

Reverse global vaccine dissent

This year, the World Health Organization named vaccine hesitancy as one of the top 10 global health threats, alongside threats as grave as climate change, antimicrobial resistance, Ebola virus, and the next influenza pandemic. What happened? How did vaccine reluctance and refusal become such a major risk?

The concerns driving antivaccine sentiment today are diverse. For example, from 2003 to 2004, a vaccine boycott in Nigeria's Kano State sparked the retransmission of polio across multiple countries as far as Indonesia. Rumors of vaccine contamination with antifertility agents contributed to distrust and reinforced the boycott, costing the Global Polio Eradication Initiative over U.S. \$500 million to regain the progress that was lost. In Japan, vaccination against human papilloma virus plummeted to almost zero after young women complained of movement disorders and chronic pain, causing the government to suspend proactive recommendation of the vaccine nearly 6 years ago. Similar episodes occurred in Denmark, Ireland, and Colombia as YouTube videos of the girls' symptoms spread anxiety, despite evidence of the vaccine's safety.

The global surge in measles outbreaks has been exacerbated by vaccine refusers. In 2015, the measles strain that sparked the Disneyland outbreak came from visitors from the Philippines, infecting people who had refused vaccination. And in Indonesia, Muslim leaders issued a fatwa against a measles vaccine containing "haram" porcine compounds, while naturopathic "cupping" methods were promoted on Facebook as an alternative to vaccination. In 2018, a mix of political, religious, and alternative health antivaccine messages circulated on WhatsApp and Facebook in Southern India, disrupting a local measles-rubella vaccination campaign.

The phenomenon of vaccine dissent is not new. The pages of 18th-century London antivaccination pamphlets bristle with many of today's memes, but these ideas now spread over unprecedented distances with remarkable speed, clustering in online neighborhoods of shared beliefs. This clustering can tear the protective fabric—the

"herd (community) immunity"—that the majority of vaccine acceptors have woven. As the portion of the community that is vaccinated decreases, there is less protection for others who may be too young, unable, or choose not to be vaccinated. For some diseases, it only takes a small minority to disrupt the protective cover.

It is just over 20 years since British physician Andrew Wakefield sowed seeds of doubt about the safety of the MMR (measles, mumps, rubella) vaccine, suggesting a link between the vaccine and autism. Suspicions around the vaccine traveled globally, instilling anxiety among the most and least educated alike. The discredited Wakefield alone, though, cannot be blamed for today's waves of vaccine discontent. He seeded a message on the eve of a technological revolution that disrupted business, politics, societies, and global health. The same year that Wakefield published his research, Google opened its doors. The launches of Facebook, YouTube, Twitter, and Instagram soon followed. These social media platforms have magnified individual sentiments that might have stayed local. Emotions are particularly contagious on social media, where personal narrative, images, and videos are shared easily.

Today's tech companies are now being called to account for their role in spreading vaccine dissent. Last month, the American Medical Association urged

the chief executives of key technology companies to "ensure that users have access to scientifically valid information on vaccinations." But this is not merely an issue of correcting misinformation. There are social networks in which vaccine views and information are circulating in online communities, where vaccine choices become part of one's overall identity.

To mitigate the globalization of vaccine dissent, while respecting legitimate sharing of concerns and genuine questions, a mix of relevant expertise is needed. Technology experts, social scientists, vaccine and public health experts, and ethicists must convene and take a hard look at the different roles each group has in addressing this challenge. It needs everyone's attention.

—Heidi J. Larson and William S. Schulz

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