

An Analysis of Workplace Injury and Job Tenure in the Health Care and Social Assistance Sector Using Tennessee Workers' Compensation Claims from 2014-2016

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1 Introduction

The Construction Industry Research and Policy Center (CIRPC) at the University of Tennessee, Knoxville received a grant from the Centers for Disease Control - National Institute of Occupational Safety and Health (NIOSH) to use Tennessee workers' compensation (WC) claims data for occupational injury¹ surveillance and prevention. This report provides a brief overview of the private industry WC claims filed within the Tennessee health care and social assistance sector for 2014-2016.

A NIOSH initiative exists to provide statistical information regarding workplace injuries that may supplement the Survey of Occupational Injuries and Illnesses (SOII) information currently assembled by the Bureau of Labor Statistics (BLS) since the SOII is only a sampling survey. Since 2015, NIOSH has awarded a number of grants to states to encourage the additional utilization of WC claims information in those states. In the summer of 2016, such a grant was awarded to CIRPC which resulted in an agreement with the Tennessee Bureau of Workers' Compensation to make this information available subject to agreed-upon confidentiality limits. By combining the WC information with unemployment insurance records, it is possible to perform injury surveillance with respect to the injured employee's industry, employer size, age, and several injury characteristics including job tenure.

This report will examine several of these injury dimensions and their relationship to job tenure.² When tenure is mentioned in safety research, it is generally found that new workers are more likely to be injured on the job than those with greater experience. Unfortunately, in these studies details are frequently missing that would help in understanding this phenomenon and in documenting a possible remedy. For the most part, the studies and available data relate to economy-wide issues and fail to consider injury cause or impact.

It is our hope that this report will be used by the health care sector³ to better understand the major sources (causes) of injury, the most prevalent nature (type) of injuries sustained, the most frequently injured body parts, and the relationship between job tenure and injury. A better understanding of these factors can better inform the Tennessee health care sector's safety initiatives.

2 Key Findings and Recommendations

The key findings of this report include:

1. Lifting and slips, trips, and falls were the most common sources of injury for workers on the job more than one year. Recommendation: Emphasize training on lifting techniques and use work modifications to reduce strains on the bodies of workers. Keep workspaces clear of clutter to eliminate exposure to slips, trips, and falls.
2. The fingers and lower back were the most frequently injured body parts. Lacerations/punctures (fingers) and lifting (back) are closely associated. Recommendation: As above, provide training on lifting best practices and modify work procedures to reduce exposures to lacerations/punctures.
3. About twelve percent of all claims required an emergency room visit. Recommendation: For workers employed outside hospitals, have protocols in place to ensure injured workers requiring emergency care receive rapid and safe transport.
4. Health care had three fatalities and all were motor vehicle accidents. Recommendation: More research is needed to mitigate the risks to drivers and occupants of emergency vehicles and non-emergency vehicles in the workplace.
5. Workers were especially vulnerable to injury during their first year. Thirty-three percent of all claims in health care were made by such workers. Smaller employers had even higher first-year injury proportions. Recommendation: Provide company orientation 'onboarding' and consider assigning new employees a trusted employee as a 'mentor' in their early weeks.
6. As a proportion of all injuries, non-fatal severe injuries were approximately twelve percent. About one-third occurred to first-year employees. Recommendation: Every firm is self-insured with its own safety resources or has a WC insurer with loss control expertise. The firm should engage all available resources to institute and maintain best practices in occupational safety and pre-employment screening.

¹In this document, the term 'injury' may mean injury and/or illness.

²In this study, the concept of 'job tenure' relates to employment with a given employer and not employment with any employer or in a particular craft or occupation with a given employer.

³North American Industry Classification System - the two-digit sector 62 represents health care and social assistance. For the remainder of this document, 'health care' shall be used in lieu of 'health care and social assistance.'

Table 1: NAICS Industry Injury Rates - 2016 BLS Rates vs. 2014-2016 Work Comp Rates*

Naics2	Sector Description	2016 BLS Rate	2014-2016 Work Comp Rate
10	All Industries	2.9	2.5
11	agriculture	1.9	3.5
21	mining	1.6	2.4
22	utilities	6.3	7.5
23	construction	2.6	2.8
31-33	manufacturing	3.7	2.7
42	wholesale trade	2.8	2.8
44-45	retail trade	3.1	2.8
48-49	transportation	4.7	3.9
51	information	1.7	0.8
52	finance	0.4	0.5
53	real estate	1.7	2.3
54	professional	NA	1.3
55	management	0.5	3.2
56	administrative	2.2	2.9
61	educational services	2.3	1.7
62	health care	3.9	2.9
71	arts	4.3	3.3
72	food services	2.6	2.1
81	other services	1.9	1.8

* Workers' compensation rates reflect only the matched portion (78.3 percent) of compensable, private claims in the WC universe.

3 Background

The BLS already publishes SOII injury rates for many industries but rates calculated with WC data can be an important supplement. Table 1 lists the Tennessee private sector BLS rates and the 2014-2016 WC counterparts. The BLS and WC composite rates for all Tennessee private sector employees are shown at the top of the table as 2.9 and 2.5 per 100 full-time equivalent (FTE) workers respectively. In making comparisons, differences in the two calculations must be considered. They differ in several ways. Here are a few:

- BLS rates are sample estimates and are subject to sampling error.
- WC industry rate numerators/counts in this report contain 'matched' claims only and are understated unless extrapolated to compensate.
- WC industry rates are adjusted upward/downward according to the industry's average annual working hours.⁴

Since the WC 'All Industries' rate represents only the matched portion of private sector claims, the true rate will be larger. Using linear extrapolation to adjust for unmatched claims (of 22 percent) yields an estimated rate of 3.2 per 100 FTE.

In 2016, the BLS rate per 100 FTE in the health care sector was 3.9 per 100 FTE. By comparison, the rate using the Tennessee 2014-2016 WC claims data was 2.9. Adjusting with linear extrapolation as before yields a rate of 3.7 per 100 FTE. The WC rates include all self-reported claims and are more comprehensive than a sample estimate.

4 Data and Data Limitations

State WC systems generally collect First Report of Injury Information (FROI) in a standardized electronic format. The first report contains more than sixty data fields to identify characteristics of the claimant and employer as well as specific details of the injury. Often a short narrative is also included. Tennessee follows this IAIABC electronic protocol for claim submission.⁵

⁴Data on industry annual working hours from the 2016 American Community Survey (ACS) PUMS.

⁵The International Association of Industrial Accident Boards and Commissions, or IAIABC, is an association of workers' compensation jurisdictional regulatory agencies.

During 2014-2016, there were 263,580 compensable claims received for all industries.⁶ Of these, 22 percent could not be matched to a specific industry and therefore not included in the analysis. Of the matched claims, 30,379⁷ are health care sector claims (NAICS 62) within the private sector.⁸ About 80 percent of the health care claimants were female.

Though more comprehensive than the BLS sampling, these WC data have limitations of their own. In addition to the unmatched claims mentioned previously, there are missing data within individual claims. In fact, certain data fields have significant numbers of missing observations. For example, in the health care sector, 19 percent of the claims percent of the claims have missing values needed to determine employee tenure at the time of injury. Report results, including those related to tenure, should not be affected significantly assuming that missing values occur randomly. Some injuries go unreported, and it is not known how this affects results.

There are at least two other important limitations of the data. First, older workers and those with longer tenure may not be exposed to the same hazards as new workers. Second, the claim data can be used to profile only injured workers. Though there is some public information on workforce age distribution and median tenure for all workers, we know little about other characteristics of workers not injured.

5 Investigative Focus

This study examined specific injury information and related that to a number of factors traditionally examined, such as nature and cause of injury, but also allowed consideration of tenure with the employer. In addition, it related these reported injuries to the size of the employer and other employment characteristics.

The WC data include all industries but this report focused on the health care sector. Of all injuries, a substantial proportion were reported by new workers during the first year of employment with their current employer. Recognition of this fact, along with other relationships found in the data (such as employer size, NAICS code, and initial treatment), may have relevance, for example, to the nature of new worker training or onboarding.

The data available from the FROI allowed consideration of the following characteristics:

- Body part injured along with injury cause and type
- Age group
- NAICS industry and firm size
- Tenure with employer

6 Findings on Injury-Tenure Relationship

In BLS publication USDL 16-1867, the January 2016 median tenure reported for the national health care industry was 3.9 years and 23 percent of workers (across all industries) had one year or less of tenure. Figure 1 shows that a substantial proportion (33 percent) of Tennessee health care injuries occurred during the first year with an employer. Assuming the Tennessee tenure distribution approximates the national distribution, the proportion of early injuries is significant.

⁶See the Appendix for the structure of the claim transactions.

⁷Sector tables throughout this document may sum to less than 30,379 claims because of missing observations or smaller subcategories that are not shown for brevity.

⁸Since 22 percent of all claims received could not be matched to a specific industry, the total claims in the private health care sector likely exceeded 30,379 by a similar percentage.

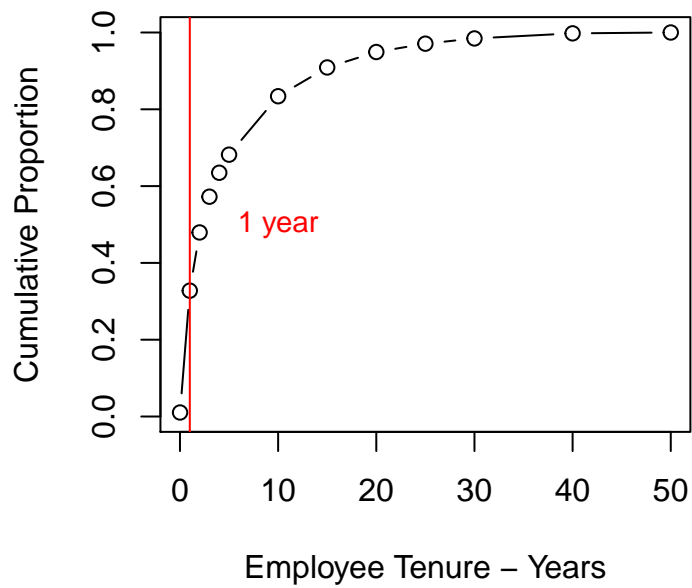


Figure 1: Cumulative Proportion of Injuries By Tenure With Employer

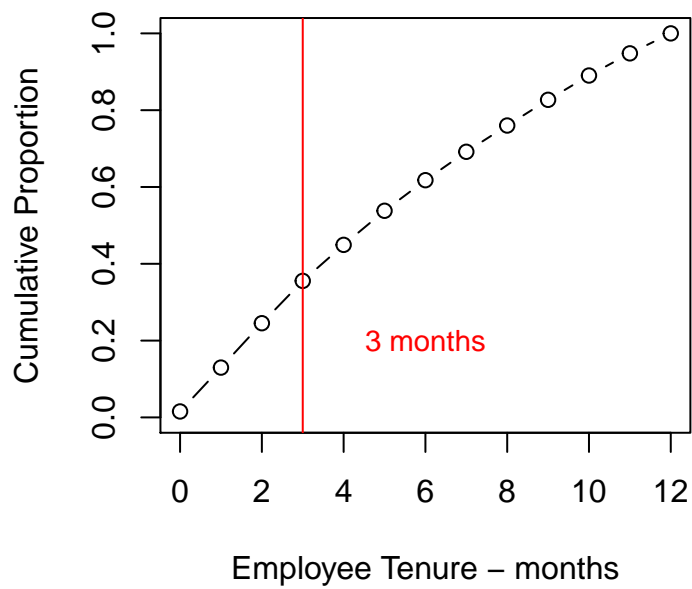


Figure 2: Cumulative Proportion of First-Year Injuries By Tenure With Employer (0 to 12 Months only)

Table 2: Claims by Age

Age Group	Tenure - 1 Year or Less	All Tenure Lengths	
	Count	Total Count	First Year Prop.
16-19 years	228	263	0.87
20-24 years	1725	2606	0.66
25-34 years	2614	6684	0.39
35-44 years	1542	5084	0.3
45-54 years	1221	5330	0.23
55-64 years	624	3822	0.16
65+ years	116	784	0.15

Table 3: First-Year Injuries by Firm Size

Firm Size	Tenure - 1 Year or Less	All Tenure Lengths	
	Count	Total Count	First Year Prop.
0-4	210	451	0.47
5-9	160	338	0.47
10-19	170	416	0.41
20-49	477	1133	0.42
50-99	564	1340	0.42
100-249	1633	4253	0.38
250-499	1231	3336	0.37
500-999	762	2558	0.30
1000+	2874	10781	0.27

To further illustrate the increased risk to new employees, consider the injury distribution within the first year. Figure 2 includes only first-year injuries and shows that about 36 percent of the first-year injuries occurred during the first three months. Clearly the initial months with an employer were critical.

Table 2 shows injuries that occurred for short-tenured (i.e. less than one year) employees by age group as a proportion of all injured employees in the group. That proportion generally decreased by age. Workers under 35 suffered a greater proportion of first-year injuries than the first-year baseline proportion of 0.33 but this does not necessarily mean that shorter tenure was less significant for older employees. Since we know little about the tenure distribution of the uninjured employees, these proportions indicate nothing about the relative risk of short-tenured employees within a particular age group. For example, if short-tenured employees in a particular group suffered 30 percent of the injuries but composed only 15 percent of the total, their relative risk would have been quite high. Therefore, the effect of tenure combined with age cannot be determined with these data. Other studies have shown that though older workers have lower total rates of injury, their new-worker rate is higher than the youngest workers.⁹ A companion analysis to this report,¹⁰ found that the 45-54 age group had the greatest injury risk among new workers.

The data show that size of the employer may make a difference for injuries to new employees. Table 3 indicates the proportion of first-year injuries begins to decrease as the firm size reaches 100 employees. Larger firms are usually thought to expend more effort in training new employees. Firms with less than 100 employees had first-year employees reporting 41 percent or more first-year injuries while that figure was 30 percent or less for firms with 500 employees or more.

The fact that job tenure is a factor suggests that cumulative industry experience may also have an effect. In other words, are older (and more experienced) employees injured less frequently than their proportion in the workforce?

Using age as a proxy for experience, Figure 3, shows both the health care industry's age distribution for workers in Tennessee¹¹ (dashed line) and the proportion of injuries by age (solid line). Workers older than 45 suffered fewer injuries than their proportionate share while the opposite was true for those younger than 45. Older workers seem

⁹Morassaei, Sara, et al. "Examining job tenure and lost-time claim rates in Ontario, Canada, over a 10-year period, 1999–2008." *Occup Environ Med* 70.3 (2013): 171-178.

¹⁰Taylor, Edward. "An Old Problem for New Workers, 2014-2016", July 2019

¹¹Age data from the 2016 American Community Survey (ACS) PUMS data.

to fare better overall when tenure is not considered.



Figure 3: Proportion of Injuries and Workers By Age

Table 4: Injuries by Body Part - Top 10 Categories

Body Part	Tenure - 1 Year or Less			Tenure - More than 1 Year		
	Count	Freq.	Rank	Count	Freq.	Rank
FINGER(S)	1064	0.132	1	1926	0.117	1
LOWER BACK AREA (MUSCLES)	1040	0.129	2	1864	0.113	2
MULTIPLE BODY PARTS	584	0.072	3	1426	0.086	3
KNEE	475	0.059	5	1161	0.070	4
HAND	503	0.062	4	1024	0.062	5
SHOULDER(S)	412	0.051	6	1003	0.061	6
EYE(S)	304	0.038	8	686	0.042	7
LOWER ARM	282	0.035	10	594	0.036	8
THUMB	338	0.042	7	564	0.034	9
ANKLE	282	0.035	10	534	0.032	10

It is informative to categorize injuries across various other dimensions to see if tenure affects the category rank order. Consider the dimensions body part, injury type, and cause. The ten most commonly injured body parts are shown in Table 4 for workers with more and less than one year tenure. Note the rank order is similar for first year workers.

For type of injury (e.g. sprain, laceration, etc.) and cause of injury (e.g. fall, slip, exertion, etc.), see Tables 5 and 6. In the former, first-year rankings closely approximate the ranking structure for other periods. In the latter, there is some rank variation. Not surprisingly, sprains, strains, punctures, lacerations, and contusions rank among the most frequent injury types and lower back was near the top of most injured body parts. It is interesting that lifting was the top cause. One possible interpretation is that workers lifting patients resulted in strains/overexertions that became musculoskeletal injuries to the lower back.

Table 5: Injuries by Type - Top 10 Categories

Injury Nature	Tenure - 1 Year or Less			Tenure - More than 1 Year		
	Count	Freq.	Rank	Count	Freq.	Rank
STRAIN	2292	0.284	1	4802	0.291	1
CONTUSION	1267	0.157	2	2698	0.163	2
PUNCTURE	1219	0.151	3	2052	0.124	3
ALL OTHER SPECIFIC INJURIES NOC	735	0.091	4	1400	0.085	4
SPRAIN	591	0.073	5	1200	0.073	5
LACERATION	508	0.063	6	1009	0.061	6
FOREIGN BODY	270	0.033	7	571	0.035	7
MULTIPLE PHYSICAL INJURIES ONLY	183	0.023	8	492	0.030	8
FRACTURE	152	0.019	9	367	0.022	9
CONTAGIOUS DISEASE	109	0.013	12	334	0.020	10

Table 6: Injuries by Cause - Top 10 Categories

Injury Cause	Tenure - 1 Year or Less			Tenure - More than 1 Year		
	Count	Freq.	Rank	Count	Freq.	Rank
LIFTING	953	0.118	1	1698	0.103	1
FALL, SLIP OR TRIP, NOC	441	0.055	5	1422	0.086	2
FELLOW WORKER, PATIENT-NOT IN ACT OF A CRIME	878	0.109	2	1246	0.075	3
HAND TOOL, UTENSIL, NOT POWERED	547	0.068	4	1019	0.062	4
CUT, PUNCTURE, SCRAPE, NOC	585	0.072	3	985	0.060	5
ON SAME LEVEL	343	0.042	8	975	0.059	6
PUSHING OR PULLING	367	0.045	6	845	0.051	7
STRAIN OR INJURY BY, NOC	358	0.044	7	792	0.048	8
OTHER - MISCELLANEOUS, NOC	302	0.037	9	591	0.036	9
CONTACT WITH, NOC	181	0.022	14	522	0.032	10

It is useful to know that the rank order of injuries sustained by short-tenured employees do not appear to have varied significantly from those with longer tenure with respect to body part, nature, and cause of injury.



Figure 4: Word Cloud of Injury Narratives

Most claims in the data contain an associated injury narrative and the word cloud in Figure 4 features the most common words found in the narratives. The cloud reinforces Table 4 results by showing ‘back’ prominently. The nouns ‘patient’ and ‘needl’ (needle) appear as does the verb ‘fell.’ The cloud suggests that lifting and patient-related injuries are a major concern in health care along with falls and needle sticks.

7 Injury Severity

To explore, non-fatal injury severity, Table 7 shows the various initial treatment modes given in the claims data. Using these modes as a proxy for severity, we assumed those claims associated with future major medical, hospitalization, and emergency evaluation represent the most severe injuries. For emergency evaluation and hospitalization, the first-year injury proportions exceeded those of the first-year baseline of 0.33.

As stated earlier, 19 percent of health care sector claims are missing job tenure information. For claims containing such information, Table 7 indicates that nearly two in five hospitalizations were first-year employees.

For fatal injuries, there were 3 incidents during the study period. In this sector, no fatalities had employer service of less than one year. Table 8 indicates that all fatalities were vehicle-related.

Table 7: Injuries by Initial Treatment Type

Type Treatment	Tenure - 1 Year or Less	All Tenure Lengths	
	Count	Total Count	First Year Prop.
Emergency Evaluation	940	2760	0.34
Hospitalization	27	70	0.39
Future Major Medical	11	43	0.26
Minor Clinic	4444	13042	0.34
Minor Onsite by Employer	973	3575	0.27
No Medical Treatment	1240	3891	0.32
Unknown	446	1221	0.37

Table 8: Fatal Injuries by Cause

Type	Tenure - 1 Year or Less	All Tenure Lengths
	Count	Count
MOTOR VEHICLE, NOC	NA	2
MOTOR VEHICLE	NA	1

8 Other Considerations

For some industries (e.g. construction, agriculture, etc), there can be seasonality in the pattern of injuries or variation by day of the week. A quick review of Figures 5 and 6 indicates no unusual patterns except for a small spike in February 2015. Further investigation reveals this spike came from falls resulting from an ice storm that hit the region.

9 Final Thoughts

From the 2014-2016 Tennessee WC claims data, we highlight these items for consideration by the health care sector.

1. Among two-digit NAICS industries, health care was above average for WC injury frequency with a rate of 2.9 per 100 FTE (extrapolated rate of 3.7 per 100 FTE).
2. Except for a spike in February 2015 (see Figure 5) when ice and snow caused a number of falls, injuries did not have much variability month-to-month.
3. Strains of the musculature were the most common type of injury and happened at almost twice the rate of the second most common (contusions). Fingers were the most common body part to be injured with lower back second.
4. Employees with job tenure of less than one year sustained 33 percent of all injuries in health care.
5. The job injury-tenure relationship varied with the size of employer. Firms with less than 100 employees had 41 percent or more of their injuries suffered by first-year employees vs. 30 percent or less for those with more than 500 employees.
6. First-year injuries had rank orders for injury type almost identical to those of the set of all injuries. Injury cause was more variable between the groups but lifting was first in both groups.
7. Workers older than 45 had lower overall rates of injury than their peers.

Further, health care is different than most industries because of patient-worker interaction. The demands of moving and treating patients leaves newly hired workers vulnerable in the early portion of their job tenure with an employer. Employees in smaller firms are more at risk. The industry should develop practices (e.g. new employee onboarding, mentorship, etc.) that target these at-risk workers.

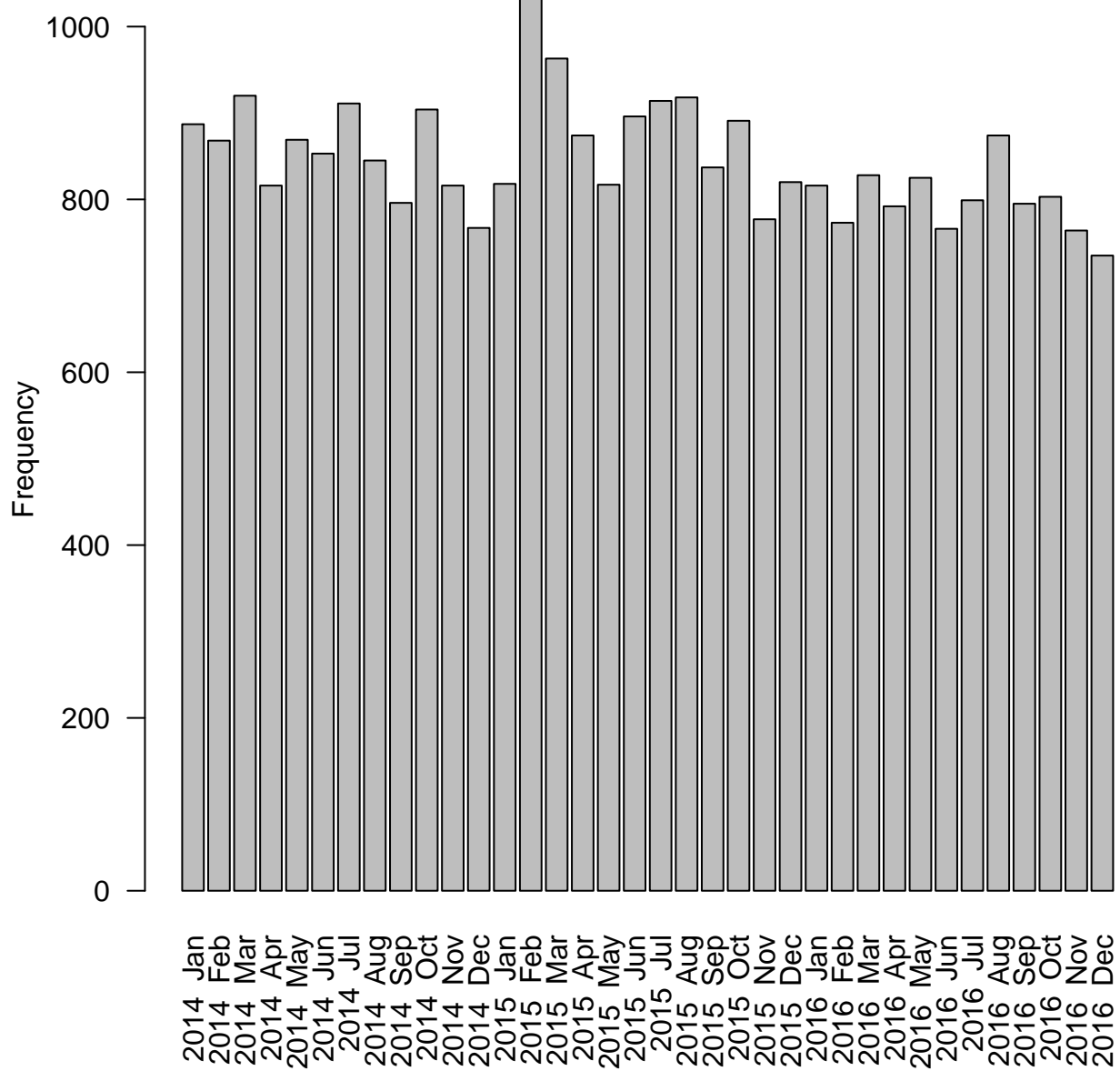


Figure 5: Monthly Distribution of Injuries

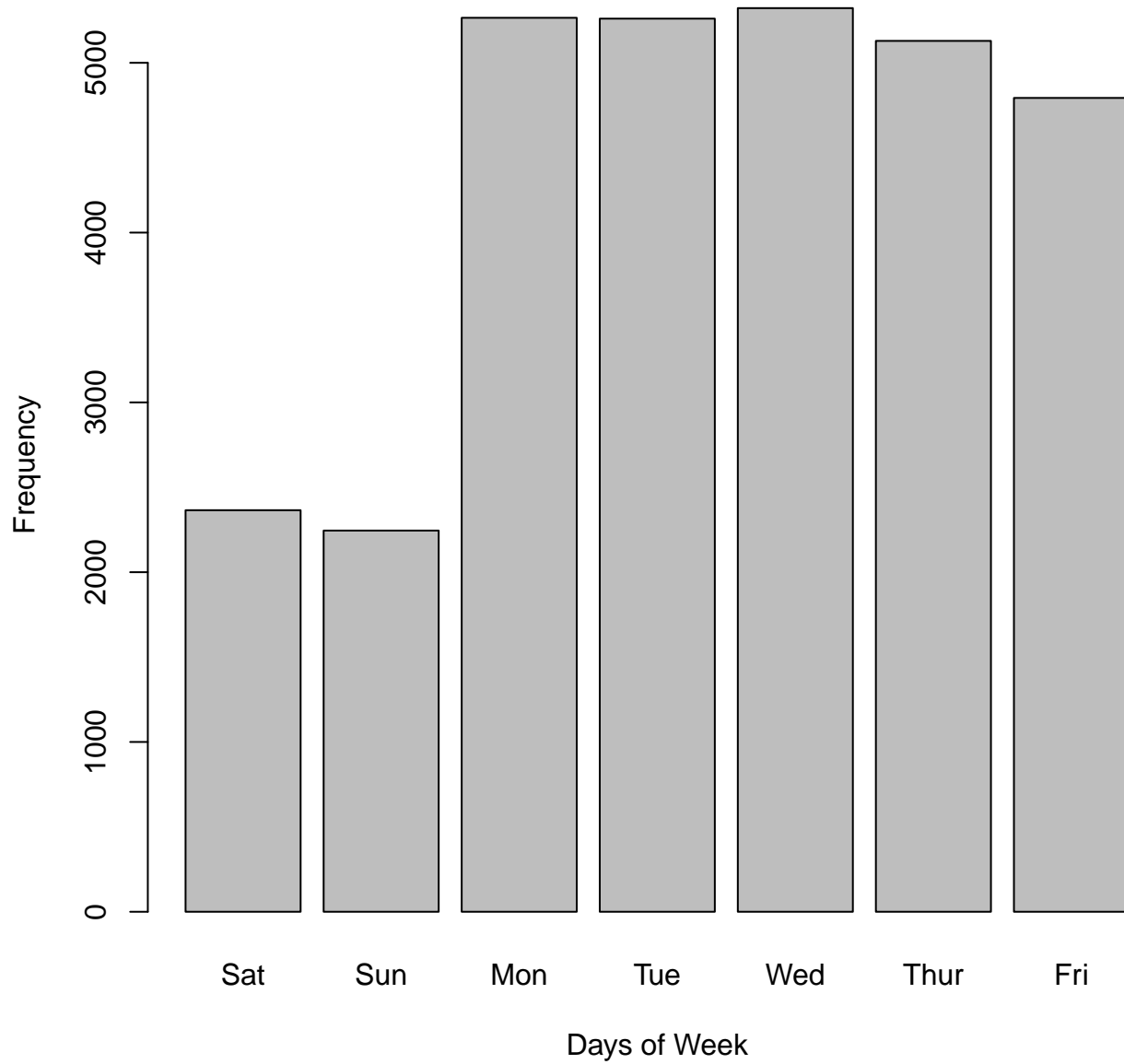


Figure 6: Weekday Distribution of Injuries

10 Appendix

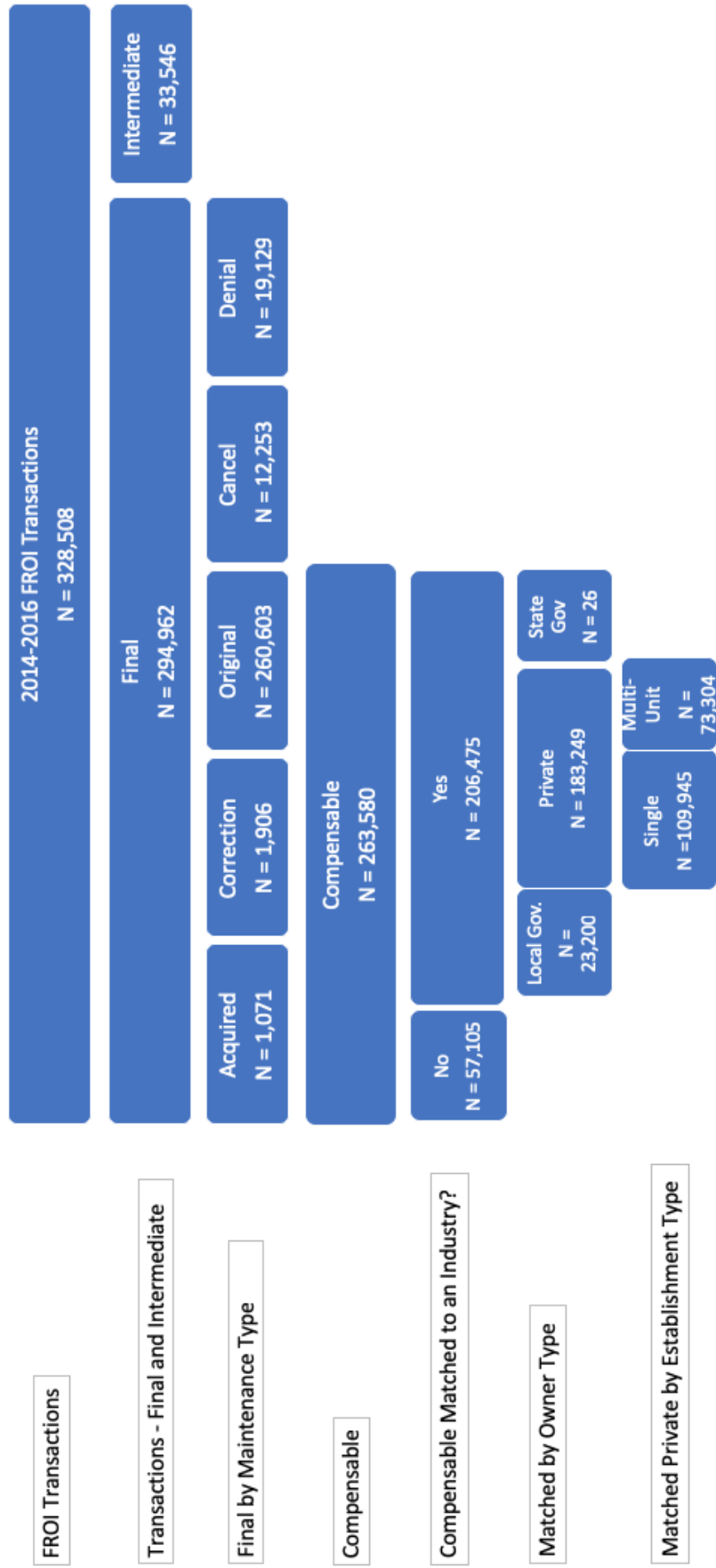


Figure 7: Structure of 2014-2016 FROI Claim Transactions