Supporting Information

Supplementary methods

**This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.**

Supplementary methods: statistical analysis

Software

Statistical analysis was completed in R software, version 4.2.1 with the "dlnm" package (1) and dependency packages "nlme"(2), "mgcv"(3), and "tsModel"(4).

Goodness-of-fit

The overall fit of the model was determined by optimising a consensus between the Akaike information criterion and the generalised cross validation value. In circumstances where the change in either of the values was minimal, we implemented the simpler model.

Distribution of outcome variable

The empirical frequency distribution of the outcome variable was well approximated by a Poisson distribution by inspection of the quantile-quantile plots and examination by a Kolmogorov-Smirnov test. However, the sample variance of the outcome variable was larger than the sample mean, quasi-Poisson distributions are commonly preferred in non-linear lag models, and the goodness-of-fit of the model was unaffected by the decision. For these reasons, the outcome variable was modelled by a quasi-Poisson distribution.

Prediction space

The prediction space of the exposure-response relationship was composed of a set of natural cubic spline basis functions and equally spaced knots over four degrees of freedom as these selections best fit the model.

Lag space

The lag space was composed of a set of natural linear spline basis functions and three log-equally spaced knots over a maximum lag of seven days as these selections best fit the model.

Sex, age, and primary ICD-10 diagnosis groups

Sex was included as categorical variable, with males = 0 and females = 1. Age was measured in years and was included as a continuous variable in models. Primary ICD-10 diagnostic groups included schizophrenia, schizotypal, and delusional disorders (F20-F29), mood (affective) disorders (F30-F39), neurotic, stress-related, and somatoform disorders (F40-F48), behavioural syndromes associated with physiological disturbances and physical factors (F50-F59), and disorders of adult personality and behaviour (F60-F69) and included as a categorical variable in models.

Daily pollutant concentrations

Daily pollutant concentrations including particulate matter with a diameter of 10 micrometers or less (PM10), nitrogen dioxide (NO2), sulfur dioxide (SO2), and humidity were not adjusted for as they were neither significant nor improved the overall fit of the model.

Fixed effects:

The model was adjusted for the fixed effects of sex, age, and ICD-10 diagnosis group. Subsequent models were created over the subsets of each variable and adjusted for the fixed effects of the remaining variables.

Time-based effects

Three types of time-based effects were examined: day of the week, public holidays, and global seasonality.

The final model included an adjustment for the fixed effect of day of the week as it improved the overall fit of the model and has been identified as an important predictor of emergency department presentations (5). The final model did not include an adjustment for the fixed effect of public holidays as it did not improve the overall fit of the model. The final model included an adjustment for global seasonality using a natural cubic spline over the entire study period with equally spaced knots over seven degrees of freedom as these selections best fit the model.

Attributable risk

Gasparrini and Leone (6) developed methods for quantifying the attributable risk of temporal exposures in distributed lag models. We reported the number of cases and 95% confidence intervals attributable to

temperatures at the 80th percentile and greater and at the 95th percentile and greater. Computations used 'forward' estimates and the confidence intervals were obtained using 10,000 Monte Carlo simulations and were completed with the "FluMoDL" package in R (7). All values were rounded up to the nearest whole number.

Attributable risk estimates:

Overall:
- 80th percentile: 210 cases (61 – 352)
- 95th percentile: 98 cases (36 – 155)

Men:
- 80th percentile: 70 cases (-61 – 181)
- 95th percentile: 28 cases (-27 – 72)

Women:
- 80th percentile: 215 cases (100 – 316)
- 95th percentile: 54 cases (1 – 98)

Public holidays in NSW, 2015–2019

2015:
- Thursday Jan 1 (New Years Day)
- Monday Jan 26 (Australia Day)
- Friday April 3 (Good Friday)
- Saturday April 4 (Easter Saturday)
- Sunday April 5 (Easter Sunday)
- Monday April 6 (Easter Monday)
- Saturday April 25 (ANZAC Day)
- Monday June 8 (Queens Birthday)
- Monday October 5 (Labour Day)
- Friday December 25 (Christmas Day)
- Saturday December 26 (Boxing Day)
- Monday December 28 (Additional Day)

2016:
- Friday Jan 1 (New Years Day)
- Tuesday Jan 26 (Australia Day)
- Friday March 25 (Good Friday)
- Saturday March 26 (Easter Saturday)
- Sunday March 27 (Easter Sunday)
- Monday March 28 (Easter Monday)
- Monday April 25 (ANZAC Day)
- Monday June 13 (Queens Birthday)
- Monday October 3 (Labour Day)
- Sunday December 25 (Christmas Day)
- Monday December 26 (Boxing Day)
- Tuesday December 27 (Additional Day)

2017:
- Sunday Jan 1 (New Years Day)
- Monday Jan 2 (Additional Day)
- Thursday Jan 26 (Australia Day)
- Friday April 14 (Good Friday)
- Saturday April 15 (Easter Saturday)

- Sunday April 16 (Easter Sunday)
- Monday April 17 (Easter Monday)
- Tuesday April 25 (ANZAC Day)
- Monday June 12 (Queens Birthday)
- Monday October 2 (Labour Day)
- Monday December 25 (Christmas Day)
- Tuesday December 26 (Boxing Day)

2018:
- Monday Jan 1 (New Years Day)
- Friday Jan 26 (Australia Day)
- Friday March 30 (Good Friday)
- Saturday March 31 (Easter Saturday)
- Sunday April 1 (Easter Sunday)
- Monday April 2 (Easter Monday)
- Wednesday April 25 (ANZAC Day)
- Monday June 11 (Queens Birthday)
- Monday October 1 (Labour Day)
- Tuesday December 25 (Christmas Day)
- Wednesday December 26 (Boxing Day)

2019:
- Tuesday Jan 1 (New Years Day)
- Monday Jan 28 (Australia Day)
- Friday April 19 (Good Friday)
- Saturday April 20 (Easter Saturday)
- Sunday April 21 (Easter Sunday)
- Monday April 22 (Easter Monday)
- Thursday April 25 (ANZAC Day)
- Monday June 10 (Queens Birthday)
- Monday October 7 (Labour Day)
- Wednesday December 25 (Christmas Day)
- Thursday December 26 (Boxing Day)

References

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4. Peng RD, McDermott A. tsModel: Time series modeling for air pollution and health. R package version 0.6-1. https://CRAN.R-project.org/package=tsModel (2022).

5. Wargon M, Guidet B, Hoang TD, Hejblum G. A systematic review of models for forecasting the number of emergency department visits. Emerg Med J 2009; 26: 395.

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