3.5	3.7	6.1	1.2	0.5	7.5	9.8
1980	8.7	56.1	39.8	2.8	3.9	0.4	8.0	3.0	17.5	33.8	6.8	3.3	2.6	4.3	0.9	0.4	6.0	8.2
1981	7.9	51.2	35.9	2.6	4.1	0.5	8.8	3.1	14.8	28.5	6.5	3.1	2.6	4.3	1.3	0.6	5.8	8.3
1982	6.7	41.9	34.0	2.5	3.4	0.4	6.6	2.2	12.7	22.5	4.7	2.2	2.5	4.0	1.1	0.5	5.3	7.6
1983	6.2	39.5	32.9	2.4	2.9	0.3	5.8	2.0	11.9	21.0	4.3	2.0	2.1	3.4	1.0	0.5	5.3	8.0
1984	6.3	42.5	28.5	2.2	4.0	0.4	6.6	2.5	12.3	23.0	4.3	2.1	2.1	3.8	1.1	0.6	5.0	8.0

*Data from the Annual Survey of Occupational Injuries and Illnesses, 1973 through 1984, on file with the Bureau of Labor Statistics. Incidence rates are per 10 000 full-time workers; numbers are given in thousands of cases.

Table 2.—Percent Distributions and RRs for Occupational Skin Diseases by Major Industry Divisions: Private Sector, United States, 1973 Through 1984*

Year	All Divisions		Agriculture		Mining		Construction		Manufacturing		Transportation		Wholesale/Retail Trade		Finance		Services	
	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
1973	44	...	54	2.5	44	0.5	32	0.8	51	3.8	37	0.6	27	0.2	27	0.1	39	0.6
1974	45	...	51	2.4	37	0.2	37	0.9	51	4.1	37	0.5	34	0.3	32	0.1	32	0.4
1975	46	...	55	2.4	33	0.3	41	1.0	49	3.6	45	0.7	36	0.3	29	0.1	40	0.6
1976	43	...	63	4.1	41	0.3	25	0.8	49	4.1	39	0.6	36	0.3	20	0.1	31	0.5
1977	45	...	60	3.7	37	0.4	32	0.8	48	3.7	43	0.7	34	0.2	27	0.1	45	0.7
1978	46	...	65	3.7	31	0.5	42	0.8	49	3.8	42	0.7	34	0.2	37	0.1	45	0.6
1979	46	...	71	4.0	32	0.5	40	0.9	48	3.5	42	0.7	39	0.3	25	0.1	45	0.7
1980	43	...	67	4.8	28	0.4	38	0.9	44	3.5	41	0.8	35	0.2	27	0.1	43	0.6
1981	41	...	65	4.7	27	0.5	39	1.1	41	3.0	43	0.8	34	0.3	38	0.2	39	0.7
1982	40	...	68	5.3	29	0.5	41	1.0	38	2.9	38	0.7	39	0.3	33	0.2	41	0.7
1983	37	...	69	5.6	29	0.5	37	0.9	35	3.0	40	0.7	37	0.3	30	0.2	39	0.8
1984	34	...	65	4.7	31	0.6	40	1.1	32	3.1	37	0.7	33	0.3	30	0.2	36	0.7

*Data from Annual Survey of Occupational Injuries and Illnesses, 1973 through 1984, on file with the Bureau of Labor Statistics. Percent distributions refer to skin diseases as a percent of all occupational illnesses within each major industrial division; relative rates (RRs) are calculated by dividing the incidence rate for industrial division (Table 1) by the incidence rate for all other industrial divisions combined.

digit SIC industries covered in the survey. Health services (SIC 80) had the largest number of cases, while agricultural crop production (SIC 01) had the highest rate. Eleven industries appeared in the "Top 15" rankings for both rates and numbers of cases. Agricultural crop production (SIC 01) and construction other than building (SIC 16) were the only two-digit SIC industries in major industrial divisions other than manufacturing that appeared in both "Top 15" rankings.

The survey also provided sufficient data to generate rate and number estimates at a four-digit level for manufacturing, of which the "Top 15" are depicted in Tables 5 and 6. Miscellaneous sporting and athletic goods (SIC 3949) had the highest rate, while miscellaneous plastic products (SIC 3079) had the

largest number of cases. Four manufacturing industries appeared in the "Top 15" rankings for both incidence rates and number of cases. Only leather tanning and finishing (SIC 3111) and broad-woven fabric mills, wool (SIC 2231) appeared in the "Top 15" rankings at the four-digit level that were not already included in both "Top 15" rankings at the two-digit level; however, the two-digit industrial classification that includes leather tanning and finishing (SIC 31) was ranked third by rates.

COMMENT

Since 1973, occupational skin diseases have remained unevenly distributed among the major industrial divisions. In the 1984 Annual Survey, agriculture accounted for 5% of all cases, but

Table 3.—'Top 15' Industries With Highest Incidence Rates of Occupational Skin Diseases by Major Two-Digit SIC Employment Categories: Private Sector, United States, 1984*

Rank	SIC	Industry	Incidence Rate†	No.‡	Relative SE, %
1§	01	Agricultural production—crops	39.4	1300	11
2	08	Forestry	35.1	0	16
3	31	Leather and leather products	27.4	500	7
4§	39	Miscellaneous manufacturing industries	25.8	900	18
5	07	Agricultural services	23.0	800	20
6§	30	Rubber and miscellaneous plastics products	18.6	1400	11
7§	34	Fabricated metal products, except machinery, equipment, and supplies	17.7	2500	4
8§	20	Food and kindred products	16.7	2600	4
9§	35	Machinery, except electrical	14.5	3100	4
10§	36	Electrical and electronic machinery, equipment, and supplies	14.4	3100	5
11§	28	Chemical and allied products	12.6	1300	7
12§	38	Measuring, analyzing, and controlling instruments; photographic, medical, and optical goods; and watches and clocks	12.5	900	7
13§	16	Construction other than building construction—general contractors	12.4	900	27
14§	37	Transportation equipment	11.8	2300	5
15	32	Stone, clay, glass, and concrete products	11.7	700	7

*Data from Annual Survey of Occupational Injuries and Illnesses, on file with the Bureau of Labor Statistics. SIC indicates Standard Industrial Classification.

†Incidence rate per 10 000 full-time workers.

‡Number of cases rounded to nearest hundred. 0 indicates number less than 50 but greater than 0.

§Also ranked in "Top 15" by number of cases.

Table 4.—'Top 15' Industries With Largest Numbers of Occupational Skin Diseases by Major Two-Digit SIC Employment Categories: Private Sector, United States, 1984*

Rank	SIC	Industry	No.†	Incidence Rate‡	Relative SE, %
1	80	Health services	3900	8.1	30
2	35§	Machinery, except electrical	3100	14.5	4
	36§	Electrical and electronic machinery, equipment, and supplies	3100	14.4	5
4	20§	Food and kindred products	2600	16.7	4
5	34§	Fabricated metal products, except machinery, equipment, and supplies	2500	17.7	4
6	37§	Transportation equipment	2300	11.8	5
7	73	Business services	1500	4.7	27
8	30§	Rubber and miscellaneous plastics products	1400	18.6	11
9	01§	Agricultural production—crops	1300	39.4	11
	28§	Chemical and allied products	1300	12.6	7
11	17	Construction—special trade contractors	1100	5.2	13
	50	Wholesale trade—durable goods	1100	3.4	26
	58	Eating and drinking places	1100	3.0	46
14	16§	Construction other than building construction—general contractors	900	12.4	16
	38§	Measuring, analyzing, and controlling instruments; photographic, medical, and optical goods; and watches and clocks	900	12.5	7
	39§	Miscellaneous manufacturing industries	900	25.8	18

*Data from Annual Survey of Occupational Injuries and Illnesses, on file with the Bureau of Labor Statistics. SIC indicates Standard Industrial Classification.

†Number of cases, rounded to nearest hundred.

‡Incidence rate per 10 000 full-time workers.

§Also ranked in "Top 15" by incidence rates. Note that three industries tied for 14th ranking by number of cases.

employed only 1% of the total US civilian private sector-working population covered by the survey. Manufacturing accounted for more than 50% of all cases while employing approximately 25% of the work force. This uneven distribution of cases and relative rates by industry has not changed substan-

tially in the Annual Survey since 1976. The number of lost workdays has not been separately tabulated for occupational skin diseases since 1978, and we could not assess any changes in this measurement of severity. Published BLS data for the period 1972 to 1976 have suggested that as many as 25% of all

Table 5.—'Top 15' Manufacturing Industries With Highest Incidence Rates of Occupational Skin Diseases by Four-Digit SIC Categories: Private Sector, United States, 1984*

Rank	SIC	Industry	Incidence Rate†	No.‡	Relative SE, %
1	3949§	Sporting and athletic goods, not elsewhere classified	109.6	600	28
2	3111	Leather tanning and finishing	108.8	200	8
3	2084	Wines, brandy, and brandy spirits	100.4	100	49
4	2092	Fresh or frozen packaged fish and seafood	80.1	200	13
5	3586	Measuring and dispensing pumps	63.2	0	6
6	2231	Broad-woven fabric mills, wool	62.8	100	7
7	3562§	Ball and roller bearings	57.2	300	8
8	3498	Fabricated pipe and fabricated pipe fittings	53.8	100	35
9	3676	Resistors, for electronic applications	52.4	100	11
10	3519§	Internal-combustion engines, not elsewhere classified	50.9	400	4
11	3451	Screw machine products	49.8	200	15
12	2017	Poultry and egg processing	49.1	100	5
13	3421	Cutlery	48.8	100	24
14	3851	Ophthalmic goods	47.3	200	4
15	2016§	Poultry dressing plants	45.6	500	6

*Data from Annual Survey of Occupational Injuries and Illnesses, on file with the Bureau of Labor Statistics. SIC indicates Standard Industrial Classification.

†Incidence rate per 10 000 full-time workers.

‡Number of cases rounded to nearest hundred. 0 indicates number less than 50 but greater than 0.

§Also ranked in "Top 15" by numbers of cases.

Table 6.—'Top 15' Manufacturing Industries With Largest Numbers of Occupational Skin Diseases by Four-Digit SIC Categories: Private Sector, United States, 1984*

Rank	SIC	Industry	No.†	Incidence Rate‡	Relative SE, %
1	3079	Miscellaneous plastics products	1100	20.2	15
2	3679	Electronic components, nec	1000	36.1	13
3	3714	Motor vehicle parts and accessories	700	16.4	12
4	3949§	Sporting and athletic goods, nec	600	109.6	28
	2011	Meat packing plants	600	39.7	8
6	2016§	Poultry dressing plants	500	45.6	6
7	3519§	Internal-combustion engines, nec	400	50.9	4
	3728	Aircraft parts and auxiliary equipment, nec	400	25.5	13
	3721	Aircraft	400	11.2	8
10	3599	Machinery, except electrical, nec	300	13.5	17
	3674	Semiconductors and related devices	300	11.4	19
	3471	Electroplating, plating, polishing, anodizing, and coloring	300	41.3	13
	3662	Radio and television transmitting, signaling, and detection equipment and apparatus	300	6.1	13
	3562§	Ball and roller bearings	300	57.2	8
	3494	Valves and pipe fittings, except plumbers' brass goods	300	31.1	17
	2821	Plastic materials, synthetic resins, and nonvulcanizable elastomers	300	34.4	22

*Data from Annual Survey of Occupational Injuries and Illnesses, on file with the Bureau of Labor Statistics. SIC indicates Standard Industrial Classification; nec, not elsewhere classified.

†Number of cases, rounded to nearest hundred.

‡Incidence rate per 10 000 full-time workers.

§Also ranked in "Top 15" by rates. Note that seven industries tied for tenth ranking by number of cases.

occupational skin disease cases involved lost time from work, averaging ten to 12 lost workdays per case.³

Some occupational health investigators have questioned the use of incidence rates for occupational illnesses based on the OSHA 200 Log data, due to

possible underrecognition of diseases⁷ or deliberate underreporting⁸ on the OSHA 200 Log form. Underrecognition is less a problem for most occupational skin diseases,⁹ which are generally acute and occur while the affected employee is still actively exposed to the causal agent, compared with other illnesses

recorded in the Annual Survey. Nonetheless, these estimates are based on self-reported data from employers, not physicians, which in turn depend on the willingness of affected employees (who may fear loss of a job or income) to report occurrences to their employers. Since the BLS performs no validation of cases reported in the Annual Survey, the estimated incidence rates and numbers of occupational skin diseases are more useful for relative rankings of risk or monitoring of trends than for purposes of benchmarking "true" estimates of disease occurrence.

Since estimates of total employee hours worked within an industry may overestimate the numbers of workers actually at risk (thereby lowering incidence rates), comparisons of rates alone may not accurately reflect the industries in which these high-risk working populations are employed. Therefore, we have also ranked the industries by estimated annual numbers of cases. Within the manufacturing division, all nine industries that were ranked in the "Top 15" for both rates and numbers of cases at the two-digit level contained at least one subindustry that was similarly ranked in the "Top 15" at the four-digit level; only two subindustries appeared at the four-digit level within SICs that were not already ranked in the "Top 15" by either rates or numbers of cases at the two-digit level. Thus, the data suggest that little discriminating power would be lost if the four-digit SIC analysis were performed only on the two-digit SIC manufacturing industries with both the highest rates and numbers of cases.

Both incidence rates and numbers of cases of occupational skin diseases have generally been declining since the inception of the Annual Survey. Whether or not due to real progress in prevention, this downward trend has been consistent across most major industrial divisions through 1983. The 1984 data suggest a reversal of this trend, but definitive conclusions and possible explanations require more years of observation and research. The proportion of occupational illnesses attributable to skin disorders has remained relatively constant across all major industrial divisions, except manufacturing, where it has been steadily falling since 1979. This decline may

be due not only to a decrease in numbers of reported skin diseases but to an increase in diagnosis of other disorders, such as repetitive trauma. Comparisons of high-risk manufacturing SICs by incidence rates (Table 5) with 1972 to 1976 data⁴ further suggest that the distribution of risk within the manufacturing sector may be changing. Only six high-risk SICs ([1] sporting and athletic goods, not elsewhere classified; [2] leather tanning and finishing; [3] fresh or frozen packaged fish and seafood; [4] poultry and egg processing; [5] poultry dressing plants; and [6] ophthalmic goods) from the 1972 to 1976 data appeared in our 1984 analysis.

The SIC coding categories used in the Annual Survey are based only on the principal business activities or products of the industry, not on the processes by which goods are manufactured or services are actually provided. Furthermore, neither the principal causal agents nor the most frequently affected occupations within these high-risk industries can be ascertained directly from the Annual Survey, since they are not recorded and can only be inferred from some general knowledge of the cutaneous hazards peculiar to a business activity or manufacturing process. Some additional indirect insight regarding causal agents may be gained by examining workers' compensation claims. For example, California data¹⁰ demonstrate that soap, detergents, and cleaning compounds are the most frequently reported causal agents within the health services industry (SIC 80), which is ranked first by numbers of cases.

Our analysis has identified high-risk industries for occupational skin diseases toward which additional research efforts should be directed to characterize those occupational activities or exposures that are most responsible for these higher risks. Such efforts could include analysis of workers' compensation claims within these high-risk industries or direct field studies.

The Office of Occupational Safety and Health Statistics, Bureau of Labor Statistics, Washington, DC, kindly provided data tapes for this analysis.

References

1. Centers for Disease Control: Leading work-related diseases and injuries—United States. *MMWR* 1986;35:561-564.
2. Mathias CGT: The cost of occupational skin disease. *Arch Dermatol* 1985;121:332-334.
3. US Department of Labor, Bureau of Labor Statistics: *Occupational Injuries and Illnesses in the United States by Industry, 1972-1984*, all yearly bulletin series, 1974-1986.
4. Wang CL: Occupational skin disease continues to plague industry. *Monthly Labor Rev* 1979;102:17-22.
5. US Department of Labor, Bureau of Labor Statistics: Occupational safety and health statistics, in *BLS Handbook of Methods*, bulletin 2134-1. 1982, vol 1, chap 17, pp 122-134.
6. Statistical Policy Division, Office of Management and Budget: *Standard Industrial Classification Manual, 1972*. 1972.
7. Discher DP, Kleinman GD, Foster FJ: *Pilot Study for Development of an Occupational Disease Surveillance Method*, publication (NIOSH) 75-162. Washington, DC, US Dept of Health, Education, and Welfare, 1975.
8. La Dou J: The not-so-clean business of making chips. *Technology Rev* 1984;87:23-36.
9. National Academy of Science: *Counting Injuries and Illnesses in the Workplace: Proposals for a Better System*. Washington, DC, National Academy Press, 1987, pp 5, 84.
10. Occupational Disease Statistics Unit, Division of Labor Statistics and Research: *Occupational Skin Disease in California (With Special Reference to 1977)*. San Francisco, Department of Industrial Relations, 1979.