Reviewer's report

Title: Community-level Risk Factors for Notifiable Gastrointestinal Illness in the Northwest Territories, Canada, 1991-2008

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Reviewer: Emily Jenkins

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This article contains some interesting ideas for generating hypotheses but I have some serious concerns about interpretation and significance of the results. Major compulsory revisions are indicated with an asterix.

This study contributes to a better understanding of the socioeconomic drivers of disease in an underserved population within a developed country. The most important conclusion is: “community-based programs that address safe water and food supplies, adequately designed, constructed, and maintained housing can play a key role in disease prevention and control” (but this is hardly a new concept).

It is an interesting idea to use a community level survey intended for other purposes to attempt to determine community level risk factors for notifiable (territorially tracked and reported) gastrointestinal diseases (NGD). It is good to report the results of the community survey as well as the results of territorial surveillance of NGD. However, the attempt to bring the two together in an ecological study, the weakest of all epidemiological studies, is fraught with potential for misinterpretation and overinterpretation. Authors may wish to reconsider this statistical approach*, which attempts to link two completely separate data sources, and instead note some interesting spatial patterns in the incidence of GIT disease, and go back to the community survey results to look for biologically plausible clues to explain observed patterns.

Overall, it feels like authors are trying too hard to tie everything back to country food consumption and zoonotic risks. There is sound microbiological and epidemiological evidence to link the 2 bacterial GIT diseases in question to consumption and handling of retail poultry, eggs, and pork (NOT wild game), and to suggest that giardiasis in people is very often of human origin – i.e. daycare outbreaks and human sewage contamination of water supplies.

From an ethical perspective, a great deal of effort has been expended in northern Canada to provide a balanced assessment of the risks and benefits of country food consumption. Overall, the general conclusion of nutritionists and public health personnel is that consumption of country foods should be encouraged for cultural, economic, and dietary reasons, while promoting safe food handling and preparation practices. The results of this study focus on the potential risks of infectious diseases associated with country food consumption, based on tenuous
statistical correlations*. That said, we cannot ignore these results – but we should be VERY careful not to overinterpret them. Phrasing throughout the paper should emphasize that these are statistical correlations NOT risk factors or “relationships”.

Authors express a specific interest in aboriginal populations but then do not go on to discuss the proportion of aboriginal people in a community as a potential community level risk factor. In addition, there is a complex mixture of Inuit, Dene (not mentioned) and Metis in the NT, which might presumably have distinct risk factors. If the study population of interest is Aboriginal, it is not clear why this study is focused in the NT, which has a relatively large non-Aboriginal population as compared to Nunavut, Nunavik, Labrador, and the northern half of most provinces in Canada.

There is a lot of undefined jargon used in this paper. Authors need to ensure that terms that have a very specific meaning are well defined*. (i.e. environmental, ecological, notifiable, and even Aboriginal all have specific epidemiological and Canadian meanings that may not be accessible to a broader international audience.)

Specific comments:

Abstract:
Background: Is “notifiable” universally understood?

Methods: be specific about the different data sources. Why were these models used, and why different models for campylobacteriosis than the other two diseases? Explain in accessible terms to a general scientific and medical audience what “Rate ratios” mean.

Results: Give directions of “community level risk factors”, not just the variable name*. i.e. Higher percentage of internal mobility as well as having a health centre (vs a hospital) were associated with increased risk of giardiasis at a community level, whereas increased health expenditure per capita was associated with decreased risk of giardiasis at a community level”.

Conclusion: It is possible that the results regarding campylobacteriosis and traditional activities are indeed spurious, and mention should be made of the benefits of traditional activities far outweighing the risks, if they actually exist*.

The conclusions about traditional knowledge, genetic adaptation, and acquired immunity come out of left field in the abstract.

Background:
Define “Contextual community level risk factor”.

There seems to be a pre-existing agenda to focus in on country foods instead of looking for general risk factors from a broad array of demographic and behavioural variables*.

Materials and Methods
Subheading “Data sources and database development” – no mention is made of databases?

How were these 18 variables selected? Were any tests done to determine covariation/collinearity and surrogacy*? Many of these variables could be highly correlated with each other, and many could serve as surrogates for socioeconomic status. This includes country food consumption – people who consume country foods out of necessity may be of low SES – alternatively they may also be of high SES if they are very successful hunters and community providers with access to boats, ATV’s, snow machines, and fuel.

NWT communicable disease registry: was anything done with the age, gender, community, and food and water history data for individual cases? This could help address individual level risk factors.

Statistical Analyses:
I am not able to comment on the appropriateness of these methods.

Why include variables that resulted in a change in the measure of effect by greater than or equal to 20%? (ie why this number?)

Results: why use a relaxed p value of greater than or equal to 0.20?

Campylobacteriosis:
How is it possible to have two variables that individually are associated with an increased incidence of disease at the community level, and yet together lead to a decreased incidence?* Explaining this interaction seems to require backflips to make a biologically meaningful connection. Could these paradoxical results reflect a sample size issue? - for example, how many people both trap and consume country food?

It seems quite likely that communities with higher use of traditional foods would also have higher food prices, both of which might be surrogates for remoteness (for which there is no variable in Table 1) and socioeconomic status. It should be noted that trapping in northern Canada is primarily for fur and that carnivores are seldom eaten, so the links between trapping and country food consumption are unclear.

Giardiasis: It seems quite likely that health centre vs hospital is directly linked to community size (not included in the variables examined).

Discussion: “relationship” is misleading. Statistical correlation perhaps?

Define “environment”.

There is no genetic characterization done by laboratories that would determine if cases of NGD are of zoonotic origin. There is support to demonstrate that RETAIL meats and domestic animal products are linked with bacterial NGD – and yet this variable (retail meat consumption) was not considered in the analysis. In the discussion, lines are often blurred by use of terms like “raw meat”
without specifying if the authors are implying retail meat or wild game*. Given that the Inuit population in the NT is very small, there is likely little consumption of raw meat (as compared to Nunavut or Nunavik, for example).

Internal mobility likely has very little to do with country foods. Many residents of northern towns are transient employees of resource extraction companies, or have seasonal employment fighting fires, etc.

“food prices increase ?as one moves? northwards”

It seems likely that people in remote communities and those of lower SES can less afford retail meat, and should therefore have lower risk of exposure to Campylobacter. This is compatible with the results that show that high food prices (ie in remote communities) are associated with decreased risk of campylobacteriosis, but incompatible with the findings that country food consumption (which should be higher in remote communities) was associated with increased risk of campylobacteriosis. This seems contradictory.

The parabolic association of salmonellosis with core need is not explained. Why would risk increase up to 42%, then decrease with increasing proportion of households in core need past 42%?*

There are no rats in the NT, and insect vectors are limited as compared to Vancouver and London (references 31 and 32).

Conclusions:

Explain “nondifferential exposure misclassification”

Be cautious when making blanket statements about communities, especially Aboriginal communities.*

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:

I declare that I have no competing interests