

AN ESTIMATE OF THE HEALTH IMPACT OF THE AUGUST 2003 PHOTOCHEMICAL EPISODE

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Ozone and PM₁₀ concentrations

There was a photochemical episode between 01/08/2003 and 14/08/2003. The measured daily maximum of running 8-hour mean ozone concentrations and daily mean PM₁₀ concentrations during this period have been compared with measurements during the same two week period in 2002 (when there was little elevation of ozone or PM₁₀ concentrations). The average concentrations measured in each zone or agglomeration has been calculated for each day. If data were unavailable for a zone or agglomeration on a particular day then values from a nearby zone or agglomeration were used. The population weighted mean of daily maximum of running 8-hour mean ozone concentration over the two week period in 2003 was 104 $\mu\text{g m}^{-3}$, the corresponding figure in 2002 was 59 $\mu\text{g m}^{-3}$. The population weighted mean of daily mean PM₁₀ concentration over the two week period in 2003 was 29 $\mu\text{g m}^{-3}$, the corresponding figure in 2002 was 16 $\mu\text{g m}^{-3}$.

Baseline death rate

I have used an annual baseline death rate of 1023.7 deaths per 100,000 derived from national statistics for 2001 (ONS 2003a). This figure includes deaths due to external causes but external causes contribute a very small fraction of the total deaths.

Dose-response coefficient

The Committee on the Medical Effects of Air Pollutants (COMEAP) dose-response coefficients are + 0.6% deaths brought forward per 10 $\mu\text{g m}^{-3}$ 8-hour mean ozone concentration and +0.75% for a 10 $\mu\text{g m}^{-3}$ increase in PM₁₀ concentrations (COMEAP, 1998). I have calculated the number of deaths brought forward for no-effect thresholds of 0 and 100 $\mu\text{g m}^{-3}$ for ozone as suggested by COMEAP. It is generally accepted that there is no threshold for the health effects of particulate matter

Results

Tables 1 and 2 show the results of the analysis for the two ozone and PM₁₀ calculations. The analysis suggests that there were between 225 and 593 additional deaths brought forward due to ozone and 207 due to PM₁₀ in the UK during the episode in August 2003 in comparison with the same period in 2002. The results for England and Wales correspond to 21-38% of the total of 2045 excess deaths reported by ONS during the heatwave (ONS 2003b). The figure of 21-38% presumes that the ozone and PM₁₀ results can be added it is possible that this involves some degree of double counting, although it is generally considered that the effects attributed to ozone are independent of those due to PM₁₀ (WHO 2003).

References

COMEAP (1998). Quantification of the effects of air pollution on health in Great Britain. Department of Health Committee on the Medical Effects of Air Pollutants. The Stationary Office. ISBN 0-11-322102-9

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Table 1 The number of deaths brought forward attributable to ozone during the first two weeks of August in 2003 and 2002 in the UK, threshold concentration of 0 mg m⁻³ (threshold concentration of 100 mg m⁻³)

	2003	2002	Difference
Scotland	83 (3)	64 (0)	20 (2)
Wales	67 (8)	43 (0)	24 (8)
Northern Ireland	28 (1)	21 (0)	7 (1)
London	212 (46)	88 (0)	124 (46)
Rest of England	959 (167)	541 (0)	418 (167)
UK	1350 (226)	756 (0)	593 (225)
England & Wales	1239 (222)	672 (0)	567 (221)

Totals may not add up due to rounding

Table 2 The number of deaths brought forward attributable to PM₁₀ during the first two weeks of August in 2003 and 2002 in the UK.

	2003	2002	Difference
Scotland	23	20	4
Wales	22	9	13
Northern Ireland	7	6	2
London	85	42	43
Rest of England	334	187	146
UK	471	264	207
England & Wales	440	239	202

Totals may not add up due to rounding