Reviewer's report

Title: Case-series analysis of fine-scale spatial variability in heat-related mortality, Philadelphia County, USA, 1983-2008

Version: 1 Date: 16 December 2011

Reviewer: Francesca de'Donato

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Article is of interest as it poses to explore the geographical differences in excess mortality within urban areas due to local socio-demographical and environmental characteristics. However there are some things which are not clear in the analysis which should definitely be clarified and explained more clearly in the text.

Introduction

Introduction is clear but should focus more on features in study to be more effective and to the point. It is worth mentioning that in urban areas especially in the US, high density areas as often those with high UHI intensity and low socio-economic level so when studying these together, especially as a factor analysis is carried out it is worth mentioning the fact they are correlated, especially Often one can be a proxy of the other so what is the benefit/limit? Please address this!

Data

Satellite data: why use only 2 days if 47 clear-sky images? An “average” map would have given a more robust idea of UHI phenomenon in Philadelphia, not only during two 2xextreme days”, suggesting the phenomenon is always present but aggravates during extreme conditions. Satellite images are daily while UHI effect is a nighttime phenomenon, hence not convinced this aspect is reported correctly here.

Modelling

A summer only analysis would have been better and standardization procedure more specific to within-summer mortality fluctuations and age-standardization. This part needs to be reworded, to explain what has been done and not necessarily all the single steps of the analysis.

Why were 3°C AT bins chosen? Doesn’t this limit sample size? Especially for extreme temperatures? Maybe something could be said about other combinations tested, especially larger bins. A sensitivity analysis would be appropriate.

Not too convinced about using different time intervals and how the potential lag effect of exposure to high temperatures is treated here. Is it repeated differently for each ZCTA? If yes, is this plausible and feasible to have differentiated lags by zone? This aspect would be complex to apply to HHWWs, which at this point
should be differentiated by zone and hour?

Results

Tables need to be improved and made more legible, SPSS output not appropriate.

Would have been better to include PC2 and PC3 as they do explain 16 and 10% of variance respectively. While 5 and 6 are much smaller and not very clear what they represent in terms of heat related mortality. Which Pc explains the elderly as PC1, and Pc have negative coefficients and Pc5 is very small?

Discussion

Results presented are of interest however should be discussed more in detail. The scope of the study isn’t that clear sometimes and limits of study should be addressed more explicitly. The correlation between area indicators, especially UHI and low socio-economic conditions or high density in identifying areas at risk should be addressed as there doesn’t seem to be a great benefit in using them all as they are predominantly all included in PC1.

Implications of results especially for HHWW and heat public health are important, indications on how results could be used in terms of definition of at risk areas, at risk susceptible subgroups should be included.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare a have no competing interests.