Reviewer's report

Title: Increase in prevalence of birth defects in an Arctic Russian setting from 1973 to 2011: a register-based study

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Reviewer: Laura Arbour

Reviewer's report:

Thanks for the opportunity to review this manuscript by Postoev et al describing rates of birth defects in Monchegorsk, within Arctic Russia from 1973-2011.

The concise paper was clearly written and provides an overview of rates of birth defects in Monchegorsk derived from two registries across timelines between 1973 and 2011. Given population based reports of rates of birth defects in Russia have not been previously published this manuscript makes a noteworthy contribution to the literature.

Major

1) A map of Russia highlighting the region of surveillance, and other regions mentioned in the manuscript would be helpful for international readers not familiar with Russia. It is appreciated that Monchegorsk was chosen as a city representative of those within an industrialized region, therefore important to document birth defect rates. However, elaboration of the demographics of that city, and Murmansk county would also be welcomed.

2) The methods describing statistical analysis fall short of explaining how comparisons between populations have been made. For example, the first statement of the conclusion describes differences between Europe and Monchegorsk. Although key comparisons are made throughout the discussion (rather than the results), how the differences were determined, and whether the differences were secure were not clear. See for further example lines 181-183, pronouncing that comparisons with other available Russian monitoring data showed that Monchegorsk prevalence was twice as high. The background Russian monitoring data from which that comparison was made was not clear, therefore it was difficult to assess the relevance of the statement. Although not all population comparisons need to be specifically included in the methods and results section, key comparisons, especially if the subject of the conclusion, should be accompanied by sufficient information to allow the reader to evaluate the differences. Lines 184-186, as another example, states that the rates of genital malformations and MSK system were ‘insignificantly lower’ than a previous published report, suggesting a statistical analysis was made but not available to the reader.

Discretionary

3) This manuscript would be made more interesting by more detail about birth
defect rates of interest. What accounts for a substantially lower rate of cardiovascular malformations in Russia compared to Europe (lines 189-190)? This is interesting since the discussion mentions a higher rate of birth defects may be accounted by increased exposures to smoking and alcohol. In both, one would expect an increase, rather than decrease in cardiovascular malformations. The low rate, however, seems to hold across time periods (Table 5) and specific comment would be helpful.

4) What accounts for high rates of MSK malformations? Are there specific malformations that are represented?

5) Another table including the time period between 2003 and 2011 of the over-all group of malformations with comparisons to EUROCAT (and perhaps the rest of Russia) for the same time period would be an interesting addition.

Overall, the information provided in this manuscript provides an important contribution to the literature in the current milieu of encouragement by the WHO for all member countries to develop and enhance congenital anomaly surveillance with the aim of prevention

Minor

Typo Line 196

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

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

**Declaration of competing interests:**

I declare that I have no competing interests.