RESPONSE TO THESIS REVIEW QUESTIONS

I sincerely appreciate the thoughtful and constructive feedback provided on my thesis, ***"The role of geology formation and anthropogenic activities in radionuclide distribution in selected regions in Ghana"***. The comments have been invaluable in guiding my revisions and enhancing the overall quality of the work. In the following, I address each comment, and provide clarifications where necessary.

1. You used multiple spatial interpolation techniques (IDW, OK, EBK) to map indoor radon levels. Can you explain why EBK was selected as the most appropriate method, and how its output supports your recommendations?

Answer: Thank you for your question. Actually, the IDW was the most appropriate method as compared to EBK and OK. The observed concentrations in the IDW map corresponded to the indoor radon data that was measured in the different locations which was not the same as observed for the EBK and OK maps. Also, the IDW recorded the lowest Mean Absolute Error (MAE) and Average Standard Error (ASE). The IDW is based on the distance between two points, those of observation and those estimated in the interpolation. The IDW also weighs the effect of the observed point on the estimated interpolation, only regarding the distance. On the other hand, the OK technique is based on the relationship between the points and the creation of a preliminary function, i.e., variogram, and in the case of the EBK method, it also recognizes the uncertainty. The OK and EBK could not appropriately describe the radon concentrations within the study area because the OK depends on normally distributed input data which was not the situation for the indoor radon data in the study and the EBK needed additional data, such as soil gas, faults, and soil types, to generate suitable interpolation maps for this study.

2. How would you prioritize health interventions based on your findings- indoor radon exposure vs. cigarette-related Po-210 exposure- in terms of public health strategy?

Answer: Thank you for the comments. In Ghana, there is little knowledge of the health risks associated with radionuclides in the environment among authorities and the public. The first intervention I believe is to educate the various stakeholders on these issues. Thus, regulators, policymakers, and the public should be enlightened on the harmful effects of high indoor radon

concentrations and Po-210 in cigarettes and how to limit the exposure. Second, for Po-210, the government should reinforcement its laws on cigarette consumption (e.g. age limit, no public sale and smoking) and there should be sustained efforts in the regulation of cigarette consumption. For indoor radon, the public must be encouraged to regularly ventilate their homes especially whenever they are indoors to keep radon levels low.

3. Did you observe any consistent statistical or spatial relationships between soil and water radioactivity levels in mining regions that could suggest contaminant transfer? If so, how can this inform environmental monitoring?

Answer: Thank you for this question. Yes, I observed some inconsistencies in the statistical relationship between soil and water activity levels in the mining regions. There were in some cases high radionuclides activity levels measured in farming areas than in mining areas. Some of these farms were adjacent or few metres away from mining sites. I assumed that there is a probable transfer of radionuclides to such areas or those farm areas have been former mining sites especially the ones very close to mining sites. In such instances, the areas need to be monitored for a period of time and mining should be stopped or strictly regulated to safeguard public health.

By

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