

Aircraft Noise and Health Effects: A six-month update (April 2019 – September 2019)

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Civil Aviation Authority
Aviation House
Beehive Ring Road
Crawley
West Sussex
RH6 0YR

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Enquiries regarding the content of this publication should be addressed to: darren.rhodes@caa.co.uk

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Chapter 1

Introduction

- 1.1 This report is an update on recent work and findings in the field of aircraft noise and health effects. It covers published research from April – September 2019 and includes relevant findings presented at the Internoise Congress, held in Madrid in June.
- 1.2 The aim of the report is to provide a succinct overview of new work relating to aviation noise and health and it is intended that such updates will be published on a six-monthly basis. This report has been published to provide the public and the aviation industry with a concise and accessible update on recent noise and health developments. It should be noted that the CAA has not validated any of the analysis reported at the conferences, nor takes any view on their applicability to UK policy making. The authors would like to thank Bernard Berry (Bel acoustics) for his valued contribution to the source material.

Chapter 2

Internoise findings

- 2.1 The Internoise Congress was held in June 2019 in Madrid. This year, there was a paucity of presentations concerning aircraft noise and health effects, possibly due to authors choosing to attend the International Congress on Acoustics being held later in the year. The findings from the Internoise meeting relating to aircraft noise and health are summarised in this chapter.
- 2.2 The first study is by Saucy et al who investigated the acute triggering effects of aircraft noise at night on cardiovascular mortality in Switzerland. The paper presents the methodological approach used by the researchers to obtain noise exposure assessment and average noise levels in the specific time intervals prior to death.
- 2.3 The aim of this study TraNQuIL (Transportation Noise: Quantitative Methods for Investigating Acute and Long-Term Health Effects) was to investigate acute effects of aircraft noise on myocardial infarction, stroke and other ischemic cardiovascular causes of mortality by means of a case-crossover study. In addition to assessment of the exposure-response relationships for different time-windows of exposure during the night preceding death, the cumulative effects of several nights preceding the event were looked at.
- 2.4 The case-crossover design allows the investigation of acute health effects for time-varying exposures such as air pollution or noise. The exposure levels at a given time when an event occurs (case events) are compared to the exposure when no event occurs (control events). Due to the daily variation of aircraft movements at Zurich airport, noise exposure varied between study days (case days) and control days. There has been a night flight ban between 23:30 and 06:00 in place since 2010, and before that was from 00:30 to 05:00 or 06:00 for approaches and departures, respectively.
- 2.5 The authors identified all deaths from the Swiss National Cohort occurring near Zurich airport between 2000 and 2014. These included 22,000 cases of cardiovascular disease, and 3000 Myocardial Infarctions. Outdoor noise exposure at participants' home addresses was calculated for the night preceding death as well as 3 to 4 control nights selected within the same month, using calculated aircraft noise impact for each registered flight. Only those individuals who had potentially been exposed to increased aircraft noise exposure were included in the study. This was determined by the criteria used in the Zurich Aircraft Noise Index, which is an index for the number of highly annoyed and highly sleep disturbed (minimum LAeq of 37 dB during the day and/or 47 dB during the night). Noise exposures for each individual at their home address was

obtained for the night prior to death and for the control nights, by using the list of aircraft movements which includes detailed information on all flights landing or taking off from Zurich airport.

- 2.6 The authors focussed on assessing only the night time aircraft noise exposure, looking at the effects of noise exposure on mortality during sleeping hours.
- 2.7 The death cases were each matched with 3 or 4 control dates (the same day of the week in the same month), and separate methodology used for deaths occurring at night (23:00 – 07:00) versus the daytime period (07:00 – 23:00). In the death cases occurring at night, noise exposure was calculated for the two hours prior to death. For people who died during the day the exposure windows were:
- 19:00-23:00: Evening
 - 23:00-23:30: Reduced air traffic
 - 23:30-06:00: Flight ban
 - 06:00-07:00: morning
 - 23:00-07:00: overall night
- 2.8 The results indicated that for both metrics Leq and Lmax, noise exposure was highest for the evening exposure window, and lowest during the core night. For deaths occurring during the daytime, the average Leq of the time windows ranges from 20 -45 dB, and the Lmax average values range between 40 to 60 dB, with the highest values of around 100 dB. This is shown in Figure 1:

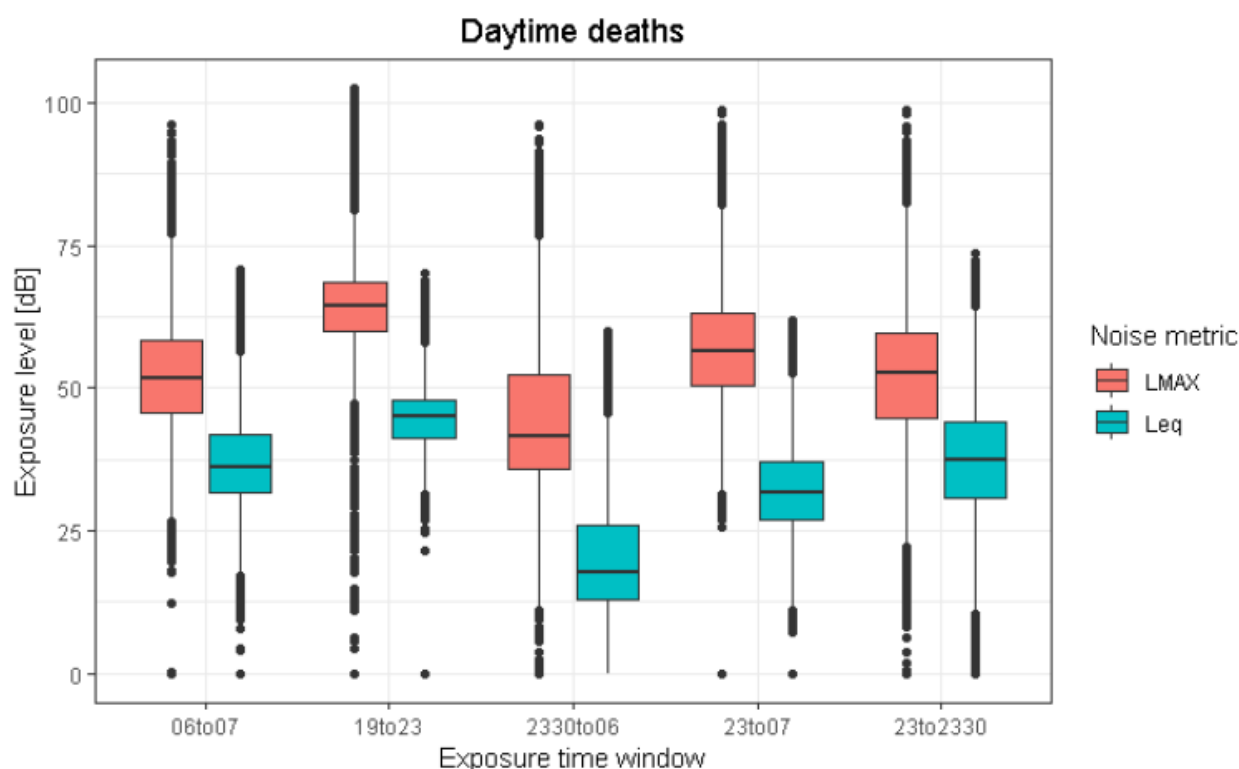


Figure 1: Boxplot of the noise exposure levels Lmax and Leq for the different time windows for all events (case and control) for daytime deaths between 2000-2014. Central line represents the median value, squares the interquartile range (IQR) and the whiskers the lower and upper limits ($-1.5 \times \text{IQR}$ and $1.5 \times \text{IQR}$). Reproduced from Internoise proceedings.

- 2.9 For the deaths occurring at night, average Leq for the preceding two hours was 36 dB with maximum values of around 65 dB, and the average Lmax for this period was 57 dB with maximum values of around 85dB. These are shown in Figure 2.