

## **Reviewer's report**

**Title:** A Review of the Epidemiologic Evidence of High Ambient Temperature and Mortality Accounting for Air Pollutants and Identifying Vulnerable Subgroups

**Version: 2 Date:** 23 March 2009

**Reviewer:** Paola Michelozzi

### **Reviewer's report:**

This article addresses a relevant topic since it revises the most recent evidence about the association between high temperatures and mortality. Overall, I recognize there is a substantial work behind this literature review but for being a systematic review, the rationale and the selection procedures should be more carefully defined (I advise to refer to the Cochrane guidelines). Specifically, the review's objectives should be better defined and the study designs more appropriate for answering the specific question should be briefly described. For example, case-crossover and case-only analyses are more suitable to study the vulnerability factors to heat-related mortality.

Moreover specific section of the paper, i.e. Vulnerable subgroups, is examined rather superficially. Epidemiological studies on heat waves episodes produced important results on vulnerable subgroups and should be considered in this section.

Therefore, I believe that the work is potentially of interest but substantial revision taking into account the following major problems is necessary.

#### Major problems

1. Title should be revised. I suggest "High ambient temperature and mortality: review of epidemiological studies from 2001 to 2008"
2. Page 1-4, Abstract and Background and Methods: The research question should be more detailed and better addressed by the rationale and methods section.
3. Page 1, Abstract, Results, lines 10-13: this paragraph should be moved in the Methods. Results should report the number of studies selected by the search strategy and the number of studies included for each topic of interest.
4. Page 1, Abstract, Results, lines 13-16: should be moved at the end of the paragraph
5. Page 3, line 22, Background: Aims and, more thoroughly Methods (page 4) should include the justification for excluding some types of epidemiological studies and for including others. The type of studies selected should reflect your research question. Furthermore, has the quality of studies included in the revision been evaluated in any way?
6. Page 4, Methods: The research strategy was too simple, and you have missed

several studies of potential interest for your three topics.

7. Page 4, Methods, line 9: the inclusion criteria are unclear and study design more suitable to your research question should be defined more clearly (i.e. time series studies, case-crossover studies, etc.) The inclusion/exclusion criteria for studies regarding each topic of interest (the same summarized in the tables) should be included. The paragraphs “exposure assessment”, “case selection” and “study design” should be included in a section “Methodological issues”, as well as the paragraph “Harvesting” (see pag. 11 lines 13-23) .

8. Page 7, Summary of recent studies: For each topic the number of studies selected and a brief description of them should be reported (i.e. the number of time series or case-crossover studies, the number of studies from the US, Europe, other countries)

9. Page 7, Summary of recent studies, General ambient temperature and mortality: The paragraph is biased since several studies are not included. You should distinguish between results from the different study designs.

10. A revision of Table 1 is essential. According to the publication period you considered, you should add several other time series studies on the effect of high temperatures on mortality for all causes (see appendix). The results should be better synthesized, giving more homogeneous information for each study, leaving only the most relevant results, and providing the threshold values. You stated that “Studies that reported mortality counts or excess deaths following heat waves were excluded” but in table 1 there are three studies on heat waves analysis (Conti et al. 2005, Grize et al. 2005, Le Tertre, 2006). Moreover, it is questionable to insert Davis et al. 2003 since it employed a different methodology from all other studies included in the table.

11. Page 8, Summary of recent studies, Air pollutants as confounders/effect modifiers: Results both in table 2 and in the text should be presented separately for each pollutant. You should check for possible articles missed (see major problem 2). Check also for Dear et al. 2005 (reference 16) since it seems an episode analysis of heat wave.

12. Page 9, Summary of recent studies, Cause-specific outcomes and vulnerable subgroups: In this paragraph the subject “vulnerability subgroups” is biased and incomplete. Several studies are not included (see major problem 2). Moreover, one of the most important aspects concern chronic conditions that increase susceptibility to high temperatures, and this aspect was not considered. This paragraph demands an in-depth examination, and probably should be omitted from this review.

13. Table 3: If included, should be revised.

14. Page 11, Summary of recent studies, Harvesting: This subject was not introduced in the background and methods sections. The first part of the paragraph should be moved in the section “Methodological Issues”. Furthermore, you should check for the types of studies you included since references 39-41 are studies about heat waves and Schwartz et al. deals with hospital admissions and not with mortality. You should include in this paragraph also the following articles that evaluated the harvesting effect:

- Braga et al. 2001 (your reference 59)
  - Braga A.L.F., Zanobetti A, and Schwartz J. The Effect of Weather on Respiratory and Cardiovascular Deaths in 12 U.S. Cities. *Environ Health Perspect* 110(9), 859-863. 2002.
  - Baccini et al. 2008 (your reference 7)
  - Hajat S, Kovats R, Atkinson R, Haines A. Impact of hot temperatures on death in London: a time series approach. *J Epidemiol Comm Health* 2002;56:367-372.
15. Page 13, Discussion: Avoid to draw conclusions from evidence that is contrasting and limited as in the case of studies about air pollution (drop the sentence “In other words, the association between temperature and mortality is partially a result of confounding by PM and O3”). Discuss the possible mechanisms through which the different pollutants should be confounders or effect modifiers of the temperature-mortality relationship in more detail.
16. Page 15, Discussion, lines 5-16: The entire paragraph is out of place here since your focus is on mortality. I advise you to drop the paragraph. If you decide to leave it, check for having included all relevant references. In particular, a multicentre study on heat-related hospital admission has recently been published and should be cited (Michelozzi P et al. *Am J Respir Crit Care Med*. 2009 Mar 1;179(5):383-9.), while Schwartz et al. 2005 should be dropped since it is a case-only analysis of deaths among patients with previous hospital admissions for heart and lung disease.
17. Furthermore, the discussion about possible limitations of the present review is missing.
18. Conclusions should be changed: You should point out the topics where your review has identified there is contrasting or limited evidence, and focus on the possible future research areas. I advise that an important point for future research is the identification of clinical pattern of chronic diseases that increase susceptibility to heat.

#### Minor problems

1. Throughout the text you should provide the appropriate references to justify your sentences.
2. Page 4, Methods, Exposure assessment, lines 21-23: Your speaking is more about statistical modelling than about exposure modelling. For example, you have not mentioned that most studies used data from the nearest airport station instead of data from city monitors (see de’Donato F et al. *Int J Biometeorol*. 2008 Mar;52(4):301-10). About this paragraph see also the Major problem 3.
3. Page 5, Methods, Study design, line 22: This sentence is not true for Europe where a number of studies about 2003 heat wave were performed in recent years.
4. Page 7, Summary of recent studies, General ambient temperature and mortality, line 18: avoid the generalization about the value of the threshold value from all the available studies (see major problems 6).

5. Page 7, Summary of recent studies, General ambient temperature and mortality, line 21: the sentence is inexact, since the threshold is often identified from the visual inspection of the exposure-response curves or by mathematical (i.e. through derivatives) or statistical (i.e. by maximum likelihood) methods.
6. Page 11, Summary of recent studies, Cause-specific outcomes and vulnerable subgroups, line 7: Please clarify "lower income areas" (i.e. persons living in lower income areas).
7. Page 13, Discussion, lines 12-14: The sentence "The results from future studies can be more readily compared..." is completely wrong since the relationship between temperature and mortality during summer is non-linear.
8. Page 16, Discussion, lines 11-20: The entire paragraph is unclear. Some of the information that you cite cannot be retrieved by death certificates. Furthermore, this applies only to case-crossover analysis that is based on individual data. The sentence about misclassification of exposure is out of place here.
9. Page 16, Discussion, line 24: I believe that health care institutions are the organisms deputated to implement policies to prevent heat-related mortality and not meteorological services like the US NWS.
10. Page 17, Discussion, lines 2-3: No formal evaluation of heat-health watch warning systems has been performed to date. This is an important area for future research. Take into account that HHWWS are not able to reduce heat-related mortality, without a prevention plan targeting vulnerable subgroups (see the WHO guidance on Heat Health Action Plans <http://www.euro.who.int/document/e91347.pdf>).
11. Page 17, Discussion, lines 3-5: Support your statement "The 2003 heat wave in Western Europe resulted in 35,000 deaths, but subsequent heat waves in more recent years did not produce such detrimental effects" by the appropriate references.

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests'