2007

Annual Summary of Occupational Disease Reports to the Michigan Department of Labor and Economic Growth

Summary of 2007 Occupational Disease Reports to the Michigan Department of Labor and Economic Growth

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SUMMARY

There were 11,240 occupational disease (OD) reports submitted to the Michigan Department of Labor and Economic Growth (MDLEG) in calendar year 2007 as required under the Michigan Occupational Disease Reporting Law. These reports were submitted by company medical departments or clinics under contract to companies to provide occupational health services to their employees, as well as health practitioners not providing services to companies. The percentage of reports received that were submitted from company medical departments or clinics under contract has decreased from 84-91% in the early 1990s to approximately 60-70% in the last six years.

The most frequent types of reports were of repetitive trauma (35%), diseases of the nervous system and sense organs (17%), toxic effects of substances (17%), and musculoskeletal disease (14%). The number of reports submitted in 2007 is much lower than the number of reports received from 1994-2001. Since 1999, there has been a downward trend of reporting; 21,538 reports were received in 1999 versus 11,240 reports received in 2007. This could represent an actual reduction in occupational diseases occurring in the state or poorer compliance with the reporting law. To address this issue, two mailings were sent to approximately 300 occupational health clinics in the state, in June and October of 2005. The mailings were to remind the clinics of the requirements of the Occupational Disease Reporting Law. Initial efforts have increased reporting by clinics from 21 to 50 clinics. A third mailing was completed in August 2008. Site visits to non-reporting clinics are planned in 2009 as part of this new initiative to enforce the requirement to report.

Companies tend to report different types of illnesses than non-company associated health practitioners. For example, there were 974 (29%) reports from non-company providers for respiratory diseases while only 142 (2%) such reports were received from employer-associated providers (Table 4).

The average age of individuals reported was 46 years, ranging from 15 to 98. Seventy-one percent of individuals reported were between the ages of 25 and 54. Sixty-four percent of all reports submitted were for male workers.

There were differences in the types of reports received through the OD reporting system compared to illnesses identified through either the Bureau of Labor Statistics' Annual Survey of a sample of employers or the Michigan Workers' Compensation Agency (Table 8). The OD reporting system had much higher percentages of illnesses from poisonings and dust diseases of the lung than the other two reporting systems. Reliance on multiple reporting systems presents a more complete picture of the spectrum of work-related illnesses in our state.

Beginning in 1997, Michigan laboratories were required to report blood lead levels; beginning in 2005, the labs were also required to report blood and urine levels of arsenic, cadmium and mercury, as well as plasma and red cell cholinesterase levels. In 2002, Michigan's two Poison Control Centers began to submit work-related reports; there were 1,133 reports received from these Centers in 2007. Given the complementary nature of all the existing programs, we are able to combine data across systems to better characterize and understand the extent and distribution of individuals who become sick and injured at work. This is an essential first step in reducing the burden of these preventable injuries and illnesses in our state. A previous publication of ours highlighted the potential incompleteness of the official statistics on occupational injuries and illnesses. The official statistics are based solely on reporting from employers. Our study indicated that the true occurrence of occupational injuries and illnesses may be undercounted by as much as two-thirds.[1] For 2007, the most recent year available, the Bureau of Labor and Statistics (BLS) survey reported 162,500 occupational injuries and illnesses in Michigan. If this represents only one-third of the true number of occurrences, then one would estimate almost 500,000 occupational injuries and illnesses in Michigan in 2007.

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. Reports are now submitted to the Michigan Department of Labor and Economic Growth (formerly the Michigan Department of Consumer and Industry Services). During the initial years after the reporting law was enacted, the number of reports received 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 began, with active solicitation of occupational disease reports. MDLEG designates the Michigan State University's College of Human Medicine, Occupational and Environmental Medicine Division as its bona fide agent to compile and analyze the occupational disease reports.

Figure 1 is a copy of the Known or Suspected Occupational Disease Report form submitted to MDLEG by company-associated and non-company associated health care providers. The form requests medical and demographic information on the affected employee and information about the facility at which the employee became ill. In 1991, computerization of the OD reports began, to allow a more efficient handling of the high volume of reports submitted and facilitating the use of these reports to direct surveillance, intervention and prevention. This is the sixteenth annual report on occupational diseases in Michigan, and is based upon the reports submitted to the MDLEG in calendar year 2007.

On-line occupational disease reporting has been available since 2001 through the Michigan State University Occupational and Environmental Medicine website: www.oem.msu.edu. A secure server is used to maintain the confidentiality of the information submitted on-line. The ability to submit audiogram results was added to on-line reporting in 2003, for cases of occupational noise-induced hearing loss. The health professional electronically submitting occupational disease reports is first given a choice between submitting an occupational disease report for hearing loss or for any other illness. If hearing loss is selected, the user is directed to a screen to report the standard occupational disease report information. Next, the user is asked whether audiogram results will be submitted electronically or via fax or mail. If submitted electronically, a screen to enter audiogram results can be used to report right and left ear hearing thresholds ranging from 250 Hz to 8000 Hz.

In addition to completing the OD report form (Figure 1) on-line, information can be submitted by:

*Email: ODReport@msu.edu
*Fax: (517) 432-3606
*Phone-in: 1-800-446-7805
*Request postage paid envelopes: 1-800-446-7805

*Mail directly to: MDLEG, MIOSHA
Management & Technical Services Division
7150 Harris Drive, PO Box 30649
Lansing, MI 48909-8149

METHODS

The computerized OD records contain: 1) the 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 an assigned standard industrial classification code (SIC)[2] for each facility; 3) details of the illness, including diagnosis date, suspected causative agent(s), whether the employee died, and an assigned diagnosis or clinical impression coded according to the International Classification of Diseases (ICD-9th Revision[3]); and 4) information about the individual who submitted the report, including whether the reporter is employed by the company, an outside medical department contracted by the company, or a private practice health professional. Beginning in 2008, the company's type of industry will be coded to the 2007 North American Industry Classification System-United States (NAICS)

scheme in lieu of the 1987 SIC coding scheme.

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 in Michigan), the two Michigan Poison Control Centers and the Federal Mine Safety and Health Administration. Additional reports are generated through annual review of death certificates, the Michigan Health and Hospital Association inpatient database, and the Michigan Cancer Registry (for cases of mesothelioma).

Since October 11, 1997, all clinical laboratories doing business in Michigan have been required to report all blood lead analysis results for both adults and children, to the Michigan Department of Community Health. The blood lead results of 10 μg/dL or greater for adults are incorporated into the OD reports submitted each year to the MDLEG. Many of the adults reported through this system have had blood lead testing as part of their company's monitoring program. However, it is the clinical laboratories that actually submit the results to the state, not the employers. Aside from the clinical laboratory reports, employers themselves almost never submit an elevated blood lead level report to the MDLEG, even though they would be required to do so under the Michigan Occupational Disease Reporting Law. In light of this, blood lead reports submitted by the clinical laboratories are all considered as non-company reports, even though the company may have initially ordered the blood lead test.

In 2004, we began counting each individual one time regardless of the number of blood lead tests he or she may have had throughout the year. Prior to 2004, if an individual had multiple blood lead tests performed throughout the year, and they were all reported to the state, each of those reports was counted in the year's statistics.

Beginning in 2005, regulations requiring laboratories to report arsenic, cadmium, mercury and cholinesterase testing went into effect. Procedures to handle these reports were developed in 2005. Seven work-related elevations of mercury, six work-related elevations of arsenic and 15 work-related elevations of cadmium have been identified since the establishment of these new regulations. In addition, there have been 37 reports of cases with a 20% or greater decrease in cholinesterase levels and a work place exposure to organophosphate pesticides.

Collection of information on work-related illnesses from Michigan's two Poison Control Centers (PCC) began in 2002. On a monthly basis, the work-related reports are incorporated into the occupational disease reporting database. In 2007, for example, 1,133 (1.3%) of the 84,529 human exposure-related PCC calls were related to occupational exposures.

More than one report on a given individual with different work-related diseases may be submitted to the MDLEG 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. 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 11,240 occupational disease reports were submitted to the MDLEG in calendar year 2007. Figure 2 shows the number of reports received each year since 1985.

Source of Reports

Company or contract medical departments submitted 70% of the reports (7,922 cases); non-company associated health practitioners submitted 30% of the reports (3,318 cases) (Figure 3). Most reports were submitted on individuals who worked in large companies (Table 1) with 89% of the 8,871 reports that listed company size coming from businesses with > 500 employees. A greater proportion of reports for companies with 500 or fewer employees come from non-company health practitioners. Just over 38% of the 1,185 reports with known company size that were submitted by non-company practitioners involved companies with < 500 employees, while about six percent of the 7,686 reports with known company size submitted by company practitioners involved facilities with < 500 employees.

Two hundred eighty-five non-company associated clinicians reported 1,438 incidents of occupational disease. Two hundred four non-company affiliated health care providers were responsible for identifying 737 reports of lead poisoning. In addition, the two Michigan Poison Control Centers reported 1,133 incidents of work-related poisonings. Two hundred thirty-seven (83%) of the clinicians reported only one patient each in calendar year 2007 (Table 2); four clinicians reported more than 100 patients each. The number of reports submitted by these four clinicians in the year 2007 ranged from 132 to 362. One of the clinicians is certified to interpret chest x-rays for dust-related lung disease ("B" readers), and two are occupational medicine physicians in private practice. 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 four years. Currently, there are nine Michigan physicians who are "B" readers.

There are approximately 300 occupational health clinics in Michigan. Since June 2005, the number of such clinics reporting occupational disease cases to the State has increased from 21 to 50. With the planned site visits to non-reporting clinics in future years, we expect the number of reporting clinics to increase.

Demographics

Table 3 shows the age, gender and race distribution of the workers with occupational diseases reported in the year 2007. The mean age of reported patients was 46 ± 13 years (range, 15 to 98 years) with over two-thirds of the patients (71%) between the ages of 25 and 54 years. One hundred nine reports were submitted for patients under age 20, and 77 reports were submitted for patients age 80 and older.

Sixty-four percent of all reports submitted were for male workers. Seventy-four percent of the submitted reports (8,353 cases) did not indicate the worker's race. Of the 2,887 reports that did indicate race, 44% were Caucasian, 35% were African American, 3% were Hispanic and 18% were listed as "other."

Younger workers. Of the 62 workers age 18 and younger, five were 15 years old, nine were 16 years old, 18 were 17 years of age, and 30 were 18 years old. Seventeen (27%) of the reported patients under age 19 were female and 45 (73%) were male. One of the younger workers was employed in the educational services industry, and one worked in manufacturing. Place of employment was unknown for 60 workers.

One of the younger workers was reported by a company-affiliated clinician or clinic. Fifty workers were reported for chemical poisonings (from the Poison Control Centers), five were for respiratory symptoms, three were for an elevated blood lead level (serum lead levels were between 10 and 30 micrograms per deciliter), two were for cumulative trauma-related conditions, and one each was for dermatitis and carbon monoxide poisoning. Three fatalities under the age of 19 from an acute traumatic injury were identified through a review of 2007 death certificates; these deaths are accounted

for in a separate Michigan reporting system for acute work-related fatalities.

Older workers. Of the 77 workers age eighty and older, 71 (92%) were between the ages of 80 and 89, and six were between 90 and 98 years of age. Seventy-four were men and three were women. Twenty-nine of the older patients worked in or were retired from manufacturing, nine worked in construction, nine worked in the transportation industry, four worked in the services industry, and two worked for the railroad. Industry or former industry was not indicated in 24 reports.

A company-affiliated clinician or contract medical clinic reported one of the patients. Forty-four of the older workers were reported for dust-related lung disease (including 34 with asbestosis, one with pleural thickening, seven with silicosis, and two for pneumoconiosis, unspecified), 13 for cancer, 10 for noise-induced hearing loss, seven for elevated blood lead levels (serum lead levels were between 10 and 28 micrograms per deciliter), two for respiratory conditions, and one for a repetitive trauma condition.

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 were the most frequently reported conditions, with 3,948 cases representing 35% of all OD reports submitted. The majority of those reports were for sprains and strains of the wrist, hand and/or finger.

Toxic effects of substances (poisonings) were the second most frequently reported conditions, with 1,890 cases representing 17% of all reports. Diseases of the nervous system and sense organs were the third most frequently reported condition, representing 1,879 (17%) of the cases. Musculoskeletal diseases were the fourth most frequently reported condition, with 1,538 cases representing 14% of all reports submitted. There were 1,116 (10%) reports of respiratory conditions, 255 (2%) reports of ill-defined disease, 232 (2%) reports of skin disorders, and 141 (1%) reports of mental disorders. Less frequently reported conditions included infectious and parasitic diseases, diseases of the digestive system, welding flash (burns to the eye), and diseases of the circulatory system.

Reporting source differences. Company and non-company affiliated providers differ markedly in the types of occupational diseases reported (Table 4). Fifty percent of reports from company health care providers are of repetitive trauma illnesses, while less than one percent of reports by non-company providers represent these diagnoses. Conversely, 57% of non-company reports are of toxic effects of substances (poisonings), compared to less than one percent of company submissions. The second, third and fourth most frequently reported diagnoses for company providers are diseases of the nervous system and sense organs (20%), diseases of the musculoskeletal system and connective tissue (19%), and ill-defined diseases (3%). Respiratory illnesses are the second most frequently reported diagnoses by non-company providers (29%). The third and fourth most frequently reported diagnoses for non-company providers are diseases of the nervous system and sense organs (8%) and neoplasms (4%).

Company and non-company practitioners also differ in the types of industries represented in their reports (Table 5). Seventy-eight percent of patients reported by company affiliated health care providers are employed in manufacturing, primarily automobile production. Sixty-six percent of patients reported by non-company affiliated providers are employed in manufacturing. The second and third most frequently reported industries by company providers are service industries (17%) and public administration (3%). The second and third industry types most frequently reported by non-company providers are construction (15%), and transportation (9%). The type of industry was missing on 1,939 non-company and 50 company reports.

Gender differences. Repetitive trauma was the most frequently reported diagnosis for men and women, with 29% of submissions on men and 47% of submissions on women (Table 6). The second, third and fourth most frequent diagnoses for men were toxic effects of substances (21%), diseases of the nervous system and sense organs (17%), and diseases of the respiratory system (14%). For women, the second, third and fourth most frequently submitted diagnoses were diseases of the musculoskeletal system and connective tissue (16%), diseases of the nervous system and sense organs (16%), and toxic effects of substances (10%). Sixty reports did not indicate gender.

Fatalities. Fatalities related to occupational illnesses were reported for 110 workers (Table 7). None of the illness-related fatalities reported were from acute incidents. The state has a separate program to track acute traumatic fatalities, called MIFACE (Michigan Fatality Assessment and Control Evaluation). The MIFACE program identified an additional 117 (provisional data) acute work-related traumatic fatalities in 2007 that occurred in Michigan. A separate report is being prepared on these deaths, and will be available in 2009. Past reports can be found at: www.oem.msu.edu. Three deaths among youths (two confirmed, one under investigation) were identified in the MIFACE Program in 2007.

Non-company clinicians reported all 110 of the individuals with occupational illnesses who died. The workers who died ranged in age from 31 to 89 years. Eighty-six died from asbestos-related cancer (including one from mesothelioma), 22 from asbestosis, and one each died from asthma and silicosis. Sixty-six of the deceased workers had been employed in manufacturing, 13 in utilities, and nine in construction. Former occupation was not specified for 22 workers.

Comparison with Other Data Systems

Published Data in Michigan at a Disease Category Level. Table 8 compares data from the OD reporting system with Workers' Compensation Agency Claims and the BLS Annual Survey. These data illustrate the variation of reported disease categories by reporting source and suggest that the magnitude of occupational diseases among Michigan workers is greater than what currently gets reported. No one system completely captures all categories of occupational disease.

The most quoted data source on occupational injuries and illnesses available in Michigan comes from the BLS annual survey of company injury and illness logs. For this data source, the most recent data available at a disease category level is from 2007 with an estimate of 13,100 occupational illnesses and 149,400 occupational injuries in the state.

Data from the MDLEG Workers' Compensation Agency (WCA) for 2007 showed 30,197 new claims for occupational injuries and illnesses with seven or more lost work days. Overall in 2007, compensation was paid by insurance companies and self-insured employers on 274,857 claims for both lost work time and medical-only costs. These claims include new claims filed in 2007 as well as previous claims for workers who continue to lose work time or incur medical costs due to their injury or illness. Sixty-seven percent of the total paid claims were for medical procedures or care only; 33% were for wage loss (www.michigan.gov/documents/wca/wca_2007_Annual_Report_226796_7.pdf).

Hospital Discharge Data – Workers' Compensation. The source of data for this section is the Michigan Health and Hospital Association (MHA). If the source of payment changed after the patient was treated and discharged from the hospital, such as might occur in a disputed workers' compensation case, it is likely that this change would not be captured in the MHA data reported in this section. Figure 4 shows the number of patients as well as hospitalizations with Workers' Compensation (WC) insurance designated as the primary payment source at discharge for the years 1992 through 2006; the numbers of hospitalizations from 1995-2006 decreased compared to the years 1992-1994. In addition, the percentage of hospitalizations with WC insurance designated as the primary payment source at

discharge decreased beginning in 1993 (Figure 5). However, for both these parameters, there has been a plateau since 2004. In 2006, 0.36% of the 1,325,723 Michigan hospitalizations designated Workers' Compensation insurance as the primary payment source at discharge.

Table 9 shows the primary discharge diagnosis for hospitalizations from 1992 to 2006 where WC insurance was designated as the primary payment source at discharge. WC insurance covers a broad range of conditions, including mental illness, infections, heart disease and cancer. The most common conditions covered by WC insurance are musculoskeletal diseases, accounting for approximately 34-44% of patient WC-related hospitalizations from 1992-2006. The second most frequent conditions covered by WC insurance during this same time period are injuries and poisoning, accounting for 36-43% of all WC-related patient hospitalizations.

Table 10 lists the demographic characteristics of patients with WC insurance designated as the primary payment source at discharge. Approximately 75% of the hospitalizations were for men, across all years from 1992 to 2006. Among hospitalizations for which race was known, approximately 85% were white, 10% were African American, 1-2% were Hispanic, <1% were Asian or American Indian, and 1-5% were listed as "other."

The majority of hospitalizations involved workers between the ages of 30 and 50 years. Less than 1% involved workers under the age of 15 or 80 years or older, except for 2005 and 2006 where 3-4% of the workers were 80 years or older. The percentage of hospitalizations of workers under the age of 20 has decreased slightly over time, from 3% in 1992 to 1.4% in 2006.

Hospital Discharge Data – Pneumoconiosis. Figure 6 shows the number of individuals hospitalized in Michigan with asbestosis, coal workers' pneumoconiosis and silicosis from 1990 to 2006. Repeat admissions of the same individual within each calendar year are excluded from these counts. For most of these patients, pneumoconiosis was not the primary discharge diagnosis listed on the discharge record. From 1993 to 2004, there was a steady increase in the number of hospitalizations for asbestosis (approximately a 40% increase) (Figure 6). From 2004 to 2006, this trend has begun to reverse. Regulations to control asbestos exposure were not promulgated until the early 1970s and were not widely implemented until the 1980s. Given the 25 year or greater latency period from the time of first exposure to the development of asbestos-related radiographic changes, the cases being identified now represent exposures from these earlier unregulated years. The trend we are seeing in Michigan is consistent with national data published in the NIOSH 2005 Work-Related Lung Disease Surveillance Report updates on asbestosis available at: www2a.cdc.gov/drds/WorldReportData/FigureTableDetails.asp?FigureTableID=15.

Payment source from the MHA is the source of data displayed in Figure 7. Medicare is the primary payment source for hospitalizations related to these dust diseases of the lung. WC insurance 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 WC insurance [4,5]. As described in the previous section, if the source of payment for the hospitalization changes after the patient is discharged from the hospital, the change in payment source will likely not be reflected in the MHA data. For example, if the anticipated payment source was initially workers' compensation but then changed to a non-work-related payment source, the record in the MHA file would still indicate workers' compensation.

Asbestosis-Related Lung Disease and Mesothelioma. Asbestos-related lung disease is the most common dust disease reported to the Michigan Department of Labor and Economic Growth. The number of reports of asbestosis in 1999 was 3,384, decreased to 677 reports in the year 2002, increased in 2006 to 1,098 but decreased in 2007 to 571 (Figure 8). The number of reports of pleural thickening decreased from 2001 to 2002, from 2,397 to 1,269 reports. In 2004, the number of reports of

asbestos-related pleural thickening increased to 1,976, and decreased to 223 in 2007. The reports for asbestos-related x-ray changes are largely from one of Michigan's B-readers as well as an occupational medicine physician.

In 1995, there were 16 B-readers in Michigan. Today, there are only nine physicians in Michigan who are certified as B-readers. Figure 9 shows the number of B-readers, chest x-rays that were reviewed, and x-rays that showed evidence of asbestos-related lung disease, with pleural and parenchymal changes separately and combined. On the average, since 1995 about 20% of the x-rays reviewed showed evidence of occupational disease, ranging from a low of 829 (8%) of 10,591 x-rays reviewed in calendar year 2000 and 296 (8%) of 3,570 x-rays reviewed in 2007, to a high of 3,640 (36%) of 10,575 x-rays reviewed in calendar year 1999. In 2006, 10% of the chest x-rays showed evidence of asbestos-related disease. Figure 9 is based on an annual survey the B-readers in Michigan complete. The numbers of reports listed in the survey are greater than the number of occupational disease reports received from B-readers that are included in the statistics of this annual report.

The association between exposure to asbestos and the risk of developing mesothelioma was first reported in the medical literature in 1943[6]. 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 exposure[7]. Among cohorts of asbestos-exposed workers, up to 10% of deaths have been attributed to mesothelioma.

The Michigan Cancer Registry has data to describe the demographics of mesothelioma in Michigan. From 1985 through 2004 there were 1,943 Michigan residents reported to the Michigan Cancer Registry with invasive mesothelioma. Figure 10 shows the number of men and women diagnosed with mesothelioma by year, from 1985 to 2004. Approximately one quarter (26%) of the reports of mesothelioma occurred in women. Mesothelioma occurred predominantly among Caucasians (93.5%) compared to African Americans (5.6%). Approximately 1% were classified as "other" ancestry.

Figure 11 shows the age at diagnosis separately for men and women. The peak age of occurrence of mesothelioma was for individuals 65 years and older for both men and women.

Figure 12 shows the distribution of the number of cases of mesothelioma among Michigan residents, by county. The south-central region of Michigan has the highest number of cases of mesothelioma. Figure 13 shows the average annual incidence rates of mesothelioma among Michigan residents, by county. The counties with the highest rates are: Presque Isle (4.6 per 100,000); Bay (4.2 per 100,000); Alger (4.1 per 100,000); Mackinac (3.7 per 100,000); Ontonagon (3.6 per 100,000); and Midland (3.5 per 100,000). The annual mesothelioma incidence rate in 2005 in Michigan was 1.4 cases per 100,000.

Poison Control Center Data. In 2007, 1,133 calls to the two Michigan Poison Control Centers were identified as work-related. Table 11 describes the available demographic characteristics of the individuals reported. There were more reports for males (67%) than females (33%). The individuals ranged in age from 15 to 79 years. Almost 85% of these individuals were less than age 50. More details about the nature of these poisonings is provided by the Poison Control Centers, but not in a format that is readily analyzable.

DISCUSSION

There were 11,240 Occupational Disease Reports sent to the MDLEG in calendar year 2007. The most

frequent types of occupational diseases reported to the MDLEG were repetitive trauma illnesses (35%), diseases of the nervous system and sense organs (17%), toxic effects of substances (17%), musculoskeletal disease (14%) and respiratory disease (10%). From 1988 through 1999, the number of reports sent to the State increased substantially. Figure 2 shows the number of occupational disease reports received each year since 1985. Since 1999, the number of reports has decreased. There was a large decrease in the number of reports received in 2005, with over 2,200 fewer reports received than in 2004; in 2007 the total number of reports decreased by over 1,500 from 2006. The initial overall decline in the number of reports reflected fewer reports from company medical departments. The number of reports from non-company affiliated practitioners remained relatively unchanged through 2004; however, from 2004 to 2007 there was a large decline of approximately 2,900 reports in the number of non-company affiliated practitioner reports as compared to 2004 (Figure 3). The cause for this decrease is unknown, but does parallel the decreases seen in the BLS Annual Survey and Workers' Compensation claims. The number of company medical departments reporting in 2007 was 426, compared to 396 in 2006, 374 in 2005, 373 in 2004 and 305 in 2003.

ICD-9 codes were used to classify the diagnosis or clinical impression recorded on the occupational disease reports submitted to the MDLEG. Sprains and strains, except those involving the back, are considered by the Federal and Michigan OSHA programs as illnesses secondary to cumulative trauma, and are therefore required to be reported even though in the ICD-9 coding system, sprains and strains are classified as injuries.

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. Currently, reports are received from approximately 426 company-affiliated and 285 non-company affiliated physicians. There were 234,445 companies in the year 2007 and 28,067 practicing physicians in Michigan in the year 2007. Accordingly, reports are received from 0.2% of companies and 1.0% of physicians. Over the last several years, these percents have remained largely unchanged. Efforts continue to remind employers of the requirement to report by routinely distributing reporting forms during MIOSHA inspections. In addition, all new physicians receive information on the requirement to report when they apply for medical licensure in Michigan.

We know that the 11,240 occupational disease reports received this past year under-represent the actual incidence of occupational diseases in Michigan. Based on our recent matching of multiple data bases in Michigan for the years 1999-2001, we estimate that the BLS survey missed 50% of the total number of occupational illnesses in Michigan. In 2007, the BLS annual survey reported 13,100 illnesses. If that figure is doubled then we would have expected in excess of 26,000 occupational illnesses in Michigan in 2007 instead of the approximately 11,000 reported. Even this number 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, given the limited training that health care providers receive in diagnosing work-related conditions, and that many individuals never inform their employer when they are diagnosed with a work-related condition.

The type of illness and the type of industry where occupational diseases occur as reported by non-company affiliated health practitioners differs from company-based health practitioners (Tables 1, 4 and 5). These differences vary depending on the specialties of the non-company affiliated physicians who submit reports. For example, the non-company affiliated health practitioners who reported patients in the year 2007 were more likely to report patients with respiratory disease who work in small, non-manufacturing companies. A large percentage of the year 2007 reports from non-company affiliated 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 affiliated specialists reporting, the data illustrates that relying on company-affiliated reports alone would

cause occupational illness statistics to markedly under-count certain work-related conditions. Similarly, one cannot rely on workers' compensation data for a reliable count of work-related conditions. For the years 1992-1994, only 9.6% of the workers for whom an Occupational Disease Report was submitted had definitely filed a Workers' Compensation reference claim, although an additional 36% may have filed a claim for a total of 45.6%[8]. This is an ongoing issue, as review of hospital discharge data for individuals with pneumoconioses shows only <1% - 8% are paid by workers' compensation (Figure 7).

Review of Table 8 shows a large difference in the distribution of occupational illnesses identified through the state's OD reporting system, compared to both the Bureau of Labor Statistics' (BLS) Annual Survey of Employers and the state's Workers' Compensation Agency (WCA) claims system. For example, poisoning represents approximately 19% (1,890) of the OD reports, while that category of diseases only accounts for less than 1% (100 cases) of the BLS survey and less than 1% (10 cases) of WCA claims. Non-employer sources such as from Poison Control Centers, "B" Readers, and laboratories provide additional occupational diseases not being reported by employers or practitioners.

In addition to tracking the overall incidence of occupational disease, a more comprehensive system allows us to identify areas of concern in our state, monitor trends, develop interventions designed to prevent additional occupational disease, and then evaluate the effectiveness of these efforts. For example, asbestos-related disease, including fibrosis and mesothelioma, is the most common lung condition from mineral dust exposures. Figures 8, 9 and 10 suggest the number of cases of these conditions may have peaked in previous years and is now on a downward trend. Only the presence of a comprehensive surveillance system involving review of multiple data sources allows such a trend to be identified and evaluated.

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6. Greenberg M. *History of Mesothelioma*. European Respiratory Journal 1997; 10:2690-2691.

7. Spirtas R, Heineman E, Bernstein L, Beebe GW, Keehn RJ, Stark A, Harlow BL, and Benichou J. *Malignant Mesothelioma: Attributable Risk of Asbestos Exposure*. Occupational and Environmental Medicine 1994; 51:804-811.

8. Biddle J, Roberts K, Rosenman KD, Welch EM. *What Percentage of Workers With Work-Related Illnesses Receive Workers' Compensation Benefits?* Journal of Occupational and Environmental Medicine 1998; 40:325-331.

Figure 1. Occupational Disease Reporting Form

Michigan Department of Labor and Economic Growth — Management and Technical Services Division

Known or Suspected Occupational Disease Report

(Information will be held confidential as prescribed in Act.)

EMPLOYEE AFFECTED

Name (Last, First, Middle)	Age	Sex M F	Race: ◯ White ◯ Black ◯ Hispanic ◯ Other
Street	City	State	Zip
Home Phone Number	Social Security Number		

CURRENT EMPLOYER

Current Employer Name	Worksite County		
Worksite Address	City	State	Zip
Business Phone	If Known, Indicate Business Type (products manufactured or work done)		
Number of Employees ◯ <25 ◯ 25-100 ◯ 100-500 ◯ >500			
Employee's Work Unit/Department	Dates of Employment From: _____ To: _____ Mo Day Year Mo Day Year		
Employee's Job Title or Description of Work			

ILLNESS INFORMATION

Nature of Illness or Health Condition (Examples: Headache, Nausea, Difficulty Breathing, Cough, etc.)		Date of Diagnosis _____ Mo Day Year
Suspected Causative Agents (Chemicals, Physical Agents, Conditions)	Did Employee Die? Yes ◯ No ◯	If Yes, Date of Death _____ Mo Day Year
If Physician, Indicate Clinical Impression for Suspected Occupational Disease, or Diagnosis of Confirmed Occupational Disease		

ADDITIONAL COMMENTS

_____

_____

REPORT SUBMITTED BY

If Report Submitted by Non-Physician, Did Employee See a Physician? Yes ◯ No ◯ Don't Know ◯
If yes, record information below.

Physician's Name	Phone		
Office Address	City	State	Zip
Name of Person Submitting Report	Physician ◯ Non-Physician ◯		
Address	City	State	Zip
Signature	Phone		Date

The Michigan Department of Labor and Economic Growth is an equal opportunity, affirmative action employer, service provider and buyer.

Return completed form to:

Michigan Department of Labor and Economic Growth
Michigan Occupational Safety and Health Administration
Management and Technical Services Division
7150 Harris Drive, P.O. Box 30649
Lansing, MI 48909-8149

MIOSHA-MTSD-51 (12/03)

Authority: P.A. 368 of 1978
Completion: Required
Penalty: Misdemeanor

Figure 2. Occupational Disease Reports to the Michigan Department of Labor and Economic Growth: 1985-2007

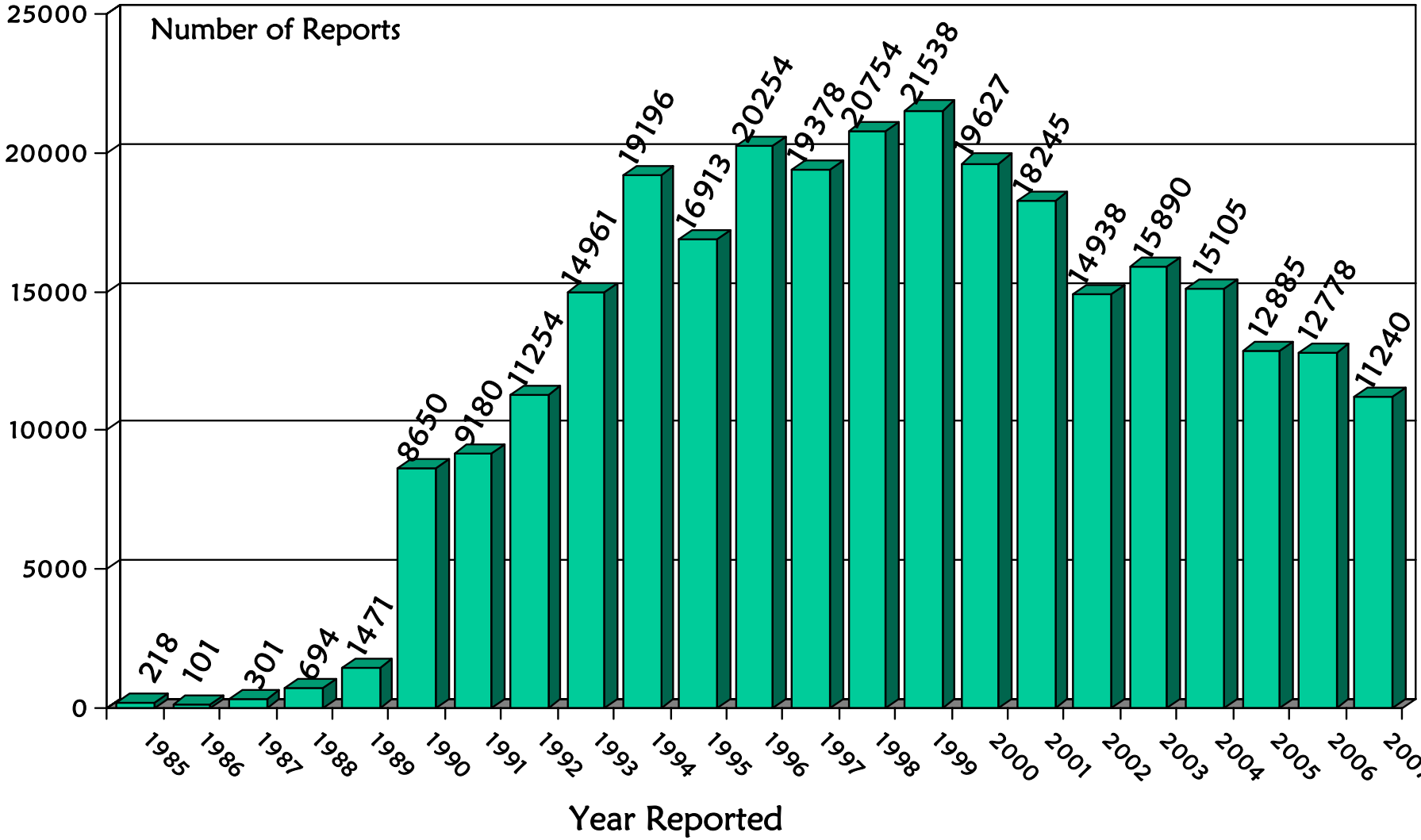
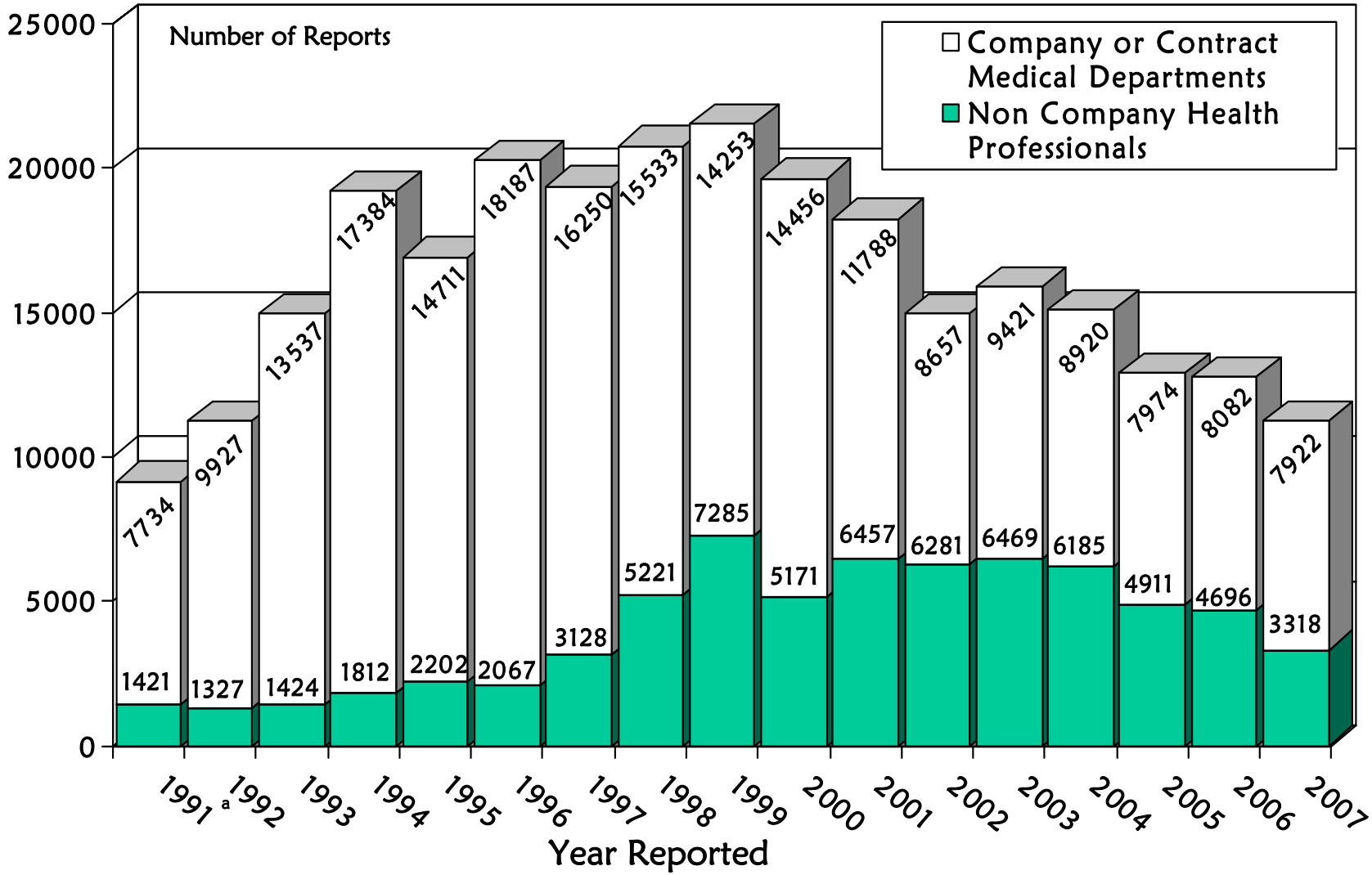


Figure 3. Occupational Disease Reports by Reporting Source, Non-Company Health Professionals and Company or Contract Medical Departments: 1991-2007



[a]Reporting source was unknown for 25 reports that are not included in this column.

Figure 4. Number of Hospitalizations and Number of Patients with Workers' Compensation Designated as Primary Payment Source at Discharge in Michigan: 1992-2006

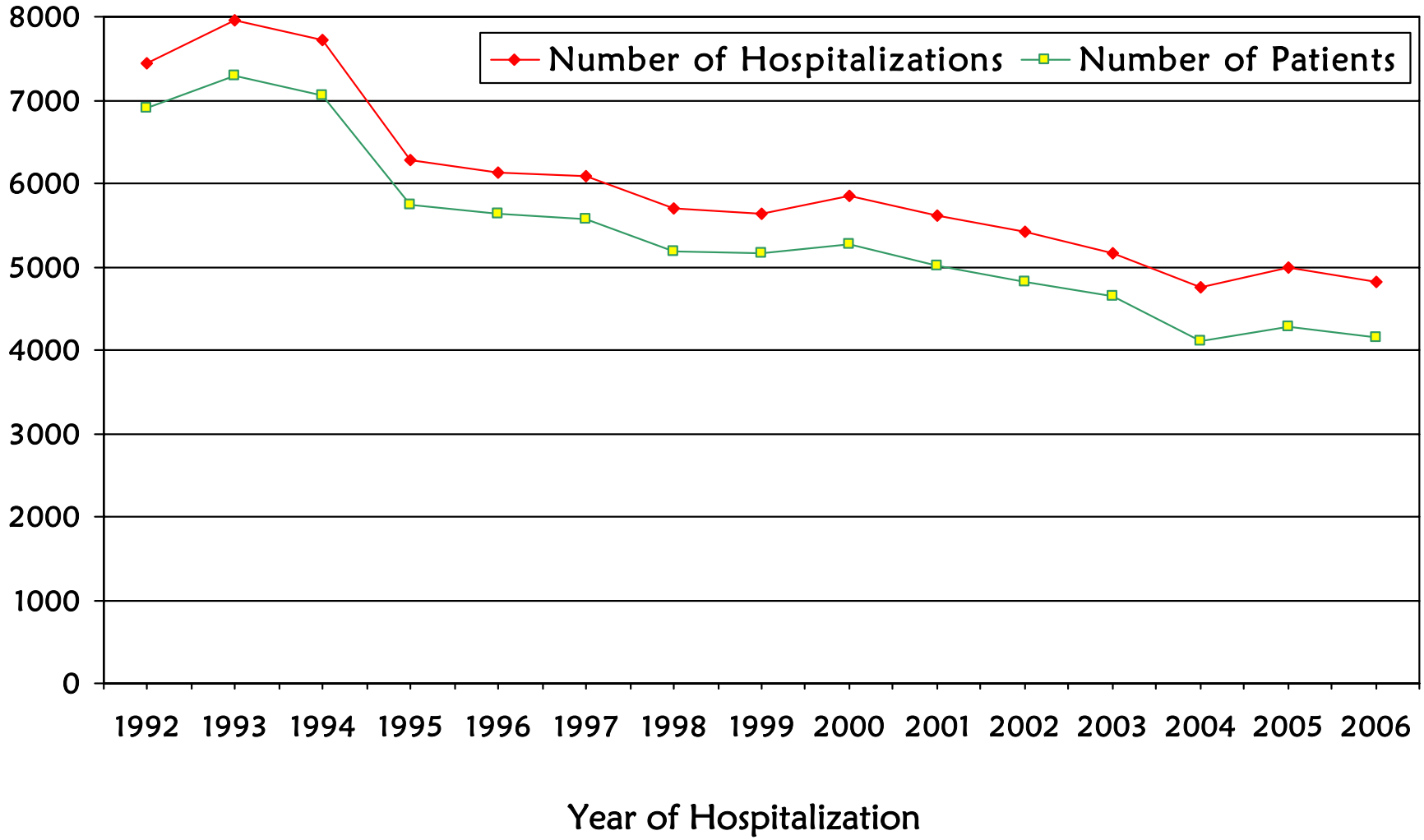


Figure 5. Percent of Total Michigan Hospitalizations with Workers' Compensation Designated as Primary Payment Source at Discharge: 1992-2006

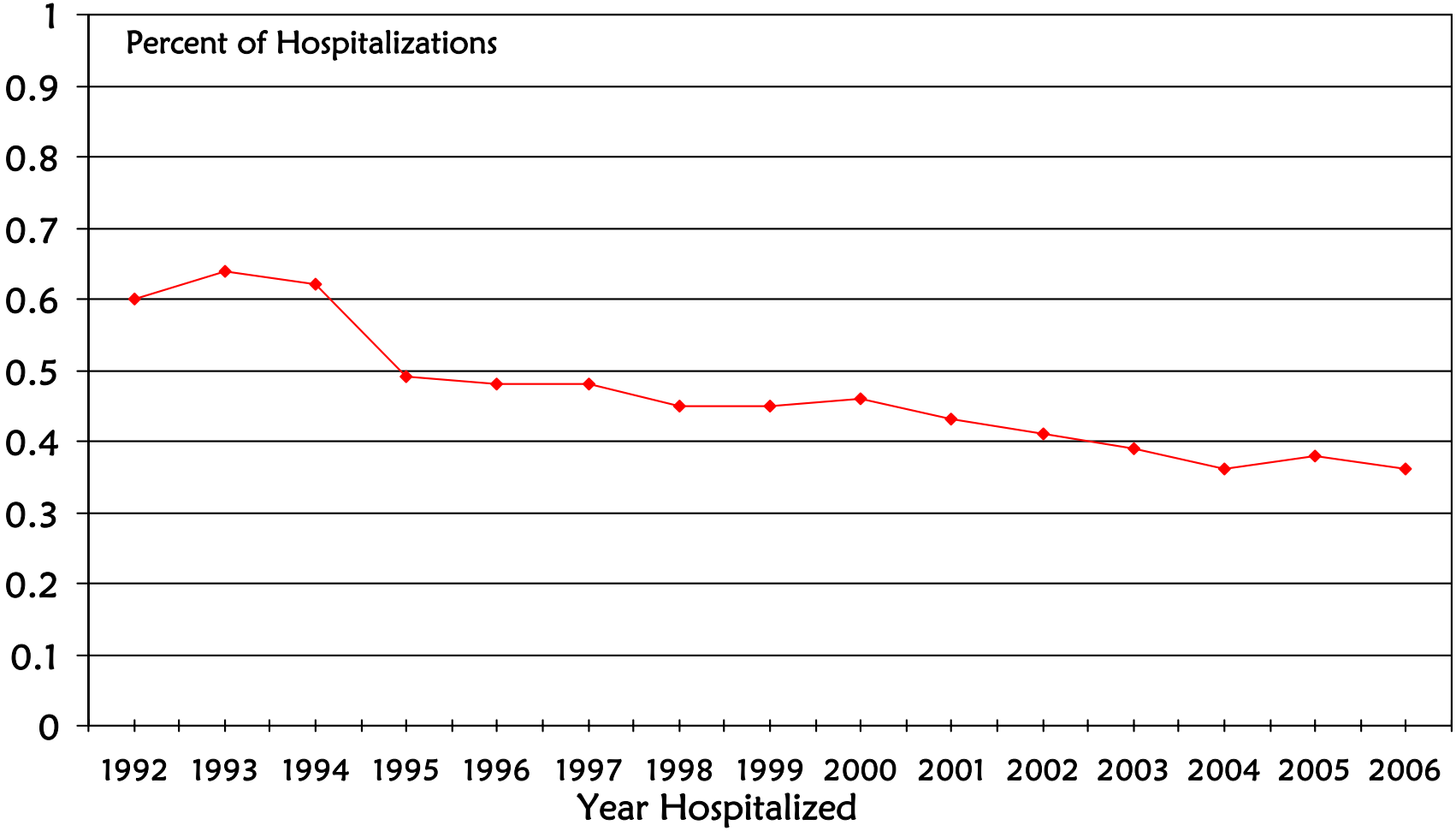


Figure 6. Number of Patients Discharged with Coal Workers' Pneumoconiosis (CWP), Asbestosis and Silicosis in Michigan: 1990-2006

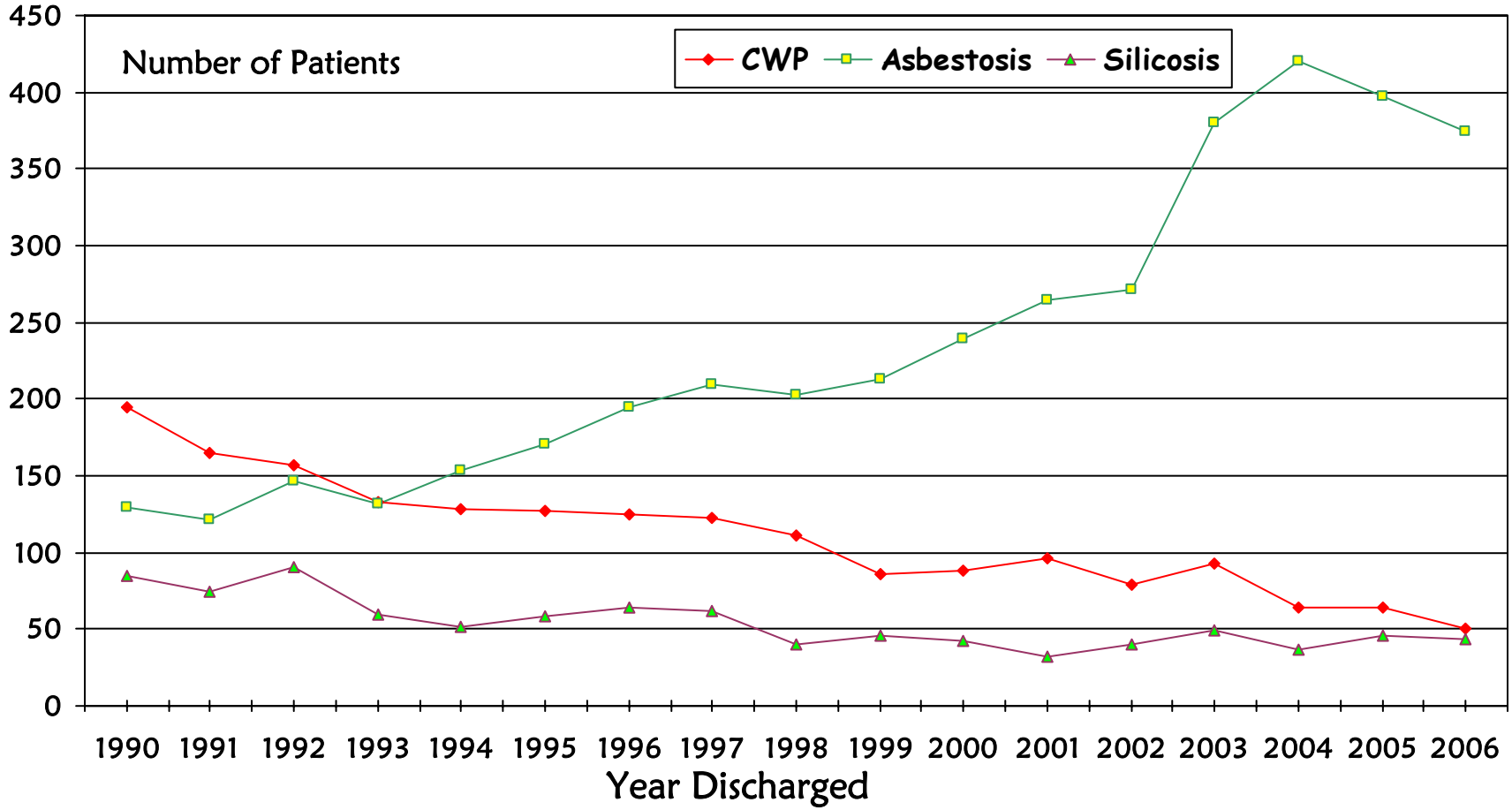
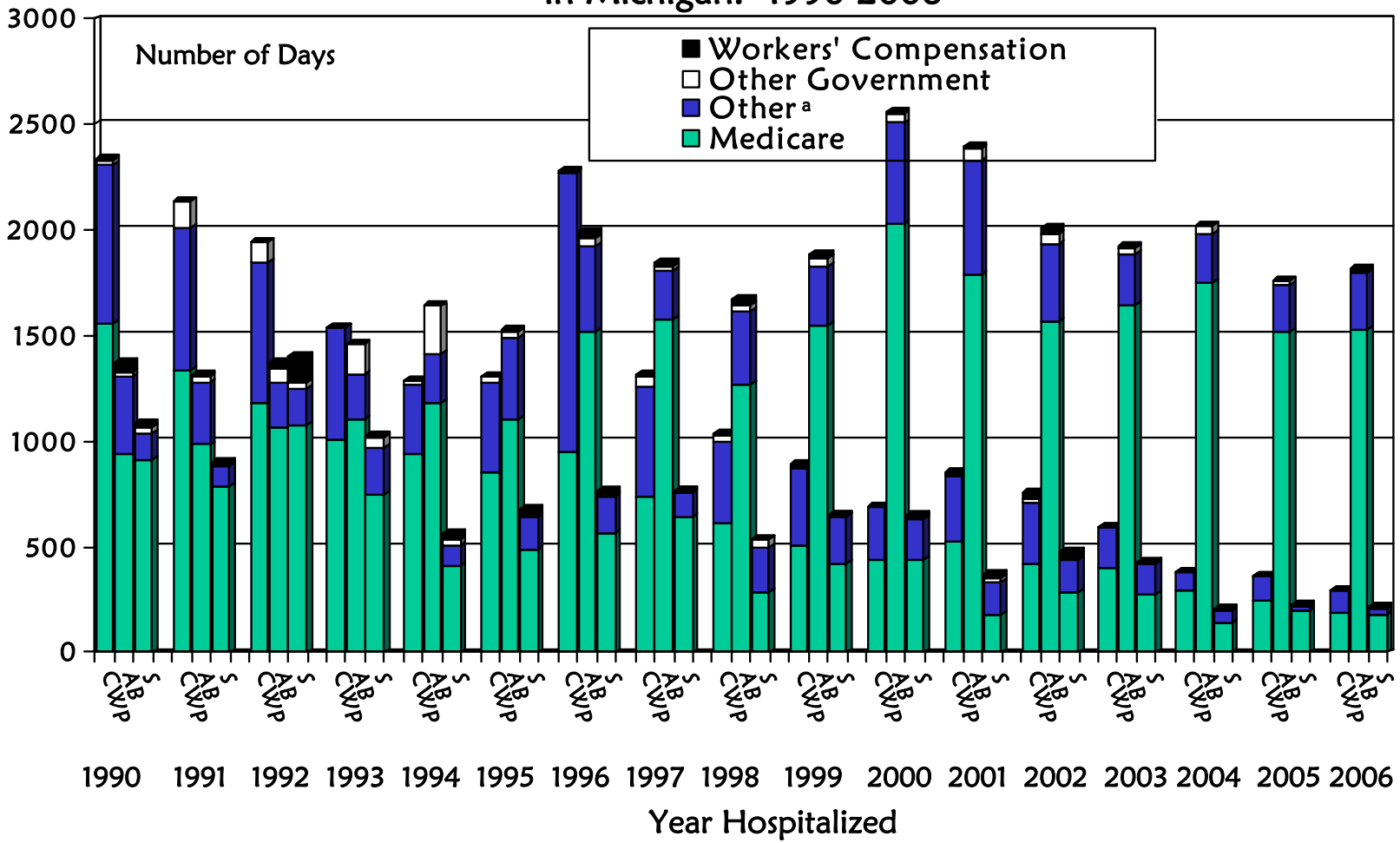


Figure 7. Number of Days Hospitalized by Payment Source at Discharge for Coal Workers' Pneumoconiosis (CWP), Asbestosis (AB) and Silicosis (S) in Michigan: 1990-2006



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

Figure 8. Asbestos-Related Cases Reported to the Michigan Department of Labor and Economic Growth: 1989-2007

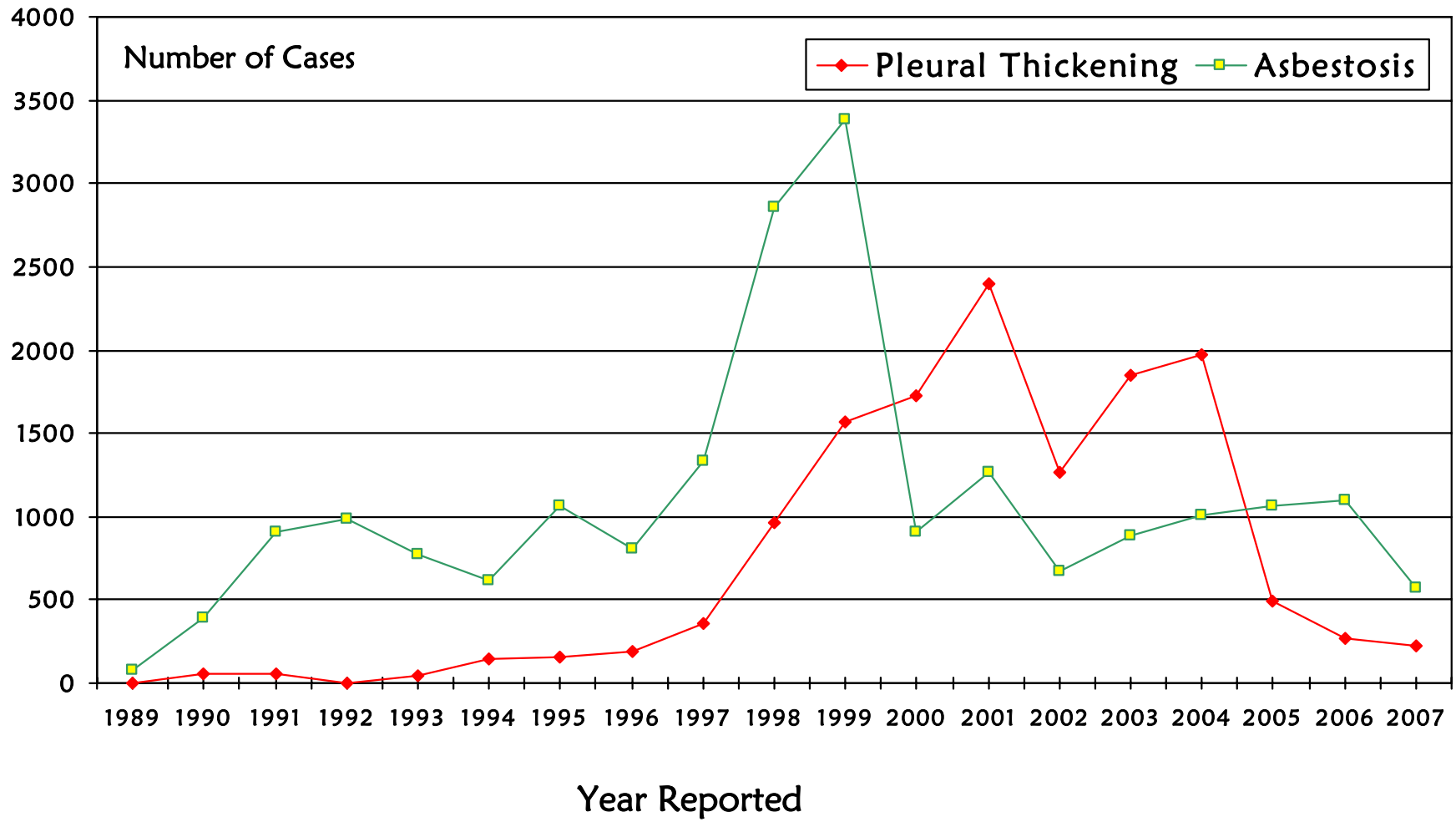


Figure 9. Summary of "B" Reading Interpretations of Chest X-rays in Michigan: 1995-2007

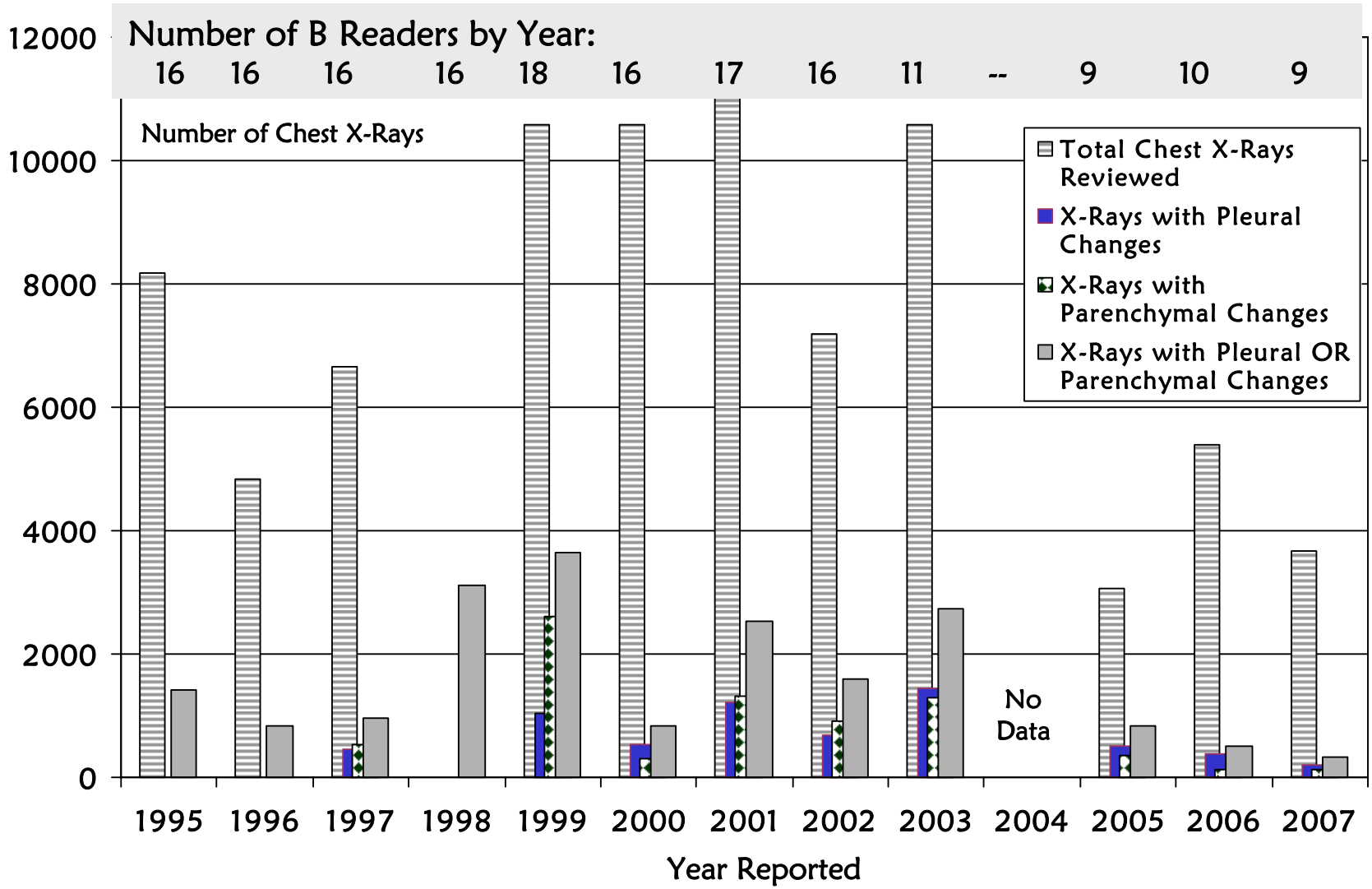


Figure 10. Number of Men and Women in Michigan Diagnosed with Mesothelioma: 1985-2004

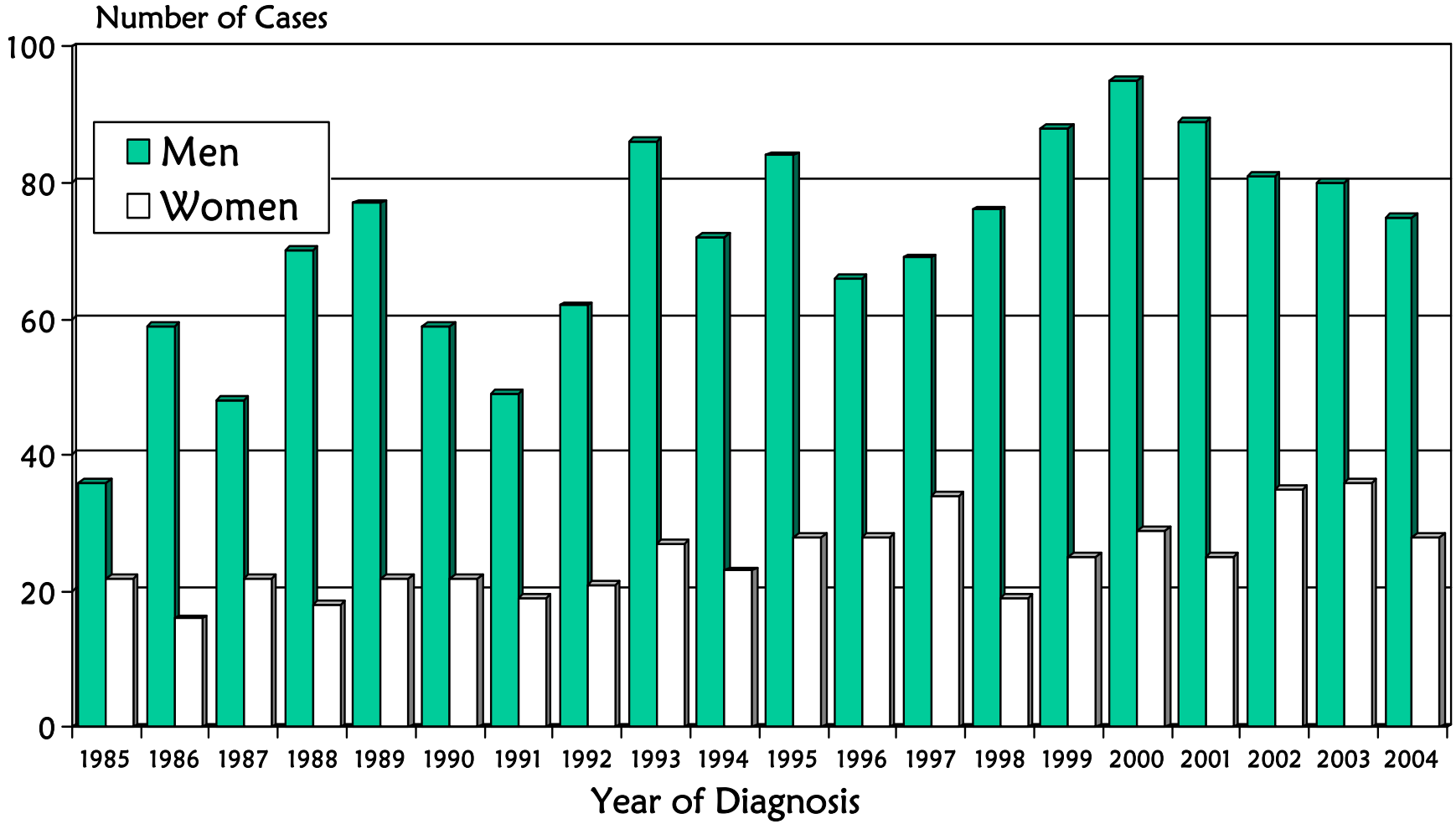
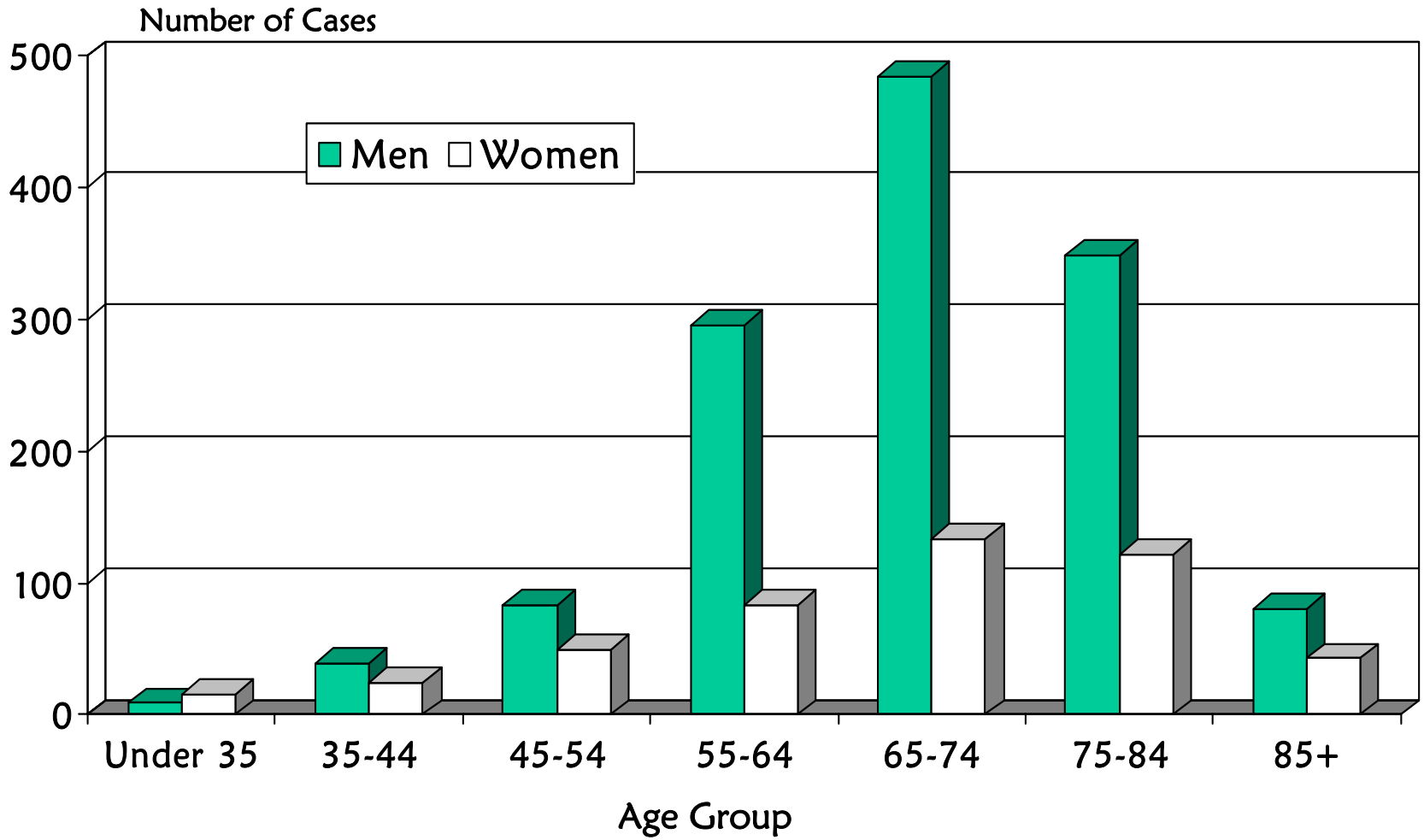
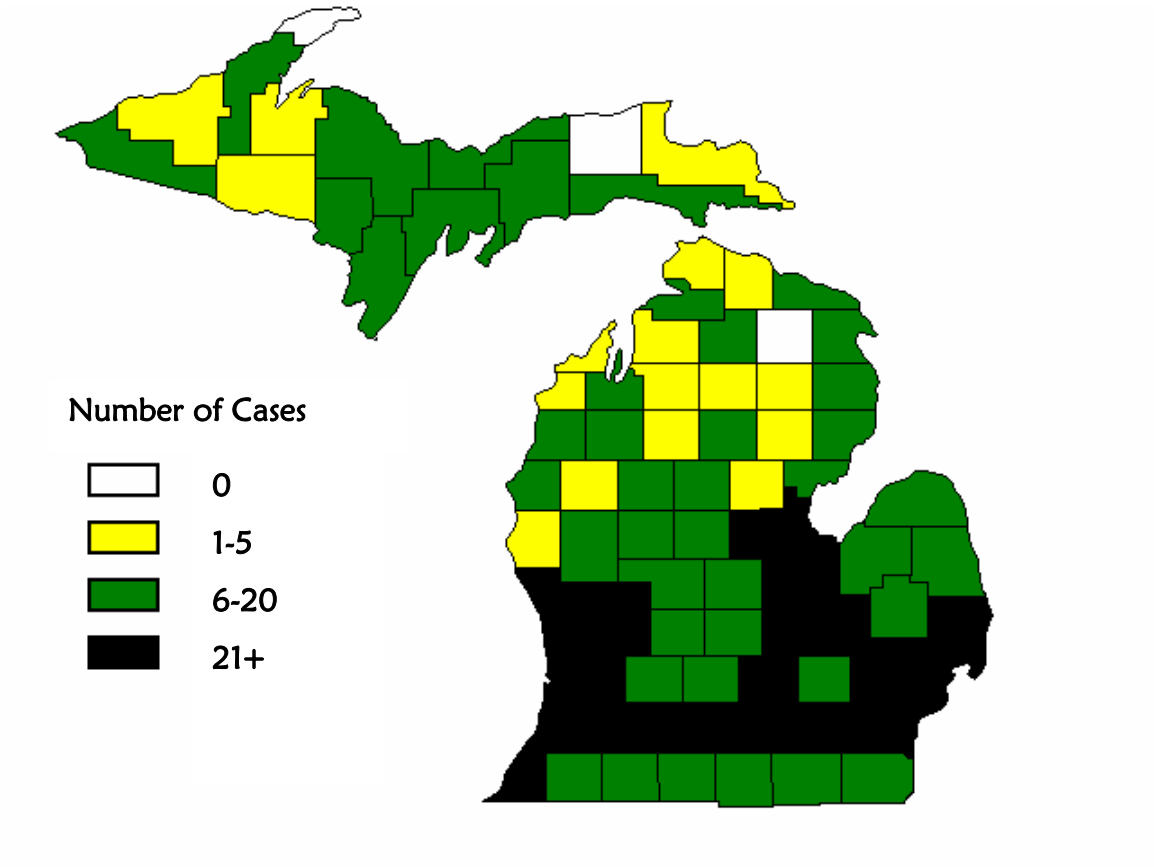


Figure 11. Cases of Mesothelioma in Michigan by Gender and Age at Diagnosis[a]: 1985-2004



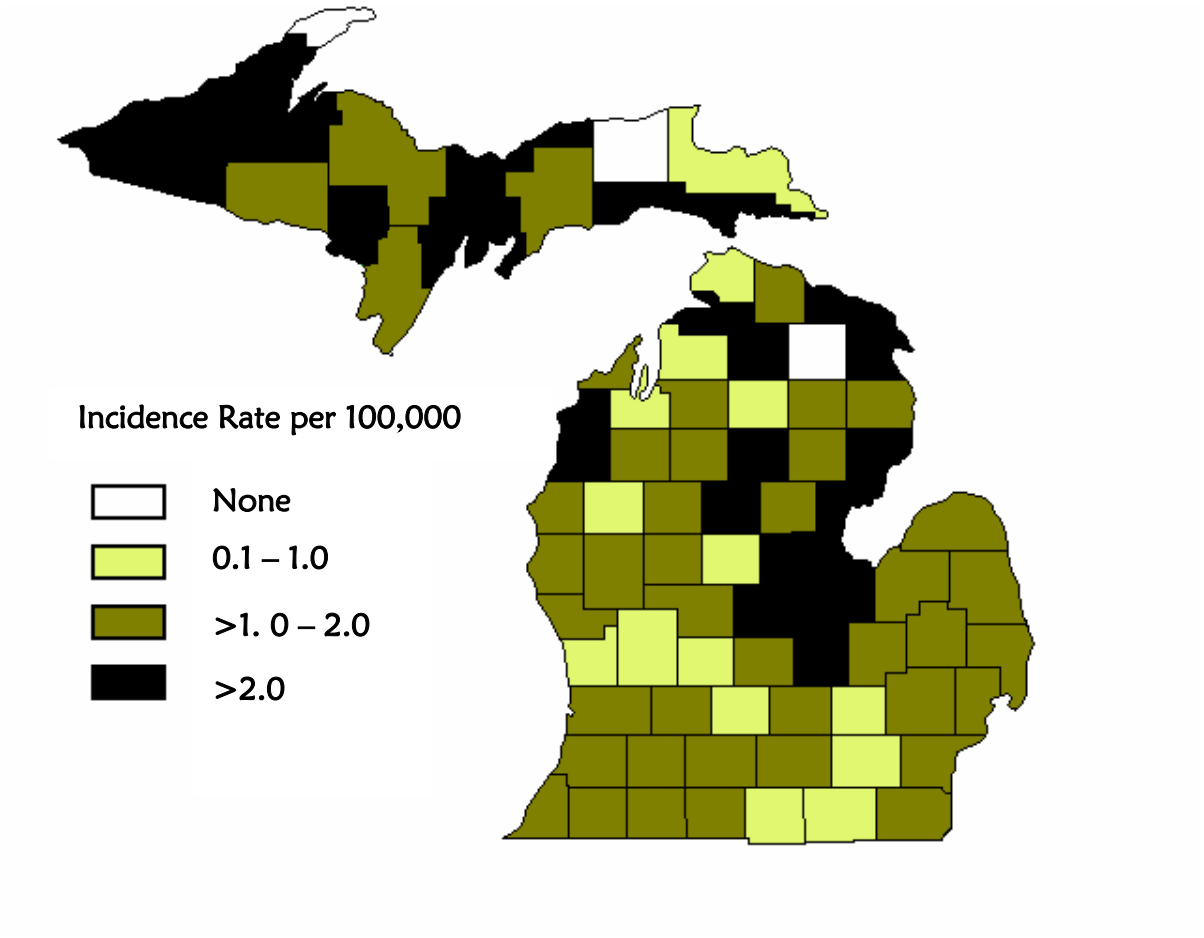
[a]For one female, age at diagnosis was unknown.

Figure 12. Distribution of Michigan Residents Diagnosed with Mesothelioma by County: 1985-2004



Total number of cases: 1,943.

Figure 13. Average Annual Incidence Rates of Mesothelioma Among Michigan Residents, by County[a]



[a]Numerator is the average number of Michigan residents by county, diagnosed with mesothelioma from 1985-2000 (most recent data available).
Denominator is the estimated number of Michigan residents age 16+ by county, from the United States Census Bureau for July 1, 1993.

Table 1. Number of Employees at Facilities Where an Occupational Illness Occurred in 2007, by Reporting Source: Company vs. Non-Company Clinician

Number of Employees	Reports from Non-Company Practitioners		Reports from Companies		Total Reports	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
< 25	96	8.1	39	0.5	135	1.5
25-100	142	12.0	85	1.1	227	2.6
100-500	217	18.3	371	4.8	588	6.6
> 500	730	61.6	7,191	93.6	7,921	89.3
Total	**1,185**[a]	100.0	**7,686**[b]	100.0	**8,871**	100.0

[a] The number of employees was missing on 2,133 reports.
[b] The number of employees was missing on 236 reports.

Table 2. Number of Occupational Disease Reports Submitted by Non-Company Health Practitioners in 2007

Number of Reports	Health Practitioners		Number of Patients Represented
	Number	*Percent*	
1	237	83.2	237
2-5	35	12.3	94
6-10	3	1.1	28
11-20	5	1.8	65
21-100	1	0.4	57
> 100	4	1.4	957
Total[a]	**285**	100.2[b]	**1,438**

[a] Not included in the above statistics: 737 reports submitted by labs for lead poisoning, representing 204 clinics; 1,133 reports submitted by Michigan's two Poison Control Centers; and 10 reports that did not list physician name.

[b] Percentage does not add to 100 due to rounding.

Table 3. Demographic Characteristics of Occupational Disease Cases Reported in 2007

Demographic Characteristic		
Age	*Number*	*Percent*
≤ 19	109	1.1
20-24	385	3.9
25-29	586	5.9
30-34	902	9.1
35-39	1,228	12.4
40-44	1,207	12.2
45-49	1,518	15.3
50-54	1,602	16.2
55-59	1,174	11.9
60-69	850	8.6
70-79	261	2.6
≥ 80	77	0.8
Total	**9,899**[a]	100.0
Gender	*Number*	*Percent*
Male	7,179	64.2
Female	4,001	35.8
Total	**11,180**[b]	100.0
Race	*Number*	*Percent*
Caucasian	1,279	44.3
African American	1,014	35.1
Hispanic	87	3.0
Other	507	17.6
Total	**2,887**[c]	100.0

[a]Age was missing on 1,341 reports. Mean age = 46± 13 years.
[b]Gender was missing on 60 reports.
[c]Race was missing on 8,353 reports.

Table 4. Number of Occupational Disease Reports in 2007, by Disease Type and Reporting Source

Disease Type	Non-Company		Company		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Infectious & Parasitic Diseases (ICD 001-139)	1	<0.1	80	1.0	81	0.7
Neoplasms (ICD 140-239)	122	3.7	0	--	122	1.1
Other Metabolic & Immunity Disorders (ICD 270-279)	0	--	1	<0.1	1	<0.1
Mental Disorders (ICD 290-319)	0	--	141	1.8	141	1.3
Diseases of the Nervous System & Sense Organs (ICD 320-389)	266	8.0	1,613	20.4	1,879	16.7
Diseases of the Circulatory System (ICD 390-459)	0	--	4	0.1	4	<0.1
Diseases of the Respiratory System (ICD 460-519)	974	29.4	142	1.8	1,116	9.9
Diseases of the Digestive System (ICD 520-579)	0	--	21	0.3	21	0.2
Diseases of the Skin & Subcutaneous Tissue (ICD 680-709)	8	0.2	224	2.8	232	2.1
Diseases of the Musculoskeletal System & Connective Tissue (ICD 710-739)	13	0.4	1,525	19.3	1,538	13.7
Symptoms, Signs & Ill-Defined Conditions (ICD 780-799)	26	0.8	229	2.9	255	2.3
Repetitive Trauma: Sprains & Strains (ICD 800-999 except ICD 940 & ICD 980-989)	25	0.8	3,923	49.5	3,948	35.1
Burn Confined to Eye (ICD 940)	0	--	12	0.2	12	0.1
Toxic Effects of Substances (ICD 980-989)	1,883	56.8	7	0.1	1,890	16.8
Total	**3,318**	100.1[a]	**7,922**	100.2[a]	**11,240**	100.0

[a] Percentage does not add to 100 due to rounding.

Table 5. Number of Occupational Disease Reports in 2007, by Industry Type and Reporting Source

Industry Type (Standard Industrial Classification)	Non-Company		Company		Total	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Agricultural & Forestry Services (SIC 01,02,07)	12	0.9	9	0.1	21	0.2
Mining (SIC 10-14)	0	--	17	0.2	17	0.2
Construction (SIC 15-17)	210	15.2	39	0.5	249	2.7
Manufacturing (SIC 20-39)						
Food & Kindred Products (SIC 20)	4	0.3	19	0.2	23	0.2
Printing & Publishing (SIC 27)	1	0.1	3	<0.1	4	<0.1
Chemicals & Allied Products (SIC 28)	16	1.2	26	0.3	42	0.5
Rubber & Misc. Plastics Products (SIC 30)	3	0.2	174	2.2	177	1.9
Stone, Clay, Glass & Concrete Products (SIC 32)	9	0.7	4	0.1	13	0.1
Primary Metal Industries (SIC 33)	357	25.9	109	1.4	466	5.0
Fabricated Metal Products (SIC 34)	88	6.4	588	7.5	676	7.3
Industrial & Commercial Machinery & Computer Equipment (SIC 35)	27	2.0	115	1.5	142	1.5
Electronic Equipment & Components (SIC 36)	1	0.1	97	1.2	98	1.1
Transportation Equipment (SIC 37)	385	27.9	4,964	63.1	5,349	57.8
Miscellaneous Manufacturing (SIC 23,24,26,29,31,38,39)	16	1.2	21	0.3	37	0.4
Transportation, Communications, Electric, Gas & Sanitary Services (SIC 40-49)	122	8.8	12	0.2	134	1.4
Wholesale & Retail Trade (SIC 50-59)	38	2.8	81	1.0	119	1.3
Insurance & Real Estate (SIC 60-67)	3	0.2	12	0.2	15	0.2
Services						
Hospitals (SIC 80)	9	0.7	1,059	13.5	1,068	11.5
Schools (SIC 82)	26	1.9	69	0.9	95	1.0
Misc. (SIC 70,72,73,75,76,79,83,86,87)	25	1.8	240	3.0	265	2.9
Public Administration (SIC 90-97)	27	2.0	214	2.7	241	2.6
Total	**1,379**	100.3 [a]	**7,872**	100.1[a]	**9,251**[b]	99.8[a]

[a] Perentage does not add to 100 due to rounding.
[b]Type of industry was unknown in 1,939 non-company reports and 50 company reports.

Table 6. Number of Occupational Disease Reports in 2007, by Disease Type and Gender[a]

Disease Type	Males		Females	
	Number	*Percent*	*Number*	*Percent*
Infectious & Parasitic Diseases (ICD 001-139)	25	0.3	56	1.4
Neoplasms (ICD 140-239)	122	1.7	0	--
Other Metabolic & Immunity Disorders (ICD 270-279)	1	<0.1	0	--
Mental Disorders (ICD 290-319)	62	0.9	69	1.7
Diseases of the Nervous System & Sense Organs (ICD 320-389)	1,227	17.1	645	16.1
Diseases of the Circulatory System (ICD 390-459)	3	<0.1	1	<0.1
Diseases of the Respiratory System (ICD 460-519)	992	13.8	124	3.1
Diseases of the Digestive System (ICD 520-579)	21	0.3	0	--
Diseases of the Skin & Subcutaneous Tissue (ICD 680-709)	152	2.1	80	2.0
Diseases of the Musculoskeletal System & Connective Tissue (ICD 710-739)	881	12.3	654	16.3
Symptoms, Signs & Ill-Defined Conditions (ICD 780-799)	157	2.2	96	2.4
Repetitive Trauma Injuries (ICD 800-999 except ICD 940 & ICD 980-989)	2,043	28.5	1,867	46.7
Burn Confined to Eye (ICD 940)	12	0.2	0	--
Toxic Effects of Substances Chiefly Non-Medicinal (ICD 980-989)	1,481	20.6	409	10.2
Total[a]	**7,179**	100.0	**4,001**	99.9[b]

[a] Gender was missing on 60 reports.
[b] Percentage does not add to 100 due to rounding.

Table 7. Demographic Characteristics of Reported Occupational Disease Fatalities in 2007

Demographic Characteristic		
	Number	*Percent*
Fatal	110	1.0
Non-Fatal	11,130	99.0
Total	**11,240**	100.0
Age	*Number*	*Percent*
30-49	1	0.9
50-59	15	13.8
60-69	25	22.9
70-79	56	51.4
≥ 80	12	11.0
Total [a]	**109**	100.0
Disease Type	*Number*	*Percent*
Neoplasms	85	77.3
Asbestosis	22	20.0
Mesothelioma	1	0.9
Asthma	1	0.9
Silicosis	1	0.9
Total	**110**	100.0
Industry Type	*Number*	*Percent*
Manufacturing	66	75.0
Construction	9	10.2
Utilities	13	14.8
Total[a]	**88**	100.0

[a]Age was missing on 1 report. Industry was missing on 22 reports.
[b]Percentage does not add to 100 due to rounding.

Table 8. Comparison of 2007 BLS Occupational Illness Survey Data and 2007 MDLEG Workers' Compensation Agency (WCA) Claims with 1992-2007 MDLEG Occupational Disease (OD) Reports

	Disease Category														
	Occupational Skin Disease		Dust Diseases of the Lung		Respiratory Conditions Due to Toxic Agents		Poisoning		Disorders Due to Physical Agents		Disorders Due to Repeated Trauma		All Other Occupational Illnesses		Reports per Year[a]
MDLEG	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*
2007 BLS Survey	2,200	16.8	No Data	--	900	6.9	100	0.8	No Data	--	No Data	--	9,900	75.6	13,100
2007 WCA Claims[b]	65	0.3	0	--	98	0.5	10	<0.1	39	0.2	15,733	78.3	4,137	20.6	20,082
MDLEG OD Reports	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*
1992-1993[c,d]	776	6.1	914	7.2	290	2.3	207	1.6	469	3.7	7,151	56.0	2,972	23.3	12,779[e]
1994-1995[c,d]	1,034	5.9	966	5.5	570	3.2	315	1.8	419	2.4	10,601	60.3	3,680	20.9	17,585
1996-1997[c,d]	1,405	7.3	1,159	6.0	799	4.1	631	3.3	414	2.1	11,293	58.3	3,668	18.9	19,369
1998-1999[c]	1,307	6.3	3,225	15.6	1,481	7.2	1,120	5.4	328	1.6	9,644	46.7	3,541	17.2	20,646
2000-2001[c]	953	5.1	1,165	6.3	2,334	12.5	1,246	6.7	231	1.2	9,068	48.7	3,639	19.5	18,636
2002-2003[c]	426	2.9	861	5.9	1,800	12.3	2,858	19.6	105	0.7	5,942	40.8	2,587	17.7	14,579
2004-2005[c]	377	2.8	1,105	8.2	1,602	11.9	2,267	16.9	46	0.3	5,094	37.9	2,938	21.9	13,429
2006	322	2.7	1,146	9.6	580	4.9	2,011	16.8	55	0.5	4,606	38.6	3,226	27.0	11,946
2007	232	2.3	623	6.2	493	4.9	1,890	18.9	35	0.4	4,182	41.9	2,522	25.3	9,977

[a]Totals do not match those in Figure 2 due to the classification method for disease categories in this table.
[b]The method used to classify diseases in the WCA database for this time period differs from previous years; this year's categorization was modeled after the classification system used to group the MDLEG OD Reports.
[c]Number of reports per year (averaged over the 2 years).
[d]Counts published in previous years' OD reports for 1992-1997 have been corrected here.
[e]Type of occupational disease was missing for 97 reports.

Table 9. Primary Diagnosis of Patients Hospitalized in Michigan from 1992-2006, with Workers' Compensation Designated as Primary Payment Source at Discharge

Primary Discharge Diagnosis (ICD-9[a])	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Infectious Diseases (001-139)	0.2	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.2	0.1	0.4	0.4	0.7	1.3
Neoplasms (140-239)	0.3	0.5	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.4	0.3
Endocrine Diseases (240-279)	0.3	0.4	0.3	0.3	0.3	0.2	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.2	0.5
Blood Diseases (280-289)	0.1	<0.1	0.1	<0.1	0.1	0.1	0.2	0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1
Mental Disorders (290-319)	1.5	1.4	1.4	1.1	0.9	1.0	0.8	1.2	1.1	0.9	0.9	0.7	0.8	0.6	0.9
Nervous System Diseases (320-389)	2.8	2.3	2.4	2.3	1.6	1.9	1.5	1.1	1.1	1.0	1.1	1.1	1.2	1.0	1.1
Circulatory Diseases (390-459)	2.7	2.6	2.3	2.5	2.8	2.3	2.3	2.3	2.2	2.6	2.1	2.6	2.9	4.0	3.8
Respiratory Diseases (460-519)	1.0	1.4	1.0	1.3	1.3	1.3	1.2	1.4	1.1	1.2	1.4	1.7	2.0	2.2	2.1
Digestive Diseases (520-579)	2.0	2.2	1.9	2.0	1.7	1.9	1.8	2.0	1.5	1.7	1.7	1.8	2.0	2.5	1.9
Genitourinary Diseases (580-629)	0.8	1.0	0.5	0.7	0.8	0.6	0.5	0.4	0.5	0.5	0.5	0.6	0.6	0.8	0.8
Pregnancy Complications (630-676)	1.4	1.6	0.3	0.5	0.5	0.9	1.1	1.0	0.7	0.4	0.5	0.4	0.1	0.2	0.1
Skin Diseases (680-709)	2.7	2.6	3.5	3.7	3.5	3.5	3.4	3.7	3.7	3.2	3.2	3.5	3.3	3.6	4.7
Musculoskeletal Diseases (710-739)	42.5	42.9	42.3	41.7	42.7	41.5	42.0	40.7	40.3	43.3	43.9	39.3	38.5	34.2	36.9
Congenital Anomalies (740-759)	0.5	0.5	0.4	0.4	0.2	0.3	0.2	0.4	0.2	0.2	0.2	0.2	0.3	0.1	0.4
Perinatal Complications (760-779)	<0.1	<0.1	--	<0.1	--	<0.1	--	--	--	<0.1	--	--	--	--	--
Symptoms & Signs (780-799)	1.2	1.3	1.3	1.6	1.7	1.5	1.3	1.6	1.6	1.2	1.2	1.7	1.5	1.8	2.3
Injury & Poisoning (800-999)	36.6	35.5	39.1	40.0	40.0	40.8	40.0	40.6	43.3	41.0	40.1	40.6	41.1	42.4	38.8
V Codes	3.4	3.4	2.7	1.2	1.3	1.7	2.6	2.6	2.0	2.0	2.2	4.7	4.6	5.5	4.1
Total[b]	**6891**	**7282**	**7058**	**5726**	**5631**	**5567**	**5183**	**5153**	**5278**	**5013**	**4809**	**5160**	**4760**	**4996**	**4825**

[a]International Classification of Diseases, 9th Revision.
[b]Totals vary due to missing information.

Table 10. Demographic Characteristics of Patients Hospitalized in Michigan from 1992-2006, with Workers' Compensation Designated as Primary Payment Source at Discharge

	1992[a]	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	# (%)	# (%)	# (%)	# (%)	# (%)	# (%)	# (%)	(%)	# (%)	# (%)	# (%)	# (%)	# %	# %	# %
Gender															
Male	5103 (74)	5388 (74)	5388 (76)	4387 (76)	4381 (78)	4205 (75)	3919 (76)	3907 (76)	4042 (77)	3797 (76)	3635 (76)	3427 (74)	3634 (76)	3748 (75)	3524 (73)
Female	1792 (26)	1903 (26)	1675 (24)	1349 (24)	1253 (22)	1365 (25)	1267 (24)	1249 (24)	1235 (23)	1217 (24)	1174 (24)	1208 (26)	1126 (24)	1248 (25)	1301 (27)
Total	6895	7291	7063	5736	5634	5570	5186	5156	5277	5014	4809	4635	4760	4996	4825
Race															
White	5173 (85)	5346 (86)	5179 (87)	3708 (85)	3355 (84)	3274 (85)	3016 (85)	2899(85)	3036 (85)	2833 (85)	2697 (86)	2598 (85)	2737 (86)	3016 (87)	2837 (87)
African American	519 (9)	515 (8)	544 (9)	417 (10)	425 (11)	378 (10)	387 (11)	323 (9)	366 (10)	335 (10)	276 (9)	324 (11)	319 (10)	319 (9)	288 (9)
Asian	11 (<1)	9 (<1)	10 (<1)	12 (<1)	7 (<1)	5 (<1)	14 (<1)	9 (<1)	16 (<1)	3 (<1)	9 (<1)	6 (<1)	11 (<1)	11 (<1)	9 (<1)
American Indian	0 --	1 (<1)	2 (<1)	1 (<1)	2 (<1)	13 (<1)	13 (<1)	5 (<1)	7 (<1)	12 (<1)	8 (<1)	3 (<1)	7 (<1)	7 (<1)	11 (<1)
Hispanic	32 (1)	37 (1)	41 (1)	49 (1)	37 (1)	26 (1)	41 (1)	51 (1)	40 (1)	51 (2)	63 (2)	66 (2)	65 (2)	60 (2)	63 (2)
Other	321 (5)	337 (5)	190 (3)	183 (4)	165 (4)	149 (4)	90 (3)	118 (3)	92 (3)	109 (3)	70 (2)	49 (2)	33 (1)	52 (2)	53 (2)
Total	**6056**	**6245**	**5966**	**4370**	**3991**	**3845**	**3561**	**3405**	**3557**	**3343**	**3123**	**3046**	**3172**	**3465**	**3261**
Age															
< 15	57 (1)	45 (1)	41 (1)	7 (<1)	9 (<1)	10 (<1)	2 (<1)	6 (<1)	4 (<1)	8 (<1)	8 (<1)	16 (<1)	6 (<1)	1 (<1)	4 (<1)
15-19	147 (2)	140 (2)	159 (2)	121 (2)	87 (2)	87 (2)	113 (2)	107 (2)	109 (2)	75 (2)	69 (1)	51 (1)	74 (2)	60 (1)	63 (1)
20-29	1248 (18)	1176 (16)	1104 (16)	903 (16)	810 (14)	801 (14)	722 (14)	725 (15)	666 (13)	629 (13)	540 (11)	537 (12)	513 (11)	573 (11)	550 (11)
30-39	2115 (31)	2157(30)	2097 (30)	1684 (29)	1636 (29)	1597 (29)	1421 (28)	1358 (27)	1362(26)	1224 (24)	1188 (25)	1102 (24)	1057 (22)	987 (20)	925 (19)
40-49	1642 (24)	1820(25)	1810 (26)	1531 (27)	1583 (28)	1618 (29)	1548 (30)	1513 (30)	1656(32)	1556 (31)	1541 (32)	1446 (31)	1519 (32)	1434 (29)	1390 (29)
50-59	1053 (15)	1205 (17)	1248 (18)	1034 (18)	1062 (19)	1017 (18)	934 (18)	884 (18)	1026 20)	1084 (22)	1029 (21)	1005 (22)	1093 (23)	1186 (24)	1128 (23)
60-69	417 (6)	466 (7)	440 (6)	360 (6)	351 (6)	329 (6)	306 (6)	309 (6)	343 (7)	331 (7)	314 (7)	361 (8)	373 (8)	377 (8)	421 (9)
70-79	92 (1)	113 (2)	104 (1)	68 (1)	74 (1)	73 (1)	78 (2)	85 (2)	75 (1)	77 (2)	85 (2)	97 (2)	101 (2)	176 (4)	181 (4)
≥ 80	23 (<1)	40 (1)	37 (1)	10 (<1)	9 (<1)	12 (<1)	8 (<1)	12 (<1)	11 (<1)	15 (<1)	18 (<1)	20 (<1)	24 (1)	192 (4)	163 (3)
Total	**6794**	**7162**	**7040**	**5718**	**5621**	**5544**	**5132**	**4999**	**5252**	**4999**	**4792**	**4635**	**4760**	**4986**	**4825**
Avg. age, std. dev.	40 ±13	41 ±13	41 ±12	41 ±12	42 ±12	42 ±12	42 ±12	42 ±12	43 ±12	43 ±12	43 ±12	44 ±13	44±12	46±15	47±15

[a]Totals vary due to missing information.

Table 11. Demographic Characteristics of 1,133 Individuals Reported by the Two Michigan Poison Control Centers in 2007

Demographic Characteristics		
Age	*Number*	*Percent*
15-19	80	9.2
20-29	313	36.0
30-39	175	20.1
40-49	169	19.4
50-59	111	12.8
60-69	19	2.2
≥ 70	2	0.2
Total	**869**[a]	99.9[b]
Gender	*Number*	*Percent*
Male	759	67.0
Female	374	33.0
Total	**1,133**	100.0

[a] Age was missing on 264 reports.
[b] Percentage 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 the reported statistics.

ICD-9 Code	Description
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