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Immunization Trends and Immunization Exemption Policies

This report focuses on the current debate over non-medical immunization exemptions in the United States. In it we examine the nationwide trends in child vaccination rates as well as those particular to the state of Vermont, the dangers of these exemptions as well as the reasons why they are used, and the results of numerous medical studies relevant to the debate.

Vaccines are generally acknowledged as one of the most significant public health success stories of the last century.[1] Vaccines are credited with radically reducing "morbidity and mortality from a variety of bacteria and viruses."[2] At the turn of the twentieth century many diseases could cause mass outbreaks and were common sources of loss of health and life.[3] These same diseases, after the advent of immunization, are now rarely seen because they have been prevented by mass vaccination. However, vaccines can in rare circumstances themselves be linked with causing illness. A potential for harm, as infrequent as it is, can be perceived as a looming threat to those who no longer experience or fear the diseases vaccines target.[4]

While there is no federal mandate for vaccination, all fifty states have passed legislation requiring specific vaccinations for school entrance. Vaccination exemptions vary from state to state. All school immunization laws grant exemptions to children for medical reasons, such as a compromised immune system. Mississippi and West Virginia are the only two states that do not grant exemptions for individuals who have religious beliefs against immunizations. Christian Scientists and the Amish are two well know religious groups that do not believe in vaccination. Twenty states, including Vermont, allow philosophical exemptions for those who object to immunizations because of personal, moral or other beliefs.[5]

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[1] Committee to Review Adverse Effects of Vaccines, Board of Population Health and Public Health Practice, The Institute of Medicine of the National Academies, *Adverse Effects of Vaccines: Evidence and Causality*, Kathleen Stratton, Andrew Ford, Erin Rusch, and Ellen Wright Clayton, editors (The National Academic Press, August 2011), accessed April 15, 2012, http://www.nap.edu/openbook.php?record_id=13164, p.ix.

[2] Committee to Review Adverse Effects of Vaccines, *Adverse Effects of Vaccines: Evidence and Causality*, p.ix.

[3] Committee to Review Adverse Effects of Vaccines, *Adverse Effects of Vaccines: Evidence and Causality*, p.ix.

[4] Committee to Review Adverse Effects of Vaccines, *Adverse Effects of Vaccines: Evidence and Causality, p.* 21-30.

[5] National Conference of State Legislatures, "States with Religious and Philosophical Exemptions from School Immunization Requirements," February 2011, accessed April 15, 2012, http://www.ncsl.org/issues-research/health/school-immunization-exemption-state-laws.aspx.

Vermont's Exemption History

Vermont has allowed an exemption based on "moral convictions" since 1979; the philosophical conviction exemption was created in 2007.[6] In the 2010-2011 school year, incoming kindergarten exemption rates in Vermont were 0.2 percent religious, 0.6 percent medical, 5.4 percent philosophical, and 10.4 percent were provisionally admitted.[7] The provisionally admitted category applies to children who are admitted to a childcare facility and are in the process of complying with immunization requirements as indicated by their health care provider.[8] Provisional admission is permitted for no longer than sixty days.[9]

Since 2005, vaccination rates in Vermont have experienced a downward trend.[10] In 2009, 59.9 percent of Vermont children ages 19 to 35 months had received the seven-series vaccine recommended by the Center for Disease Control.[11] The seven-series vaccine includes 4 doses of DTP/DT/DTaP (Diphtheria, tetanus, pertussis), 3 doses of poliovirus vaccine, 1 dose of measles containing vaccine, 3 doses of Hib (*Haemophilus influenzae* type b) vaccine, 3 doses of hepatitis B vaccine, 1 dose of varicella vaccine and 4 does of PCV (Pneumococcal).[12] In comparison with the other New England states, Vermont has the lowest percentage of children ages 19 to 35 months receiving the vaccine series. Figure 1 shows the New England states and the percentages of children ages 19 to 35 months receiving the vaccine series.

[6] Gregory Sanford, Vermont State Archives and Records Administration; Vermont Association of Hospitals and Health Systems, "House Health Care Considers Philosophical Exemptions," accessed April 12, 2012, http://www.vahhs.org/index.php?option=com_content&view=article&id=158%3Ahouse-health-care-considers-philosophical-exemptions&catid=48%3Ahighlights&Itemid=148.

[7] Vermont Department of Health, "Vermont's Immunization Law," modified March 26, 2012, accessed April 12, 2012, http://healthvermont.gov/hc/imm/documents/immunization_law_faq.pdf.

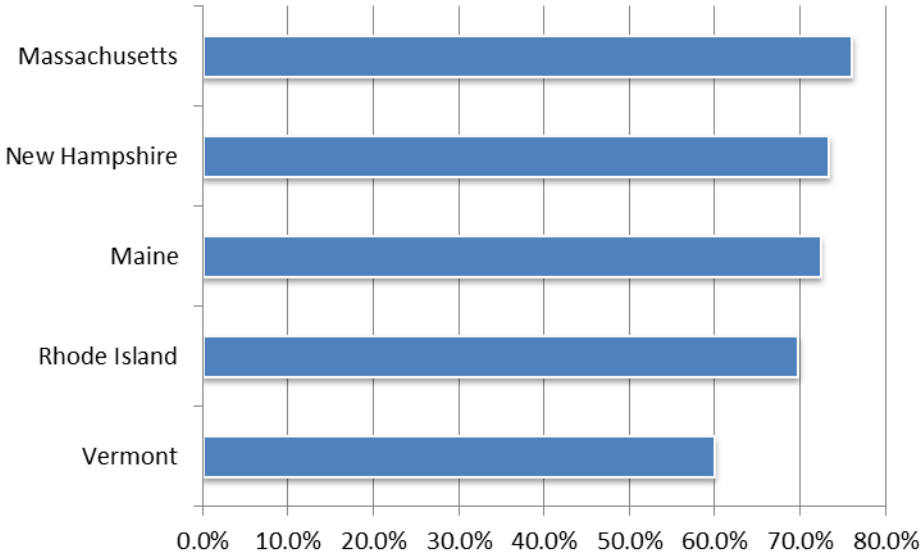
[8] Vermont department of Health, "Vermont Immunization Requirements," modified 2011, accessed April 12, 2012, http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CC8QFjAB&url=http%3A%2F%2Fhealthvermont.gov%2Fhc%2Fimm%2Fdocuments%2Fchildcare_provider_requirements_guidance.pdf&ei=IPGPT_2bEYX20gHNppjCBQ&usg=AFQjCNHm5xT2mnifTBX3aGO4kdiINUcsDw&sig2=iSmkbYaoS07lCmh67jezdQ.

[9] Vermont Department of Health, "Vermont Immunization Requirements."

[10] Vermont Association of Hospitals and Health Systems, "House Health Care Considers Philosophical Exemptions."

[11] Center for Disease Control and Prevention, Morbidity and Mortality Weekly Report, "National, State, and Local Area Vaccination Coverage Among Children Aged 19-35 Months – United States 2009," modified 2010, accessed April 12, 2012, http://www.cdc.gov/mmwr/PDF/wk/mm5936.pdf, p.10.

[12] Center for Disease Control and Prevention, Morbidity and Mortality Weekly Report, "National, State, and Local Area Vaccination Coverage Among Children Aged 19-35 Months – United States 2009."



	Vermont	Rhode Island	Maine	New Hampshire	Massachusetts
Series1	59.9%	69.7%	72.3%	73.3%	76.0%

Figure 1: Percent of Children Aged 19 to 35 Months Receiving Vaccine Series, New England States, 2009.

Source: Center for Disease Control and Prevention, Morbidity and Mortality Weekly Report, "National, State, and Local Area Vaccination Coverage among Children Aged 19-35 Months – United States 2009," modified 2010, accessed April 12, 2012, http://www.cdc.gov/mmwr/PDF/wk/mm5936.pdf.

Dangers of Immunization Exemptions

Mandatory immunizations ensure the health of the public as a whole. Individual exemptions threaten not only the exempted individual's well-being, but also the health of his or her entire community.[13] In order to maintain "herd immunity," or the level of immunization in a community that makes transmission unlikely,[14] a minimum of 75%-94% of the population must be vaccinated.[15] Dipping below this level endangers the immunized community as well; it increases the likelihood that individuals who have received the necessary immunizations will acquire these vaccine preventable diseases (VPD).[16]

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[13] Daniel R. Feiken, "Individual and Community Risks of Measles and Pertussis Associated with Personal Exemptions to Immunization," *The Journal of the American Medical Association*, 284, no. 24 (2000): 3145-3150.
[14] Center for Disease Control and Prevention, "Vaccine & Immunizations Glossary," Last modified March 7, 2012, Accessed April 12, 2012, http://www.cdc.gov/vaccines/about/terms/glossary.htm#h.
[15] Thomas Aragorn, "Epidemiological Concepts for the Prevention and Control of Microbial Threats," 2005, accessed April 2012, http://vaccines.procon.org/sourcefiles/herd_immunity.pdf.
[16] Daniel R. Feiken, "Individual and Community Risks…," (p 3149).

A 2000 study by the American Medical Association found that non-vaccinated individuals were twenty-two times more likely to acquire pertussis, also referred to as "whooping cough", and six times more likely to acquire measles than vaccinated children.[17] Additional studies have shown increased risk among geographical "clusters" of people who have exempted themselves from vaccination. This means that outbreaks are more likely to occur when individuals who have been exempted from immunizations are geographically concentrated in a small area.[18] This danger is especially threatening in religious communities that regularly make use of a religious exemption, such as schools of Christian Scientists and Amish villages. These communities have experienced numerous outbreaks of preventable diseases.[19] These kinds of outbreaks are the threat that a community faces from high exemption percentages and, consequently, low vaccination rates. The outbreaks that these communities have experienced can be considered a testament to the precautionary benefits of vaccinations and a warning of the dangers associated with immunization exemptions.

Justification for Non-Medical Vaccine Exemption

Despite the lack of peer-reviewed evidence suggesting vaccines are unsafe, concerns about vaccination safety persist in the United States. In a 2009 survey study conducted by the *Journal of the American Academy of Pediatrics*, 54 percent of respondents indicated that they are concerned about the serious adverse effects of vaccines.[20] The most common medical concern regarding vaccinations is the belief that certain vaccines can cause Autism in otherwise healthy children.[21] The 'safety of vaccines' question became a prominent issue after Dr. Andrew Wakefield published a study in the British medical journal, *The Lancet,* in 1998. In the study Wakefield and his research team claimed that the MMR Vaccine—treating Measles, Mumps and Rubella—caused autism spectrum disorders.[22] The publication of Wakefield's research initiated a controversy over the medical safety of vaccinations. Thimerosal, a mercury-containing preservative used in vaccinations since the 1930s, was blamed as the compound in vaccinations that could cause autism.[23]

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[17] Daniel R Feiken, "Individual and Community Risks…," (p 3149).

[18] Saad B Omer, et al., "Geographic Clustering of Nonmedical Exemptions to School Immunization Requirements and Associations With Geographic Clustering of Pertussis," *American Journal of Epidemiology,* 168. no. 12 (2008): 1389-1396.

[19] Center for Disease Control and Prevention, "Outbreak of Measles Among Christian Science Students – Missouri and Illinois," last updated May 2001, accessed April 2012, http://www.cdc.gov/mmwr/preview/mmwrhtml/00031788.htm; Center for Disease Control and Prevention, "Poliovirus Infections in Four Unvaccinated Children – Minnesota," last reviewed October 2005, accessed April 2012, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5441a6.htm.

[20] Freed et al., "Parental Vaccine Concerns in 2009," *Journal of the American Academy of Pediatrics*, 125(4), 2010, p. 656.

[21] Center for Disease Control and Prevention, "Vaccine Safety: Concerns about Autism," accessed April 12, 2012, http://www.cdc.gov/vaccinesafety/Concerns/Autism/Index.html.

[22] Autism spectrum disorders are defined as pervasive developmental disorders according to the Diagnostic and Statistical Manual of Mental Disorders.

[23] Center for Disease Control and Prevention, "Vaccine Safety: Concerns about Autism."

The entirety of the medical community has concluded that there is no causal relationship between autism and vaccinations. Dr. Wakefield's research was discredited by multiple academic journals, most notably the British medical journal in which he had published his study, *The Lancet*. The research evidence led The Institute of Medicine of National Academics to assert that there is no causal relationship between the MMR vaccine and autism, and no causal relationship between thimerosal-containing vaccines and autism.[24] Despite the overwhelming evidence that thimerosal-containing vaccines do not have serious medical risk, in July 1999 the Public Health Service agencies, the American Academy of Pediatrics, and vaccine manufacturers agreed that thimerosal should be reduced or eliminated in vaccines as a precautionary measure.[25]

Despite the overwhelming literature suggesting otherwise, many individuals believe that vaccines may cause autism. In the aforementioned study conducted by Freed et al., 25 percent of the participants believed that some vaccines cause autism in otherwise healthy children.[26] Concerns about vaccine safety are fueled solely by personal accounts and anecdotal evidence. "Although peer-reviewed original scientific research and multiple expert committees that have reviewed all available data on this issue have failed to show any association between vaccines and autism, anecdotally the concern continues to affect parents."[27]

The failure for medical literature to shape opinion on the subject is a similar concern voiced by the Autism Science Foundation:

> While there are still a handful of parents who, in almost a religious way, cling to the notion that vaccines cause autism, the vast majority of parents and scientists have accepted what the data clearly show. There is no data to support an autism vaccine link. There never has been. Vaccines don't cause autism.[28]

Justification for Religious and Philosophical Exemptions

Religious exemptions are the most widely recognized non-medical exemption in the United States, as only two states—Mississippi and West Virginia—do not allow them. There are religious sects—such as Christian Scientists and the Amish community—who oppose

[24] Institute of Medicine of the National Academics, "Immunization Safety Review: Vaccines and Autism," last modified May 14, 2004, accessed April 12, 2012, http://www.iom.edu/Reports/2004/Immunization-Safety-Review-Vaccines-and-Autism.aspx.
[25] Center for Disease Control and Prevention, "Vaccine Safety: Thimerosal," accessed April 12, 2012, http://www.cdc.gov/vaccinesafety/Concerns/thimerosal/index.html.
[26] Freed et al., "Parental Vaccine Concerns in 2009," p. 657.
[27] Freed at al., "Parental Vaccine Concerns in 2009," p. 657.
[28] Autism Science Foundation, "Autism and Vaccines: Beyond the Autism/Vaccine Hypothesis: What Parents Need to Know about Autism Research," accessed April 12, 2012, http://www.autismsciencefoundation.org/autismandvaccines.html.

vaccinations on the grounds of their religious beliefs.[29] The United States Supreme Court has not yet ruled on the constitutionality of religious exemptions but in examining similar cases in which religious beliefs conflict with public or state interests there is a discernible trend, "The Court rulings suggest that mandatory immunization against dangerous diseases does not violate the First Amendment right to free exercise of religion."[30] This trend suggests that if a state chooses to eliminate religious exemptions in their vaccine programs, the Supreme Court will support the Constitutionality of that action.

Aside from religious exemptions, 20 states offer philosophical exemptions for those who object to immunizations on the grounds of moral, personal or other reasons. An example of a common philosophical objection would resemble "the state has no right to impose mandatory health policy on my children." Debating the validity of this ideological claim is outside the scope of this report. The Supreme Court has, however, upheld mandatory state immunization law, which has set the precedent for the Constitutionality of mandatory vaccine programs.[31] Individuals have also opposed vaccinations for other philosophical or moral beliefs such as a belief that vaccines interfere with "nature's generic blueprint," and other unspecified personal reasons. [32]

Empirical evidence does not support the notion that vaccines cause direct and adverse medical conditions. Justification for non-medical exemption is absent in the aggregate peer-reviewed academic and scientific literature. Furthermore, rulings by the U.S. Supreme Court suggest that the Court would find mandatory vaccinations Constitutional.

Opinions from Medical & Health Community

The Institute of Medicine (IOM) issued an 800-page comprehensive report titled *Adverse Effects of Vaccines*, in August 2011.[33] The report reviews peer-reviewed primary studies, summarizes their findings, and evaluates epidemiological, clinical, and biological evidence. The report looks at evidence regarding adverse health events associated with "specific vaccines covered by the National Vaccine Injury Compensation Program (VICP), including the varicella zoster vaccine, influenza vaccines, the hepatitis B vaccine, and the human papillomavirus vaccine, among others."[34] The study finds that "while no vaccine is a hundred percent safe, very few adverse events are shown to be caused by vaccines."[35]

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[29] Anthony Cioli, "Mandatory School Vaccinations: The Role of Tort Law," *Yale Journal of Biology and Medicine*, 81(3), 2008, p. 130.
[30] Daniel A. Salmon, & Andrew W. Siegel, "Religious and Philosophical Exemptions from Vaccination Requirements and Lessons Learned from Conscientious Objectors from Conscription," *Public Health Reports*, 116(4), 2001, p. 291.
[31] Daniel A. Salmon & Andrew W. Siegel, "Religious and Philosophical Exemptions from Vaccination Requirements and Lessons Learned from Conscientious Objectors from Conscription," p. 290.
[32] Anthony Cioli, "Mandatory School Vaccinations: The Role of Tort Law," p. 130.
[33] Committee to Review Adverse Effects of Vaccines, Board of Population Health and Public Health Practice, The Institute of Medicine of the National Academies, *Adverse Effects of Vaccines: Evidence and Causality*.
[34] Committee to Review Adverse Effects of Vaccines, Board of Population Health and Public Health Practice, The Institute of Medicine of the National Academies, *Adverse Effects of Vaccines: Evidence and Causality*.
[35] Committee to Review Adverse Effects of Vaccines, Board of Population Health and Public Health Practice, The Institute of Medicine of the National Academies, *Adverse Effects of Vaccines: Evidence and Causality*, p. x.

According to the IOM, “many of the case reports the committee reviewed simply cited a temporal relation between vaccine administration and an adverse event. Association, however, does not equal causation. More is required.”[36] Clinical Evidence suggests that many of the vaccines that have been associated with negative side effects are not necessarily the cause of the illnesses with which they have been associated. For example, the IOM study concludes that “evidence favors rejection of a causal relationship" between the Measles-Mumps-Rubella (MMR) vaccine and autism or childhood diabetes.[37] Other examples include the DTaP vaccine which is not causally associated with diabetes. Nor is the influenza vaccine, given as a shot, causally associated with exacerbating asthma. The study does, however, find that "evidence convincingly supports a causal relationship" between the chickenpox vaccine and rare instances of encephalitis (inflammation of the brain), as well as pneumonia, meningitis, and hepatitis *in individuals with “demonstrated immune deficiencies”* [emphasis added].[38] Correlation between a vaccine and illness in those who are immune deficient is important to acknowledge and is a call to continue to research on vaccines. The correlation does not affect the general population and in all fifty states exception from vaccination is offered to those with immune deficiencies.

In terms of public heath, vaccines can eradicate disease and prevent mass outbreaks of serious illnesses. Mandatory vaccination has largely eliminated diseases, such as polio and smallpox, which were once responsible for thousands of children’s deaths each year in the United States.[39] According to the American Academy of Pediatrics, “most childhood vaccines are 90-99% effective in preventing disease. When vaccinated children do contract a disease, despite being vaccinated against it, they usually have milder symptoms with less serious complications than an un-vaccinated child with the same disease.”[40] According to researchers at the Pediatric Academic Society, childhood vaccinations in the US prevent “about 10.5 million cases of infectious illness and 33,000 deaths per year.”[41]

Conclusion

There is a consensus in the medical community that vaccines are safe, that the dangers of vaccine exemptions are very real, and that the increased use of exemptions has led to an increase of vaccine preventable diseases across the United States. Still, parents across the

[36] Committee to Review Adverse Effects of Vaccines, Board of Population Health and Public Health Practice, The Institute of Medicine of the National Academies, *Adverse Effects of Vaccines: Evidence and Causality*, p. x.
[37] Committee to Review Adverse Effects of Vaccines, Board of Population Health and Public Health Practice, The Institute of Medicine of the National Academies, *Adverse Effects of Vaccines: Evidence and Causality*.
[38] Committee to Review Adverse Effects of Vaccines, Board of Population Health and Public Health Practice, The Institute of Medicine of the National Academies, *Adverse Effects of Vaccines: Evidence and Causality*.
[39] American Academy of Pediatrics, "Why Does My Child Need to be Immunized?," www.healthychildren.org, http://www.healthychildren.org/English/safety-prevention/immunizations/pages/Why-Immunize-Your-Child.aspx.
[40] American Academy of Pediatrics, "Why Does My Child Need to be Immunized?”
[41] Fangjun Zhou, PhD, et al., "Economic Evaluation of Routine Childhood Immunization with DTaP, Hib, IPV, MMR and Hep B Vaccines in the United States," Pediatric Academic Societies Conference, Seattle, Washington, May 2003, accessed April 15, 2012, http://archpedi.ama-assn.org/cgi/content/full/159/12/1136.

country have grown more cynical about vaccine safety and efficacy.[42] This cynicism has in turn led to a decrease in the percentage of vaccinations nationwide. Given the medical literature's consistent and voluminous evidence supporting the importance, safety and success of vaccinations, this decrease rightly causes serious concern among policy makers and medical professionals.

This report was completed on April 19, 2012 by Alison Kelly, Elizabeth Dunn, Marc Laliberte, and William Andreycak under the supervision of Professor Anthony "Jack" Gierzynski.

Contact: Professor Anthony Gierzynski, 513 Old Mill, The University of Vermont, Burlington, VT 05405, phone 802-656-7973, email agierzyn@uvm.edu.

[42] "Cynicism" refers to the rejection of all evidence; the term should not be confused with "skepticism," which is the critical evaluation of information based on reason and standards of evidence. The American public has become more cynical in general (as opposed to skeptical) as is evident in public opinion regarding other areas of science such as climate change. For a discussion of this point see Brooks Jackson and Kathleen Hall Jamieson, *Unspun: Finding Facts in a World of Disinformation* (New York: Random House, 2007).