

# BULLETIN

## Workplace Injuries and Employment: Studying the Links

### Introduction

Some jobs carry a greater risk of workplace injury than others. For example, if a job involves heavy manual work then a greater risk of injury may be associated with it compared with, say, a sedentary office job. The risk of workplace injury is clearly related to the nature of a job. However, previous research has also shown that some individuals appear to be more likely than others to suffer a workplace injury.

This bulletin, prepared by Rhys Davies, outlines key results of two research projects recently undertaken on behalf of the Health and Safety Executive. McKnight, Elias and Wilson (1999) utilised individual level data from the Labour Force Survey to examine the correlations which exist between the occurrence of a work-related accident, the characteristics associated with an individual's job and their personal characteristics. Davies and Elias (2000) analyse aggregate injury data to consider how both individual and employment characteristics can in turn explain geographical and temporal variations in workplace injury rates.

### Data on Workplace Injuries

There are two official sources of information on workplace injuries. Under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), employers are responsible for reporting workplace injuries that result in an absence from normal work of more than three days (excluding road traffic accidents). Employers must also report accidents where a member of the public is killed or requires hospital attention as a result of operations under the control of an employer. Aggregated information from these reports formed the basis of the study by Davies and Elias (2000).

Since 1993 a set of questions on workplace injuries commissioned by the Health and Safety Executive has been included in the winter quarter (December to February) of the

Labour Force Survey (LFS). The LFS is a rich data source providing information on individuals' jobs as well as their personal characteristics. Survey respondents are asked whether they had been injured in a work-related accident in the previous 12 months, whether any such injury was caused by a road traffic accident and how soon after the accident they were able to return to work. This was the source of information used in the study by McKnight, Elias and Wilson (1999).

### Movements in Injury Rates Over Time

Figure 1 shows movements in employee injury rates based upon workplace accidents reported under RIDDOR. From April 1986, the monthly employee injury rate increases to a peak of 85 injuries per 100 thousand employees during October 1990. Employee injury rates then show a decline, although the introduction of new reporting regulations in April 1995 make it difficult to establish the position of any

Figure 1: Employee Injury Rates and the Economic Cycle

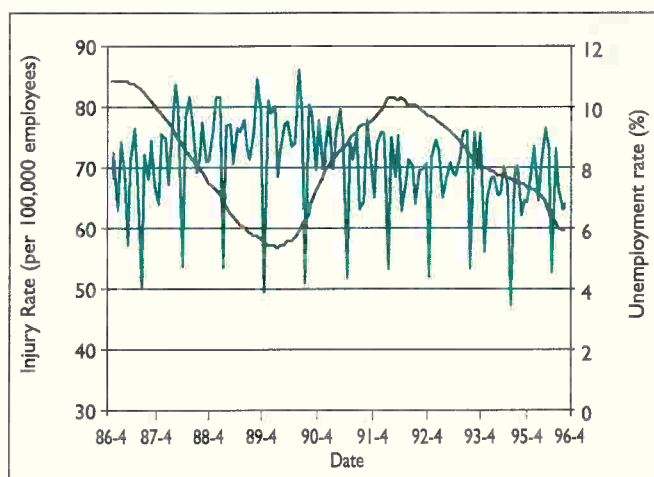
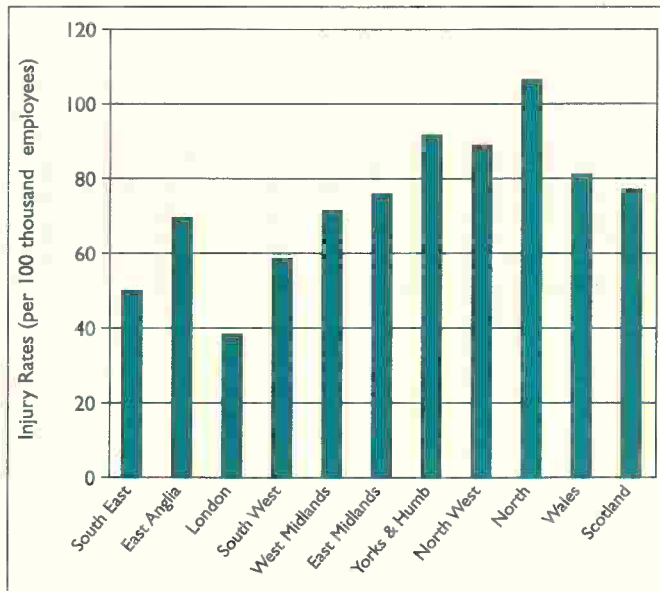


Figure 2: Average Regional Employee Injury Rates<sup>1</sup>



subsequent trough in employee injury rates due to inconsistencies in the definition of 'reportable' injuries. Comparing employee injury rates with movements in the claimant unemployment rate, it can be seen that the incidence of workplace injuries follows a pro-cyclical pattern. The peak in the employee injury rate is associated with a trough in the claimant unemployment rate.

### Regional Variations in Workplace Injury Rates

Figure 2 shows average employee injury rates based upon reported workplace accidents for the 11 standard regions of Great Britain. Significant variations in monthly employee injury rates are shown to exist between the regions over the period of analysis. Average monthly injury rates are highest in the North (106.2 injuries per 100 thousand employees), Yorkshire and Humberside (89.8) and in the North West (86.9). Employee injury rates are lowest within London (38.6 injuries per 100 thousand employees), the South East (49.8) and the South West (58.54).

### 'Reportable' and 'Non-Reportable' Injuries: A View from the LFS

Information in the Labour Force Survey enables the calculation of injury rates from all workplace injuries, and injury rates resulting from 'reportable' workplace accidents (non road accidents resulting in over 3 days of absence from normal work). The LFS suggests that only one third of all workplace injuries in 1996/7 are reportable under RIDDOR. The proportion of workplace injuries that are reportable varies between industries and occupation groups. Workers in hotels & restaurants have the lowest share of injuries that are reportable (23 per cent) in contrast with the highest share found in health & social work (43 per cent).

1. Monthly injury rates calculated for period April 1986 to March 1995.

It must also be noted that whilst not all workplace injuries are reportable under RIDDOR, not all 'reportable' injuries are actually reported. Estimates by the Health and Safety Executive suggest that employers only report approximately 40% of injuries to employees that they should have reported under RIDDOR. The position is worse for the self-employed where reporting levels are estimated to be less than 10%.

### Factors Affecting the Individual Risk of a Workplace Injury: Evidence from the LFS

The variations in employee injury rates shown in Figures 1 and 2 reflect variations in the exposure of individuals to the risk of a workplace injury over time and between the regions. If all workplace injuries occurred as random events, everyone in employment would be exposed to this same degree of risk. However, Figures 1 and 2 suggest that there is not a uniform exposure to the risk of workplace injury. Some people work in jobs that carry a much greater risk of workplace injury. Others may have personal characteristics that make them more 'risk prone'. The characteristics of those in employment and the nature of employment will vary, both geographically and over the economic cycle, to contribute to the differences in the rate of workplace injuries shown in Figures 1 and 2.

McKnight, Elias and Wilson (1999) use multivariate statistical techniques to 'separate out' the various influences on the risk of a workplace injury associated with employer and workplace characteristics, such as occupation, industrial sector and level of qualification, age and length of time spent in a job. Their analysis computed 'adjusted relative risks' that take account of the separate contributions made by this range of factors to the overall risk of an individual experiencing a workplace injury.

#### Personal Characteristics

After adjusting for a wide variety of factors, men are estimated to face a 35% higher risk of reportable injury compared to women. Reportable workplace injury rates are higher for workers who have been employed in their current job for less than 12 months. Workers who have been employed in their current job for more than a year are approximately 60% less likely to suffer a reportable workplace injury. Workers who possess high level qualifications have a lower relative risk of workplace injury relative to those with no qualifications. However, workers who possess low or intermediate level qualifications have a higher relative risk of workplace injury compared to those with no qualifications.

#### Occupation

After taking account of other factors, workers in elementary transport occupations face a 675% higher risk of reportable workplace injury relative to workers in clerical occupations. Workers in metal and vehicle trades, and in other elementary occupations face approximately a 400% higher risk of reportable injury than those in clerical occupations. The lowest risks of reportable injuries are found among office managers, followed by professionals, health associate professionals, associate professionals, clerical workers,

hairdressing & related occupations and high level sales occupations.

### Industry Characteristics

Wide sectoral variations observed in the unadjusted risk of reportable workplace injury almost disappear when controlling for other factors, most notably the occupation in which a person works. Mining, agriculture, wholesale & retail trade, health & social work and community work are the only industrial sectors that have a higher risk of reportable workplace injury than financial services after account has been taken of the strong 'occupational' effects. No industrial sector has a significantly lower risk of reportable workplace injury relative to financial services. The variations in relative risks in the unadjusted data can, therefore, be attributed mainly to occupation, gender and other personal or environmental factors that characterise these industries.

### Other Employment Characteristics

Those in employment within smaller workplaces (less than 10 employees) are estimated to face a 20% lower risk of reportable workplace injury compared to those in larger establishments. Workers in the private sector are estimated to face a 31% lower risk of workplace injury compared to public sector workers.

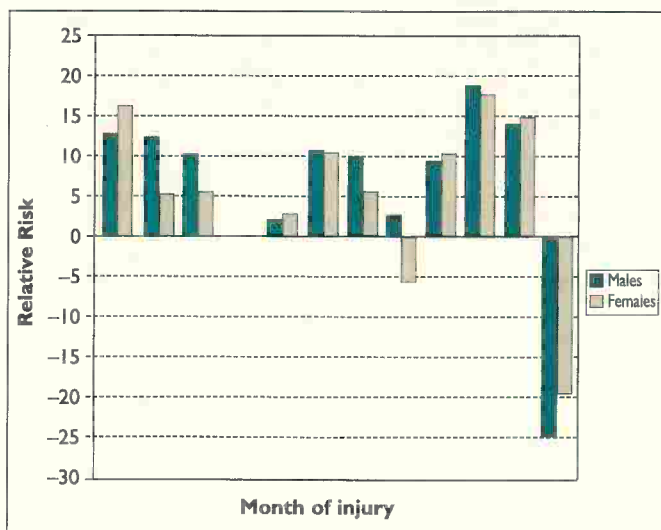
## Factors Affecting Temporal and Regional Variations in Aggregate Injury Rates

Davies and Elias (2000) utilise reports made under RIDDOR to construct an aggregate time series of industrial injury rates for the United Kingdom covering the period April 1986 to March 1987. Multivariate statistical techniques were then used to understand the time series and geographical variations in workplace injury rates constructed from this source.

### Seasonal Variations in Workplace Injuries

Figure 3 charts the relative risk of an employee experiencing a workplace injury by month of occurrence and indicates the

Figure 3: Seasonal Variations in Reported Workplace Injuries



importance of seasonal influences upon employee injury rates. The risk of a workplace injury is greatest for both males and females during the month of October. Male employees are 17% more likely and female employees are 16% more likely to experience a workplace injury during the month of October relative to April. Employee injury rates are lowest during the month of December reflecting the reduced days worked during this month. With the exception of December, employee injury rates are generally higher during the Autumn and Winter months.

### Cyclical Variations in Workplace Injuries

A variety of factors may explain the pro-cyclical pattern in employee injury rates seen in Figure 1. Firstly, during a period of economic expansion, increases in the level of recruitment will reduce the average work experience of those in employment. Secondly, the level of work intensity, both in terms of effort and hours worked, will increase in an attempt to meet increased product demand. Changes in the level of unemployment may also have an effect on the incidence of workplace injuries by changing the behaviour of those in employment. For example, during periods of increased surplus in the labour market, those in employment may become more fearful of losing their jobs, in turn encouraging safer behaviour at work. This is termed the 'labour scarcity' hypothesis.

To consider all of these potential explanations, the modelling procedure controlled for the effects of experience (measured as the length of time continuously employed), intensity (hours worked) and labour scarcity (the ratio of unemployment to vacancies). Estimates indicated that lower levels of opportunity in the labour market were associated with a decline in the rate of workplace injuries. The average work experience of those in employment was not estimated to influence aggregate employee injury rates. Employee injury rates were estimated to increase with the number of hours worked. Evidence was therefore found to support the labour scarcity and work intensity hypotheses.

### Long Term Trends in Employee Injury Rates

Time trends were incorporated into models to consider the existence of underlying trends in workplace injuries. The analysis indicated the presence of a downward trend in employee injury rates. However, analyses by gender indicated the presence of divergent trends in male and female employee injury rates. Incorporating the effects of the economic cycle, male employee injury rates are estimated to be following a pro-cyclical pattern around a downward long-run growth trend between April 1986 and March 1997. In contrast, female employee injury rates are estimated to be following a pro-cyclical pattern around an upward long run growth trend.

### Employee Injury Rates and Structural Influences

To consider geographical variations in employee injury rates between the 11 standard regions of Great Britain, a set of variables was constructed to control for structural differences in the populations at risk of a workplace injury between the regions. These controls considered occupational structure,

industrial structure, personal characteristics, workplace characteristics and patterns of employment. Analysis of structural influences upon employee injury rates revealed the following:

- employment within manufacturing, construction, and the distribution and transport sector is associated with a higher employee injury rates;
- employment within personal and protective services occupations followed by craft and related occupations were estimated to exert the largest influence upon the employee injury rate;
- both high and low levels of educational attainment are associated with low workplace injury rates relative to the attainment of intermediate level qualifications;
- employee injury rates decline as the age of those in employment increases;
- the level employment in workplaces with fewer than 25 employees was associated with lower workplace injury rates;
- temporary employment contracts were associated with higher workplace injury rates.

#### Factors Contributing to Regional Variations in Injury Rates

A further modelling exercise was undertaken to consider the relative impact of these structural factors in driving regional variations in employee injury rates. The results of the modelling exercise are presented in table 1, which shows the impact of six groups of structural characteristics upon regional employee injury rates. This is expressed in terms of the percentage variation in regional injury rates from that of a hypothetical 'average' region (a region containing the average characteristics of the 11 standard regions). The 'average' region acts as a baseline case, against which the impact of structural characteristics upon injury rates can be considered.

Table 1 points to the general importance of industrial structure and the occupational composition of employment in determining regional variations in employee injury rates. For example, the employee injury rate within the North is 38%

higher than the 'average rate' (estimated as 205 injuries per 100,000 employees). Holding other influences constant, employee injury rates are 13% higher than the average rate due to the industrial composition of employment and 14% higher due to occupational structure.

#### Concluding Comments

The analyses of individual level data from the Labour Force Survey point to the importance of personal and employment characteristics in influencing the risk of a workplace injury. Analysis of employee injury rates based on reports made under RIDDOR considered how these influences can explain both temporal and regional variations in employee injury rates. Interestingly, both studies indicate that employment in small firms is associated with lower rates of workplace injuries. Both studies also estimate a complex relationship between educational attainment and the occurrence of workplace injuries. The analysis of RIDDOR data indicates that growth in temporary employment also presents a challenge for the future.

Movements in employee injury rates were estimated to move pro-cyclically over the economic cycle. There is evidence to suggest that these movements are driven by changes in work intensity and labour scarcity. The industrial and occupational composition of employment account for a majority of regional variations in employee injury rates. Variations in employee injury rates are a national or regional issue only in so far as certain occupations are concentrated within certain geographical areas.

#### References

- Davies R. and P. Elias (2000). *An Analysis of Temporal and National Variations in Reported Workplace Injury Rates*. Institute for Employment Research, University of Warwick.
- McKnight A., P. Elias and L. Wilson (1999). *Workplace Injuries and Workforce Trends*. Institute for Employment Research, University of Warwick.

Table 1: Estimated Impact of Structural Characteristics on Regional Employee Injury Rates (%)<sup>1</sup>

Region	Structural Characteristics						Total
	Industry Effects	Occupation Effects	Education Effects	Personal Characteristics	Other Workplace Characteristics	Labour Market Effects	
South East	-4%	-21%	8%	-4%	0%	2%	-20%
East Anglia	1%	9%	2%	-4%	-3%	2%	5%
London	-15%	-32%	-20%	7%	9%	0%	-46%
South West	-6%	0%	8%	-2%	-9%	-1%	-10%
West Midlands	2%	7%	-2%	-4%	4%	-1%	6%
East Midlands	0%	6%	3%	-4%	0%	1%	6%
Yorks and Humber	7%	11%	4%	1%	-1%	-2%	21%
North West	2%	2%	6%	2%	3%	0%	16%
North	13%	14%	5%	2%	3%	-3%	38%
Wales	-2%	13%	6%	3%	-5%	0%	15%
Scotland	6%	4%	-14%	4%	-1%	2%	0%

The summation of the estimated structural effects may not sum to the total estimated variation in regional employee injury rates from then average. Due to the logistic transformation of the workplace injury rate outlined in chapter 4, the explanatory variables in the estimated model are not linearly related to the injury rate. However, as the logistic function is approximately linear, the summation of the individual structural effects provide good approximation of the total variation in regional employee injury rates.