

1999

Annual Summary of Occupational Disease Reports to the Michigan Department of Consumer and Industry Services



**Summary of 1999
Occupational Disease Reports
to the
Michigan Department of Consumer & Industry Services**

A Joint Report
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SUMMARY

Despite the fact that occupational disease reports were received from only 0.1% of companies and 1% of health care providers, 21,538 occupational disease reports were received in 1999. The most frequent types of occupational diseases reported were repetitive trauma (40%), respiratory disease (25%), diseases of the nervous systems and sense organs (12%) and musculoskeletal diseases (7%).

This reporting system complements the employer based system mandated by the Federal Occupational Safety and Health Administration (OSHA). For example, there were 5,219 reports from health care providers and hospitals for diseases of the respiratory system while only 63 such reports were received from employers (Table 4). There were an increasing number of individuals with asbestosis and pleural thickening as compared to previous years (Figure 6). This trend would be missed if only employer reports were relied upon.

The average age of individuals reported was 45 years with a range from 17 to 98. Sixty-nine percent were between the ages of 25 and 55. Seventy-three percent of all reports submitted were for male workers. The number and percentage of hospitalizations paid for by workers' compensation continued to decrease. Low back problems are the major cause (41%) for hospitalizations paid for by workers' compensation.

An initiative is planned in the coming year to combine occupational injury and illness reports from all sources to present a more comprehensive overview of work-related injuries and illnesses in Michigan.

INTRODUCTION

Since 1978, physicians, hospitals, clinics, other health professionals and employers have been required by the Michigan Public Health Code (Article 368, Part 56, P.A. 1978, as amended) to report known or suspected cases of occupational diseases. Until 1996, these reports were submitted to the Michigan Department of Public Health (MDPH). Reports are now submitted to the Michigan Department of Consumer and Industry Services (MDCIS). During the initial years after the reporting law was enacted, the number of reports received by the MDPH was generally less than one hundred each year. Following the 1988 implementation of the Sentinel Event Notification System for Occupational Risks (Project SENSOR), a statewide initiative for occupational disease surveillance, active solicitation of occupational disease (OD) reports began. Since 1988, the number of reports sent to the MDPH/MDCIS has increased substantially. Figure 1 shows the number of occupational disease reports received each year since 1985. Over the past four years approximately 20,000 reports have been received annually. Figure 2 shows the number of reports by reporting source for 1991-1999 (the years for which reporting source is known).

Computerization of the OD report data, which began in 1991, allows for more efficient handling of the increasing number of reports submitted and facilitates use of the reports for meaningful surveillance efforts. This is the ninth annual report on occupational diseases in Michigan, and is based upon the reports submitted to the MDCIS in calendar year 1999.

Figure 3 is a copy of the occupational disease (OD) report that is submitted to MDCIS by companies and health care providers. The form requests medical and demographic information on the affected employee and information about both the employer and the facility at which the employee became ill. This information is used to monitor occupational diseases within the state, and to assist in directing intervention efforts.

In addition to completing the OD report form (Figure 3), information can be submitted by:

*Email: Rosenman@msu.edu

*Postage paid envelopes: call 1-800-446-7805 to request

*Fax: (517) 432-3606

*Phone-in: 1-800-446-7805

*Mail directly to : MDCIS, Occupational Health Division
Bureau of Safety & Regulation
7150 Harris Drive
PO Box 30649
Lansing, MI 48909-8149

METHODS

The computerized OD records contain: 1) the affected employee's name, age, sex, race, zip code and social security number; 2) the employer's name, work site address, city, zip code, number of persons employed at the facility and the company's standard industrial classification code (SIC)¹; 3) details of the illness, including date of diagnosis, suspected causative agent(s), whether the employee died, and diagnosis or clinical impression coded according to the International Classification of Diseases (ICD-9th Revision)²; and 4) information about the individual who submitted the report, including company affiliation (i.e whether the reporter is a practitioner employed by the company, or an outside medical department contracted by the company, or a private practice health professional). An OD report is initiated when a clinician knows or suspects that a patient's illness is work-related. Reports are submitted by physicians, audiologists, employers, hospitals, clinics, laboratories, the 3rd Judicial Court of Michigan (which processes the majority of the asbestos-related claims) and the federal Mine Safety and Health Administration. Additional reports are generated through annual review of death certificates and the Michigan Health and Hospital Association inpatient database.

More than one report on a given individual with different work-related diseases may be submitted to the MDCIS within a given year and across multiple years. If more than one report is submitted in a given year for a chronic disease in a single individual, only one of the submissions is included in our statistics. Further, if multiple reports are submitted over several years on that individual's chronic disease, only the earliest report is included in our statistics. In contrast, if several reports are submitted for acute illnesses for a single individual, all of the reports are included in our statistics. Appendix A lists the chronic disease categories for which duplicate reports within and across years are removed.

RESULTS

A total of 21,538 occupational disease reports were submitted to the MDCIS in 1999. Figure 1 shows the number of reports received each year since 1985. A quality control audit conducted for last year's annual report uncovered a small number of duplicate chronic disease cases. Consequently the number of reports reflected in Figure 1 for 1991-1997 is slightly lower than was reported in the annual reports prior to 1998.

Source of Reports

Sixty-six percent of the reports (14,253 cases) came from company or contract medical departments. The remaining thirty-four percent (7,285 cases) came from non-company health practitioners. Most patients worked in large companies (Table 1) with 99% of the 14,794 reports that listed company size coming from businesses with more than 500 employees. A larger proportion of reports involving smaller companies (fewer than 500 employees) come from non-company health practitioners. Almost fifteen percent of the 543 reports with known company size that were submitted by non-company practitioners involved companies with fewer than 500 employees, while less than one percent of the 14,251 reports with known company size that were submitted by company practitioners involved

facilities with fewer than 500 employees.

Four hundred eighty-seven private practice clinicians (non-company affiliated) reported 7,285 incidents of occupational disease. This is approximately 2000 more reports from non-company practitioners than were submitted in 1998, and reflects a significant increase in the number of dust-related lung diseases reported by x-ray “B” readers in the last two years. A “B” reader is a licensed physician who has passed a test on interpreting chest x-rays for pneumoconiosis, and maintains certification by passing an additional test every 4 years. There are 15 Michigan physicians who are “B” readers. One hundred eighty of the clinicians who reported in 1999 (70%) reported only one patient each (Table 2), while four clinicians reported more than one-hundred patients each. Two of these are physicians certified by the federal government to interpret chest x-rays for dust-related lung disease; one is an occupational medicine physician who practices at a hospital based clinic; and one is a large audiology group practice. The number of reports submitted by these 4 clinicians in 1999 ranged from 112 to 3,154.

Demographics

Table 3 shows the age, gender and race distribution of the workers with reported occupational diseases. The mean age of reported patients was 45 ± 14 years (range, 17 to 98 years) with the majority of patients (69%) between the ages of 25 and 55. Fifty-eight reports were submitted for patients under age 20, and 211 were submitted for patients over age 80.

Seventy-three percent of all reports submitted were for male workers. Eighty-three percent of the submitted reports (17,772 cases) did not indicate the worker’s race. Of the 3,766 reports that did indicate race, 68% were white, 23% were African American, 6% were Hispanic and 3% were marked “other.”

Younger workers. Of the 58 workers under age 20, the youngest five were 17 years old, 13 were 18, and 38 were 19 years old. Twenty-two of the reported patients under age 20 were women, and 36 were men.

Forty of the younger workers were employed in manufacturing, six worked in health care services, one worked in construction, and one in auto repair services. Place of employment was unknown for 10 of the reported workers.

Forty-three of the younger workers were reported by company affiliated clinicians or contract medical departments, and fifteen were reported by private-practice physicians. Thirty-one reports were for repetitive trauma (sprains and strains), eight for elevated blood lead levels, eight for skin diseases, five for respiratory symptoms, two for heat stress and two for ill-defined conditions. No fatalities were reported for any workers under age 20. Of the eight cases of elevated lead levels, five had serum lead levels between 10 and 24 micrograms per deciliter and three had levels between 25 and 35 $\mu\text{g}/\text{dl}$.

Older workers. Of the 211 workers age eighty and older, 191 were between the ages of 80 and 89,

and twenty were between 90 and 98 years old. Two hundred were men and 11 were women. All but two of these patients were reported by non-company clinicians.

One hundred sixty-eight of the older workers were reported for dust-related lung disease (including 112 with asbestosis 37 with pleural thickening, and 19 with silicosis), one for a respiratory condition due to chemical fumes, 34 for noise-induced hearing loss, seven for elevated blood lead levels, and one for cancer.

Sixty-one of the older patients worked in (or were retired from) manufacturing, two worked in utility services, two in health care services, nine in construction, four in government and one in farming. Occupation or former occupation was not indicated in 133 reports.

Illness Information

Table 4 shows the distribution of diagnoses or clinical impressions by reporting source. Diagnoses are grouped by major International Classification of Diseases categories (ICD-9th Revision). Overall, repetitive trauma illnesses (ICD-9 categories 800-999 except 940 and 980-989) were the most frequently reported conditions, with 8,563 cases representing 40% of all OD reports submitted. The majority of reports were for sprains and strains of the wrist, hand and finger.

Diseases of the respiratory system were the second most frequently reported conditions, with 5,282 cases representing 25% of all reports. Diseases of the nervous system and sense organs (ICD-9 320-389) were third, with 2,548 cases representing 12% of all reports submitted. There were 1,463 reports of musculoskeletal and connective tissue disease (7%), 1,226 reports of skin and subcutaneous disease (6%), 1,188 reports for toxic effects of substances (6%), 575 reports of mental disorders (3%), 111 burns to the eye (<1%), and 73 reports of cancer (<1%). Infrequently reported conditions included infectious and parasitic diseases, diseases of the digestive system and diseases of the circulatory system.

Four hundred fifty-two reports of symptoms, signs and ill-defined conditions (ICD-9 780 - 799) were also submitted, which suggests that physicians and other health care providers are reporting both *known* and *suspected* cases of occupational disease.

Reporting source differences. Company affiliated and non-company affiliated practitioners differ markedly in the types of occupational diseases they report (Table 4). Sixty percent of submissions by company health care providers are reports of repetitive trauma illnesses, while less than one percent of submissions by non-company providers represent these diagnoses. Conversely, seventy-two percent of non-company submissions are reports of respiratory illness, while less than one percent of company submissions are for respiratory illness. The second, third and fourth most frequently reported diagnoses for company providers are diseases of the nervous system and sense organs (12%), musculoskeletal system and connective tissue (7%), and skin and subcutaneous tissue (6%). Toxic effects of substances are the second most frequently reported diagnoses by non-company providers (14%). The third and fourth most frequently reported diagnoses for non-company providers

are diseases of the nervous system and sense organs (12%) and cancer (1%).

Company and non-company practitioners also differ in the types of industries represented in their reports (Table 5). Ninety-seven percent of patients reported by company affiliated health care providers are employed in manufacturing, primarily automobile production. In contrast, only 73% of patients reported by non-company affiliated providers are employed in manufacturing. The second and third industry types most frequently reported by company providers are service industries (primarily hospitals) (3%) and mining (<1%). The second and third industry types most frequently reported by non-company providers are construction (14%) and services (6%). The type of industry was missing on 4,012 non-company and 2 company reports.

Gender differences. Repetitive trauma illnesses were the most frequently reported diagnoses for both men and women, with 33% of submissions on men and 56% of submissions on women reporting one of these diagnoses (Table 6). The second, third and fourth most frequently submitted diagnoses for men were diseases of the respiratory system (32%), nervous system and sense organs (13%) and toxic effects of substances (7%). For women, the second, third and fourth most frequently submitted diagnoses were diseases of the skin and subcutaneous tissue (10%), musculoskeletal system and connective tissue (11%) and nervous system and sense organs (8%). Twenty-four reports did not indicate gender.

Fatalities. Fatalities related to occupational illnesses were reported for 86 workers. The 86 individuals who died were all reported by non-company clinicians. All 86 cases were men. The workers who died ranged in age from 40 to 85. Twenty-one died from asbestosis, fifty-eight died from asbestos-related cancer, and seven died of silicosis. Thirty-nine of the deceased workers had been employed in manufacturing, 11 worked in construction, one worked in mining, two worked in services and 6 were utility workers. Former occupation was not specified for 27 workers.

Comparison With Other Data Systems

The Bureau of Workers' Disability Compensation, (a division of the MDCIS) receives reports based on claims for compensation, which are generated when an injury or illness results in being off work for seven or more consecutive days (Michigan Employers Basic Report of Injury, Form 100). Not all claims are compensated. In 1999, the Bureau of Workers' Compensation Disability received 51,459 reports of injuries and illnesses involving the loss of seven or more consecutive work days. In 1990, the latest year for which the disease category distribution in Table 8 is available, the Bureau received 8,851 claims for compensation of occupational illnesses³, and 70,829 claims for occupational injuries. The largest category of occupational illness claims received by the Bureau of Workers' Disability Compensation were for disorders due to repeated trauma, with 3,425 claims (39% of all claims submitted). This is consistent with the types of disorders most frequently submitted in OD reports. (Table 8).

The MDCIS also conducts annual surveys on samples of Injury and Illness Logs kept by Michigan companies. Through 1994, these annual surveys on samples of *Injury and Illness Logs*⁴ kept by

Michigan companies contained estimates of specific disease categories. In the 1997 Survey (the most recent survey available) only an estimate of the total number of illnesses is available; the MIOSHA Information Division estimated a total of 40,400 occupational illnesses for that year⁵. 1994 is the most recent year for which the disease category distribution in Table 8 is available. In 1994, there were an estimated 52,098 occupational illnesses in the state. (Only illnesses which require more than first aid are included.) The highest percentage of estimated occupational illnesses from the 1994 survey was also for disorders due to repeated trauma, with 36,994 claims (71%), followed by 6,336 claims (12%) for occupational skin diseases or disorders. Table 8 compares the claims submitted to the Bureau of Workers' Disability Compensation in 1990, the 1994 MDCIS survey estimates, and the OD reports submitted for 1992-1999.

Disorders due to repeated trauma constituted 47% of the average number of reports per year to the MDCIS for 1998-1999, which is greater than that predicted by the 1990 Workers' Disability Compensation claims (39%), but less than that predicted by the MDCIS 1994 survey (71%).

Dust diseases of the lung reported in 1998-1999 (3,225 average cases, 16% of reports) constituted a much higher percentage of total OD reports submitted than either the 1990 Workers' Compensation claims or 1994 survey estimates would predict (0.1% -0.4%). This difference is consistent with data collected by the MDCIS which demonstrates that only 40% of patients with dust diseases of the lung secondary to sand exposure (silicosis) apply for Workers' Compensation. Many of these patients are retirees who may not have filed Workers' Compensation claims, so employers may be unaware of their illness. Consequently, employer surveys and Workers' Compensation claims data tend to under-predict chronic diseases such as dust-related lung disease.

Hospital Discharge Data - Pneumoconiosis

Figure 4 shows the number of individuals hospitalized in Michigan with asbestosis, coal workers' pneumoconiosis and silicosis from 1990-98. Repeat admissions of the same individuals are excluded from these counts. For most of these patients pneumoconiosis was not the primary diagnosis listed on the discharge record. As shown in Figure 5, Medicare is the primary payment source for hospitalization related to these diseases. Workers' Compensation is very rarely the source of payment, which is consistent with findings in both Michigan and New Jersey that the majority of patients with pneumoconiosis never apply for Workers' Compensation^{6,7}.

Hospital Discharge Data - Workers' Compensation

Table 9 shows the primary discharge diagnosis for hospitalizations in 1992 through 1998 where the source of payment was Workers' Compensation. A broad range of conditions are covered by Workers' Compensation, including mental illnesses, infections, heart disease and cancer. The most common conditions paid for by Workers' Compensation are musculoskeletal diseases, over half of which involve the lower back. Injury and poisoning constitute the second largest category.

Figure 6 shows the number of hospitalizations paid for by Workers' Compensation for the years

1992-1998. The number of hospitalizations per year that were paid for by Workers' Compensation in 1998 (the most recent year for which data are available) is lower than the average number of hospitalizations reported in previous years (5,691 hospitalizations for 1998 versus 6,105 per year for 1996-97 versus 6,993 for 1994-95, and 7,645 for 1992-93). In addition, the percentage of the total number of Michigan hospitalizations that are paid for by Workers' Compensation has decreased since 1993 (Figure 7). In 1998, 0.45% of the 1,256,672 Michigan hospitalizations were paid for by Workers' Compensation.

The demographic characteristics of patients with Workers' Compensation hospitalizations are shown in Table 10. Approximately seventy-five percent of the hospitalizations were for men in 1992-93, 1996-97 and 1998. This proportion dipped to 62 percent in the 1994-95 period. Among hospitalizations for which race is known, approximately 85% were white, 9-11% were African American, approximately 1% were Hispanic, <1% were Asian or American Indian, and 3 to 5% were listed as "other" over the seven years.

The majority of hospitalizations involved workers between the ages of thirty and fifty years. Around one percent involved workers under age fifteen or over age eighty. The number of hospitalizations of workers under age fifteen in 1996-97 was lower than the number reported in the other years in Table 10 (an average of 11 hospitalizations per year (0.2%) in 1996-97 versus 41 (0.6%) in 1994-95, 56 (0.7%) in 1992-93 and 56 (1.0%) in 1998.

Mesothelioma/Asbestosis

The association between exposure to asbestos and the risk of developing mesothelioma was first reported in the medical literature in 1943⁹. The only other exposure associated with the risk of developing mesothelioma has been the therapeutic use of x-rays. The percentage of patients with mesothelioma who have a history of occupational asbestos exposure is lower in studies that are based on review of medical records compared to studies based on a complete work history where 90% of mesothelioma has been attributed to asbestos exposure¹⁰. Among cohorts of asbestos-exposed workers, up to 10% of deaths have been attributed to mesothelioma.

Asbestos-related lung disease is the most common of the dust diseases reported to the Michigan Department of Consumer and Industry Services. The number of reports of both asbestosis and pleural thickening is continuing to increase (Figure 8). This is due to a large volume of reports from a Michigan "B" reader who began reporting patients with asbestos-related x-ray changes in 1997 and a tripling of reports from an occupational medicine physician.

We have used data from the Michigan Cancer Registry to describe the demographics of mesothelioma in Michigan. From 1985 through 1996 there were 731 Michigan residents reported to the Michigan Cancer Registry with the diagnosis of mesothelioma of the pleura, and 99 of the peritoneum. Another 200 patients were reported with mesothelioma of the lung (140), chest (9), abdomen (8), or an unknown site (43). We have excluded seven patients from the analyses who were reported with mesothelioma of the heart or reproductive organs since mesotheliomas from these sites are not usually

associated with asbestos exposure.

Figure 9 shows the number of men and women with mesothelioma by year. Almost one quarter (24.7%) of the reports of mesothelioma occurred in women. Mesothelioma occurred predominantly among whites (91.4%). This race categories includes American Indian and other categories. However, race was unknown for 40% of the mesothelioma cases.

Figure 10 shows the age of diagnosis separately for men and women. The peak age of occurrence was for individuals 60 years and older.

Figure 11 shows the number of men with mesothelioma by county. Figure 12 shows the number of women with mesothelioma by county. Figures 13 and 14 show the average annual incidence rates for men and women 40 years and older by county. The counties with the highest rates for men are Mackinac (13.7 cases per 100,000), Bay (12.7 cases per 100,000), Midland (12.7 cases per 100,000), Houghton (10.7 cases per 100,000), Presque Isle (10.1 cases per 100,000), Arenac (9.7 cases per 100,000), and Missaukee (9.6 cases per 100,000). The rates among women were lower than those among men. The counties with the highest rate for women were Alger (7.7 cases per 100,000), Ontonagon (7.3 cases per 100,000), Antrim (3.5 cases per 100,000), and Gogebic (3.3 cases per 100,000). At this time no follow up has been conducted to determine the history of asbestos using facilities in different counties as the presumed explanation for the variation of county rates of mesothelioma.

DISCUSSION

There were 21,538 Occupational Disease Reports sent to the MDCIS in 1999. The most frequent types of occupational diseases reported to the MDCIS were repetitive trauma illnesses (40%), respiratory disease (25%), diseases of the nervous system and sense organs (12%), and diseases of the musculoskeletal system (7%).

It is important to note that we used the ICD-9 codes to classify the diagnosis or clinical impression recorded on the occupational disease reports submitted to the MDCIS. In the ICD-9 coding system, sprains and strains are classified as injuries. However, in Michigan, employers are only required to report *illnesses* on the OD reporting form, not injuries. We assume the reports received for sprains and strains represent illness secondary to cumulative trauma, which are required to be reported.

Many employers, physicians and other health care providers do not report patients with occupational diseases either because they are unaware of the reporting law or choose not to report for a different reason. We currently receive reports from approximately 176 companies and 257 non-company physicians. There were approximately 256,718 companies and 25,612 practicing physicians in Michigan in 1999. Accordingly, we are receiving reports from 0.1% of companies and 1% of physicians. We have continued our efforts to remind employers of the requirement to report by routinely distributing reporting forms during MIOSHA inspections. Also, all new physicians receive information on the requirement to report when they apply for medical licensure in Michigan.

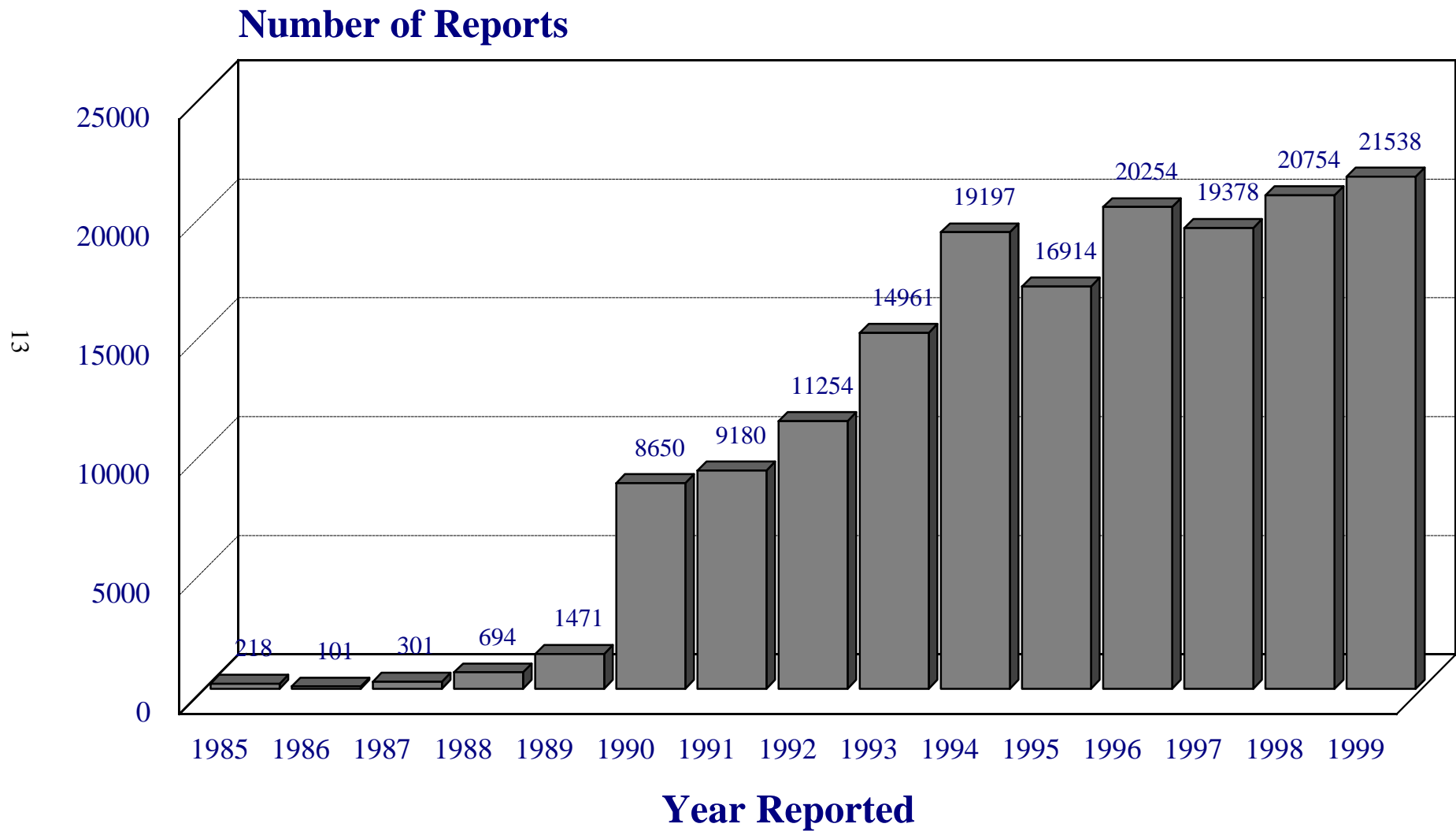
We know that the 20,000 reports received each year do not represent the actual incidence of occupational disease in Michigan. Using capture-recapture analysis we have previously estimated that 29,193 to 60,968 individuals are diagnosed with occupational diseases each year in Michigan.⁸ Even this range is an underestimate because it assumes that all physicians recognize work related illness in their patients and that all employers are informed when work-related conditions are diagnosed. These assumptions often go unmet.

The percentage of reports received from non-company health practitioners as compared to employers is increasing in large part due to an increase in reports of asbestos-related diseases from a small number of physicians. The type of illness and the type of industry where occupational diseases occur as reported by non-company health practitioners differs from company-based health practitioners (Tables 1, 4 and 5). These differences vary depending on the specialties of the private practice physicians who submit reports. For example, the non-company health practitioners who reported patients in 1999 were more likely to report patients with respiratory disease who work in small, non-manufacturing companies. A large percentage of the 1999 reports from non-company health practitioners were from physicians who are specialists in the radiographic interpretation of mineral and dust-related lung disease. Without these reports the increased diagnosis of asbestos related lung disease would be missed (Figure 8). However, regardless of the mix of non-company specialists reporting, the data illustrate that relying on company based reports alone would cause occupational illness statistics to markedly under-count certain work-related conditions. We have previously reported that for 1992-1994, only 14.5% of the workers for whom an Occupational Disease Report was submitted had filed a Workers' Compensation claim, although an additional 22.7% may have filed a claim.⁸ To determine the true burden of occupational disease in our state, multiple reporting sources must be used. Efforts to develop a comprehensive surveillance system for Michigan as well as the nation need to continue. In addition to tracking the incidence of occupational disease, such a comprehensive system would allow us to prioritize and evaluate the effectiveness of interventions designed to prevent occupational disease.

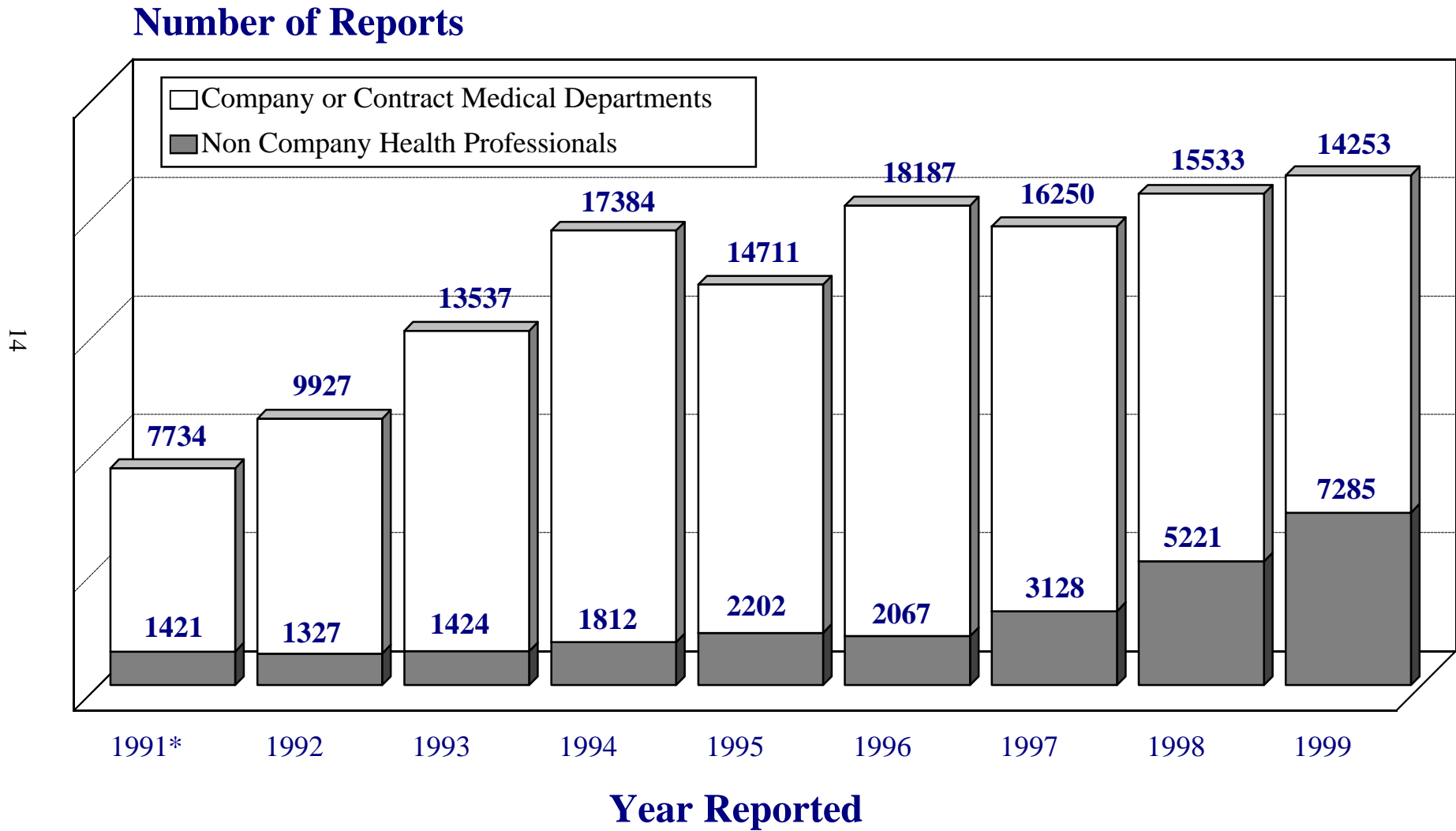
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Figure 1. Occupational Disease Reports to the Michigan Department of Consumer and Industry Services, 1985-1999



**Figure 2. Occupational Disease Reports by Reporting Source:
Non-Company Health Professionals and Company or
Contract Medical Departments, 1991-1999**



*Reporting source was unknown for 25 reports.

Figure 4. Number of Patients Discharged with Coal Workers' Pneumoconiosis, Asbestosis and Silicosis in Michigan: 1990-1998

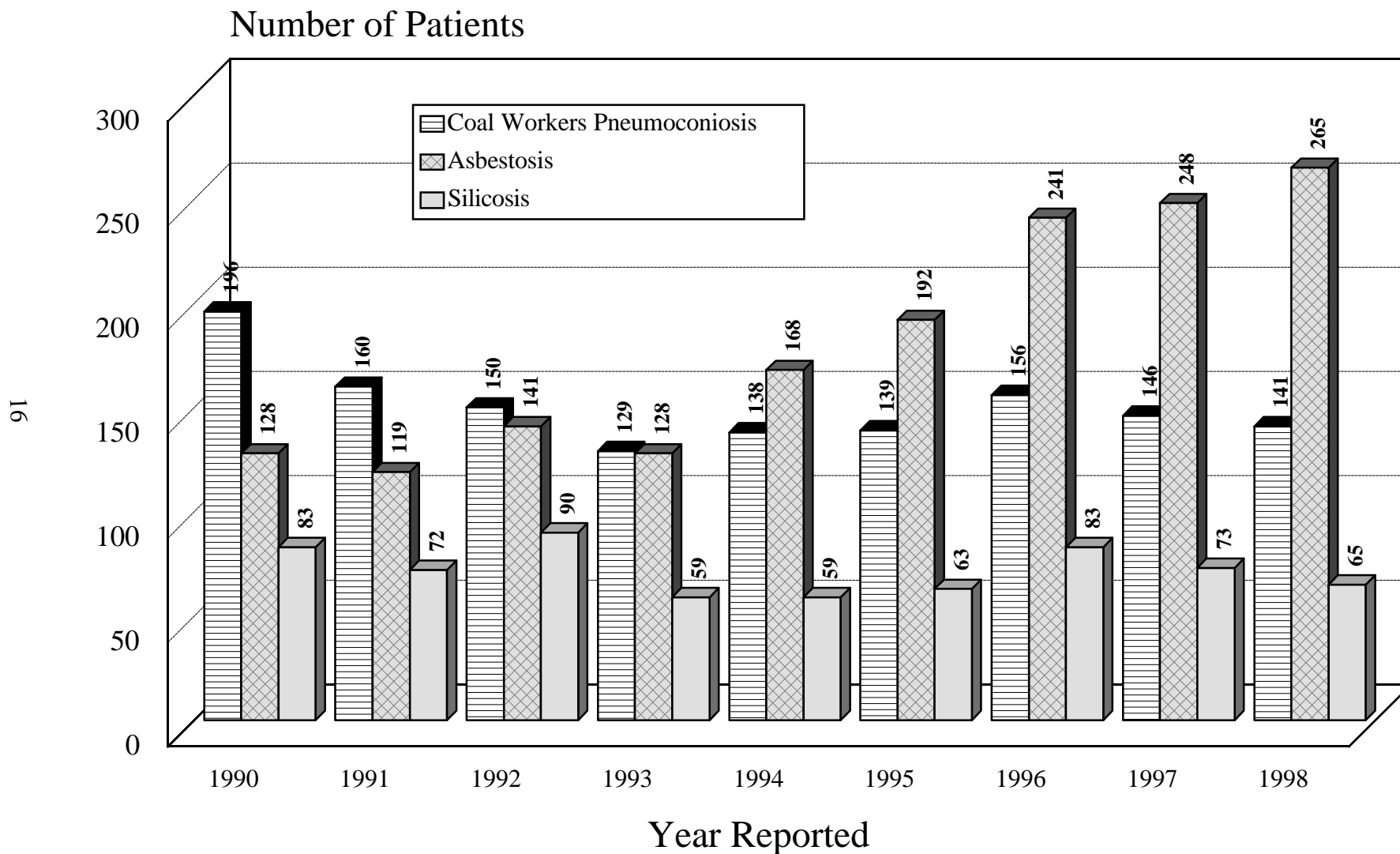
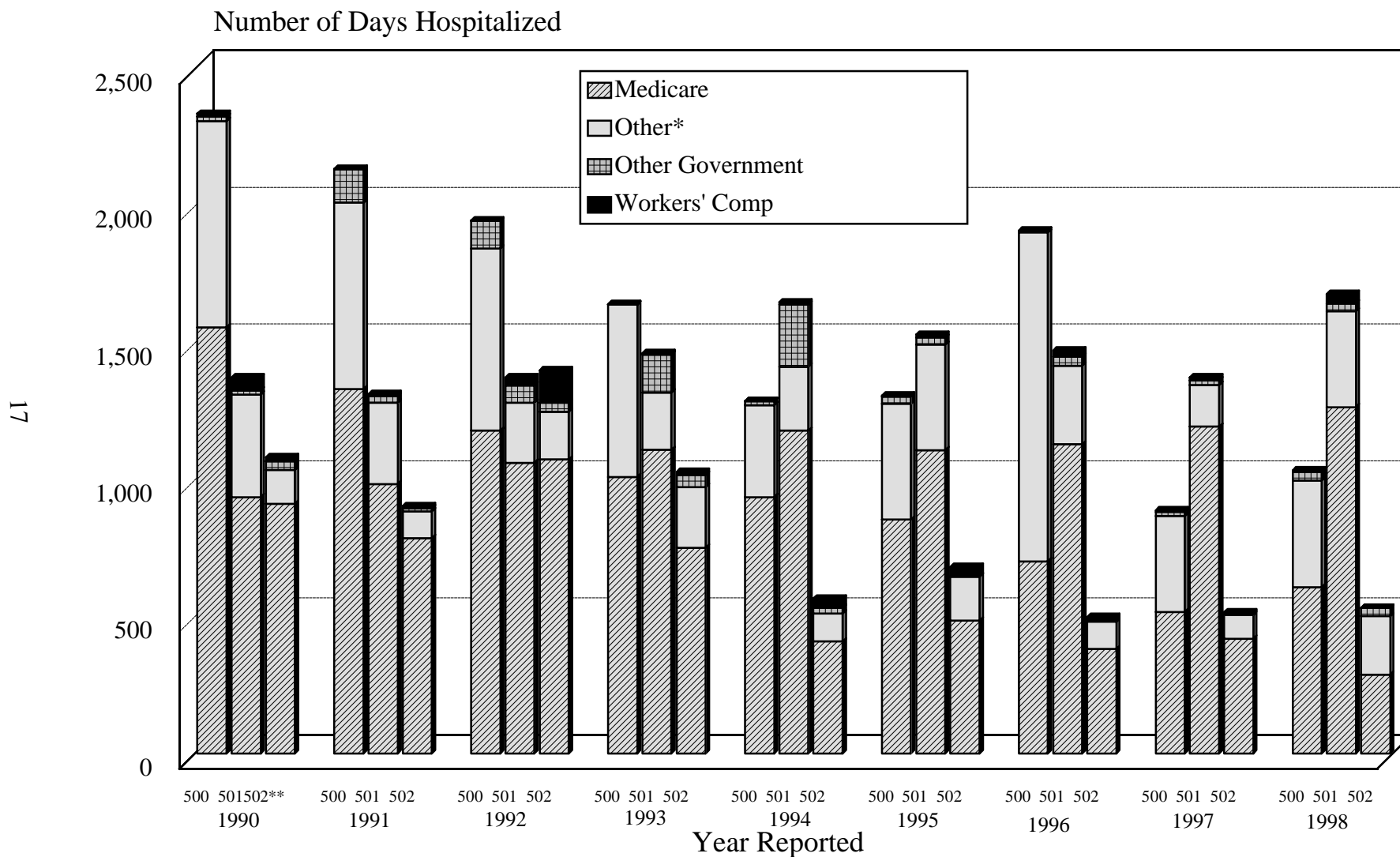


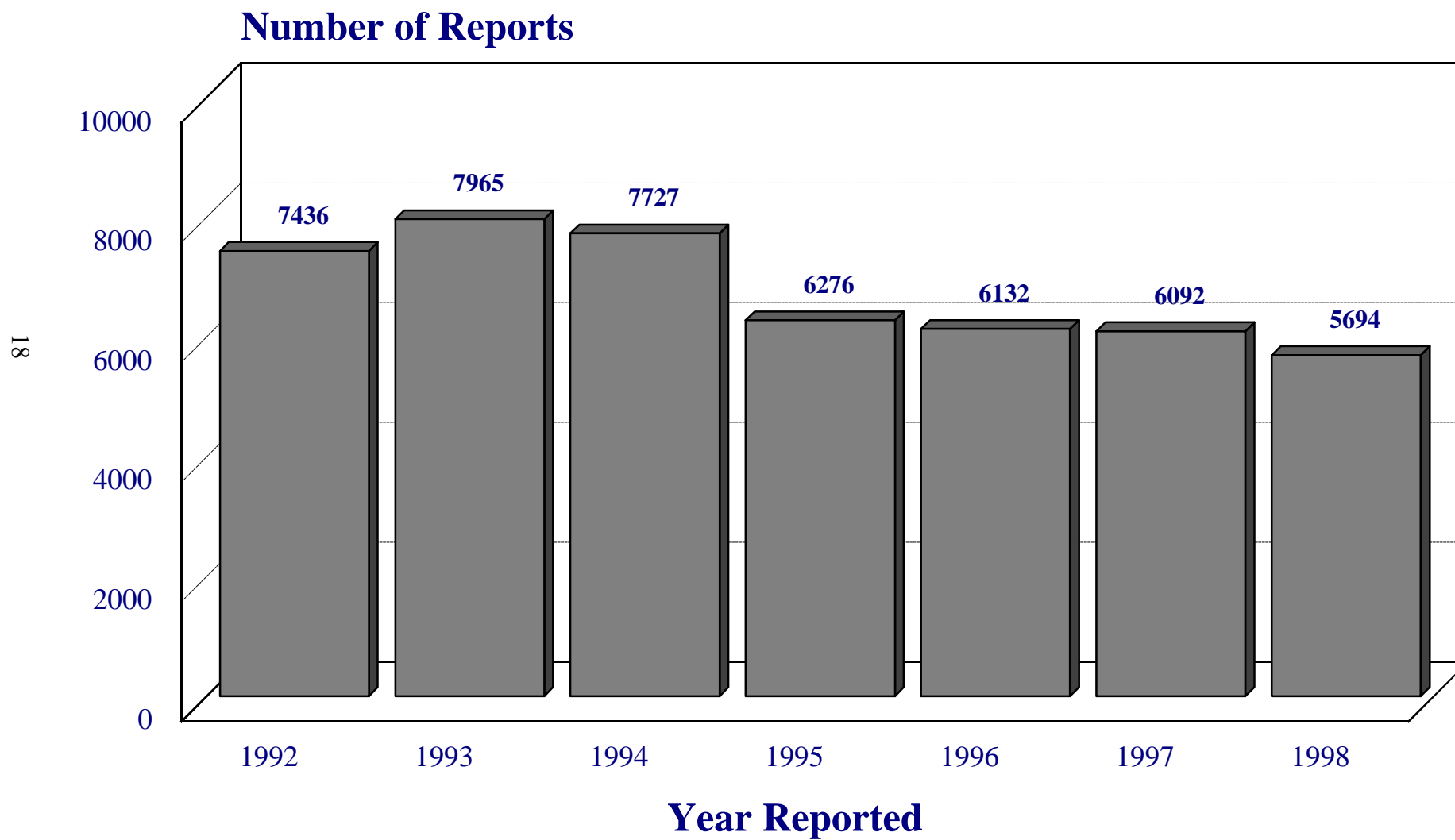
Figure 5. Number of Days Hospitalized by Payment Source for Coal Workers' Pneumoconiosis, Asbestosis and Silicosis in Michigan: 1990-1998



*"Other" includes Medicaid, HMOs, PPOs, Other Insurance, Self-Pay and No-Charge payment sources.

** Diagnosis Codes: 500 = Coal Workers' Pneumoconiosis; 501 = Asbestosis; 502 = Silicosis

Figure 6. Number of Hospitalizations Paid for by Workers' Compensation in Michigan: 1992-1998



**Figure 7. Percent of Total Michigan Hospitalizations Paid for
by Workers' Compensation: 1992-1998**

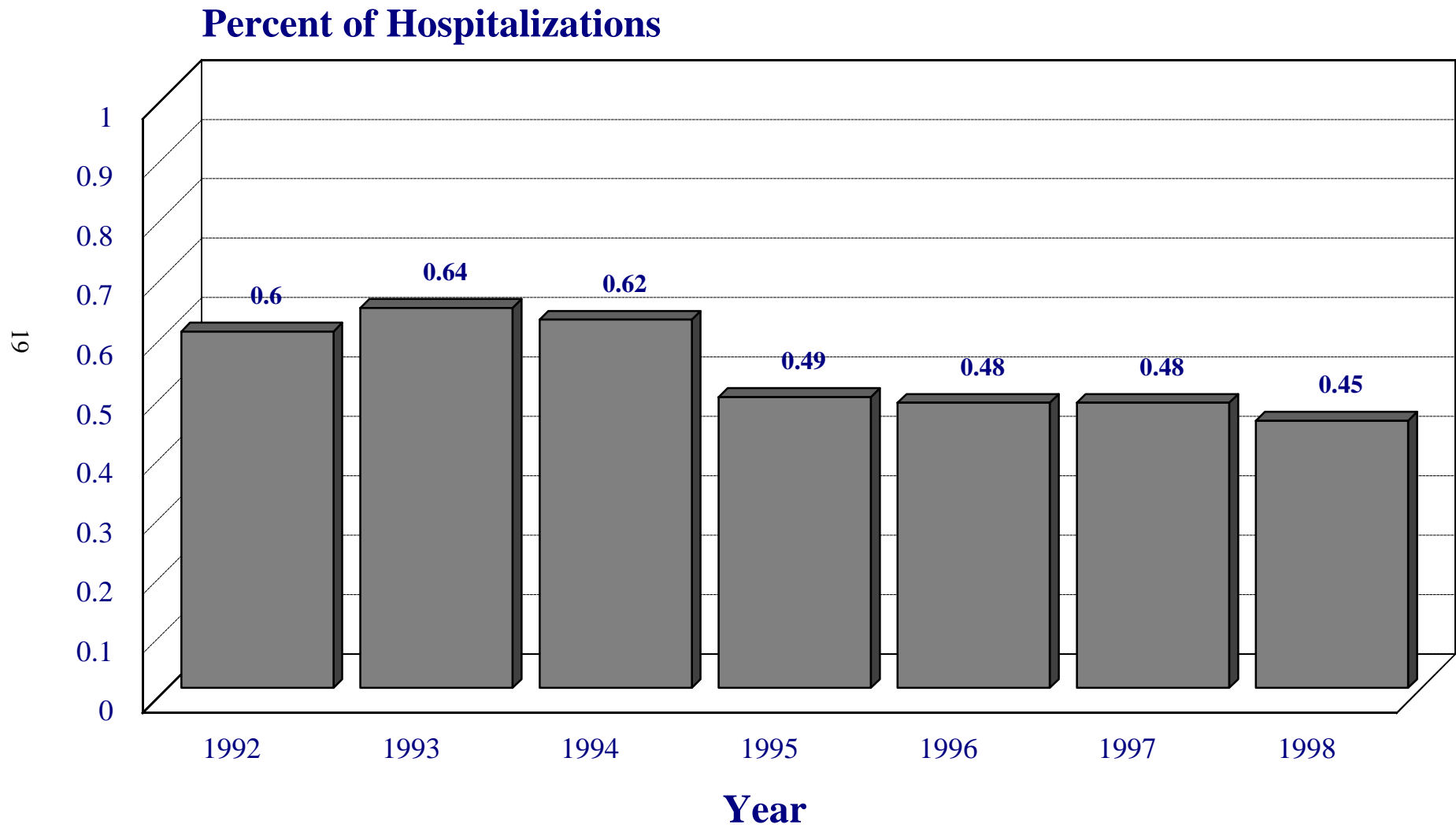


Figure 8. Asbestos-Related Cases Reported to the MDCIS: 1989-1999

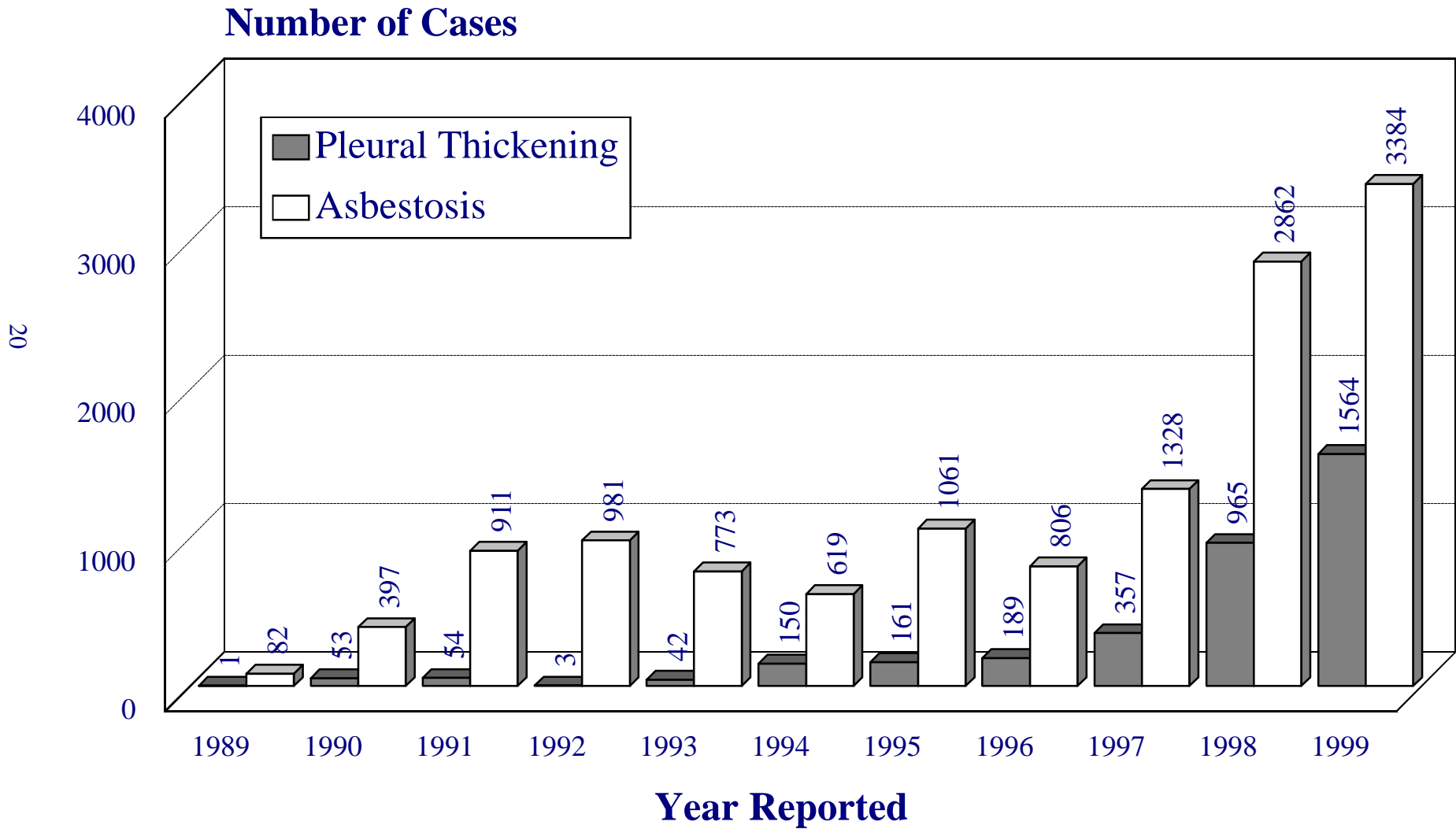


Figure 9. Number of Men and Women in Michigan Diagnosed with Mesothelioma: 1985-1996

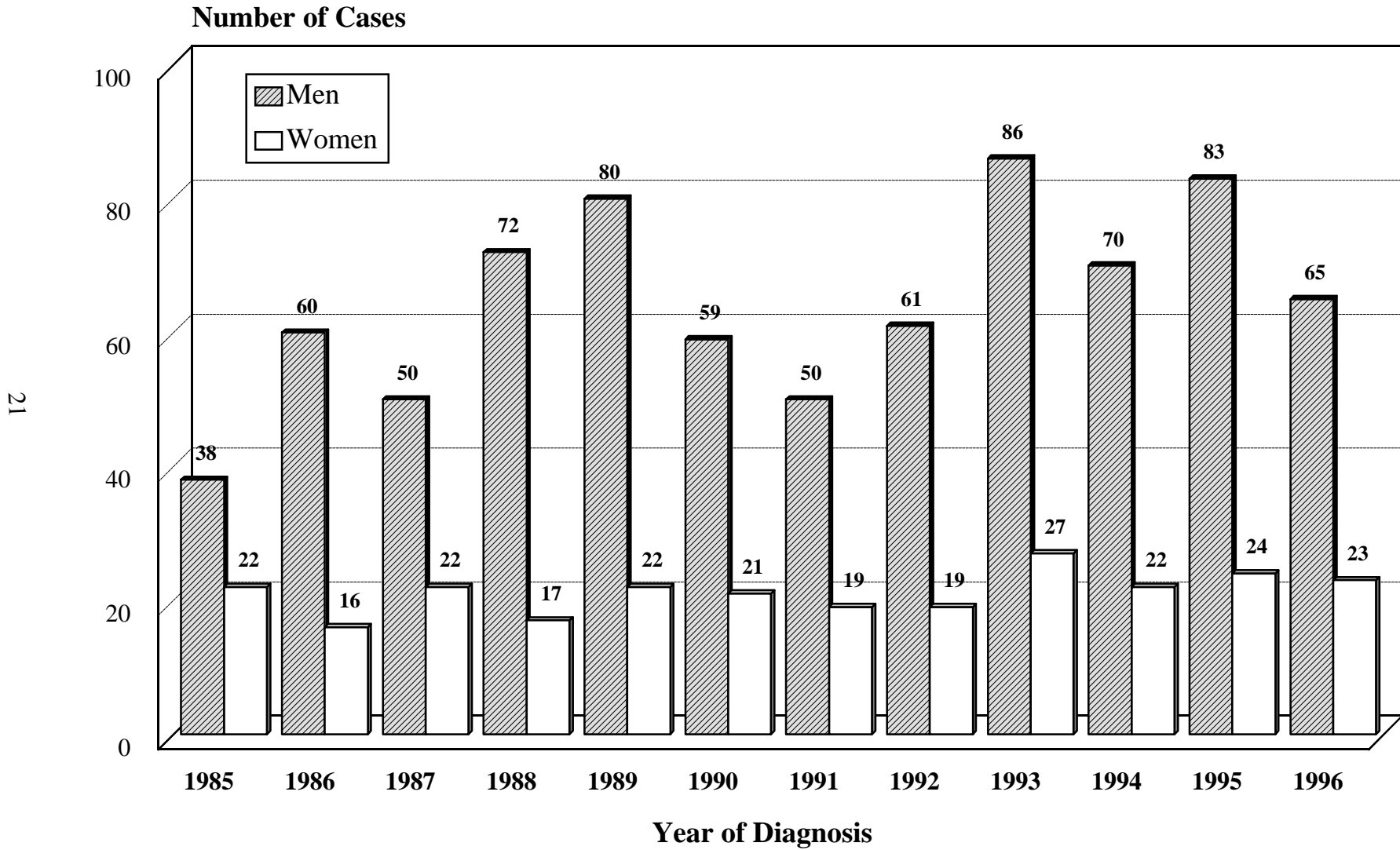


Figure 10. Number of Men and Women in Michigan Diagnosed with Mesothelioma, by Age at Diagnosis: 1985-1996

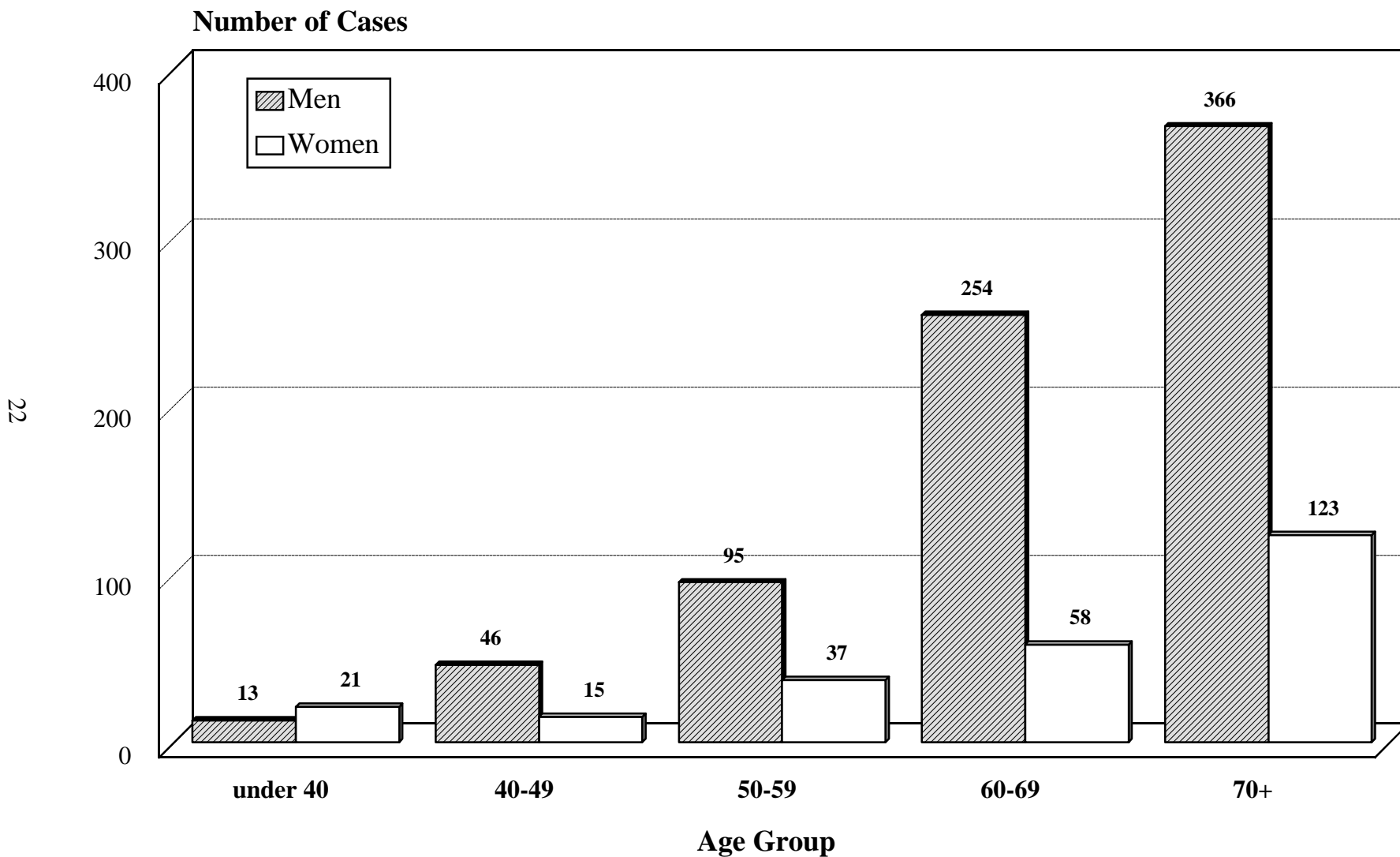


Figure 11. Distribution of Men Age 40 & Older Diagnosed with Mesothelioma in Michigan by County: 1985-1996

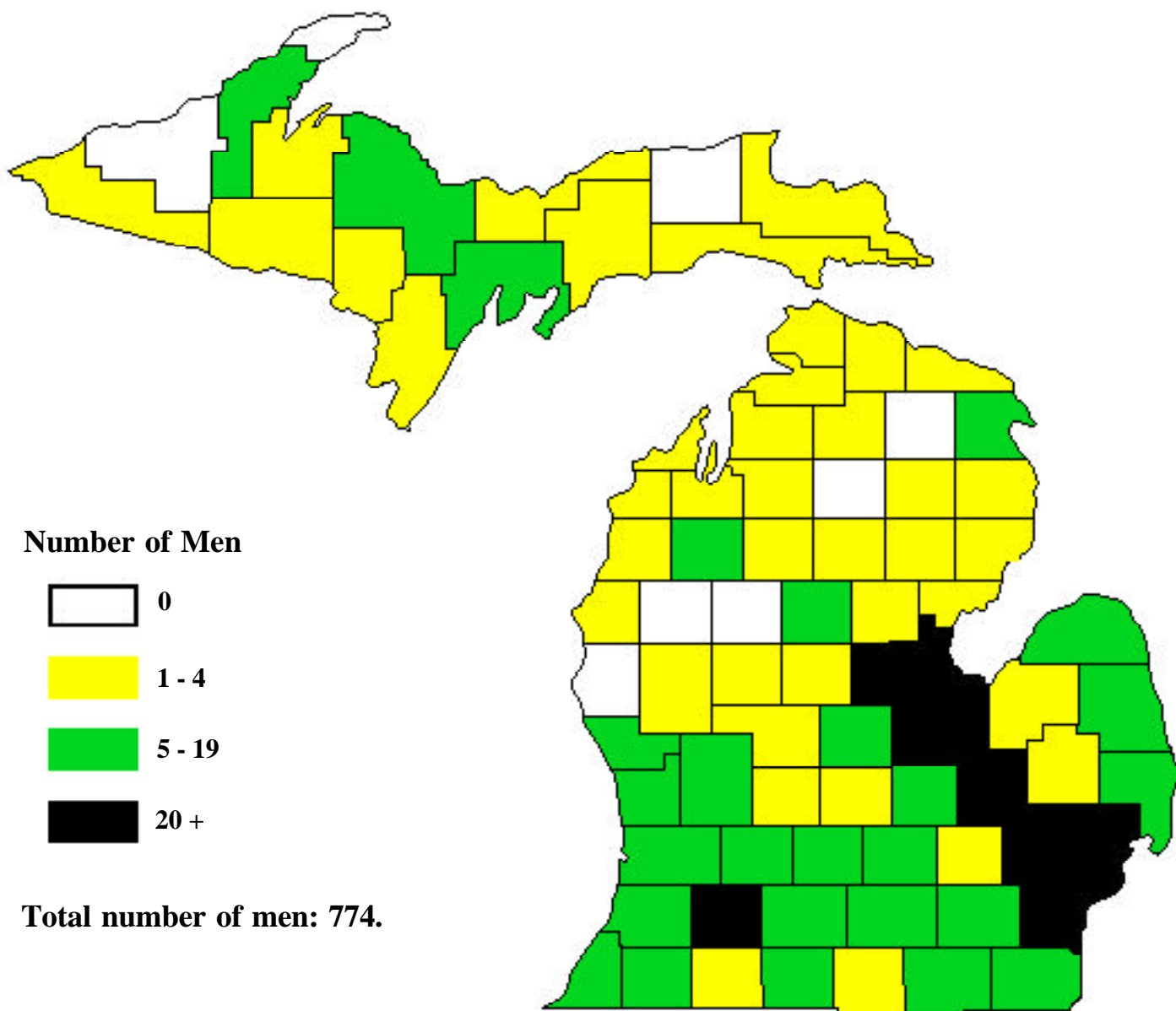


Figure 12. Distribution of Women Age 40 & Older Diagnosed with Mesothelioma in Michigan by County: 1985-1996

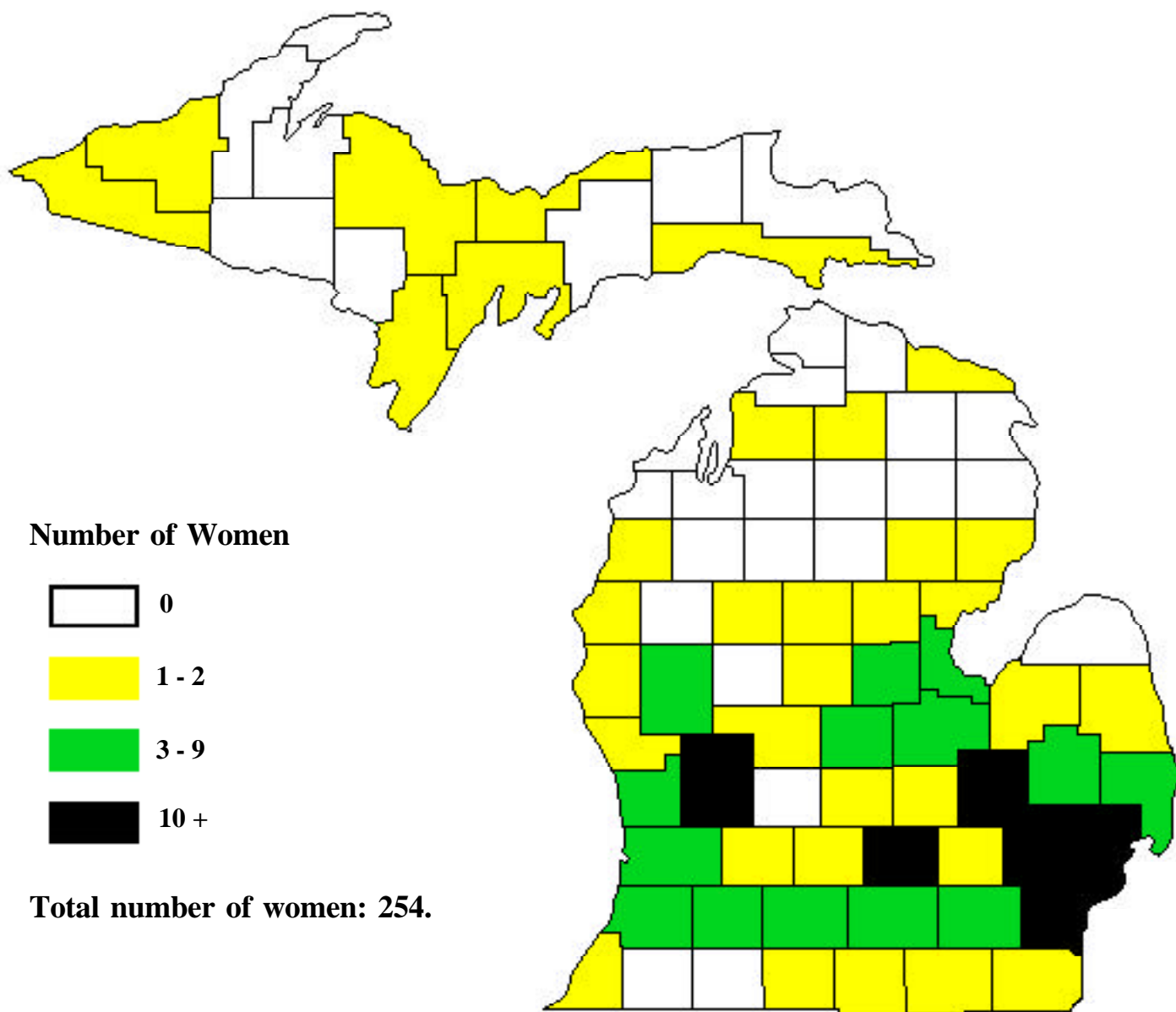
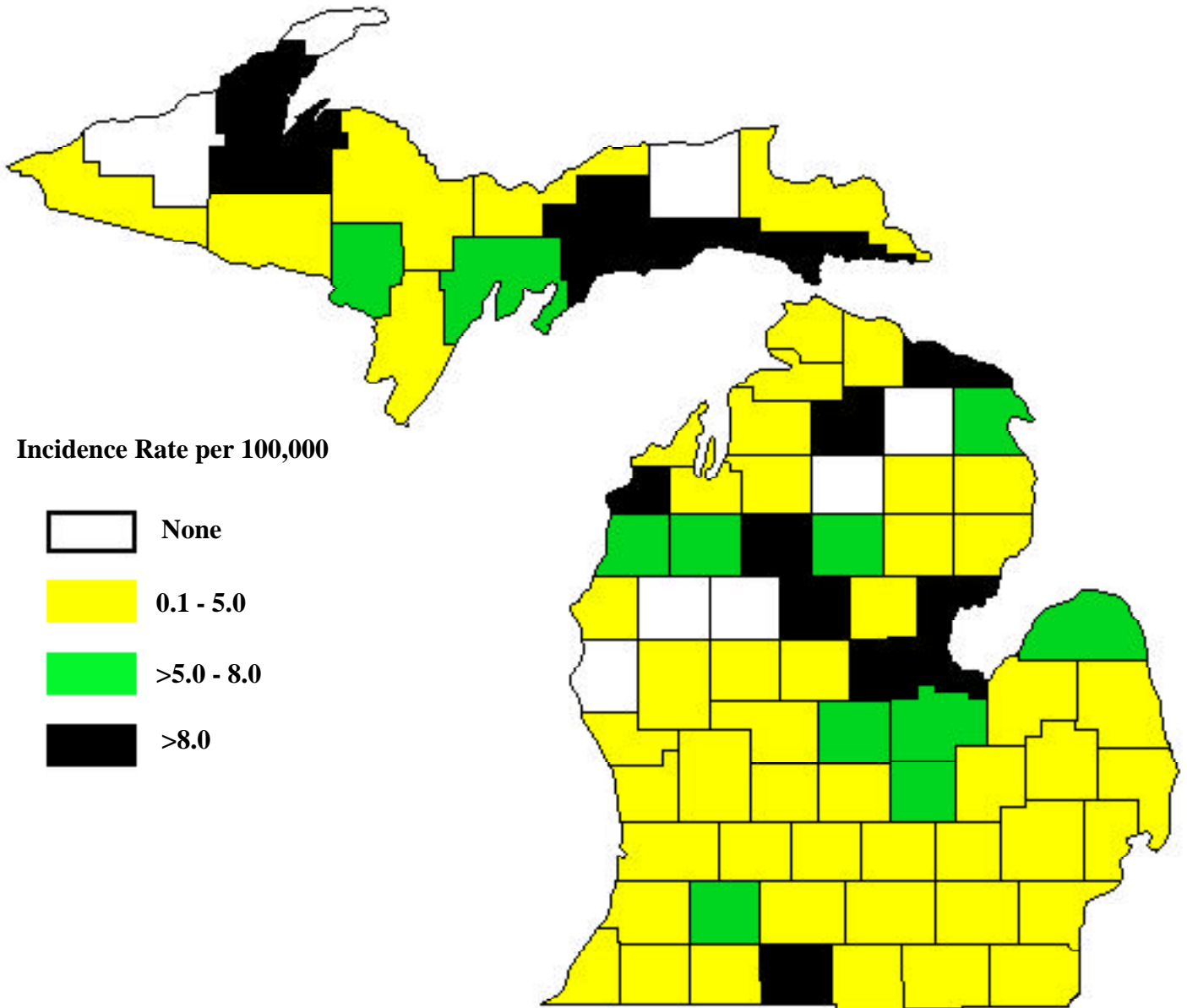
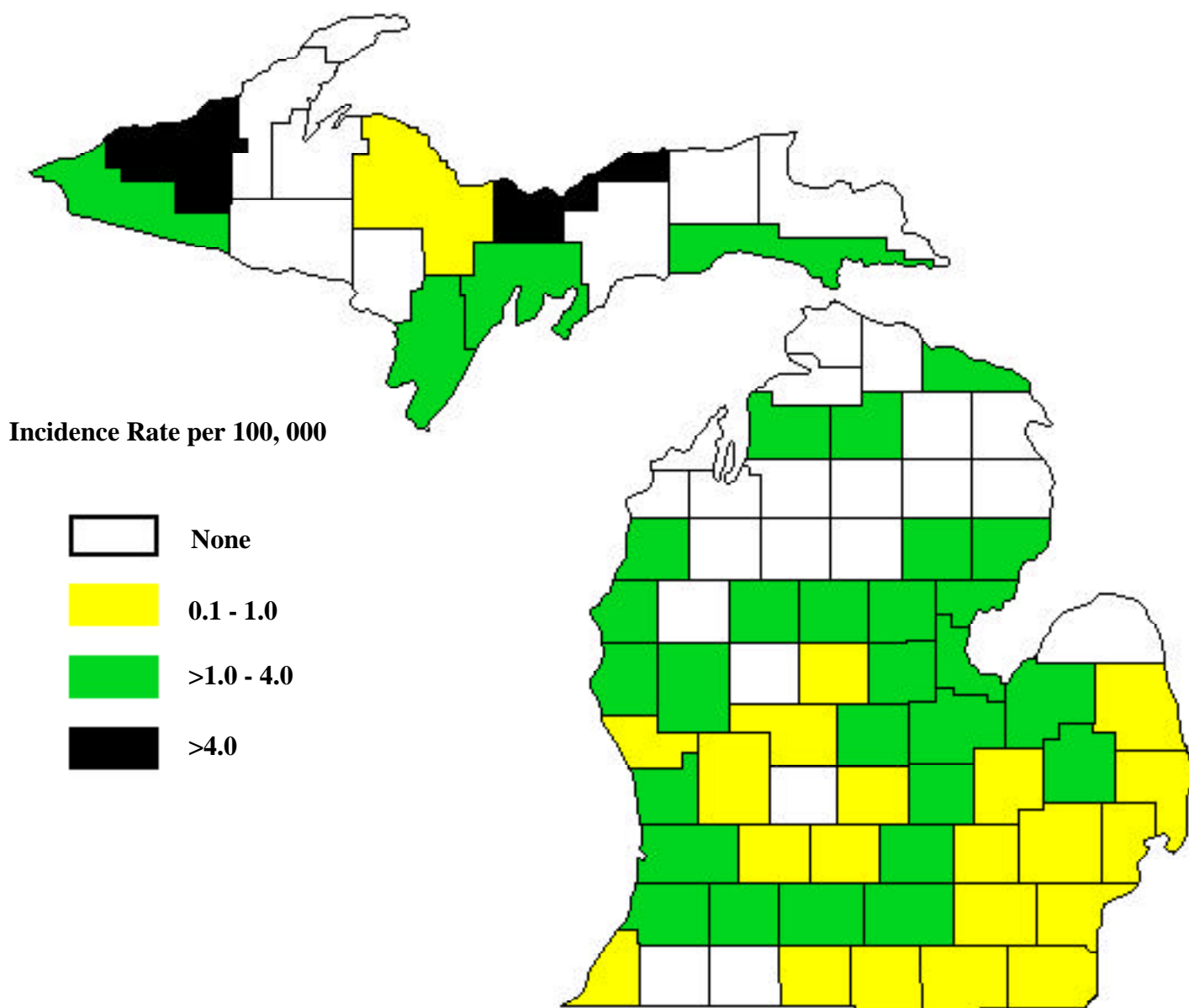


Figure 13. Average Annual Incidence Rates of Mesothelioma for Male Michigan Residents by County*



*Numerator is the average number of males age 40+ by county, diagnosed with mesothelioma from 1985-1996. Denominator is the average number of males age 40+ by county, from the Census Bureau for 1990-1996.

Figure 14. Annual Average Incidence Rates of Mesothelioma for Female Michigan Residents by County*



*Numerator is the average number of females age 40+ by county, diagnosed with mesothelioma from 1985-1996. Denominator is the average number of females age 40+ by county, from the Census Bureau for 1990-1996.

**Table 1. Number of Employees at Facilities Where an Occupational Illness Occurred
(By Reporting Source: Company vs. Non-Company Clinician)**

NUMBER OF EMPLOYEES	Reports from Non-Company Practitioners		Reports from Companies		Total Reports	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
<25	7	1.3	7	<0.1	14	0.1
25-100	19	3.5	23	0.2	42	0.3
100-500	53	9.8	45	0.3	98	0.7
>500	464	85.5	14,176	99.5	14,640	99.0
Total	543 ^a	100.1 ^b	14,251 ^c	100.0	14,794	100.1 ^b

a The number of employees was missing on 6742 reports.

b Percent does not add to 100 due to rounding.

c The number of employees was missing on 2 reports.

**Table 2. Number of Occupational Disease Reports Submitted by
Non-Company Health Practitioners**

Number of Reports	Health Practitioners		Number of Patients Represented
	Number	Percent	
1	180	(70.0)	180
2-5	47	(18.3)	114
6-10	14	(5.4)	116
11-20	2	(0.8)	24
21-40	6	(2.3)	165
41-100	4	(1.6)	279
101+	4	(1.6)	5415
Total ^a	257	(100.0)	6293

a 992 reports were submitted by a lab for lead poisoning. These are not included in the above statistics.

Table 3. Demographic Characteristics of Reported Occupational Disease Cases

	<i>Number of Reports</i>	<i>Percent of Reports</i>
AGE		
≤19	58	0.3
20-24	1087	5.3
25-29	2316	11.3
30-34	1969	9.6
35-39	1921	9.4
40-44	2647	13.0
45-49	2935	14.4
50-54	2341	11.5
55-59	1789	8.8
60-69	1933	9.5
70-79	1210	5.9
80+	211	1.0
Total	20,417 ^a	100
GENDER		
Male	15,655	72.8
Female	5,859	27.2
Total	21,514 ^b	100
RACE		
White	2573	68.3
African American	859	22.8
Hispanic	234	6.2
Other	100	2.7
Total	3766 ^c	100

aAge was missing on 1121 reports. Mean age = 45± 14 years.

bGender was missing on 24 reports.

cRace was missing on 17,772 reports.

Table 4. Number of Occupational Disease Reports by Disease Type and Reporting Source

DISEASE TYPE	Non-Company		Company		Total	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Infectious and Parasitic Diseases (ICD 001-139)	0	--	29	0.2	29	0.1
Neoplasms (ICD140-239)	72	1.0	1	<0.1	73	0.3
Mental Disorders (ICD 290-319)	0	--	575	4.0	575	2.7
Diseases of the Nervous System and Sense Organs (ICD 320-389)	857	11.8	1691	11.9	2548	11.8
Diseases of the Circulatory System (ICD 390-459)	0	--	3	<0.1	3	<0.1
Diseases of the Respiratory System (ICD 460-519)	5219	71.6	63	0.4	5282	24.5
Diseases of the Digestive System (ICD 520-579)	0	--	25	0.2	25	0.1
Diseases of the Skin and Subcutaneous Tissue (ICD 680-709)	45	0.6	1181	8.3	1226	5.7
Diseases of the Musculoskeletal System and Connective Tissue (ICD 710-739)	44	0.6	1419	10.0	1463	6.8
Symptoms, Signs and Ill-Defined Conditions (ICD 780-799)	41	0.6	411	2.9	452	2.1
Repetitive Trauma: Sprains and Strains (ICD 800-999 except ICD 940 & ICD 980-989)	12	0.2	8551	60.0	8563	39.8
Burn Confined to Eye (ICD 940)	0	--	111	0.8	111	0.5
Toxic Effects of Substances Chiefly Non-Medicinal (ICD 980-989)	995	13.7	193	1.4	1188	5.5
Total	7285	100.1^a	14,253	100.1^a	21,538	99.9^a

^aPercent does not add to 100 due to rounding.

Table 5. Number of Reports by Industry Type and Reporting Source

INDUSTRY TYPE	Non-Company		Company		Total	
	Number	Percent	Number	Percent	Number	Percent
Agricultural and Forestry Services (SIC 01,02,07,08)	14	0.4	0	--	14	0.1
Mining (SIC 10-14)	4	0.1	17	0.1	21	0.1
Construction (SIC 15-17)	449	13.7	0	--	449	2.6
Manufacturing (SIC 20-39)						
Food and Kindred Products (SIC 20)	7	0.2	99	0.7	106	0.6
Furniture (25)	9	0.3	253	1.8	262	1.5
Paper and Allied Products (SIC 26)	43	1.3	3	<0.1	46	0.3
Printing and Publishing (SIC 27)	12	0.4	4	<0.1	16	0.1
Chemicals and Allied Products (SIC 28)	24	0.7	111	0.8	135	0.8
Rubber and Misc. Plastics Products (SIC 30)	15	0.5	248	1.7	263	1.5
Stone, Clay, Glass & Concrete Products (SIC 32)	9	0.3	20	0.1	29	0.2
Primary Metal Industries (SIC 33)	1769	54.0	559	3.9	2328	13.3
Fabricated Metal Products (SIC 34)	171	5.2	1714	12.0	1885	10.8
Industrial & Commercial Machinery & Computer Equipment (SIC 35)	40	1.2	85	0.6	125	0.7
Electronic Equipment and Components (SIC 36)	10	0.3	734	5.2	744	4.2
Transportation Equipment (SIC 37)	178	5.4	9,986	70.1	10,164	58.0
Miscellaneous Manufacturing (SIC 24, 29, 38, 39)	114	3.5	1	<0.1	115	0.7
Transportation, Communications, Electric, Gas & Sanitary Services (SIC 40-49)	118	3.6	0	--	118	0.7
Wholesale and Retail Trade (SIC 50-59)	32	1.0	5	<0.1	37	0.2
Insurance & Real Estate (SIC 60-67)	3	0.1	0	--	3	<0.1
Services						
Hospitals (SIC 80)	35	1.1	375	2.6	410	2.3
Schools (SIC 82)	41	1.3	37	0.3	78	0.4
Misc. (SIC 70,72,73,75,76,79,83,86,87,)	105	3.2	0	--	105	0.6
Public Administration (SIC 90-97)	71	2.2	0	--	71	0.4
Total	3,273	100.0	14,251	100.0	17,524 ^a	100.1 ^b

^aType of industry was unknown in 4012 non-company reports and 2 company reports.

^bPercent does not add to 100 due to rounding

Table 6. Number of Occupational Disease Reports by Disease Type and Gender^a

DISEASE	Males	
	<i>Number</i>	<i>Per</i>
Infectious and Parasitic Diseases (ICD 001-139)	11	0
Neoplasms (ICD140-239)	73	0
Mental Disorders (ICD 290-319)	373	2
Diseases of the Nervous System and Sense Organs (ICD 320-389)	2082	1
Diseases of the Circulatory System (ICD 390-459)	1	<
Diseases of the Respiratory System (ICD 460-519)	5006	3
Diseases of the Digestive System (ICD 520-579)	24	0
Diseases of the Skin and Subcutaneous Tissue (ICD 680-709)	627	4
Diseases of the Musculoskeletal System and Connective Tissue (ICD 710-739)	835	5
Symptoms, Signs and Ill-Defined Conditions (ICD 780-799)	253	1
Repetitive Trauma Injuries (ICD 800-999 except ICD 940 and ICD 980-989)	5162	3
Burn Confined to Eye (ICD 940)	104	0
Toxic Effects of Substances Chiefly Non-Medicinal (ICD 980-989)	1104	7
Total^a	15,655	10

^aGender was missing on 24 reports.

^bPercent does not add to 100 due to rounding.

Table 7. Number of Reported Occupational Disease Fatalities

	<i>Number</i>	<i>Percent</i>
Fatal	86	0.4
Non-Fatal	21,452	99.6
Total	21,538	100

**Table 8. Comparison of 1990 MDCIS Workers' Disability Compensation Claims
and 1994 Occupational Illness Survey Data with
1992-1999 Occupational Disease Reports**

DISEASE CATEGORY	MDCIS Survey & Compensation Claims				MDCIS Occupational Disease Reports ^a							
	1994 Survey ^b		1990 Claims ^c		1992-1993		1994-1995		1996-1997		1998-1999	
	Number	Percent	Number	Percent	Mean Number ^d	Percent	Mean Number ^d	Percent	Mean Number ^d	Percent	Mean Number ^d	Percent
Occupational Skin Diseases or Disorders	6,336	12.2	372	4.2	776	6.0	1,034	5.9	1,405	7.3	1,307	9.3
Dust Diseases of the Lung	186	0.4	12	0.1	914	7.1	966	5.5	1,159	6.0	3,225	15.6
Respiratory Conditions Due to Toxic Agents	2,590	5.0	87	1.0	290	2.3	570	3.0	799	4.1	1,481	7.2
Poisoning	765	1.5	403	4.6	207	1.6	315	1.8	631	3.3	1,120	5.4
Disorders Due to Physical Agents	1,944	3.7	80	0.9	469	3.6	419	2.4	414	2.1	328	1.6
Disorders Due to Repeated Trauma	36,994	71.0	3,425	38.7	7,151	55.8	10,601	60.3	11,293	58.3	9,644	46.8
All Other Occupational Illnesses	3,283	6.3	4,475	50.5	2,972	23.2	3,680	20.9	3,668	18.9	3,541	17.2
Number of Reports Per Year	52,098		8,851		12,779 ^e		17,585		19,369		20,644	

aCounts published in previous years' OD reports for 1992-1997 have been corrected here.
b1994 is the last year this report was generated. Combines public and private sector reports.
c1990 is the last year this report was generated.
dNumber of reports *per year* (averaged over the 2 years)
eType of occupational disease was missing on 97 reports

**Table 9. Primary Diagnosis of Workers' Compensation Hospitalizations
in Michigan 1992 - 1998^a**

PRIMARY DIAGNOSIS	1992-1993		1994-1995		1996-1997		1998	
	Mean Number ^b	Percent	Mean Number ^b	Percent	Mean Number ^b	Percent	Number	Percent
Infectious & Parasitic Diseases (001-139)	21	0.3	43	0.6	58	1.0	16	0.3
Neoplasms (140-239)	30	0.4	15	0.2	15	0.2	18	0.3
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders (240-279)	31	0.4	26	0.4	15	0.2	26	0.5
Diseases of the Blood & Blood Forming Organs (280-289)	7	0.1	5	0.1	7	0.1	12	0.2
Mental Disorders (290-319)	124	1.6	97	1.4	61	1.0	54	0.9
Diseases of the Nervous System & Sense Organs (320-389)	220	2.9	185	2.6	111	1.8	96	1.7
Diseases of the Circulatory System (390-459)	215	2.8	185	2.6	173	2.8	150	2.6
Diseases of the Respiratory System (460-519)	103	1.3	78	1.1	68	1.1	69	1.2
Diseases of the Digestive System (520-579)	167	2.2	139	2.0	116	1.9	103	1.8
Diseases of the Genitourinary System (580-629)	68	0.9	45	0.6	40	0.7	25	0.4
Complications of Pregnancy, Childbirth, & the Puerperium (630-676)	65	0.9	25	0.4	37	0.6	61	1.1
Diseases of the Skin & Subcutaneous Tissue (680-709)	199	2.6	249	3.6	210	3.4	189	3.3
Diseases of the Musculoskeletal System & Connective Tissue (710-739)	3251	42.5	2866	41.0	2499	40.9	2325	40.9
Congenital Anomalies (740-759)	37	0.5	24	0.3	17	0.3	9	0.2
Conditions Originating in the Perinatal Period (760-779)	1	<0.1	1	<0.1	1	<0.1	1	<0.1
Symptoms, Signs, and Ill-Defined Conditions (780-799)	100	1.3	108	1.5	105	1.7	78	1.4
Injury & Poisoning (800-999)	2750	35.6	2719	38.9	2435	39.9	2244	39.4
V Codes	286	3.7	183	2.6	139	2.3	215	3.8
Total	7645	100	6993	100	6105	100	5691	100

^aPrincipal diagnosis was unknown for 14 cases in 92-93, 17 cases in 94-95, 14 cases in 96-97 and 3 cases in 1998.

^bNumber of cases per year averaged over the 2 years

**Table 10. Demographic Characteristics of Hospitalizations
Paid for by Workers' Compensation
in Michigan 1992 - 1998^a**

	1992 -1993		1994-1995		1996-1997		1998	
	<i>Mean Number^b</i>	<i>Percent</i>	<i>Mean Number^b</i>	<i>Percent</i>	<i>Mean Number^b</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
GENDER								
Male	5698	74.0	5343	61.7	4687	76.7	4281	75.2
Female	2002	26.0	1659	38.3	1425	23.3	1413	24.8
Total	7700	100	7002	100	6112	100	5694	100
RACE								
White	5733	85.7	4876	86.1	3644	84.4	3334	84.6
African American	565	8.4	526	9.3	439	10.2	433	11.0
Asian	5	0.1	14	0.2	6	0.1	15	0.4
American Indian	1	<0.1	2	<0.1	8	0.2	13	0.3
Hispanic	36	0.5	47	0.8	32	0.8	40	1.0
Other	353	5.3	197	3.5	169	3.9	104	2.6
Total	6693	100	5662	100	4298	100	3939	99.9 ^c
AGE								
<15	56	0.7	41	0.6	11	0.2	56	1.0
15-19	151	2.0	148	2.1	94	1.5	121	2.1
20-29	1301	17.2	1081	15.5	873	14.3	760	13.3
30-39	2321	30.6	2054	29.4	1740	28.6	1563	27.4
40-49	1880	24.8	1826	26.1	1743	28.6	1695	29.8
50-59	1237	16.3	1258	18.0	1147	18.8	1035	18.2
60-69	487	6.4	455	6.5	385	6.3	345	6.1
70-79	112	1.5	101	1.4	87	1.4	109	1.9
80+	34	0.4	28	0.4	13	0.2	10	0.2
Total	7579	100	6992	100	6093	100	5694	100

a Gender, Race and Age were not reported for all hospitalizations.

b Number of hospitalizations per year averaged over the 2 years.

c Percent does not add to 100 due to rounding.

APPENDIX A

Chronic Occupational Diseases

Multiple reports for an individual patient with one of the following diseases may be submitted within and across years, but only one of these submissions is counted in our statistics.

<u>ICD-9 Code</u>	<u>Description</u>
011	Pulmonary Tuberculosis
015	Tuberculosis of the bones and joints
135	Sarcoidosis
137	Tuberculosis , Late Effects of
140-239	Neoplasms (Cancers)
250-259	Diseases of Other Endocrine Glands
260-269	Nutritional Deficiencies
270-279	Metabolic and Immunity Disorders Except 276, Dehydration
280-289	Disease of the Blood and Blood Forming Organs
290-319	Mental Disorders Except 308:Acute Reaction to Stress, and 309: Adjustment Reaction
320-340	Selected Diseases of the Nervous System and Sense Organs
388-389	Disorders of the Ear: Noise Induce Hearing Loss, Tinnitus
390-409	Selected Diseases of the Circulatory System
491-505	Selected Diseases of the Respiratory System
509	Pleural Plaques with no parenchymal abnormality marked on the ILO Form
515	Interstitial Lung Disease, Pulmonary Fibrosis
517	Connective Tissue Lung Disease
520-579	Diseases of the Digestive System
580-629	Diseases of the Genitourinary System