Injury and Illness Data for Illinois Mining Industry Employees, 1990 to 2012

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Objective: This study identifies and evaluates injury types associated with distribution of cause of injuries and compensation among Illinois miners. **Methods:** Cases were selected from the Illinois Workers' Compensation database from 1990 to 2012 to determine injury distributions and compensation among miners and non-miners. Logistic models were used to analyze total monetary compensation, temporary total disability (TTD), and permanent partial disability as primary outcomes. **Results:** The major predictors of total monetary compensation in both miners and non-miners were TTD, permanent partial disability, average weekly wage, and age at the time of filing. Systemic injuries were an additional driver of final monetary compensation among miners. Miners were compensated $618 less (total monetary compensation; confidence interval 95%: −971, −266; $P < 0.001$), had 2.1 more weeks away from work (TTD; confidence interval 95%: 1.58, 2.63; $P < 0.001$), and had higher numbers of systemic injuries than non-miners. **Conclusions:** Systemic injuries are important drivers for total monetary compensation in miners in terms of median compensation and TTD.

Mining is one of the most hazardous industrial sectors in the United States, with the second highest fatality rate and one of the highest rates of severe injuries.[1] According to the Mine Safety and Health Administration (MSHA), in 2012 the injury rate among coal, metal, and non-metal mine workers was 2.6 (per 100 full-time employees).[2,3] This rate is significantly higher than the general workforce rate of 1.8 (per 100 full-time employees).[4] The mining industry has shown a steady reduction in employment for decades that can largely be explained by increases in productivity due to increased automation as well as small mine closures, mine consolidations (ie, larger companies buying smaller operations), and subcontracted employment.[2,5,6] These changes, especially the pressure to increase production, as well as the practice of contracting out operations may result in increased rates of injury and disease.[1]

Miners are exposed to numerous occupational hazards and are at risk for both serious injury as well as debilitating illness. Mining-related illnesses are caused by factors ranging from heat, fumes, bio-aerosols, and exposure to respirable dust and particulate matter. Coal mining is associated with coal workers' pneumoconiosis, chronic bronchitis, silicosis, asbestosis, emphysema, and lung function impairment.[7] National Institute for Occupational Safety and Health data from 1995 to 2009 show an increase in the percentage of miners examined in the Coal Workers Health Surveillance Program with coal workers' pneumoconiosis (International Labor Organization category 1/0 or greater) and progressive massive fibrosis. In addition, severe coal workers' pneumoconiosis is occurring in coal miners at younger ages (<50 years of age) than previously seen. According to National Institute for Occupational Safety and Health, greater intensity and longer duration of exposure along with increased silica content in coal mine dust are potential explanations for this finding.[8–10]

Several factors have been associated with increased risk of injury in mines. Stone operators consistently have the highest injury rates, and across all miners, most injuries are caused by falls or while handling materials.[3] In addition, employment in smaller establishments has been noted as a risk factor for injury and illness in many industries, including mining.[11–15] Risk of injury is increased among young workers and during their first few years of mining employment.[11]

Occupational injury and illness data for the United States are substantially underreported; although it is unclear to what degree underreporting occurs in the mining sector.[16–19] Individual studies of occupational injuries, affected body parts, and compensation types have been reported, but there is limited information linking these together in the mining sector.[20–23] A better understanding of the most common types of injuries associated with higher injury proportions/distributions and compensation can inform the implementation of an effective safety management system in the mining sector. This could result in a reduction in the severity and frequency of injuries and reduce lost time from work, health care costs, and worker turnover.

In 1990, there were 2427 active mines in Illinois including 2084 coal; 293 stone, sand, and gravel; 41 non-metal; and three metal mines. By 2010, there were only 327 active mines in the state, comprised of 268 sand, stone, and gravel; 53 coal; five non-metal; and one metal mine.[24] Despite the decline in number of active mines, as of 2012, Illinois ranked fifth in coal production, and ranked third for number of mining employees across all mine types in the United States, making Illinois a good setting to study mining-related workers' compensation claims.[25] These claims provide a broad picture of the workers' demographic characteristics, the events leading up to an injury/illness, the resulting injury/illness and, most importantly, long-term outcomes involving monetary compensation (cost), lost work, and permanent disability. In this study, we analyzed workers' compensation claim data from the Illinois Workers' Compensation Commission (IWCC) to (1) describe the cause and nature of occupational injuries and illnesses suffered by miners between 1990 and 2012 in Illinois, (2) compare claim rates with injury rates reported to MSHA, (3) identify key drivers of cost, missed work, and permanent disability among miners and describe how they differ from non-miners.

METHODS

Data Source

IWCC operates the administrative court system for workers' compensation cases in Illinois. Unlike single carrier states with a centralized reporting system, IWCC only handles claims in which the employee and employer are unable to resolve compensation issues for an injury without administrative intervention. Claims or

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portions of claims that are not disputed by either party are not litigated through IWCC and do not appear in this dataset. We obtained data from the IWCC of all claims filed between 1990 and 2012 including employer and employee demographics (age, gender, marital status, and number of dependents), cause and type of injury or illness, level of temporary and permanent disability, and details on the compensation costs associated with the injury.

Case Selection

A multistep, case-selection algorithm was used to identify miners within the claims database. The database does not include industry or occupation codes; however, the name of the employer/company is available for every case. Therefore, we used general keywords to search by employer/company name (eg, coal, silica, mining, quarry, coal) and a list of company names of registered mining companies in Illinois provided by MSHA.[26] We also included variations of these search terms because of misspellings or abbreviations. Company address data were also used to confirm that the study participant was employed by a mining company. The final list of employers was manually reviewed to remove non-mining companies. Employees of mining equipment supply companies were excluded. Office workers and miners were included in the analysis as there was no way to separate job categories of employees of mining companies within the IWCC data set.

Selection of the Comparison Group

We randomly selected comparison cases from the same data set using workers who worked for non-mining companies. Given the changes over time associated with level of compensation, the judges and arbitrators within the court system, the laws governing workers' compensation in Illinois, and inflation, we used a frequency matching design to randomly select an equal number of comparison cases to mining company cases within each filing year using the random sampling procedure in SAS (PROC SURVEYSELECT, SAS Institute, Inc., Cary, NC).

Outcome Variables

Total Monetary Compensation

The total monetary compensation is the entire amount of money awarded to the employee in settled and decided cases. This comprises all the individual components involved in a claim including medical costs, attorney fees, penalties, rehabilitation, vocational training, missed work, disability, settlement payments, and other forms of compensation. Total compensation dollars were adjusted for inflation using the Urban Consumer Price Index for all urban consumers in 2012 real dollars.

Temporary Total Disability in Weeks of Lost Work

Temporary total disability (TTD) refers to the time period an injured worker is temporarily unable to do work, or is cleared for light duty, as indicated by a physician. There is a minimum and maximum monetary benefit an employee can collect on TTD that depends on the number of dependents and wage level, which varied between 1990 and 2012; however, this variability did not affect our analysis. In this analysis, we describe TTD in terms of weeks. Thus, the minimum number of weeks used for analysis was 0.14, which is equivalent to 1 day.

Permanent Partial Disability

Permanent partial disability (PPD) involves partial loss of body function at the point of maximum medical improvement, and is measured as a percentage of body disability. When determining PPD, the IWCC takes into account the nature of the accident, nature of the initial injury, objective physician physical findings, lost time, ability to return to work, job description, weekly wage, and current subjective complaints. We used the statutory formula to calculate cumulative percent disability when more than one body part was injured and limited in function. An example of the statutory formula for computing cumulative disability is $A + (1 - A) \times B$, where A is the percent disability for a specific injury involving a specific body part and B is the percent disability for a second specific injury involving a specific body part.

Statistical Analysis

We used SAS software for all statistical analyses (v.9.4; SAS Institute). Frequencies of injuries overall, and distributions by demographic characteristics were determined. Appropriate parametric (Pearson chi-square) and non-parametric tests (Wilcoxon rank sum) were used to evaluate bivariate relationships. *t*-test was used to compare mean differences in parametric continuous metrics. Average weekly wage and total monetary compensation values were adjusted for 2012 inflation values using the Bureau of Labor Statistics Urban Consumer Price Index. IWCC claims include all workers in the mining industry, including administrative and other non-production staff. Therefore, we used annual average employment numbers reported to the Quarterly Census of Employment and Wages based for private establishments in the mining industry (North American Industry Classification System 21).[27] Part 50 reports are based on information collected from the Mine Accident, Injury and Illness Report (Form 7000-1) and the Quarterly Employment and Production Form (Form 7000-2). For data on injuries reported to MSHA on Part 50 reports, we included the total count of all injuries and illnesses for all mine types including fatalities, non-fatal injuries and illnesses resulting in days lost work, and non-fatal injuries and illnesses resulting in no days lost work.[24]

All three outcome variables were right-skewed; therefore, non-parametric statistical methods were employed (eg, Kruskal-Wallis test). Because none of the outcome variables were normally distributed, we used median regression models in SAS version 9.4 (PROC QUANTREG; SAS Institute). In all multivariable models, statistical evaluation of covariates, as well as a priori knowledge, was used to determine inclusion of covariates in the final models. The variables analyzed as potential covariates included gender, age, marital status, number of dependents, median weekly wage, use of an attorney, claims involving monetary compensation, median days from accident to filing, median days from accident to decision, and median days from filing to decision. Affected body parts were also evaluated in the models. Illnesses and injuries affecting the entire body or major systems (circulatory, respiratory, nervous system) were coded as ''systemic.'' We conducted three separate sets of multivariable analyses using manual stepwise model building procedures. First, we developed multivariable models to examine median differences in total monetary compensation, TTD, and PPD between miners and non-miners. Second, we stratified the models by mining employment to identify predictors associated with total monetary compensation, TTD, and PPD in miners and compare the findings to drivers of cost, missed work, and permanent disability in non-miners. For this second objective, we built separate models for miners and non-miners. No evidence of multicollinearity among the independent variables was indicated. Third, we developed a multivariable model with mining included as an independent variable. A two-sided *P* value less than 0.05 was considered statistically significant. The University of Illinois at Chicago institutional review board for the Protection of Human Participants approved the study (#2008-0060).

RESULTS

Study Population

The study population included 29,690 Illinois workers' compensation claims filed from 1990 to 2012, of which, 14,845

were filed by workers employed in the mining industry. Mining cases filed were about 1.1% (14,845/1356465) of all IWCC cases filed from 1990 to 2012. Demographic characteristics of the mining and comparison group are summarized in Table 1. Compared with the non-mining group, a greater proportion of mining industry employees were men (96.5% vs 68.1%; $P < 0.01$), married (82.7% vs 57.9%; $P < 0.01$), older (mean age of 47.5 vs 41.3; $P < 0.01$), and had a higher median weekly wage ($1094 vs $666; $P < 0.01$). Although both groups had comparable number of dependents, the mining industry employees were less likely to use an attorney as part of their workers compensation case (70.6% vs 84.2%; $P < 0.01$).

Table 2 presents crude claim rates for mining industry employees in addition to injuries and illnesses reported to MSHA. In the claims dataset, we observed a precipitous decline in the number of claims filed in 2005 and 2006, followed by an increase in claims in 2007 and 2008. The increase in claims is perhaps attributable to a brief but sharp increase in the number of claims possibly due to mine closures during this time. These cases mainly involved hearing loss, pulmonary injury/illness, and systemic conditions involving the body as a whole. These three conditions comprised an average of 28% of all claims annually prior to 2007, but represented 61% of all filed claims in 2007 ($n = 548$) and 60% of filed claims in 2008 ($n = 432$).

TABLE 1. Demographic Characteristics and Claim Information of Mining and Non-Mining Industry Employees From 1990–2012

	Mining Industry Employees ($n = 14,845$)	Non-Mining Industry Employees* ($n = 14,845$)
Gender		
Women	513 (3.5%)	4,721 (31.8%)
Men	14,319 (96.5%)	10,109 (68.1%)
Unspecified	13 (0.1%)	15 (0.1%)
Age (mean), yrs	47.5	41.3
≥24	311(2.1%)	1,395(9.4%)
25–34	1,592 (10.7%)	3,651 (24.6%)
35–44	4,145 (27.9%)	4,228 (28.5%)
45–54	4,936 (33.3%)	3,488 (23.5%)
≥65	3,863(26.0%)	2,083(14.0%)
Marital status		
Single	2,135 (14.4%)	5,695 (38.4%)
Married	12,275 (82.7%)	8,590 (57.9%)
Divorced/widowed	276 (1.9%)	448 (3.0%)
Unspecified	159 (1.1%)	112 (0.8%)
Number of dependents		
0–1	10,851(73.1%)	10,341(69.7%)
2–3	3,486 (23.5%)	3,665(24.7%)
≥4	508(3.4%)	839(5.7%)
Median weekly wage†	$1,094	$666
Used attorney	10,475 (70.6%)	12,495 (84.2%)
Claim w/decision involving monetary compensation	11,875 (80.0%)	12,589 (84.8%)
Median days from accident to filing	370	167
Median days from accident to decision	811	693
Median days from filing to decision	362	429

Adapted from Illinois Workers' Compensation Commission.
*Non-miners: random frequency matching workers from all industries by filing year for claims.
†Adjusted for inflation (2012).

Primary Outcomes

On average, mining industry employees waited over 2 years (811 days) from the accident date until a workers' compensation decision was reached compared with 693 days among non-mining industry employees ($P < 0.01$). Overall, 40.0% ($n = 6535$) of the mining group and 49.5% ($n = 7349$) of the comparison group received compensation relating to temporary total disability, whereas 62.8% ($n = 9330$) of the mining group and 72.9% ($n = 10,828$) of the comparison group received a decision regarding PPD. Based on unadjusted comparisons, the median total monetary compensation was higher for mining industry employees compared with non-mining industry employees ($18,709 vs $10,996, $P < 0.001$). The median number of weeks of TTD resulting in lost work was slightly higher among mining industry employees (10.1 vs 8.0 weeks), whereas the median PPD was identical between the two groups (15.0% vs 15.0%).

Cause and Nature of Injury

Among workers wherein a detailed cause of injury was provided, the most common causes of injury among mining industry employees were struck against/caught in or between objects (16.7% vs 9.3%), overexertion injuries (eg, sprains, strains; 12.9% vs 15.7%), contact by inhalation (11.6% vs 0.2%), and falls/slips (11.2% vs 17.1%). Almost all the injuries caused through contact by inhalation in the mining group were filed by workers over the age of 45 ($n = 1669$, 96%).

Body Part Injured

The most commonly affected body parts by injury/illness among mining workers were upper extremities (27.9% vs 36.3%), lower extremities (19.8% vs 20.2%), and systemic (17.6% vs 6.2%) (Table 3). Mining industry employees suffering systemic injuries/illnesses had the highest median monetary compensation ($32,000) relative to mining industry employees suffering injuries involving other body regions. In contrast, among non-mining industry employees, the median monetary compensation did not differ much by body part affected. Mining industry employees with systemic injuries/illnesses also had the highest median weeks of lost work (17.4 weeks). The highest median percent of PPD was observed among workers with injuries to their upper extremities within both miners and non-miners (20%).

Multivariable Analysis

In the three separately adjusted models comparing claims filed by mining industry employees to non-mining industry employees, the adjusted median total monetary compensation was $599.10 less for mining industry employees (95% confidence interval [CI], −987.14, −211.06; $P = 0.003$), adjusted median TTD awarded mining industry employees was higher by 2.6 weeks (95% CI, 1.99, 3.13; $P < 0.001$), and adjusted median percent PPD was 1.0% lower than non-mining industry employees (95% CI, −1.47, −0.57; $P < 0.001$). Table 4 presents the key predictors of total monetary compensation, TTD, and PPD for mining industry employees and non-mining industry employees separately. The major drivers of total monetary compensation in both groups of workers were TTD, PPD, average weekly wage, and age of the employee at the time of filing, while systemic injuries was an additional driver of final monetary compensation among mining industry employees. For mining industry employees, the main determinants of higher weeks of TTD were age at time of filing, use of an attorney, PPD, and systemic injuries/illnesses. In contrast, among non-mining industry employees, TTD was driven by average weekly wage, use of an attorney, and PPD (Table 4). For percent PPD, both use of an attorney and systemic injuries/illnesses were inversely related to final determination of disability.

TABLE 2. Comparison of Trends in Injury and Illness Filing Rates Between IWCC and the MSHA Part 50 Program, 1990–2012

Filing Year	IWCC Claims by Filing Year	Total Injuries Reported to MSHA*	Total Number of Employees†	IWCC Claim Rate by Filing Year per 100 Employees	Injury Rate MSHA Part 50 per 100 Employees
Prior to 1990	—	—	—	—	—
1990	1,340	—	18,470	7.3	—
1991	1,273	—	17,732	7.2	—
1992	1,051	—	16,841	6.2	—
1993	952	1,188	15,790	6.0	7.5
1994	862	1,430	14,714	5.9	9.7
1995	728	1,033	13,795	5.3	7.5
1996	595	792	12,578	4.7	6.3
1997	672	747	11,705	5.7	6.4
1998	555	713	10,893	5.1	6.5
1999	572	726	10,444	5.5	7.0
2000	542	528	9,762	5.6	5.4
2001	477	541	9,978	4.8	5.4
2002	617	534	9,655	6.4	5.5
2003	472	559	9,276	5.1	6.0
2004	444	480	9,182	4.8	5.2
2005	354	505	9,718	3.6	5.2
2006	286	468	10,115	2.8	4.6
2007	895	414	9,963	9.0	4.2
2008	724	393	9,608	7.5	4.1
2009	419	334	9,297	4.5	3.6
2010	381	324	9,065	4.2	3.6
2011	320	333	9,519	3.4	3.5
2012	314	326	10,096	3.1	3.2

Includes fatalities, non-fatal injuries and illnesses resulting in days lost work, non-fatal injuries and illnesses resulting in no days lost work. IWCC, Illinois Workers' Compensation Commission; MSHA, Mine Safety and Health Administration. Correlation between Number Employees and Total Hours, $r = 0.95$.

*Citation: http://www.msha.gov/ACCINJ/ALLMINES.HTM, based on reported total employee hours for all mine types.

†CEWQ data, annual average employment, North American Industry Classification System 21, private establishments only.

DISCUSSION

This workers' compensation dataset provides a framework for describing the types of injuries/illnesses and long-term outcomes from those injuries/illnesses among mining industry employees in relation to other workers. In this study, mineworkers waited 118 more days than the comparison group for a workers' compensation decision, and after adjusting for multiple covariates, the median total financial compensation was lower by $618. Although crude total monetary compensation was substantially higher among mining industry employees, the difference was primarily the result of a much higher average weekly wage and a higher propensity to suffer from systemic injuries/illnesses. Despite limitations with the data regarding injury type and nature of injury, the observed distribution of cause of injury and body parts affected were consistent with the

TABLE 3. Median Total Monetary Compensation, Temporary Total Disability, and Permanent Partial Disability by Affected Body Part and Industry

Body Part Injured Employees	*n*		Median Total Monetary Compensation (USD)†		Median Temporary Total Disability (Weeks)		Median Permanent Partial Disability (%)	
	Mining	Non-Mining	Mining	Non-Mining	Mining	Non-Mining	Mining (%)	Non-mining (%)
Head, neck, and face	1,584	1,002	7,215[a]	6,751[a]	8.29	6.43	8	5
Back and spine	2,164	3,262	21,376	11,996	14.93[a]	11.27[a]	7[a]	6[a]
Torso	183	225	8,178[a]	6,247[a]	5.71	6.29	3	3
Upper extremities	4,146	5,387	11,123[a]	10,733[a]	8	7.14	20[a]	20[a]
Lower extremities	2,936	3,005	20,958[a]	12,614[a]	10.71[a]	8.57[a]	18[a]	18[a]
Systemic	2,619	918	32,000[a]	10,974[a]	17.36	10	10[a]	5[a]
Multiple body Parts/unspecified‡	2,026	2,303	21,383[a]	11,616[a]	10.86[a]	8.21[a]	13	10

Claims filed with the Illinois Workers Compensation Commission, 1990–2012.

*Excludes dismissed claims and ongoing claims without a decision.

†Adjusted for inflation (2012).

‡Workers' compensation codes for affected body parts includes a category for "multiple body parts," which are categorized as unspecified in this analysis. In contrast, there are codes that specifically identify the body parts affected if a worker suffered an injury affecting more than one region. For this reason, the total number will exceed 14,845 in both groups.

[a]Statistically significant ($P < 0.05$).

TABLE 4. Predictors of Median Total Monetary Compensation, TTD, and PPD Among Mining and Non-Mining Industry Employees

	Mining Industry Employees			Non-Mining Industry Employees		
	Parameter Estimate	95% Confidence Limits	*P* Value	Parameter Estimate	95% Confidence Limits	*P* Value
Total monetary compensation						
Intercept	−5170.58	−6370.93, −3970.22	<0.001	−7368.69	−8102.64, −6634.75	<0.001
Age at time of filed claim per year	58.16	42.41, 73.92	<0.001	48.62	35.90, 61.35	<0.001
Married	−191.44	−560.43, 177.55	0.31	492.00	217.88, 766.11	<0.001
Adjusted average weekly wage per $100	506.57	399.5, 613.65	<0.001	1156.97	1,094.86, 1,219.08	<0.001
Worker used attorney	909.08	500.19, 1,317.97	<0.001	1,290.98	838.13, 1,743.83	<0.001
TTD per week	553.65	518.71, 588.60	<0.001	399.63	362.37, 436.89	<0.001
PPD per percent increase	729.99	696.24, 763.75	<0.001	532.47	503.88, 561.05	<0.001
Systemic injuries/illnesses	19,020.79	18,448.78, 19,592.80	<0.001	1452.20	759.55, 2,144.85	<0.001
TTD, weeks						
Intercept	−2.46	−4.98, 0.06	0.055	−0.19	−1.39, 1.02	0.761
Age at time of filed claim per year	0.15	0.10, 0.20	<0.001	0.01	−0.02, 0.03	0.560
Adjusted average weekly wage per $100	0.08	−0.04, 0.21	0.193	0.26	0.16, 0.36	<0.001
Worker used attorney	4.40	3.69, 5.11	<0.001	3.42	2.74, 4.09	<0.001
PPD per percent increase	0.21	0.17, 0.25	<0.001	0.24	0.21, 0.27	<0.001
Systemic injuries/illnesses	8.31	5.19, 11.44	<0.001	2.29	0.26, 4.33	0.027
PPD						
Intercept	8.86%	6.70, 11.01	<0.001	7.38%	6.19, 8.58	<0.001
Age at time of filed claim per year	0.07%	0.03, 0.10	<0.001	0.17%	0.15, 0.20	<0.001
Adjusted average weekly wage per $100	0.19%	0.08, 0.3	<0.001	0.17%	0.1, 0.25	<0.001
Worker used attorney	−1.63%	−2.29, -0.97	<0.001	−5.11%	−5.83, −4.38	<0.001
TTD per week	0.26%	0.24, 0.28	<0.001	0.32%	0.30, 0.34	<0.001
Systemic injuries/illnesses	−3.08%	−3.63, −2.54	<0.001	−4.85%	−5.55, −4.16	<0.001

Claims filed with the Illinois Workers Compensation Commission, 1990–2012. PPD, permanent partial disability; TTD, temporary total disability.

literature showing most injuries were caused by falls, coal dust exposure, and mining equipment and the most injured body part were upper extremities.[21,22] In addition, despite IWCC only receiving data on contested claims filed in through the administrative court system, the claim rates were comparable with the number of injuries reported on MSHA Part 50 reports which include many injuries that do not result in permanent disability.

For total monetary compensation, TTD, PPD, and average weekly wage were the major drivers of costs as expected. In addition, suffering systemic injuries and illnesses was also associated with a substantial increase in final total monetary compensation among mineworkers, which is consistent with expected level of impairment and cost of treatment for chronic systemic diseases.

It should be noted that the category for systemic injury/illness is very broad; however, among the mining industry employees who had a nature of injury code that was narrowly defined, the majority were coded as respiratory illness or poisoning. Although it was not the most reported injury type, systemic injuries were more prominent among mining employees than non-mining employees. Additionally, 0.2% of non-mining claims were a result of contact by inhalation compared with the 11.6% in mining employees, suggesting that contact by inhalation is a strong contributor to systemic injuries among miners. This is not surprising given the respiratory hazards associated with mining.[7,28] Mining employees with injuries caused by inhalation contact were also associated with older age, indicating workers with longer tenures, greater cumulative exposures, and longer latencies of these diseases. The Federal Coal Mine Health and Safety Act of 1969 established the Federal Black Lung compensation program; however, this program only provides benefits for total disability to address pneumoconiosis-related disabilities in coal mining employees. Partial disability is only permitted through the state workers' compensation program managed by the IWCC administrative court system.[29] Workers may be compensated for abnormal chest imaging, abnormal physiology, or even clinical symptoms without having to reach a level of total disability.[30]

LIMITATIONS

Mining cases were selected from the workers' compensation database using keywords from the Department of Labors' job classification, which may result in excluding or missing valid cases. One of the major limitations of the workers' compensation dataset is that it only captures contested cases and excludes any cases settled out of court. Occupational illnesses such as pneumoconiosis are also underreported in the IWCC as these prevalent cases are not readily captured while the employee is working because of the delay of onset of symptoms and a lack of occupational history-taking among healthcare providers. Despite the likely underestimate of true incident cases, the total number of claims filed in the IWCC court system is comparable with the number of injuries and illnesses reported to MSHA on Part 50 reports; however, only a direct data linkage of the two data systems can determine the level of overlap,[24] which is currently being conducted by our research group.

The cause and nature of injury is poorly characterized in the IWCC data. This made it difficult to conduct any statistical analysis on the most common injuries and illnesses in the Illinois mining industry. As a result, we could not clearly identify pneumoconiosis cases from other systemic injuries and illnesses common in mining. Additionally, 40% of the comparison group and 37% of the mining group data identified employees as being injured during the course of employment without any further detailed description of the cause of injury. Although we were limited in our descriptive analysis, among the cases with characterization of cause and nature of injury, the distribution was equivalent to that reported in the literature.[3] The absence of job titles prevented an analysis linking injuries to specific occupations. Moreover, when IWCC cases were compared with

MSHA reported cases, the crude claims in the mining industry reported to MSHA had some office workers (ranged from 7.8% to 12%) who might have affected the comparison.[31]

Total monetary compensation does not distinguish between medical and indemnity costs. An analysis teasing apart these costs could shed some light on which injuries result in greater medical costs and demand a greater proportion of medical resources. IWCC does not include medical costs accrued prior to or during the filing process for compensation; this can potentially underestimate the cost of injury in the workplace and its impact on work performance.

CONCLUSIONS

We examined total monetary compensation, TTD, and PPD as they relate to injuries among Illinois mineworkers and a comparison group of non-mining industry employees. Between 2007 and 2012, claim rates nearly matched or exceeded MSHA injury rates. This finding supports previous assertions of underreporting in the mining sector.[16–19] In addition, by linking injury types with the distribution of cause of injuries, we were able to clearly show that systemic injuries played a large role in final monetary compensation and higher weeks of TTD among mining industry employees. Finally, based on the adjusted models, median monetary compensation and PPD were lower for mining industry employees compared with non-mining industry employees, but miners received approximately 2 weeks more TTD than non-miners. Moreover, claims rates are usually lower than overall injury/illness rates because many cases are resolved without dispute. The fact that the claim rates are higher indicates that there may be a greater underreporting of injuries in recent years. As MSHA uses injury reports to measure levels of injury experience and identify areas for improvement, our findings show that the true burden of injury in the mining sector is not accurately revealed by those reports. Therefore, it is necessary to improve and encourage proper reporting protocols, especially in the Illinois mining industry. It is clear that relying on employers to document and report injuries are a major contributing factor to underreporting. Development and implementation of a reporting system that is not reliant on employers could help address underreporting. In addition, a better understanding of the employee and employer-level barriers to reporting is necessary to improve the safety culture and injury reporting to MSHA.

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