Appendix 1 Environmental tobacco smoke

Environmental tobacco smoke

A1.1 Active tobacco smoking has long been recognised as an important cause of both pulmonary and cardiovascular disease (Royal College of Physicians (Lond), 1970). More recently, exposure to environmental tobacco smoke has also been shown to be associated with a range of diseases and disorders both in adults and, perhaps more remarkably, in very young children (Department of Health, 1998). Recent studies have provided further evidence of this association (Whincup *et al*, 2004, Yusuf *et al*, 2004 and Raupach *et al*, 2005).

A1.2 The pollutants found in environmental tobacco smoke (ETS) include many found in the ambient air: this is unsurprising as the source – combustion of bio-derived organic material – is common to both. Fine particles, oxides of nitrogen, carbon monoxide, aldehydes, polycyclic aromatic hydrocarbons and other organic compounds all occur in raised concentrations in environments where tobacco is smoked and in urban air. It is accepted that the mixture of pollutants generated by burning tobacco and, for example, by vehicles may well not be identical, but if concentrations of some likely toxicologically active components proved to be similar, we might expect to see some overlap in effects. If this were the case and given that the effects of ETS are now well established, this might increase confidence in accepting the reported associations between exposure to low concentrations of air pollutants and effects on health.

A1.3 It is also interesting to note that the development of understanding of the effects of tobacco smoke has paralleled that of air pollution. Both active smoking and the intense air pollution episodes of the 1950s in the UK were rapidly accepted as injurious to health. Acceptance that exposure to low concentrations of both tobacco smoke and air pollution has developed more slowly and the same reluctance to believe that exposure to low concentrations of pollutants can produce significant effects on health has been seen in both cases. Many of the same problems, including the need to take careful account of confounding factors, have also been encountered in the two areas.

A1.4 A detailed review of the effects on health of exposure to environmental tobacco smoke has not been attempted here. Instead, we have drawn extensively on the findings of a recent review of the evidence relating to the effects on health of passive (involuntary) smoking provided by Samet and Wang (2000). The authors tabulated the results of 22 studies relating to passive smoking and coronary heart disease. The findings of these studies are not entirely consistent. Tunstall-Pedoe *et al* (1995) examined the association between various levels of passive exposure to tobacco smoke and non-fatal coronary heart disease in Scotland and reported relative risks ranging from 1.2 in the lowest (but not zero) exposure group to 1.6 in the highest exposure group. A number of other studies have produced similar estimates of increased risk. Samet and Wang concluded their survey as follows:

"There are strengths and weaknesses to both the case-control and cohort study designs in investigating ETS and CHD outcomes. Many of the case-control studies have small sample sizes and lack the power to detect significant associations. Furthermore many studies also lack information on other risk factors for CHD, and therefore they may not adequately adjust for confounders. In contrast, many of the cohort studies have large sample sizes and do adjust for confounders. They also avoid information bias by assessing smoking status and exposure prior to the CHD outcome. However, cohort studies are more susceptible to exposure misclassification which increases with the length of follow-up.

Although the risk estimates for ETS and CHD outcomes vary, they range mostly from null to modestly significant increases in risk, with the risk for fatal outcomes generally higher and more significant. In their meta-analysis Law, Morris and Wald (1997) estimated the excess risk from ETS exposure as 30% (95% CI: 22, 38%) at age 65 years. The California Environmental Protection Agency (Cal EPA, 1997) recently concluded that there is "an overall risk of 30%" for CHD due to exposure from ETS. The American Heart Association's Council for Cardiopulmonary and Critical Care has also concluded that environmental tobacco smoke both increases the risk of heart disease and is "a major preventable cause of cardiovascular disease and death" (Taylor, Johnson and Kazemi, 1992). This conclusion was echoed in 1998 by the Scientific Committee on Tobacco and Health in 1998".

A1.5 Before an informative parallel can be drawn between the effects of passive exposure to tobacco smoke and those of air pollution, a great deal more would need to be known about the comparative compositions and concentrations of the two mixtures of pollutants. Much depends, of course, on the level of active smoking taking place in the environment where passive exposure takes place. Spengler and Ferris (1985) reported a particle concentration of 70 $\mu g/m^3$ 24-hour average in homes with two or more smokers and a concentrations of 37 $\mu g/m^3$ for a home with one smoker. Spengler *et al* (1981) measured personal exposures to respirable particles in non-smoking adults in rural Tennessee. The mean 24-hour exposure for those exposed to tobacco smoke at home was 64 $\mu g/m^3$ compared with 36 $\mu g/m^3$ for those not exposed.

A1.6 If we accept for a moment that exposure to perhaps 50 μg/m^3 of respirable particles as a result of passive exposure to tobacco smoke causes a 20% increase in the risk of CHD we might not be surprised that life-time exposure to about 25 μg/m^3 $PM_{2.5}$ – (the difference between the least and most polluted cities in the US Six Cities Study) – was associated with an increased risk of cardiopulmonary disease of about 30%. If nothing else, the effects are of the same order of magnitude.

A1.7 We do not wish to press the comparison between the effects of passive smoking and of exposure to air pollution: there are too many imponderables to make this valuable, but we conclude that evidence of the effects of passive smoking on the cardiovascular system adds to, rather than detracts from, our conclusion that long-term exposure to ambient levels of pollutants, especially respirable particles, is associated with an increased risk to health from cardiovascular disease.

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Appendix 2
Description of the air pollution epidemiology database (APED)

Description of the air pollution epidemiology database (APED)

Identification of time-series studies (ecological and panel)

A2.1 Three bibliographic databases were searched: Medline, Embase and Web of Science (Web of Knowledge). Separate search strings for each study type, ecological time-series and panel, were used. The search strings were tested against known literature until we were satisfied that they were sensitive enough to pick up all relevant studies. The full reference and abstract for each of the citations identified by the searches were downloaded from the source bibliographic databases into Reference Manager (RM) databases, one for potential time-series studies and one for potential panel studies. Within each of the RM databases the studies were assigned unique identification codes.

A2.2 Papers already available to the academic department were checked for inclusion in the RM databases. Citations in reviews of the published literature (such as the consultation document on particles published by the United States Environmental Protection Agency) were also checked to ensure that no relevant papers were missed.

A2.3 The process of identifying time-series studies from those selected by the search strings comprised two stages. First, the abstracts of all studies were reviewed and those studies obviously not relevant (e.g. clinical, mechanistic, exposure assessment) were removed from the RM databases. In the second stage, copies of the remaining studies were obtained and the relevant studies identified.

A2.4 Once studies had been identified they were assigned a code within RM indicating whether or not they provided *usable* numerical estimates of the short term effects of air pollution. If they did not provide usable estimates then the reason(s) was also recorded. Studies were classified as follows:

- studies providing usable numerical estimates of the effects of air pollution;
- studies providing numerical estimates that were *unusable* (e.g. because of inappropriate statistical methods or insufficient data provided in the paper);
- studies which did not provide numerical estimates for the effects of air pollution (e.g. where the association between air pollution and health is assessed using a correlation coefficient);

- those studies which reviewed published literature;
- those studies using existing data or simulated data to develop new analytical techniques;
- others (letters, editorials, errata, meeting abstracts, case crossover and case control study designs).

Studies providing usable numerical estimates

A2.5 For all time-series studies providing usable regression estimates a number of items of data were identified, recorded on a coding sheet and then entered into Access databases, one containing details of results for all ecological time-series studies and the other containing similar information for all panel studies. These data described basic features of each study as well as recording the regression coefficients, standard errors and the information necessary to calculate standardised estimates of the health effects of each pollutant. We also included variables that described relevant elements of the analysis such as the length of the study period, year of study, continent, average pollution levels etc. General information about each study contained in the RM databases (title, authors, journal reference etc.) was also downloaded into the Access databases. These study specific data were linked to the result specific data using the relational features of the Access software.

Studies providing unusable numerical estimates

A2.6 A number of studies contained numerical estimates but were not included in the Access databases. The reason(s) for their exclusion were coded in the RM databases and fell largely into two categories, statistical method and data quality. The former included studies that did not control for seasonality and other confounders adequately and the latter included studies that were of a very limited period or a very small population (e.g. a single hospital).

Presentation of results

A2.7 In ecological time-series studies, relative risks, regression estimates and percentage changes in the mean number of events per day were all used to assess the association between the pollutants and health outcomes. In order to make results comparable estimates from Poisson and log-linear models (relative risks, regression estimates and percentage changes) were converted into a standard metric: percentage change in the mean number of daily events associated with a 10 $\mu g/m^3$ increase in the pollutant (1 mg/m^3 increase for CO). Access queries were written to calculate these adjusted estimates. Estimates from linear models were standardized to the change in the number of events associated with 10 $\mu g/m^3$ increases in the pollutant (1 mg/m^3 increases for CO). Where the logarithm of the pollutant was used in the model, the results were quoted for a unit change in the pollutant level on the logarithmic scale – in other words, the number of health events or percentage change in the number of health events associated with the relevant change in the pollutant level (2.7x or 10x for natural and base 10 logarithms).

A2.8 A similar process was undertaken for panel study results. Most studies using binary outcomes used logistic regression and presented odds ratios. These have been converted to represent 10 $\mu g/m^3$ increases in the pollutant. The results for continuous outcomes were usually given as betas, sometimes as percentage change. These have been converted to betas for 10 $\mu g/m^3$ increases in the pollutant. Results recorded as percentage change have been converted to betas where this was possible (only a few cases). Units for lung function were standardized to litres (L) or L/min as appropriate.

Selection of lags

A2.9 Many studies investigated and reported results for a number of pollutant lags or days prior to the health events. Some studies specified an *a priori* lag for investigation whilst others investigated a number of lags and reported only those that had the largest (or largest positive) effect or were statistically significant. It was desirable to be able to specify the lag for specific analyses but also it was essential that a result for each outcome/pollutant combination from each study could be easily selected for presentation without reference to a specified lag. For a given outcome defined by event type (mortality/admission etc.), disease group and age group and a given pollutant, a single result was extracted and denoted as the 'selected' result for that combination of outcome and pollutant. The selection was made in priority order as follows:

1. Only one lag measure presented (this may be because only one was examined or only one was presented in the paper)
2. Results for more than one lag presented. The lag selected was chosen as:

   2.1 lag focused on by author OR;

   2.2 most statistically significant OR;

   2.3 largest estimate.

A2.10 In addition to this selected lag, results for lag 0 and lag 1 were recorded (if different to "selected" lag from above process). A result for a cumulative lag (mean of pollution measures over 2 or more days), chosen by criteria 2.1-2.3 above was also recorded when cumulative results were available.

A2.11 Some studies only provided results by season, that is, if no all-year analyses were undertaken. In these cases the selection process described above applied to each season analysed. Where only results from multi-pollutant models (two, three, four pollutants in a single statistical model) were given then the results from the model with the most pollutants in it was selected for inclusion in the Access database.

For panel studies a similar approach was used.

Multi-city studies

A2.12 A number of recent studies have presented meta-analyses of results from several locations. As well as presenting results from each location, summary estimates have been calculated. Where such studies have used previously published data only the summary estimates have been recorded. Where previously unpublished city-specific results are presented they have been recorded separately.

Summary estimates

A2.13 Regression estimates and standard errors for each group of studies were transferred into STATA where standard procedures within STATA were used to calculate fixed- and random-effects summary estimates (DerSimonian and Laird, 1986; Stata Corp, 1997).

Publication bias

A2.14 Publication bias is a process that leads to the published literature being unrepresentative of the totality of evidence (Begg and Berlin, 1989; Dickersin, 1997). When present, publication bias might lead to the adoption of a false hypothesis, or to an estimate of a true effect that is biased away from the null, both of which consequences are clearly of importance to air pollution science and policy. Results from the database were subjected to an analysis for publication bias using graphical techniques and statistical tests.

A2.15 The funnel plot shows effect estimates plotted against a measure of the precision of the estimate (standard error or reciprocal of the within-study variance) and asymmetry in the plot leads one to suspect the presence of publication bias (amongst other possible causes) (Light and Pillemer, 1984).

A2.16 Evidence of asymmetry in the funnel plot was formally tested using Egger's linear regression test (Egger *et al*, 1997). This technique regresses the standardised effect size against the inverse of the standard error. A non-zero intercept provides evidence that the funnel plot is asymmetric. A further test from Begg, based upon a rank – correlation approach to assess correlation between estimate size and variance, was also applied (Begg and Mazumdar, 1994). The 'Trim and Fill' method was employed to attempt to adjust the summary estimate for publication bias (Duval and Tweedie, 2000). This method estimates the number of studies, together with their effect estimates and standard errors, needed to achieve symmetry.

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Appendix 3a
Time-series studies of air pollution and cardiovascular disease

Mortality

Cardiovascular mortality and PM_{10}. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(1)	Moolgavkar	2000	Cook	cardiac	all	lag 3	35	0.44	0.07	0.81
(1)	Moolgavkar	2000	Los Angeles	cardiac	all	lag 2	44	0.89	0.32	1.45
(1)	Moolgavkar	2000	Maricopa	cardiac	all	lag 1	41	1.75	0.51	3.00
(2)	Zmirou	1996	Lyon	cardiac	all	lag 2	38	0.79	-0.20	1.79
(3)	Schwartz	1993	Birmingham, Alabama	cardiac	all	lag 1-3	44	1.58	0.39	2.79
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 2	25	1.45	-0.16	3.09
(5)	Braga	2001	10 US Cities	cardiac	all	lag 0		0.60	0.40	0.80
(6)	Ostro	1999	Bangkok	cardiovascular	all	lag 3	65	1.61	0.62	2.61
(7)	Ostro	1999	Coachella Valley	cardiovascular	all	lag 2	57	1.61	0.42	2.81
(8)	Ballester	2002	3 Spanish Cities	cardiovascular	all	lag 0-1		1.20	0.50	1.90
(9)	Goldberg	2001	Montreal	cardiovascular	all	lag 1	29	0.90		
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	20	0.41	-0.78	1.61
(11)	Pope III	1996	Utah Valley	cardiovascular	all	lag 0-4	47	1.90	0.57	3.24
(12)	Ostro	2000	Coachella Valley	cardiovascular	all	lag 0	42	1.21	0.41	2.02
(13)	Simpson	2000	Melbourne	cardiovascular	all	lag 0	19	-0.10	-1.39	1.21
(14)	Wong	2002	Hong Kong	cardiovascular	all	lag 2	46	0.30	-0.20	0.80
(15)	Hoek	2000	Netherlands	cardiovascular	all	lag 0-6	34	0.19	-0.16	0.54
(16)	Bremner	1999	London	cardiovascular	all	lag 1	25	0.55	-0.07	1.17
(17)	Ocana-Riola	1999	Seville	cardiovascular	all	lag 5	43	-1.40	-3.31	0.55
(18)	Galan	1999	Madrid	cardiovascular	all	lag 0	33	0.91	0.15	1.68
(19)	Daponte	1999	Huelva	cardiovascular	all	lag 5	40	3.05	-1.15	7.43
(20)	Pope	1999	Ogden	cardiovascular	all	lag 0-4	32	3.98	2.66	5.31
(20)	Pope	1999	Salt Lake City	cardiovascular	all	lag 0-4	41	0.80	0.07	1.54
(20)	Pope	1999	Provo/Orem	cardiovascular	all	lag 0-4	38	1.67	0.49	2.88
(21)	Ponka	1998	Helsinki	cardiovascular	65+	lag 0	28	0.00		
(22)	Ostro	1996	Santiago	cardiovascular	all	lag 0	115	0.75	0.34	1.16
(23)	Pope	1992	Utah County	cardiovascular	all	lag 0	47	1.81	0.38	3.25
(24)	Hong	1999	Inchon	cardiovascular	all	lag 0-4	74	1.40	-0.40	3.23

Cardiovascular mortality and PM_{10}. Percentage change for 10 µg/m^3 increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(25)	Sanhueza	1999	Santiago	cardiovascular	all	lag 0	107	0.25	0.05	0.44
(26)	Fairley	1999	Santa Clara County	cardiovascular	all	lag 0	27	1.74		
(27)	Hong	1999	Inchon	cardiovascular	all	lag 1	72	0.70	-0.67	2.09
(28)	Castillejos	2000	Mexico City	cardiovascular	all	lag 1-5	45	2.00	0.39	3.64
(29)	Mar	2000	Phoenix	cardiovascular	all	lag 0	47	1.90	0.38	3.44
(30)	Szafraniec	1999	Krakow	cardiovascular	65+	lag 0	56	0.58	-0.10	1.27
(31)	Lippmann	2000	Wayne County	cardiovascular	all	lag 1	28	1.34	-0.26	2.95
(32)	Gouveia	2000	Sao Paulo	cardiovascular	65+	lag 0	64	0.58	0.02	1.15
(33)	Wichmann	2000	Erfurt	cardiovascular	all	lag 0	31	0.79	-0.69	2.29
(34)	Hoek	2001	Netherlands	cardiovascular	all	lag 0-6		0.15	-0.20	0.50
(35)	Wong	2001	Hong Kong	cardiovascular	all	lag 2	52	0.36	-0.18	0.91
(36)	Zeghnoun	2001	Rouen	cardiovascular	all	lag 1	28	1.06	-0.29	2.43
(36)	Zeghnoun	2001	Le Havre	cardiovascular	all	lag 1	31	2.55	0.04	5.12
(36)	Zeghnoun	2001	Paris	cardiovascular	all	lag 2	22	0.86	0.13	1.60
(36)	Zeghnoun	2001	Strasbourg	cardiovascular	all	lag 3	29	2.37	0.25	4.54
(37)	Biggeri	2001	Bologna	cardiovascular	all	lag 0-1	41	1.30	-0.30	2.93
(37)	Biggeri	2001	Florence	cardiovascular	all	lag 0-1	40	1.50	-0.50	3.54
(37)	Biggeri	2001	Milan	cardiovascular	all	lag 0-1	45	0.40	-0.70	1.51
(37)	Biggeri	2001	Palermo	cardiovascular	all	lag 0-1	43	3.50	1.80	5.23
(37)	Biggeri	2001	Rome	cardiovascular	all	lag 0-1	59	1.80	0.70	2.91
(37)	Biggeri	2001	Turin	cardiovascular	all	lag 0-1	64	0.70	0.00	1.40
(38)	Goldberg	2001	Montreal	cardiovascular	all	lag 1	29	0.90	-0.33	2.14
(39)	Hong	2002	Seoul	cerebrovascular	all	lag 0	47	0.69	0.60	0.78
(14)	Wong	2002	Hong Kong	cerebrovascular	all	lag 2	46	0.70	-0.20	1.61
(1)	Moolgavkar	2000	Cook	cerebrovascular	all	lag 2	35	0.65	-0.03	1.33
(1)	Moolgavkar	2000	Los Angeles	cerebrovascular	all	lag 0	44	-0.82	-1.87	0.24
(1)	Moolgavkar	2000	Maricopa	cerebrovascular	all	lag 5	41	2.14	0.02	4.31
(34)	Hoek	2001	Netherlands	cerebrovascular	all	lag 0-6		0.38	-0.37	1.14
(40)	Ito	1996	Cook County, Illinois	circulatory	all	lag 0-1	37	0.30	-0.20	0.80

Cardiovascular mortality and PM_{10}. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(41)	Wordley	1997	Birmingham, West Midlands	circulatory	all	lag 1	26	1.66	0.14	3.18
(5)	Braga	2001	10 US Cities	ami	all	lag 0		0.60	0.20	1.00
(9)	Goldberg	2001	Montreal	ihd	all	lag 1	29	1.25		
(14)	Wong	2002	Hong Kong	ihd	all	lag 0-3	46	1.30	0.10	2.51
(34)	Hoek	2001	Netherlands	ihd	all	lag 0-6		0.06	-0.46	0.58
(38)	Goldberg	2001	Montreal	ihd	all	lag 1	29	1.25	-0.35	2.87
(34)	Hoek	2001	Netherlands	embolism + thrombosis	all	lag 0-6		0.12	-1.39	1.66
(34)	Hoek	2001	Netherlands	dysrhythmias	all	lag 0-6		0.50	-0.88	1.90
(34)	Hoek	2001	Netherlands	heart failure	all	lag 0-6		0.44	-0.51	1.40

Cardiovascular mortality and $PM_{2.5}$. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(42)	Lipfert	2000	Philadelphia counties, NJ counties	cardiac	all	lag 0-1	17	1.11		
(1)	Moolgavkar	2000	Los Angeles	cardiac	all	lag 1	22	1.04	0.15	1.93
(28)	Castillejos	2000	Mexico City	cardiovascular	all	lag 1-5	27	1.55	-1.25	4.43
(29)	Mar	2000	Phoenix	cardiovascular	all	lag 1	13	7.09	2.25	12.16
(31)	Lippmann	2000	Wayne County	cardiovascular	all	lag 1	15	1.26	-0.93	3.49
(38)	Goldberg	2001	Montreal	cardiovascular	all	lag 1	15	1.34	-0.46	3.18
(12)	Ostro	2000	Coachella Valley	cardiovascular	all	lag 4	15	3.34	-2.22	9.21
(13)	Simpson	2000	Melbourne	cardiovascular	all	lag 0	9	0.30	-2.08	2.74
(9)	Goldberg	2001	Montreal	cardiovascular	all	lag 0-2	15	1.05		
(43)	Morgan	1998	Sydney	cardiovascular	all	lag 0	7	1.60	-4.35	3.26
(44)	Borja-Aburto	1998	Mexico City	cardiovascular	all	lag 4	26	2.19	-10.00	4.44
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	12	0.51	-1.19	2.24
(26)	Fairley	1999	Santa Clara County	cardiovascular	all	lag 0	9	2.45		
(45)	Schwartz	1996	6 USA cities	ihd	all	lag 0-1		2.10	1.4	2.80
(9)	Goldberg	2001	Montreal	ihd	all	lag 0-2	15	1.34		
(38)	Goldberg	2001	Montreal	ihd	all	lag 1	15	2.23	-0.10	4.62
(1)	Moolgavkar	2000	Los Angeles	cerebrovascular	all	lag 3	22	1.44	-0.24	3.15
(46)	Ostro	1995	Los Angeles	circulatory	all	lag 0	83	0.28	-0.28	0.84

Cardiovascular mortality and Black Smoke. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(47)	Zmirou	1998	4 European cities	cardiac	all	single		0.40	0.20	0.59
(47)	Zmirou	1998	4 Eastern European cities	cardiac	all	single		0.00	-0.20	0.20
(8)	Ballester	2002	7 Spanish Cities	cardiovascular	all	lag 0-1		0.30	-0.20	0.80
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	11	0.90	-0.90	2.72
(48)	Ballester	1996	Valencia	cardiovascular	all	lag 4	68	1.24	0.29	2.20
(49)	Sunyer	1996	Barcelona	cardiovascular	all	lag 1	42	0.89	0.35	1.44
(50)	Wojtyniak	1996	Krakow	cardiovascular	all	lag 0	73	0.14	-0.19	0.47
(50)	Wojtyniak	1996	Lodz	cardiovascular	all	lag 2	57	0.13	-0.20	0.45
(50)	Wojtyniak	1996	Poznan	cardiovascular	all	lag 2	34	-0.20	-0.79	0.39
(50)	Wojtyniak	1996	Wroclaw	cardiovascular	all	lag 1	54	0.13	-0.36	0.63
(15)	Hoek	2000	Netherlands	cardiovascular	all	lag 0-6	10	0.79	0.40	1.19
(16)	Bremner	1999	London	cardiovascular	all	lag 1	11	1.18	-0.12	2.49
(51)	Tobias	1998	Barcelona	cardiovascular	all	lag 3	40	0.89	0.35	1.43
(52)	Aguinaga	1999	Pamplona	cardiovascular	all	lag 5	22	-2.32	-9.94	5.93
(53)	Bellido Blasco	1999	Castellon	cardiovascular	all	lag 2	20	3.48	0.50	6.55
(54)	Cambra	1999	Bilbao	cardiovascular	all	lag 4	23	-1.65	-3.64	0.38
(55)	Anderson	1996	London	cardiovascular	all	lag 1	13	0.39	-0.45	1.23
(56)	Garcia-Aymerich	2000	Barcelona	cardiovascular	all	lag 0-3	42	1.15	0.38	1.94
(57)	Tenias Burillo	1999	Valencia	cardiovascular	all	lag 1	44	0.95	-0.51	2.43
(34)	Hoek	2001	Netherlands	cardiovascular	all	lag 0-6		0.72	0.32	1.11
(36)	Zeghnoun	2001	Rouen	cardiovascular	all	lag 1	14	2.80	-0.28	5.98
(36)	Zeghnoun	2001	Le Havre	cardiovascular	all	lag 0-3	13	1.65	-1.39	4.79
(36)	Zeghnoun	2001	Paris	cardiovascular	all	lag 1	16	0.36	-0.21	0.93
(36)	Zeghnoun	2001	Bordeaux	cardiovascular	all	lag 0	13	1.35	-0.83	3.59
(36)	Zeghnoun	2001	Marseille	cardiovascular	all	lag 1	16	1.23	-0.06	2.54
(58)	Arribas-Monzon	2001	Zaragoza	cardiovascular	all	lag 1		0.66	-0.49	1.82
(59)	Le Tertre	2002	Bordeaux	cardiovascular	all	lag 0-1		1.76	-0.73	4.31
(59)	Le Tertre	2002	Le Havre	cardiovascular	all	lag 0-1		1.40	-1.61	4.50
(59)	Le Tertre	2002	Marseille	cardiovascular	all	lag 0-1		0.92	-0.24	2.10

Cardiovascular mortality and Black Smoke. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(59)	Le Tertre	2002	Paris	cardiovascular	all	lag 0-1		0.40	-0.24	1.04
(59)	Le Tertre	2002	Rouen	cardiovascular	all	lag 0-1		0.98	-1.06	3.07
(59)	Le Tertre	2002	5 French Cities	cardiovascular	all	lag 0-1		0.61	0.10	1.13
(34)	Hoek	2001	Netherlands	ihd	all	lag 0-6		0.42	-0.15	1.00
(34)	Hoek	2001	Netherlands	embolism + thrombosis	all	lag 0-6		1.08	-0.71	2.90
(34)	Hoek	2001	Netherlands	dysrhythmias	all	lag 0-6		1.73	0.02	3.46
(34)	Hoek	2001	Netherlands	heart failure	all	lag 0-6		1.97	0.77	3.18
(34)	Hoek	2001	Netherlands	cerebrovascular	all	lag 0-6		1.01	0.17	1.85

Cardiovascular mortality and TSP. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(47)	Zmirou	1998	Barcelona, Milan	cardiac	all	single		0.20	0.00	0.40
(60)	Xu	2000	Shenyang	cardiac	all	lag 0-3	382	0.21	0.06	0.37
(61)	Michelozzi	2000	Rome	cardiac	all	lag 0		0.40	-0.10	0.90
(62)	Diaz	1999	Madrid	cardiovascular	all	lag 0		1.26		
(8)	Ballester	2002	5 Spanish Cities	cardiovascular	all	lag 0-1		0.70	0.10	1.30
(9)	Goldberg	2001	Montreal	cardiovascular	all	lag 0	49	0.65		
(63)	Wietlisbach	1996	Zurich	cardiovascular	all	lag 3	46	0.24	-0.33	0.81
(63)	Wietlisbach	1996	Basle	cardiovascular	all	lag 3	45	1.77	0.91	2.63
(64)	Diaz	1998	Madrid	cardiovascular	all	lag 0		0.42		
(65)	Guillen Perez	1999	Cartagena	cardiovascular	all	lag 3	56	0.10	-0.02	0.22
(54)	Cambra	1999	Bilbao	cardiovascular	all	lag 0	72	1.18	0.30	2.07
(66)	Canada	1999	Oviedo	cardiovascular	all	lag 2	73	1.36	-0.35	3.10
(66)	Canada	1999	Gijon	cardiovascular	all	lag 5	75	1.37	0.10	2.66
(67)	Peters	2000	Czech Republic (coal basin)	cardiovascular	all	lag 0	99	-0.34	-0.73	0.07
(67)	Peters	2000	Germany (Rural)	cardiovascular	all	lag 0	44	0.15	-0.23	0.53
(68)	Michelozzi	1998	Rome	cardiovascular	all	lag 1	83	0.37	-0.07	0.81
(69)	Kelsall	1997	Philadelphia	cardiovascular	75+	lag 0	63	0.53	0.00	1.06
(70)	Borja-Aburto	1997	Mexico City	cardiovascular	all	lag 0	204	0.51	0.09	0.93
(71)	Loomis	1996	Mexico City	cardiovascular	all	lag 0	168	0.51	0.08	0.95
(72)	Bacharova	1996	Bratislava	cardiovascular	all	lag 0	89	-10.47	-51.60	65.61
(73)	Schwartz	1994	Cincinnati	cardiovascular	all	lag 0	71	0.77	0.30	1.25
(74)	Gao	1993	Beijing	cardiovascular	all	lag 0	336	0.00	-0.37	0.38
(75)	Schwartz	1992	Philadelphia	cardiovascular	all	lag 0-1	73	0.93	0.56	1.29
(24)	Hong	1999	Inchon	cardiovascular	all	lag 0-5	92	2.00	0.20	3.83
(76)	Kotesovec	2000	Northern Bohemia	cardiovascular	65+		99	0.00		
(77)	Cadum	1999	Turin	cardiovascular	all	lag 0	120	0.92	0.55	1.29
(38)	Goldberg	2001	Montreal	cardiovascular	all	lag 0	49	0.65	-0.32	1.62
(78)	Cropper	1997	Delhi	cardiovascular	all	lag 2	378	0.42	-0.25	1.10
(79)	Rossi	1999	Milan	ami	all	lag 3	142	0.96	0.30	1.62
(9)	Goldberg	2001	Montreal	ihd	all	lag 0	49	0.89		

Cardiovascular mortality and TSP. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(38)	Goldberg	2001	Montreal	ihd	all	lag 0	49	0.90	-0.38	2.19
(79)	Rossi	1999	Milan	heart failure	all	lag 0	142	0.68	0.30	1.06
(64)	Diaz	1998	Madrid	cerebrovascular	all	lag 0		1.69		

Cardiovascular mortality and NO_2. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(1)	Moolgavkar	2000	Cook	cardiac	all	lag 3	48	0.54	0.12	0.97
(1)	Moolgavkar	2000	Los Angeles	cardiac	all	lag 1	73	0.73	0.53	0.92
(1)	Moolgavkar	2000	Maricopa	cardiac	all	lag 4	36	1.21	0.51	1.91
(2)	Zmirou	1996	Lyon	cardiac	all	lag 1	70	0.20	-0.81	1.22
(61)	Michelozzi	2000	Rome	cardiac	all	lag 1-2		0.40	-0.10	0.90
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 2	39	0.33	-0.77	1.44
(63)	Wietlisbach	1996	Zurich	cardiovascular	all	lag 3	58	0.30	-0.42	1.03
(63)	Wietlisbach	1996	Basle	cardiovascular	all	lag 3	54	2.62	1.13	4.14
(63)	Wietlisbach	1996	Geneva	cardiovascular	all	lag 3	59	1.08	0.09	2.07
(12)	Ostro	2000	Coachella Valley	cardiovascular	all	lag 0	38	0.95	-0.48	2.39
(13)	Simpson	2000	Melbourne	cardiovascular	all	lag 0	22	0.00		
(14)	Wong	2002	Hong Kong	cardiovascular	all	lag 0-2	54	0.80	-0.10	1.71
(15)	Hoek	2000	Netherlands	cardiovascular	all	lag 0-6	32	0.92	0.50	1.35
(17)	Ocana-Riola	1999	Seville	cardiovascular	all	lag 3	57	1.19	-0.60	3.01
(19)	Daponte	1999	Huelva	cardiovascular	all	lag 3	32	-3.42	-9.06	2.57
(67)	Peters	2000	Germany (Rural)	cardiovascular	all	lag 0	24	0.54	-0.76	1.85
(44)	Borja-Aburto	1998	Mexico City	cardiovascular	all	lag 1-5	69	0.73	-0.87	2.36
(68)	Michelozzi	1998	Rome	cardiovascular	all	lag 1	96	0.39	-0.11	0.89
(69)	Kelsall	1997	Philadelphia	cardiovascular	all	lag 0	72	-0.17	-0.58	0.23
(80)	Kinney	1991	Los Angeles	cardiovascular	all	lag 0	132	0.23	0.14	0.33
(24)	Hong	1999	Inchon	cardiovascular	all	lag 0-4	44	2.12	-1.69	6.08
(26)	Fairley	1999	Santa Clara County, California	cardiovascular	all	lag 1	48	0.37		
(27)	Hong	1999	Inchon	cardiovascular	all	lag 1	46	0.63	-1.82	3.13
(56)	Garcia-Aymerich	2000	Barcelona	cardiovascular	all	lag 0-3		0.61	-0.24	1.47
(77)	Cadum	1999	Turin	cardiovascular	all	lag 1	82	1.38	0.85	1.92
(29)	Mar	2000	Phoenix	cardiovascular	all	lag 4		3.05	1.40	4.72
(34)	Hoek	2001	Netherlands	cardiovascular	all	lag 0-6		0.76	0.30	1.22
(35)	Wong	2001	Hong Kong	cardiovascular	all	lag 2	56	1.34	0.45	2.23
(36)	Zeghnoun	2001	Rouen	cardiovascular	all	lag 0-1	33	3.57	0.88	6.32

Cardiovascular mortality and NO_2. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(36)	Zeghnoun	2001	Le Havre	cardiovascular	all	lag 1	35	1.43	-0.75	3.66
(36)	Zeghnoun	2001	Paris	cardiovascular	all	lag 0-1	54	0.80	0.20	1.40
(36)	Zeghnoun	2001	Strasbourg	cardiovascular	all	lag 4	51	1.04	-0.14	2.23
(36)	Zeghnoun	2001	Lyon	cardiovascular	all	lag 1	40	0.94	-1.49	3.43
(36)	Zeghnoun	2001	Toulouse	cardiovascular	all	lag 3	28	0.93	-2.41	4.39
(37)	Biggeri	2001	8 Italian Cities	cardiovascular	all	lag 0-1	70	1.20	0.90	1.50
(37)	Biggeri	2001	Bologna	cardiovascular	all	lag 1-2	60	2.10	0.10	4.14
(37)	Biggeri	2001	Florence	cardiovascular	all	lag 1-2	70	1.90	0.00	3.84
(37)	Biggeri	2001	Milan	cardiovascular	all	lag 1-2	87	1.30	0.40	2.21
(37)	Biggeri	2001	Palermo	cardiovascular	all	lag 1-2	61	3.20	1.20	5.24
(37)	Biggeri	2001	Rome	cardiovascular	all	lag 1-2	86	2.00	1.10	2.91
(37)	Biggeri	2001	Turin	cardiovascular	all	lag 1-2	75	1.30	0.35	2.26
(81)	Saez	2002	Barcelona	cardiovascular	all	single	54	1.03	0.11	1.96
(81)	Saez	2002	Gijon	cardiovascular	all	single	45	1.76	-0.55	4.13
(81)	Saez	2002	Huelva	cardiovascular	all	single	33	2.04	-4.54	9.07
(81)	Saez	2002	Madrid	cardiovascular	all	single	71	0.91	1.96	-0.13
(81)	Saez	2002	Oviedo	cardiovascular	all	single	50	3.37	-0.99	7.91
(81)	Saez	2002	Seville	cardiovascular	all	single	59	2.43	0.82	4.06
(81)	Saez	2002	Valencia	cardiovascular	all	single	67	0.62	-0.89	2.14
(81)	Saez	2002	7 Spanish Cities	cardiovascular	all	single		1.13	-0.06	2.33
(59)	Le Tertre	2002	Le Havre	cardiovascular	all	lag 0-1		1.51	-0.92	4.00
(59)	Le Tertre	2002	Lyon	cardiovascular	all	lag 0-1		0.96	-1.98	3.99
(59)	Le Tertre	2002	Paris	cardiovascular	all	lag 0-1		0.90	0.20	1.61
(59)	Le Tertre	2002	Rouen	cardiovascular	all	lag 0-1		3.00	0.38	5.68
(59)	Le Tertre	2002	Strasbourg	cardiovascular	all	lag 0-1		-1.36	-3.70	1.05
(59)	Le Tertre	2002	Toulouse	cardiovascular	all	lag 0-1		0.46	-3.11	4.15
(59)	Le Tertre	2002	9 French Cities	cardiovascular	all	lag 0-1		0.90	0.30	1.51
(14)	Wong	2002	Hong Kong	ihd	all	lag 1	54	2.40	1.20	3.61
(34)	Hoek	2001	Netherlands	ihd	all	lag 0-6		0.56	-0.07	1.20

Cardiovascular mortality and NO_2. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(34)	Hoek	2001	Netherlands	embolism + thrombosis	all	lag 0-6		0.07	-1.83	2.00
(34)	Hoek	2001	Netherlands	dysrhythmias	all	lag 0-6		0.99	-0.81	2.82
(34)	Hoek	2001	Netherlands	heart failure	all	lag 0-6		2.09	0.79	3.40
(39)	Hong	2002	Seoul	cerebrovascular	all	lag 2	48	1.94	0.69	3.21
(14)	Wong	2002	Hong Kong	cerebrovascular	all	lag 1	54	-0.40	-1.50	0.71
(1)	Moolgavkar	2000	Cook	cerebrovascular	all	lag 1	48	0.62	-0.15	1.41
(1)	Moolgavkar	2000	Los Angeles	cerebrovascular	all	lag 0	73	0.72	0.37	1.08
(1)	Moolgavkar	2000	Maricopa	cerebrovascular	all	lag 1	36	2.10	0.17	4.06
(34)	Hoek	2001	Netherlands	cerebrovascular	all	lag 0-6		1.58	-0.60	3.80

Cardiovascular mortality and 1 hour ozone. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(47)	Zmirou	1998	4 European cities	cardiac	all	single		0.40	0.20	0.59
(2)	Zmirou	1996	Lyon	cardiac	all	lag 1	15	-1.23	-3.89	1.51
(49)	Sunyer	1996	Barcelona	cardiovascular	all	lag 1	71	0.57	0.09	1.04
(12)	Ostro	2000	Coachella Valley	cardiovascular	all	lag 0	129	-0.51	-1.17	0.16
(51)	Tobias	1998	Barcelona	cardiovascular	all	lag 5	68	0.57	0.09	1.06
(43)	Morgan	1998	Sydney	cardiovascular	all	lag 0	42	0.45	-0.04	0.94
(82)	Simpson	1997	Brisbane	cardiovascular	all	lag 0	43	0.61	-0.27	1.50
(70)	Borja-Aburto	1997	Mexico City	cardiovascular	all	lag 0	310	0.18	0.03	0.32
(71)	Loomis	1996	Mexico City	cardiovascular	all	lag 0	308	0.11	-0.27	0.48
(55)	Anderson	1996	London	cardiovascular	all	lag 0	40	0.35	0.05	0.65
(32)	Gouveia	2000	Sao Paulo	cardiovascular	65+	lag 0	60	0.29	-0.04	0.62

Cardiovascular mortality and 8 hour ozone. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(47)	Zmirou	1998	4 European cities	cardiac	all	single		0.40	0.00	0.80
(2)	Zmirou	1996	Lyon	cardiac	all	lag 1	10	0.00	-2.30	2.36
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	48	0.16	-0.60	0.92
(14)	Wong	2002	Hong Kong	cardiovascular	all	lag 0	29	-0.30	-0.90	0.30
(15)	Hoek	2000	Netherlands	cardiovascular	all	lag 1	47	0.31	0.17	0.46
(16)	Bremner	1999	London	cardiovascular	all	lag 2	32	0.67	0.10	1.25
(18)	Galan	1999	Madrid	cardiovascular	all	lag 1	79	-0.81	-1.59	-0.02
(83)	Saurina	1999	Barcelona	cardiovascular	all	lag 1	68	0.71	0.20	1.23
(82)	Simpson	1997	Brisbane	cardiovascular	all	lag 0	33	0.99	-0.39	2.38
(70)	Borja-Aburto	1997	Mexico City	cardiovascular	all	lag 0	188	0.37	0.15	0.59
(55)	Anderson	1996	London	cardiovascular	all	lag 0	28	0.28	-0.09	0.64
(26)	Fairley	1999	Santa Clara County, California	cardiovascular	all	lag 0	58	0.30		
(27)	Hong	1999	Inchon	cardiovascular	all	lag 1	31	-0.90	-6.28	4.80
(77)	Cadum	1999	Turin	cardiovascular	all	lag 0	74	0.67	-0.02	1.37
(57)	Tenias Burillo	1999	Valencia	cardiovascular	all	lag 5	46	1.27	-0.71	3.29
(34)	Hoek	2001	Netherlands	cardiovascular	all	lag 1		0.36	0.21	0.51
(35)	Wong	2001	Hong Kong	cardiovascular	all	lag 3	34	0.18	-0.36	0.72
(36)	Zeghnoun	2001	Strasbourg	cardiovascular	all	lag 1	37	0.57	-0.39	1.54
(36)	Zeghnoun	2001	Lyon	cardiovascular	all	lag 2	52	0.50	-0.95	1.96
(36)	Zeghnoun	2001	Toulouse	cardiovascular	all	lag 3	68	1.22	0.02	2.43
(81)	Saez	2002	Barcelona	cardiovascular	all	single	68	0.55	-0.03	1.14
(81)	Saez	2002	Madrid	cardiovascular	all	single	42	0.54	-0.04	1.13
(81)	Saez	2002	Valencia	cardiovascular	all	single	46	3.14	0.35	6.00
(59)	Le Tertre	2002	9 French Cities	cardiovascular	all	lag 0-1		0.48	-0.06	1.01
(59)	Le Tertre	2002	Le Havre	cardiovascular	all	lag 0-1		0.28	-1.80	2.40
(59)	Le Tertre	2002	Lyon	cardiovascular	all	lag 0-1		0.38	-1.59	2.38
(59)	Le Tertre	2002	Paris	cardiovascular	all	lag 0-1		0.42	-0.34	1.18
(59)	Le Tertre	2002	Rouen	cardiovascular	all	lag 0-1		1.38	-0.63	3.43
(59)	Le Tertre	2002	Strasbourg	cardiovascular	all	lag 0-1		0.22	-0.83	1.28

Cardiovascular mortality and PM_{10}. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(59)	Le Tertre	2002	Toulouse	cardiovascular	all	lag 0-1		1.00	-0.85	2.89
(14)	Wong	2002	Hong Kong	ihd	all	lag 3	29	0.90	0.00	1.81
(34)	Hoek	2001	Netherlands	ihd	all	lag 1		0.17	-0.04	0.38
(34)	Hoek	2001	Netherlands	embolism + thrombosis	all	lag 1		0.88	0.21	1.55
(34)	Hoek	2001	Netherlands	dysrhythmias	all	lag 1		0.48	-0.16	1.11
(34)	Hoek	2001	Netherlands	heart failure	all	lag 1		0.51	0.06	0.96
(39)	Hong	2002	Seoul	cerebrovascular	all	lag 0	27	1.55	0.16	2.96
(14)	Wong	2002	Hong Kong	cerebrovascular	all	lag 0	29	-0.10	-0.20	0.00
(34)	Hoek	2001	Netherlands	cerebrovascular	all	lag 1		0.46	0.15	0.77

Cardiovascular mortality and 24 hour ozone. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(1)	Moolgavkar	2000	Cook	cardiac	all	lag 0	36	0.76	0.39	1.13
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 0	52	0.28	-0.38	0.94
(62)	Diaz	1999	Madrid	cardiovascular	all	lag 4		5.80		
(84)	Goldberg	2001	Montreal	cardiovascular	all	lag 1	26	0.72	0.02	1.42
(63)	Wietlisbach	1996	Zurich	cardiovascular	all	lag 1	27	-0.03	-0.81	0.76
(63)	Wietlisbach	1996	Basle	cardiovascular	all	lag 1	24	-1.62	-3.83	0.65
(67)	Peters	2000	Germany (Rural)	cardiovascular	all	lag 0	38	0.59	-0.38	1.57
(44)	Borja-Aburto	1998	Mexico City	cardiovascular	all	lag 1-2	87	0.88	0.03	1.72
(21)	Ponka	1998	Helsinki	cardiovascular	under 65	lag 5	18	-6.05	-9.97	-1.95
(69)	Kelsall	1997	Philadelphia	cardiovascular	all	lag 1	34	0.28	-0.18	0.74
(24)	Hong	1999	Inchon	cardiovascular	all	lag 0-4	26	-3.67	-10.95	4.21
(25)	Sanhueza	1999	Santiago	cardiovascular	all	lag 0	124	0.08	-0.06	0.22
(84)	Goldberg	2001	Montreal	ihd	all	lag 0	26	1.34	0.58	2.10

Cardiovascular mortality and SO_2. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(1)	Moolgavkar	2000	Cook	cardiac	all	lag 1	16	1.10	0.41	1.79
(1)	Moolgavkar	2000	Los Angeles	cardiac	all	lag 1	5	5.34	4.46	6.22
(1)	Moolgavkar	2000	Maricopa	cardiac	all	lag 3	5	3.27	1.45	5.12
(47)	Zmirou	1998	5 European cities	cardiac	all	single		0.79	0.20	1.38
(47)	Zmirou	1998	5 Eastern European cities	cardiac	all	single		0.20	0.00	0.40
(2)	Zmirou	1996	Lyon	cardiac	all	lag 0-3	47	1.55	0.59	2.52
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 3	33	0.18	-0.92	1.29
(60)	Xu	2000	Shenyang	cardiac	all	lag 0-3	150	0.18	-0.05	0.42
(8)	Ballester	2002	13 Spanish Cities	cardiovascular	all	lag 0-1		0.50	-0.20	1.20
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	16	-0.09	-1.32	1.16
(48)	Ballester	1996	Valencia	cardiovascular	all	lag 2	40	0.99	-0.55	2.55
(63)	Wietlisbach	1996	Zurich	cardiovascular	all	lag 3	35	0.14	-0.37	0.65
(63)	Wietlisbach	1996	Basle	cardiovascular	all	lag 3	27	2.20	0.97	3.45
(63)	Wietlisbach	1996	Geneva	cardiovascular	all	lag 3	40	1.21	0.24	2.18
(49)	Sunyer	1996	Barcelona	cardiovascular	all	lag 1	41	1.36	0.61	2.12
(50)	Wojtyniak	1996	Lodz	cardiovascular	all	lag 2	46	0.43	-0.03	0.90
(50)	Wojtyniak	1996	Poznan	cardiovascular	all	lag 0	41	-0.06	-0.42	0.29
(50)	Wojtyniak	1996	Krakow	cardiovascular	all	lag 0	74	0.52	0.17	0.86
(50)	Wojtyniak	1996	Wroclaw	cardiovascular	all	lag 2	29	-0.47	-0.91	-0.03
(14)	Wong	2002	Hong Kong	cardiovascular	all	lag 0-1	14	0.70	-0.60	2.02
(15)	Hoek	2000	Netherlands	cardiovascular	all	lag 0-6	10	0.96	0.55	1.38
(16)	Bremner	1999	London	cardiovascular	all	lag 1	20	0.44	-0.56	1.45
(51)	Tobias	1998	Barcelona	cardiovascular	all	lag 3	41	1.36	0.62	2.11
(17)	Ocana-Riola	1999	Seville	cardiovascular	all	lag 0	7	-5.19	-11.74	1.84
(52)	Aguinaga	1999	Pamplona	cardiovascular	all	lag 0	10	-1.45	-3.97	1.13
(18)	Galan	1999	Madrid	cardiovascular	all	lag 0	26	0.07	0.02	0.11
(19)	Daponte	1999	Huelva	cardiovascular	all	lag 3	10	-5.70	-13.22	2.47
(53)	Bellido Blasco	1999	Castellon	cardiovascular	all	lag 1	13	3.60	0.27	7.04
(65)	Guillen Perez	1999	Cartagena	cardiovascular	all	lag 2	44	-0.16	-0.38	0.06
(54)	Cambra	1999	Bilbao	cardiovascular	all	lag 4	22	-2.05	-3.93	-0.13

Cardiovascular mortality and SO_2. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(66)	Canada	1999	Oviedo	cardiovascular	all	lag 4	38	0.77	-1.00	2.57
(66)	Canada	1999	Gijon	cardiovascular	all	lag 5	29	1.97	0.24	3.73
(67)	Peters	2000	Germany (Rural)	cardiovascular	all	lag 0	70	0.01	-0.26	0.28
(85)	Alberdi Odriozola	1998	Madrid	cardiovascular	all	lag 1	75	0.00		
(82)	Simpson	1997	Brisbane	cardiovascular	all	lag 0	10	0.37	-3.20	4.08
(69)	Kelsall	1997	Philadelphia	cardiovascular	all	lag 0	39	0.44	0.04	0.85
(70)	Borja-Aburto	1997	Mexico City	cardiovascular	all	lag 0	143	0.25	-0.58	1.09
(71)	Loomis	1996	Mexico City	cardiovascular	all	lag 0	146	0.25	-0.58	1.09
(72)	Bacharova	1996	Bratislava	cardiovascular	all	lag 0	24	-13.15	-46.14	40.04
(55)	Anderson	1996	London	cardiovascular	all	lag 1	31	0.08	-0.48	0.64
(74)	Gao	1993	Beijing	cardiovascular	all	lag 0	40	2.80	0.60	5.06
(86)	Mackenbach	1993	Netherlands	cardiovascular	all	lag 0	18	-0.06	-0.20	0.08
(87)	Krzyzanowski	1991	Krakow	cardiovascular	all	lag 1-4		1.05	0.64	1.46
(24)	Hong	1999	Inchon	cardiovascular	all	lag 0-4	61	1.03	-2.38	4.55
(76)	Kotesovec	2000	Northern Bohemia	cardiovascular	65+		73	0.00		
(27)	Hong	1999	Inchon	cardiovascular	all	lag 1	49	2.17	-0.61	5.02
(56)	Garcia-Aymerich	2000	Barcelona	cardiovascular	all	lag 0-3	41	1.76	0.79	2.74
(77)	Cadum	1999	Turin	cardiovascular	all	lag 2	29	2.24	1.42	3.06
(29)	Mar	2000	Phoenix	cardiovascular	all	lag 0	8	9.65	3.03	16.68
(30)	Szafraniec	1999	Krakow	cardiovascular	65+	lag 0	36	1.58	0.96	2.21
(57)	Tenias Burillo	1999	Valencia	cardiovascular	all	lag 2	26	-1.78	-4.31	0.82
(32)	Gouveia	2000	Sao Paulo	cardiovascular	65+	lag 1	19	2.15	0.49	3.84
(34)	Hoek	2001	Netherlands	cardiovascular	all	lag 0-6		0.72	0.30	1.14
(35)	Wong	2001	Hong Kong	cardiovascular	all	lag 1	18	1.83	0.74	2.93
(36)	Zeghnoun	2001	Rouen	cardiovascular	all	lag 0	26	0.85	-1.18	2.91
(36)	Zeghnoun	2001	Le Havre	cardiovascular	all	lag 1	18	1.18	0.33	2.04
(36)	Zeghnoun	2001	Paris	cardiovascular	all	lag 1	14	0.75	-0.17	1.67
(36)	Zeghnoun	2001	Strasbourg	cardiovascular	all	lag 4	21	3.89	0.56	7.33
(36)	Zeghnoun	2001	Marseille	cardiovascular	all	lag 0-1	16	2.18	0.64	3.75

Cardiovascular mortality and SO_2. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(36)	Zeghnoun	2001	Lille	cardiovascular	all	lag 0-3	19	1.49	0.33	2.66
(36)	Zeghnoun	2001	Lyon	cardiovascular	all	lag 1-2	21	2.98	0.86	5.14
(58)	Arribas-Monzon	2001	Zaragoza	cardiovascular	all	lag 1		1.84	0.07	3.64
(37)	Biggeri	2001	6 Italian Cities	cardiovascular	all	lag 0-1	13	1.40	0.90	1.90
(37)	Biggeri	2001	Bologna	cardiovascular	all	lag 1-2	9	5.50	-0.50	11.86
(37)	Biggeri	2001	Florence	cardiovascular	all	lag 1-2	8	5.90	-1.80	14.20
(37)	Biggeri	2001	Milan	cardiovascular	all	lag 1-2	18	3.20	1.20	5.24
(37)	Biggeri	2001	Palermo	cardiovascular	all	lag 1-2	13	4.40	-0.10	9.10
(37)	Biggeri	2001	Rome	cardiovascular	all	lag 1-2	9	7.30	3.80	10.92
(37)	Biggeri	2001	Turin	cardiovascular	all	lag 1-2	18	0.60	-1.50	2.74
(59)	Le Tertre	2002	8 French Cities	cardiovascular	all	lag 0-1		1.04	0.51	1.56
(59)	Le Tertre	2002	Bordeaux	cardiovascular	all	lag 0-1		6.23	1.89	10.76
(59)	Le Tertre	2002	Le Havre	cardiovascular	all	lag 0-1		0.96	-0.08	2.01
(59)	Le Tertre	2002	Lille	cardiovascular	all	lag 0-1		1.15	0.04	2.28
(59)	Le Tertre	2002	Lyon	cardiovascular	all	lag 0-1		1.25	-1.13	3.68
(59)	Le Tertre	2002	Marseille	cardiovascular	all	lag 0-1		2.82	0.81	4.87
(59)	Le Tertre	2002	Paris	cardiovascular	all	lag 0-1		0.51	-0.40	1.44
(59)	Le Tertre	2002	Rouen	cardiovascular	all	lag 0-1		0.26	-2.24	2.82
(59)	Le Tertre	2002	Strasbourg	cardiovascular	all	lag 0-1		0.16	-2.88	3.30
(88)	Venners	2003	Chongqing	cardiovascular	all	lag 3	213	1.84	1.05	2.64
(89)	Derriennic	1989	Marseilles	circulatory	65+	lag 5	51	7.12	1.14	13.10
(14)	Wong	2002	Hong Kong	ihd	all	lag 1	14	2.80	1.20	4.43
(34)	Hoek	2001	Netherlands	ihd	all	lag 0-6		0.37	-0.23	0.98
(34)	Hoek	2001	Netherlands	embolism + thrombosis	all	lag 0-6		3.01	1.08	4.98
(34)	Hoek	2001	Netherlands	dysrhythmias	all	lag 0-6		1.13	-0.73	3.03
(34)	Hoek	2001	Netherlands	heart failure	all	lag 0-6		2.36	1.06	3.69
(39)	Hong	2002	Seoul	cerebrovascular	all	lag 2	18	1.87	0.52	3.24
(14)	Wong	2002	Hong Kong	cerebrovascular	all	lag 2	14	-1.19	-3.50	1.18
(1)	Moolgavkar	2000	Cook	cerebrovascular	all	lag 2	16	0.66	-0.58	1.93

Cardiovascular mortality and SO_2. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(1)	Moolgavkar	2000	Los Angeles	cerebrovascular	all	lag 1	5	4.78	3.14	6.44
(1)	Moolgavkar	2000	Maricopa	cerebrovascular	all	lag 1	5	8.07	4.67	11.58
(34)	Hoek	2001	Netherlands	cerebrovascular	all	lag 0-6		1.15	0.50	1.82

Cardiovascular mortality and CO. Percentage change for 1 mg/m^3 increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(1)	Moolgavkar	2000	Cook	cardiac	all	lag 3	1.2	1.53	0.26	2.82
(1)	Moolgavkar	2000	Los Angeles	cardiac	all	lag 2	1.7	3.32	2.89	3.75
(1)	Moolgavkar	2000	Maricopa	cardiac	all	lag 3	1.6	3.07	1.83	4.32
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 3	0.9	3.19	-1.02	7.57
(63)	Wietlisbach	1996	Zurich	cardiovascular	all	lag 3	1.3	0.60	-1.93	3.20
(63)	Wietlisbach[4]	1996	Basle	cardiovascular	all	lag 3	1.0	14.68	0.37	31.03
(63)	Wietlisbach	1996	Geneva	cardiovascular	all	lag 3	1.9	0.90	-1.44	3.31
(15)	Hoek	2000	Netherlands	cardiovascular	all	lag 0-6	0.5	3.65	1.00	6.38
(16)	Bremner	1999	London	cardiovascular	all	lag 1	0.9	1.40	-0.10	2.92
(19)	Daponte	1999	Huelva	cardiovascular	all	lag 5	0.6	0.14	-0.04	0.32
(66)	Canada	1999	Oviedo	cardiovascular	all	lag 3	1.3	5.13	-1.20	11.87
(66)	Canada	1999	Gijon	cardiovascular	all	lag 1	1.7	-3.34	-7.89	1.43
(67)	Peters	2000	Germany (Rural)	cardiovascular	all	lag 0	0.6	1.80	-0.60	4.26
(24)	Hong	1999	Inchon	cardiovascular	all	lag 0-4	2.1	-2.81	-8.74	3.50
(26)	Fairley	1999	Santa Clara County, California	cardiovascular	all	lag 1	1.4	1.44		
(27)	Hong	1999	Inchon	cardiovascular	all	lag 1	1.9	0.15	-0.99	1.31
(29)	Mar	2000	Phoenix	cardiovascular	all	lag 1	1.9	6.32	2.92	9.83
(57)	Tenias Burillo	1999	Valencia	cardiovascular	all	lag 5	2.8	0.65	-2.17	3.55
(34)	Hoek[5]	2001	Netherlands	cardiovascular	all	lag 0-6		23.85	-5.69	62.63
(34)	Hoek	2001	Netherlands	ihd	all	lag 0-6		50.17	3.38	118.13
(34)	Hoek	2001	Netherlands	embolism + thrombosis	all	lag 0-6		69.01	-47.31	442.09
(34)	Hoek	2001	Netherlands	dysrhythmias	all	lag 0-6		65.08	-41.86	368.72
(34)	Hoek	2001	Netherlands	heart failure	all	lag 0-6		136.83	10.45	407.79
(34)	Hoek	2001	Netherlands	cerebrovascular	all	lag 0-6		70.34	26.90	128.64
(39)	Hong	2002	Seoul	cerebrovascular	all	lag 2	1.1	5.97	1.07	11.12
(1)	Moolgavkar	2000	Cook	cerebrovascular	all	lag 1	1.2	2.54	0.18	4.94
(1)	Moolgavkar	2000	Los Angeles	cerebrovascular	all	lag 1	1.7	3.15	2.34	3.97
(1)	Moolgavkar	2000	Maricopa	cerebrovascular	all	lag 5	1.6	4.21	1.98	6.48

[4] Wietlisbach (1996) Basle excluded from meta analysis pending data queries

[5] Hoek (2001) excluded from meta analysis pending data queries

Cardiovascular mortality and sulphate. Percentage change for 10 μg/m^3 increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant*	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 1	642.7	0.02	-0.00	0.05
(9)	Goldberg	2001	Montreal	cardiovascular	all	lag 0-2	2.2	5.34		
(26)	Fairley	1999	Santa Clara County	cardiovascular	all	lag 0	1.5	15.03		
(31)	Lippmann	2000	Wayne County	cardiovascular	all	lag 0	343.75	0.01	-0.03	0.05
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	2.7	-2.23	-6.80	2.56
(15)	Hoek	2000	The Netherlands	cardiovascular	all	lag 1	3.8	0.83	-0.76	2.46
(9)	Goldberg	2001	Montreal	ischaemic heart disease	all	lag 0-2	2.2	6.14		

* In μg/m^3 except for Buffalo and Wayne County studies (in nmoles/m^3). 1 nmole/m^3 = 0.096 μg/m3.

Appendix 3b
Time-series studies of air pollution and cardiovascular disease

Hospital admissions

Cardiovascular admissions and PM_{10}. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	20	-0.25	-1.03	0.55
(90)	Atkinson	1999	London	cardiovascular	all	lag 0	25	0.63	0.18	1.08
(91)	Tolbert	2000	Atlanta	cardiovascular	all	lag 0-2	28	-1.70	-3.11	-0.27
(91)	Tolbert	2000	Atlanta	cardiovascular	all	lag 0-2	28	1.00	-1.63	3.70
(92)	Prescott	1998	Edinburgh 1	cardiovascular	65+	lag 1-3	21	4.80	0.90	8.85
(93)	Wong	1999	Hong Kong	cardiovascular	all	lag 0-2	45	0.60	0.20	1.00
(10)	Anderson	2001	West Midlands	cardiac	all	lag 0-1	20	0.12	-0.74	0.99
(94)	Zanobetti	2000	10 US cities	cardiac *	65+	distribute	29	1.27	1.05	1.49
(95)	Zanobetti	2000	Cook County	cardiac	65+	lag 0	33	1.31	0.97	1.65
(96)	Schwartz	1999	Chicago	cardiac	65+	lag 0	35	0.92	0.52	1.31
(96)	Schwartz	1999	Colorado Springs	cardiac	65+	lag 0	23	1.09	-1.29	3.54
(96)	Schwartz	1999	Minneapolis	cardiac	65+	lag 0	28	0.81	-0.75	2.39
(96)	Schwartz	1999	New Haven, Conneticut	cardiac	65+	lag 0	37	1.14	0.41	1.87
(96)	Schwartz	1999	St Paul	cardiac	65+	lag 0	34	1.66	0.57	2.75
(96)	Schwartz	1999	Seattle	cardiac	65+	lag 0	29	0.70	-0.03	1.44
(96)	Schwartz	1999	Spokane	cardiac	65+	lag 0	37	1.30	0.17	2.44
(96)	Schwartz	1999	Tacoma	cardiac	65+	lag 0	37	1.04	0.19	1.91
(97)	Schwartz	1997	Tucson	cardiac	65+	lag 0	39	1.19	0.23	2.16
(98)	Linn	2000	Los Angeles	cardiac	30+	lag 0	45	0.64	0.41	0.88
(99)	Samet	2000	14 USA cities	cardiac	65+	lag 0		1.07	0.93	1.21
(99)	Samet	2000	Birmingham, Alabama	cardiac	65+	lag 0	31	0.63	0.08	1.19
(99)	Samet	2000	Boulder	cardiac	65+	lag 0	22	2.57	0.07	5.14
(99)	Samet	2000	Canton	cardiac	65+	lag 0	26	0.41	-0.98	1.82
(99)	Samet	2000	Chicago	cardiac	65+	lag 0	33	1.12	0.82	1.41
(99)	Samet	2000	Detroit	cardiac	65+	lag 0	32	1.28	0.94	1.62
(99)	Samet	2000	Minneapolis-St Paul	cardiac	65+	lag 0	24	1.09	0.41	1.76
(99)	Samet	2000	Nashville	cardiac	65+	lag 0	29	-0.23	-1.38	0.93
(99)	Samet	2000	New Haven, Conneticut	cardiac	65+	lag 0	26	2.06	1.26	2.86

Cardiovascular admissions and PM_{10}. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(99)	Samet	2000	Pittsburgh	cardiac	65+	lag 0	31	0.99	0.70	1.29
(99)	Samet	2000	Provo/Orem	cardiac	65+	lag 0	30	0.60	-0.48	1.69
(99)	Samet	2000	Seattle	cardiac	65+	lag 0	27	1.31	0.81	1.81
(99)	Samet	2000	Spokane	cardiac	65+	lag 0	36	0.55	-0.08	1.18
(99)	Samet	2000	Youngstown	cardiac	65+	lag 0	29	1.78	0.55	3.02
(99)	Samet	2000	Colorado Springs	cardiac	65+	lag 1	23	1.34	-0.28	2.98
(100)	Moolgavkar	2000	Cook	cardiac	65+	lag 0	35	0.83	0.59	1.08
(100)	Moolgavkar	2000	Los Angeles	cardiac	65+	lag 0	44	0.64	0.23	1.04
(100)	Moolgavkar	2000	Maricopa	cardiac	65+	lag 2	41	-0.72	-1.55	0.11
(101)	Schwartz	2001	Cook County	cardiac	65+	lag 0-1	36	1.27	0.93	1.61
(102)	Stieb	2000	Saint John	cardiac	all	lag 3	14	5.79	1.93	9.80
(61)	Michelozzi	2000	Rome	cardiac	all	lag 0		0.47	0.00	0.95
(37)	Biggeri	2001	8 Italian Cities	cardiac	all	lag 0-1	49	0.70	0.40	1.00
(37)	Biggeri	2001	Bologna	cardiac	all	lag 0-3	41	1.30	0.10	2.51
(37)	Biggeri	2001	Florence	cardiac	all	lag 0-3	40	2.30	0.90	3.72
(37)	Biggeri	2001	Milan	cardiac	all	lag 0-3	45	1.50	0.90	2.10
(37)	Biggeri	2001	Palermo	cardiac	all	lag 0-3	43	1.10	0.30	1.91
(37)	Biggeri	2001	Ravenna	cardiac	all	lag 0-3	59	0.50	-0.60	1.61
(37)	Biggeri	2001	Rome	cardiac	all	lag 0-3	59	1.20	0.60	1.80
(37)	Biggeri	2001	Turin	cardiac	all	lag 0-3	64	0.20	-0.30	0.70
(103)	Wong	2002	Hong Kong	cardiac	all	lag 0	47	0.50	0.20	0.80
(103)	Wong	2002	London	cardiac	all	lag 0	25	1.10	0.50	1.70
(104)	Le Tertre	2002	8 European cities	cardiac	all	lag 0-1		0.50	0.20	0.80
(104)	Le Tertre	2002	Barcelona	cardiac	all	lag 0-1		0.50	-0.40	1.41
(104)	Le Tertre	2002	Birmingham	cardiac	all	lag 0-1		-0.14	-0.90	0.62
(104)	Le Tertre	2002	London	cardiac	all	lag 0-1		1.04	0.50	1.59
(104)	Le Tertre	2002	Milan	cardiac	all	lag 0-1		0.63	0.26	1.01
(104)	Le Tertre	2002	Paris	cardiac	all	lag 0-1		0.20	-0.34	0.75
(104)	Le Tertre	2002	Rome	cardiac	all	lag 0-1		0.21	-0.46	0.89
(104)	Le Tertre	2002	Stockholm	cardiac	all	lag 0-1		0.79	-1.07	2.67

Cardiovascular admissions and PM_{10}. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 1	25	0.62	-0.36	1.61
(105)	McGowan	2002	Christchurch	cardiac	all	lag 0				
(41)	Wordley	1997	Birmingham, West Midlands	cardiac	all	lag 2	26	-0.70	-1.86	0.46
(106)	Medina	1997	Paris	ami	all	lag 1	25	-2.06	-7.25	3.42
(98)	Linn	2000	Los Angeles	ami	30+	lag 0	45	0.60	0.01	1.20
(107)	Eilstein	2001	Strasbourg	ami	all	lag 0	56	0.47	-1.10	2.06
(102)	Stieb	2000	Saint John	ihd	all	lag 3	14	4.39	-0.70	9.75
(61)	Michelozzi	2000	Rome	ihd	all	lag 0		1.45	0.56	2.35
(104)	Le Tertre	2002	Birmingham	ihd	65+	lag 0-1		0.33	-1.15	1.83
(104)	Le Tertre	2002	London	ihd	65+	lag 0-1		1.04	0.08	2.01
(104)	Le Tertre	2002	Milan	ihd	65+	lag 0-1		0.73	-0.05	1.52
(104)	Le Tertre	2002	Netherlands	ihd	65+	lag 0-1		0.36	0.02	0.71
(104)	Le Tertre	2002	Paris	ihd	65+	lag 0-1		1.70	0.57	2.84
(104)	Le Tertre	2002	Rome	ihd	65+	lag 0-1		1.58	-0.20	3.38
(104)	Le Tertre	2002	Stockholm	ihd	65+	lag 0-1		2.74	0.19	5.36
(104)	Le Tertre	2002	8 European cities	ihd	65+	lag 0-1		0.80	0.30	1.30
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	20	0.86	-0.82	2.56
(108)	Schwartz	1995	Detroit	ihd	65+	lag 0	43	0.56	0.16	0.96
(93)	Wong	1999	Hong Kong	ihd	all	lag 0-1	45	0.70	-0.10	1.51
(109)	Burnett	1999	Toronto	ihd	all	lag 0-1	30	1.62	1.04	2.20
(90)	Atkinson	1999	London	ihd	65+	lag 0	25	0.97	0.15	1.80
(31)	Lippmann	2000	Wayne County	ihd	65+	lag 2	28	1.72	0.10	3.37
(105)	McGowan	2002	Christchurch	ihd	all	lag 0				
(103)	Wong	2002	Hong Kong	ihd	all	lag 2	47	0.50	-0.10	1.10
(103)	Wong	2002	London	ihd	all	lag 3	25	0.30	-0.50	1.11
(105)	McGowan	2002	Christchurch	dysrhythmias	all	lag 0				
(98)	Linn	2000	Los Angeles	dysrhythmias	30+	lag 0	45	0.20	-0.39	0.79
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 4	14	7.93	-0.17	16.68
(108)	Schwartz	1995	Detroit	dysrhythmias	65+	lag 1	43	0.59	-0.13	1.31
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 0	30	1.63	0.57	2.70

Cardiovascular admissions and PM_{10}. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(31)	Lippmann	2000	Wayne County	dysrhythmias	65+	lag 1	28	0.58	-2.24	3.48
(91)	Tolbert	2000	Atlanta	dysrhythmias	all	lag 0-2	28	0.90	-2.25	4.15
(91)	Tolbert	2000	Atlanta	dysrhythmias	all	lag 0-2	28	2.50	-3.00	8.31
(105)	McGowan	2002	Christchurch	heart failure	all	lag 0				
(98)	Linn	2000	Los Angeles	heart failure	30+	lag 0	45	0.40	-0.19	0.99
(102)	Stieb	2000	Saint John	heart failure	all	lag 5	14	-9.06	-15.47	-2.17
(108)	Schwartz	1995	Detroit	heart failure	65+	lag 0-1	43	0.99	0.37	1.61
(93)	Wong	1999	Hong Kong	heart failure	all	lag 0-3	45	4.80	3.20	6.42
(109)	Burnett	1999	Toronto	heart failure	all	lag 0-2	30	1.87	0.82	2.93
(110)	Morris	1998	Chicago	heart failure	65+	lag 0	38	0.77	0.20	1.35
(31)	Lippmann	2000	Wayne County	heart failure	65+	lag 0	28	1.87	0.04	3.73
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	45	0.06	-0.43	0.55
(41)	Wordley	1997	Birmingham, West Midlands	cerebrovascular	all	lag 0	26	2.08	0.03	4.12
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	20	-1.37	-3.32	0.62
(93)	Wong	1999	Hong Kong	cerebrovascular	all	lag 2	45	0.30	-0.50	1.11
(109)	Burnett	1999	Toronto	cerebrovascular	all		30			
(100)	Moolgavkar	2000	Cook	cerebrovascular	65+	lag 0	35	0.64	0.29	0.99
(100)	Moolgavkar	2000	Los Angeles	cerebrovascular	65+	lag 5	44	0.40	-0.20	1.00
(100)	Moolgavkar	2000	Maricopa	cerebrovascular	65+	lag 2	41	1.62	0.40	2.86
(31)	Lippmann	2000	Wayne County	cerebrovascular	65+	lag 1	28	0.94	-1.12	3.05
(104)	Le Tertre	2002	8 European cities	cerebrovascular	65+	lag 0-1		0.00	-0.30	0.30
(109)	Burnett	1999	Toronto	circulatory	all	lag 0	30	0.51	-0.54	1.57

Cardiovascular admissions and $PM_{2.5}$. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(91)	Tolbert	2000	Atlanta	cardiovascular	all	lag 0-2	18	2.40	-1.25	6.18
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	12	-0.28	-1.48	0.93
(102)	Stieb	2000	Saint John	cardiac	all	lag 3	9	5.79	-0.12	12.05
(100)	Moolgavkar	2000	Los Angeles 1	cardiac	20-64	lag 0	22	1.40	0.73	2.08
(100)	Moolgavkar	2000	Los Angeles	cardiac	65+	lag 0	22	1.70	1.00	2.40
(10)	Anderson	2001	West Midlands	cardiac	all	lag 0-1	12	-0.23	-1.59	1.16
(102)	Stieb	2000	Saint John	ihd	all	lag 4	9	-5.82	-13.17	2.15
(31)	Lippmann	2000	Wayne County	ihd	65+	lag 2	15	1.71	-0.56	4.03
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	12	-0.17	-2.57	2.29
(109)	Burnett	1999	Toronto	ihd	all	lag 0-2	18	3.14	2.12	4.18
(91)	Tolbert	2000	Atlanta	dysrhythmias	all	lag 0-2	18	2.40	-5.26	10.68
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 3	9	12.17	-0.08	25.92
(31)	Lippmann	2000	Wayne County	dysrhythmias	65+	lag 1	15	1.28	-2.68	5.40
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 0	18	2.38	0.77	4.02
(102)	Stieb	2000	Saint John	heart failure	all	lag 5	9	-14.36	-23.49	-4.14
(31)	Lippmann	2000	Wayne County	heart failure	65+	lag 1	15	3.53	0.93	6.19
(109)	Burnett	1999	Toronto	heart failure	all	lag 0-2	18	2.58	0.99	4.20
(100)	Moolgavkar	2000	Los Angeles 1	cerebrovascular	20-64	lag 5	22	1.40	0.09	2.72
(100)	Moolgavkar	2000	Los Angeles	cerebrovascular	65+	lag 1	22	1.10	0.16	2.05
(31)	Lippmann	2000	Wayne County	cerebrovascular	65+	lag 0	15	0.72	-2.14	3.66
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	12	-0.91	-3.78	2.06

Cardiovascular admissions and Black Smoke. Percentage change for 10 μg/m^3 increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(10)	Anderson	2001	West Midlands	cardiac	all	lag 0-1	11	1.01	-0.36	2.41
(104)	Le Tertre	2002	4 European cities	cardiac	all	lag 0-1		1.10	0.40	1.80
(104)	Le Tertre	2002	Barcelona	cardiac	all	lag 0-1		0.67	-0.59	1.94
(104)	Le Tertre	2002	Birmingham	cardiac	all	lag 0-1		1.15	-0.39	2.71
(104)	Le Tertre	2002	London	cardiac	all	lag 0-1		2.16	1.19	3.14
(104)	Le Tertre	2002	Paris	cardiac	all	lag 0-1		0.57	0.14	0.99
(111)	Ballester	2001	Valencia	cardiac	all	lag 2	44	1.49	-0.47	3.49
(112)	Poloniecki	1997	London	cardiovascular	all	lag 1	12	1.58	0.19	2.99
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	11	0.60	-0.60	1.81
(90)	Atkinson	1999	London	cardiovascular	all	lag 0	11	1.17	0.40	1.95
(111)	Ballester	2001	Valencia	cardiovascular	all	lag 2	44	1.45	-0.04	2.96
(92)	Prescott	1998	Edinburgh 1	cardiovascular	65+	lag 1-3	9	-0.20	-1.50	1.12
(92)	Prescott	1998	Edinburgh 2	cardiovascular	65+	lag 1-3	9	2.30	-1.90	6.68
(112)	Poloniecki	1997	London	ami	all	lag 1	12	2.01	0.61	3.43
(112)	Poloniecki	1997	London	angina pectoris	all	lag 1	12	2.01	0.20	3.85
(104)	Le Tertre	2002	5 European cities	ihd	65+	lag 0-1		1.10	0.60	1.60
(104)	Le Tertre	2002	Barcelona	ihd	65+	lag 0-1		0.62	-1.71	3.00
(104)	Le Tertre	2002	Birmingham	ihd	65+	lag 0-1		-0.73	-3.61	2.23
(104)	Le Tertre	2002	London	ihd	65+	lag 0-1		2.69	0.97	4.44
(104)	Le Tertre	2002	Paris	ihd	65+	lag 0-1		1.17	0.32	2.03
(104)	Le Tertre	2002	Netherlands	ihd	65+	lag 0-1		1.00	0.50	1.51
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	11	1.19	-1.38	3.84
(90)	Atkinson	1999	London	ihd	65+	lag 3	11	1.80	0.34	3.29
(112)	Poloniecki	1997	London	ihd	all	lag 1	12	-1.66	-3.92	0.65
(112)	Poloniecki	1997	London	dysrhythmias	all	lag 1	12	1.69	-0.28	3.69
(112)	Poloniecki	1997	London	heart failure	all	lag 1	12	0.53	-1.03	2.11
(112)	Poloniecki	1997	London	cerebrovascular	all	lag 1	12	-0.21	-1.53	1.13
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	11	-1.63	-4.62	1.47
(111)	Ballester	2001	Valencia	cerebrovascular	all	lag 5	44	1.56	-1.40	4.61

Cardiovascular admissions and TSP. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(113)	Diaz	2001	Madrid	cardiovascular	all		39	0		

Cardiovascular admissions and NO_2. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(97)	Schwartz	1997	Tucson	cardiac	65+	lag 0	36	0.32	-1.06	1.71
(98)	Linn	2000	Los Angeles	cardiac	30+	lag 0	65	0.73	0.53	0.94
(100)	Moolgavkar	2000	Cook	cardiac	65+	lag 0	48	1.51	1.21	1.80
(100)	Moolgavkar	2000	Los Angeles	cardiac	65+	lag 0	73	1.20	1.05	1.34
(100)	Moolgavkar	2000	Maricopa	cardiac	65+	lag 0	36	1.51	0.78	2.23
(102)	Stieb	2000	Saint John	cardiac	all	lag 2	17	-2.31	-5.26	0.74
(61)	Michelozzi	2000	Rome	cardiac	all	lag 0		1.99	1.39	2.59
(37)	Biggeri	2001	8 Italian Cities	cardiac	all	lag 0-1	70	1.30	0.70	1.90
(37)	Biggeri	2001	Bologna	cardiac	all	lag 0-3	60	2.60	1.10	4.12
(37)	Biggeri	2001	Florence	cardiac	all	lag 0-3	70	2.00	0.60	3.42
(37)	Biggeri	2001	Milan	cardiac	all	lag 0-3	87	2.50	2.00	3.00
(37)	Biggeri	2001	Palermo	cardiac	all	lag 0-3	61	1.20	0.30	2.11
(37)	Biggeri	2001	Ravenna	cardiac	all	lag 0-3	61	0.30	-1.00	1.62
(37)	Biggeri	2001	Rome	cardiac	all	lag 0-3	86	2.50	1.90	3.10
(37)	Biggeri	2001	Turin	cardiac	all	lag 0-3	75	0.70	0.00	1.40
(103)	Wong	2002	Hong Kong	cardiac	all	lag 0	54	1.20	0.70	1.70
(103)	Wong	2002	London	cardiac	all	lag 0	61	0.70	0.40	1.00
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 0	39	0.51	-0.19	1.22
(113)	Diaz	2001	Madrid	cardiovascular	all		65	0.00		
(112)	Poloniecki	1997	London	cardiovascular	all	lag 1	67	0.42	0.09	0.75
(92)	Prescott	1998	Edinburgh 1	cardiovascular	65+	lag 1-3	51	-0.26	-2.75	2.29
(93)	Wong	1999	Hong Kong	cardiovascular	all	lag 0-1	51	1.30	0.70	1.90
(112)	Poloniecki	1997	London	ami	all	lag 1	67	0.47	0.15	0.80
(98)	Linn	2000	Los Angeles	ami	30+	lag 0	65	0.58	0.06	1.09
(112)	Poloniecki	1997	London	angina pectoris	all	lag 1	67	0.37	-0.09	0.82
(93)	Wong	1999	Hong Kong	ihd	all	lag 0-1	51	1.00	-0.10	2.11
(109)	Burnett	1999	Toronto	ihd	all	lag 0-1	48	1.94	1.49	2.40
(102)	Stieb	2000	Saint John	ihd	all	lag 10	39	-2.32	-4.41	-0.20
(61)	Michelozzi	2000	Rome	ihd	all	lag 0		2.49	1.39	3.60
(103)	Wong	2002	Hong Kong	ihd	all	lag 3	54	0.70	0.10	1.30

Cardiovascular admissions and NO_2. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(103)	Wong	2002	London	ihd	all	lag 0	61	0.70	0.20	1.20
(114)	Ponka	1996	Helsinki	ihd	all	lag 7	39	-6.46	-10.80	-1.91
(112)	Poloniecki	1997	London	ihd	all	lag 1	67	-0.05	-0.59	0.49
(112)	Poloniecki	1997	London	dysrhythmias	all	lag 1	67	0.47	0.01	0.94
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 0-2	48	1.08	-0.14	2.32
(98)	Linn	2000	Los Angeles	dysrhythmias	30+	lag 0	65	0.31	-0.20	0.83
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 4	17	4.96	-1.16	11.46
(112)	Poloniecki	1997	London	heart failure	all	lag 1	67	-0.05	-0.41	0.30
(93)	Wong	1999	Hong Kong	heart failure	all	lag 0-3	51	4.40	2.50	6.34
(109)	Burnett	1999	Toronto	heart failure	all	lag 0	48	1.90	1.31	2.49
(115)	Burnett	1997	10 Canadian Cities	heart failure	65+	lag 1	42	1.10	0.47	1.75
(98)	Linn	2000	Los Angeles	heart failure	30+	lag 0	65	0.52	0.01	1.04
(102)	Stieb	2000	Saint John	heart failure	all	lag 7	39	1.79	-0.91	4.57
(112)	Poloniecki	1997	London	cerebrovascular	all	lag 1	67	-0.26	-0.56	0.04
(93)	Wong	1999	Hong Kong	cerebrovascular	all	lag 0-1	51	0.80	-0.20	1.81
(109)	Burnett	1999	Toronto	cerebrovascular	all	lag 0	48	0.41	-0.19	1.01
(114)	Ponka	1996	Helsinki	cerebrovascular	all	lag 6	39	-4.09	-7.00	-1.09
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	65	0.21	-0.20	0.62
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	65	1.05	0.53	1.57
(111)	Ballester	2001	Valencia	cerebrovascular	all	lag 4	67	3.62	0.66	6.67
(100)	Moolgavkar	2000	Cook	cerebrovascular	65+	lag 0	48	0.94	0.55	1.33
(100)	Moolgavkar	2000	Los Angeles	cerebrovascular	65+	lag 0	73	0.57	0.38	0.77
(109)	Burnett	1999	Toronto	circulatory	all	lag 0	48	0.73	-0.07	1.54

Cardiovascular admissions and 1-hour ozone. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(116)	Morgan	1998	Sydney	cardiac	all	lag 0	44	0.21	-0.18	0.61
(117)	Tobias	2001	Madrid	cardiovascular	all		27	2.16	-0.32	4.71
(107)	Eilstein	2001	Strasbourg	ami	all	lag 2	44	3.83	0.51	7.26
(108)	Schwartz	1995	Detroit	ihd	65+	lag 0	72	0.14	-0.14	0.42
(108)	Schwartz	1995	Detroit	heart failure	65+		72	0.30	-0.04	0.65
(110)	Morris	1998	Chicago	heart failure	65+	lag 0	68	0.29	-0.10	0.68
(115)	Burnett	1997	10 Canadian Cities	heart failure	65+	lag 1	58	0.35	-0.11	0.81
(118)	Morris	1995	Los Angeles	heart failure	65+		150	0.24	0.04	0.45
(118)	Morris	1995	Chicago	heart failure	65+		78	0.12	-0.30	0.55
(118)	Morris	1995	Philadelphia	heart failure	65+		90	-0.21	-0.58	0.15
(118)	Morris	1995	New York	heart failure	65+		82	-0.48	-0.87	-0.09
(118)	Morris	1995	Detroit	heart failure	65+		78	-0.44	-1.03	0.16
(118)	Morris	1995	Houston	heart failure	65+		104	-0.04	-0.44	0.36
(118)	Morris	1995	Milwaukee	heart failure	65+		92	0.00	-2.61	2.68

Cardiovascular admissions and 8 hour ozone. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(10)	Anderson	2001	West Midlands	cardiac	all	lag 0-1	48	0.28	-0.26	0.82
(103)	Wong	2002	Hong Kong	cardiac	all	lag 2	28	0.50	0.10	0.90
(103)	Wong	2002	London	cardiac	all	lag 0	32	-0.80	-1.20	-0.40
(111)	Ballester	2001	Valencia	cardiac	all	lag 5	46	-2.14	-4.65	0.44
(119)	Petroeschevsky	2001	Brisbane	cardiovascular	all	lag 3	38	-0.65	-1.46	0.16
(112)	Poloniecki	1997	London	cardiovascular	all	lag 1	26	-0.55	-1.15	0.05
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	48	0.02	-0.48	0.51
(90)	Atkinson	1999	London	cardiovascular	all	lag 2	32	0.45	0.04	0.87
(111)	Ballester	2001	Valencia	cardiovascular	all	lag 2	46	-0.95	-2.90	1.04
(91)	Tolbert	2000	Atlanta	cardiovascular	all	lag 0-2	102	-0.12	-0.64	0.40
(91)	Tolbert	2000	Atlanta	cardiovascular	all	lag 0-2	81	-0.59	-1.88	0.73
(93)	Wong	1999	Hong Kong	cardiovascular	all	lag 0-5	24	1.30	0.50	2.11
(112)	Poloniecki	1997	London	ami	all	lag 1	26	-0.35	-0.95	0.25
(112)	Poloniecki	1997	London	angina pectoris	all	lag 1	26	-0.30	-1.09	0.49
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	48	0.14	-0.84	1.13
(93)	Wong	1999	Hong Kong	ihd	all	lag 5	24	0.50	-0.30	1.31
(90)	Atkinson	1999	London	ihd	65+	lag 3	32	-0.44	-1.05	0.18
(103)	Wong	2002	Hong Kong	ihd	all	lag 3	28	0.50	0.00	1.00
(103)	Wong	2002	London	ihd	all	lag 0	32	-0.90	-1.40	-0.40
(112)	Poloniecki	1997	London	ihd	all	lag 1	26	-0.55	-1.50	0.41
(112)	Poloniecki	1997	London	dysrhythmias	all	lag 1	26	0.30	-0.60	1.22
(91)	Tolbert	2000	Atlanta	dysrhythmias	all	lag 0-2	102	-0.04	-1.08	1.01
(91)	Tolbert	2000	Atlanta	dysrhythmias	all	lag 0-2	81	-1.70	-4.41	1.09
(112)	Poloniecki	1997	London	heart failure	all	lag 1	26	-0.12	-0.80	0.57
(93)	Wong	1999	Hong Kong	heart failure	all	lag 0-5	24	3.80	1.80	5.84
(112)	Poloniecki	1997	London	cerebrovascular	all	lag 1	26	-0.30	-0.90	0.30
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	48	-0.09	-1.15	0.99
(93)	Wong	1999	Hong Kong	cerebrovascular	all	lag 0	24	-0.80	-1.70	0.11
(111)	Ballester	2001	Valencia	cerebrovascular	all	lag 2	46	-2.40	-5.36	0.65

Cardiovascular admissions and 24-hour ozone. Percentage change for 10 µg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(97)	Schwartz	1997	Tucson	cardiac	65+	lag 0	54	0.20	-0.86	1.27
(98)	Linn	2000	Los Angeles	cardiac	30+	lag 0	48	-0.35	-0.64	-0.06
(102)	Stieb	2000	Saint John	cardiac	all	lag 6	63	2.48	0.52	4.47
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 0	52	0.06	-0.32	0.43
(113)	Diaz	2001	Madrid	cardiovascular	all	lag 6	26	9.18		
(120)	Wong	1999	Hong Kong	cardiovascular	65+	lag 0-5		0.59	0.00	1.19
(92)	Prescott	1998	Edinburgh 1	cardiovascular	65+	lag 1-3	29	-2.99	-5.87	-0.03
(62)	Diaz	1999	Madrid	cardiovascular	all	lag 6		9.29		
(98)	Linn	2000	Los Angeles	ami	30+	lag 0	48	-0.35	-1.03	0.34
(107)	Eilstein	2001	Strasbourg	ami	all	lag 1	21	7.86	0.27	16.02
(120)	Wong	1999	Hong Kong	ihd	65+	lag 0-5		0.20	-1.44	1.87
(109)	Burnett	1999	Toronto	ihd	all	lag 2	39	0.16	-0.15	0.47
(114)	Ponka	1996	Helsinki	ihd	all	lag 1	22	4.59	1.60	7.67
(114)	Ponka	1996	Helsinki	ihd	all	lag 1	22	-6.49	-9.66	-3.21
(102)	Stieb	2000	Saint John	ihd	all	lag 6-10	46	1.11	0.05	2.18
(120)	Wong	1999	Hong Kong	dysrhythmias	65+	lag 0-5		1.36	-0.20	2.95
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 2-4	39	0.89	-0.13	1.92
(98)	Linn	2000	Los Angeles	dysrhythmias	30+	lag 0	48	-0.05	-0.73	0.64
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 2	63	2.96	-1.07	7.17
(120)	Wong	1999	Hong Kong	heart failure	65+	lag 0-5		2.66	0.98	4.36
(109)	Burnett	1999	Toronto	heart failure	all	lag 2	39	0.36	-0.14	0.86
(115)	Burnett	1997	10 Canadian Cities	heart failure	65+	lag 2	30	1.11	-0.10	2.32
(98)	Linn	2000	Los Angeles	heart failure	30+	lag 0	48	-0.05	-0.73	0.64
(102)	Stieb	2000	Saint John	heart failure	all	lag 4	63	-4.26	-7.67	-0.72
(120)	Wong	1999	Hong Kong	cerebrovascular	65+	lag 0-5		-0.20	-1.23	0.84
(109)	Burnett	1999	Toronto	cerebrovascular	all		39			
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	48	0.15	-0.34	0.64
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	48	0.35	-0.34	1.04
(109)	Burnett	1999	Toronto	circulatory	all	lag 2	39	0.05	-0.63	0.73

Cardiovascular admissions and SO_2. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(10)	Anderson	2001	West Midlands	cardiac	all	lag 0-1	16	0.30	-0.57	1.18
(97)	Schwartz	1997	Tucson	cardiac	65+	lag 0	9	0.13	-1.23	1.52
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 0	33	0.09	-0.57	0.76
(111)	Ballester	2001	Valencia	cardiac	all	lag 2	26	3.57	0.12	7.14
(100)	Moolgavkar	2000	Cook	cardiac	65+	lag 0	16	1.46	0.99	1.94
(100)	Moolgavkar	2000	Los Angeles	cardiac	65+	lag 0	5	5.10	4.43	5.78
(100)	Moolgavkar	2000	Maricopa	cardiac	65+	lag 0	5	2.68	1.50	3.86
(102)	Stieb	2000	Saint John	cardiac	all	lag 8	64	0.75	0.27	1.22
(61)	Michelozzi	2000	Rome	cardiac	all	lag 0		6.26	4.16	8.41
(37)	Biggeri	2001	8 Italian Cities	cardiac	all	lag 0-1	13	2.00	0.50	3.52
(103)	Wong	2002	Hong Kong	cardiac	all	lag 0	15	1.60	1.00	2.20
(103)	Wong	2002	London	cardiac	all	lag 0	21	1.40	0.90	1.90
(119)	Petroeschevsky	2001	Brisbane	cardiovascular	all	lag 0	11	1.03	-0.48	2.56
(112)	Poloniecki	1997	London	cardiovascular	all	lag 1	16	0.48	0.12	0.84
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	16	-0.17	-0.96	0.62
(92)	Prescott	1998	Edinburgh 1	cardiovascular	65+	lag 1-3	22	-0.22	-0.93	0.49
(92)	Prescott	1998	Edinburgh 2	cardiovascular	65+	lag 1-3	22	1.78	-0.37	3.99
(93)	Wong	1999	Hong Kong	cardiovascular	all	lag 0-1	17	1.60	0.60	2.61
(90)	Atkinson	1999	London	cardiovascular	all	lag 0	20	0.87	0.12	1.62
(111)	Ballester	2001	Valencia	cardiovascular	all	lag 2	26	3.02	0.42	5.69
(112)	Poloniecki	1997	London	ami	all	lag 1	16	0.63	0.26	1.00
(107)	Eilstein	2001	Strasbourg	ami	all	lag 0	62	0.73	-0.36	1.84
(112)	Poloniecki	1997	London	angina pectoris	all	lag 1	16	0.26	-0.18	0.70
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	16	0.65	-1.10	2.43
(93)	Wong	1999	Hong Kong	ihd	all	lag 1	17	1.00	-0.50	2.52
(109)	Burnett	1999	Toronto	ihd	all	lag 0-2	14	1.60	1.08	2.11
(90)	Atkinson	1999	London	ihd	65+	lag 0	20	1.71	0.34	3.10
(102)	Stieb	2000	Saint John	ihd	all	lag 8	64	0.89	0.23	1.56
(61)	Michelozzi	2000	Rome	ihd	all	lag 0		11.34	7.24	15.59
(103)	Wong	2002	Hong Kong	ihd	all	lag 2	15	0.40	-0.50	1.31

Cardiovascular admissions and SO_2. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(103)	Wong	2002	London	ihd	all	lag 0	21	1.40	0.70	2.10
(112)	Poloniecki	1997	London	ihd	all	lag 1	16	-0.11	-0.69	0.47
(112)	Poloniecki	1997	London	dysrhythmias	all	lag 1	16	0.35	0.00	0.70
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 0	14	0.55	-0.20	1.31
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 7	64	-1.01	-2.14	0.12
(112)	Poloniecki	1997	London	heart failure	all	lag 1	16	0.11	-0.30	0.52
(93)	Wong	1999	Hong Kong	heart failure	all	lag 0	17	3.60	1.30	5.95
(109)	Burnett	1999	Toronto	heart failure	all	lag 0-1	14	1.33	0.65	2.01
(115)	Burnett	1997	10 Canadian Cities	heart failure	65+	lag 1	8	1.49	0.16	2.84
(115)	Burnett	1997	10 Canadian Cities	heart failure	65+	lag 0	8	1.49	0.27	2.72
(102)	Stieb	2000	Saint John	heart failure	all	lag 1	64	-0.81	-1.78	0.17
(112)	Poloniecki	1997	London	cerebrovascular	all	lag 1	16	0.04	-0.32	0.39
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	16	-2.25	-4.30	-0.16
(93)	Wong	1999	Hong Kong	cerebrovascular	all	lag 3	17	-1.00	-2.20	0.21
(109)	Burnett	1999	Toronto	cerebrovascular	all	lag 0	14	0.03	-0.46	0.52
(111)	Ballester	2001	Valencia	cerebrovascular	all	lag 5	26	3.78	-1.56	9.41
(100)	Moolgavkar	2000	Cook	cerebrovascular	65+	lag 0	16	1.14	0.46	1.82
(100)	Moolgavkar	2000	Los Angeles	cerebrovascular	65+	lag 0	5	2.36	1.41	3.31
(109)	Burnett	1999	Toronto	circulatory	all	lag 0	14	0.01	-0.44	0.46

Cardiovascular admissions and CO. Percentage change for 1 mg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(97)	Schwartz	1997	Tucson	cardiac	65+	lag 0	3.8	1.33	0.25	2.44
(98)	Linn	2000	Los Angeles	cardiac	30+	lag 0	1.9	2.59	2.11	3.08
(100)	Moolgavkar	2000	Cook	cardiac	65+	lag 0	1.2	3.58	2.72	4.46
(100)	Moolgavkar	2000	Los Angeles	cardiac	65+	lag 0	1.7	3.74	3.39	4.09
(100)	Moolgavkar	2000	Maricopa	cardiac	65+	lag 0	1.6	2.39	1.53	3.26
(102)	Stieb	2000	Saint John	cardiac	all	lag 3	2.0	-2.17	-4.54	0.25
(61)	Michelozzi	2000	Rome	cardiac	all	lag 0		3.67	2.76	4.59
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 1	0.9	1.10	-1.55	3.81
(112)	Poloniecki	1997	London	cardiovascular	all	lag 1	1.1	1.86	0.67	3.08
(90)	Atkinson	1999	London	cardiovascular	all	lag 0	0.9	1.27	0.20	2.35
(92)	Prescott	1998	Edinburgh 1	cardiovascular	65+	lag 1-3	0.8	9.15	-0.80	20.09
(112)	Poloniecki	1997	London	ami	all	lag 1	1.1	1.83	0.64	3.03
(98)	Linn	2000	Los Angeles	ami	30+	lag 0	1.9	3.25	1.80	4.72
(107)	Eilstein	2001	Strasbourg	ami	all	lag 0	1.8	4.64	-1.36	11.01
(112)	Poloniecki	1997	London	angina pectoris	all	lag 1	1.1	0.93	-0.64	2.53
(109)	Burnett	1999	Toronto	ihd	all	lag 0-1	1.5	4.90	3.39	6.43
(90)	Atkinson	1999	London	ihd	65+	lag 3	0.9	2.27	0.19	4.39
(102)	Stieb	2000	Saint John	ihd	all	lag 3	19.6	-0.39	-0.74	-0.04
(61)	Michelozzi	2000	Rome	ihd	all	lag 0		4.43	2.68	6.21
(112)	Poloniecki	1997	London	ihd	all	lag 1	1.1	-0.87	-2.77	1.07
(112)	Poloniecki	1997	London	dysrhythmias	all	lag 1	1.1	0.13	-0.02	0.29
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 0-1	1.5	6.01	2.69	9.43
(98)	Linn	2000	Los Angeles	dysrhythmias	30+	lag 0	1.9	1.86	0.43	3.30
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 9	19.6	0.62	0.15	1.09
(112)	Poloniecki	1997	London	heart failure	all	lag 1	1.1	0.56	-0.77	1.90
(109)	Burnett	1999	Toronto	heart failure	all	lag 0	1.5	5.57	3.63	7.56
(98)	Linn	2000	Los Angeles	heart failure	30+	lag 0	1.9	2.02	0.59	3.47
(102)	Stieb	2000	Saint John	heart failure	all	lag 0	19.6	0.31	-0.11	0.74
(112)	Poloniecki	1997	London	cerebrovascular	all	lag 1	1.1	-0.53	-1.77	0.72
(109)	Burnett	1999	Toronto	cerebrovascular	all	lag 2-3	1.5	1.04	-1.34	3.48

Cardiovascular admissions and CO. Percentage change for 1 mg/m^3 increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	1.9	0.72	-0.38	1.83
(100)	Moolgavkar	2000	Cook	cerebrovascular	65+	lag 4	1.2	1.04	-0.16	2.25
(100)	Moolgavkar	2000	Los Angeles	cerebrovascular	65+	lag 0	1.7	1.76	1.28	2.24
(109)	Burnett	1999	Toronto	circulatory	all	lag 0	1.5	1.93	-0.69	4.62

Comparison of effects of PM_{10} within studies. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	20	0.86	-0.82	2.56
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	20	-1.37	-3.32	0.62
(108)	Schwartz	1995	Detroit	ihd	65+	lag 0	43	0.56	0.16	0.96
(108)	Schwartz	1995	Detroit	dysrhythmias	65+	lag 1	43	0.59	-0.13	1.31
(108)	Schwartz	1995	Detroit	heart failure	65+	lag 0-1	43	0.99	0.37	1.61
(93)	Wong	1999	Hong Kong	ihd	all	lag 0-1	45	0.70	-0.10	1.51
(93)	Wong	1999	Hong Kong	heart failure	all	lag 0-3	45	4.80	3.20	6.42
(93)	Wong	1999	Hong Kong	cerebrovascular	all	lag 2	45	0.30	-0.50	1.11
(109)	Burnett	1999	Toronto	ihd	all	lag 0-1	30	1.62	1.04	2.20
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 0	30	1.63	0.57	2.70
(109)	Burnett	1999	Toronto	heart failure	all	lag 0-2	30	1.87	0.82	2.93
(109)	Burnett	1999	Toronto	circulatory	all	lag 0	30	0.51	-0.54	1.57
(98)	Linn	2000	Los Angeles	ami	30+	lag 0	45	0.60	0.01	1.20
(98)	Linn	2000	Los Angeles	dysrhythmias	30+	lag 0	45	0.20	-0.39	0.79
(98)	Linn	2000	Los Angeles	heart failure	30+	lag 0	45	0.40	-0.19	0.99
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	45	0.06	-0.43	0.55
(31)	Lippmann	2000	Wayne County	ihd	65+	lag 2	28	1.72	0.10	3.37
(31)	Lippmann	2000	Wayne County	dysrhythmias	65+	lag 1	28	0.58	-2.24	3.48
(31)	Lippmann	2000	Wayne County	heart failure	65+	lag 0	28	1.87	0.04	3.73
(31)	Lippmann	2000	Wayne County	cerebrovascular	65+	lag 1	28	0.94	-1.12	3.05
(102)	Stieb	2000	Saint John	ihd	all	lag 3	14	4.39	-0.70	9.75
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 4	14	7.93	-0.17	16.68
(102)	Stieb	2000	Saint John	heart failure	all	lag 5	14	-9.06	-15.47	-2.17
(104)	Le Tertre	2002	8 european cities	cardiac	65+	lag 0-1		0.70	0.40	1.00
(104)	Le Tertre	2002	8 european cities	ihd	65+	lag 0-1		0.80	0.30	1.30
(104)	Le Tertre	2002	8 european cities	stroke	65+	lag 0-1		0.00	-0.30	0.30
(104)	Le Tertre	2002	Birmingham	cardiac	all	lag 0-1		-0.14	-0.90	0.62
(104)	Le Tertre	2002	Birmingham	ihd	65+	lag 0-1		0.33	-1.15	1.83
(104)	Le Tertre	2002	London	cardiac	all	lag 0-1		1.04	0.50	1.59
(104)	Le Tertre	2002	London	ihd	65+	lag 0-1		1.04	0.08	2.01

Comparison of effects of PM_{10} within studies. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(104)	Le Tertre	2002	Milan	cardiac	all	lag 0-1		0.63	0.26	1.01
(104)	Le Tertre	2002	Milan	ihd	65+	lag 0-1		0.73	-0.05	1.52
(104)	Le Tertre	2002	Paris	cardiac	all	lag 0-1		0.20	-0.34	0.75
(104)	Le Tertre	2002	Paris	ihd	65+	lag 0-1		1.70	0.57	2.84
(104)	Le Tertre	2002	Rome	cardiac	all	lag 0-1		0.21	-0.46	0.89
(104)	Le Tertre	2002	Rome	ihd	65+	lag 0-1		1.58	-0.20	3.38
(104)	Le Tertre	2002	Stockholm	cardiac	all	lag 0-1		0.79	-1.07	2.67
(104)	Le Tertre	2002	Stockholm	ihd	65+	lag 0-1		2.74	0.19	5.36

Comparison of effects of Black Smoke within studies. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(112)	Poloniecki	1997	London	ami	all	lag 1	12	2.01	0.61	3.43
(112)	Poloniecki	1997	London	angina pectoris	all	lag 1	12	2.01	0.20	3.85
(112)	Poloniecki	1997	London	ihd	all	lag 1	12	-1.66	-3.92	0.65
(112)	Poloniecki	1997	London	dysrhythmias	all	lag 1	12	1.69	-0.28	3.69
(112)	Poloniecki	1997	London	heart failure	all	lag 1	12	0.53	-1.03	2.11
(112)	Poloniecki	1997	London	cerebrovascular	all	lag 1	12	-0.21	-1.53	1.13
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	17	1.19	-1.38	3.84
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	17	-1.63	-4.62	1.47
(104)	Le Tertre	2002	8 European cities	cardiac	65+	lag 0-1		1.30	0.40	2.21
(104)	Le Tertre	2002	8 European cities	ihd	65+	lag 0-1		1.10	0.60	1.60
(104)	Le Tertre	2002	8 European cities	cerebrovascular	65+	lag 0-1		0.00	-0.70	0.70
(104)	Le Tertre	2002	Barcelona	cardiac	65+	lag 0-1		1.30	-0.17	2.78
(104)	Le Tertre	2002	Barcelona	ihd	65+	lag 0-1		0.61	-1.73	2.96
(104)	Le Tertre	2002	Barcelona	cerebrovascular	65+	lag 0-1		-1.75	-4.27	0.79
(104)	Le Tertre	2002	Birmingham	cardiac	65+	lag 0-1		1.68	-0.17	3.54
(104)	Le Tertre	2002	Birmingham	ihd	65+	lag 0-1		-0.73	-3.67	2.21
(104)	Le Tertre	2002	Birmingham	cerebrovascular	65+	lag 0-1		2.09	-1.04	5.22
(104)	Le Tertre	2002	London	cardiac	65+	lag 0-1		2.27	1.15	3.40
(104)	Le Tertre	2002	London	ihd	65+	lag 0-1		2.66	0.97	4.35
(104)	Le Tertre	2002	London	cerebrovascular	65+	lag 0-1		-0.74	-2.61	1.13
(104)	Le Tertre	2002	Netherlands	ihd	65+	lag 0-1		1.00	0.50	1.50
(104)	Le Tertre	2002	Netherlands	cerebrovascular	65+	lag 0-1		-0.24	-0.86	0.37
(104)	Le Tertre	2002	Paris	cardiac	65+	lag 0-1		0.42	-0.11	0.94
(104)	Le Tertre	2002	Paris	ihd	65+	lag 0-1		1.17	0.32	2.01
(104)	Le Tertre	2002	Paris	cerebrovascular	65+	lag 0-1		0.56	-0.37	1.49

Comparison of effects of NO_2 within studies. Percentage change for 10 $\mu g/m^3$ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(112)	Poloniecki	1997	London	ami	all	lag 1	67	0.47	0.15	0.80
(112)	Poloniecki	1997	London	angina pectoris	all	lag 1	67	0.37	-0.09	0.82
(112)	Poloniecki	1997	London	ihd	all	lag 1	67	-0.05	-0.59	0.49
(112)	Poloniecki	1997	London	dysrhythmias	all	lag 1	67	0.47	0.01	0.94
(112)	Poloniecki	1997	London	heart failure	all	lag 1	67	-0.05	-0.41	0.30
(112)	Poloniecki	1997	London	cerebrovascular	all	lag 1	67	-0.26	-0.56	0.04
(10)	Anderson	2001	West Midlands	ihd	65+	lag 0-1	26	0.47	-0.29	1.23
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	26	-0.16	-1.05	0.72
(93)	Wong	1999	Hong Kong	ihd	all	lag 0-1	51	1.00	-0.10	2.11
(93)	Wong	1999	Hong Kong	heart failure	all	lag 0-3	51	4.40	2.50	6.34
(93)	Wong	1999	Hong Kong	cerebrovascular	all	lag 0-1	51	0.80	-0.20	1.81
(109)	Burnett	1999	Toronto	ilhd	all	lag 0-1	48	1.94	1.49	2.40
(109)	Burnett	1999	Toronto	dysrhythmias	all	lag 0-2	48	1.08	-0.14	2.32
(109)	Burnett	1999	Toronto	heart failure	all	lag 0	48	1.90	1.31	2.49
(109)	Burnett	1999	Toronto	cerebrovascular	all	lag 0	48	0.41	-0.19	1.01
(109)	Burnett	1999	Toronto	circulatory	all	lag 0	48	0.73	-0.07	1.54
(98)	Linn	2000	Los Angeles	ami	30+	lag 0	65	0.58	0.06	1.09
(98)	Linn	2000	Los Angeles	dysrhythmias	30+	lag 0	65	0.31	-0.20	0.83
(98)	Linn	2000	Los Angeles	heart failure	30+	lag 0	65	0.52	0.01	1.04
(98)	Linn	2000	Los Angeles	cerebrovascular	30+	lag 0	65	0.21	-0.20	0.62
(102)	Stieb	2000	Saint John	Ihd	all	lag 10	17	-2.32	-4.41	-0.20
(102)	Stieb	2000	Saint John	dysrhythmias	all	lag 4	17	4.96	-1.16	11.46
(102)	Stieb	2000	Saint John	heart failure	all	lag 7	17	1.79	-0.91	4.57

Cardiovascular admissions and sulphate. Percentage change for 10 μg/m³ increase

Citation	First author	Year of publication	City	Diagnosis	Ages	Lag (days)	Mean/ median pollutant*	Percentage change	95% Lower confidence limit	95% Upper confidence limit
(10)	Anderson	2001	West Midlands	cardiovascular	all	lag 0-1	2.7	0.52	-2.57	3.71
(91)	Tolbert	2000	Atlanta	cardiovascular	all	lag 0-2	4.7	-0.80	-6.76	5.55
(10)	Anderson	2001	West Midlands	cardiac	all	lag 0-1	2.7	1.56	-2.06	5.31
(4)	Gwynn	2000	Buffalo	cardiac	all	lag 1	642.7	0.01	-0.01	0.03
(10)	Anderson	2001	West Midlands	ischaemic heart disease	65+	lag 0-1	2.7	3.65	-3.08	10.85
(31)	Lippmann	2000	Wayne County	ischaemic heart disease	65+	lag 2	343.8	0.01	-0.02	0.05
(31)	Lippmann	2000	Wayne County	dysrhythmias	65+	lag 1	343.8	0.02	-0.05	0.08
(91)	Tolbert	2000	Atlanta	dysrhythmias	all	lag 0-2	4.7	-2.19	-14.17	11.46
(31)	Lippmann	2000	Wayne County	heart failure	65+	lag 0	343.8	0.05	0.01	0.09
(31)	Lippmann	2000	Wayne County	cerebrovascular	65+	lag 1	343.8	0.01	-0.04	0.06
(10)	Anderson	2001	West Midlands	cerebrovascular	65+	lag 0-1	2.7	3.47	-4.27	11.84

* In μg/m³ (West Midlands study) or nmoles/m³ (US studies)

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Appendix 4
Two pollutant estimates for PM_{10} and other pollutants

The APED database was searched for studies reporting two pollutant models in which PM_{10} or NO_2 were analysed with other pollutants in the model. The aim was to see how robust each of these pollutants was to the inclusion of other pollutants. The concept is that those pollutants that are most robust in two (or multipollutant models) have a more convincing case for being closer to the causal pathway. Caution must be exercised in the interpretation of such analyses however, because the estimates obtained tend to be less precise. This means that confidence intervals may widen even when the estimate is relatively unchanged.

Table 1 Cardiac mortality studies where PM_{10} is adjusted by SO_2

	%change for a 10 unit* change and 95% CI		
	estimate	**lcl**	**ucl**
PM_{10} SINGLE ESTIMATES			
Lippmann et al 2000 [Wayne County, USA]	1.9	0.1	3.7
Bremner et al 1999 [London, UK]	0.3	-0.5	1.1
Hoek et al 2000 [Netherlands]	-0.4	-0.8	0.1
Ballester et al 2002 [3 Spanish cities]	2.4	0.1	4.8
random effects (PM_{10} single)	0.7	0.1	1.2
PM_{10} CONTROLLING FOR SO_2			
Lippmann et al 2000 [Wayne County, USA]	1.3	-0.3	3.0
Bremner et al 1999 [London, UK]	0.6	-0.1	1.2
Hoek et al 2000 [Netherlands]	0.2	-0.2	0.5
Ballester et al 2002 [3 Spanish cities]	1.2	0.5	1.9
random effects (PM_{10} controlling for SO_2)	0.6	-0.4	1.7

* $\mu g/m^3$

Figure 1 Cardiac mortality studies where PM_{10} is adjusted by SO_2

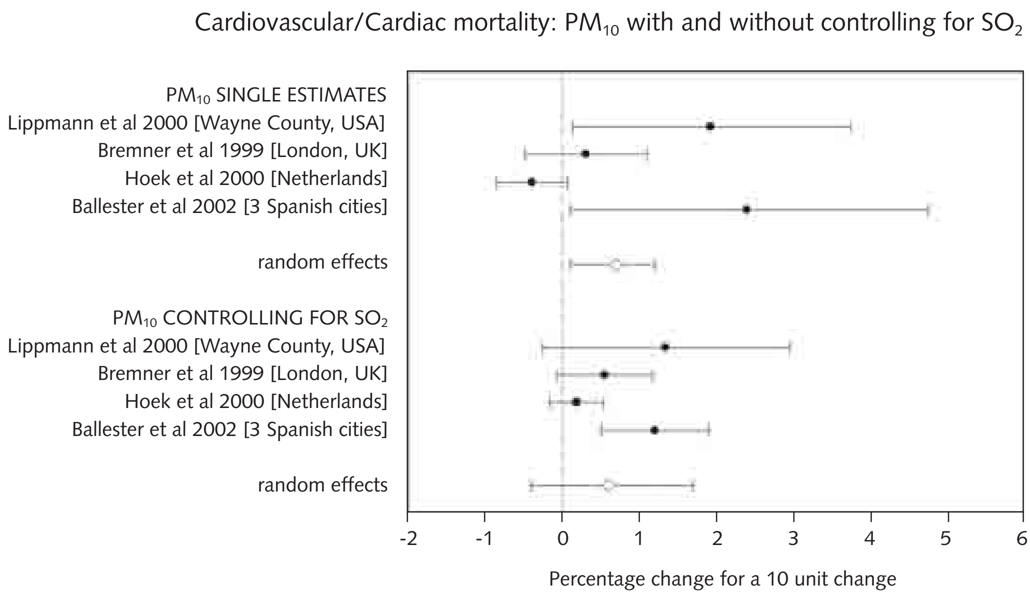


Table 2 Cardiac mortality studies where PM_{10} is adjusted by NO_2

	% change for a 10 unit* change and 95% CI		
	estimate	lcl	ucl
PM_{10} SINGLE ESTIMATES			
Zeghnoun et al 2001 [Le Havre, France]	2.5	0.0	5.1
Wong et al 2001 [Hong Kong]	0.4	-0.2	0.9
Lipfert et al 2000 [Philadelphia, USA]	1.3	-0.3	3.0
Bremner et al 1999 [London, UK]	0.6	-0.1	1.2
Hoek et al 2000 [Netherlands]	0.2	-0.2	0.5
Moolgavkar 2000 [Maricopa, USA]	0.6	-0.7	1.8
random effects (PM_{10} single)	0.4	0.1	0.7
PM_{10} CONTROLLING FOR NO_2			
Zeghnoun et al 2001 [Le Havre, France]	2.2	-0.9	5.3
Wong et al 2001 [Hong Kong]	-0.4	-1.5	0.8
Lipfert et al 2000 [Philadelphia, USA]	1.1	-0.8	3.0
Bremner et al 1999 [London, UK]	-0.1	-0.9	0.7
Hoek et al 2000 [Netherlands]	-0.3	-0.8	0.2
Moolgavkar 2000 [Maricopa, USA]	0.1	-1.6	1.8
random effects (PM_{10} controlling for NO_2)	-0.2	-0.5	0.2

* μg/m³

Figure 2 Cardiac mortality studies where PM_{10} is adjusted by NO_2

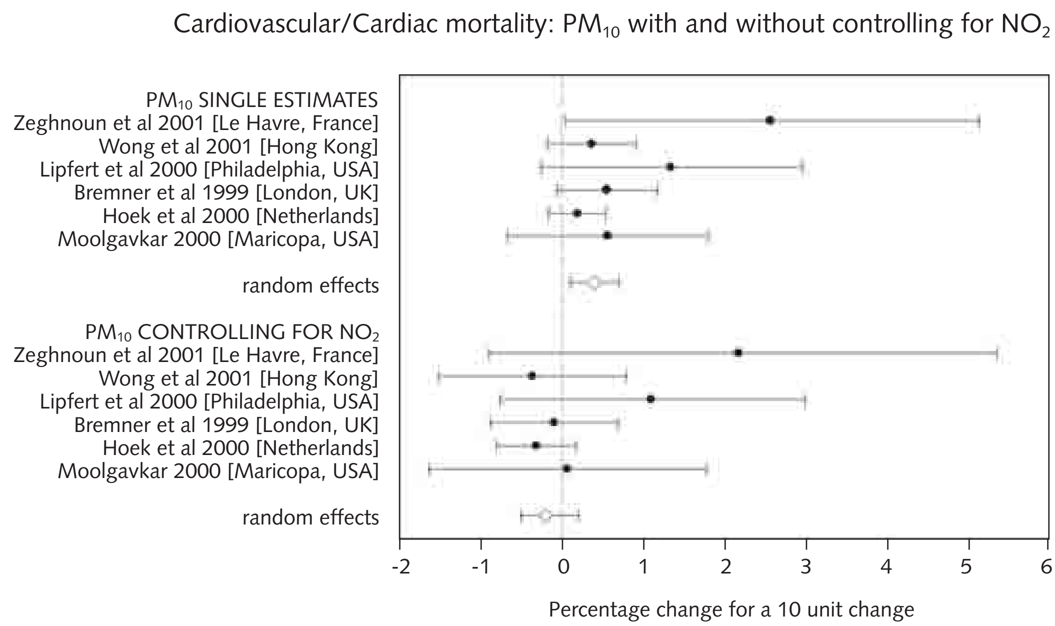


Table 3 Cardiac mortality studies where PM_{10} is adjusted by O_3

	%change for a 10 unit* change and 95% CI		
	estimate	lcl	ucl
PM_{10} SINGLE ESTIMATES			
Lippmann et al 2000 [Wayne County, USA]	1.4	-0.5	3.3
Castillejos et al 2000 [Mexico City]	1.3	-0.7	3.3
Sanhueza et al 1999 [Santiago, Chile]	0.2	0.0	0.4
Bremner et al 1999 [London, UK]	0.5	-0.1	1.1
Lipfert et al 2000 [Philadelphia, USA]	0.3	0.3	0.3
Hoek et al 2000 [Netherlands]	0.2	-0.1	0.6
random effects (PM_{10} single)	0.4	0.1	0.7
PM_{10} CONTROLLING FOR O_3			
Lippmann et al 2000 [Wayne County, USA]	1.3	-0.3	3.0
Castillejos et al 2000 [Mexico City]	2.0	0.4	3.6
Sanhueza et al 1999 [Santiago, Chile]	0.2	0.0	0.4
Bremner et al 1999 [London, UK]	0.6	-0.1	1.2
Lipfert et al 2000 [Philadelphia, USA]	0.8	0.8	0.8
Hoek et al 2000 [Netherlands]	0.2	-0.2	0.5
random effects (PM_{10} controlling for O_3)	0.3	0.1	0.4

* $\mu g/m^3$

Figure 3 Cardiac mortality studies where PM_{10} is adjusted by O_3

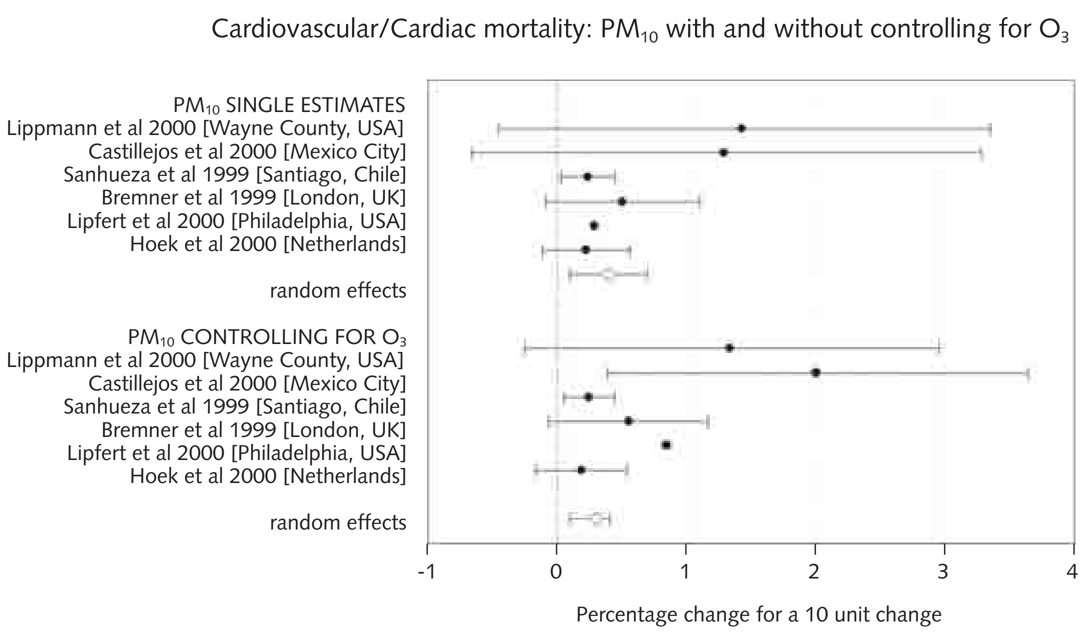
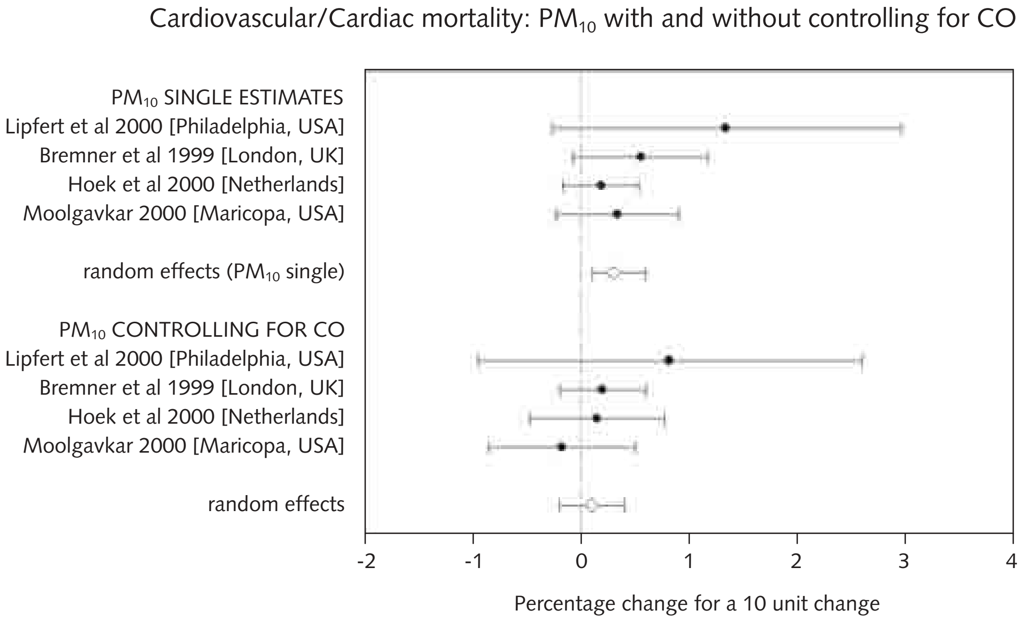


Table 4 Cardiac mortality studies where PM_{10} is adjusted by CO

	%change for a 10 unit* change and 95% CI		
	estimate	lcl	ucl
PM_{10} SINGLE ESTIMATES			
Lipfert et al 2000 [Philadelphia, USA]	1.3	-0.3	3.0
Bremner et al 1999 [London, UK]	0.6	-0.1	1.2
Hoek et al 2000 [Netherlands]	0.2	-0.2	0.5
Moolgavkar 2000 [Maricopa, USA]	0.3	-0.2	0.9
random effects (PM_{10} single)	0.3	0.1	0.6
PM_{10} CONTROLLING FOR CO (PM_{10} controlling for CO)			
Lipfert et al 2000 [Philadelphia, USA]	0.8	-0.9	2.6
Bremner et al 1999 [London, UK]	0.2	-0.2	0.6
Hoek et al 2000 [Netherlands]	0.1	-0.5	0.8
Moolgavkar 2000 [Maricopa, USA]	-0.2	-0.8	0.5
random effects (PM_{10} controlling for CO)	0.1	-0.2	0.4

* $\mu g/m^3$

Figure 4 Cardiac mortality studies where PM_{10} is adjusted by CO



Cardiovascular/Cardiac mortality, cardiac admissions and NO_2

A systematic review of studies giving single NO_2 estimates and also controlling, in two pollutant models, for a measure of particulate matter.

Contents

Table 1 Hospital admissions studies where NO_2 is adjusted by PM_{10} (insufficient estimates for a meta-analysis)

	%change for a 10 unit* change and 95% CI		
	estimate	lcl	ucl
NO_2 SINGLE ESTIMATES			
Wong et al 2002 [London]	0.7	0.3	1.1
Wong et al 2002 [Hong Kong]	1.4	0.9	1.9
Moolgavkar 2000 [Cook County, USA]	1.5	1.2	1.8
NO_2 CONTROLLING FOR PM_{10}			
Wong et al 2002 [London]	0.6	0.0	1.2
Wong et al 2002 [Hong Kong]	1.7	0.9	2.5
Moolgavkar 2000 [Cook County, USA]	1.2	0.8	1.5

* μg/m³

Figure 1 Forest plot for PM_{10}/NO_2 hospital admissions studies

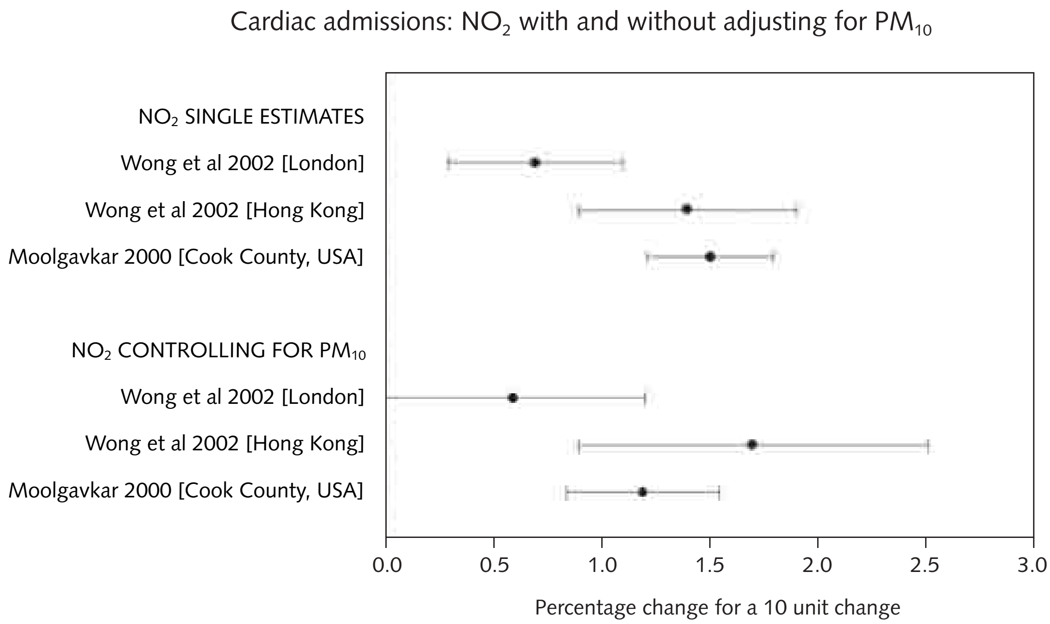
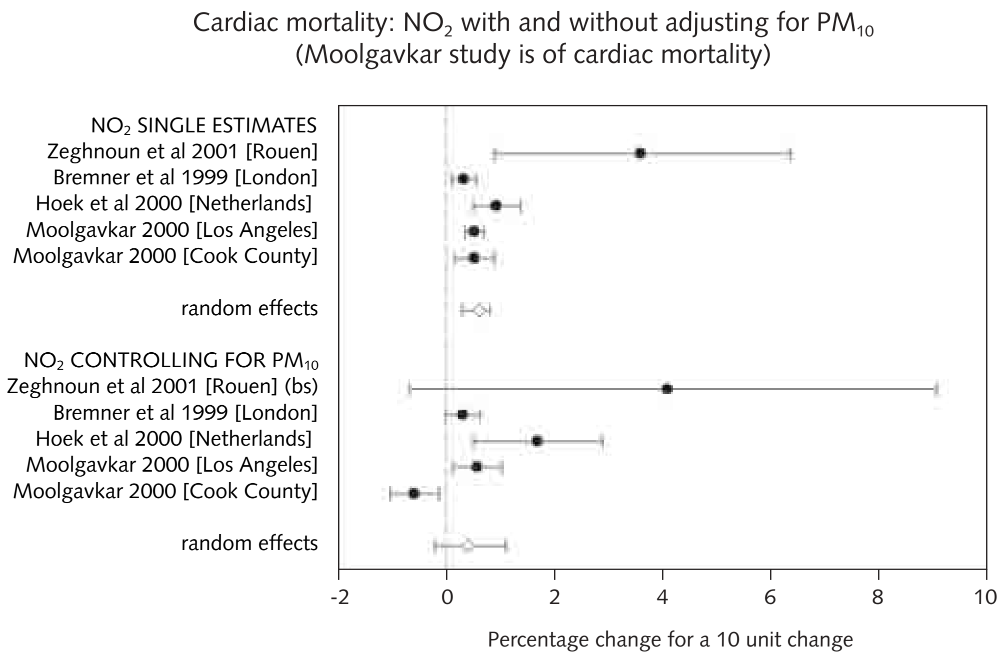


Table 2 Studies where NO_2 is adjusted by PM_{10}

	%change for a 10 unit* change and 95% CI		
	estimate	lcl	ucl
NO_2 SINGLE ESTIMATES			
Zeghnoun et al 2001 [Rouen]	3.6	0.9	6.3
Bremner et al 1999 [London]	0.3	0.1	0.6
Hoek et al 2000 [Netherlands]	0.9	0.5	1.4
Moolgavkar 2000 [Los Angeles]	0.5	0.4	0.7
Moolgavkar 2000 [Cook County]	0.5	0.2	0.9
random effects (NO_2 single)	0.6	0.3	0.8
NO_2 CONTROLLING FOR PM_{10}			
Zeghnoun et al 2001 [Rouen] (bs)	4.0	-0.7	9.0
Bremner et al 1999 [London]	0.3	0.0	0.6
Hoek et al 2000 [Netherlands]	1.7	0.5	2.9
Moolgavkar 2000 [Los Angeles]	0.6	0.1	1.0
Moolgavkar 2000 [Cook County]	-0.6	-1.0	-0.1
random effects (NO_2 controlling for PM_{10})	0.4	-0.2	1.1

Note: Zeghnoun is BS, not PM_{10}
*µg/m³

Figure 2 Forest plot for PM_{10}/NO_2 mortality studies



Cardiac admissions and particulate air pollution

A systematic review of studies giving single particulate measures and also controlling, in two pollutant models, for a variety of gases.

Contents

Table 1 Studies where PM_{10} is adjusted by SO_2

	%change for a 10 unit* change and 95% CI		
	estimate	lcl	ucl
PM_{10}/BS SINGLE ESTIMATES			
Le Tertre et al 2002 [8 European cities]	0.5	0.2	0.8
Wong et al 2002 [Hong Kong]	0.5	0.2	0.8
Ballester et al 2001 [Valencia]	1.5	-0.5	3.5
random effects (PM_{10} single)	0.5	0.3	0.7
PM_{10}/BS CONTROLLING FOR SO_2			
Le Tertre et al 2002 [8 European cities]	0.5	-0.9	1.9
Wong et al 2002 [Hong Kong]	0.1	-0.4	0.6
Ballester et al 2001 [Valencia]	0.4	-1.8	2.8
random effects (PM_{10}/BS controlling for SO_2)	0.2	-0.3	0.6

*µg/m³

Figure 1 Forest plot for PM_{10}/SO_2 studies

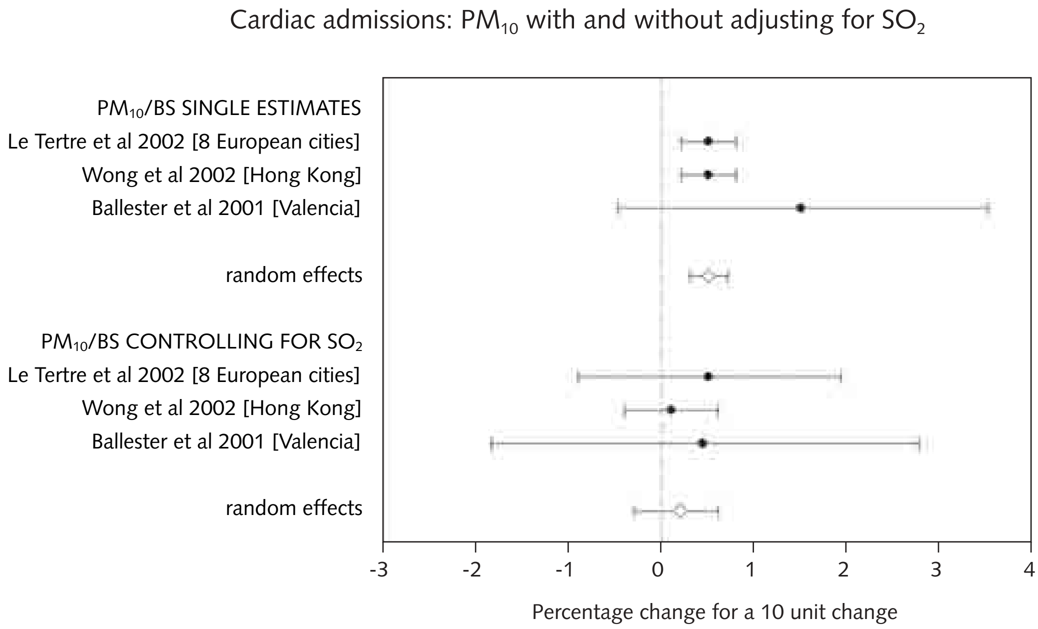


Table 2 Studies where PM_{10} is adjusted by NO_2

		%change for a 10 unit * change and 95% CI	
	estimate	lcl	ucl
PM_{10} SINGLE ESTIMATES			
Le Tertre et al 2002 [8 European cities]	0.5	0.2	0.8
Wong et al 2002 [Hong Kong]	0.5	0.2	0.8
Moolgavkar 2000 [Cook County]	0.8	0.6	1.1
random effects (PM_{10} single)	0.6	0.5	0.8
PM_{10}/BS CONTROLLING FOR NO_2			
Le Tertre et al 2002 [8 European cities]	0.2	-0.5	0.9
Wong et al 2002 [Hong Kong]	-0.3	-0.9	0.3
Moolgavkar 2000 [Cook County]	0.4	0.1	0.6
random effects (PM_{10} controlling for NO_2)	0.2	0.0	0.5

* $\mu g/m^3$

Figure 2 Forest plot for PM_{10}/NO_2

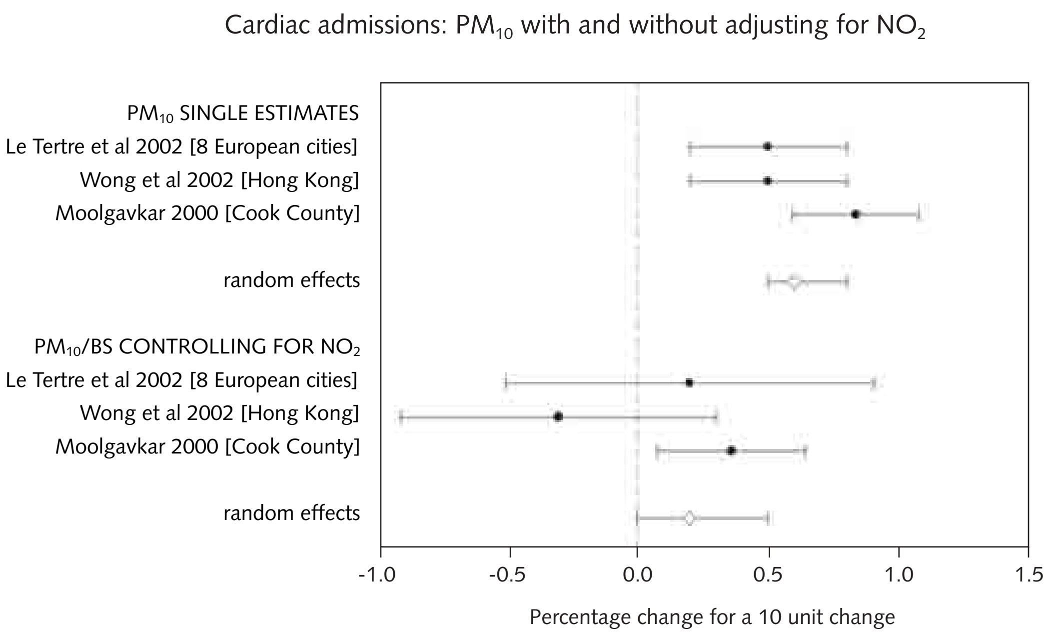


Table 3 Studies where PM_{10} is adjusted by O_3

	%change for a 10 unit change and 95% CI		
	estimate	lcl	ucl
PM_{10} SINGLE ESTIMATES			
Le Tertre et al 2002 [8 European cities]	0.5	0.2	0.8
Wong et al 2002 [Hong Kong]	0.5	0.2	0.8
random effects (PM_{10} single)	0.5	0.3	0.7
PM_{10}/BS CONTROLLING FOR O_3			
Le Tertre et al 2002 [8 European cities]	0.5	0.2	0.8
Wong et al 2002 [Hong Kong]	0.7	0.3	1.1
random effects (PM_{10} controlling for O_3)	0.6	0.3	0.8

Figure 3 Forest plot for PM_{10}/O_3

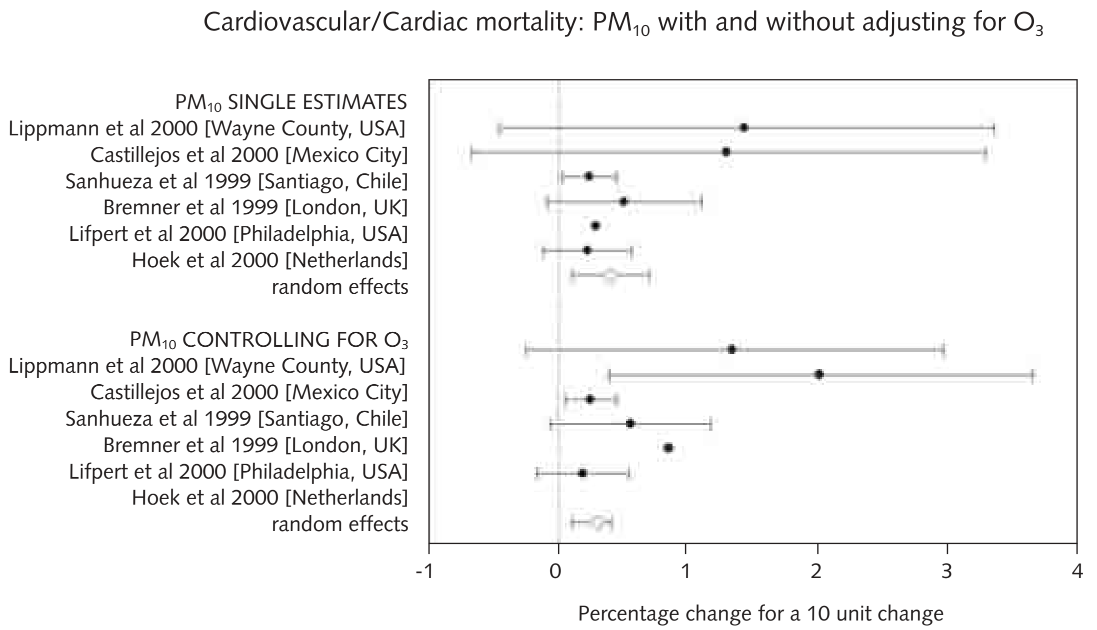
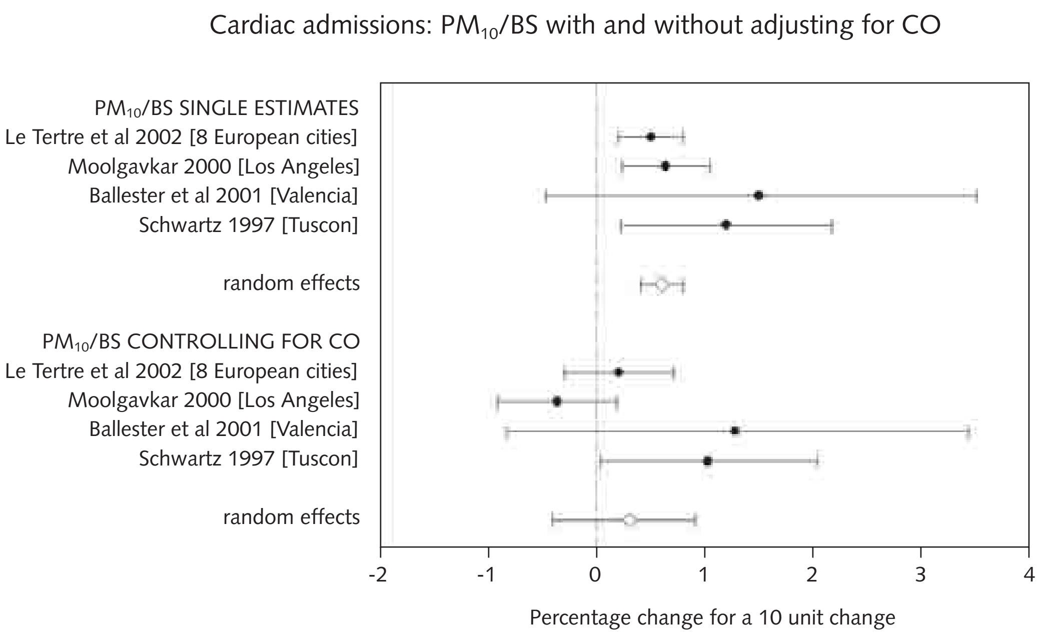


Table 4 Studies where PM_{10} is adjusted by CO

		%change for a 10 unit* change and 95% CI	
	estimate	lcl	ucl
PM_{10}/BS SINGLE ESTIMATES			
Le Tertre et al 2002 [8 European cities]	0.5	0.2	0.8
Moolgavkar 2000 [Los Angeles]	0.6	0.2	1.0
Ballester et al 2001 [Valencia]	1.5	-0.5	3.5
Schwartz 1997 [Tuscon]	1.2	0.2	2.2
random effects (PM_{10} single)	0.6	0.4	0.8
PM_{10}/BS CONTROLLING FOR CO (PM_{10} controlling for CO)			
Le Tertre et al 2002 [8 European cities]	0.2	-0.3	0.7
Moolgavkar 2000 [Los Angeles]	-0.4	-0.9	0.2
Ballester et al 2001 [Valencia]	1.3	-0.8	3.4
Schwartz 1997 [Tuscon]	1.0	0.0	2.0
random effects (PM_{10} controlling for CO)	0.3	-0.4	0.9

* $\mu g/m^3$

Figure 4 Forest plot for PM_{10}/CO



Appendix 5 Glossary of terms and abbreviations

Terms are defined here in the context of their use in this report.

Acute phase protein	Protein released into the blood by the liver as a response to inflammation or injury
Aerosol acidity	The acidity (often expressed in terms of pH (qv)) of the ambient aerosol
Afferent and efferent	A neural reflex involves nerves running towards and away from integrating centres in the spinal cord or brain: the former are described as afferent, the latter as efferent
Air pollution episode	A period, usually of some days, when concentrations of air pollutants are significantly raised
Ambient air	Outdoor air
Acute myocardial infarction (AMI)	Sudden cessation of blood supply to part of the myocardium (qv). Generally known as a heart attack.
Aneurysmal dilation	An abnormal dilation at some point along a blood vessel: an aneurysm
Angina (pectoris)	Pain in the chest caused by impaired blood supply to the heart
Angiotensin converting enzyme (ACE)	The enzyme that converts angiotensin I into angiotensin II, located mainly in the lining of blood vessels. ACE may be inhibited: ACE inhibitors are used in the treatment of some types of high blood pressure
Atheromatous disease	Disease of blood vessels involving the accumulation of fatty material of porridge-like consistency in the inner layer of the artery wall resulting in narrowing of the artery. These fatty deposits are known as plaques
Atheromatous plaques	The discrete lesions of the arterial wall in atheromatous disease
Atherosclerosis	Synonymous with atheromatous disease

Autonomic nervous system (ANS)	The involuntary nervous system (sympathetic and parasympathetic) that controls a wide range of physiological functions including movements of the gut, the heart beat and the secretions of glands
Baroreceptor	Receptors that monitor blood pressure, located for example in the carotid sinus.
Beta receptors (β-blockers)	Adrenaline and noradrenaline act on receptors which are divided into two types: alpha and beta. Drugs which block beta receptors (beta blockers) are used in the treatment of some forms of high blood pressure. Compounds which stimulate beta receptors e.g. salbutamol, are used in the treatment of asthma attacks
Black Smoke	Non-reflective (dark) particulate matter, measured by the smoke stain method
Bradycardia	An abnormally slow heart rate
Carbon monoxide (CO)	A poisonous gas produced by incomplete oxidation of fossil fuels. Carbon monoxide is poisonous by virtue of its capacity to bind to haemoglobin with more than 200 times the avidity of oxygen
Cardiovascular disease	Disorders of the heart and circulatory system
Case-crossover studies	An epidemiological technique involving comparing ambient conditions during a period when an individual suffered some effect on health with a period when no such effect occurred
Catecholamines	The hormones adrenaline and noradrenaline
Coronary heart disease (CHD)	Disease of the heart caused by a reduction in the blood flow to the myocardium (the muscle of the heart wall) due to narrowing of the coronary arteries. Generally caused by atherosclerosis.
Chronic obstructive pulmonary disease (COPD)	Long-standing disease of the airways of the lung associated with increased production of phlegm and shortness of breath and often caused by cigarette smoking
Confidence limits	See confidence interval. The values t_1 and t_2 which form the upper and lower boundaries of the confidence interval are the confidence limits

Confidence interval If it is possible to define two statistics t_1 and t_2 (functions of sample values only) such that, θ being a parameter under estimate,

$$P\ (t_1 \leq \theta > t_2) = \alpha$$

where α is some fixed probability (e.g. 0.95 or 95%), the interval between t_1 and t_2 is called a confidence interval. The assertion that θ lies in this interval will be true, on average, in a proportion α of the cases when the assertion is made

Coronary arteries The arteries which supply blood to the heart itself. The right and left coronary arteries arise from the root of the aorta as it leaves the heart

Cor pulmonale Failure of the right ventricle of the heart caused by chronic lung disease

Coronary thrombosis Partial or complete obstruction of a blood vessel supplying the heart by a clot or a ruptured atheromatous plaque

C-reactive protein A protein produced by the liver and released into the blood in response to injury and physiological stress and which is regarded as a marker of stress. Its exact functions are unknown

Cross-sectional cohort study An epidemiological method involving following the fate of age-defined groups (cohorts) in several locations with a view to investigating the effects of location-dependent factors on health

Cytokines A name given to a large group of molecules that are important in controlling cellular activities in tissues. Some dozens of such factors are now known. They play an important part in controlling the inflammatory reaction to tissue damage. The interleukins, IL1-IL23 are examples of cytokines

Ecological studies Studies conducted at a population level without taking account of individual-specific factors

Eight-hour average concentration The concentration of a pollutant, measured at intervals of, for example, 15 minutes or an hour and averaged over an 8-hour period

Electrocardiogram (ECG)	A recording, from electrodes placed on the chest and limbs, of electrical changes originating in the muscle of the heart
Electroencephalogram (EEG)	A recording, from electrodes placed on the scalp, of the electrical activity of the brain
Electromyogram (EMG)	A recording, from electrodes placed on the surface of, or inserted into a muscle, of the electrical activity of that muscle
Epidemiological studies	Investigations of diseases conducted at a population level
Fixed effects model	An approach to meta-analysis in which there is assumed to be no variation across studies in the air pollution effect beyond sampling (statistical) variation. Confidence intervals for mean effect from fixed effect models are typically narrower than confidence intervals from random effects models
General additive model (GAM)	A statistical regression model in which effects of some explanatory variables on the outcome are allowed to be curved, without specific algebraic form (non-parametric smoothing). Used in particular to model effects of temperature and medium-term fluctuations of mortality over time in time series studies
Granulocyte-macrophage colony stimulating factor (GM-CSF)	See cytokines
Haemorrhagic stroke	Bleeding from a blood vessel supplying the brain into the brain substance resulting in brain damage
Heart rate variability (HRV)	The variability in the beat-to-beat interval of the heart
Heterogeneity	Variation or differences between estimates of impacts of pollutants studied in different locations
HF (LF)	High frequency and low frequency components of the Fourrier transform of the wave pattern of heart rate variability. Complex wave forms may be analysed into a number of components: Fourrier analysis
Hypoxia, hypoxic	An abnormally low level of oxygen: produced in tissues by a reduced blood supply or by a normal supply of blood which is deficient in oxygen

Ischaemic heart disease (IHD)	Heart disease due to a reduction in blood supply to the myocardium (the muscle of the heart wall) caused by a reduction in blood flow through the coronary arteries.
Implanted cardioverter defibrillators	Devices that sense variations in a patient's heart rhythm and which can, if necessary, deliver a shock to the heart that will convert ventricular fibrillation back to a normal rhythmic pattern
Interleukin-1 (IL-1)	See cytokines
Interleukin-6 (IL-6)	See cytokines
International Classification of Disease (ICD)	The International Classification of Disease is an internationally agreed system for classifying diseases in which code numbers are allocated to disease categories and subcategories
Lognormal distribution	A statistical distribution with a long right tail (right-skewed) often found to fit the distribution of air pollution concentrations over space or time
Longitudinal studies	Epidemiological techniques that involve following populations or individuals over a period of time
Maximal 1-hour concentration	The highest concentration, averaged over a 1-hour period, recorded during a specified period e.g. 24 hours or a week
Meta-analytical techniques	Statistical techniques that allow the results of studies (commonly epidemiological) to be combined
Metalloproteinases	A large group of enzymes that play an important role in controlling the amount of connective tissue present in the tissues of the body. Recent work shows that they play a key role in controlling remodelling of tissue structure in disease processes
Myocardial infarction	Death of part of the muscular wall of the heart caused by impairment of its blood supply
Myocardium	The muscular tissue comprising the great majority of the mass of the heart
Nanoparticles	Particles of less than 100 nm (qv) diameter
Neural pathways	Well defined pathways in the nervous system generally characterised by anatomically identifiable bundles of nerve fibres

Nitrogen dioxide (NO_2)	A gas produced during combustion by the oxidation of atmospheric nitrogen
nm	Nanometre. A unit of length. One nanometre = 1 millionth of a millimetre or 10^{-9} metres
Non-parametric smoothing methods	Statistical techniques that allow confounding factors to be taken into account in time-series study analysis without prior assumptions regarding the form of relationship between these variables and the outcome variable (see also generalised additive model)
Nucleus ambiguus	An important centre in the lower brain stem which contains the cell bodies of nerve fibres that supply the muscles of the palate, larynx and pharynx
Odds ratio	A measure of association between an exposure and outcome, mainly used in case-control studies. The odds of an outcome are defined as P/(1-P), where p is the probability of the outcome. When an outcome is rare, an odds ratio estimates the ratio of disease rates in the populations exposed and unexposed
Olfactory nerve	The nerve supplying the sensory area in the upper part of the nose where the odour receptors serving the sense of smell are found
Ozone	A strongly oxidant gas produced from oxygen
Panel studies	A study of a generally small and closely monitored group of individuals
Partial pressure	The contribution to the total pressure of a gas mixture exerted by a component of that mixture
Particle	A minute portion of matter – frequently a very small solid or liquid particle (or droplet) of micrometre or nanometre dimensions
Peptidergic	Synapses that are activated by the release of peptide molecules such as substance P. Peptides are short chains of amino acid molecules
Photochemical smog	Air pollution containing a high concentration of oxidising pollutants such as ozone and nitrogen dioxide

PM_{10}, $PM_{2.5}$, $PM_{1.0}$ The concentrations (expressed in µg/m^3) of particles of generally less than 10 µm, 2.5 µm and 1.0 µm in the ambient air. On a typical day in London, for example, PM_{10} = 20 µg/m^3. The terms PM_{10}, $PM_{2.5}$ etc. are sometimes used to describe particles of less than 10 µm, 2.5 µm etc. diameter, but this is not strictly correct: the terms refer to concentrations of particles not to the particles themselves

PO_2 Partial pressure of oxygen

Poisson models Statistical methods that link explanatory variables with outcome data expressed as the number (counts) of events, where it is assumed that the counts are distributed according to a skewed distribution reported by S D Poisson in 1837 and found to describe the distribution of rare events in time particularly well

Prevalence ratio (PV) The ratio of the prevalences of, for example, deaths from heart disease in two defined groups, for example men and women or those living in London and in Birmingham

Pulmonary oedema An abnormal accumulation of fluid in the alveoli of the lung

Random effects model An approach to meta-analysis in which allowance is made for variation across studies in the air pollution effect beyond sampling (statistical) variation. Such variation is often called heterogeneity. Confidence intervals for mean effect from random effects models are typically wider than confidence intervals from fixed effect models

Randomised control trial An experimental design in which treatments (or exposures in the case of toxicology) are allocated to subjects on a random basis. Commonly, a number of subjects are randomly allocated to a small number of treatment groups

Regression techniques Statistical methods used to generate an equation to represent a relationship between an outcome variable and one or more explanatory variables

Rolling 8-hour average An eight-hour average concentration (see above) with calculated overlapping 8-hour periods, usually with starting points at 1-hour intervals from each other

Seasonality Used as short-hand for the effect of seasons on the day-to-day variations in indices of ill-health

Space heating	Heating of the indoor environment
Standardised mortality ratio (SMR)	A fraction representing the actual (observed) number of deaths occurring per year in a specific study area or population from a specific cause, divided by the expected number of deaths assuming that the age-specific death rates in the study population are the same as some larger comparison population. Usually expressed as a percentage, though the % sign is often omitted e.g. SMR = 90 (%)
Sulphate particles	Small airborne particles comprising mainly ammonium sulphate or bisulphate and formed by the reaction between sulphuric or sulphurous acid and ammonia, the latter being produced largely by agricultural activities
Sulphur dioxide (SO_2)	An acidic gas formed by oxidation of sulphur found in fossil fuel
Time-series study	An epidemiological method that focuses on the relationship between outcome (e.g. number of deaths or hospital admissions in a population) and explanatory variables (e.g. climate, pollutant concentrations) using measures of these variables at regular time intervals, usually daily
TEOM	Tapered element oscillating microbalance. A method of measuring mass of particles in real time
Trigeminal nerve	The cranial nerve supplying sensory fibres to much of the eye, the face and scalp and motor fibres to the chewing muscles
Troponin	Troponin is a structural protein involved in the contractile process in muscle cells. A raised level in the blood may indicate damage to the muscle cells of the heart especially following myocardial infarction
Tumour necrosis factor-α (TNF-α)	See cytokines
Tunica intima	The thin inner lining of the wall of a blood vessel below which atheroma is deposited
Ultrafine particles	Particles of less than 100 nm (qv) diameter
µm	Abbreviation for micrometre or micron (a unit of length). 1µm = one thousandth of a millimetre

VA/QC ratio	The ratio of ventilation (the volume of fresh air reaching the alveoli each minute) to blood flow (the volume of blood reaching the alveoli each minute)
Vasa vasorum	The small blood vessels which supply blood to the walls of large blood vessels
Ventricular fibrillation (VF)	Abnormal, rapid and uncoordinated ventricular electrical activity preventing the normal pumping of blood by the ventricle
Ventricular tachycardia (VT)	Abnormally fast heart rate driven from a ventricular focus
Vitamin-antioxidant hypothesis	An hypothesis that argues that the effects of some pollutants may be due to the release of oxidative radicals in the airways and that these can be neutralised by an adequate intake of vitamins of which some, such as vitamin C, are antioxidants

Appendix 6
Membership of the Committee on the Medical Effect of Air Pollutants

Chairman:	Professor JG Ayres BSc MD FRCP
Members:	Professor HR Anderson MD MSc FFPHM FMedSci (*until June 2003*) Dr B Armstrong BA MSc PhD Professor P Blain CBE MB BS PhD FRCP FFOM Professor D Derwent OBE MA PhD (*from June 2003*) Professor K Donaldson BSc PhD DSc FIBiol FRCPath FFOM Professor A Frew MA MD FRCP Professor RM Harrison OBE PhD DSc CChem FRSC FRMetS FRSH (*until June 2003*) Professor S Holgate MD DSc FRCP FRCPE FIBiol FMedSci (*from June 2003*) Mr J F Hurley MA Mrs A Lambert BSc Professor D Laxen BSc MSc PhD (*from June 2003*) Professor W MacNee MD FRCP(G) FRCP(E) (*until June 2004*) Dr V Murray FRCP FRCPath FFOM Professor P Poole-Wilson MA MD FRCP FACC FMedSci Dr J Pritchard BSc PhD (*until June 2004*) Professor RJ Richards BSc PhD DSc (*until June 2003*) Professor A Seaton CBE MD FRCP FFOM FMedSci (*until June 2003*) Professor V Stone BSc PhD CBiol FIBiol ILTM (*from June 2003*) Professor D Strachan BA MSc MD MRCGP FRCP FFPHM FMedSci Professor D Walters BSc MB BS FRCP FRCPCH
Secretariat	Dr RL Maynard CBE FRCP FRCPath FFOM (Medical) Dr H Walton BSc DPhil (Scientific) Mrs I Myers BSc MSc (Scientific) Miss J Cumberlidge BSc MSc (Minutes)

Contributors	Dr P Harrison BSc PhD, (MRC Institute of Environment and Health) Dr M Meadows BSc PhD (Department for Environment, Food and Rural Affairs)

Mrs Alice Lambert died during the preparation of this report. She had shown a great interest in the work: this was recognised by the Members and the Secretariat. Her special contribution as the Lay Member of the Committee is apparent in the Lay Summaries that precede the detailed presentation of evidence in this report.

Appendix 7
Membership of the Sub-group on Cardiovascular Disease and Air Pollution

Chairman:	Professor JG Ayres BSc MD FRCP
Members:	Professor R Anderson MD MSc FFPHM FMedSci
	Professor K Donaldson BSc PhD DSc FIBiol FRCPath FFOM
	Dr R Heller MD FRCP FFPH
	Professor P Poole-Wilson MA MD FRCP FACC FMedSci
	Professor RJ Richards BSc PhD DSc
	Professor A Seaton CBE MD FRCP FFOM FMedSci
	Dr J Townend BSc MD FRCP FESC
	Professor H Tunstall-Pedoe MA MD FRCP FRCPE FFPH FESC*
	Professor P Whincup MB MSc PhD FRCP FFPH
	Dr M Williams BSc PhD
Secretariat	Dr RL Maynard CBE FRCP FRCPath FFOM (*Medical*)
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* Contributed in the early stages of the preparation of the report