



Changing Workforce Demographics and Workplace Injury Frequency

INTRODUCTION

By any measure, claim frequency in workers compensation has been declining for many years. As reported annually in NCCI's **State of the Line Report**,¹ workers compensation frequency has fallen almost every year for over two decades and by nearly one-third just in the last 10 years. A slightly different metric used by the Bureau of Labor Statistics (BLS), which we will discuss in detail in this report, shows a 30% decrease since 2006.

Recent declines in frequency have coincided with a period of significant changes in the US labor force. Most notably, the workforce has added a lot of older workers. The number of workers who are at least 55 years old has doubled since 2000, even as the number of workers under 55 has been stable. There have been changes in gender composition and sector mix of workers as well. Women now make up 47% of the labor force. The share of service sector employment is near record highs.

These statistics invite a natural question: To what extent do demographic changes in the workforce explain declining claim frequency in workers compensation? This research investigates the relationship between changing workforce demographics and workers compensation frequency.

¹ The most recent **State of the Line Report**, **State of the Line Guide**, and **State of the Line** video can be found online at www.ncci.com/Articles/Pages/II_NewsFromAIS.aspx.

© Copyright 2019 National Council on Compensation Insurance, Inc. All Rights Reserved.

THE RESEARCH ARTICLES AND CONTENT DISTRIBUTED BY NCCI ARE PROVIDED FOR GENERAL INFORMATIONAL PURPOSES ONLY AND ARE PROVIDED "AS IS." NCCI DOES NOT GUARANTEE THEIR ACCURACY OR COMPLETENESS NOR DOES NCCI ASSUME ANY LIABILITY THAT MAY RESULT IN YOUR RELIANCE UPON SUCH INFORMATION. NCCI EXPRESSLY DISCLAIMS ANY AND ALL WARRANTIES OF ANY KIND INCLUDING ALL EXPRESS, STATUTORY AND IMPLIED WARRANTIES INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

KEY FINDINGS

- Work injury frequency has declined by almost one-third between 2006 and 2017
- Workforce demographics also have changed over this period
 - The share of workers aged 55 and older has risen by one-third
 - The share of female employment has increased slightly
 - Employment growth is concentrated in service sectors
- Incidence rates and causes of injury vary meaningfully by worker demographics
 - Younger prime-age workers have lower injury frequency than older workers, a reversal from 10 years ago
 - Younger workers have relatively more contact² injuries and relatively fewer falls, slips, and trips
 - Sector mix is not a major determinant of why frequency has declined more for younger workers
 - Men have higher injury frequency than women, but the gap is shrinking
 - The gender gap in frequency and its decline are primarily driven by contact injuries
 - Men are concentrated in sectors that have high contact injury rates
 - Despite differences in sector mix for men and women, most of the gender gap in frequency is not directly attributable to sector mix
 - Goods-producing sectors, such as Construction and Manufacturing, have higher injury frequency than most service sectors
 - Frequency in all sectors has declined, but the sector rankings from high-frequency to low-frequency have not changed
 - Most sectors have experienced similar frequency declines in percentage terms
 - High-frequency sectors tend to have high incidence rates for all causes of injury
- In aggregate, frequency decline is mainly the result of lower incidence rates for all workers, not the result of changing workforce demographics
 - Frequency has dropped at an annualized rate of 1%–4% for workers in each category by age, gender, or sector
 - Demographics affect frequency, but year-to-year demographic changes in the workforce are too small to explain overall decline
 - The aging workforce has had almost no net effect on frequency decline
 - Increased proportions of female and service sector workers push frequency downward a little bit

OUTLINE

This report is divided into the following sections.

- Data Description and Defining Frequency
- How Is the Workforce Changing?
- How Does Frequency Change by Worker Characteristics?
- What Explains Overall Frequency Decline?
- Summary

DATA DESCRIPTION AND DEFINING FREQUENCY

How We Measure Frequency

In this research report, we use BLS data on days away from work claims, which is collected and processed from the Survey of Occupational Injuries and Illnesses (SOII). The BLS uses a different definition of frequency than NCCI's primary metrics.³ The denominator for BLS frequency is work hours, expressed as a number of full-time equivalent (FTE) workers. The BLS reports estimates of both **total** injuries and illnesses suffered by workers with particular characteristics and **rates** of injuries and illnesses, measured per 10,000 full-time equivalent workers. We will refer to these BLS rates as *incidence rates*. Critically, incidence rates are reported by worker characteristics (e.g., incidence rate for women). For this reason, BLS incidence rates will be the main frequency measure used throughout the report.

² Contact injuries in this report refer to BLS' "contact with objects and equipment" event type.

³ Davis, J., "NCCI Explains Its Top 3 Frequency Measures," 10/15/18. www.ncci.com/Articles/Pages/II_Insights-Top3FreqMeasures.aspx

NCCI’s measures, in contrast, define frequency as number of claims per dollars of premium or of payroll. In the *Annual Statistical Bulletin*, NCCI also estimates frequency per 100,000 workers. This measure uses payroll data from policies and average weekly wage from the Quarterly Census of Employment and Wages to estimate number of workers. NCCI produces separate estimates of lost-time and medical-only claims. Likewise, the BLS definition of days-away-from-work claims is similar but not identical to NCCI lost-time claims.⁴ We do not, therefore, expect to match BLS incidence rates to NCCI frequency, but we do expect BLS and NCCI frequency measures to capture similar patterns in injury frequency over time.

A key aspect of BLS data relevant to measuring frequency is that BLS staff use the Current Population Survey⁵ along with characteristics of injured workers in the SOII to estimate incidence rates per 10,000 FTE workers by demographic characteristics and cause of injury. NCCI data has considerable information about injured worker claim characteristics, but not about the demographic characteristics of the workers covered by policies. In other words, we know a lot more about the population of *injured* workers than *insured* workers from the NCCI data.

What Are the Primary Causes of Injury?

BLS uses a classification system to aggregate injury causes into seven major types.⁶ These types and the incidence rates due to each type are shown in Table 1. The second and third columns show the incidence rate by cause per 10,000 FTE in 2006 and 2017. The fourth and fifth columns are the share of total injuries and illnesses from that cause in 2006 and 2017.

Table 1—Three Events of Workplace Injuries Are Responsible for Over 85 Percent of Cases
BLS Incidence Rates by Event, 2006 and 2017

Injury Event	Cases per 10,000 FTE		Percent Share	
	2006	2017	2006	2017
Overexertion	46.0	30.0	36.5%	33.7%
Contact with objects/equip.	36.2	23.2	28.7%	26.0%
Falls/Slips/Trips	29.1	23.1	23.1%	25.9%
Transportation	6.1	4.9	4.8%	5.5%
Violence	2.4	4.0	1.9%	4.5%
Exposure to harmful subst./env.	6.1	3.8	4.8%	4.3%
Fire/Explosion	0.2	0.1	0.2%	0.1%
	126.1	89.1	100%	100%

Source: US Bureau of Labor Statistics, SOII

The table shows that three main causes caused over 85% of total workplace injuries in 2006 and 2017 (this is also true for all years between):

- Overexertion
- Contact with objects or equipment
- Falls, slips and trips

⁴ BLS days away from work claims include all claims in which any work time was missed due to injury, whereas NCCI lost-time claims are generally those involving indemnity payments, which commence after a specified waiting period that varies by state.

⁵ The Current Population Survey is produced jointly by BLS and the US Census Bureau and provides a wide variety of labor force statistics for the United States.

⁶ NCCI terminology for “cause of injury” is very similar to BLS terminology for “event or exposure.” We will use cause of injury in this report to refer to NCCI frequency by cause or BLS incidence rates by event.

Overexertion has the most associated injuries in each year, but its share has declined from 36.5% to 33.7%. The share of injuries caused by contact with objects or equipment has also fallen. Among the three major causes of injury, only falls, slips and trips makes up a higher share in 2017 than in 2006, meaning the incidence rate for falls, slips and trips has declined less than has the overall incidence rate over the last decade.

Do We See Similar Patterns in NCCI Data and BLS Data?

Before proceeding to the main analysis, we establish a concordance between BLS survey data and NCCI Unit data for frequency declines by cause of injury and overall. This check increases our confidence that BLS survey results match the more comprehensive injury data reported to NCCI, and thus that the BLS data reliably captures real patterns in the incidence rates by worker characteristics.

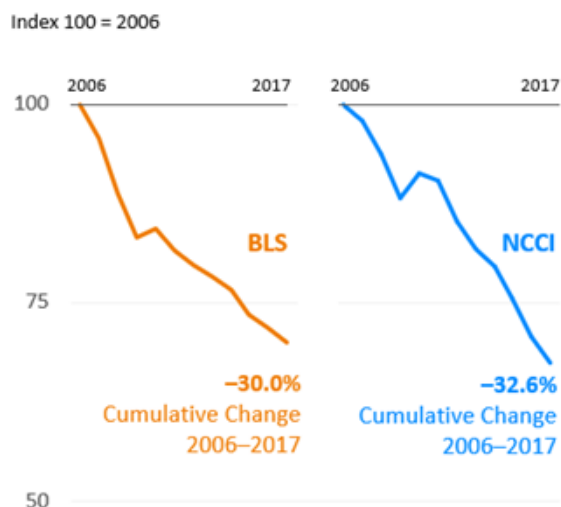
FREQUENCY HAS DECLINED SIMILARLY IN BOTH SOURCES

NCCI and BLS measures show very similar frequency declines. Figure 1 shows frequency measured by BLS incidence rates and by NCCI lost-time cases per premium.⁷ For comparability, we have standardized both measures by setting frequency to an index of 100 in 2006. This is a rescaled version of the same information provided annually in NCCI’s **State of the Line** presentation at its *Annual Issues Symposium*.

FREQUENCY BY CAUSE OF INJURY HAS CHANGED SIMILARLY IN BOTH SOURCES

As we have discussed, NCCI and BLS definitions do not perfectly match. However, we can draw a rough mapping from BLS to NCCI groupings of causes of injury.⁸ In Table 2, we show BLS categories for major injury-causing events and the corresponding cause or causes by NCCI grouping. Two of these are one-to-one comparisons. In the other case, BLS’ broad category of Contact with Objects and Equipment mostly encompasses four NCCI cause of injury groupings.

Figure 1—BLS and NCCI Frequency Declines Are Closely Matched Since 2006



Sources: US Bureau of Labor Statistics; NCCI

⁷ To allow for analyzing changes in frequency over time, the premium in the NCCI frequency measure is adjusted to current wage level and to current approved loss cost level by state.

⁸ Both BLS and NCCI have more detailed classifications (e.g., “slip without fall” and “fall to lower level”) which could enable an even more precise mapping. However, some dissimilarities would always prevent a perfect correspondence. Since our goal in this report is not to explore the most detailed causes of injury, we simply show results from this high-level comparison.

Table 2—Corresponding BLS Event and NCCI Cause of Injury Categories
BLS and NCCI Injury Categories

BLS Event	NCCI Cause(s)
Falls/Slips/Trips	Fall/Slip
Overexertion and Bodily Reaction	Strain
Contact with Objects & Equipment	Caught in Between Cut/Puncture/Scrape Striking Against/Stepping On Struck By

Using the broadest classifications, we compare frequency of three types of BLS injury event codes to NCCI analogues.⁹ Results are shown in Table 3. The frequency for each category in 2011 is normalized to 100 and subsequent index values represent a given year’s percentage of 2011 frequency for the given category.

Table 3—BLS and NCCI Frequencies by Cause of Injury
Indexed to Incidence Rate in 2011=100

Source	Category of Injury	2011	2012	2013	2014	2015	2016	2011 Share
BLS	Overexertion	100	98.1	93.1	88.3	83.0	82.0	36.5%
NCCI	Strain	100	100.1	91.9	85.9	82.9	78.1	32.4%
BLS	Contact with Objects/Equipment	100	97.0	95.8	90.9	91.7	90.5	25.5%
NCCI	Combined Injury Causes ¹⁰	100	102.4	98.4	95.2	94.6	91.9	23.7%
BLS	Falls/Slips/Trips	100	95.0	95.8	101.1	95.0	90.4	25.2%
NCCI	Fall/Slip	100	93.8	95.1	94.0	92.3	87.0	26.2%

Source: US Bureau of Labor Statistics; NCCI

Despite the slight differences in category definitions—and in the definition of frequency itself—the two data sources show similar patterns.

- Overexertion (strain) was the largest category, with a share around one-third of cases
- The other two major categories comprised roughly one-quarter of cases each
- Overexertion (strain) injury frequency is falling faster than that of any other major category, with around a 20% drop from 2011 to 2016 in both datasets, compared to about a 10% drop in both datasets for the other two major categories.

Overall, these results for all cases and by cause of injury provide strong evidence that BLS and NCCI data are comparable.

⁹ The NCCI frequencies in this section are calculated from NCCI *Statistical Plan* data. For an overview of NCCI frequency data, see Davis, J, and D. Brown, “Countrywide Trends in Claim Frequency and Severity,” 9/25/18. www.ncci.com/Articles/Pages/II_Insights-Frequency-Severity.aspx

¹⁰ As detailed in Table 2, there are four NCCI cause of injury groupings that are mapped to the BLS injury event, Contact with Objects/Equipment.

HOW IS THE WORKFORCE CHANGING?

We will consider frequency changes by three key worker characteristics: age, gender, and economic sector. These are all dimensions in which workforce composition has changed notably in recent years.

Age

The most prominent trend in the US labor force over the past two decades is the increasing share of workers aged 55 and older—from about 12% of the labor force in 1996 to 17% in 2006 and 22% in 2016. As shown in Table 4, this is projected by BLS to continue over the next 10 years.¹¹ At the same time, the proportion of workers under age 25 has consistently decreased. Historically, young workers have higher incidence rates than older workers.

Table 4—Proportion of the US Labor Force by Age Range
1996–2016 + projected 2026

Age Ranges	1996	2006	2016	2026
16–19	5.8%	4.8%	3.7%	3.1%
20–24	10.0%	10.0%	9.6%	8.6%
25–34	25.3%	21.5%	22.3%	22.1%
35–44	27.3%	23.7%	20.6%	22.2%
45–54	19.7%	23.2%	21.3%	19.2%
55–64	9.1%	13.2%	16.6%	16.2%
65 and older	2.9%	3.6%	5.8%	8.6%
Total	100.0%	100.0%	100.0%	100.0%

Source: US Bureau of Labor Statistics, Employment Projections program

Gender

There is also an important gender element to the changing workforce. Women now compose 47% of the total labor force and contribute more than half of labor force growth. There is also a gender difference in kinds of work. Recent BLS statistics show that women currently make up 52% of private service-providing employment but only 22% of private, nonagricultural goods-producing employment.

In Table 5, we show total private employment, BLS-projected employment growth, and the female share of employment, all broken down by sector. This illustrates the sharp contrast in goods-producing and service-providing sector employment by gender.

¹¹ Tables 4 and 5 use 2016 rather than 2017 as the reference year because the BLS employment projections are published biannually, allowing for comparisons 10 years apart. The broad patterns described hold if 2017 age and sector data is used instead.

Table 5—Female Employment Share by Economic Sector

BLS Projections for Employment Growth, 2016–2026

Economic Sector	millions		Female Share 2016
	Employment 2016	Proj. Growth 2016–2026	
Education and Health Services	22.6	+4.5	76.4%
Financial Activities	8.3	+0.5	53.2%
Other Services	6.4	+0.4	52.1%
Leisure and Hospitality	15.6	+1.3	51.3%
Professional and Business Services	20.1	+2.2	41.6%
Trade, Transportation and Utilities	27.2	+0.9	39.0%
Information	2.8	+0.1	38.9%
Manufacturing	12.3	–0.7	28.8%
Mining	0.6	+0.1	13.6%
Construction	6.7	+0.9	9.7%
All Sectors	122.8	+10.0	46.1%

Source: US Bureau of Labor Statistics, CPS and Employment Projections program

Sector

Even setting aside gender, the mix of workers distributed across sectors has changed. There is a long-term trend in the share of employment away from goods-producing sectors—especially Manufacturing but also Construction and Natural Resources and Mining—to service sectors. This is important because Construction, Manufacturing, and Natural Resources and Mining all have above-average incidence rates. So does Trade, Transportation and Utilities, which is classified as a service sector but whose transportation and utilities components often complement resource or manufacturing production.

Table 6 shows the decrease in the share of nonagricultural wage and salary employment in goods-producing sectors over the last 10 years—and the projected decline in the next 10. Manufacturing’s employment share has fallen by almost 20% in the last 10 years and is expected to fall about 15% more in the next 10. Most of the service sectors that are growing have low injury risks, although healthcare jobs—the bulk of the fastest-growing sector—have higher incidence rates than any other service sector.

Table 6—Proportion of Employment by Economic Sector

	2006	2016	2026
Goods	19.5%	16.0%	15.0%
Manufacturing	12.3%	10.1%	8.7%
Construction	6.7%	5.5%	5.7%
Mining	0.5%	0.5%	0.5%
Services	80.5%	84.0%	85.0%
Trade, Transportation and Utilities	22.8%	22.2%	21.2%
Education and Health Services	15.8%	18.4%	20.4%
Professional and Business Services	15.2%	16.4%	16.8%
Leisure and Hospitality	11.4%	12.7%	12.8%
Financial Activities	7.3%	6.7%	6.6%
Other Services	5.4%	5.2%	5.1%
Information	2.6%	2.3%	2.1%
Total	100.0%	100.0%	100.0%

Source: US Bureau of Labor Statistics, Employment Projections program

HOW DOES FREQUENCY CHANGE BY WORKER CHARACTERISTICS?

Age

FREQUENCY BY AGE

A 2011 NCCI research brief¹² found that younger and older workers' frequency largely converged throughout the 1990s and 2000s. In 1994, workers under age 35 suffered about 280 workplace injuries and illnesses per 10,000 FTE workers. Workers aged 45–64 suffered about 200 injuries and illnesses per 10,000 FTE. By the late 2000s, both incidence rates had declined to slightly over 100—a reduction of almost 50% for older workers, but an even larger reduction of nearly 65% for younger workers.

In recent years, younger workers have continued to experience larger frequency declines than older workers. Younger prime-age workers, aged 25–34 and 35–44, now have lower incidence rates than older workers, aged 45–54 and 55–64. Workers under 25 still have relatively high frequency, and workers aged 65 and older still have relatively low frequency, although workers over 65 have also experienced relatively slow declines. We show results by age range in Table 7.

¹² Restrepo, T. and H. Shuford, "Workers Compensation and the Aging Workforce," Dec. 2011. www.ncci.com/Articles/Documents/II_2011_Aging_Workforce_Research_Brief.pdf

Table 7—BLS Incidence Rates* by Age Range, 2006 to 2017

Year	Age Ranges						
	16–19	20–24	25–34	35–44	45–54	55–64	65+
2006	134.2	142.9	126.1	131.5	123.6	122.1	106.0
2007	124.0	134.4	118.4	123.9	123.0	119.9	96.2
2008	115.9	119.1	109.0	111.0	116.6	116.7	102.4
2009	100.8	111.1	100.6	109.1	108.6	106.8	98.7
2010	114.4	111.4	100.1	105.4	115.6	108.9	98.5
2011	105.2	107.8	97.3	104.4	110.5	106.4	90.0
2012	108.9	107.9	98.2	99.1	107.6	103.0	83.7
2013	109.6	102.4	94.2	96.5	105.8	103.9	90.0
2014	104.8	101.9	90.3	93.2	104.0	106.3	85.6
2015	109.2	97.5	85.2	91.4	99.6	101.3	81.0
2016	100.5	95.8	83.8	85.0	97.2	103.9	81.7
2017	111.7	93.8	80.1	82.7	94.7	100.2	85.4
2006-2017	-17%	-34%	-36%	-37%	-23%	-18%	-19%

*Lost Work Day Cases per 10,000 Full-Time Equivalent Workers (FTEs)

Source: US Bureau of Labor Statistics, SOII

In Figure 2, we show the change in frequency by age graphically. For simplicity, we combine the seven age ranges in Table 7 into four categories: 16–24, 25–44, 45–64, and 65 and older. In 2006, incidence rates were successively higher for younger age categories. Since 2006, workers in the two younger categories have had larger frequency declines. In 2017, workers aged 25–44 became the group with the lowest incidence rates, in part due to an uptick for workers aged 65 and older. Workers aged 16–24 had similar frequency to workers aged 45–64.

The shift by age is especially apparent when focusing just on the middle two categories, workers aged 25–44 and 45–64. These are the ages after which most people have finished their schooling but before retirement, and these workers compose over 90% of total employment. Incidence rates for workers aged 25–44 crossed with those for workers aged 45–64 in 2007, and the gap has widened over the last decade. Among prime-age workers, young workers now have lower frequency.

FREQUENCY BY CAUSE OF INJURY AND AGE

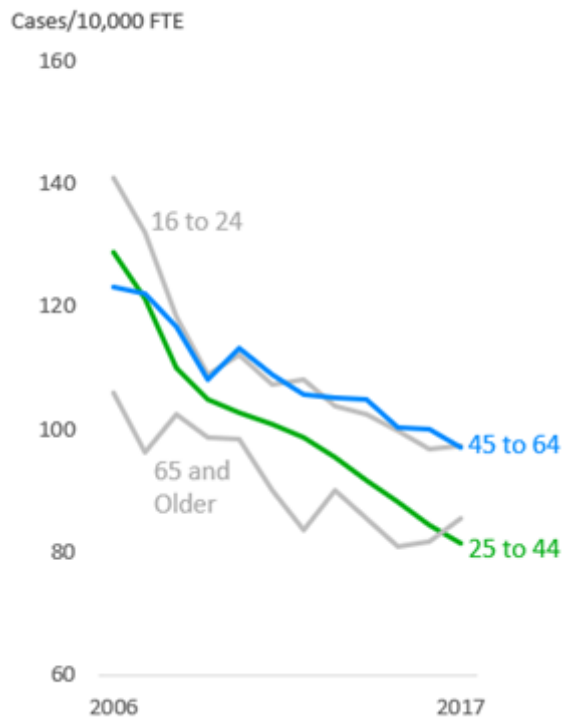
There are at least two key reasons why younger workers may be seeing larger decreases in incidence rates than older workers:

- Younger and older workers may face a different mix of injuries. If certain causes of injury are more common for younger workers, and the frequency of those causes declined faster than others (regardless of age), then young workers will see larger frequency declines than older workers.
- Incidence rates for all injury event types may be declining more for younger workers than for older workers.

In fact, both explanations have contributed to the larger decline in incidence rates for younger workers, but most of the difference comes from faster declines by each cause of injury.

We examine the effects of injury mix first. Table 8 shows the breakdown by age of the three largest causes of injury by age, aggregating all remaining causes into an “other” category. Clear patterns emerge. Older workers have a higher proportion of injuries from falls, slips and trips, and a lower proportion of injuries from contact with objects or equipment. Overexertion injuries peak in middle age.

Figure 2—BLS Incidence Rates by Age Range



Source: US Bureau of Labor Statistics

Table 8—Relative Share of Injuries by Cause Varies by Age

	Age Ranges						
	16–19	20–24	25–34	35–44	45–54	55–64	65+
Fall/slip/trips	20%	17%	19%	21%	25%	33%	44%
Contact	42%	39%	32%	27%	24%	21%	22%
Overexertion	23%	30%	35%	40%	39%	35%	24%
Other	15%	14%	14%	13%	12%	11%	10%
Total	100%	100%	100%	100%	100%	100%	100%

Source: US Bureau of Labor Statistics, SOII

Since 2006, for the major causes of injury, the incidence rate has declined the most for overexertion and the least for falls, slips, and trips. Since older workers have relatively more falls, slips, and trips, injury mix does lead to slightly smaller incidence rate declines than for younger workers. But these effects are small. The proportions in Table 8 do not change much between consecutive age ranges. Most notably, injury mix cannot explain why incidence rates in Table 7 are so similar between workers aged 25–34 and 35–44, and so similar between workers aged 45–54 and 55–64, but starkly different between workers aged 35–44 and 45–54.

The second reason why younger workers may be seeing larger decreases in incidence rates than older workers is because incidence rates for every major cause of injury have declined more for younger workers, which is shown in Table 9. Each cell of Table 9 represents the cumulative percentage decline from 2006 through 2017 in incidence rate by age range and cause of injury. For each of the three major causes, incidence rates fell much more for workers in the 20–24, 25–34, and 35–44 age ranges than for workers aged 45–54 and 55–64. The larger frequency declines for young workers are mostly due to younger workers getting fewer injuries from every cause. Differing distributions of injuries by age play a smaller role.

Table 9—Younger Workers Experienced Larger Frequency Declines for Each Cause of Injury
Frequency Percentage Decline From 2006 to 2017 by Age Range and Cause

	Age Ranges				
	20–24	25–34	35–44	45–54	55–64
Fall/slip/trips	33%	37%	30%	17%	13%
Contact	37%	39%	40%	28%	24%
Overexertion	43%	41%	42%	27%	18%
	20 to 44 Years			45 to 64 Years	

Source: US Bureau of Labor Statistics, SOII

Gender

FREQUENCY BY GENDER

Men have higher injury frequency than women, but in the last 10 years, the gap has been cut by more than half. As shown in Figure 3, men’s incidence rate fell from 142.8 in 2006 to 95.2 in 2017, while women’s incidence rate fell from 106.4 to 81.5. Men’s rates have converged from 34% higher than women’s to 17% higher.

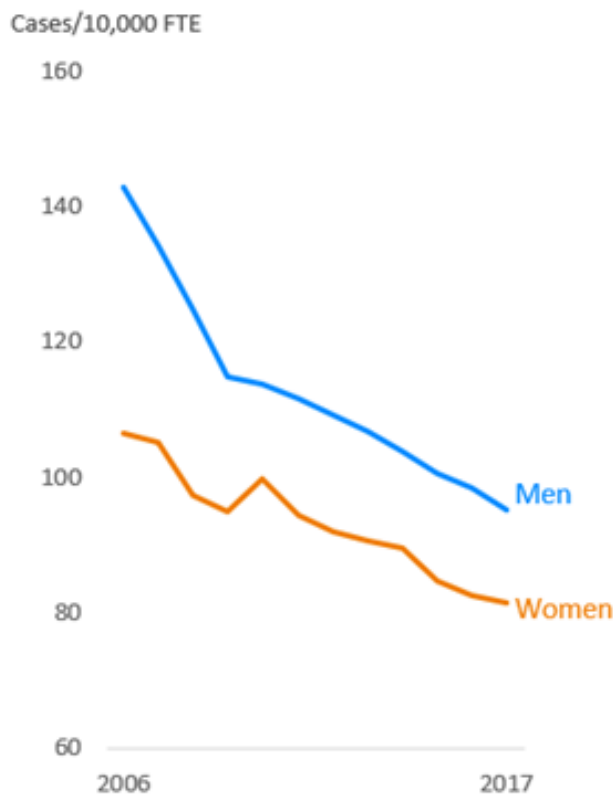
The gender composition of the workforce did not change much over this period. Women’s work hours increased from about 41% to 42% of total hours, which has a negligible impact on overall frequency.

FREQUENCY BY CAUSE OF INJURY AND GENDER

Men’s and women’s incidence rates are driven by different events. The biggest differential is in contact injuries. Men have roughly twice the rates of contact injuries as women, mostly because of different occupational mix. As shown in Table 10, contact injuries made up a much higher proportion of men’s injuries than women’s in both 2006 and 2017. In contrast, a greater proportion of women’s injuries were falls, slips and trips.

Table 10 also shows how the proportion of injuries for each gender has changed over time. Women’s causes of injury have changed somewhat, most notably by the share of overexertion injuries falling from 39% to 33% since 2006. The distribution of men’s injuries has not changed much since 2006.

Figure 3—BLS Incidence Rates by Gender



Source: US Bureau of Labor Statistics

Table 10—Relative Share of Injuries by Cause and Gender, 2006 and 2017

	2006		2017	
	Men	Women	Men	Women
Fall/slip/trips	20%	29%	22%	31%
Contact	33%	19%	30%	20%
Overexertion	35%	39%	34%	33%
Other	13%	13%	14%	16%
Total	100%	100%	100%	100%

Source: US Bureau of Labor Statistics, SOI

Does cause of injury explain the partial convergence in men’s and women’s incidence rates? Table 11 shows the percentage difference each year between men’s and women’s incidence rates per 10,000 FTE workers, shown both overall and by cause of injury. The biggest change since 2006 is the partial convergence of contact incidence rates, which do help drive down the gap between men’s and women’s incidence rates. Even though men’s rates for contact injuries remain far higher, they are no longer over twice as high for men than for women. Women have also had relatively more falls, slips and trips since 2008 than in 2006 and 2007. Overexertion injuries have remained close to 20% higher for men than women throughout the period.

Table 11—Men and Women Differ Most in Contact Injury Rates

Year	Overall Rate		Percent Men Vary from Women by Injury Type			
	Men	Women	Overall	Contact	Overexertion	Fall/slip/trips
2006	142.8	106.4	+34%	+134%	+20%	−9%
2007	134.1	105.2	+27%	+117%	+18%	−9%
2008	124.8	97.3	+28%	+126%	+18%	−17%
2009	114.8	94.9	+21%	+95%	+16%	−16%
2010	113.6	99.7	+14%	+85%	+9%	−20%
2011	111.6	94.3	+18%	+112%	+9%	−17%
2012	109.2	91.9	+19%	+96%	+20%	−20%
2013	106.6	90.7	+18%	+101%	+16%	−18%
2014	103.9	89.4	+16%	+94%	+13%	−17%
2015	100.5	84.8	+19%	+98%	+19%	−14%
2016	98.4	82.5	+19%	+95%	+20%	−16%
2017	95.2	81.5	+17%	+80%	+18%	−16%

Source: US Bureau of Labor Statistics, SOII

These gender differences in injury causes are closely related to sector mix. The observed high rates of contact injuries for men, both in absolute terms and relative to women's rates, fit with the high contact incidence rates experienced in traditionally male-dominated sectors. We discuss the relationship of injury frequency and sector mix next.

Sector

FREQUENCY BY SECTOR

Different types of jobs have very different incidence rates. Table 12 shows the private-industry incidence rates for NAICS supersectors, ordered from highest to lowest frequency. We list average incidence rates for three four-year periods between 2006 and 2017 and annualized frequency declines between periods.

While incidence rates have declined substantially in every sector, the sectors' ordering has not changed between 2006 and 2017. Construction and Natural Resources and Mining have the highest rates, whereas office-based sectors Financial Activities, Professional and Business Services and Information have the lowest. Most sectors' incidence rates have declined close to the 2.8% annualized rate of overall decline. Construction has the largest decline in frequency in percentage as well as absolute terms, while Leisure and Hospitality has experienced the smallest percentage decline.

Table 12—BLS Incidence Rates by Sector, 2006–17

NAICS Supersector	Average Frequency			Annualized Decrease in Freq.		
	2006–2009 (1)	2010–2013 (2)	2014–2017 (3)	(1) to (2)	(2) to (3)	(1) to (3)
Construction	185.5	149.7	131.1	5.2%	3.3%	4.2%
Natural Resources and Mining	156.7	143.1	129.8	2.2%	2.4%	2.3%
Trade, Transportation and Utilities	149.6	132.0	123.7	3.1%	1.6%	2.3%
Education and Health Services	133.5	123.3	106.2	2.0%	3.7%	2.8%
Manufacturing	124.6	107.4	97.5	3.6%	2.4%	3.0%
Leisure and Hospitality	104.3	103.8	94.4	0.1%	2.3%	1.2%
Other Services	97.3	89.7	79.3	2.0%	3.0%	2.5%
Information	67.9	65.5	57.5	0.9%	3.2%	2.0%
Professional and Business Services	63.7	53.8	46.9	4.2%	3.4%	3.8%
Financial Activities	45.3	40.2	37.1	2.9%	2.0%	2.5%
Overall	117.4	103.5	93.2	3.1%	2.6%	2.8%

Source: US Bureau of Labor Statistics, SOII

FREQUENCY BY CAUSE OF INJURY AND SECTOR

How do causes of injury differ by sector? In Figure 4, we show the incidence rate by the three most common injury causes, by NAICS supersector. These are ordered from the highest to lowest overall incidence rate.

Unsurprisingly, different sectors have significantly different distributions of injuries. The highest frequency sectors, Construction and Natural Resources and Mining, have extremely high rates of contact injuries. They also have high rates of falls, slips, and trips. However, they have lower overexertion incidence rates than Trade, Transportation and Utilities, Education and Health Services, and Manufacturing. Manufacturing has a much lower rate of falls, slips, and trips than the other goods-producing sectors, and a lower rate than several service sectors as well. At the lower end of the spectrum, Information, Professional and Business Services, and Financial Activities have low incidence rates for each of the three major causes.

This figure also fits with the gender pattern of injuries shown previously. Construction, Manufacturing and Natural Resources and Mining all have high relative and absolute levels of contact injuries, and most goods-producing employees are men. The other two major causes of injury are less concentrated in male-dominated industries, and have more similar incidence rates between men and women.

HOW MUCH DOES SECTOR MIX EXPLAIN FREQUENCY DECLINES BY AGE AND GENDER?

We have described changes in incidence rates over time by age, gender, and sector; but how do these interact? If the sector mixes of men and women, or of younger and older workers, have changed since 2006, that may partially explain the patterns we have seen.

Unfortunately, because incidence rates are not published by worker age and sector or by gender and sector, we cannot directly examine changes in sector mix by age or gender. Instead, we use Current Population Survey (CPS) data¹³ on the total number of workers in each sector by age or gender to determine how much impact sector mix could have had on incidence rates.

We find that differences in sector mix between men and women do partially explain differences between incidence rates by gender. A decline in the Construction incidence rate contributed significantly to the partial convergence in men’s and women’s incidence rates since 2006. However, most of the gap cannot be explained by sector mix. Differences in sector mix between younger and older workers are small and are not a significant explanation for younger workers’ faster frequency declines.

Figure 4—Common Injury Events by Sector, 2017



Source: US Bureau of Labor Statistics

¹³ The data tables used in this section differ from the population data used to create the incidence rates in that it measures number of workers rather than work hours and includes public employees. However, since the comparisons in this section rely on comparing the differences in sector mix by age or gender, it should still give a good approximation of the impact of sector mix on differences in incidence rates by demographics.

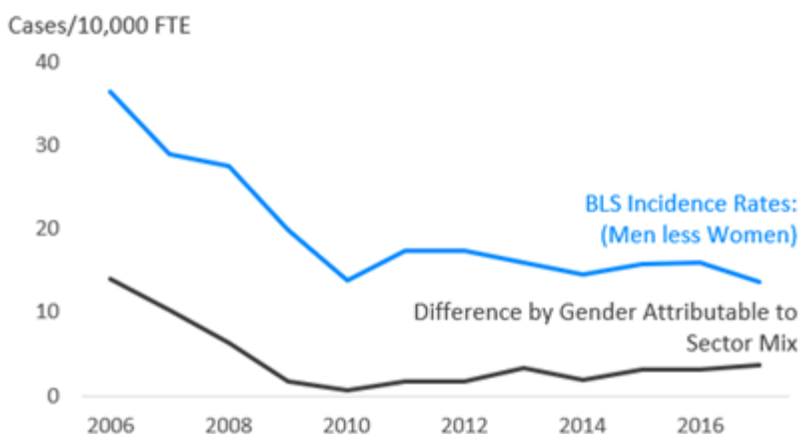
We estimate the contribution of sector mix to incidence rate differences by gender as follows. First, we assume that incidence rates by sector are constant between men and women. Then we calculate incidence rates for men and women in each year by applying each gender’s actual sector mix from the CPS to the sectors’ incidence rates. The difference between those counterfactual incidence rates is the amount we attribute to differences in the sector mix. This is the black line in Figure 5. The blue line is the actual difference between men’s and women’s rates.

For age, we follow the same procedure for older and younger workers as we did for men and women. For simplicity, we restrict our attention to the two broad age categories from Figure 2 that compose most of the workforce: ages 25–44 and ages 45–64. The overall difference and the proportion we attribute to sector mix are shown in Figure 6.

By gender, sector mix is dramatically different. Most notably, the Construction and Manufacturing sectors employ many more men than women, whereas the reverse is true for Education and Health Services. There has not been a large change since 2006 in the relative shares of men and women in different economic sectors.

Figure 5 shows how much of the difference between men’s and women’s incidence rates can be attributed to sector mix. Holding within-sector incidence rates the same for men and women, differences in sector mix would have led to a 14.1 difference in overall incidence rates by gender in 2006, dipping to 0.7 in 2010 and slowly increasing to 3.6 in 2017. The distance between the blue and black lines shows that there would have been a substantial gender gap in incidence rates since 2006 regardless of gender differences in sector mix.

Figure 5—Does Sector Mix Explain Different Incidence Rates? Difference by Gender



Source: US Bureau of Labor Statistics; NCCI

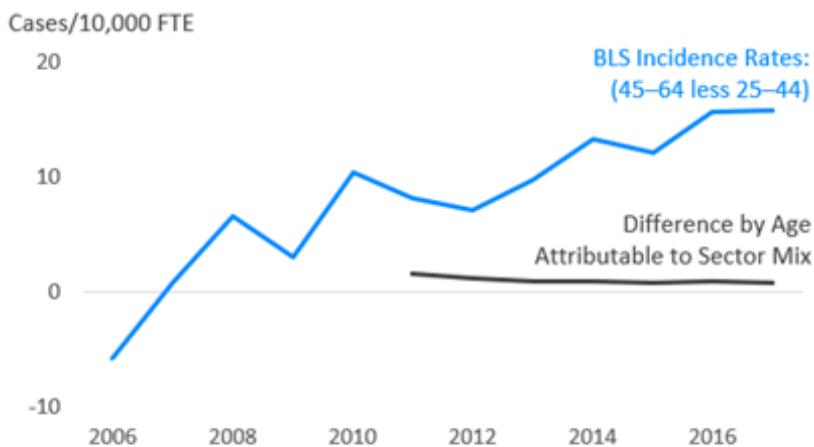
Declining incidence rates in Construction help explain both the sharp decline between 2006 and 2010 in both the blue and black lines in Figure 6. The incidence rate for Construction fell from about 220 cases per 10,000 FTE workers in 2006 to 150 in 2010.

Younger and older workers have similar sector mixes. Workers aged 25–44 are slightly more likely to be employed in Leisure and Hospitality and Professional and Business Services, and workers aged 45–64 are slightly more likely to be employed in Manufacturing and Education and Health Services. However, these differences are only one or two percentage points; for example, in 2011, 13.1% of workers aged 25–44 were employed in Professional and Business Services, compared to 11.6% of workers aged 45–64.

Figure 6 shows that if younger and older workers had the same incidence rates within each sector, then sector mix would cause workers aged 45–64 to have only about one extra case per 10,000 FTE workers. It is true that older workers are more likely to work in high-frequency sectors, but this difference is much too small to explain differences in frequency in each year. Sector mixes for younger and older workers have not changed much since 2011 and, therefore, cannot explain why younger workers have experienced larger declines in incidence rates.

While the results in this section rely on supplementary data and cannot be considered definitive, they suggest that sector mix plays a secondary role in explaining gender differences in incidence rate and does not explain age differences at all.

Figure 6—Does Sector Mix Explain Different Incidence Rates? Difference by Age



Source: US Bureau of Labor Statistics; NCCI

WHAT EXPLAINS OVERALL FREQUENCY DECLINE?

We have shown in previous sections that the average characteristics of the workforce have changed over time and that frequency can vary considerably between workers with different characteristics. We have also shown that frequency has declined a lot for each type of worker. A natural follow-up question is this: How much impact has the changing workforce had on overall frequency change? And how much of the overall decline has been due to lower incidence rates within demographic groups?

Surprisingly, demographic changes have had very little impact. To demonstrate this, we calculate what the frequency in each year would have been had the population distribution of worker characteristics remained fixed.

First, we calculate counterfactual incidence rates under a scenario in which each age range experienced the same changes in incidence rate as it did in reality but with the population distribution of age remaining fixed.

Table 13 shows the proportion of hours worked by people in each age range from 2006 through 2017. Workers aged 55 and older account for 6.5 percentage points more of total work hours in 2017 than in 2006, and the proportion of workers aged 16–24 and 35–54 has slightly declined. Our counterfactual incidence rates for each year hold the work hours constant at 2006 levels, but allowing incidence rates to change year-by-year within age ranges as they did in the actual data (as in Table 7).

Table 13—Workers Over 55 Have a Larger Share of Total Hours in 2017 Than They Did in 2006
Proportion of Hours Worked, 2006 to 2017

Year	Age Ranges						
	16–19	20–24	25–34	35–44	45–54	55–64	65+
2006	3.2%	10.1%	23.5%	25.1%	23.6%	12.0%	2.6%
2007	3.0%	9.9%	23.6%	24.6%	23.7%	12.4%	2.8%
2008	2.9%	9.7%	23.4%	24.2%	23.9%	13.1%	3.0%
2009	2.5%	9.2%	23.3%	23.7%	24.3%	13.8%	3.1%
2010	2.3%	9.2%	23.6%	23.2%	24.2%	14.3%	3.3%
2011	2.2%	9.3%	23.7%	22.7%	23.9%	14.7%	3.5%
2012	2.2%	9.4%	23.3%	22.6%	23.4%	15.2%	3.8%
2013	2.2%	9.5%	23.5%	22.4%	22.9%	15.7%	3.9%
2014	2.2%	9.5%	23.5%	22.0%	22.7%	15.9%	4.1%
2015	2.3%	9.4%	23.7%	21.8%	22.4%	16.0%	4.4%
2016	2.3%	9.3%	24.1%	21.7%	22.0%	16.2%	4.4%
2017	2.4%	9.2%	24.1%	21.6%	21.6%	16.5%	4.6%

Source: US Bureau of Labor Statistics, SOII

The results of this exercise are shown in Table 14. The calculated values are never more than a few tenths of a point different from the actual incidence rates. Worker aging makes almost no difference to overall frequency decline. The effects of frequency declines within age ranges dwarf the effects from the changing age distribution.

Table 14—Workforce Aging Does Not Explain Frequency Decline
BLS Incidence Rates with Constant 2006 Distributions

	Actual	Age Constant
2006	127.8	127.8
2007	122.2	122.3
2008	113.3	113.3
2009	106.4	106.4
2010	107.7	107.7
2011	104.3	104.4
2012	101.9	102.2
2013	99.9	99.9
2014	97.8	97.7
2015	93.9	94.0
2016	91.7	91.4
2017	89.4	89.1

Source: US Bureau of Labor Statistics, SOII

The same pattern holds for gender and sector. Women’s labor force share has been increasing, and women have lower frequency than men. Goods-producing sectors—Construction, Natural Resources and Mining, and Manufacturing—have lowered employment over the past 10 years, even as lower-frequency service sectors have added jobs. These effects should push down frequency. And they do, but not by much. Worker characteristics are not shifting as fast as frequency for each type of worker is declining.

Table 15 adds two columns to Table 14. One holds the proportion of hours worked by women constant, and one holds the sector mix in hours worked constant, both at 2006 levels. As we did for aging, we allow the incidence rate for each subgroup to change as in the actual data. And as we found with aging, the counterfactual incidence rates are extremely close to the actual rates. Changes in sector mix, which have the largest impact, have led to only one fewer days-away-from-work case per 10,000 workers—about 2.6% of the total frequency decline since 2006.

Table 15—Changing Gender and Sector Mix Do Not Explain Frequency Decline, Either
BLS Incidence Rates with Constant 2006 Distributions

	Actual	Age Constant	Gender Constant	Sector Constant
2006	127.8	127.8	127.8	127.8
2007	122.2	122.3	122.2	122.3
2008	113.3	113.3	113.5	113.6
2009	106.4	106.4	106.6	106.9
2010	107.7	107.7	107.9	108.4
2011	104.3	104.4	104.5	105.0
2012	101.9	102.2	102.1	102.7
2013	99.9	99.9	100.1	100.9
2014	97.8	97.7	97.9	98.5
2015	93.9	94.0	94.0	94.8
2016	91.7	91.4	91.9	92.6
2017	89.4	89.1	89.6	90.4

Source: US Bureau of Labor Statistics, SOII

SUMMARY

Our analysis of recent demographic changes and their impact on injury frequency focuses on three dimensions of the US workforce: age distribution, gender distribution, and sector mix. Each of these is changing in ways historically associated with lower incidence rates. The workforce is getting older and more concentrated in service sectors, and it has a higher proportion of women.

We describe changes in injury frequency since 2006 by worker characteristics and compare those changes between groups. Worker characteristics matter in every dimension. Frequency has fallen more for younger workers than for older workers, inverting the long-standing relationship that younger workers have higher injury frequency than older workers. Workers aged 25–44 now have the lowest incidence rates of any age range. The gap between men’s and women’s incidence rates has been cut in half. While all sectors show large frequency declines, Construction has experienced the largest percentage decline since 2006. Construction also has the highest incidence rate of any sector.

Causes of injury differ by worker characteristics. Young workers suffer relatively more contact injuries, middle age workers more overexertion injuries, and older workers more falls, slips, and trips. Younger workers have experienced larger declines in incidence rates for all causes of injury. Men's higher rate of contact injuries drive much of the gender gap in incidence rates. These contact injuries are most common in goods-producing sectors that employ a predominantly male workforce. Workers in Trade, Transportation and Utilities and Education and Health Services have the highest rates of overexertion injuries. Office-based workers have low incidence rates for every cause of injury.

Notwithstanding the demographic impacts noted above, our main conclusion is simple. Workforce demographics do matter to injury frequency, but demographic change does not explain declining injury frequency during the past decade. For the period of this study since 2006, incidence rates have declined 1% to 4% annually (usually 2%–3%) across-the-board for all worker demographic categories and for all three of the most common causes of injury. Frequency decline is mainly the result of lower incidence rates for all workers, not the result of changing workforce demographics.

ACKNOWLEDGEMENTS

We thank Jim Davis, Kirt Dooley, Len Herk, Barry Lipton, Mark Moffett, and John Robertson for helpful comments. Shawn Adcock provided exceptional research support and assistance with graphics.

REFERENCES

- Antonello, K., "State of the Line Report," May 2018. www.ncci.com/Articles/Pages/II_NewsFromAIS.aspx
- Davis, J., "NCCI Explains Its Top 3 Frequency Measures," Oct 2018. www.ncci.com/Articles/Pages/II_Insights-Top3FreqMeasures.aspx
- Davis, J. and D. Brown, "Countrywide Trends in Claim Frequency and Severity," Sep 2018. www.ncci.com/Articles/Pages/II_Insights-Frequency-Severity.aspx
- Restrepo, T. and H. Shuford, "Workers Compensation and the Aging Workforce," Dec. 2011. www.ncci.com/Articles/Documents/II_2011_Aging_Workforce_Research_Brief.pdf
- Bureau of Labor Statistics, U.S. Department of Labor, *Current Population Survey Tables*, last accessed 1/25/19. www.bls.gov/cps/tables.htm
- Bureau of Labor Statistics, U.S. Department of Labor, *Employment Projections*, last accessed 1/25/19. www.bls.gov/emp/tables/employment-by-major-industry-sector.htm
- Bureau of Labor Statistics, U.S. Department of Labor, *Injuries, Illnesses and Fatalities Data*, last accessed 11/13/18. www.bls.gov/iif/data.htm