Reviewer's report

Title: Modeling undetected live poliovirus circulation after apparent interruption of transmission: Implications for surveillance and vaccination

Version: 3 Date: 19 December 2014

Reviewer: Walter Orenstein

Reviewer's report:

This study uses a modeling approach to examine the possibility of silent circulation of wild and vaccine-derived polioviruses as well as the length of time needed to ensure interruption and transmission and to certify eradication, important concepts for the polio endgame. The authors use scenario-specific inputs (India, Nigeria, Tajikistan and Israel) to model circulation for the 3 polio types finding variation in circulation and illustrating the importance of surveillance sensitivity. It also illustrates the importance of boosting immunity with multiple tOPV campaigns before the switch in places like Nigeria, as modeling showed this action to lead to earlier elimination of cVDPV2s. The problem this reviewer foresees is that the explanation of the model is extremely difficult to understand for the “non-modeler”. If the intended audience is a “non-modeler” group, particularly those involved in making policy regarding polio certification, then extensive rewriting is called for to make the model more understandable to that audience. On the other hand, if the primary audience is other modelers, the manuscript may be fine as is.

For example Figures 1 b and 1 c are virtually impossible to understand and the explanation in the text is not very helpful. I would be extremely useful to simplify them, if possible. Further, it would be better to have more simple figures than fewer very complicated figures.

Detailed comments:

• In discussing Israel, authors noted that population immunity fell below the threshold and transmission of WPV occurred without any paralytic cases due to protection from IPV. Did modeling of this experience give any information on transmission of cVDPVs?

• Figure 1a should include footnotes for definitions. For example, what does “a partially infectible person” mean. That should be defined in the footnote.

• Figure 1b is labeled twice (second one should be 1c). Figure 1b is virtually impossible to read. What do the lower case “d”’s mean? What do the double parallel lines perpendicular to lines mean? What does the positive “+” as well as “-“mean? The text trying to explain Figure 1 is dense and very difficult to follow.

• Figure 1d (environmental surveillance details) is mentioned in the text but not included in the attachments.

• Figure 1- first box typo, should be “surveillance”
• Table 1 – define EIP as a footnote to the table. How was it derived for the table? What do all the terms in the bottom right box for Israel mean?
• Table 2- legend with definitions of acronyms would be helpful
• Line 122 – authors assume readers will know what a “cVDPV” is. Suggest footnoting the definition.
• Line 223 – the definition for “partially infectible” is not clear. Is this someone who has systemic immunity (i.e., protected against paralysis) but with absent or limited mucosal immunity?

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

**Quality of written English:** Acceptable

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