Reviewer’s report

Title: Forecast analysis of the incidence of Tuberculosis in the Province of Quebec

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Reviewer: Jane Heffernan

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Review
Forecast analysis of the incidence of Tuberculosis in the Province of Quebec

The authors fit an SELIR model to TB data in Quebec and use this model to forecast the TB epidemic in this province. They focus on Canadian-born Inuit, Foreign-born and non-indigenous Canadian-born. The model is fit for the general Quebec population (Fig 3), and then each one of the sub-populations listed above (Fig 4-6).

Major Comments:

To generate Figs 3-6 the model is fit to data and then the authors use the general trend to forecast the TB epidemic. I do not know why the subpopulations are treated independently of each other to generate Figs 4-6. It seems that these populations will have some mixing, thus a metapopulation model or core group model would be better suited. If these populations are truly mixing independent of each other, then please provide data/references justifying this assumption.

Why does the SELIR model not include relapse or reinfection?

I do not understand how the Gaussian random number distributions were used or generated. I do not understand how these relate to Figs 3-6. Clarification is needed.

Euler’s method with a time step of one month was used. Why was one month chosen? Why not use ODE solvers that are preprogrammed in MATLAB?

Page 10 – the authors state that the number of cases will increase in the middle of the century. Please show this result.

The model is revised later to include retransmission. What is retransmission? Please show the new model and new model diagram. Does retransmission not occur in immigrant populations too?

Page 12 – the immigrant cases will never vanish because there is a constant incoming rate in to the equation for the E class. Thus, this result is not surprising.

Page 12- the authors mention an increase in immigrant cases. Please show this result.
Page 12 – if immigrant populations live close to one another, why is retransmission and/or reinfection not included in the model?

Page 13 – the authors state that the immigrant and Canadian-born populations largely live in the same cities. So transmission can occur between these populations. This is not included in the model (in the way that I understand that the model was fit to the data). Please justify the assumption of independence or revise the model to include transmission between populations.

If the stochastic model is to be used in this study, results should be shown. Last two lines of page 13 – normal distribution… - I do not understand the motivation behind choosing this process. Please explain.

Page 14 – the authors state that if new treatments came in to effect, then the model results would no longer be adequate. There are drug therapies for TB now. How do these affect the current model?

Parameter values – What are the realistic ranges for these parameter values? How is the model structure sensitive to the parameter ranges (sensitivity analysis)?

Why are there no error bars on Fig 3?

Figure 6 – there is not enough information and discussion in the text about the differences between the two cases presented here.

Minor Comments:

I suggest that figures 3-6 should be one figure with 4 subplots.

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

**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