

Revisiting Zika-caused microcephaly in Colombia and Brazil

August 4 2016

Last month when the number of Zika linked microcephaly cases in Colombia began to rise, it looked like the connection between the two afflictions had finally been confirmed. Then, in the last two weeks, cases have plateaued again. This combined with highly uneven reporting of Zika infections in Brazil makes the epidemic difficult to analyze. According to the latest report from the New England Complex Systems Institute (NECSI), depending on which data can be considered reliable, Colombia's microcephaly outbreak might be over or it could peak anywhere between 200 and thousands of cases.

When Zika was first reported in Colombia in August, 2015, the wait began to see if that country would experience a wave of microcephaly cases like the one impacting Brazil. Now Colombia has declared an end to the Zika epidemic, but with the delay between infection and birth, more cases would still be expected.

As NECSI previously reported, an increase in microcephaly in Colombia first became apparent after June 18, when reported cases began to rise above the expected background rate of this birth defect. NECSI's analysis of the available data suggested that Zika infection during the first trimester of pregnancy leads to microcephaly in 1 percent of cases. This is consistent with observations from the previous outbreak in French Polynesia.

If the rate of 1 percent of pregnancies infected in the first trimester developing microcephaly is accurate, the outbreak in Colombia should

peak at 200 cases in the coming weeks. By that model the last two weeks should have seen around 10 more cases, but none were reported.

To validate the data from Colombia and French Polynesia, NECSI has looked to the available information from Brazil's outbreak. The results were phenomenally inconsistent. According to the reported cases of Zika and microcephaly in one Brazilian state, Bahia, a staggering 63 percent of pregnancies infected with Zika in the first trimester result in microcephaly. The calculated rates from other states show even wider discrepancies. If the data from Brazil is used to predict the outbreak in Colombia, there could be 10,000 microcephaly cases.

The problem is a pervasive unevenness in Zika reporting. Reporting was not mandatory in Brazil until 2016. Since most cases are asymptomatic and symptoms are usually mild anyway, underreporting is to be expected. But there would have to be 63 times more unreported Zika infections in Bahia to make the microcephaly rates match Colombia's data.

It is difficult to draw any conclusions in the face of such unclear data. The missing cases in Colombia might be reported tomorrow. The discrepancy with Brazil will have to be resolved by better reports of the rate of Zika in Brazil and the ongoing monitoring of microcephaly cases in Colombia.

In the mean time, it is important to acknowledge when available data is not providing clear answers, and what the absence of clear answers might mean. On July 25, the journal *Nature* published a discussion titled "Brazil asks whether Zika acts alone to cause birth defects." Inconsistencies in the data suggest a more complicated relationship between Zika and microcephaly than has been assumed. To predict the impact of outbreaks and the particular dangers faced during pregnancy, a better understanding—and better data—is needed.

More information: Yaneer Bar-Yam, et al, Determining the rate and week of infection of Zika caused microcephaly from Colombian and Brazilian data; Status Report August 1, 2016, NECSI (August 1, 2016). necsi.edu/research/social/pand...s/statusreport3.html

Declan Butler. Brazil asks whether Zika acts alone to cause birth defects, *Nature* (2016). [DOI: 10.1038/nature.2016.20309](https://doi.org/10.1038/nature.2016.20309)

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