August 11, 2015 & December 30, 2015

2014 Annual Report

Summary of Occupational Disease Reports to the Michigan Department of Licensing and Regulatory Affairs

NOTE

The Bureau of Labor and Statistics (BLS) survey data was not available at the time of publication of the 2014 Annual Report, affecting Table 8 (page 10). This information will be updated in the 2015 Annual Report.

In addition, the Michigan Health and Hospital Association, Michigan In-patient and Out-patient databases for calendar year 2014 were not available at the original time of publication of the 2014 Annual Report (8-11-2015). This information has been updated as of 12-30-2015 affecting Figures 4 & 5 (page 11) and Tables 9 & 10 (page 12).

2014 ANNUAL REPORT SUMMARY OF OCCUPATIONAL DISEASE REPORTS TO THE MICHIGAN DEPARTMENT OF LICENSING and REGULATORY AFFAIRS

Occupational Disease Surveillance Program

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There are many ways to report occupational diseases to the state:

ONLINE:

www.oem.msu.edu

EMAIL:
ODReport@ht.msu.edu

FAX:

517.432.3606

TELEPHONE:

1.800.446.7805

MAIL:

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Mgt & Tech Svc Div
530 W Allegan St
PO BOX 30649
Lansing, MI 48909

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909 Fee Road, Room 117
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There are many resources available to help employers, employees, healthcare professionals and others understand more about work-related diseases. Links to these resources can be found at: **www.oem.msu.edu**.

Acronyms

BLS Bureau of Labor Statistics

LARA MI Department of Licensing and Regulatory Affairs

MDCH Michigan Department of Community Health

MIOSHA Michigan Occupational Safety and Health Administration

MSU OEM Michigan State University Occupational and Environmental Medicine

NAICS North American Industrial Classification System

NIOSH National Institute for Occupational Safety and Health

OD Report Occupational Disease Report

WCA Workers' Compensation Agency

This report was funded by the National Institute for Occupational Safety & Health, under cooperative agreement U60-OH008466.

Background

This is the 23rd annual report on occupational diseases in Michigan, and is based upon the reports submitted to the Michigan Department of Licensing and Regulatory Affairs (LARA) in calendar year 2014. 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. LARA designates Michigan State University's College of Human Medicine, Occupational and Environmental Medicine Division (MSU OEM) as its bona fide

Background continued...

Part 56 of the Michigan Public Health Code requires reporting of all known or suspected occupational illnesses or work-aggravated health conditions to the Michigan Department of Licensing and Regulatory Affairs *within 10 days of discovery*.

agent to compile and analyze the occupational disease reports.

A standard form is used to report individuals with a known or suspected work-related condition. It requests medical and demographic information on the affected employee as well as information about the facility at which the employee became ill. Figure 1 is a copy of the Known or Suspected Occupational Disease reporting form.

Reports received are reviewed by MSU OEM staff and computerized.

In some cases, additional follow-up is conducted. The reported patient may be contacted and interviewed by staff at MSU OEM to obtain more information about their illness. A Michigan Occupational Safety and Health Administration (MIOSHA) enforcement inspection may be initiated at the patient's workplace to assess current working conditions and determine if other employees are experiencing similar health issues.

Reports are analyzed on a yearly basis and the results are shared with health professionals and other stakeholders.

In 2014, 852 (1.4%) of the 61,562 human exposure-related calls to the Michigan Poison Control Center were related to occupational exposures.

Figure 1. Occupational Disease Reporting Form

Michigan Department of Licensing and Regulatory Affairs — MIOSHA Wage Hour and Technical Services Division

Known or Suspected Occupational Disease Report

(Information will be held confidential as prescribed in Public Act 368 of 1978.)

EMPLOYEE AFFECTED

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

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: Mo Day Year To: 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? If yes, record information below.	Yes No Don't Know		
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 Licensing Regulatory Affairs is an equal opportunity, affirmative action employer, service provider and buyer

Return completed form to:

Michigan Department of Licensing and Regulatory Affairs
Michigan Occupational Safety and Health Administration
MIOSHA Wage Hour and Technical Services Division
7150 Harris Drive, P.O. Box 30649
Lansing, MI 48909-8149

MIOSHA-MTSD-51 (06/13)

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

METHODS

An occupational disease (OD) report is initiated when a clinician knows or suspects that a patient's illness is work-related. Reports are submitted by or requested from a variety of sources, listed below. Additional reports are generated through annual review of the Michigan Health and Hospital Association inpatient database.

SOURCES TO IDENTIFY PATIENTS

- **Health Care Providers** Private practice, working for industry, NIOSH-certified "B" readers, audiologists, clinics
- **Employers**
- **Hospitals** for International Classification of Diseases—9th Revision (ICD-9)[1] 502, 501, 495, 496, 491, 492, and other select work-related conditions
- **Workers' Compensation Agency**
- **Poison Control Center** data for work-related poisonings
- **Reports from Co-Workers or MIOSHA Field Staff** confirmed by a health care provider
- **Death Certificates** for ICD-10 Cause of Death (COD) or contributing COD J61, J62.8, J63, J64, J65, J67; if Underlying COD J45, J68
- **3rd Judicial Circuit State Court of Michigan** for asbestos-related disease
- **Mine Safety and Health Administration**
- **Michigan Cancer Registry** for mesothelioma
- **Clinical Laboratories** for blood lead analyses, and specific IgE allergy testing

OD reports are used to direct surveillance, intervention and prevention activities. The computerized OD report information includes: 1) employee name, age, sex, race, zip code and optional partial social security number; 2) employer name, worksite address, city, zip code, number of persons employed at the facility and an assigned North American Industry Classification System (NAICS) code; 3) details of the illness, diagnosis date, suspected causative agent(s), vital status, and an assigned ICD-9 code; 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.

More than one report on a given individual with different work-related diseases may be submitted to LARA within a given year and across multiple years. If several reports are submitted for acute illnesses for a single individual, all of the reports are included in our statistics. In contrast, 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 (see list below for chronic diseases).

The 2013 Annual Report on Silicosis & Other Work-Related Lung Disease contains information on Asbestos-related lung disease that was formerly in the OD Annual Reports. The report can be found at: www.oem.msu.edu

CHRONIC OCCUPATIONAL DISEASES COUNTED ONLY ONCE

ICD-9	DESCRIPTION
011	Pulmonary TB
015	TB of Bones & Joints
135	Sarcoidosis
137	TB, Late Effects of
140-239	Cancer
250-259	Diseases of Other Endocrine Glands
260-269	Nutritional Deficiencies
270-279	Metabolic & Immunity Disorders except 276, Dehydration
280-289	Diseases of the Blood & Blood Forming Agents
290-319	Mental Disorders except 308 (Acute Reaction to Stress) & 309 (Adjustment Reaction)
320-340	Select Diseases of the Nervous System & Sense Organs
388-389	Noise-Induced Hearing Loss, Tinnitus
390-409	Select Diseases of the Circulatory System
491-505	Select Diseases of the Respiratory System
509	Pleural Plaques w/no Parenchymal Abnormality on 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

RESULTS

A total of 8,228 occupational disease reports were submitted to LARA in calendar year 2014. Figure 2 shows the number of reports received each year since 1985.

Reporting Source

Company or contract medical departments submitted 58% of the reports (4,802 cases); non-company associated health care practitioners submitted 42% of the reports (3,426 cases). Figure 3 shows the trends by reporting source (company or non-company associated) since 1991.

Company Size

A little over half of the reports were submitted on individuals who worked in large companies (Table 1) with 54% of the 5,873 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. About 74% of the 1,229 reports with known company size that were submitted by non-company practitioners involved companies with < 500 employees, while about 38% of the 4,644 reports with known company size submitted by company practitioners involved facilities with < 500 employees.

Non-Company Clinicians

One hundred thirty-two non-company-associated clinicians reported 249 incidents of occupational disease. Thirty labs were

Figure 2
OD Reports to LARA by Year Reported: 1985-2014

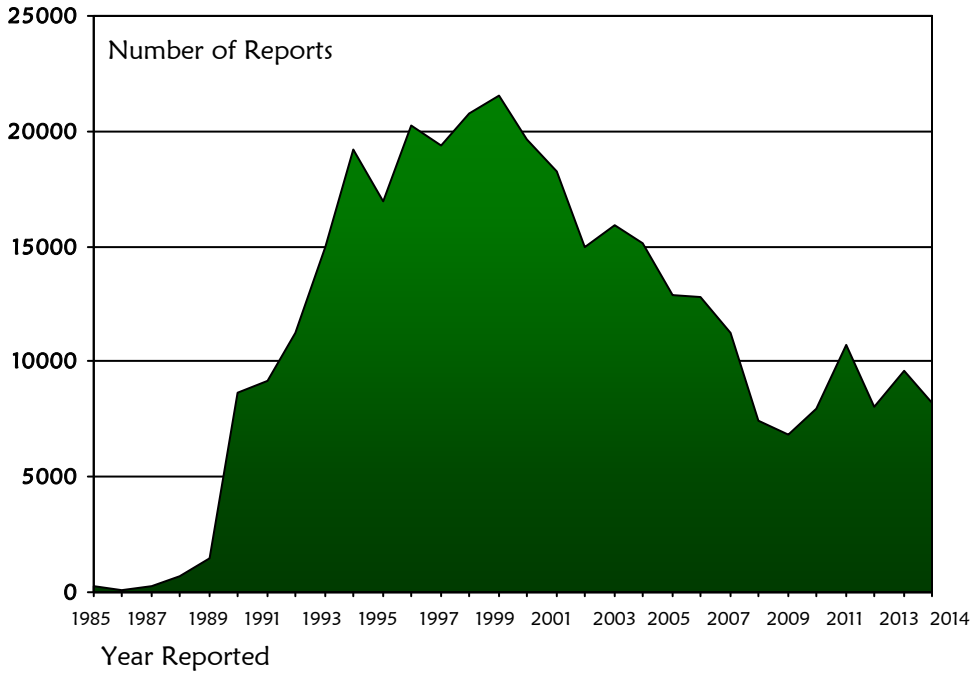
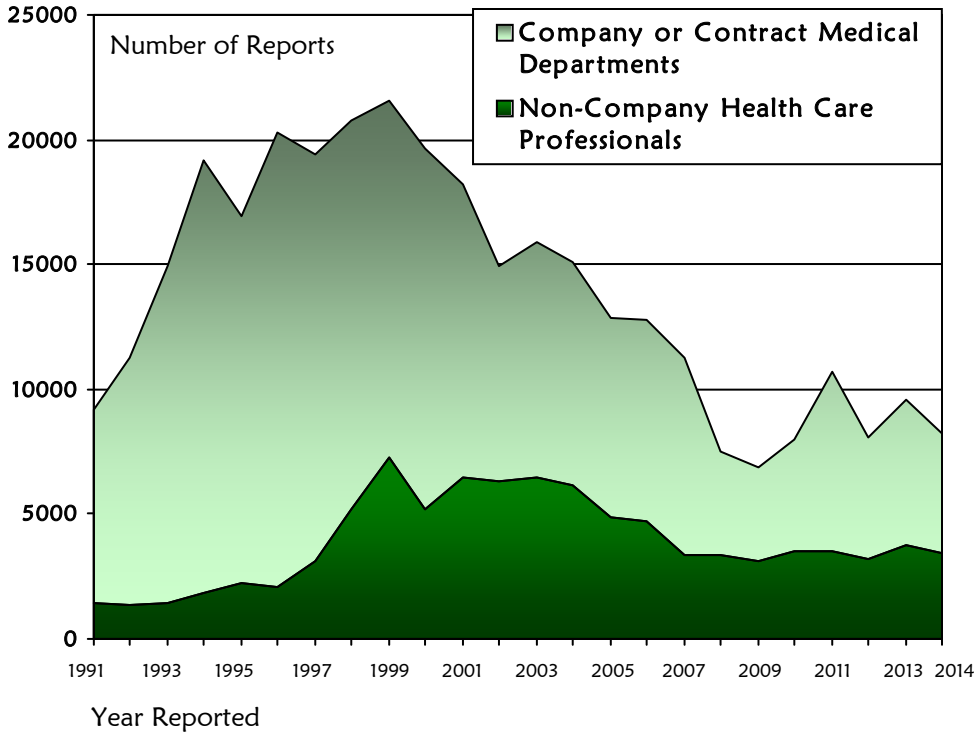


Figure 3
OD Reports by Year and Reporting Source: 1991-2014



RESULTS, continued...

responsible for identifying 1,737 reports of lead poisoning. In addition, the Michigan Poison Control Center reported 803 incidents of work-related poisonings, the 3rd Circuit Court of Michigan reported 327 asbestos-related claims, hospitals reported 288 patients with work-related conditions, and two labs reported 22 latex allergies. One hundred seventeen (89%) of the clinicians reported only one patient each in calendar year 2014 (Table 2); one clinician reported 46 patients; this clinician is certified to interpret chest x-rays for dust-related lung disease ("B" reader). 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. In 2014, there were six Michigan physicians who were listed as a "B" reader on the NIOSH "B" reader website.

Table 1
Company Size at Facilities with an OD Report in 2014: Non-Company v Company Clinicians

Number of Employees	REPORTING SOURCE					
	Non-Company Clinicians		Company Clinicians		Total Reports	
	#	%	#	%	#	%
< 25	193	15.7	368	7.9	561	9.6
25-100	290	23.6	535	11.5	825	14.0
100-500	425	34.6	883	19.0	1,308	22.3
> 500	321	26.1	2,858	61.5	3,179	54.1
Total	1,229[a]	100.0	4,644[b]	99.9[c]	5,873	100.0

[a] The number of employees was missing on 2,197 reports.
[b] The number of employees was missing on 158 reports.
[c] Percent does not add to 100 due to rounding.

Table 2
OD Reports Submitted by Non-Company Clinicians in 2014

Number of Reports	Clinicians		Patients
	#	%	#
1	117	88.6	117
2-5	11	8.3	29
6-10	0	—	—
11-20	2	1.5	33
>20	2	1.5	70
Total[a]	132	99.9[b]	249

[a] Includes reports only from individual clinicians.
[b] Percent does not add to 100 due to rounding.

Occupational Health Clinics

There are approximately 187 occupational health clinics in Michigan. From June 2005 to 2009, the number of such clinics reporting occupational disease cases to the State increased from 21 to 56. In 2010, the number of reporting clinics dropped to 44, in 2011 increased to 64, in 2012 decreased to 61, in 2013 increased to 66, and in 2014 decreased to 46. Biennial audits of a sample of non-reporting clinics began in 2009.

Demographics

Table 3 shows the age, gender and race distribution of the workers with occupational diseases reported in the year 2014. The mean age of reported patients was 45 ± 15 years (range, 15 to 94 years) with approximately two-thirds of the patients (64%) between the ages of 25 and 54 years. Ninety-five reports were submitted for patients age 19 or younger, and 102 reports were submitted for patients age 80 and older.

Sixty-six percent of all reports submitted were for male workers. Ninety percent of the submitted reports (7,429 cases) did not indicate the worker's race. Of the 799 reports that did indicate race, 79% were Caucasian, 12% were African American and 9% were Hispanic.

RESULTS, continued...

Table 3
Demographic Characteristics of Occupational Disease Cases Reported in 2014

Demographic Characteristic		
Age	#	%
≤ 19	95	1.4
20-24	492	7.0
25-29	662	9.4
30-34	610	8.7
35-39	668	9.5
40-44	789	11.2
45-49	819	11.7
50-54	918	13.1
55-59	812	11.6
60-69	813	11.6
70-79	239	3.4
> 80	102	1.5
Total[a]	7,019	100.1[b]
Gender	#	%
Male	5,368	65.7
Female	2,805	34.3
Total[c]	8,173	100.0
Race	#	%
Caucasian	628	78.6
African American	96	12.0
Hispanic	75	9.4
Total[d]	799	100.0

[a]Age was unknown for 1,209 reports. Mean age 45 ±15 yrs.
[b]Percent does not add to 100 due to rounding.
[c]Gender was unknown for 55 reports.
[d]Race was unknown for 7,429 reports.

Younger Workers

Of the 57 workers *age 18 and younger*, four were 15 years old, seven were 16 years old, 15 were 17 years of age, and 31 were 18 years old. Twenty-two (39%) of the reported patients age 18 and younger were female and 35 (61%) were male. Place of employment was unknown for 40 of the 57 younger workers. Of the 17 with known employment type, 11 worked in the services industry (one in auto repair, nine in recreation, and one in education), four worked in the trades industry, and two worked in manufacturing.

Nine of the younger workers were reported by a company-affiliated clinician or clinic. Twenty-six were reported by the Poison Control Center, 13 were for respiratory symptoms, 13 were for an elevated blood lead level (serum lead levels were between five and 24 micrograms per deciliter), three were for general symptoms, and one each was for noise-induced hearing loss and dermatitis. No work-related fatalities for workers age 18 or younger were identified in 2014.

Older Workers

Of the 102 workers age eighty and older, 95 (93%) were between the ages of 80 and 89, and seven (7%) were between 90 and 94 years of age. Seventy-seven were men and 25 were women. Thirty-two of the older patients worked in or were retired from manufacturing, four worked in utilities, one worked in construction, and one worked for the railroad. Industry or former industry was not indicated in 64 reports.

Private practice clinicians not associated with any company reported 97 of the 102 patients. Fifty-nine of the older workers were reported for dust-related lung disease (including 16 with lung cancer, 25 with asbestosis, 12 with silicosis and six with pleural thickening), 34 for elevated blood lead levels (serum lead levels were between 5 and 10 micrograms per deciliter), two for other respiratory illness, and one each for shoulder sprain, carpal tunnel syndrome, toxic effect of other substances, a blood disease, noise-induced hearing loss, work-related asthma and COPD.

Illness Information

Table 4 shows the distribution of diagnoses or clinical impressions by reporting source. Diagnoses were grouped by major International Classification of Diseases categories (ICD-9th Revision). Overall, repetitive trauma conditions (sprains and strains) were the most frequently reported conditions, with 2,610 cases representing 32% of all OD reports submitted.

Toxic effects of substances (poisoning) were the second most frequently reported, with 1,808 (22%) cases. Symptoms, signs and ill-defined conditions were the third most frequently reported conditions with 858 (10%) cases, followed by diseases of the respiratory system which were the fourth most frequently reported conditions, with 829 (10%) cases. Musculoskeletal diseases were reported for 688 cases representing 8% of all reports

RESULTS, continued...

Table 4
2014 OD Reports by Disease Type and Reporting Source

DISEASE TYPE	Non-Company		Company		Total	
	#	%	#	%	#	%
Infectious & Parasitic Diseases (ICD 001-139)	0	--	22	0.5	22	0.3
Neoplasms (ICD 140-239)	103	3.0	4	0.1	107	1.3
Metabolic Disorders (ICD 270-279)	0	--	1	<0.1	1	<0.1
Blood and Blood Forming Organs (ICD 280-289)	0	--	14	0.3	14	0.2
Mental Disorders (ICD 290-319)	2	<0.1	91	1.9	93	1.1
Nervous System & Sense Organs (ICD 320-389)	23	0.7	660	13.7	683	8.3
Circulatory System (ICD 390-459)	0	--	0	--	0	--
Respiratory System (ICD 460-519)	658	19.2	171	3.6	829	10.1
Digestive System (ICD 520-579)	0	--	18	0.4	18	0.2
Genitourinary System (ICD 580-629)	1	<0.1	1	<0.1	2	<0.1
Skin & Subcutaneous Tissue (ICD 680-709)	16	0.5	322	6.7	338	4.1
Musculoskeletal System & Connective Tissue (ICD 710-739)	8	0.2	680	14.2	688	8.4
Symptoms, Signs & Ill-Defined Conditions (ICD 780-799)	631	18.4	227	4.7	858	10.4
Repetitive Trauma: Sprains & Strains (ICD 800-999 except ICD 940 & ICD 980-989)	61	1.8	2,549	53.1	2,610	31.7
Burn Confined to Eye (ICD 940)	153	4.5	4	0.1	157	1.9
Toxic Effects of Substances - Poisonings (ICD 980-989)	1,770	51.7	38	0.8	1,808	22.0
TOTAL	**3,426**	100.0	**4,802**	100.1[a]	**8,228**	100.0

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

submitted. There were 683 (8%) nervous system and sense organ disease reports, 338 (4%) reports of skin diseases, 157 (2%) burns to the eye, 107 (1%) reports of cancers, and 93 (1%) reports of mental disorders (stress-related illnesses). Less frequently reported conditions included diseases of the digestive system, infectious and parasitic diseases, and diseases of the blood and blood forming organs.

Reporting Source Differences

Company and non-company-affiliated providers differed markedly in the types of occupational diseases reported (Table 4). Fifty-three percent of reports from company health care providers were of repetitive trauma illnesses, while two percent of reports by non-company providers represented these diagnoses. Conversely, 52% of non-company reports were of toxic effects of substances (poisonings), compared to one percent of company submissions. The second, third and fourth most frequently reported diagnoses for company providers were musculoskeletal diseases (14%), nervous system and sense organs (14%) and skin disorders (7%). Respiratory diseases were the second most frequently reported diagnoses by non-company providers (19%). The third and fourth most frequently reported diagnoses for non-company providers were symptoms, signs and ill-defined conditions (18%) and burns to the eye (5%).

Company and non-company practitioners differed by industries represented in their reports (Table 5). Company-affiliated providers and non-company-affiliated physicians reported high percentages of patients employed in manufacturing (68% and 43%, respectively), primarily automobile production. The second and third most frequently reported industries by company providers were healthcare and social assistance (8%) and retail trade (4%). The second and third industry types most frequently reported by non-company providers were construction (22%), and utilities and public administration (7% each). Industry type was missing on 2,082 non-company and 100 company reports.

Gender Differences

Repetitive trauma was the most frequently reported diagnosis for women, with 42% of submissions (Table 6). The second, third and fourth most frequent diagnoses for women were signs, symptoms and ill-defined conditions (13%), poisonings (11%) and musculoskeletal diseases (11%). For men, poisonings were the most frequently reported diagnoses (28%), followed by repetitive trauma (26%), respiratory conditions (11%) and diseases of the nervous system and sense organs (10%). Fifty-five reports did not indicate gender.

RESULTS, continued...

Table 5
2014 OD Reports by Industry Type and Reporting Source

2007 North American Industry Classification System		Non - Company		Company		Total	
		#	%	#	%	#	%
11	Ag, Forestry Fishing & Hunting	8	0.6	10	0.2	18	0.3
21	Mining	5	0.4	11	0.2	16	0.3
22	Utilities	89	6.6	15	0.3	104	1.7
23	Construction	294	21.9	103	2.2	397	6.6
31-33	Manufacturing	579	43.1	3,178	67.6	3,757	62.1
42	Wholesale Trade	25	1.9	64	1.4	89	1.5
44-45	Retail Trade	35	2.6	197	4.2	232	3.8
48-49	Transportation & Warehousing	32	2.4	83	1.8	115	1.9
51	Information	1	0.1	27	0.6	28	0.5
52	Finance & Insurance	2	0.1	17	0.4	19	0.3
53	Real Estate & Rental & Leasing	0	—	22	0.5	22	0.4
54	Professional, Scientific & Tech Svcs	9	0.7	37	0.8	46	0.8
55	Mgt of Companies & Enterprises	0	—	0	—	0	—
56	Administrative & Support & Waste Mgt & Remediation Svcs	37	2.8	147	3.1	184	3.0
61	Educational Services	28	2.1	176	3.7	204	3.4
62	Health Care & Social Assistance	57	4.2	390	8.3	447	7.4
71	Arts, Entertainment & Recreation	31	2.3	31	0.7	62	1.0
72	Accommodation & Food Services	11	0.8	53	1.1	64	1.1
81	Other Services (excl Public Admin)	12	0.9	40	0.9	52	0.9
92	Public Administration	89	6.6	101	2.1	190	3.1
	Total[a]	1,344	100.1[b]	4,702	100.1[b]	6,046	100.1[b]

[a]Industry was unknown for 2,082 non-company reports and 100 company reports.
[b]Percent does not add to 100 due to rounding.

Table 6
2014 OD Reports by Disease Type and Gender

DISEASE TYPE	Males		Females	
	#	%	#	%
Infectious & Parasitic Diseases (ICD 001-139)	5	0.1	17	0.6
Neoplasms (ICD 140-239)	103	1.9	4	0.1
Metabolic Disorders (ICD 270-279)	1	<0.1	0	—
Blood and Blood Forming Organs (ICD 280-289)	4	0.1	10	0.4
Mental Disorders (ICD 290-319)	45	0.8	39	1.4
Nervous System & Sense Organs (ICD 320-389)	514	9.6	167	6.0
Circulatory System (ICD 390-459)	0	—	0	—
Respiratory System (ICD 460-519)	609	11.3	220	7.8
Digestive System (ICD 520-579)	13	0.2	5	0.2
Genitourinary System (ICD 580-629)	1	<0.1	1	<0.1
Skin & Subcutaneous Tissue (ICD 680-709)	210	3.9	128	4.6
Musculoskeletal System & Conn Tissue (ICD 710-739)	386	7.2	302	10.8
Symptoms, Signs & Ill-Defined Conditions (ICD 780-799)	464	8.6	357	12.7
Repetitive Trauma: Sprains & Strains (ICD 800-999 except ICD 940 & ICD 980-989)	1,416	26.4	1,187	42.3
Burn Confined to Eye (ICD 940)	94	1.8	63	2.2
Toxic Effects of Substances (ICD 980-989)	1,503	28.0	305	10.9
TOTAL[a]	**5,368**	99.9[b]	**2,805**	100.0

[a]Gender was not listed for 55 individuals.
[b]Percent does not add to 100 due to rounding.

Fatalities

Fatalities related to occupational illnesses were reported for 83 workers (Table 7). None of the illness-related fatalities reported were from acute incidents. Non-company clinicians reported all but one of the 83 fatalities. The workers who died ranged in age from 53 to 93 years. Sixty died from asbestos-related cancer, 21 from asbestosis, and one each from another lung disease and silicosis. Forty-four of the deceased workers had been employed in manufacturing, seven in construction, six in utilities, and one each in mining and transportation. Former occupation was not specified for 24 workers.

Michigan has a separate program to track acute traumatic fatalities, called MIFACE (Michigan Fatality Assessment and Control Evaluation). The MIFACE program identified an additional 146 traumatic work-related fatalities from injuries in 2014 that occurred in Michigan (provisional data). A separate report for the most recent work-related fatalities (2013 calendar year) can be found at: www.oem.msu.edu. There were no deaths among youths in the MIFACE Program in 2014.

RESULTS, continued...

Comparison with Other Data Systems

No one reporting system captures the true burden of occupational disease. The following section looks at other reporting systems and the contribution each makes to the overall characterization of work-related illness in our state.

Table 7
Demographic Characteristics of Reported Occupational Disease Fatalities in 2014

DEMOGRAPHIC CHARACTERISTIC		
Vital Status	**#**	**%**
Fatal	83	1.0
Non-Fatal	8,145	99.0
Total	**8,228**	**100.0**
Age	**#**	**%**
40 - 49	0	—
50 - 59	3	3.7
60 - 69	26	31.7
70 - 79	34	41.5
≥ 80	19	23.2
Total	**82**	**100.1[a]**
Unknown	1	
Disease Type	**#**	**%**
Neoplasm-lung	60	72.3
Asbestos-related	21	25.3
Other– lung	1	1.2
Silicosis	1	1.2
Total	**83**	**100.0**
Industry	**#**	**%**
Manufacturing	44	74.6
Construction	7	11.9
Utilities	6	10.2
Transportation	1	1.7
Mining	1	1.7
Total	**59[b]**	**100.1[a]**

[a]Percentage does not add to 100 due to rounding.
[b]Industry was missing on 24 reports.

Published Aggregate Data in MI

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.

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. In 2013, there were a total of 117,400 injuries and illnesses of which 56,700 were severe enough to cause loss of work days, job transfer or restriction. Of the 117,400 total, 8,200 were occupational illnesses and 109,200 were occupational injuries.

Data from Michigan's Workers' Compensation Agency (WCA) for 2014 showed 23,306 claims for occupational injuries and illnesses with seven or more consecutive days away from work; 14,902 of those claims are for illnesses (Table 8). Overall in 2014, about $502 million in compensation was paid by insurance companies and self-insured employers on 195,193 claims for both lost work time and medical-only costs. These claims include new claims filed in 2014, as well as previous claims for workers who continue to lose work time or incur medical costs due to their injury or illness. Sixty-nine percent of the total paid claims in 2014 were for medical procedures or care only and 31% for wage loss (http://www.michigan.gov/documents/wca/2014_Annual_Report_485649_7.pdf).

Other Sources-Hospital Discharge Data

The hospital discharge data described in this next section is not part of the 8,228 occupational disease reports described in the 2014 Annual Report. Hospital discharge data does not include identifiers; presumably some of the patients overlap with those in the 8,228 OD reports. However, especially for long latency, chronic diseases like asbestosis, it would be difficult to identify newly diagnosed patients. Therefore, the hospitalization data in this section should be considered as supplemental to the 8,228 OD reports submitted to the state in 2014. The most recent data available from the MHA is for calendar year 2013. The following section looks at hospital data where Workers' Compensation is the expected payer.

RESULTS, continued...

Table 8
Comparison of 2013 Bureau of Labor Statistics (BLS) Occupational Illness Survey Data and 2014 LARA Workers' Compensation Agency (WCA) Claims with 2008—2014 LARA Occupational Disease (OD) Reports

	Disease Category														
	Skin		Lung—Dust		Lung—Toxic		Poisoning		Physical Agents		Repeated Trauma		All Other		Total
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
BLS Survey															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2013	1,100	13.4	ND	--	600	7.3	200	2.4	ND	--	ND	--	6,300	76.8	8,200
WCA Claims															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2014	30	.2	0	--	89	0.6	4	<0.1	39	0.3	12,006	80.6	2,734	18.3	14,902
LARA OD Reports															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2008	196	2.9	905	13.2	600	8.7	1,811	26.4	13	0.2	2,305	33.5	1,042	15.2	6,872
2009	258	4.1	321	5.1	372	5.9	1,782	28.1	176	2.8	1,892	29.8	1,544	24.3	6,345
2010	263	3.5	440	5.9	841	11.3	1,750	23.5	190	2.5	2,394	32.1	1,573	21.1	7,451
2011	499	4.9	459	4.5	634	6.3	1,716	17.0	237	2.3	3,974	39.3	2,589	25.6	10,108
2012	378	5.0	328	4.3	419	5.5	1,442	18.9	46	0.6	2,892	38.0	2,106	27.7	7,611
2013	347	4.0	274	3.2	439	5.1	2,192	25.5	45	0.5	3,263	37.9	2,041	23.7	8,601
2014	338	4.5	371	4.9	458	6.1	1,808	23.9	181	2.4	2,547	33.7	1,863	24.6	7,566

ND = There was no data for this disease category.

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 2013; the numbers of hospitalizations from 1995-2013 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). For both these parameters, there was a plateau in the decrease from 2004 to 2008. However, there was also a decrease in 2009-2013 in both these parameters. In 2009, 0.30% of the 1,305,935 Michigan hospitalizations designated WC insurance as the primary payment source at discharge; in 2013 0.25% of the 1,229,393 Michigan hospitalizations designated WC insurance as the primary payment source at discharge.

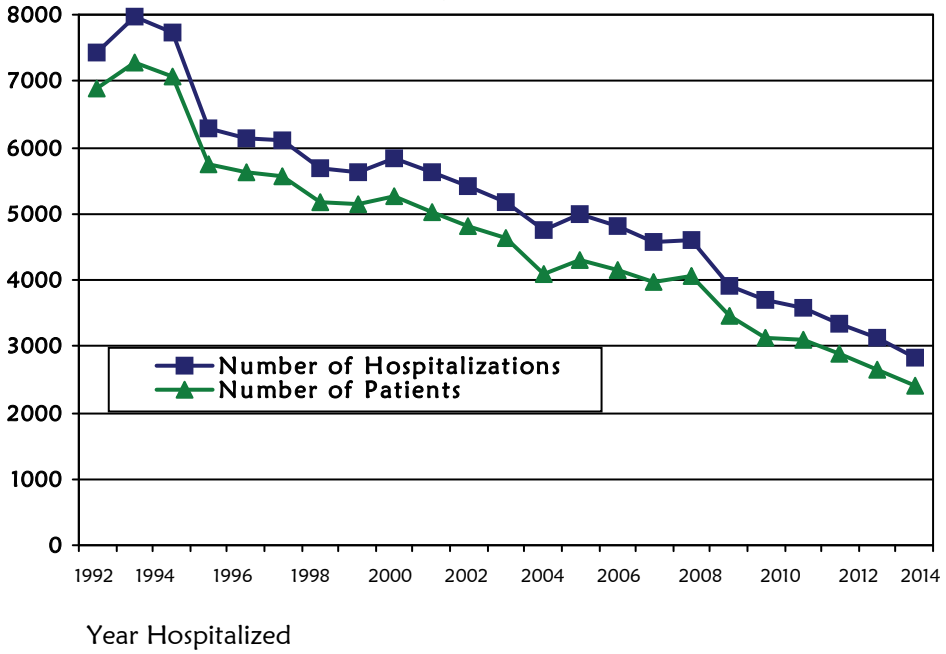
Table 9 shows the primary discharge diagnosis for hospitalizations from 2002 to 2013 where WC insurance was designated as the primary payment source at discharge. WC insurance covers a broad range of conditions, including mental illness, infections, heart disease and cancer. The most common two hospitalized conditions covered by WC insurance were injuries and poisoning accounting for 49%, and musculoskeletal diseases, accounting for 25% of all WC-related patient hospitalizations.

Table 10 lists the demographics of patients with WC insurance as the primary payment source at discharge. From 70-76% of the hospitalizations were for men, across all years from 2002 to 2013. Among hospitalizations for which race was known, approximately 85-90% were white, 7-11% were African American, <1% were Asian, and 2-5% were listed as "other."

Most hospitalizations involved workers between the ages of 40 and 59 years. Less than 1% involved workers under the age of 15. The percentage of workers 80 years or older has ranged over time from <1-4%. The percentage of hospitalizations of workers under the age of 20 has decreased slightly over time, from 3% in 1992 to less than 1% in 2013 (1992 data not shown).

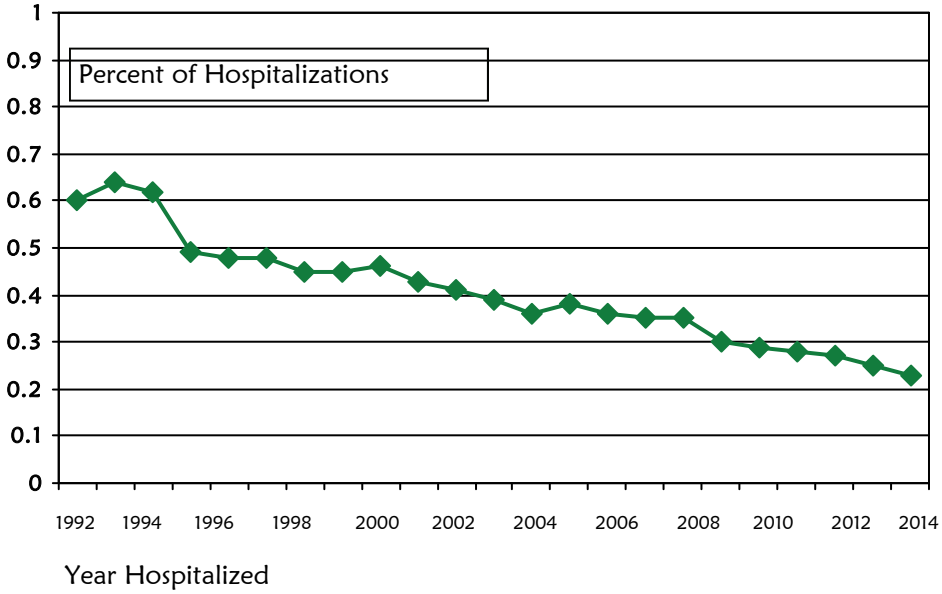
RESULTS, continued...

Figure 4
Hospitalizations and Patients with Workers' Compensation Designated as the Primary Payment Source at Discharge in Michigan: 1992-2014



The number of hospitalizations and patients with Workers' Compensation as the primary source of payment in Michigan has steadily declined over time.

Figure 5
Percent of Total Michigan Hospitalizations with Workers' Compensation Designated as the Primary Payment Source at Discharge in Michigan: 1992-2014



In calendar year 2014, there were 1,227,988 hospitalizations in Michigan. Of those, only 0.23% were paid for by Workers' Compensation. The percent of hospitalizations paid for by Workers' Compensation in Michigan has steadily declined over time.

RESULTS, continued...

Table 9 Primary Diagnosis of Hospitalizations in Michigan from 2002-2014, with Workers' Compensation Designated as Primary Payment Source at Discharge

	Year of Hospitalization												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1º Discharge Diagnosis[a]	%	%	%	%	%	%	%	%	%	%	%	%	%
Infectious Diseases (001-139)	0.1	0.4	0.4	0.7	1.3	0.8	1.3	1.6	1.2	1.5	1.7	2.2	2.6
Neoplasms (140-239)	0.2	0.2	0.2	0.4	0.3	0.1	0.3	0.3	0.1	0.4	0.2	0.1	0.1
Endocrine Diseases (240-279)	0.4	0.3	0.4	0.2	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6
Blood Diseases (280-289)	<0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	<0.1	0.1	0.2	0.1	0.2
Mental Disorders (290-319)	0.9	0.7	0.8	0.6	0.9	1.0	0.9	0.9	0.8	1.0	0.6	1.0	0.9
Nervous System Diseases (320-389)	1.1	1.1	1.2	1.0	1.1	1.4	1.7	1.6	2.0	1.8	2.1	2.1	1.9
Circulatory Diseases (390-459)	2.1	2.6	2.9	4.0	3.8	4.6	4.1	4.7	4.8	4.7	3.9	3.1	4.0
Respiratory Diseases (460-519)	1.4	1.7	2.0	2.2	2.1	2.2	2.6	2.5	2.8	1.9	2.4	1.8	2.1
Digestive Diseases (520-579)	1.7	1.8	2.0	2.5	1.9	1.8	2.3	2.5	2.6	1.9	2.0	1.8	1.9
Genitourinary Diseases (580-629)	0.5	0.6	0.6	0.8	0.8	1.1	1.3	1.2	1.1	1.3	0.9	0.8	1.0
Pregnancy Complications (630-676)	0.5	0.4	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.3	0.1	0.3	0.4
Skin Diseases (680-709)	3.2	3.5	3.3	3.6	4.7	4.7	3.8	4.0	4.3	5.2	5.6	5.0	5.0
Musculoskeletal Diseases (710-739)	43.9	39.3	38.5	34.2	36.9	33.1	32.2	31.8	29.8	28.7	28.5	24.7	23.6
Congenital Anomalies (740-759)	0.2	0.2	0.3	0.1	0.4	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.1
Perinatal Complications (760-779)	--	--	--	--	--	<0.1	--	--	--	--	--	--	—
Symptoms & Signs (780-799)	1.2	1.7	1.5	1.8	2.3	1.7	1.9	1.4	1.8	1.6	1.4	1.3	1.4
Injury & Poisoning (800-999)	40.1	40.6	41.1	42.4	38.8	42.3	41.8	42.4	43.1	44.2	44.0	48.9	48.5
V Codes	2.2	4.7	4.6	5.5	4.1	3.9	4.6	3.8	4.3	4.6	5.3	5.9	5.8
Total[b]	**4809**	**5160**	**4760**	**4996**	**4825**	**4578**	**4611**	**3906**	**3688**	**3589**	**3333**	**3127**	**2823**

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

Table 10 Demographics of Hospitalizations in Michigan from 2002-2014, with Workers' Compensation Designated as Primary Payment Source at Discharge

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Gender	%	%	%	%	%	%	%	%	%	%	%	%	%
Male	76	74	76	75	73	73	70	71	73	74	75	75	76
Female	24	26	24	25	27	27	30	29	27	26	25	25	24
Total[a] **#**	**4809**	**4635**	**4760**	**4996**	**4825**	**4578**	**4611**	**3906**	**3688**	**3589**	**3333**	**3127**	**2823**
Race	%	%	%	%	%	%	%	%	%	%	%	%	%
White	86	85	86	87	87	87	90	89	90	89	87	88	87
African Am	9	11	10	9	9	9	8	9	7	8	9	9	8
Asian	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
Other	5	4	3	3	4	4	2	2	2	3	4	3	4
Total[a] **#**	**3123**	**3046**	**3172**	**3465**	**3261**	**3233**	**3255**	**2761**	**2671**	**2659**	**2557**	**2532**	**2286**
Age	%	%	%	%	%	%	%	%	%	%	%	%	%
< 15	<1	<1	<1	<1	<1	<1	--	--	<1	<1	<1	<1	<1
15-19	1	1	2	1	1	1	1	1	1	1	1	1	1
20-29	11	12	11	11	11	11	10	9	9	10	10	11	11
30-39	25	24	22	20	19	18	17	17	18	17	15	14	16
40-59	54	53	55	53	52	54	54	55	53	53	55	54	54
60-79	8	10	10	11	12	12	14	14	16	15	17	18	17
≥ 80	<1	<1	1	4	3	3	4	4	3	4	1	1	1
Total[a] **#**	**4792**	**4635**	**4760**	**4986**	**4825**	**4578**	**4602**	**3902**	**3688**	**3589**	**3333**	**3127**	**2823**
Avg Age	43	44	44	46	47	47	48	49	48	48	48	48	47
SD-Age	±12	±13	±12	±15	±15	±15	±15	±15	±14	±15	±13	±14	±14

[a] Totals vary due to missing information.

RESULTS, continued...

Poison Control Center Data

In 2014, 803 calls to the Michigan Poison Control Center (PCC) were identified for individuals with work-related symptoms. Table 11 describes available demographic characteristics and disease categories of the individuals reported. There were more reports for males (61%). The individuals ranged in age from 15 to 75 years. Eighty-three percent of these individuals with known age were less than age 50. Of the 803 calls to the PCC in 2014, the top calls included: 208 (26%) for allergic reactions, 207 (26%) for nervous system symptoms, 147 (18%) for skin-related symptoms, and 126 (16%) for nausea and vomiting.

Table 11
Demographic Characteristics of 803 Individuals Reported by the Michigan Poison Control Center in 2014

Demographic Characteristics		
Age	#	%
15-19	43	5.9
20-29	274	37.6
30-39	162	22.2
40-49	124	17.0
50-59	101	13.9
60-69	24	3.3
≥ 70	1	0.1
Total	**729**[a]	100.0
Gender	#	%
Male	467	61.0
Female	299	39.0
Total	**766**[b]	100.0
Disease Type	#	%
Allergic Reaction	208	25.9
Nervous System & Sense Organs	207	25.8
Skin Rash and Burns	147	18.3
Nausea & Vomiting	126	15.7
Respiratory Symptoms	91	11.3
Carbon Monoxide Poisoning	11	1.4
Head and Neck Symptoms	7	0.9
Cardiovascular Symptoms	5	0.6
Animal Bite	1	0.1
Total	**803**	100.0

[a]Age was unknown for 74 reports.
[b]Gender was missing on 37 reports.

Adult Blood Lead Epidemiology and Surveillance (ABLES)

In 2014, there were 12,534 adult Michigan residents reported by labs as having their blood tested for lead. Table 12 describes the demographic characteristics of the 1,737 individuals reported with a blood lead level of 5 ug/dL and above. Most individuals were males between the ages of 30 and 59. Construction and manufacturing were the most frequently reported industries of lead exposure. A comprehensive report on all blood lead levels in Michigan can be found at: www.oem.msu.edu, the 2011 Annual Report on Blood Lead Levels on Adults in Michigan.

Table 12
Demographic Characteristics of 1,737 Individuals Reported by Laboratories with Elevated Blood Lead in Michigan, 2014

	Blood Lead Level			
	>=5 & <10 *ug*/dL		>=10 *ug*/dL	
Age	#	%	#	%
16-19	12	1.2	5	0.7
20-29	129	12.4	73	10.5
30-39	172	16.6	142	20.3
40-49	232	22.4	173	24.8
50-59	239	23.0	175	25.1
60-69	157	15.1	103	14.8
≥ 70	97	9.3	27	3.9
Total	**1,038**[a]	100.0	**698**	100.1[b]
Gender	#	%	#	%
Male	843	81.1	635	91.0
Female	196	18.9	63	9.0
Total	**1,039**	100.0	**698**	100.0
Industry	#	%	#	%
Construction	128	39.9	132	31.7
Manufacturing	95	29.6	166	39.8
Utilities	34	10.6	19	4.6
Trade	14	4.4	12	2.9
Public Admin	21	6.5	53	12.7
Arts & Entertainment	3	0.9	10	2.4
Admin & Support	10	3.1	3	0.7
Transportation	9	2.8	11	2.6
Other Services	2	0.6	2	0.5
Prof & Scientific	3	0.9	4	1.0
Mining	0	--	0	—
Health Care	2	0.6	5	1.2
Real Estate	0	--	0	--
Total	**321**[c]	99.9[b]	**417**[c]	100.1[b]

[a] Age was unknown for one individual.
[b]Percent does not add to 100 due to rounding.
[c]Industry was missing on 718 reports of blood lead levels <10 ug/dL and on 281 reports of blood leads >=10ug/dL.

DISCUSSION

There were 8,228 Occupational Disease Reports sent to LARA in calendar year 2014. This report does not include occupational injuries. The most frequent types of occupational diseases reported to LARA were repetitive trauma illnesses (32%), toxic effects of substances (22%), signs and ill-defined conditions (10%) and respiratory diseases (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 had been decreasing, except for the increase in 2003, 2010, 2011 and 2013. There was a large decrease in the number of reports received in 2005, with over 2,200 fewer reports received than in 2004; in 2009 the total number of reports decreased by over 640 from 2008. In 2010, the number of reports increased to 7,952, an increase of over 1,000 reports since 2009, and in 2011 to 10,701, an increase of almost 4,000 reports, a decrease of 2,548 reports in 2012, an increase of 1,554 reports in 2013, and a decrease of 1,395 reports in 2014.

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 2009, there was a large decline of approximately 3,000 reports in the number of non-company-affiliated practitioner reports as compared to 2004 (Figure 3). The number of company-affiliated physicians or medical departments reporting decreased in 2014 to 190, compared to 210 in 2013, 179 in 2012, 188 in 2011, 185 in 2010, 194 in 2009, 449 in 2008, 426 in 2007, 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 LARA. 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 healthcare 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 190 company-affiliated physicians reporting employees from 1,149 different companies; there were 132 non-company-affiliated physicians reporting patients to the state. There were 228,925 companies in the year 2014 and 30,355 licensed physicians in Michigan in the year 2014. Accordingly, reports are received from 0.5% of companies and 0.4% of physicians. Over the last several years, these percentages 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.

The 8,228 occupational disease reports received this past year under-represent the actual incidence of occupational diseases in Michigan. Based on an MSU study matching multiple data bases in Michigan for the years 1999-2001, one could estimate that the BLS survey missed 50% of the total number of occupational illnesses in Michigan[2]. For 2013, the most recent year available, the BLS annual survey reported 8,200 illnesses; by extension one would expect 19,000 illnesses in 2013 instead of the approximately 9,600 reported in that year. Even these types of estimates are 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 healthcare 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 industry where occupational diseases occur as reported by non-company-affiliated healthcare practitioners differs from company-based healthcare practitioners (Tables 1, 4 and 5). The differences vary depending on the specialties of the non-company-affiliated physicians who submit reports. For example, in 2014 the non-company-affiliated health care practitioners were more likely to report patients with respiratory disease who work in small, non-manufacturing companies. A large percentage of the year 2014 reports from non-company-affiliated health

DISCUSSION

care practitioners were from physicians who are specialists in the radiographic interpretation of mineral and dust-related lung disease. 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 undercount certain work-related conditions. Similarly, one cannot rely on Workers' Compensation data for a reliable count of work-related conditions. In a study covering the years 1992-1994, only 9.6% of the workers for whom an Occupational Disease Report was submitted had definitely filed a WC claim, although an additional 36% may have filed a claim for a total of 45.6%[3]. In that study, limits of the data did not allow for a more precise estimate of the claims filed, but the range underscores the point that a large number of workers do not file WC claims even though they are seen by a physician for their illness. This is an ongoing issue, as review of hospital discharge data for individuals with pneumoconioses shows only <1% - 8% paid by WC (2013 Annual Report: Tracking Silicosis and Other Work-Related Lung Diseases in Michigan, available at: www.oem.msu.edu).

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 BLS Annual Survey of Employers and the state's WCA claims system. For example, poisoning represents approximately 24% (1,808) of the OD reports, while that category of diseases only accounts for approximately 2% (200 cases) of the BLS survey and <1% (4 cases) of WCA claims. Non-employer sources such as from the Poison Control Center, "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 subsequently evaluate the effectiveness of these efforts.

REFERENCES

1. Public Health Services and Health Care Financing Administration. *International Classification of Diseases, 9th Revision, Clinical Modification*. Washington: Public Health Service, 1980.
2. Rosenman KD, Kalush A, Reilly MJ, Gardiner JC, Reeves M, Luo Z. *How Much Work-Related Injury and Illness is Missed by the Current National Surveillance System?* J Occup Environ Med 2006; 48:357-365.
3. Biddle J, Roberts K, Rosenman KD, Welch EM. *What Percentage of Workers With Work-Related Illnesses Receive Workers' Compensation Benefits?* J Occup Environ Med 1998; 40:325-331.