

# 1. Aim

To investigate the use of exploratory data mining and visualisation techniques on data generated from the RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) dataset to identify spatial and temporal patterns on accidents at work.



# 2. Background

- Work-related deaths, injuries, diseases and near misses must by law be reported to the Health and Safety Executive. Information regarding the accident, the worker and workplace are recorded and stored by the Health and Safety Executive in a database called RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations).
- Between 2011 and 2012 alone, 173 workers were reported killed at work, with 111,164 other injuries reported as occurring in the workplace. Approximately 212,000 injuries leading to over a 3-day absence from work occurred, with 27 million working days being lost overall. Injuries at work and ill health (excluding cancer) cost society an estimated 13.4 billion in 2010/11, therefore putting a huge strain on the country financially. These staggering statistics reveal a need to greater understand the causes of accidents at work.
- The dataset for this investigation consists of a 6-year sample of the RIDDOR dataset which is geographically referenced and provides a rich source of information on the worker and the incident.



# 3. Methods- Advanced quantitative Methods

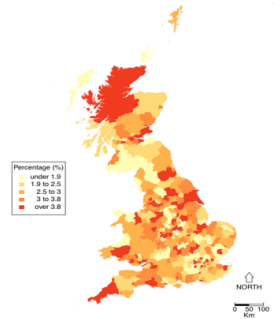
- GIS techniques to visually explore the data and identify where accidents occur most across Great Britain, comparing these areas to the hours of daylight they receive during the longest and shortest days of the year.
- Statistical modelling- Poisson regression analysis of variables from the RIDDOR dataset- specifically Broad Groups 1 to 9 of the Standard Occupation Classification groups to identify which occupations are more statistically likely to have an accident than the others.

# 4a. Results- Daylight Hours

There are overall more accidents in the North of England and Scotland. This could be due to there being less daylight hours in the north of the country than the south in winter months (see map of hours of daylight for the longest day of the year). Not only are there fewer hours of daylight in these months but also weather conditions vary the most in terms of extreme temperatures, rain, snow, ice and high wind speeds compared to any other time of the year.

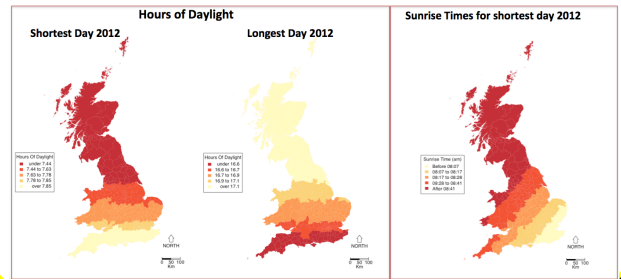
Cornwall initially appeared to be an outlier in terms of the results found regarding the hours of daylight as the South of England has more hours of daylight during the winter months. However, the map of the sunrise times revealed that perhaps most of the accidents occurring in Cornwall could be taking place in the early morning when it is still dark. A reason for this could be due to Cornwall's agricultural sector. Farmers generally start their work duties early of a morning.


Accidents per head of working population



Places with highest rates of accidents

Place	Accidents per 1000 workers	Standard Error (per 1000 workers)
Edinburgh	37	1.17
Canab	33	1.03
County Down	33	0.88
Galoppe	28	0.71
Deucester	26	0.94

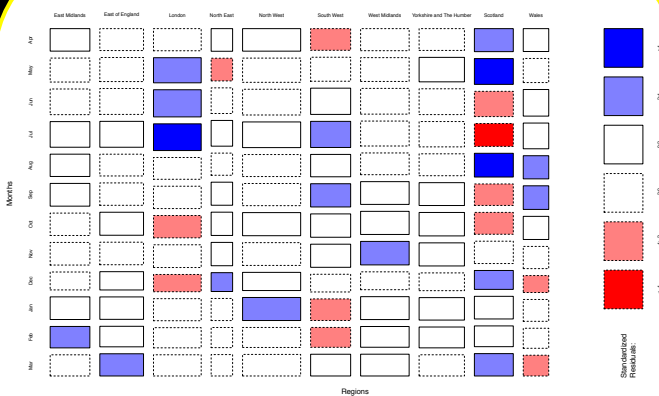




## Accidents in the Workplace

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# 4b. Results- Seasonal Variation



The mosaic plot shows a cross tabulation of the standardised residuals of accidents by region and month of the year. The areas of the boxes represent the number of total people having accidents. Horizontally, this is accidents by region, and vertically this is accidents occurring each month. The solid black outlined box and the blue coloured boxes, represent accidents occurring more than the overall average by region and month and the dashed outlined box and the red coloured boxes, represent accidents occurring less than the overall average by region and month.

There are more accidents in the North of England and Scotland in December and January, the winter months. There are fewer accidents in London, the South West of England, and Wales (where the majority of the population is towards the South of Wales- in Cardiff). These places have more daylight in the working day in the winter. In the summer months, June and July, there are more accidents in London and the South West of England which have less hours of daylight than the rest of Great Britain. There are less accidents in Scotland, which has more hours of daylight than the rest of Great Britain.

# 4c. Results- Occupation

The poisson regression model carried out on the effect of Standard Occupation Classification (SOC) Broad Groups on accident rates has revealed that manual jobs (Broad Groups 8 and 9) such as machine operators, farm workers, postal workers and cleaners have a statistically higher chance of having an accident at work compared to Broad Groups 4 and 6- administrative and secretarial occupations and caring, leisure and other service occupations.



# 5. Conclusions

- There is evidence to suggest that daylight hours affect the level of accidents occurring across Great Britain.
- The level of accidents are higher in the North of England and Scotland in the winter, however the level of accidents are higher in the South of England in the summer. Reverting back to the maps showing the hours of daylight, we can see that on the longest day of the year, which generally represents the summer months; June, July and August, the hours of daylight in the south are lower than the north of the country. This again reiterates that daylight hours appear to have an effect on accidents at work.
- Employees in manual working jobs are statistically more likely to be involved in an accident than workers in non-manual jobs.

## What Next?

Explore the social determinants of accidents at work by pulling out variables from the Census and other national datasets and creating regression models to identify whether there are any differences in: age, sex & deprivation scores on accidents at work.

Further look into whether there are any patterns between occurrence of accidents around change in clocks for Daylight Saving Time.