

# Environmental Studies

# FACT SHEET



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## Noise pollution, heart disease and strokes

This Factsheet:

- Explains the problems scientists face in trying to obtain valid data when there are many variables to consider. Throughout the Factsheet there are questions about the design of investigations. The answers are at the end of the Factsheet.
- Outlines the health impacts of aircraft and traffic noise pollution with particular reference to heart disease.

Worldwide air travel is increasing, in the UK this will mean one of three things:

- A new runway at Heathrow
- A new runway at Gatwick
- An entirely new airport

All three would increase noise levels over London and surrounding areas. There is increasing evidence that noise pollution from aircraft – and from traffic entering and leaving airports – is causing serious health problems.

These problems may include increased incidence of:

- heart attacks
- strokes
- dementia

But the evidence is disputed by scientists.

In 2015 The Airports Commission published its report on whether and where there should be expansion of airports in and around London. They concluded:

- Heathrow is operating at full capacity.
- Gatwick is quickly approaching full capacity.
- Regional airports are being squeezed out by Heathrow i.e. they are flying to other European cities before taking off to long-haul destinations e.g. Asia.
- Foreign investment in the UK is suffering because of the limited ability of London airports to take the number of passengers, including foreign investors, who want to come to the UK.
- The best option is to build a 3<sup>rd</sup> runway at Heathrow.

Wherever new capacity is added, it is certain that noise pollution will increase. The Mayor of London's report stated that, if a 3<sup>rd</sup> runway was built at Heathrow, between 99,000 and 277,000 people would experience significant, new noise pollution, along with 124 more schools.

Scientists carried out a small area investigation into aircraft noise and cardiovascular disease near Heathrow airport in London. Their objective was to investigate the association of aircraft noise with risk of stroke, coronary heart disease, and cardiovascular disease in the general population.

The investigation covered 12 London boroughs and nine districts west of London with a population of 3.6 million residents that are exposed to aircraft noise related to Heathrow airport.

Risks for hospital admissions were assessed for approximately 36,000 of these residents and the risk of mortality was assessed for 300 of these residents.

1. Why were the sample sizes so small compared to the population of residents?

The results were as follows:

Hospital admissions showed statistically significant linear trends of increasing risk with higher levels of both daytime and night time noise. (significant at the 95% level).

2. What does the term “significant at the 95% level mean?”

When areas experiencing the highest levels of daytime aircraft noise were compared with those experiencing the lowest noise levels ( $>63$  dB  $v \leq 51$  dB), the relative risk of hospital admissions for stroke was 1.24 and 1.21 for coronary heart disease.

3. For every 1000 residents experiencing the lowest noise levels admitted to hospital with coronary heart disease, how many from areas experiencing the highest noise levels would be expected to be admitted for stroke?

Cause of death was obtained from the records of the Office for National Statistics and Department of Health data held by the UK Small Area Health Statistics Unit at Imperial College London.

4. Suggest one possible source of error in this data.

Confounding factors are those that could influence hospital admission rates but which have nothing to do with exposure to noise. The data from all areas samples have to be adjusted to take these factors into account.

5. Suggest three confounding factors in this study.

Admissions for coronary heart disease and cardiovascular disease were particularly affected by adjustment for South Asian ethnicity because this group have higher than average incidence rates.

6. The scientists adjusted their data to give more weight to noise of certain frequencies. Suggest why they did this.

The scientists did not actually directly measure any noise levels. Rather they used computer models of aircraft noise for airplanes arriving and departing Heathrow.

7. Suggest two factors that the computer model would have taken into account when estimating noise levels from arriving and departing aircraft.

The scientists focussed only on aircraft noise, ignoring exposure to traffic noise.

8. Suggest why they did this.

Hundreds of scientific investigations have been conducted into the health effects of exposure to noise. The investigations do not always reach the same conclusion.

A census based study of 4.6 million adults aged > 30 years in Switzerland found an association with mortality from cardiovascular disease infarction in those exposed to the highest level of aircraft noise but only if they had lived at least 15 years in their place of residence and no associations were found with stroke or cardiovascular mortality.

An investigation of adults aged 45-85 years living in Vancouver, Canada found no association between aircraft noise and death from heart disease, neither did a study involving 57 000 adults aged 50-64 years in Denmark with death from stroke mortality.

Both studies investigated areas where the population was exposed to lower noise levels than those investigated around Heathrow.

### Pulling all the data together

In the year 2000, German scientists reviewed hundreds of scientific reports into the possible effects of acute (sudden, short term) and chronic (long term) exposure to noise. This kind of study is known as a meta-analysis.

**Meta-analysis:** a statistical method of combining results from separate studies to get broader overall conclusions about a hypothesis. Meta-analyses are a useful way to reach an overall conclusion from lots of studies that have used different statistical techniques, or had very different sampling sizes or strategies.

The scientists concluded:

High levels of aircraft noise were associated with increased risks of stroke, coronary heart disease, and cardiovascular disease for both hospital admissions and mortality in areas near Heathrow airport.

### Summary: Effect of aircraft and traffic noise on health

Exposure to high noise levels:

- Increases blood pressure
- Increases the risks of both hospital admissions and mortality from stroke, coronary heart disease, and cardiovascular disease
- Acute exposure increases adrenaline levels and heart rate
- Chronic exposure increases noradrenaline levels and blood pressure.

### References

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1. Sampling is expensive so the number of people investigated has to be limited.
  2. There is a 95% probability that the conclusion is true, a 5% chance that the results are accidental / If the investigation were to be repeated 100 times, the same result would be obtained 95 times.
  3. 1,210
  4. Wrong identification of cause of death
  5. age / sex / ethnicity / deprivation / smoking habits / drinking habits / exposure to particulates from traffic / family history of disease
  6. The human ear is more sensitive to some frequencies than others. The A weighted equivalent ( LAeq ) devalues lower frequencies compared with medium and higher frequencies.
  7. Height / speed / flight angle / engine power
  8. The study was investigating the potential effects on health of Heathrow expansion. It is not clear what the additive (combined) effects of different sources of noise are, so it made interpretation simpler just to concentrate on aircraft noise.
- How best to meet commercial aircraft capacity for London and other major cities is still being debated. The potential health effects of more aircraft are also still being debated, but meta-analysis suggests they may be significant, and harmful.

ANSWERS

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