Reviewer's report

Title: Incidence of cancer among residents of high temperature geothermal areas in Iceland: A census based study 1981 to 2010

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Reviewer: Peter Baxter

Reviewer's report:

My comments are focused on the geothermal aspects of the paper as I'm not sufficiently well versed on epidemiological research into cancer aetiology in Iceland to know if this paper represents a significant advance in the use of cancer registry data in that country. It is well written and presented and although I'm not a statistician the approach to the analysis and the role of potential confounders seems thorough.

It is an interesting question whether living in volcanic areas presents any special health risk or advantage and the literature is sparse on this matter. This paper is therefore welcome. However, the weaknesses lie in the absence of exposure data and in the extent of moving residence during the follow up period, the latter being mentioned in the text. Indoor air radon is the main issue in drawing any conclusions on a link between this gas and cancer incidence, as has been indicated in the abstract conclusion (which for clarity should be slightly reworded and softened), yet this is not mentioned except for a passing reference to the low radon levels found in geothermal water in Iceland on page 3. Hot water with these low levels is used in homes for bathing, showers, etc, but not for drinking, and presumably no surveys on indoor radon have been undertaken in Iceland (which is surprising) or they should be referenced here. It would be important to have this clarified and why, if the concentrations of radon are likely to be so low, the authors attribute so much weight to it being a causal factor in explaining the variation in cancer incidence they have found.

At present the evidence for such a hypothesis looks very weak, especially as they say there is no increase in lung cancer given the known interaction between radon exposure and tobacco smoking.

The authors do not mention the role of chance when making multiple comparisons with a long list of causes of death and finding statistical significance. The increases in cancer incidence by cause are non-specific and modest.

The titles of the three tables do not explain that Table 2 is all deaths combined, table 3 is men only and Table 4 is women only. I have two slightly different forms of Fig. 2 which is a mistake, presumably.

I'm in favour of publishing this paper if the above comments can be adequately dealt with as it would contribute to answering a question which is frequently
asked in volcanic areas yet few studies have been previously undertaken. Radon may a red herring and other exposures related to geochemical, dietary and even occupational factors in these rural (farming) communities so far unknown may be specific to certain volcanic areas and worthy of future hypothesis generation.

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

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

No competing interests to declare