DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Centers for Disease Control
and Prevention (CDC)

Memorandum

Date: December 29, 2004

To: William D. Bennett
Data Systems Team, Information Resources Branch, EID, NIOSH, P03/C18

From: Norys Guerra, M.D., M.P.H.
Office of Extramural Programs, NIOSH, E74

Subject: Final Report Submitted for Entry into NTIS, Grant Number: R01OH004276-03

The attached final report has been received from the principal investigator on the subject NIOSH grant. When the document is forwarded to the National Technical Information Service, please inform us of the document number. This will allow us to respond to inquiries received about the final report. Publications are highlighted on the attached final report summary.

Attachments:
Final Report
Summary

cc: Sherri Diana, EID, P03/C18

Title: Linking Occupational Injury and Illness Data Bases
Investigator: Kenneth Rosenman
Affiliation: Michigan State University
City & State: East Lansing, MI
Telephone: (517) 353-1846
Award Number: 5R01OH004276-03
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Final Report Abstract:
The national surveillance I system for occupational injuries and illnesses, which is administered by the u. S. Department of Labor Bureau of Labor Statistics (BLS) is based on reports from employers. The national estimates are derived from a sampling strategy rather than a census of all work-related injuries and illnesses. In response to a National Academy of Sciences report in 1987 (NRC, 1987) which showed that the BLS national estimates missed 50% of acute work-related deaths, BLS began the Census of Fatal Occupational Injuries (CFOI). CFOI is a complete census that uses multiple data sources, covers all workers and is not dependent on an employer either being aware of the condition or responding to a survey. No such change was implemented to improve the national estimates for non-fatal work-related injuries and illnesses.
There have been an increased number of studies documenting that the BLS national estimates for work-related injuries and illnesses undercount both chronic conditions and acute injuries (Boyle et al, 2000; Islam et al, 2003; Landrigan and Baker, 1991; Leigh et al, 1997; Leigh et al, 2004; Nelson et al, 1992; Park et al, 1992; Roscoe et al, 2002; Rosenman et al, 2003; Stanbury et al, 2003; Windau et al, 1991). These previous studies, which estimated undercoul1lting by the BLS system have been based on comparison of counts of work-related injuries or illnesses in non-employer based data sources with the BLS estimates and not of actual matching of individuals identified in the different systems. In this study, adhering to the strict confidentiality rules of the BLS, we present the results of matching both individual workers and companies from non-employer based data sources with the actual individuals reported by the companies who participated in the BLS annual survey in Michigan in 1999,2000 and 2001.
We present the percentage of work-related injuries and illnesses missed in Michigan by the BLS survey estimates and use capture-recapture analysis to estimate the number of injuries and illnesses missed in Michigan by all data sources. We present this data for overall injuries and illnesses and also by specific conditions and industrial sectors.

Publications:
None to date.

Final Progress Report

Linking Occupational Injury And Illness Data Bases

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List of Abbreviations

ABLES – Adult Blood Lead Epidemiologic Surveillance
BLS – Bureau of Labor Statistics
CFOI – Census of Fatal Occupational Injuries
EIN – Employer Identification Number
IMIS – Integrated Management Information System
MSHA – Mine Safety and Health Administration
OD – Occupational Disease Report
OSHA – Occupational Safety and Health Administration
SIC – Standard Industrial Classification
WC – Workers' Compensation

ABSTRACT

The national surveillance system for occupational injuries and illnesses, which is administered by the U. S. Department of Labor Bureau of Labor Statistics (BLS) is based on reports from employers. The national estimates are derived from a sampling strategy rather than a census of all work-related injuries and illnesses. In response to a National Academy of Sciences report in 1987 (NRC, 1987) which showed that the BLS national estimates missed 50% of acute work-related deaths, BLS began the Census of Fatal Occupational Injuries (CFOI). CFOI is a complete census that uses multiple data sources, covers all workers and is not dependent on an employer either being aware of the condition or responding to a survey. No such change was implemented to improve the national estimates for non-fatal work-related injuries and illnesses.

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We present the percentage of work-related injuries and illnesses missed in Michigan by the BLS survey estimates and use capture-recapture analysis to estimate the number of injuries and illnesses missed in Michigan by all data sources. We present this data for overall injuries and illnesses and also by specific conditions and industrial sectors.

SIGNIFICANT FINDINGS

The significant finding is that the BLS Survey markedly underestimates the number of injuries and illnesses that occur each year. Where we were able to match actual people with at least one day away from work reported by companies in the BLS survey, we estimate BLS missed up to 69% of injuries and illnesses. Where we were only able to match the companies but not the people for cases mainly involving non lost work days we estimated BLS missed up to 34% of the cases. The difference in these two estimates is secondary to our inability in the non lost work day cases to match on individuals since BLS does not collect the names on non lost work day cases. For the non lost work day cases we considered a case a match if there were a number reported by the same company in the different databases. The days away from work matching indicated that this falsely raised the percentage of time there was a match between BLS and the other databases.

TRANSLATION OF FINDINGS

The results of this study suggest that BLS misses 49-69% of injuries and illnesses (Leigh et al, 2004). This is the first time this estimate of BLS undercount is based on the actual comparison of cases reported to BLS by employers. This is consistent with studies that showed that BLS missed 50% of acute traumatic fatalities when deaths were estimated the same way injuries and illnesses are currently estimated.

Possible solutions to address the BLS undercount include switching from sampling to a census such as MSHA does for the mining industry and/or using multiple sources as BLS does for CFOI.

In the interim results from the BLS annual survey need to be adjusted upwards to take into account the large BLS undercount of work-related injuries and illnesses.

SCIENTIFIC REPORT

Specific Aims

1. **To link the Michigan data on work-related injuries and illnesses from the following systems; U. S. Department of Labor, Bureau of Labor Statistics (BLS) Annual Survey of Occupational Injuries and Illnesses; U. S. Department of Labor Occupational Safety and Health Administration (OSHA) Injury and Illness Survey; First Injury and Illness Reports to the Michigan Bureau of Workers' Disability Compensation (BWDC); Occupational Disease Reports to the Michigan Department of Consumer and Industry Services (MDCIS); Michigan hospital inpatient/outpatient Data Base; Michigan Census of Fatal Occupational Injuries (CFOI); Michigan Adult Blood Lead Epidemiologic Surveillance (ABLES); U. S. Department of Labor Occupational Safety and Health Administration (OSHA) Integrated Management Information System; U. S. Department of Labor Mine Safety and Health Administration (MSHA) Injury and Illness data base.**

   We initially merged the ABLES and Hospital Discharge database into the OD database. We elected not to use the CFOI and MSHA database because of their small size. The other five data systems were merged for the years 1999, 2000 and 2001.

2. **To assess the degree of overlap between the nine data systems listed in the first specific aim.**

   The degree of overlap is described in the results section.

3. **To estimate the magnitude of work-related injuries and illnesses in Michigan using the nine data systems listed in the first specific aim.**

   The magnitude of work-related injuries and illnesses in Michigan is described in the results section. Because of the assumptions required to do capture-recapture and the availability of personal identifiers we could only do capture-recapture analysis on injuries and illnesses with at least one day away from work in two data bases.

4. **To develop a comprehensive and efficient model for conducting work-related injury and illness surveillance that is generalizable to other states.**

   Suggestions for correcting the undercount in the BLS system are in the discussion and conclusion.

BACKGROUND

The national surveillance system for occupational injuries and illnesses, which is administered by the U. S. Department of Labor Bureau of Labor Statistics (BLS), is based on reports from employers. The national estimates are derived from a sampling strategy rather than a census of all work-related injuries and illnesses. In response to a National Academy of Sciences report in 1987 (NRC, 1987) which showed that the BLS national estimates missed 50% of acute work-related deaths, BLS began the Census of Fatal Occupational Injuries (CFOI). CFOI is a complete census that uses multiple data sources, covers all workers and is not dependent on an employer either being aware of the condition or responding to a survey. No such change was implemented to improve the national estimates for non-fatal work-related injuries and illnesses.

There have been an increased number of studies documenting that the BLS national estimates for work-related injuries and illnesses undercount both chronic conditions and acute injuries (Boyle et al, 2000; Islam et al 2003; Landrigan and Baker, 1991; Leigh et al, 1997; Leigh et al, 2004; Nelson et al, 1992; Park et al, 1992; Roscoe et al, 2002; Rosenman et al, 2003; Stanbury et al, 2003; Windau et al, 1991). These previous studies, which estimated undercounting by the BLS system, have been based on comparison of counts of work-related injuries or illnesses in non-employer based data sources with the BLS estimates and not of actual matching of individuals identified in the different systems. In this study, adhering to the strict confidentiality rules of the BLS, we present the results of matching both individual workers and companies from non-employer based data sources with the actual individuals reported by the companies who participated in the BLS annual survey in Michigan in 1999.

METHODS

Five data bases were used in the analysis: (1) U.S. Department of Labor Bureau of Labor Statistics Annual Survey (BLS); (2) U.S. Department of Labor Occupational Safety and Health Administration Annual Survey (OSHA); (3) Michigan Bureau of Workers'

Disability and Compensation First Injury and Illness Reports (WC); (4) Michigan Occupational Disease Reports (OD); and (5) U.S. Department of Labor OSHA Integrated Management Information System (IMIS). A summary of each data system follows.

The BLS survey is an annual survey of a sample of employers by state, industry type and employment size. In Michigan it includes both public and private employers. In all states it excludes the self-employed, farms with fewer than 11 employees, private households and federal employers. In 27 states public employees are excluded. All injuries and illnesses from facilities in the mining and railroad section are obtained from the U.S. Department of Labor Mine Safety and Health Administration (MSHA) and the Department of Transportation's Federal Railroad Administration (DOT) and are included in the results. Using appropriate weights and a non-response adjustment factor, total estimates of injuries and illnesses and estimates by state and industrial section are obtained. Individual names are collected for all lost workday cases with days away from work where an employer has 30 or less cases with days away from work in a year. If employer has more than 30 cases with days away from work in a year than the employer is only requested to provide names for those cases that occurred at specific randomly chosen time intervals. Social Security numbers are not obtained. Only counts (no names of individuals) of total injuries, injuries with restricted days, total illnesses, illnesses with restricted work days and illnesses by seven disease categories are obtained on cases not involving days away from work. Individuals' names and company names are available in the BLS confidential database for cases involving days away from work and only company names for all other cases.

The OSHA annual survey is a survey of all employers with one or more employees in all sectors except mining, railroad, postal services or private households. For agriculture an establishment must have 11 or more employees to be covered. The database does not have individuals' names. It does have company names, total injuries, injuries with restricted days, injuries with days away from work, total illnesses, illnesses with restricted work days and illnesses with days away from work and illnesses by seven disease categories.

All Michigan employers who are required to provide workers' compensation insurance are required to report on what is titled a "Form 100" all injuries and illnesses "which arise out of and in the course of the employment, or on which a claim is made and result in any of the following: 1) Disability extending beyond seven consecutive days, b) Death; c) "Specific losses" (such as loss of a limb) to the Bureau of Workers' Disability and Compensation. Although employers are not required to report disability lasting less than seven consecutive days, approximately 20% of the reports received do not meet the seven-day criteria. All reports including the ones that do not meet the seven day criteria have the individual's name, and social security number, company name, number of lost work days, date of injury, nature of injury and body part affected. If an employee has an injury or illness and the employer disputes the work-relatedness of the claim then either the employee can request a mediation or hearing (Form 104) or an employer can file a notice of dispute (Form 107). All Forms 100, 104 and 107 with injury dates in 1999, 2000 and 2001 were used. These reports have the individual's name, social security

number, and company name. Although Forms 104 and 107 do not have the number of lost workdays, the Workers' Compensation Bureau estimated that 75% of these forms were filed for lost work day cases of at least seven consecutive days.

Michigan law requires all healthcare providers, including hospitals, clinics, laboratories and employers to report all known or suspected work-related illnesses but not injuries to the State (Part 56 of PA of 1978). The computerized OD records contain: 1) the affected employee's name, and social security number; the employer's name, date of diagnosis, and diagnosis or clinical impression coded according to the International Classification of Diseases (ICD-9th Revision). No information on lost work days is collected.

When an OSHA inspection is conducted in Michigan, the inspector reviews the injury and illness log maintained by an employer (only required if an employer has 11 or more employees). Information on the total number of injuries and illnesses by the seven disease categories are collected. Company names are collected but not individuals' names. This data is included in the U. S. Department of Labor OSHA Integrated Management Information System (IMIS), which covers both Federal and State Plan OSHA inspections.

Data for all five data bases described above are collected by one agency in Michigan, the Michigan Department of Labor and Economic Growth (MDLEG). The U.S. Department of Labor OSHA Annual Survey and U.S. Department of Labor IMIS data were obtained with the cooperation of MDLEG from the U.S. Department of Labor. The worker compensation data was obtained directly from MDLEG. The OD database is maintained by Michigan State University under contract to MDLEG. Access to the BLS annual survey data was obtained under the auspices of Intergovernmental Personnel Act Assignment agreements. All access to BLS data was done in a confidential manner and took place in a locked room in the BLS offices with strict review by BLS of all data, both electronic and paper, removed from the office.

Matching was performed at two levels: person to person matching for the three data bases with names of individuals (BLS, WC, and OD) and company level matching for all five data bases (BLS, OSHA, WC, OD, IMIS) for the years 1999, 2000 and 2001.

Person level matching was accomplished by matching the databases in pairs. For each pair of databases all of the records in the smaller database (based on number of records) were examined one at a time. The first step was to pull all records from the larger database, which had the same first five characters of the employee's last name or social security number as the record being examined. The second step was for the computer to identify likely matches from the records selected in the first step and order those matches in order of goodness. The third step (done manually) was to choose the most likely match from each list of possible matches or decide that no match existed.

There were three basic areas examined in the matching process: person/company, diagnosis and date of injury/illness. The best level of matching had the same last name, first name and social security number. There were also lower levels of matching that

involved using only the first 5 characters of the last name, the first initial of the first name and accepting social security number matches where six or more digits were in the same positions. Age was considered matching within one year. Missing age or employee information was also considered matching at a lower level.

The criteria above were used to assign a level of matching. At the highest levels all records were found to be matching in the manual phase. At the lowest levels less than five percent of the records matched in the manual phase. In the middle levels about half the records matched in the manual phase. The basic strategy was to view records in the manual phase, which might not be easy to electronically identify as matches due to typographic errors, differences in naming or missing data.

In cases where the level of matching on the person/company information was not sufficiently good to enable us to be sure that this was the same person, we tried to rule out matches that didn't describe the same incident. This was primarily based on the date of injury, but when the date of injury wasn't within ninety days the diagnosis became the determining factor.

Diagnosis codes were categorized as acute or chronic. Acute diagnoses were matched if they were less than or equal to 180 days apart. Any chronic diagnosis within a year was considered matching. There were three different schemes of diagnosis coding used (ICD 9, BLS Nature of Injury Code and WorkComp Nature of Injury Code). Two methods of matching diagnosis were attempted. The first method mapped the diagnosis codes from the other coding schemes to the first two digits of the appropriate BLS Nature Code. The second method divided the diagnoses from each of the coding schemes into the following categories (All Injuries, Skin Diseases, Respiratory Diseases, Dust Diseases, Poisonings, Physical Agents, Repeated Trauma, Other Illnesses).

It was found during the matching process that both of these methods worked to some extent to distinguish between matching and non-matching diagnoses. However, both methods suffered from having an unacceptable number of false positives. Because of these problems it was decided to use the diagnosis information only when the person/company information was unclear about whether the record matched or not.

The method used for company level matching was very similar to the method used in person level matching described above. Any company that matched on the person level was considered as matching on the company level. There were three variables: company name, company street address and Employer identification number (EIN) used in the company level matching. The EIN is a unique number assigned by the United States Internal Revenue Service to each company. The first step after matching companies based on person matches was to pull all records from the larger database which that had the same first ten letters of the company name, the same first ten letters of the company street address or the same EIN. The method used in the second and third steps was unchanged.

We distinguished between different facility addresses of the same company. The best level of matching for company name and street address was to have the first ten characters match. The middle level of matching was to have the first word match. For EIN the best level of matching was to have same EIN. The lowest level of matching was to have the field missing in one or both databases.

To estimate the total number of injuries and illnesses derived from the company matches we assumed that if matching companies were in different data bases that the cases reported from those companies in the different data bases were the same if the cases were in the same injury or illness category. This assumption would favor conservative results because it likely that some of the cases were on different people.

To estimate the total number of injuries and illnesses with days away from work from person matches we could only use the BLS and WC databases. Although the OD database had individual names on which to match we were unable to identify which of the OD reports had days away from work. For the WC and BLS match we did the match for cases with one or more days away from work and again only for those cases with greater than seven days away from work. The WC database was incomplete for individuals with 1-7 days away from work and to obtain an accurate estimate from capture-recapture analysis a case must have an equal chance of being captured in both systems, this would only be true for cases with more than seven days away from work.

In order to derive the estimates we used the BLS weights and applied those weights to the largest number of reports reported in any of the databases where the company matched to a BLS company that was included in the annual survey. See Appendix I for documentation of methods.

RESULTS

There were a total of 5,934 companies in the BLS Annual Survey in Michigan in 1999, 5,913 in 2000 and 5,555 in 2001. Prior to weighting, there were a total of 109,365 injuries and illnesses reported by 2,719 companies in 1999, 102,934 injuries and illnesses in 2000 reported by 2,550 companies and 84,538 injuries and illnesses in 2001 reported by 2,412 companies. Another 3,215 companies reported having no injuries or illnesses in 1999, 3,363 in 2000 and 3143 in 2001. Prior to weighting, there were 11,407 individuals reported by 2,016 companies with injuries and illnesses that caused days away from work in 1999, 10,509 individuals reported by 1,894 companies in 2000 and 8,567 individuals reported by 1,730 companies in 2001. The other 3,918 companies reported no injuries and illnesses with days away from work in 1999, 4,019 companies in 2000 and 3,825 companies in 2001.

With weighting, BLS estimated there were a total of 296,700 injuries and illnesses in Michigan in 1999 of which 68,400 were cases with days away from work, 290,000 injuries and illnesses in 2000 of which 68,900 were cases with days away from work and 258,000 injuries and illnesses in 2001 of which 58,300 were days away from work.

For 1999, WC received 61,069 claims of first report, and 22,243 requests for mediation or notice of dispute from 25,641 companies; 62,897 claims of first report and 23,312 requests for mediation or notice of dispute from 27,016 companies for 2000; and 51,028 claims of first reports and 21,451 requests for mediation or notice of dispute from 24,468 companies for 2001. Of the 61,069 claims of first reports 51,459 (84.3%) had at least seven consecutive days of no work in 1999, 54,201(86.1%) in 2000 and 43,178 (84.6%) in 2001. There were another 108,567 work-related injuries and illnesses, with medical only claims but no lost wage replacement, because they did not meet the seven-day minimum for a total of 169,636 cases with injuries or illnesses in the WC system in 1999; 161,882 and 224,836, respectively in 2000; and 131,253 and 182,296, respectively in 2001. There were 21,351 OD reports from 618 companies, 116,296 OSHA reports from 3364 companies and 30,357 IMIS reports from 7,611 companies in 1999; 20,098 OD reports from 702 companies, 104,430 OHSA reports from 3,323 companies, and 48,811 IMIS reports from 6,505 companies in 2000; and; 17,287 OD reports from 742 companies, 93,783 OSHA reports from 3,673 companies and 54,764 IMIS reports from 4,691 companies in 2001.

Table I shows the company level match across five databases. Adding all the cases in Table I after weighting provided an estimate of 352,139 injuries and illnesses in 1999, 442,047 injuries and illnesses in 2000, and 365,021 injuries and illnesses in 2001. BLS reported 84% of these injuries and illnesses in 1999, 66% in 2000 and 71% in 2001.

These same results for company match by industry for 1999-2001 are shown in Table II and by injury versus illness in Table III.

See Table IV for the person level match and capture-recapture analysis for the two databases with individual names and information on the number of lost work days. This table shows the match for ≥ 1 day away from work and greater than 7 days away from work for illnesses and injuries separately, and illnesses and injuries combined. Adding all cases with ≥ 1 day away from work after weighting provided an estimate of 134,312 and after including capture-recapture an estimate of 214,610 in 1999, 141,407 and 208,355 in 2000, and 124,177 and 171,488 in 2001. This compares to the BLS published estimate of 68,400 (50.9% and 31.9%) in 1999, 68,900 (48.7% and 33.1%) in 2000 and 58,300 (46.9% and 34.0%) in 2001. Adding cases for more than 7 days away from work after weighting provided an estimate of 78,100 and after including capture-recapture 97,133 in 1999, 87,297 and 106,996 in 2000, and 72,731 and 80,967 in 2001. This compares to the BLS data, alone which estimated 32,056 (41.0% and 33.0%) in 1999, 33,219 (38.1% and 31.0%) in 2000 and 27,117 (37.3% and 33.5%) in 2002.

These same results for person match by industry are shown in Table V and by type of injury/illness in Tables VI and VII.

DISCUSSION

There are multiple reasons why the current BLS national system for estimating work-related injuries and illnesses is incomplete: (1) lack of coverage of government workers

in half the states although not in Michigan where government workers are covered; (2) lack of coverage of the self-employed and farms with fewer than 11 employees in all states; (3) the perceived presence by employers of financial and regulatory disincentives for complete reporting; (4) employers not knowing about former employees or retirees who develop diseases with a long latency period between first exposure and manifestation of the disease (i.e. pneumoconiosis); (5) the presence of socioeconomic disincentives for employees to make their employer aware of a work-related condition, and (6) the use of a sampling strategy, rather than a complete census.

The data indicated that alternate databases report additional cases beyond what a company reports to BLS either when they report cases or when a company reports they have no cases. In the top half of Table I where a company in BLS reported at least one case, more cases were identified in the other databases. The bottom half of Table I shows cases identified in companies in the BLS survey where those companies said they had no cases but alternate data bases indicated there were cases. Workers' Compensation was the largest source of cases missed by the BLS survey.

Our estimate of the cases missed by the BLS annual survey is much greater for days away from cases than all cases. We do not believe that this difference is secondary to less reporting of more severe cases (cases requiring days away from work) but rather is secondary to the fact that we could only match on the person level for days away from work cases. Our assumption for all cases, that reported cases in the different databases were actually the same cases, was overly conservative. Where we had information, on the individual this was clearly not true.

If one expanded the BLS annual survey to include workers' compensation information our data indicate a substantial percentage of cases would still be missed (20% in 1999, 18% in 2000, 10% in 2001). These estimates of missed cases do not include injuries not covered by either the BLS annual survey, or workers' compensation such as the self-employed, family farmers, and Federal employees. It is estimated that exclusion of these workers causes an additional 25% undercount beyond that missed by undercounting of BLS and WC covered employers (Leigh et al, 2004).

Our results show that the incompleteness is not uniform for all injuries and illnesses nor across all industries. To obtain more accurate estimates of work-related injuries and illnesses it will be necessary to change the current system to address the undercount. The development of the national CFOI system for occupational fatal injuries is an example of basic changes that were implemented to correct the undercount in fatal work-related injuries. CFOI uses multiple data sources that cover all employees and data sources that are not dependent on an employer either being aware of the condition or submitting the report. No such comprehensive system for non-fatal work-related injuries and illnesses exists at either the national or state level.

The significance of developing a more comprehensive surveillance system for work-related injuries and illnesses would be its usefulness for guiding decision making about the percentage of public health resources that should be allocated to occupational health

and safety in comparison to other public health issues and to prioritize, target and evaluate both public health and enforcement activity to reduce work-related injuries and illnesses.

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PUBLICATIONS

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? (in preparation).

Gardiner JC, Luo Z, Rosenman KD, Reilly MJ, Kalush A. Capture-Recapture Analysis Using Weighted Estimates (in preparation).

INCLUSION OF GENDER AND MINORITY STUDY SUBJECTS

There were approximately 350,000 individuals included in the study. Race and ethnicity was not known for most individuals. Sixty-five percent were males and 35% were females.

INCLUSION OF CHILDREN

Workers who were less than 21 years of age were included in the study. Actual numbers included in the databases are not available.

MATERIALS AVAILABLE FOR OTHER INVESTIGATORS

Publications will allow Public Health Departments, OSHA, Workers' Compensation Bureaus and other policy makers to estimate the additional occurrence of work-related injuries and illness not captured in the National BLS tracking system.

Table I. Number of Reports After Company Match Between BLS Annual Survey, Workers' Compensation, Occupational Disease, OSHA Annual Survey and IMIS Data Base, Michigan 1999-2001							
Data Bases							
BLS	WC	OD	OSHA	IMIS	Number of Reports, 1999	Number of Reports, 2000	Number of Reports, 2001
					Weighted	Weighted	Weighted
Yes	No	No	No	No	56,193	50,583	59,301
Yes	Yes	No	No	No	137,115	139,944	103,995
Yes	Yes	Yes	No	No	7,056	10,326	19,664
Yes	Yes	Yes	Yes	No	35,047	27,118	14,914
Yes	Yes	Yes	Yes	Yes	20,859	32,053	25,075
Yes	Yes	Yes	No	Yes	1,053	7,278	784
Yes	Yes	No	Yes	No	39,874	46,582	29,315
Yes	Yes	No	Yes	Yes	13,664	39,326	30,464
Yes	Yes	No	No	Yes	15,826	20,674	8,006
Yes	No	No	No	Yes	2,288	2,345	4,593
Yes	No	No	Yes	No	5,323	6,304	11,182
Yes	No	Yes	Yes	No	981	380	2,825
Yes	No	Yes	No	No	518	555	169
Yes	No	Yes	No	Yes	107	---	313
Yes	No	No	Yes	Yes	1,071	1,644	4,515
Yes	No	Yes	Yes	Yes	---	1,040	3,185
No	Yes	Yes	Yes	Yes	---	---	---
No	Yes	No	Yes	Yes	141	---	115
No	Yes	No	No	Yes	203	5,248	1,999
No	Yes	No	No	No	14,082	49,630	42,219
No	Yes	No	Yes	No	167	794	2,011
No	Yes	Yes	No	No	---	---	---
No	Yes	Yes	Yes	No	---	76	---
No	Yes	Yes	No	Yes	---	---	---
No	No	Yes	Yes	Yes	---	---	---
No	No	No	Yes	Yes	506	---	---
No	No	No	No	Yes	---	---	---
No	No	Yes	No	No	---	---	---
No	No	Yes	Yes	No	---	---	---
No	No	Yes	No	Yes	---	---	---
No	No	No	Yes	No	---	---	11
Total					**352,139***	**442,047***	**365,021***

*Total includes individual rows of matching database combinations that were suppressed because of small numbers to comply with BLS confidentiality rules.

Table II. Company Match Between BLS Annual Survey, Workers' Compensation, Occupational Disease, OSHA and IMIS by Industry, Michigan 1999-2001						
	1999		2000		2001	
Standard Industrial Classification	BLS	%[1]	BLS	%[1]	BLS	%[1]
Agriculture, forestry, fishing (01-09)	3,100	99	3,700	95	2,900	87
Mining (10-14)	500	81	600	74	500	76
Construction (15-17)	14,400	86	16,900	73	15,900	78
Manufacturing (20-39)	134,400	92	131,300	77	109,600	81
Auto Manufacturing (37)	(48,500)	90	(51,600)	63	(43,400)	78
Transportation, comm., elec. svcs (40-49)	16,200	58	16,000	26	12,000	51
Wholesale trade (50-51)	19,300	82	14,200	65	12,800	49
Rental trade (52-59)	36,400	70	37,500	60	31,600	54
Finance, insurance, real estate (60-67)	3,100	92	3,200	46	3,100	64
Services (70-89)	42,400	61	38,500	48	38,500	48
Public Administration (91-97)	9,300	75	9,700	66	9,100	67

[1]Percent of total combined BLS, WC, OD, OSHA and IMIS estimates reported by BLS.

Table III. Company Match Between BLS Annual Survey, Workers' Compensation, Occupational Disease, OSHA and IMIS by All Injuries and All Illnesses, Michigan 1999-2001						
	1999		2000		2001	
Injury/Illness	BLS	%[1]	BLS	%[1]	BLS	%[1]
All Illnesses	37,400	80	37,400	32	31,700	37
All Injuries	259,300	90	252,800	90	226,300	89

[1]Percent of total combined BLS, WC, OD, OSHA and IMIS estimates reported by BLS.

Table IV. Person Match Between BLS Annual Survey and Workers' Compensation Claims, Michigan 1999-2001

Combined

BLS	WC	Number of Individuals 1999 Days Away From Work ≥ 1 Day	> 7 Days	Number of Individuals 2000 Days Away From Work ≥1 Day	> 7 Days	Number of Individuals 2001 Days Away From Work ≥ 1 Day	> 7 Days
Yes	Yes	23,087	17,594	18,493	14,435	11,371	9,025
Yes	No	45,339	14,462	50,477	18,791	46,889	18,092
No	Yes	65,936	46,044	72,437	54,079	65,918	45,614
No	No	80,248	19,034	66,947	19,691	47,310	8,236
Total		214,610	97,134	208,354	106,996	171,488	80,967

Injuries

BLS	WC	Number of Individuals 1999 Days Away From Work ≥ 1 Day	> 7 Days	Number of Individuals 2000 Days Away From Work ≥1 Day	> 7 Days	Number of Individuals 2001 Days Away From Work ≥ 1 Day	> 7 Days
Yes	Yes	20,482	15,683	15,180	11,636	10,274	8,231
Yes	No	41,238	12,089	44,680	15,532	42,929	15,704
No	Yes	57,776	38,248	61,750	44,189	56,864	36,746
No	No	78,479	17,720	64,087	17,748	45,719	7,669
Total		197,975	83,740	185,697	89,105	155,786	68,350

Illnesses

BLS	WC	Number of Individuals 1999 Days Away From Work ≥ 1 Day	> 7 Days	Number of Individuals 2000 Days Away From Work ≥1 Day	> 7 Days	Number of Individuals 2001 Days Away From Work ≥ 1 Day	> 7 Days
Yes	Yes	2,605	1,911	3,313	2,799	1,097	794
Yes	No	4,101	2,373	5,797	3,259	3,960	2,388
No	Yes	8,160	7,796	10,687	9,890	9,054	8,868
No	No	1,769	1,314	2,860	1,943	1,591	567
Total		16,635	13,394	22,657	17,891	15,702	12,617

Table V. Person Match Between BLS Annual Survey, and Workers' Compensation Claims for ≥1 Day and >7 Days Away from Work by Industry, Michigan 1999-2001

	1999						2000						2001					
	≥ 1 Day			> 7 Days			≥1 Day			> 7 Days			≥ 1 Day			> 7 Days		
Standard Industrial Classification	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]
Agriculture, forestry, fishing 01-09	983	87	77	326	72	65	1,171	81	76	302	54	50	920	75	71	399	61	60
Mining 10-14	159	54	54	117	100	51	245	55	55	168	100	49	141	49	49	103	100	46
Construction 15-17	5,415	76	63	3,320	67	60	7,636	73	66	3,851	60	56	6,900	72	61	3751	61	56
Manufacturing 20-39	22,292	55	36	11,266	53	42	21,494	47	30	11,245	44	33	17,708	51	27	8,219	48	40
Auto Manufacturing 37	(4,921)	47	31	(2,854)	57	43	(6,492)	38	20	(3,876)	43	26	(5,822)	43	18	(2,287)	40	37
Transportation, comm.., elec. svcs 40-49	5,444	30	18	2,407	20	12	5,883	22	13	3,015	14	11	4,950	14	12	2,392	9	8
Wholesale trade 50-51	5,410	65	54	2,114	55	48	3,183	68	61	1,571	60	57	2,831	71	49	1,398	75	71
Rental trade 52-59	8,733	37	17	4,050	29	27	9,059	46	35	3,531	32	31	7,181	62	58	2,783	50	49
Finance, insurance, real estate 60-67	1,172	79	61	446	69	62	1,054	71	61	594	66	63	811	62	54	390	51	49
Services 70-89	14,360	54	40	5,860	36	31	14,480	60	42	6,401	46	39	13,012	66	54	5,502	56	51
Public Administration 91-97	4,455	62	41	2,148	50	41	4,765	68	49	2,548	59	51	3,805	68	46	2,180	68	61
Total	**68,400***	**51**	**32**	**32,056**	**41**	**33**	**68,900***	**49**	**33**	**33,226**	**38**	**31**	**58,300***	**47**	**34**	**27,117**	**37**	**34**

[1]Percent of total combined BLS and WC estimates reported by BLS.
[2]Percent of total including capture-recapture estimates reported by BLS.
*Published BLS numbers differ from calculated total because of rounding.

Table VI. Person Match Between BLS Annual Survey, and Workers' Compensation Claims for ≥1 Day and 7 Days Away from Work by Injury, Michigan 1999-2001

	1999						2000						2001					
	≥ 1 Day			> 7 Days			≥1 Day			> 7 Days			≥ 1 Day			> 7 Days		
Injury	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]
00, 09	5,179	56	55	2,617	39	39	7,326	62	62	3,910	48	48	6,526	71	70	2,866	51	51
00. Traumatic injuries, msp.	(2,190)	100	100	(1,389)	96	96	(3,306)	100	100	(1,998)	92	92	(2,532)	100	100	(1,087)	95	95
09. Other traumatic injuries	(2,990)	42	42	(1,229)	23	23	(4,019)	48	48	(1,913)	32	32	(3,994)	60	59	(1,779)	40	40
01, 02	36,643	57	40	18,537	40	33	35,826	54	38	18,798	38	30	29,521	50	44	14,912	34	31
01. Traumatic injuries to bones	(5,602)	56	54	(4,448)	50	49	(6,058)	61	60	(4,598)	55	54	(4,805)	63	62	(3,531)	55	54
02. Traumatic injuries to muscles, tendons, etc.	(31,041)	57	39	(14,089)	38	30	(29,768)	52	37	(14,198)	34	28	(24,716)	48	42	(11,380)	30	28
03, 04, 05	15,358	86	83	4,314	57	55	15,530	84	80	4,062	56	55	13,847	85	83	3,896	61	58
03. Open wounds	(6,345)	76	75	(2,104)	48	47	(5,759)	71	70	(1,681)	42	42	(5,613)	74	72	(2,051)	50	49
04. Surface wounds and bruises	(7,505)	98	98	(1,761)	73	73	(7,853)	97	97	(1,910)	84	84	(6,714)	97	97	(1,557)	86	85
05. Burns	(1,508)	81	81	(449)	55	55	(1,919)	85	85	(471)	47	47	(1,520)	86	86	(287)	54	54
06. Intracranical injuries	436	69	69	73	40	40	495	75	75	113	40	40	254	89	89	141	81	81
07. Effects of environmental conditions.	40	75	75	---	---	---	---	---	---	---	---	---	88	91	91	---	---	---
08. Multiple traumatic injuries	2,675	62	62	1,104	41	40	2,269	56	56	1,179	41	41	1,788	51	50	896	34	33

[1]Percent of total combined BLS, and WC estimates reported by BLS.

[2]Percent of total including capture-recapture estimates reported by BLS.

Totals were not calculated because of differences in nomenclature of Injury/Illness recording schemes in BLS and in WC.

Table VII. Person Match Between BLS Annual Survey, and Workers' Compensation Claims for ≥1 Day and 7 Days Away from Work by Illness, Michigan 1999-2001

	1999						2000						2001					
	≥ 1 Day			> 7 Days			≥1 Day			> 7 Days			≥ 1 Day			> 7 Days		
Illness	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]	BLS	%[1]	%[2]
7a. Skin	546	79	79	107	48	48	242	68	68	55	34	34	347	71	71	50	33	33
7c. Respiratory Conditions due to Toxic Agents	219	76	76	26	25	25	206	73	73	50	40	40	161	72	72	2	3	3
7d. Poisoning	225	100	100	22	52	52	196	99	99	84	100	100	154	100	100	---	---	---
7e. Disorders due to Physical Agents	268	95	95	45	54	54	192	90	90	17	33	33	258	97	97	---	---	---
7f. Disorders Associated With Repeated Trauma	3,089	68	63	2,212	59	55	2,476	62	60	1,821	54	53	2,282	70	69	1,838	65	64
7g. Other	35,934	55	39	17,421	37	30	34,994	49	36	17,676	34	28	28,741	46	40	14,244	30	27

[1]Percent of total combined BLS and WC estimates reported by BLS.
[2]Percent of total including capture-recapture estimates reported by BLS.
Totals were not calculated because of differences in nomenclature of Injury/Illness recording schemes in BLS and in WC.