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Reply to Letter to the Editor

Author's reply : "It could have been much worse: The Minnesota measles outbreak of 2017"

We are thankful for the opportunity to respond to the letter [1] regarding our manuscript on the 2017 Minnesota Measles outbreak [2]. We wish to start this letter by acknowledging the outstanding work of the Minnesota team to address and contain the outbreak. Although Ehresmann et al. bring up several valid points, we believe that these points do not invalidate the core message of our analysis. Here, we will respond to their concerns and summarize where we remain.

First, the importance of the Somali-autism relationship to our manuscript was the potential concern of autism in the population that made them susceptible to MMR-related targeted efforts by anti-vaccination advocates. We cited Barnevik-Olsson et al. [3] on autism in the Somali population to highlight that concern. However, we also cited the Hewitt et al. [4] work that rebuts claims of increased autism rates in the Somali community and noted in our manuscript that the fear was misplaced. Yet we acknowledge that given the sensitivity of this topic in the Somali community and its complex nature, we could have been more nuanced in our explanation and had no intention of undermining efforts to increase confidence in the MMR vaccine.

Regarding the data used, Ehresmann et al. correctly note that our language regarding private school districts was inadequate. In the publicly-available vaccination data, private schools are treated as their own districts in Minnesota. Unfortunately, we did not convey this clearly. Ehresmann et al. also note the more precise vaccinations requirements for the pre-K population in Minnesota. Similarly, we acknowledge that our data were not as detailed as what the Minnesota team has access to internally (e.g., Minnesota Immunization Information Connection data and calendar date and location of the measles cases). For our analysis we worked with the best publicly-available data at the time of submission (December 12, 2017), and we should not have used the word "confirmed" to describe the measles cases and could have noted that the data were preliminary.

Ehresmann et al. state that "it is important that users of the data reach out to the institutions and content experts." This was on our mind as well when developing and conducting the analysis. We initially worked with a public health officer from Hennepin County where most cases were located. However, after a prolonged delay from the officer, we decided to move forward without their input as this was a timely analysis with significant public health implications.

We acknowledge that our statement about "enforcement" could be misleading, as children without MMR vaccine could be in full compliance with the state law via a medical or non-medical exemption. However, our objective was to highlight empirical evidence showing that lower incidences of measles were associated with the existence as well as enforcement of immunization requirements for school entry [5].

In sum, we believe that the key messages of our manuscript remain true: Minnesota has several pockets of spatially contiguous public school districts with MMR coverage rates below the recommended threshold for herd immunity; the measles cases in the 2017 outbreak were found in many of the same geographic regions as these low-coverage public school districts; and if the infections had spread into schools in these low coverage regions (e.g., via the geography proximity of infectious and susceptible children), the outbreak could have been worse.

References

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