Reviewer’s report

Title: Estimation of cumulative number of post-treatment Lyme disease cases in the US, 2016 and 2020

Version: 2 Date: 02 Jan 2019

Reviewer: Gerrit Gort

Reviewer's report:

The authors made a good effort to incorporate the comments. Currently I have no remaining comments, but one technicality related to the negative binomial distribution. The authors sample counts of yearly new infections using the negative binomial distribution, which is a more reasonable distribution than the Poisson distribution here. For the negative binomial distribution an "overdispersion" parameter is employed. This overdispersion parameter is estimated using the CDC surveillance data, using an overdispersed Poisson model. I suspect that this approach is not correct, because a standard overdispersed Poisson model indeed has a constant overdispersion parameter (with variance equal to the mean multiplied by overdispersion parameter), but not so for the negative binomial distribution: its variance is \( \mu + \mu^2 / \text{size} = \mu^*(1+ \mu/\text{size}) \) (using the parameter names from R in function nbinom). From this you see, that the multiplication factor changes with \( \mu \). The parameter size is the parameter related to overdispersion (relative to Poisson). My suggestion is to use the CDV surveillance data, using a negative binomial model (you can use the R function glm.nb (from mass package), to estimate this parameter. Next, use this parameter to sample from negative binomial distribution(s).

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes
Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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