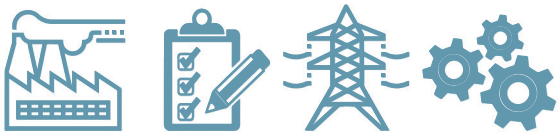
HEALTH AND SAFETY AUTHORITY

Industry Sector



Analysis of Work-related Injury and Illness, 2001 to 2014

ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

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Sectoral Analysis No. 3: Industry Sector
by O. Kenny, B., Maître and H. Russell (April 2018)

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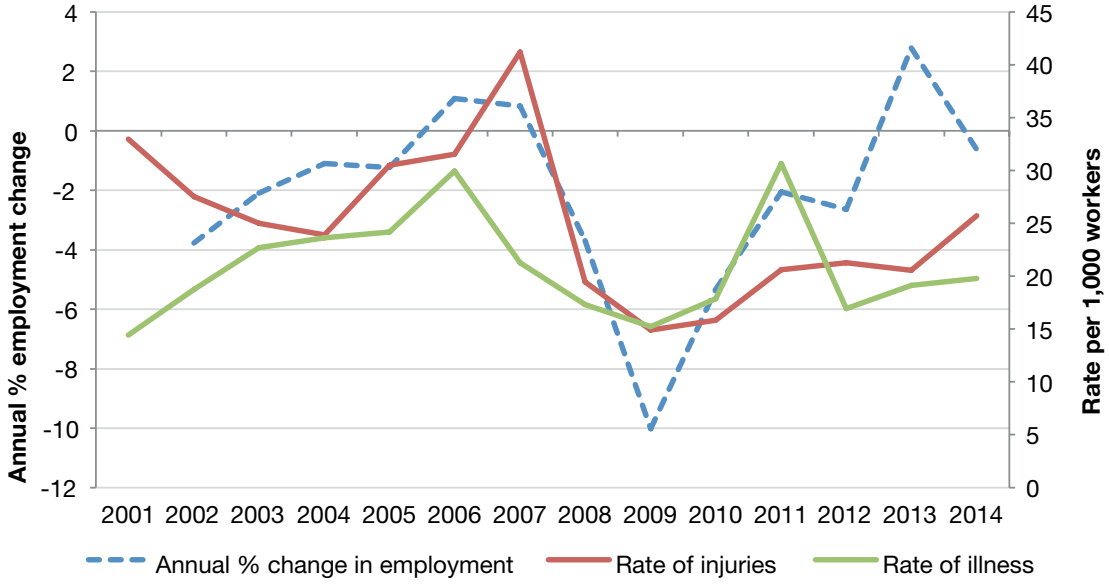
The following analysis draws on the CSO's Quarterly National Household Survey (QNHS) to explore work-related injuries and illnesses in the industry sector (see Box 1 for details on data sources and measures). The results are based on workers' self-reports of work-related illness and injury. All injuries and illnesses are included, regardless of whether or not they resulted in an absence from work as many people continue to work while sick or injured. Findings across the economy as a whole are explored in Russell *et al.* (2015 and 2016).[i] This research briefing provides a within-sector picture of the industry sector over the period 2001–2014. This sector consists of manufacturing, utilities and mining.

Employment in the industry sector has been in decline since 2001, a trend that was accelerated by the recession (Russell *et al.*, 2015). For example, employment in industry fell from an average across all quarters of 318,900 in 2001 to 239,000 in 2014. The blue dotted line in Figure 1 shows the annual percentage change in numbers of industry workers employed between 2001 and 2014. This was only positive in the late boom years (1.1% growth in 2005–2006 and 0.8% in 2006–2007) and in some recovery years (2012–2013). As can be seen, the rates of injury and illness per 1,000 workers quite closely mirror the pattern of change over time in the employment rate.

Figure 1: Rates of work-related injury and illness and annual percentage change in employment in the industry sector, 2001–2014



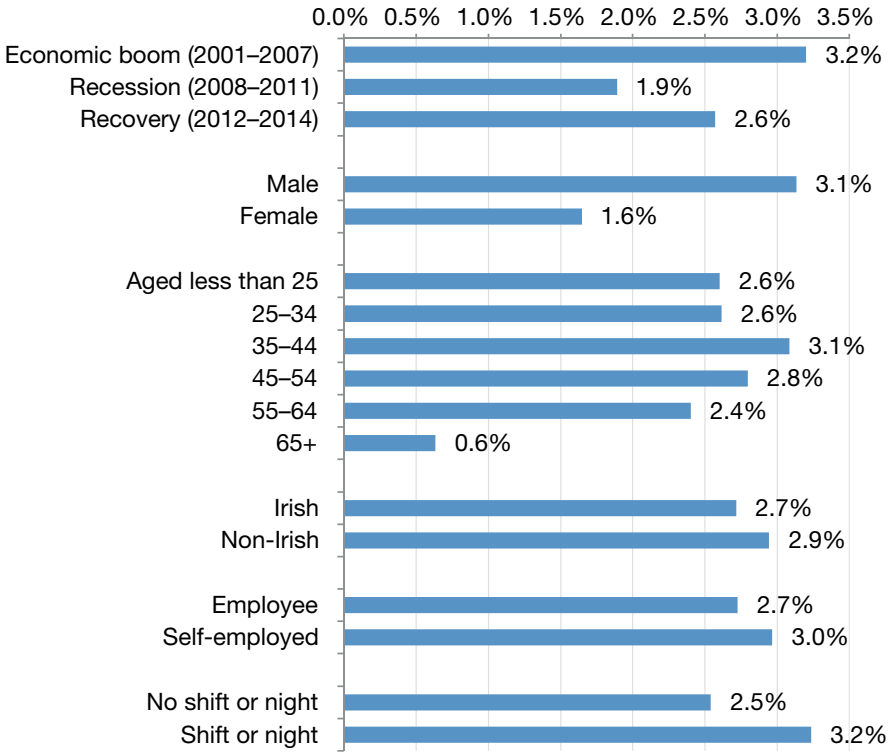
Source: QNHS modules work-related accidents and illnesses, authors' analysis.
Note: The illness rate in 2011 is not directly comparable to adjacent years due to changes in question wording in 2012.

The rate of work-related injury in industry rose during the boom period to a peak of 41.2 per 1,000 in 2007 and fell with the recession to a low of 14.9 in 2009; since then it has been trending upwards as the economy has been recovering. The rate of work-related illness in the industry sector also followed this pattern, though, apart from a spike in 2011 (probably due to changes in question wording in 2012), it did not fluctuate as dramatically as that for injury.

Worker and job characteristics and risk of injury

Figure 2 shows the relationship between risk of injury in the industry sector and a range of worker and job characteristics. The probabilities are calculated using a logit regression model, which allows us to compare 'like with like'.[ii]

Figure 2: Modelled percentage experiencing injury in the industry sector, 2001–2014



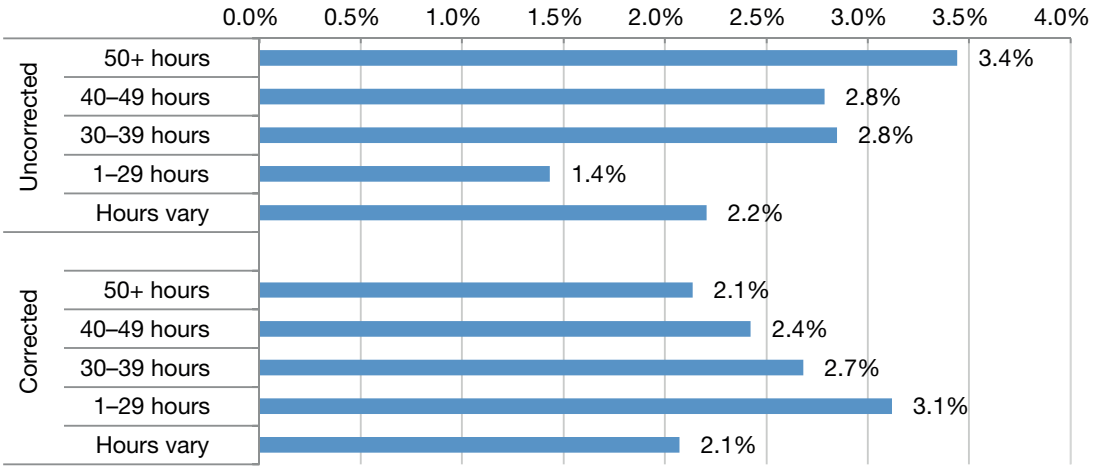
Source: QNHS modules on work-related accidents and illnesses, authors' analysis.
Note: Results are taken from a logit model in which job tenure and hours of work are also included (see Russell *et al.*, 2015, for an explanation and description of the modelling strategy).

With factors such as gender, age, nationality and job composition controlled for, we see that levels of injury in the industry sector were significantly lower during the recession period (1.9%) compared to the boom period (3.2%). During the recovery period, the rate rose again (to 2.6%), though the difference between injury rates in this period and the recession or boom was not significant.

Women working in the industry sector are about half as likely to report a work-related injury (1.6%) as men (3.1%). This may be linked to the fact that women in this sector are more likely to be employed in white-collar rather than manual occupations. Looking at differences between age groups, we see that older workers (over 65 years) have a significantly lower risk of injury (0.6%) compared to workers in any other age group (2.4% to 3.1%). This may be due to a greater level of experience and skill among older workers, or a tendency for people to move into less physically demanding jobs within the sector as they get older, or out of the sector entirely. The only other significant difference found was that shift or night workers have a higher risk of injury (3.2%) compared to those not working shift or night work (2.5%).

Other job characteristics examined included hours of work and job tenure. Figure 3 shows that the risk of injury was significantly lower for those working fewer than 30 hours per week (1.4%) compared to those working longer hours per week (2.8% to 3.4%). However, we make a correction to account for the fact that those working longer hours are exposed to work-related hazards over a longer period of time.[iii] Following this adjustment, we see that *per hour worked*, those working fewer than 30 hours per week have the highest risk of injury, though this is not statistically significant.

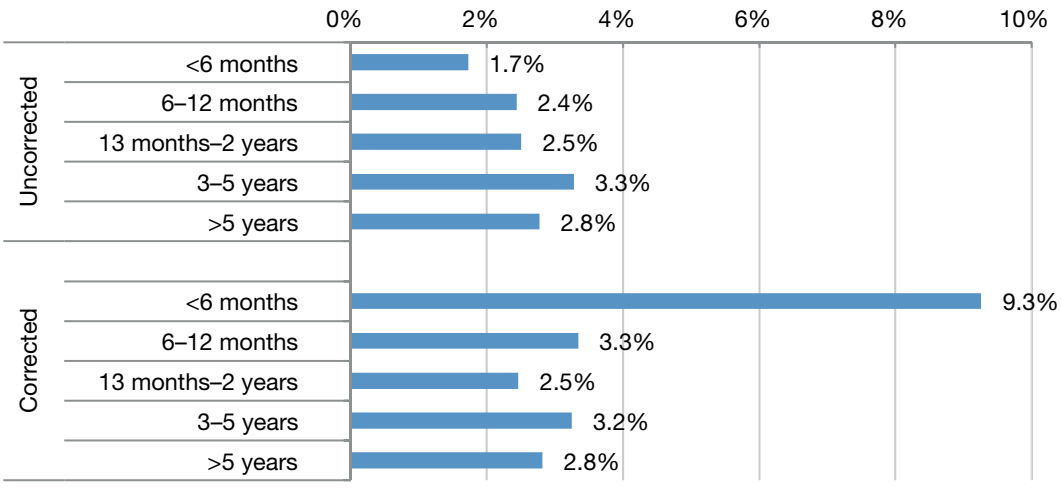
Figure 3: Modelled percentage experiencing injury in the industry sector by working hours, with and without corrections for exposure (per hour worked)



Source: QNHS modules on work-related accidents and illnesses, authors' analysis.
Note: Models include the full set of controls outlined in Figure 2.

In the case of job tenure, the uncorrected results show little variation in the risk of injury depending on length of time working in the job (Figure 4). Once a correction for exposure is made, however, we see that *per month worked*, those with less than six months' experience are about three times more likely to experience an injury (9.3%).[iv] This represents a significant difference, when compared to all other tenures over six months, where the risk of injury is between 2.5% and 3.3%.

Figure 4: Modelled percentage experiencing injury in the construction sector by job tenure, with and without corrections for exposure (per month worked)

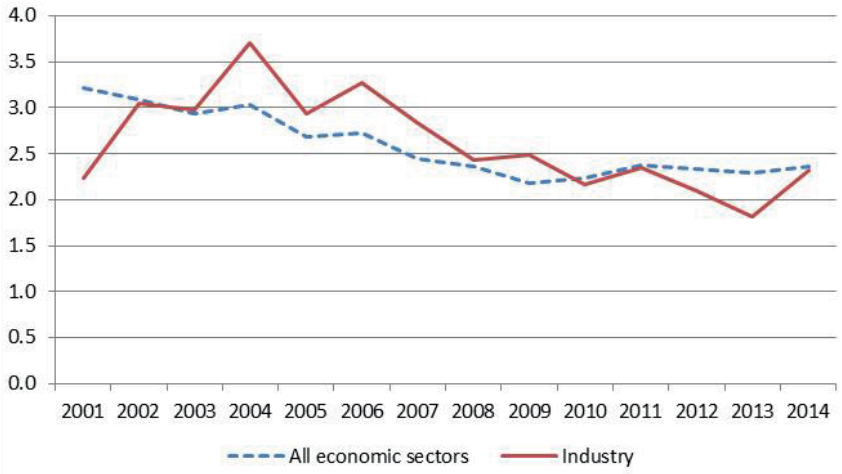


Source: QNHS modules on work-related accidents and illnesses, authors' analysis.
Note: Models include the full set of controls outlined in Figure 2.

Worker fatalities in the industry sector

This section looks at worker fatalities in the industry sector for the period 2001 to 2014. Figure 5 shows that, across all economic sectors, the three-year rolling fatality rate declined from 3.2 per 100,000 workers in 2001 to 2.4 per 100,000 workers in 2014. The fatality rate for industry workers is very similar to that observed for all sectors and follows the same downward trend, from 3.0 per 100,000 workers in 2002 to 2.3 per 100,000 workers in 2014.

Figure 5: Three-year rolling rate of worker fatalities per 100,000 workers, industry and all sectors, 2011–2014



Source: HSA data.

While the fatality rate in the industry sector is very similar to the overall rate, this sector accounts for a large number of fatalities in absolute terms. The four sectors shown in Figure 6 accounted for 85% of all worker fatalities in 2014. There were 62 fatalities in the industry sector in the seven-year boom period (2001–2007); this figure fell to 39 fatalities in the following seven-year period (2008–2014).

Figure 6: Number of worker fatalities by sector, 2001–2014

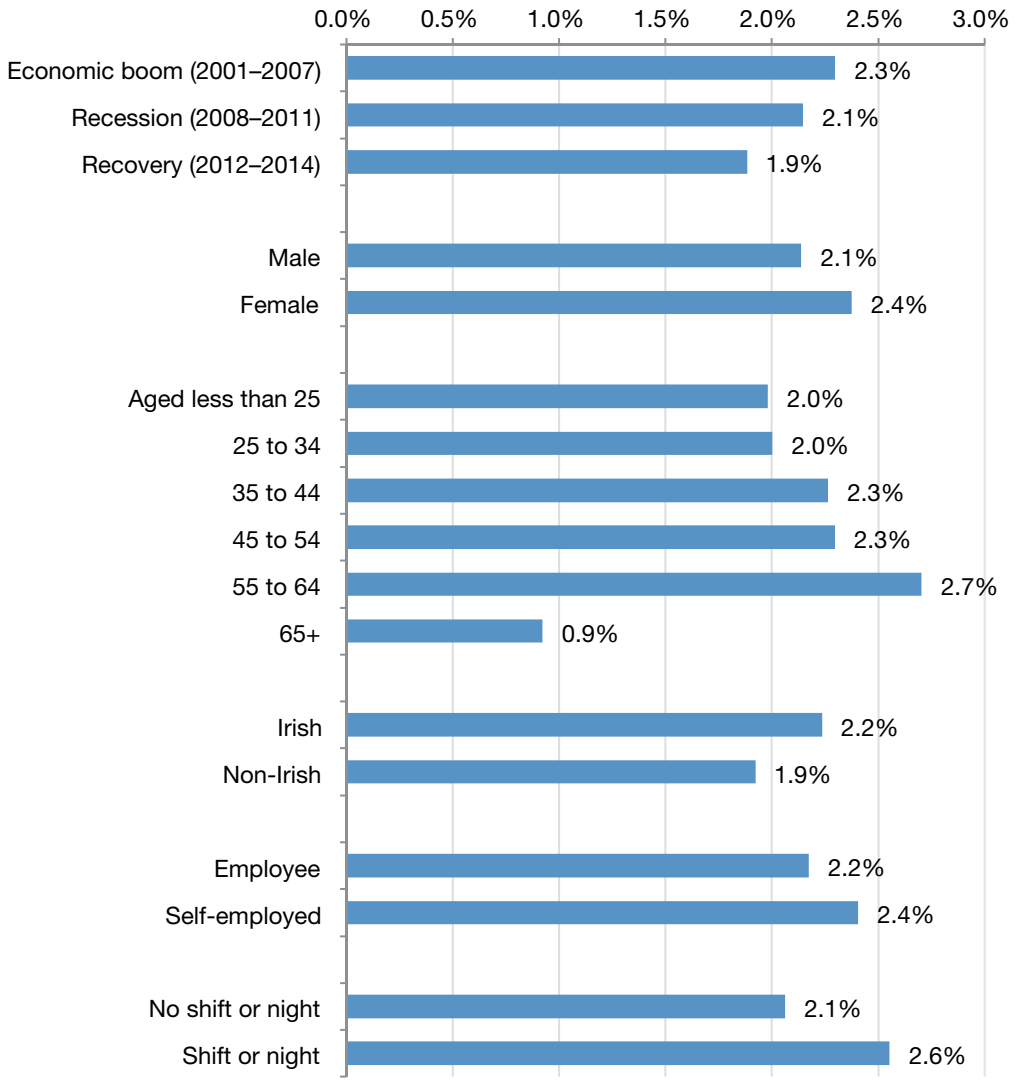
Source: HSA data.

Work-related illness in the industry sector

This section explores the association between illness and specific time periods, the characteristics of those working in the industry sector and their job structure. Over the period 2002 to 2014, illnesses experienced by workers in the industry were mainly due to musculoskeletal disorders at 52% – just above the rate of 47% for all sectors. Figure 7 confirms a lower degree of fluctuation in illness rates in this sector compared to injury rates, as we see that changes in these rates that occurred across the boom, recession and recovery periods are small and not significant.

Similarly, we find that any relationships between worker or job characteristics and the reported rate of illness in the sector (displayed in Figure 7 below) do not achieve statistical significance.

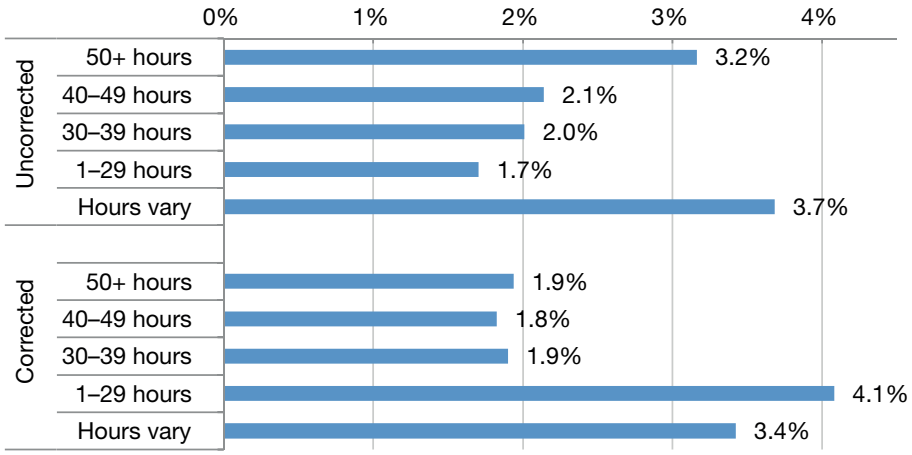
Figure 7: Modelled percentage experiencing illness in the construction sector, 2001–2014



Source: QNHS modules on work-related accidents and illnesses, authors' analysis.
Note: Results are taken from a logit model in which job tenure and hours of work are also included (see Russell *et al.*, 2015, for an explanation and description of the modelling strategy).

Figures 8 and 9 examine the relationship between rates of illness in the industry sector and both hours of work and job tenure. Figure 8 shows that, before adjusting for exposure to risk, those working fewer than 30 hours per week had the lowest risk (1.7%). After correcting for exposure, the results show that members of this group now have the highest risk of illness (4.1%), a rate that is significantly higher than for those working more than 30 hours per week (1.8% to 1.9%).

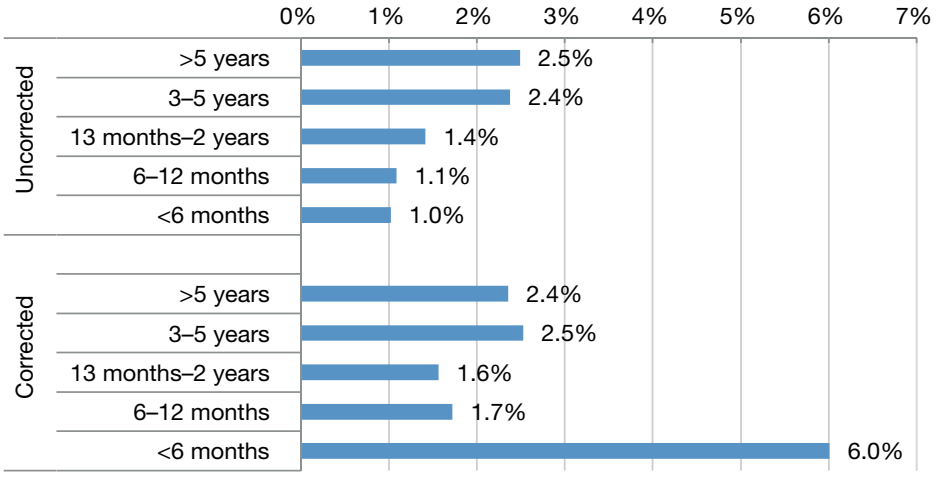
Figure 8: Modelled percentage experiencing illness in the industry sector by working hours, with and without corrections for exposure (per hour worked)



Source: QNHS modules on work-related accidents and illnesses, authors' analysis.
Note: Models include the full set of controls outlined in Figure 7.

Finally, we might expect a higher risk of musculoskeletal disorders among those with longer job tenures, due to cumulative years of physically demanding work, or among new recruits who will have had less training and experience (see Russell *et al.* (2016) for more detail on types of work-related illnesses). In Figure 9, the unadjusted figures show that illness risk is indeed higher for those with a longer tenure. We also find that, after adjusting for exposure to risk per month, the rate of illness becomes highest for those in the lowest tenure group – those with less than six months' job experience (6.0%).[v]

Figure 9: Modelled percentage experiencing illness in the industry sector by job tenure, with and without corrections for exposure (per month worked)



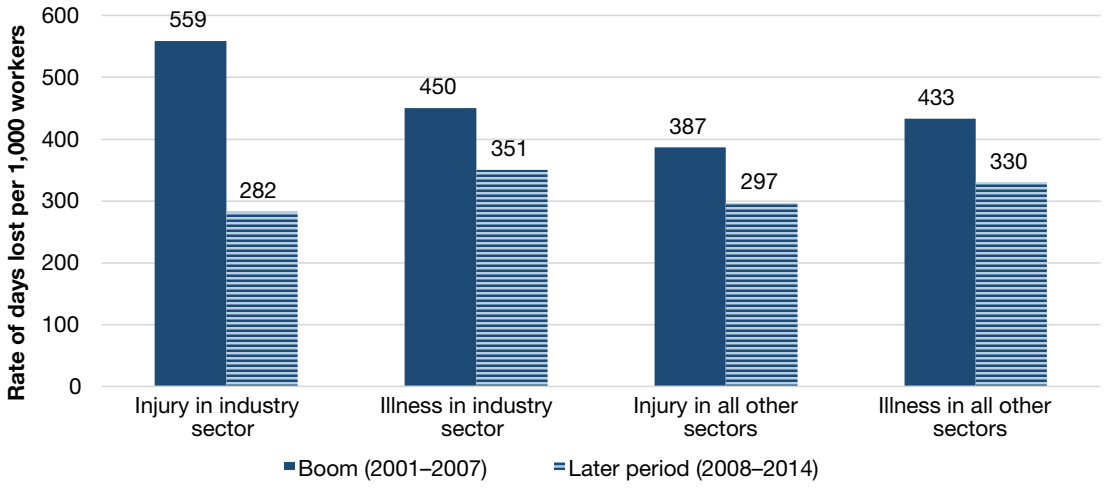
Source: QNHS modules on work-related accidents and illnesses, authors' analysis.
Note: Models include the full set of controls outlined in Figure 7.

Days lost due to illness and injury

The number of days lost in the industry sector due to injury and illness fluctuated significantly over the years 2001 to 2014. The annual average number of days lost due to injury in this sector during the boom, at almost 169,000, is higher than that which occurred in any other sector. This figure more than halved, to just over 82,000, in 2008–2014 to become the third highest number of days lost to injury across all sectors, after the health and transport sectors.[vi] While there was also a fall in the annual average number of days lost due to illness across the two periods, it was less steep: it went from 136,000 during the boom – again the highest figure across sectors – to 102,000 in 2008–2014, the second highest figure across sectors (after health). The pattern across the economy-wide analysis showed that the annual average number of days lost for both illness and injury declined during the recession before rising again in the recovery period to overtake the number of days lost in the boom.

Some of this reduction in days lost to injury and illness may be a result of declining employment in the industry sector, as outlined above. To account for this, Figure 10 shows the annual average number of days lost to injury and illness per 1,000 workers in the industry sector, for both time periods.

Figure 10: Annual average number of days lost to injury and illness per 1,000 workers in industry and all other sectors for two time periods, 2001–2014



Source: QNHS modules on work-related accidents and illnesses, authors' analysis.
Note: 'All other sectors' excludes the industry sector for total number of injury and illness days lost and for numbers employed.

During the boom period (2001–2007), an average of 559 days per 1,000 workers were lost to injury and a further 450 days were lost to illness. The corresponding rates were 387 and 433 across all other sectors (excluding industry). The average number of days lost to injury in the industry sector fell to 282 per 1,000 workers in 2008–2014, representing three times the rate of decline found in all other sectors, where rates fell to 297 per 1,000 workers. This meant that there were fewer days lost to injury in industry than across all other sectors during this period. The rate of days lost to illness in the industry sector also fell, though less sharply, between the boom and 2008–2014, from 450 to 351 per 1,000 workers. This is similar to the proportionate fall in rates of days lost to illness seen across all sectors (from 433 to 330 per 1,000 workers).

Inspections in the industry sector

Table 1 shows that, between 2003 and 2015, the rate of inspections per 1,000 workers completed in the industry sector was slightly higher than the corresponding rate across all sectors.

Table 1: Health and safety inspections in the industry sector, 2003–2015

Year	Inspections in industry sector	Employed in industry (,000s)	Inspection rate per 1,000 workers	Inspection rate all sectors
2003	2,250	300.4	7.5	5.9
2004	2,448	297.1	8.2	6.1
2005	2,839	293.4	9.7	6.9
2006	3,007	296.6	10.1	7.5
2007	2,559	299.1	8.6	6.4
2008	3,265	288.0	11.3	7.5
2009	3,560	259.2	13.7	9.4
2010	2,761	245.4	11.3	8.9
2011	2,112	240.3	8.8	8.3
2012	2,232	234.0	9.5	7.5
2013	1,881	240.5	7.8	6.5
2014	1,468	239.0	6.1	5.6
2015	1,512	248.2	6.1	5.5

Source: Number of inspections taken from HSA annual reports (these are only available from 2003 onwards). Numbers employed taken from QNHS, averaged across four quarters.

During the boom years, inspection rates per 1,000 workers in the industry sector ranged between 7.5 in 2003 and 11.3 in 2008. This represents an increase in the absolute number of inspections in most years during this period but is also a function of overall decreasing employment in this sector. The inspection rate peaked in 2009 at 13.7 per 1,000 workers. The number of inspections began falling from 2010 and, while the number of industry sector employees was also falling, the annual percentage change was lower for the employment rate than the inspection rate. This led to an average inspection rate of 8.3 per 1,000 workers over the last six years, which is only marginally higher than the rate of 7.1 per 1,000 workers for all sectors.

The overall economy-wide research found that higher inspection rates were associated with a lower risk of work-related injury and illness. When we add inspection rates to the models that also control for time period (boom, recession, recovery), we find that there is no significant effect for inspection rates on the risk of work-related illness or injuries (results available from authors).[vii]

Summary

- Despite an overall trend of declining employment in the industry sector, rates of work-related injury, and to some degree illness, have followed the economic cycle.
- Statistical models show that, when other factors are controlled for, the rate of injury was higher in the boom period (3.2%) than the recession and recovery periods (1.9% and 2.6%), while there were no significant differences between periods for illness rates.
- Women and older workers (65 years or over) in the industry sector have a significantly lower risk of injury; 1.6% for women compared to 3.1% for men and 0.6% for workers over 65 years compared to 2.4%–3.1% for younger workers. The risk of injury was higher for shift or night workers (3.2%) compared to those not working these hours (2.5%).
- When a correction for exposure to risk is made, those with less than six months' job experience are more likely to report an injury (9.3%) than those with tenures over six months, for whom the injury risk is between 2.5% and 3.3%.
- While the downward trending fatality rate in the industry sector reflects the trend for all sectors, there is still a large number of fatalities in this sector, with 39 cases recorded between 2008 and 2014.
- The risk of illness is higher for those working part-time (4.1%) compared to those working more than 30 hours per week (1.8% to 1.9%).
- The annual average number of days lost to injury was higher in the industry sector than in any other sector during the boom, but this fell dramatically in the post-2008 period. The rate of days lost to injury per 1,000 workers in the industry sector during 2008–2014 was lower than that for all other sectors together.
- While there was also a drop in days lost to illness between the boom and later periods, this was less sharp compared to the reduction in injuries. The pattern of decline in the rate of days lost to illness per 1,000 workers between these time periods in the industry sector was relatively similar to that observed in all other sectors.
- Inspection rates in the industry sector rose during most years between 2003 and 2009 but have been declining since. There was no significant effect of inspection rates on risk of illness or injury when other factors, including the economic period, were controlled for.

Box 1: Description of data sources and measures

Data sources

The main data source for these sectoral analyses is the annual special modules on work-related accidents and illnesses that form part of the QNHS carried out by the CSO. It is carried out in private households and the responses are unconnected to any workplace reporting. The module is restricted to those who are employed at the time of the survey or who are not currently employed, but who worked during the 12-month reference period. For example, in 2015, in the case of injuries, respondents were asked:

'How many, if any, injuries did you incur at work (excluding commuting) during the period January 2014 to December 2014?'

For illnesses, the following question was asked:

'How many, if any, illnesses or disabilities have you experienced during the 12 months January 2014 to December 2014, that you believe were caused or made worse by your work?'

Respondents were also asked how many days they had taken off work as a result of these injuries or illnesses.

In 2013, the module was part of a European-wide labour force survey and a number of changes were introduced, including a change in question wording to allow the data to be harmonised across the EU (see Russell *et al.*, 2016, for further detail). This means that caution is needed when interpreting trends over time in the injury and illness rates based on the QNHS data.

While the QNHS provides the best randomised national sample of work-related injuries and illnesses, a number of limitations should be borne in mind. One is the 'healthy worker effect', whereby the least healthy or most seriously injured workers leave the labour market, while the healthier workers remain. The likelihood of 'unhealthy' workers leaving the labour market depends both upon the extent to which employers accommodate those with disabilities or illness, which may vary by sector, and the level of compensation available through the welfare system. A further limitation is that those who have not worked in the previous 12 months are excluded from the QNHS module, leading to an underestimation of the extent of work-related illnesses and injuries.

An additional difficulty with the illness statistics arises from the fact that there may be a significant time lapse between exposure to a workplace hazard and the emergence of an illness. This is particularly the case for many cancers and musculoskeletal problems (Drummond, 2007). The tendency of workers with a chronic illness or a disability to change to a less demanding job may also influence the association between work-related illness and sector or hours of work found in the data.

A final caveat concerning the QNHS module data is that, despite a large number of respondents, work-related injuries and illnesses are uncommon and therefore the actual case numbers are relatively small. This is especially true when the figures are broken down by sector or other characteristics such as nationality or shift work status. The statistical models take this issue into account but descriptive tables, for example, on the number of days lost, should be treated with caution.

Employment rates

As the recorded accidents, illnesses and days lost occur over a 12-month period and because employment levels fluctuate seasonally, employment rates were calculated using the average employment level across the four quarters of the relevant year. This provides a better basis for calculating the incidence rate than any one particular quarter. Rates of injury, illness and days lost are derived from the numbers experiencing injury and illness in each sector, divided by the number employed in that sector and multiplied by 1,000 to give an incidence rate per 1,000 workers.

Endnotes

[i] Russell, H., B. Maître and D. Watson (2015). *Trends and patterns in occupational health and safety in Ireland*. Dublin: ESRI; Russell, H., B. Maître and D. Watson (2016). *Work-related musculoskeletal disorders and stress, anxiety and depression in Ireland: Evidence from the QNHS 2002–2013*. Dublin: ESRI. Please see full reports for further details and reference lists.

[ii] Where relevant, all the results in the charts have been tested for statistically significant difference. Any in-text references to statistically significant (or not) differences in results can be taken to mean that statistical models were applied to reach such conclusions.

[iii] Following methods used by Davies and Jones (2005, p. 54), we constructed full-time equivalent (FTE) injury rates using annual average working hours per week (overall sample mean of 35.5 hours per week). A full list of references can be found in Russell *et al*. (2015 and 2016). The adjusted results should be seen as illustrative as they assume other characteristics remain unchanged.

[iv] We adjusted the rates for those employed for less than one year to produce an annual equivalent rate. These adjusted figures should be seen as illustrative as they assume that the monthly/hourly risk and other factors remain stable.

[v] This may represent a significant difference from some of the other categories where the error bars overlap only slightly (not shown in the chart here) but as the reference category in the model was >5 years we cannot be certain of this.

[vi] Due to a smaller number of unweighted cases where any days were lost in the industry sector, figures cannot be presented for the recession (2008–2011) and recovery (2012–2014) periods separately. In addition, there is no information for 2012 due to a change in question wording.

[vii] As there is only one observation of the inspection rate per year, it is difficult to disentangle this effect from other changes that have followed the same pattern. In some sectors, the inspection rate is too strongly correlated with the boom/recession/recovery period to allow an estimation. The economy-wide models include a continuous variable that records annual employment change within sectors. This within-year variation allows us to apply a more robust test of the inspection rates.

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