

Injury Frequency Rates

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Introduction

At the Statistics User Conference in 2014 HSE was asked for some information about calculating injury frequency rates as they are used by many organisations. HSE uses Incidence Rates rather than Frequency Rates so it is difficult to compare internal Frequency Rates with published HSE rates.

This paper sets out to:

- explain what frequency rates are and how do they differ from incidence rates;
- show how they can be calculated from your data;
- show how they can be calculated from published HSE data;
- provide some example rates; and
- explain some of the issues involved in using them.

What are frequency rates?

Both types of rate are intended to enable the risk faced by one group of workers, e.g. in a particular industry, to be compared with those in another group. The two approaches do this in slightly different ways.

Published HSE injury rates give the number of people injured over a year in a group of 100,000 employees or workers. The frequency rate is the number of people injured over a year for each million¹ hours worked by a group of employees or workers.

Which approach is right? If there are big differences in the hours worked by the groups being compared, or if the hours worked change significantly over time then frequency rates are better. If not then incidence rates are easier to calculate and aren't affected by uncertainties in the estimates of hours worked.

How can I calculate my frequency rates?

The formulae to calculate the two types of rate are shown below:

$$I_R = \text{Incidence Rate} = \frac{\text{Injuries (per year)}}{\text{Employment}} * 100,000$$

$$F_R = \text{Frequency Rate} = \frac{\text{Injuries (per year)}}{\text{Hours worked (per year)}} * 1,000,000$$

$$= \frac{\text{Injuries}}{\text{Av.Hours per week} * \text{Weeks per Year} * \text{Employment}} * 1,000,000$$

If you know the number of injuries over a year and the hours worked then you can calculate the frequency rate.

¹ Some organisations use a different number of hours as the multiplier

How can I calculate Frequency Rates from published HSE data?

By comparing the first and third equations above:

$$\frac{\text{Injuries}}{\text{Employment}} * 100,000 = I_R = \frac{F_R * \text{Av. Hours per week} * \text{Weeks per Year}}{10}$$

$$F_R = \frac{I_R * 10}{\text{Av. Hours per week} * \text{Weeks per Year}}$$

So, all that you need to know to convert from one rate to the other is the number of hours worked by the group over the year, or the average hours worked per week and the number of weeks in the year.

HSE does not produce this data, but the Office for National Statistics does. There are two main sources of data on hours of work:

- the Annual Survey of Hours and Earnings (ASHE) survey and
- the Labour Force Survey (LFS).

More information about the surveys can be found on the ONS web site – www.ons.gov.uk.

The key tables for calculating industry rates are ASHE table 16.9a – total paid hours worked and LFS table HOUR03. (These are routinely updated by ONS – every year for ASHE and several times a year for HOUR03. This means that you need to search the ONS site for them as any links provided here would soon be out of date.)

HOUR03 is easier to work with and is updated quarterly, but the ASHE table includes a fuller industry breakdown. The figures from the two tables are slightly different because they come from different sources.²

From ASHE table 16.9a select the 'All' tab and take the mean paid hours worked figure for the relevant industry. With HOUR03 choose the column for your industry (industries are only available at Section level and some are grouped together) and calculate the average actual weekly hours for the year. With those figures and 52.1³ weeks per year you can convert between published HSE rates and frequency rates.

Worked example

For construction in 2013/14 the average weekly hours according to HOUR03 (November 2014) was 37.2 (Averaged between April-June 2013 and January-March 2014). From the ASHE table the mean figure for construction in 2014 was 39.3.

Our published table RIDIND – Reported injuries to employees and the self-employed in Great Britain, by detailed industry and severity of injury (www.hse.gov.uk/statistics/tables/ridind.xlsx) shows that the total rate of reported injury for construction employees in 2013/14p was 412.4 per 100,000 employees.

To convert this to a frequency rate we multiply it by 10 and divide it by the average weekly hours and by the number of weeks in a year. Using the HOUR03 estimate:

$$F_R = \frac{412.4 \times 10}{37.2 \times 52.1} = 2.13 \text{ (HOUR03)}$$

$$F_R = \frac{412.4 \times 10}{39.3 \times 52.1} = 2.01 \text{ (ASHE)}$$

² ASHE table are for employees, while HOUR03 are for workers. Both tables cover the UK. HOUR03 includes hours for a second job (all hours are allocated to the industry sector of the main job), and paid and unpaid overtime. UK and GB average weekly hours are likely to be of a similar order, as are those for workers and employees.

³ 365 (days per year) divided by 7 (days per week) = 52.1 (weeks per year)

Example frequency rates

Riddor Injury and Frequency Rates 2013/14p for reported injuries

Industry ⁴	Major or Specified injuries				Over-7-day injuries			
	Riddor		ASHE	HOUR03	Riddor		ASHE	HOUR03
	Nos	Rate ⁵	Frequency Rate		Nos	Rate ⁵	Frequency Rate	
A - Agriculture, Forestry And Fishing	292	193.84	1.00	0.85	470	312.00	1.61	1.36
B - Mining and Quarrying	114	100.03	0.47	-	246	215.85	1.01	
C - Manufacturing	3 159	120.79	0.59	0.63	10 436	399.03	1.94	2.10
D - Electricity, Gas, Steam And Air Conditioning	90	52.56	0.27	-	173	101.04	0.52	
E - Water Supply; Sewerage, Waste Management	578	285.23	1.35	-	1 811	893.70	4.24	
F - Construction	1 900	150.09	0.73	0.77	3 293	260.12	1.27	1.33
G - Wholesale And Retail Trade; Repair Of Motor Vehicles	2 202	61.31	0.36	0.39	7 364	205.04	1.22	1.30
H - Transportation And Storage	2 175	181.17	0.87	0.97	8 483	706.61	3.41	3.77
I - Accommodation And Food Service	1 099	78.53	0.52	0.54	3 746	267.67	1.78	1.85
J - Information And Communication	169	17.68	0.10	0.10	477	49.91	0.27	0.27
K - Financial And Insurance Activities	129	12.15	0.07	-	309	29.09	0.16	
L - Real Estate Activities	45	16.79	0.10	-	160	59.70	0.34	
M - Professional, Scientific And Technical	151	9.99	0.06	0.06	256	16.93	0.10	0.09
N - Administrative And Support Service Activities	862	77.04	0.45	0.49	2 261	202.07	1.18	1.29
O - Public Administration And Defence; Compulsory Social Sec	1 171	64.96	0.35	0.39	3 699	205.21	1.11	1.22
P - Education	1 686	57.09	0.39	0.40	3 041	102.98	0.70	0.73
Q - Human Health And Social Work Activities	2 370	64.26	0.39	0.42	11 238	304.72	1.86	1.99
R - Arts, Entertainment And Recreation	484	82.36	0.57	-	740	125.92	0.87	
S - Other Service Activities	201	38.51	0.25	-	513	98.30	0.63	

Source RIDDOR, ASHE and HOUR03

Notes

The annual actual hours worked are calculated by multiplying the actual weekly hours worked by 52.1³.

⁴ See www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/sic2007---explanatory-notes.pdf for details of the Industrial Classification (SIC 2007)

⁵ Injury Rate per 100 000 employees

Estimates for all injuries in Great Britain from the Labour Force Survey

Worker type		Employees							
Year		Latest 3 year average (2011/12 - 2013/14)							
Injury type		All workplace injury							
Hours estimate		Actual hours (Main job)							
Industry	Estimated incidence (thousands)			Injury Rate (per 100 000 employees)			Frequency Rate (per 1 000 000 hours worked)		
	central	95% C.I.		central	95% C.I.		central	95% C.I.	
		lower	upper		lower	upper		lower	upper
All industry	501	478	525	2 040	1 940	2 130	12.4	11.9	13.0
Agriculture (A)	7	4	10	4 380	2 800	5 970	25.2	16.5	34.0
Other production industries (B,D,E)	10	7	13	2 040	1 370	2 720	10.6	7.1	14.1
Manufacturing (C)	67	59	76	2 570	2 250	2 890	13.5	11.8	15.1
Construction (F)	30	25	36	2 450	2 000	2 890	12.7	10.4	15.0
Retail/wholesale (G)	73	64	83	2 080	1 820	2 350	14.2	12.4	15.9
Transport (H)	36	30	42	3 030	2 530	3 540	16.5	13.8	19.3
Food/accommodation (I)	40	33	46	2 990	2 480	3 500	22.7	18.9	26.6
Other business industries (J-N)	44	37	51	910	770	1 050	5.1	4.3	5.9
Public administration (O)	37	31	43	2 110	1 760	2 460	12.5	10.5	14.5
Education (P)	52	45	59	1 810	1 560	2 060	12.2	10.5	13.9
Health services (Q)	84	75	94	2 390	2 120	2 660	16.0	14.2	17.8
Other service industries (R-U)	21	16	26	1 890	1 470	2 310	13.1	10.2	16.1

Source Labour Force Survey (LFS)

Notes

The annual actual hours worked are calculated by multiplying the actual weekly hours worked by 52.1³.

The Labour Force Survey (LFS) is a national survey currently consisting of around 44,000 households each quarter, which provides information on the UK labour market. The Health and Safety Executive commission's annual questions in the LFS to gain a view of work-related illness and workplace injury based on individuals' perceptions.

The LFS survey data is used to make inferences about the whole population. When data obtained from a sample is used in this way, there is an element of sampling error, or uncertainty, about the sample estimate. Confidence intervals represent the range of uncertainty resulting from the estimate being derived from a sample of people, not the entire population. They are calculated so the range has a 95% chance of including the true value in the absence of bias - that is the value that would have been obtained if the entire population had been surveyed.

Confidence intervals (C.I.)

Issues to consider

- For most companies, particularly those with fewer than 100 employees, the number of incidents that need to be recorded or reported each year will be very small. Using non-reportable, minor injuries, property damage or 'near misses', can give you more meaningful numbers to work with. (This is why the LFS all injuries rates are included above and why fatal injuries are not listed separately.)
- Under the old RIDDOR reporting requirement (major and over- 3-day) self-reported results suggested that just over half of all reportable non-fatal injuries to employees were actually reported. Under the newer requirements (major/specified and over-7-day), early indications suggest reporting levels of non-fatal injuries to employees have fallen below half. Hopefully you record all reportable injuries, so remember this when comparing your rates with those published for RIDDOR. (LFS rates don't suffer from this degree of underreporting.)
- If your business uses contractors to carry out much of the work then do you include their health and safety data? If not then you may be ignoring most of the risks in your business and your performance may appear unrealistically better than the rest of your industry. (Reporting rates for the self-employed are very low, so don't use rates for the self-employed in comparisons.)
- Estimates of the numbers employed in an industry and the average hours worked per week do have a margin of uncertainty, so don't expect rates to be exact. That also means that small differences in rates are probably not significant.

Conclusion

It is fairly easy to calculate frequency rates for your business or to compare them with those for the whole of your industry using the formulae given on pages 1 and 2. Some example rates are provided in the tables on pages 3 and 4.

You need to be careful about the way that you interpret your results, taking note of the issues mentioned above.

An account of how the figures are used for statistical purposes can be found at www.hse.gov.uk/statistics/sources.htm .

For information regarding the quality guidelines used for statistics within HSE see www.hse.gov.uk/statistics/about/quality-guidelines.htm

A revisions policy and log can be seen at www.hse.gov.uk/statistics/about/revisions/

Additional data tables can be found at www.hse.gov.uk/statistics/tables/.

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