

Reviewer's report

Title: Spatial variation in the incidence of breast cancer and its proximity to soil dioxin contamination in Midland, Saginaw, and Bay Counties, Michigan

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Reviewer: Kurunthachalam Kannan

Reviewer's report:

Review of "Spatial variation in the incidence of breast cancer and its proximity to soil dioxin contamination in Midland, Saginaw, and Bay Counties, Michigan"
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Environmental Health

This manuscript describes application of geostatistical techniques to associate high levels of dioxins in soils with increased rates of breast cancer in Midland, Saginaw, and Bay cities in Michigan. The manuscript is novel in that it documents GIS and spatial analysis techniques are useful in environmental health assessment as well as in assessing disease outcomes in populations. These novel geostatistical methods can be used in conjunction with epidemiological surveys to strengthen cause-effects relations for environmental diseases in general populations. The manuscript is well written and comprehensive. The problem formulation and approaches are well thought out. Statistical methods are well described. Discussion and conclusions are adequately supported by the results. The authors have appropriately identified and discussed limitations. There are a few minor issues related to the presentation of data and I would suggest that these issues (listed below) are clarified.

1. It should be clearly stated in the abstract that dioxin data were obtained from published results. It is not clearly stated anywhere. For example, page 2, methods first line states, 532 soils were collected. It is the dioxin data for 532 soils that were obtained from published literature, not the soils. If you say soils have been collected, then readers will think that you analyzed those soils for dioxins. Furthermore, objective 1 of the paper on page 2 and elsewhere (page 7, line 4) is to "characterize" dioxin contamination. This can be interpreted as if the study involved analysis of dioxins in soils. Because this study basically performed meta analysis of published data, I would rephrase the word "characterization" in objective 1 as 'statistical evaluation of dioxin levels in soils' or alike.
2. Page 2, last line of "methods" section and first line of 'Results' section: Remove "sites" after 'contamination'.
3. Page 2, second line of results section: insert 'cancer' after 'breast'.
4. Page 3, line 6: "contamination areas" should be 'contamination'.
5. Several of the references used are from grey/non-peer reviewed literature or

website information. It would be beneficial to cite published peer-reviewed papers to strengthen the discussions. There are two recent papers that report dioxin levels in the Saginaw River watershed which can be cited at several locations on the manuscript. For example, page 3, 'Background' instead of reference 4 from website, cite the peer-reviewed published paper that reports soil contamination along the Saginaw River; Kannan, K., Yun, S.H., Ostaszewski, A., McCabe, J.M., Taylor, D. and Taylor, A.B. (2008). Dioxin-Like Toxicity in the Saginaw Bay Watershed: Polychlorinated -dibenzo-p-dioxins, -dibenzofurans, and -biphenyls in sediments and floodplain soils from the Saginaw and Shiawassee Rivers and Saginaw Bay, Michigan, USA. Archives of Environmental Contamination and Toxicology, 54, 9-19 and Yun, S.H., Addink, R., McCabe, J.M., Ostaszewski, A., Taylor, D., Taylor, A.B. and Kannan, K. (2008). Polybrominated diphenyl ethers and polybrominated biphenyls in sediment and floodplain soils of the Saginaw River watershed, Michigan, USA. Archives of Environmental Contamination and Toxicology, 55, 1-10

6. References : Kannan et al. 2008 and Yun et al., 2008- dioxin in the Saginaw River can be cited on page 3, line 18; after Tittabawassee River; Page 6, line 3, along with other references cite Kannan et al., 2008; Yun et al., 2008; Page 17, second line - cite Kannan et al., 2008, who report high levels of TEQs exceeding 90 ppt.

7. One of the major limitations that can be listed is the lack of data for other soils from background sites/ZIP codes. Only one or two background data are available and this is a limitation. For example, high incidence of cancer in Frankenmuth zip code, may be due to high soil dioxin conc, but no data are available. I would add another limitation is the lack of TEQ data for more soils from locations away from Midland.

8. Page 4, first 3 lines: I would delete "and some PCBs" because all the TEQs reported in this study are only for PCDDs/Fs. Although some PCBs are dioxin-like, for this particular study, TEQ data are only from PCDD/F results. So, instead of "419 types" say "210 congeners/isomers of PCDD/F".

9. References 6 and 7 can be replaced with a peer-reviewed published paper: Giesy, J.P. and Kannan, K. (1998). Dioxin-like and non-dioxin-like toxic effects of polychlorinated biphenyls (PCBs): Implications for risk assessment. Critical Reviews in Toxicology, 28: 511-569.

10. Page 8, line 5: It states that female breast cancer cases were obtained. The subject is misleading. It should be "Data pertaining to female breast cancer cases were obtained".

11. Page 9, Soil dioxin data: line 5: Please indicate here that TEQ values are given on a dry weight basis and it is for PCDDs and PCDFs only (not PCBs). This is important because readers should not take this as a PCB TEQ. As indicated in reference 3 (Hilscherova et al) and also references above- Kannan et al and Yun et al. PCDD/Fs are critical contaminants in this watershed. PCB levels are low and they do not contribute much to TEQs. This information should be mentioned in this section on Page 9.

12. Page 15, second line from the bottom: It is also worth adding additional

statement that “occurrence of elevated concentrations of PCDD/Fs in bottom sediments, at depths below 60” in the river indicates that the contamination is occurring historically (Kannan et al., 2008)”.

13. Page 16: In the “Results” section, first para, it is worth to compare the trends/rate of increase in breast cancer for 45-64 old females, with the national rate of increase. Is this increasing rate higher than the national rate of breast cancer increase?

14. All the dioxin values need to be round to 3 significant digits, especially table 3 and values reported in text; For example, p16, second line from the bottom: “64445.95” should be “6450”

Level of interest: An article of outstanding merit and interest in its field

Quality of written English: Acceptable

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