

# Opinion: Vaccinations, vaccine science, and a new U.S. president

18 November 2016, by Peter Hotez

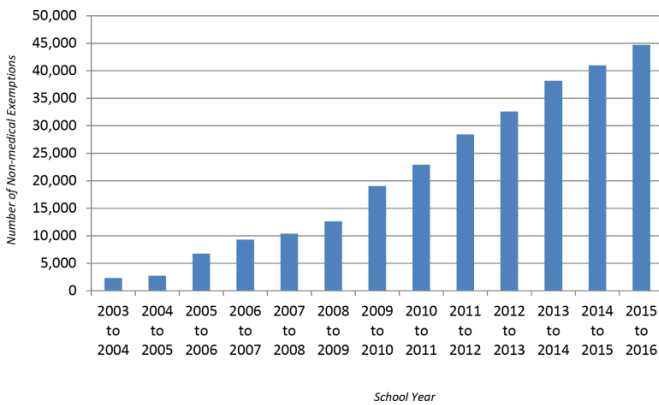


Fig 1. Personal belief exemptions in Texas: K–12th grade students with nonmedical exemptions, Texas, 2003–2016

The 2016 US Presidential debates and campaign were mostly devoid of any meaningful science policy discussions. Beyond climate change we don't really know where US President-Elect Donald Trump stands on most science issues, but given the urgency of some of the most pressing and emerging aspects of a global science agenda we can expect him to welcome such challenges in the weeks and months ahead.

A particular science issue of great concern to the public health of Americans and indeed children worldwide has been a rising tide of anti-vaccine sentiments and the birth of a highly toxic and aggressive "neo" anti-vaxxer movement replete with slick advertising, lobbying, and even film production and exhibits. In an October 2016 *PLOS Medicine* article ('Texas and its Measles Epidemic') I highlighted how one such neoantivaxxer putsch is currently underway in the state of Texas.

As shown in Fig 1 almost 50,000 Texas children are currently not receiving their annual school vaccines due to non-medical exemptions, a jump

of almost 20-fold over the last decade, with number of Texas school districts and schools dropping precipitously to alarming and historic lows in their vaccination rates.

My worry is that we will soon begin seeing measles transmission return to Texas, with outbreaks possibly appearing 2017 or 2018. I prioritize measles over other childhood infectious diseases due to the extraordinarily high transmissibility of the measles virus, as expressed in a reproductive number that can almost reach 20 – meaning a single infected child can infect that many non-vaccinated children, especially young infants not yet old enough to receive [measles vaccine](#).

A second concern is that the Texas anti-vaxxer movement could grow both within our borders and beyond. Our nation is so good at exporting American culture that anti-vaxxer sentiments and declines in vaccination rates could spread to other nations. If [vaccination rates](#) decline in some of the large low- and middle-income nations such as Brazil, China, India, Indonesia, and Nigeria the results would be catastrophic. We could reverse all the gains achieved through Millennium Development Goal 4 (MDG 4, to reduce child mortality). Those results include new findings just released by the Gates Foundation-supported Global Burden of Disease 2015 Mortality and Causes of Death Collaborators that found a 75 percent reduction in global measles mortality over the last decade such that (for the first time ever) fewer than 100,000 children died from measles in 2013 and 2015. A vigorous neoanti-vaxxer movement starting in Texas could ultimately derail those historic global declines, with catastrophic numbers of child deaths.

The return of measles to Texas and possibly reversals of MDG 4 are especially tragic given that the neoanti-vaxxer movement is entirely steeped in pseudoscience and faux conspiracy theories. As a counter in *PLOS Medicine* this fall I summarized

three massive studies involving hundreds of thousands of children that clearly show no link between the MMR (measles, mumps, and rubella) vaccine and thimerosal containing vaccines and autism.

I also believe there is no plausibility to the theory that we're giving too many vaccines and that we need to space them out. First of all changing vaccine schedules risks reducing their immunogenicity or ability to protect the child, and second it's important to remember that every child's immune system is presented with dozens if not hundreds of new antigens daily through the gastrointestinal and respiratory tracts and would not be affected by a few additional vaccines.

As both a research scientist who develops vaccines for neglected diseases and a father of an adult daughter with autism and other developmental delays (Fig 2) I also think it's important to emphasize the genetic and epigenetic basis of autism and why I believe there is no plausible or credible mechanism to link this condition to vaccines. The good news is that research on autism genetics and epigenetics is progressing rapidly and suggests the possibilities of some exciting new diagnostic modalities and therapies downstream.

What does all this have to do with the US President-Elect? In a detailed piece published this month in the Business Insider, Lindsay Dodgson summarizes Mr. Trump's publicly stated views on vaccines as being either harmful or somehow causing or precipitating autism [6]. Among them are several tweets in 2014 alleging links between autism and vaccines, mostly occurring when a child receives too many vaccines at once, e.g., "Healthy young child goes to doctor, gets pumped with massive shot of many vaccines, doesn't feel good and changes – AUTISM. Many such cases!"; a similar statement he made to Fox News in 2012; and his widely heard remarks during one of the GOP debates in which he discussed an "epidemic" of autism and his statement about its link to vaccines.

Along similar lines, Amanda Marcotte summarized her position as follows:

Claiming that you're not opposed to vaccines, just that you want them to be safer or on a different schedule, is a common deflection technique among anti-vaccination conspiracy theorists. As Trump demonstrated, it's a way to position yourself as reasonable while still perpetuating the false belief that getting your jabs is going to destroy your brain. Meanwhile, there's no evidence that vaccines are safer if they're spaced out more—all that does is open a window to disease exposure and increase the risk that a child could miss a vaccine altogether.

So where do we go from here? It's encouraging that President-Elect Trump chose not to repeat his allegations about vaccines and autism when questioned this fall by the scientific community. And so far he has not repeated his earlier statements post-election. Less encouraging are claims that Mr. Trump actually met with Wakefield last August and that he supports Wakefield's position. For now, I'm willing to put that one in the unsubstantiated rumor category.

My position is that we now start with a clean slate, and use this period to encourage the President-Elect to adopt a position on vaccines that is both supported by abundant scientific evidence and endorsed by the mainstream community of vaccine scientists and autism experts. My hope is that the Trump transitional team takes the time to identify a top-flight presidential science advisor such as the ones that served Presidents Clinton (Neal Lane), W. Bush (John Marburger III), and Obama (John Holdren). Like his predecessors I believe that even without formal scientific training our President-Elect has both the intelligence and capacity to absorb sound and forthright scientific information.

Public health is under threat and the stakes are high.

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