Reviewer’s report

Title: Exposure to Hazardous Air Pollutants and Risk of Incident Breast Cancer in the Nurses' Health Study II

Version: 0 Date: 17 Oct 2017

Reviewer: Jyotsna Jagai

Reviewer’s report:

The authors present an analysis of hazardous air pollutants in association with incident breast cancer in the Nurses' Health Study. The findings suggest varied associations for different pollutants. Overall, this is an interesting study, however, I would like to see some additional context for the research and have some questions on the analysis.

Abstract:

The authors conclude that long term exposures to HAPs in adulthood are not consistently associated with breast cancer. However, only 2002 estimates of HAPs were used from the NATA data, therefore, it cannot be considered long term exposures.

Introduction:

A comment for the overall paper, the authors focus on the two particular studies that utilize the California Teachers Study as comparisons, particularly in the introduction and discussion. Are these the only two studies to consider HAPs and breast cancer outcomes? It would be helpful to have a more comprehensive background section siting additional references that consider HAPs and breast cancer outcomes is needed.

Methods:

The exposure utilizes the 2002NATA data, however, it is not clear from the description, the time frame in which women were diagnosed with breast cancer. Therefore, it not clear if the exposure is preceding the outcome with a sufficient lag period for cancer development. I would suggest including some descriptive information on date of cancer diagnosis. In addition, the authors should consider limiting the analysis to cases diagnosed a sufficient time following the exposure utilized.

There are several confounders which are utilized in the analysis. Several of these confounders seem as though they may be highly correlated (such as height and BMI and median household income and median home value). I am concerned that the models may be over adjusted. The statistical analysis does not describe any model building or assessment of model fit. I would
suggest that the authors provide more justification, both from the literature and statistically for this particular analysis, for the inclusion of all of these confounders.

The authors also mention adjusting for age and calendar period. Is that age at diagnosis, at the beginning of the study, or current age? What is the calendar period, month, season, quarter? And what is the reason for including the calendar period?

In the statistical analysis it is mentioned that quartiles of exposure were used since dose-responses were not linear. I would recommend that this be described in more detail. How was this assessed and which HAPs demonstrated non-linear responses? Additionally, the statement following says p-values for trend were obtained using the median value for quartile of exposure. However, I would recommend not focusing on the p-value for the trend and including the estimates of trend as well so that the reader can assess the dose-response regardless of statistical significance.

Results:

I would recommend including estimates of trend, and not only p-values, in the results tables.

Discussion:

As mentioned earlier, the discussion focuses on the two CTS studies. However, there is no comparison of results to any other studies which assess HAPs and breast cancer outcomes. Therefore, it is not clear how these results compare to other studies in this area.

The limitations of the use of NATA data are mentioned however, no references are provided and it is not clear if these limitations are specific to this study or if this is a common challenge of using NATA and geographic level exposures.

Minor Comments:

Page 7, line 40 - the parentheses are not necessary around the ER as the acronym has been established previously.

Page 10, line 33 - 36 - the acronyms ER+/PR+ and ER-/PR- are used for the first time and not described or mentioned earlier in the paper. Additionally, here the authors use ER+ and throughout the paper elsewhere they use ER-positive. Please be consistent.

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An article whose findings are important to those with closely related research interests
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