

## Supplementary Online Content

Mustafić H, Jabre P, Caussin C, et al. Main air pollutants and myocardial infarction: a systematic review and meta-analysis. *JAMA*. 2012;307(7):713-721.

**eAppendix.** Search strategies

**eFigure.** Flowchart of search strategy and selection of studies for meta-analysis

**eTable 1.** Description of the studies

**eTable 2.** Ozone studies and temperature adjustment

This supplementary material has been provided by the authors to give readers additional information about their work.

## eAppendix. Search strategies

### Ovid

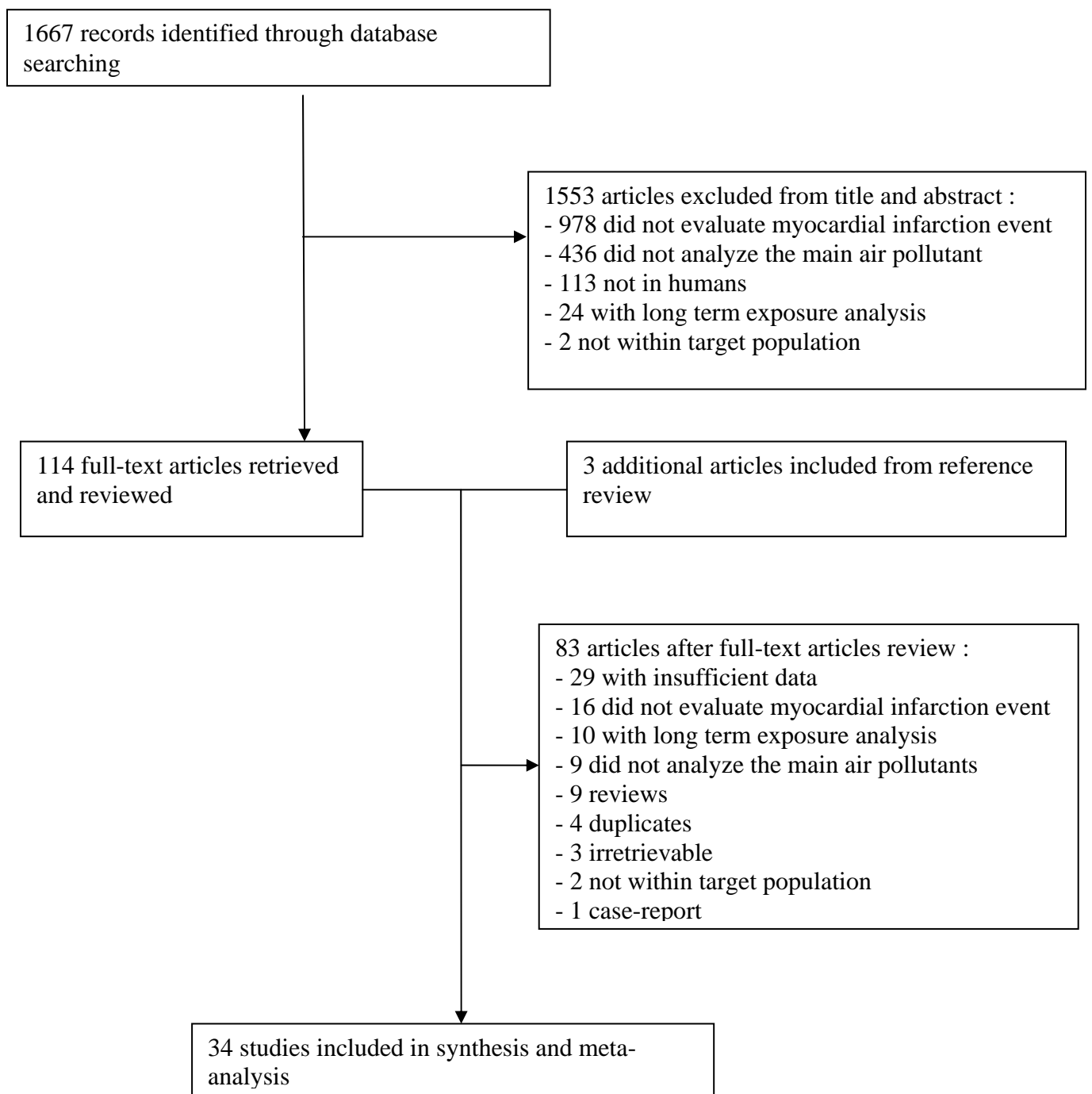
Database(s): EMBASE 1988 to 2011 Week 10, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1948 to Present, EBM Reviews - Cochrane Central Register of Controlled Trials 1st Quarter 2011, EBM Reviews - Cochrane Database of Systematic Reviews 2005 to February 2011 Search Strategy:

#	Searches	Results
1	myocardial infarct*.mp.	289174
2	heart attack*.mp.	6961
3	exp Acute Coronary Syndrome/	16658
4	acute coronary syndrome*.mp.	35254
5	exp Myocardial Infarction/	292436
6	exp heart infarction/	156160
7	("cardiac infarct*" or "cardial infarct*" or ("coronary arter*" adj3 occlusion) or (heart adj2 infarct*) or "myocardium infarct*" or "premonitory infarction sign" or "subendocardial infarct*" or "myocardial stunning" or "cardiogenic shock").mp. [mp=ti, ab, sh, hw, tn, ot, dm, mf, ps, rs, nm, ui, kw, tx, ct]	180323
8	or/1-7	391120
9	exp air pollution/	105560
10	exp Particulate Matter/	49843
11	((air or atmosphere or atmospheric) adj (pollution* or polluted or pollutant* or contamination or contaminated)).mp. [mp=ti, ab, sh, hw, tn, ot, dm, mf, ps, rs, nm, ui, kw, tx, ct]	115230
12	("particulate matter" or "PM2.5" or "PM10").mp. [mp=ti, ab, sh, hw, tn, ot, dm, mf, ps, rs, nm, ui, kw, tx, ct]	33973
13	exp ozone/	22927
14	exp Carbon Monoxide/	29104
15	exp Carbon Monoxide Poisoning/	6524
16	exp nitrogen dioxide/	7822
17	exp Sulfur Dioxide/	9692
18	(ozone or "O3" or "carbon monoxide" or carbonmonoxide or "nitrogen dioxide" or "NO2" or "N2O4" or "dinitrogen tetraoxide" or "nitrogen peroxide" or "nitrogen tetroxide" or nitrogenoxide or "nitrous dioxide" or "sulphur dioxide" or "sulphur dioxyde" or "sulfurous anhydride" or "SO2").mp. [mp=ti, ab, sh, hw, tn, ot, dm, mf, ps, rs, nm, ui, kw, tx, ct]	102577
19	("CO" adj3 (pollut* or contamin* or particulate or poisoning)).mp. [mp=ti, ab, sh, hw, tn, ot, dm, mf, ps, rs, nm, ui, kw, tx, ct]	2687
20	or/9-19	255133
21	8 and 20	1322
22	limit 21 to human [Limit not valid in CCTR,CDSR; records were retained]	1043
23	limit 22 to humans [Limit not valid in CCTR,CDSR; records were retained]	1043
24	remove duplicates from 23	771
25	from 24 keep 1-763	763
26	limit 25 to (book or book series or editorial or erratum or letter or addresses or autobiography or bibliography or biography or comment or dictionary or directory or interactive tutorial or interview or lectures or legislation or news or patient education handout or periodical index or portraits or published erratum or video-audio media or webcasts) [Limit not valid in EMBASE,Ovid MEDLINE(R),Ovid MEDLINE(R) In-Process,CCTR,CDSR; records were retained]	72
27	25 not 26	691
28	24 not 25	8

**eAppendix.** Search strategies cont.Scopus

- 1 TITLE-ABS-KEY("cardiac infarct\*" or "cardial infarct\*" or ("coronary arter\*" W/3 occlusion) or (heart W/2 infarct\*) or "myocardium infarct\*" or "premonitory infarction sign" or "subendocardial infarct\*" or "myocardial stunning" or "cardiogenic shock" or "myocardial infarct\*" or "heart attack\*" or "acute coronary syndrome\*")
- 2 TITLE-ABS-KEY((air w/1 pollut\*) or (air w/1 contamination) or (air w/1 contaminated) or (atmosphere w/1 pollut\*) or (atmosphere w/1 contamination) or (atmosphere w/1 contaminated) or (atmospheric w/1 pollut\*) or (atmospheric w/1 contamination) or (atmospheric w/1 contaminated) or "particulate matter" or "PM2.5" or "PM10" or ozone or "O3" or "carbon monoxide" or carbonmonoxide or "nitrogen dioxide" or "NO2" or "N2O4" or "dinitrogen tetraoxide" or "nitrogen peroxide" or "nitrogen tetroxide" or nitrogenoxide or "nitrous dioxide" or "sulphur dioxide" or "sulphur dioxyde" or "sulfurous anhydride" or "SO2" or (co w/3 pollut\*) or (co w/3 contamin\*) or (co w/3 particulate) or (co w/3 poisoning))
- 3 1 and 2
- 4 PMID(0\*) OR PMID(1\*) OR PMID(2\*) OR PMID(3\*) OR PMID(4\*) OR PMID(5\*) OR PMID(6\*) OR PMID(7\*) OR PMID(8\*) OR PMID(9\*)
- 5 3 and not 4
- 6 DOCTYPE(le) OR DOCTYPE(ed) OR DOCTYPE(bk) OR DOCTYPE(er) OR DOCTYPE(no) OR DOCTYPE(sh)
- 7 5 and not 6

**eFigure. Flowchart of search strategy and selection of studies for meta-analysis**



**eTable 1. Description of the studies**

Study	Location	Period	Data source	Population	Number of events	Air pollution exposure variables	Potential confounders included	Lag pattern (single-day, mean-days or both)	Model (mono-pollutant, multi-pollutant or both)	Air pollutant peak or / and mean concentration	Pollutant measurement quality score (0-1 point)	MI validation score (0-1 point)	Adjusted quality score (0-3 points)
<b>Case crosser studies of good quality</b>													
Barnett <sup>9</sup> , 2006	5 cities in Australia and 2 cities in New-Zealand	1998 - 2001	Hospital admissions	General	Not given	O <sub>3</sub> , CO, NO <sub>2</sub> , PM10, PM2.5	Trends, seasonality, temperature, humidity, pressure, day of week, holidays, influenza levels	Mean-days	Both	Mean	1	1	3
Bhaskaran <sup>4</sup> , 2011	England and Wales	2003 - 2006	MI registry	General	79288	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, seasonality, temperature, humidity, holidays, influenza levels	Both	Both	Mean	1	1	3
D'Ippoliti <sup>36</sup> , 2003	Roma, Italy	1995 - 1997	Hospital admissions	General	6531	CO, NO <sub>2</sub>	Trends, seasonality, temperature, humidity, day of week	Both	Mono-pollutant	Mean	1	1	3
Henrotin <sup>37</sup> , 2010	Dijon, France	2001 - 2007	MI registry	General	771	O <sub>3</sub>	Trends, seasonality, temperature, humidity, holidays, influenza levels	Both	Multi-pollutant	Peak and mean	1	1	3
Ruidavets <sup>44</sup> , 2005	Toulouse, France	1997 - 1999	MI registry	General	399	O <sub>3</sub> , NO <sub>2</sub> , SO <sub>2</sub>	Trends, seasonality, temperature, humidity, influenza levels	Both	Mono-pollutant	Peak or mean	1	1	3
Zanobetti <sup>45</sup> , 2006	Boston, USA	1995 - 1999	Hospital admissions	65 years and +	15578	O <sub>3</sub> , CO, NO <sub>2</sub> , PM2.5	Trends, seasonality, temperature, humidity, pressure, day of week	Both	Mono-pollutant	Mean	1	1	3

**eTable 1.** Description of the studies cont.

Study	Location	Period	Data source	Population	Number of events	Air pollution exposure variables	Potential confounders included	Lag pattern (single-day, mean-days or both)	Model (mono-pollutant, multi-pollutant or both)	Air pollutant peak or / and mean concentration	Pollutant measurement quality score (0-1 point)	MI validation score (0-1 point)	Adjustment quality score (0-3 points)
<b>Case crosser studies of intermediate quality</b>													
Belleudi <sup>41</sup> , 2010	Roma, Italy	2001 - 2005	Emergency hospital admissions	General	22659	PM10, PM2.5	Trends, seasonality, temperature, pressure, holidays influenza levels	Both	Mono-pollutant	Mean	1	1	1
Berglind <sup>10</sup> , 2010	Stockholm, Sweden	1993 - 1994	MI registry	General	660	O <sub>3</sub> , CO, NO <sub>2</sub> , PM10	Trends, seasonality, temperature, humidity, day of week influenza levels	Single-day	Mono-pollutant	Mean	1	1	2
Nuvolone <sup>42</sup> , 2011	Tuscany, Italy	2002 - 2005	MI registry	General	11450	CO, NO <sub>2</sub> , PM10	Trends, seasonality, temperature, holidays, day of week influenza levels	Both	Both	Peak or mean	1	1	2
Pope <sup>35</sup> , 2006	Utah, USA	1991 - 2001	Angiographic registry	General	3910	PM2.5	Trends, seasonality, temperature, day of week	Both	Mono-pollutant	Mean	1	1	2
Rich <sup>21</sup> , 2010	New Jersey, USA	2004 - 2006	Hospital admissions	General	5864	PM2.5	Trends, seasonality, temperature, day of week	Single-day	Multi-pollutant	Mean	1	1	2
Sullivan <sup>22</sup> , 2005	Washington	1988 - 1994	Hospital admissions	General	5793	CO, NO <sub>2</sub> , PM2.5	Trends, seasonality, temperature, day of week	Single-day	Mono-pollutant	Mean	1	1	2
Zanobetti <sup>29</sup> , 2005	21 cities in USA	1986 - 1999	Hospital admissions	General	302453	PM10	Trends, seasonality, temperature, day of week	Single-day	Mono-pollutant	Mean	1	1	2

**eTable 1.** Description of the studies cont.

Study	Location	Period	Data source	Population	Number of events	Air pollution exposure variables	Potential confounders included	Lag pattern (single-day, mean-days or both)	Model (mono-pollutant, multi-pollutant or both)	Air pollutant peak or / and mean concentration	Pollutant measurement quality score (0-1 point)	MI validation score (0-1 point)	Adjusted quality score (0-3 points)
<b>Case crosser studies of low quality</b>													
Cheng <sup>33</sup> , 2009	Kaohsiung, Taiwan	1996 - 2006	Hospital admissions	General	Not given	O <sub>3</sub> , NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, humidity, day of week	Mean-days	Both	Mean	1	1	0
Hsieh <sup>34</sup> , 2010	Taipei, Taiwan	1996 - 2006	Hospital admissions	General	23420	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, seasonality, humidity	Mean-days	Mono-pollutant	Mean	1	1	0
Peters <sup>20</sup> , 2001	Boston, USA	1999 - 2001	MI registry	General	772	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10, PM2.5	Seasonality, temperature, humidity	Single-day	Mono-pollutant	Mean	1	1	0
Peters <sup>43</sup> , 2005	Augsburg, Germany	1999 - 2001	MI registry	General	851	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10, PM2.5	Seasonality, temperature, humidity, pressure, day of week	Both	Mono-pollutant	Mean	1	1	0

**eTable 1. Description of the studies cont.**

Study	Location	Period	Data source	Population	Number of events	Air pollution exposure variables	Potential confounders included	Lag pattern (single-day, mean-days or both)	Model (mono-pollutant, multi-pollutant or both)	Air pollutant peak or / and mean concentration	Pollutant measurement quality score (0-1 point)	MI validation score (0-1 point)	Adjustment quality score (0-3 points)
<b>Time-series studies of good quality</b>													
Braga <sup>7</sup> , 2001	10 cities in USA	1986 - 1993	Death registry	General	Not given	PM10	Trends, seasonality, temperature, humidity, pressure, day of week	Both	Mono-pollutant	Peak or mean	1	1	3
Eilstein <sup>23</sup> , 2001	Strasbourg, France	1984 - 1989	MI registry	General	Not given	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub>	Trends, seasonality, temperature, humidity, pressure, day of week, influenza levels	Single-day	Mono-pollutant	Peak and mean	1	1	3
Hoek <sup>32</sup> , 2001	Netherlands	1986 - 1994	Death registry	General	62 per day	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, seasonality, temperature, humidity, day of week, holidays influenza levels	Mean-days	Mono-pollutant	Peak or mean	1	1	3
Lanki <sup>24</sup> , 2006	5 cities in Europe	1992 - 2000	MI registry, hospital admissions	General	26854	O <sub>3</sub> , CO, NO <sub>2</sub> , PM10	Trends, seasonality, temperature, humidity, pressure, day of week, holidays	Single-day	Mono-pollutant	Mean	1	1	3
Mate <sup>25</sup> , 2010	Madrid, Spain	2003 - 2005	Death registry	General	1096	PM2.5	Trends, seasonality, temperature, day of week, influenza levels	Single-day	Mono-pollutant	Mean	1	1	3
Poloniecki <sup>27</sup> , 1997	London, UK	1987 - 1994	Hospital admissions	General	68300	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub>	Trends, seasonality, temperature, humidity, day of week, influenza levels	Single-day	Both	Mean	1	1	3
Sharovsky <sup>40</sup> , 2004	Sao Paulo, Brazil	1996 - 1998	Death registry	General	12007	CO, SO <sub>2</sub> , PM10	Trends, seasonality, temperature, humidity, day of week, holidays influenza levels	Both	Mono-pollutant	Mean	1	1	3



**eTable 1.** Description of the studies cont.

Study	Location	Period	Data source	Population	Number of events	Air pollution exposure variables	Potential confounders included	Lag pattern (single-day, mean-days or both)	Model (mono-pollutant, multi-pollutant or both)	Air pollutant peak or / and mean concentration	Pollutant measurement quality score (0-1 point)	MI validation score (0-1 point)	Adjustment quality score (0-3 points)
<b>Time-series studies of intermediate quality</b>													
Linn <sup>12</sup> , 2000	Los Angeles, USA	1992 - 1995	Hospital admissions	General	Not given	O <sub>3</sub> , CO, NO <sub>2</sub> , PM10	Trends, seasonality, temperature, humidity, pressure, day of week	Single-day	Mono-pollutant	Peak or mean	1	1	1
Mann <sup>39</sup> , 2002	California, USA	1988 - 1995	Insurance registry	General	19690	O <sub>3</sub> , CO, NO <sub>2</sub> , PM10	Trends, seasonality, temperature, day of week	Both	Mono-pollutant	Peak or mean	1	1	2
Zanobetti <sup>30</sup> , 2009	112 cities in USA	1999 - 2005	Death registry	General	397894	PM2.5	Trends, seasonality, temperature, day of week	Mean-days	Mono-pollutant	Mean	1	1	2
Zanobetti <sup>31</sup> , 2009	26 cities in USA	2000 - 2003	MEDICARE registry, hospital admissions	65 years and +	121652	PM2.5	Trends, seasonality, temperature, day of week	Mean-days	Mono-pollutant	Mean	1	1	2

**eTable 1.** Description of the studies cont.

Study	Location	Period	Data source	Population	Number of events	Air pollution exposure variables	Potential confounders included	Lag pattern (single-day, mean-days or both)	Model (mono-pollutant, multi-pollutant or both)	Air pollutant peak or / and mean concentration	Pollutant measurement quality score (0-1 point)	MI validation score (0-1 point)	Adjusted quality score (0-3 points)
<b>Time-series studies of low quality</b>													
Cendon <sup>14</sup> , 2006	Sao Paulo, Brazil	1998 - 1999	Hospital admissions	65 years and +	19272	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, seasonality, temperature, day of week	Both	Mono-pollutant	Peak or mean	0	1	1
Koken <sup>8</sup> , 2003	Denver, USA	1993 - 1997	Hospital admissions	65 years and +	1576	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, temperature, day of week	Single-day	Mono-pollutant	Mean	1	1	0
Medina <sup>26</sup> , 1997	Paris, France	1991 - 1995	Doctor's house calls registry	General	Not given	O <sub>3</sub> , NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, seasonality, temperature, humidity, influenza levels	Single-day	Mono-pollutant	Peak or mean	1	0	2
Stieb <sup>28</sup> , 2009	14 cities in Canada	1992 - 2003	Emergency admissions	General	63184	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10, PM2.5	Seasonality, temperature, humidity, day of week	Single-day	Mono-pollutant	Mean	1	0	0
Ueda <sup>38</sup> , 2009	9 cities in Japan	2002 - 2004	Death registry	General	67897	PM2.5	Seasonality, temperature, humidity, day of week	Both	Mono-pollutant	Mean	1	1	0
Ye <sup>19</sup> , 2001	Tokyo, Japan	1980 - 1995	Hospital emergency transports	65 years and +	Not given	O <sub>3</sub> , CO, NO <sub>2</sub> , SO <sub>2</sub> , PM10	Trends, temperature	Single-day	Mono-pollutant	Mean	1	0	0

O<sub>3</sub>: ozone; CO: carbon monoxide; NO<sub>2</sub>: nitrogen dioxide; SO<sub>2</sub>: sulfur dioxide; PM10: particulate matter within 10 µm; PM2.5: particulate matter; MI: myocardial infarction.

**eTable 2. Ozone studies and temperature adjustment**

Study	Adjustment for temperature
<b>Case-crossover studies</b>	
Bhaskaran <sup>46</sup> , 2011	Daily minimum and maximum temperatures, non linear temperature adjustment, lag day 0 and lag days 0-3
Henrotin <sup>37</sup> , 2010	Stratification on warm, intermediate and cold periods
Ruidavets <sup>44</sup> , 2005	Daily minimum and maximum temperatures, non-linear temperature adjustment, lag day 0
Zanobetti <sup>45</sup> , 2006	Non-linear temperature adjustment, lag day 1
Berglind <sup>10</sup> , 2010	Non-linear temperature adjustment, lag day 0 and lag day 1
Cheng <sup>33</sup> , 2009	Stratification on daily mean temperature with a 25°c cut-off
Hsieh <sup>34</sup> , 2010	Stratification on daily mean temperature with a 23°c cut-off
Peters <sup>20</sup> , 2001	Daily minimum temperature, non linear temperature adjustment, lag day 0
Peters <sup>43</sup> , 2005	Non-linear temperature adjustment, lag day 0
<b>Time-series studies</b>	
Eilstein <sup>23</sup> , 2001	Daily minimum temperature and non-linear temperature adjustment, lag day 0 and lag days 0-5
Hoek <sup>32</sup> , 2001	Not reported
Lanki <sup>24</sup> , 2006	Non linear temperature adjustment, lag day 0 and average lag days 1-3
Poloniecki <sup>27</sup> , 1997	Linear temperature adjustment, lag day 1
Linn <sup>12</sup> , 2000	Daily mean temperature and non-linear temperature adjustment, lag day 0
Mann <sup>39</sup> , 2002	Non-linear temperature adjustment, lag day 0
Cendon <sup>11</sup> , 2006	Non-linear temperature adjustment, 2-day moving average
Koken <sup>8</sup> , 2003	Daily maximum and non-linear temperature adjustment, lag days 0-4
Medina <sup>26</sup> , 1997	Dew point temperature, non-linear temperature adjustment, lag days 0-2
Stieb <sup>28</sup> , 2009	Daily mean temperature, non-linear temperature adjustment, lag days 0-2