

Measles, Movements and Medical Exemptions: How California Learned to Lead the Way

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A Disney Disease

In mid-December of 2014, tourists from all over the world buzzed around Anaheim's Disneyland. While they waited in line for the Matterhorn or spun around in oversized teacups, parents and children were unaware of the spreading disease—a strain of measles found earlier that year in the Philippines.³³⁸ Researchers estimated the vaccination rate of Disneyland's guests during the outbreak to be as low as fifty percent and no higher than eight-seventy percent. With such dismal rates, Disneyland became a resort for infectious disease. The higher estimate still placed the population well under a rate offering herd immunity—an immunity level to a disease within a population that makes disease-spreading difficult or impossible. After running models using data from California's Department of Health and media-reported sources, epidemiologists tracked the spread to states beyond California, and into Canada and Mexico.³³⁹ By mid-January, there were already fifty-one confirmed cases in California

³³⁸ "Measles Cases and Outbreaks," Centers for Disease Control and Prevention, accessed February 4, 2019, <https://www.cdc.gov/measles/cases-outbreaks.html>.

³³⁹ Cari Nierenberg, "Disneyland Measles Outbreak Confirmed to Be Linked to Low Vaccination Rates," *Scientific American* (March 17, 2015).

alone.³⁴⁰ Health officials hoped to contain the outbreak to theme park visitors, but patients who had not visited the park began to appear in Orange County hospitals. Ultimately, at least 147 measles cases originated from the Disneyland outbreak.³⁴¹

A contagious disease spreading through a crowded theme park is not particularly uncommon. But this theme park was located in the United States, where health officials declared the elimination of measles in 2000. Even so, from the Northwest to New York, epidemics are now sprouting all over the country. The Disneyland epidemic is a cautionary tale of how little is required for measles to spread. This paper shows how vaccination hesitancy and dissemination of misinformation about measles contributes to preventable loss of life and health, and that addressing school-entry vaccination policies effectively increases vaccination rates. In particular, states now struggling with measles can learn from California's Senate Bill 277—written in the wake of the Disneyland outbreak—and recreate California's success. These measures are demonstrated to be successful and can prevent official states of emergency like those in Brooklyn and Rockland County, New York, during the recent measles epidemic in 2019.³⁴²

³⁴⁰ Rong-Gong Lin II, "Disneyland Measles: Rapid Spread Concerns Health Officials," *Los Angeles Times*, January 17, 2015.

³⁴¹ Sara Novak, "The Long History of America's Anti-Vaccination Movement," *Discover* (November 27, 2018).

³⁴² See Tyler Pager and Jeffery C. Mays, "New York Declares Measles Emergency, Requiring Vaccinations in Parts of Brooklyn," *New York Times*, April 9, 2019; and Michael Gold and Tyler Pager, "New York

When the Centers for Disease Control (CDC) announced the elimination of measles within the United States, the institution defined elimination as an absence of disease transmission for greater than twelve months. Effective vaccination programs throughout the country deserve credit for this success. Before the vaccine became available in 1963, nearly all children contracted measles. Every year around three to four million Americans were infected, and of those, an estimated 48,000 were hospitalized and 400 to 500 died.³⁴³

In 1978, the CDC set a goal to eliminate measles by 1982. This goal was not met, but widespread vaccinations dramatically reduced infection. The CDC reports that a measles outbreak among vaccinated children in 1989 spurred the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, and the American Academy of Family Physicians to recommend a second dose of the measles, mumps, and rubella (MMR) vaccine for all children. This second dose, along with an improved first dose, further dropped the rate of infection.³⁴⁴

Measles is not uncommon in many countries and regularly transmits to the United States. Since the vast majority of Americans are vaccinated, the general population benefits from herd immunity, which includes the small percentage of the population that is medically unable

Suburb Declares Measles Emergency, Barring Unvaccinated Children From Public," *New York Times*, March 26, 2019.

³⁴³ "Measles History," Centers for Disease Control and Prevention, accessed February 9, 2019,

<https://www.cdc.gov/measles/about/history.html>.

³⁴⁴ "Measles History," Centers for Disease Control and Prevention.

to be vaccinated or is still too young to be vaccinated. To protect a community from a highly contagious disease like measles, epidemiologists generally consider a vaccination rate of around ninety-three percent to effectively achieve herd immunity.³⁴⁵

As the Disneyland epidemic continued to spread, San Diego reported ten more cases. According to the Health and Human Services Agency, nine out of these ten had never received vaccinations.³⁴⁶ A study in the *Journal of the American Medical Association* suggests the Disneyland outbreak was likely a consequence of low vaccination rates encouraged by the anti-vaccination movement in America.³⁴⁷

A few influential groups oppose vaccinations, and though small, concentrations of unvaccinated people incubate epidemics. The anti-vaccination movement is not a recent phenomenon, nor is it unique to the United States, but dates back to when the English physician Edward Jenner first discovered a smallpox vaccine in 1796.

The Rise of Vaccinations and Movements Against Them

Since antiquity, smallpox posed a serious threat to human health, and it was not until the late eighteenth century

³⁴⁵ Kirk Johnson, "'A Match Into a Can of Gasoline': Measles Outbreak Now an Emergency in Washington State," *New York Times*, February 6, 2019.

³⁴⁶ Tony Perry, "San Diego County Has 10 Measles Patients; 9 Weren't Vaccinated," *Los Angeles Times*, January 15, 2015.

³⁴⁷ Maimuna S. Majumder et al., "Substandard Vaccination Compliance and the 2015 Measles Outbreak," *Journal of the American Medical Association of Pediatrics* 169, no. 5 (2015): 494-495.

that Edward Jenner discovered a vaccine derived from cowpox. Jenner wondered why milkmaids had a reputation for lovely complexions—they rarely had smallpox scars. By contracting the less severe cowpox, Jenner hypothesized that milkmaids developed protection from smallpox. During this time, the sciences of virology and immunology were nonexistent. Instead, Jenner sought to fight smallpox by imitating the immunity he found in milkmaids. After twelve years of research, he experimented on a boy named James Phipps. Jenner inoculated Phipps with cowpox, and within days, Phipps developed cowpox sores around the administered location. Jenner then exposed Phipps to smallpox and the boy remained healthy. Even while lacking the underlying modern scientific explanations, Jenner discovered the basic concept of vaccination by carefully observing the workings of nature.³⁴⁸

Following Jenner's publication of the cowpox experiment, use of vaccinations spread throughout England. The general enthusiasm for mass vaccination also met with opposition. After the first Vaccination Act in 1840, which provided free vaccinations to the poor, England established compulsory vaccination with the Vaccination Act of 1853. Anti-vaccination sentiments soared after the introduction of compulsory vaccination. Organizations began to spring up: the Anti-Compulsory Vaccination League in 1867, the National Anti-Compulsory Vaccination League in 1874, and William Tebb's London Society for the Abolition of Compulsory Vaccination in 1879. In 1896, Tebb

³⁴⁸ William Foege, *House on Fire: The Fight to Eradicate Smallpox* (Berkeley: University of California Press, 2011), 8.

consolidated resistance groups into the National Anti-Vaccination League.³⁴⁹

The anti-vaccination camp launched a range of criticism. Not only did they challenge Jenner's idea of vaccination, they also disagreed with how the disease spread. Some criticism derived from religion, when clergy deemed vaccinations unchristian because they came from animals.³⁵⁰ Some criticism revolved around a disagreement about the origin of disease; for example, maintaining that vaccinations provided no protection because disease arose from decaying organic matter.³⁵¹ Other criticism emphasized political concerns about government-mandated vaccinations, stoking a controversy between individual liberty and public safety.³⁵²

In the United States, however, influential supporters such as Thomas Jefferson saw the public health potential. Jenner's vaccine arrived in the United States in 1800. Starting in 1809, Massachusetts enacted the first mandatory vaccination laws, later followed by Minnesota, West

³⁴⁹ Dorothy Porter and Roy Porter, "The Politics of Prevention: Anti-Vaccinationism and Public Health in Nineteenth-Century England," *Medical History* 32 (1988): 235.

³⁵⁰ "History of Anti-Vaccination Movements," The History of Vaccines, The College of Physicians of Philadelphia, last modified January 10, 2018, <https://www.historyofvaccines.org/content/articles/history-anti-vaccination-movements#Source%204>.

³⁵¹ Porter and Porter, "The Politics of Prevention," 237.

³⁵² The College of Physicians of Philadelphia, "History of Anti-Vaccination."

Virginia, and California.³⁵³ Still, Americans were generally suspicious of the medical field. The previous century saw the golden age of medical quackery and in the early nineteenth century the practice of bloodletting was still common.³⁵⁴

In 1902, a smallpox epidemic broke out in Cambridge, Massachusetts. The state entrusted cities with the power to legislate vaccinations, so Cambridge established a mandatory vaccination policy. Cambridge ran into difficulties executing the new law and one resident, Pastor Henning Jacobson, refused compulsory vaccination. As a child in Sweden, inoculation caused him intense sickness and one of his sons also became ill after being inoculated.³⁵⁵ The city filed criminal charges against him and he went to court. The case went up to the United States Supreme Court and, in 1905, the court decided to permit states' municipalities to enforce laws that protect the public against communicable diseases—a decision that is among the most important Supreme Court decisions in the field of public health.³⁵⁶ The United States did not see another major advancement in measles treatment for half a century.

In November 1961, President John Kennedy delivered the opening speech for the first International Conference on Measles Immunization. The National

³⁵³ Sara Novak, "The Long History."

³⁵⁴ Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity* (New York: W. W. Norton, 1997), 284.

³⁵⁵ See Chapter 8 in Michael Willrich, *Pox: An American History* (New York: Penguin Press, 2011).

³⁵⁶ Lawrence O. Gostin, "Jacobson v Massachusetts at 100 Years: Police Power and Civil Liberties in Tension," *American Journal of Public Health* 95, no. 4 (April 2005): 577.

Institutes of Health hosted the conference in Bethesda, Maryland, and the event was partly a tribute to the recent advances by John Enders, a Nobel laureate who developed an exceptional strain of measles for use in vaccines.³⁵⁷ Enders discovered the strain in an eleven-year-old boy, Dave Edmonston, that provided an infection strong enough to build immunity to the disease, but with mild enough symptoms not to sicken the child. The virus was named the Edmonston strain. Enders delivered a lecture after winning the Nobel Prize in 1954, which sparked new tissue culture studies in the 1960s.³⁵⁸ Enders never patented the strain because he believed, as his colleague Samuel Katz recalled Enders saying, “The more people working on the problem the sooner you’d get an answer.”³⁵⁹

By 1961, increasing political tension between the Soviet Union and the United States spilled into public health issues. The Soviets had already begun using Albert Sabin’s oral polio vaccine on a mass scale. “The Soviet Union would be in a position to exploit the new oral poliomyelitis vaccine as a ‘Cold War’ weapon if the U.S. did not accelerate mass production of the vaccine,” was the lead of a *New York Times* article that year.³⁶⁰ Under this pressure, President Kennedy made vaccinations a critical aspect of his administration. He proposed the Vaccine Approbations Act, which subsidized

³⁵⁷ Arthur Allen, *Vaccine* (New York: W. W. Norton, 2007), 215–16.

³⁵⁸ John F. Enders et al., “The Cultivation of the Poliomyelitis Viruses in Tissue Culture,” *Reviews of Infectious Diseases* 2, no. 3 (1980): 493–504; Allen, *Vaccine*, 216, 220.

³⁵⁹ Allen, *Vaccine*, 221.

³⁶⁰ John W. Finney, “Sabin Prods U.S. on Oral Vaccine,” *New York Times*, March 18, 1961.

polio and measles vaccine purchases by the state, and funded vaccines for the next four decades.³⁶¹

During the hearing for the Vaccine Approbations Act in 1962, congressmen from the southern and western regions of the country showed concern about its implicit coercion. The critics recognized that an increase in federal funds also increased pressure to vaccinate. They carefully ensured that state-mandated religious and philosophical exemptions were not overridden by the federal government.³⁶²

Vaccination was so successful throughout the 1960s that general concern for infectious diseases fell, and by 1970, President Nixon shifted focus to cancer.³⁶³ During this period, however, policy makers weakly applied vaccine laws. By 1969, twenty-four states still had no vaccination requirements and of the states that had requirements, only eight had penalties for not vaccinating. The ineffectual execution of mass vaccinations halted in 1977, when the Carter administration arrived in Washington. They requested that the CDC set a goal to have ninety percent of children immunized by school entry. During this time, federal spending on vaccinations more than quadrupled from \$4.9 million in 1976 to \$23 million two years later.³⁶⁴

In 1998, a revival of the anti-vaccination movement occurred when an article authored by Andrew Wakefield and published in the prestigious British medical journal, *The*

³⁶¹ Allen, *Vaccine*, 229.

³⁶² Allen, *Vaccine*, 230.

³⁶³ Allen, *Vaccine*, 240.

³⁶⁴ Alan R. Hinman, "The New U.S. Initiative in Childhood Immunizations," *Bulletin of the Pan-American Health Organization* 13, no. 2 (1979): 169.

Lancet, claimed a connection between autism and bowel disease and the MMR vaccine. Wakefield's article feigned scientific evidence linking the MMR vaccine to autism and bowel disease and fueled the growing anti-vaccination movement in America. He based his work on twelve cases of autistic children admitted to the Royal Free Hospital in London in 1996-1997. The article has since been thoroughly investigated and found to be definitively false and fraudulent.³⁶⁵ *The Lancet* retracted Wakefield's article twelve years after its publication. A retraction from a journal is an unusual event. "Typically, bad science disappears in a fog of irreproducibility, never requiring a formal retraction," wrote Paul Offit, Professor of Vaccinology and Pediatrics at the Perelman School of Medicine. "Journal editors retract only those studies they believe were falsified or misrepresented."³⁶⁶

In addition, Brian Deer of *The Sunday Times of London*, found serious conflicts of interest relating to the funding of Wakefield's study. Deer found that Richard Barr, a personal injury lawyer who represented the parents of five of the twelve children in Wakefield's study, had paid Wakefield £435,643, plus expenses, to support his research.³⁶⁷ This research was used in the lawsuit against

³⁶⁵ Fiona Godlee et al., "Wakefield's Article Linking MMR Vaccine and Autism Was Fraudulent," *British Medical Journal* 342 (January 2011), <https://doi.org/10.1136/bmj.c7452>.

³⁶⁶ Paul A. Offit, *Deadly Choices* (New York: Basic Books, 2011), 95.

³⁶⁷ Offit, *Deadly Choices*, 93.

pharmaceutical companies, claiming that the MMR vaccine caused autism.³⁶⁸

Two months after the retraction of Wakefield's article, the General Medical Council, an independent regulator for physicians in England, concluded a 217-day fitness-to-practice hearing and stripped him from the medical register. After learning of the conflicts of interest, Richard Horton, editor of *The Lancet*, admitted that "he should never have published Wakefield's article linking MMR to autism."³⁶⁹ The scientific community discredited Wakefield's work, yet its damage lingers as misinformation.

Still popular within the anti-vaccine movement, Wakefield, who now lives in Austin, Texas, returned to prominence when the Trump administration took office in 2016. Wakefield attended one of the inaugural balls, where he spoke about his ongoing battle against the medical establishment: "What we need now is a huge shakeup at the Centers for Disease Control and Prevention – a huge shakeup. We need that to change dramatically."³⁷⁰

Misinformation and Public Health Initiatives

The effects of the anti-vaccination movement are still felt throughout the world. The World Health Organization listed "vaccine hesitancy" as one of the top ten global health

³⁶⁸ Brian Deer, "Revealed: MMR Research Scandal," *The Sunday Times*, February 22, 2004; Brian Deer, "How the Case Against the MMR Vaccine Was Fixed," *British Medical Journal* 342 (January 2011), <https://doi.org/10.1136/bmj.c5347>.

³⁶⁹ Deer, "MMR Research Scandal."

³⁷⁰ Sarah Boseley, "How Disgraced Anti-Vaxxer Andrew Wakefield Was Embraced by Trump's America," *The Guardian*, July 18, 2018.

threats in 2019.³⁷¹ Vaccine hesitancy refers to people who hesitate to vaccinate even when vaccines are available. The issue has nothing to do with where the balance of scientific evidence rests, but with the ability of the anti-vaccination movement to convey misinformation to the public. One study analyzed the content of 480 anti-vaccine websites for misinformation, source of their misinformation, and persuasive tactics used. They found that messages are persuasive to parents against vaccination by mixing credible science and parental anecdotes with a “considerable amount of misinformation.”³⁷²

“The deluge of conflicting information, misinformation, and manipulated information on social media,” said Heidi Larson, director of The Vaccine Confidence Project, “should be recognized as a global public-health threat.”³⁷³ The Vaccine Confidence Project targets misinformation and acts as a myth-buster in hopes of stifling rumors against vaccines before they go viral. The project also created a Vaccine Confidence Index that tracks attitudes toward vaccines and categorizes misinformation into various levels. Examples of poor science like

³⁷¹ “Ten threats to global health in 2019,” *World Health Organization*, accessed February 11, 2019, <https://www.who.int/emergencies/ten-threats-to-global-health-in-2019>.

³⁷² Meghan Moran et al., “Why Are Anti-Vaccine Messages so Persuasive? A Content Analysis of Anti-Vaccine Websites to Inform the Development of Vaccine Promotion Strategies,” *American Public Health Association*, accessed February 13, 2019, <https://apha.confex.com/apha/143am/webprogram/Paper329083.html>.

³⁷³ Heidi J. Larson, “The Biggest Pandemic Risk? Viral Misinformation,” *Nature* 562 (2018): 309.

Wakefield's 1998 article and social media disseminators, who can widely and quickly spread misinformation are included in this index. Social media misinformation creates a cloud of confusion that circulates in the general public, which increases vaccine hesitancy.

Misinformation on social media affects public behavior. For example, after a group in Denmark broadcast testimonies on social media purporting harm done to girls by the human papillomavirus vaccination, the national immunization rates fell from more than ninety percent in 2000 to under twenty percent in 2005.³⁷⁴ Prominent government officials and their spouses typically have large social media followings and in some cases, have used this platform to propagate misinformation about measles and vaccines. President Donald Trump tweeted about the debunked link between autism and the MMR vaccine: "Healthy young child goes to doctor, gets pumped with massive shot of many vaccines, doesn't feel good and changes - AUTISM. Many such cases!"³⁷⁵ Darla Shine, the wife of former White House Communications Director, Bill Shine, has also posted false claims that naturally contracting measles fights cancer: "The entire Baby Boom population alive today had the #Measles as kids. Bring back our

³⁷⁴ Larson, "The Biggest Pandemic Risk?"

³⁷⁵ Donald J. Trump (@realDonaldTrump), "Healthy young child goes to doctor," Twitter, March 28, 2014, <https://twitter.com/realdonaldtrump/status/449525268529815552?lang=en>.

#ChildhoodDiseases they keep you healthy & fight cancer.”³⁷⁶

One cost-effective way to address the sources and distribution channels of vaccine misinformation is to invest further in public health initiatives. A study in the *Journal of Epidemiology & Community Health* found that the median return on investment (ROI) for nationwide public health interventions was 27.2 and the median cost-benefit ratio (CBR) was 17.5.³⁷⁷ A 27.2 ROI for public health interventions means that for every dollar spent on public health there is about \$27 dollars gained in benefits. The CBR divides the benefit of public health interventions by its costs, so the ratio represents \$17.50 in benefits for every dollar in costs. In terms of economics, public health spending is an exceptionally good deal for communities.

Vaccinations are a key part of public health interventions and vaccine success rate can drastically alter the CBR. Generally, vaccines save \$34 for every dollar spent. These savings come from preventing large amounts of suffering and death—the World Health Organization estimates that from 2000 to 2017, the “measles vaccination prevented an estimated 21.1 million deaths.”³⁷⁸ Even so, not all vaccines are equally effective. While thirty-four to

³⁷⁶ Darla Shine (@DarlaShine), “The entire Baby Boom population,” Twitter, February 13, 2019,

<https://twitter.com/DarlaShine/status/1095679791154581506>.

³⁷⁷ Rebecca Masters et al., “Return on Investment of Public Health Interventions: A Systematic Review,” *Journal of Epidemiology & Community Health* 71, no. 8 (August 2017): 827-834.

³⁷⁸ “Measles,” *World Health Organization*, accessed November 29, 2018, <https://www.who.int/news-room/fact-sheets/detail/measles>.

one is the average, some vaccines are less successful in matching infections. In cases of poor matches, the CBR can be as low as twenty-one to one. Although good matches are crucial for successful vaccines, this is less of an issue for the measles vaccine, since measles does not mutate frequently. A research letter in the *Journal of the American Medical Association* suggests that a “failure to vaccinate, rather than failure of vaccine performance, may be the main driver of measles transmission, emphasizing the importance of maintaining high vaccine coverage.”³⁷⁹

Trendsetting Legislation: SB-277

Vaccinations cannot save lives and prevent suffering if communities refuse to inoculate. California found an effective means to curtail low vaccination rates—one that harkens back to England’s Vaccination laws in the 1800s. After the measles outbreak in Disneyland, State Senator Richard Pan authored Senate Bill 277, which removed all exemptions—except medical exemptions—from vaccine requirements for children entering school. It also permitted local health departments access to school health information on student vaccinations to determine any immunization deficiencies.³⁸⁰

³⁷⁹ Nakia S. Clemmons et al., “Incidence of Measles in the U.S., 2001-2015,” *Journal of the American Medical Association* 318, no. 13 (2017): 1279.

³⁸⁰ “SB-277 Public Health: Vaccinations,” *California Legislative Information*, section 6(c), accessed February 20, 2019, http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB277.

Although a large majority of Californians supported vaccinations, opponents voiced their disapproval during the debate over SB-277. One reporter framed the dispute as though it were two equal sides of a contentious argument. Tracy Seipel, from the *East Bay Times*, wrote an article titled, “Incendiary Vaccine Bill Advances in 6-2 Senate Health Committee Vote.” The article refers to vaccines as “Sacramento’s most contentious issue this year.”³⁸¹ While anti-vaccination groups protested the hearing, nothing is contentious about the overwhelming consensus of the scientific community regarding the safety and effectiveness of vaccines.

Before SB-277, parents easily opted out of vaccinating their children by using religious or philosophical exemptions. Unvaccinated students were also admitted conditionally if they planned to be vaccinated at a later time. In 2014, one in every three students in California lived in a county with a vaccination rate below ninety percent. Even though the overall vaccination rate in the state was ninety-three percent, it was unevenly distributed among communities—some communities were protected by herd immunity while others fell below the necessary vaccination rate. After the bill took effect in 2016—eliminating all but medical exemptions and curbing conditional admission by requiring students to vaccinate within six months—more than ninety-nine percent of students attended schools in

³⁸¹ Tracy Seipel, “Incendiary Vaccine Bill Advances in 6-2 Senate Health Committee Vote,” *East Bay Times*, April 8, 2015.

communities with vaccination rates that achieved herd immunity.³⁸²

Fall of 2016 saw the highest vaccination rates in Californian kindergarteners since 1998. In particular, the vaccination rate for measles rose to 97.3 percent in 2016, from 92.6 percent in 2014—the year of the Disneyland outbreak.³⁸³ California also saw a twenty-five percent increase in vaccination rates within the worst-performing ten percent of communities.³⁸⁴ Since measles is highly contagious, medical officials suggest a ninety-five percent vaccination rate to achieve herd immunity, which SB-277 has led California to surpass. These numbers show that the legislation worked, and similar legislation in other states could spread these successes throughout the country.

Years after the lessons learned from Disneyland, measles reemerged in Oregon and Washington. Measles is not a disease of a bygone era; it can and has returned. The Disneyland outbreak taught California to handle infectious diseases seriously. California strengthened its policy on school-entry vaccinations and dramatically increased vaccination rates. These policies worked, and the public benefited from effective vaccination legislation. The Northwest should turn to California for guidance.

³⁸² Emily Oster and Geoffrey Kocks, “After a Debacle, How California Became a Role Model on Measles,” *New York Times*, January 16, 2018.

³⁸³ Soumya Karlamangla and Rong-Gong Lin II, “Vaccination Rate Jumps in California after Tougher Inoculation Law,” *Los Angeles Times*, April 13, 2017.

³⁸⁴ Oster and Kocks, “After a Debacle.”

New Epidemics in the Northwest

The American Northwest recently experienced one of its most severe measles epidemics in history. Seventy-five measles cases were reported to the CDC by the beginning of 2019, 385 while vaccination rates in Oregon counties have dropped over the past fifteen years. In 2000, the vaccination rate for kindergarteners in Oregon was more than ninety-five percent, but by 2015, it plummeted to thirty percent.³⁸⁶ In response, the Oregon legislature—following California’s model SB227—introduced its own House Bill 3063, which intends to increase the vaccination rates by eliminating philosophical and religious exemptions. Having failed to pass legislation in 2015, Oregon’s current epidemic may be the impetus to push it through this time. The Oregon Pediatric Society, the Oregon Nurses Association, and the Oregon Education Association all endorsed the bill.

The Oregonians for Medical Freedom (OFMF), the state’s prominent anti-vaccination organization, also attended the hearings for the new bill. Dr. Paul Thomas serves as Co-Chair for OFMF and authored *The Vaccine-Friendly Plan*, which promotes vaccine hesitancy and is a best seller on Amazon in the vaccination category. Thomas runs a clinic in Beaverton that has more than 15,000 patients. One parent, who received consultation from Thomas, saw her six-year-old unvaccinated son contract tetanus.³⁸⁷ The CDC reported the case in March 2019, and the story quickly

³⁸⁵ Johnson, “Match Into a Can of Gasoline.”

³⁸⁶ Oster and Kocks, “After a Debacle.”

³⁸⁷ Rachel Monahan, “Pediatrician Paul Thomas Has 15,000 Patients—and He Tells Them the Measles Vaccine Might Cause Autism,” *Willamette Week*, March 20, 2019.

became national news. The boy was hospitalized for fifty-seven days and his inpatient costs were more than \$800,000.³⁸⁸ After the ordeal, remarkably, the parents still refused to vaccinate their child.³⁸⁹ Before this, the last pediatric tetanus case in Oregon was over thirty years ago.³⁹⁰ Despite the lack of evidence for a causal link between autism and the MMR vaccine, Thomas asserted that House Bill 3063 will lead to hundreds of new cases of autism.³⁹¹

Although Thomas' claim that the MMR vaccine causes autism is scientifically unsubstantiated, many other scientific reasons do exist to explain the recent rise in autism. Since the United States began recording autism in 2000, cases have steadily increased. As of now, no test exists, such as a brain scan or blood sample, to diagnose autism. Physicians base diagnosis on observations of their patient's behavior. The criteria for diagnosis are decided using the *Diagnostic and Statistical Manual of Mental Disorders* (DSM). The CDC set up the Autism and Developmental Disabilities Monitoring Network in 2000 to collect school and health records for eight-year-old children in designated counties around the country. Every two years, clinicians

³⁸⁸ Sarah Mervosh, "An Unvaccinated Boy Got Tetanus. His Oregon Hospital Stay: 57 Days and \$800,000," *New York Times*, March 9, 2019.

³⁸⁹ Monahan, "Pediatrician Paul Thomas Has 15,000 Patients."

³⁹⁰ "Notes From the Field: Tetanus in an Unvaccinated Child—Oregon, 2017," *Morbidity and Mortality Weekly Report* 68, no. 9 (March 8, 2019): 231–232.

³⁹¹ Molly Harbarger, "Hundreds Pack Oregon Hearing to Oppose Bill to End Vaccine Exemptions," *The Oregonian*, February 28, 2019.

analyze these records using the DSM criteria for autism, such as social problems and repetitive behavior.³⁹²

While this approach has the strength of recording data on all children living in a single area at a particular time, it also has weaknesses. One problem is the notable variation in rates of autism between states. Eric Fombonne, professor of psychiatry at Oregon Health and Science University, says that the variation probably is not due to any natural differences between states, but rather reflects the differences in autism awareness and the services provided in each state.³⁹³ The definition of autism over time has changed as well. Before 1980, autism was not listed in the DSM. In 1991, the US Department of Education ruled that autism was a learning disability, which encouraged parents to have their children diagnosed. One study notes that only 60.6 percent of autism cases diagnosed by the previous edition of the DSM will meet the new diagnostic criteria in the most current fifth edition, released in 2013.³⁹⁴ Individuals with autism may have been misdiagnosed in the past. These new diagnostic categories account in large part for the increasing prevalence of autism. The rise of autism coincides with a reduction of other developmental disorders. The decrease in the prevalence of intellectual disability, for example,

³⁹² Jessica Wright, "The Real Reasons Autism Rates Are Up in the U.S.," *Scientific American*, March 3, 2017.

³⁹³ Wright, "The Real Reasons Autism Rates Are Up in the U.S."

³⁹⁴ James C. McPartland, "Sensitivity and Specificity of Proposed DSM-5 Diagnostic Criteria for Autism Spectrum Disorder," *Journal of the American Child and Adolescent Psychiatry* 51, no. 4 (April 2012): 368-383.

accounted for more than sixty-four percent of the increase in autism.³⁹⁵

Besides the challenges of changing diagnostic criteria and differing levels of autism awareness, the rise of autism in the United States is also linked to biological factors arising from contemporary lifestyles. As men now wait longer to have children, they raise their risk of fathering a child with autism. The chances of fathering an autistic child begin to rise after age thirty, and men older than fifty are over two times more likely to father an autistic child than men under thirty.³⁹⁶ Premature babies also have higher survival rates than they did in the past, and these preterm babies are at a higher risk of autism—the risk rises the earlier delivery occurs.³⁹⁷

Even with a lack of evidence to link the MMR vaccine to autism, Oregonians still diligently avoided vaccination through exemptions. In 2018, Oregon waived vaccinations with non-medical exemptions for kindergarten children at 7.6 percent, by far the highest in the United States, while the national median stood at 2.2 percent.³⁹⁸

³⁹⁵ Andrew Polyak et al., “Comorbidity of Intellectual Disability Confounds Ascertainment of Autism: Implications for Genetic Diagnosis,” *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics* 168, no.7 (October 2015): 600-608.

³⁹⁶ Christina M. Hultman, “Advancing Paternal Age and Risk of Autism: New Evidence from a Population-Based Study and a Meta-Analysis of Epidemiological Studies,” *Molecular Psychiatry* 16, no. 12 (December 2011): 1203-1212.

³⁹⁷ Wright, “The Real Reasons Autism Rates Are Up.”

³⁹⁸ “Vaccination Coverage for Selected Vaccines and Exemption Rates Among Children in Kindergarten—U.S., 2017–18 School Year,”

Parents easily acquired a vaccination exemption for their children by watching an informational video.³⁹⁹ Vaccination rates crucially depend on how states handle exemptions—especially the ease with which parents exempt their children or the ease in which doctors write exemptions for children. If Oregon passes House Bill 3063, it will face the same issues California is now facing: the use of medical exemptions as a substitute for philosophical and religious exemptions.

Extraordinary Exemptions

Californian officials anticipated a small rise in medical exemptions after passing SB-277. They assumed that some medically exempt children opted for religious or philosophical exemptions because they were easier to acquire, but SB-277 removed that option. Parents needed a doctor's note to waive the vaccine requirement. Yet officials did not anticipate the more than threefold increase in medical exemptions.⁴⁰⁰ Doctors estimate that at most only three percent of the population qualify for medical exemptions—as a result of medical conditions such as an allergy to gelatin or chemotherapy treatment. Strikingly, the *Los Angeles Times* reported that in fifty-eight schools across California, as many as ten percent of children were medically exempt in

Morbidity and Mortality Weekly Report 67, no. 40 (October 12, 2018): 1115–1122.

³⁹⁹ Monahan, “Pediatrician Thomas Has 15,000 Patients.”

⁴⁰⁰ Richard J. Pan, and Dorit Rubinstein Reiss, “Vaccine Medical Exemptions Are a Delegated Public Health Authority,” *Pediatrics* 142, no. 5 (November 2018), e20182009, <https://doi.org/10.1542/peds.2018-2009>.

fall 2016, and seven schools had twenty percent or more medically exempt children. Curiously, one school, Sunridge Charter, gave medical exemptions to forty percent of its student body.⁴⁰¹ These schools, well below the vaccination rate to achieve herd immunity, endanger their students to a measles epidemic.

States have the authority to mandate vaccinations, so medical exemptions are a delegation of state authority to physicians for the protection of public health. Senator Richard Pan notes that, “Essentially, physicians are fulfilling an administrative role: certifying to the state that a patient meets professionally recognized criteria that justify granting an ME [medical exemption].”⁴⁰² West Virginia is another state, like California, that accepts only medical exemptions for school vaccinations. They require the child’s physician to submit an exemption to a State Immunization Officer, who is a licensed physician in West Virginia and employed by the State Bureau for Public Health. The officer then determines the validity of the medical contraindications for each vaccine based on guidance from the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, and the American Academy of Family Physicians.⁴⁰³ This model avoids placing school

⁴⁰¹ Soumya Karlamangla and Sandra Poindexter, “Despite California’s Strict New Law, Hundreds of Schools Still Don’t Have Enough Vaccinated Kids,” *Los Angeles Times*, August 13, 2017.

⁴⁰² Pan and Reiss, “Vaccine Medical Exemptions.”

⁴⁰³ “Medical Exemptions Information,” Office of Epidemiology & Prevention Services, West Virginia Department of Health & Human Resources Bureau for Public Health, accessed April 2, 2019, <https://oeeps.wv.gov/Pages/Medical-Exemptions-Information.aspx>.

administrators in the position of arbiter of medical exemptions.

One study surveyed the experiences of health officials and immunization staff who worked with medical exemptions in California after SB-277 went into effect. The study concluded that if the state does not make legal changes to include a standardized review board for medical exemptions, the long-term success of SB-277 is questionable. The 250 percent increase of medical exemptions since the implementation of SB-277 is in part due to physicians writing exemptions to please vaccine-hesitant parents.⁴⁰⁴

After legislators passed SB-277, about 200 doctors, lawyers, and scientists—all opposed to pro-vaccination laws—organized into the Physicians for Informed Consent. One founding member is Orange County Pediatrician Bob Sears.⁴⁰⁵ Sears was convicted of gross negligence, “in that he did not obtain the basic information necessary for decision making, prior to determining to exclude the possibility of future vaccines” for his two-year-old patient.⁴⁰⁶ On June 27, 2018, the Medical Board of

⁴⁰⁴ Mohanty et al., “Experiences With Medical Exemptions After a Change in Vaccine Exemption Policy in California,” *Pediatrics* 142, no. 5 (November 2018), e20181051, <https://doi.org/10.1542/peds.2018-1051>.

⁴⁰⁵ Joanna Nix, “There Is a Whole Cottage Industry of Doctors Helping Parents Skip Their Kids’ Vaccines,” *Mother Jones* (January/February 2018).

⁴⁰⁶ “In the Matter of the Accusation Against: Robert William Sears, M.D., Physician’s and Surgeon’s Certificate No. A 60936,” Medical

California placed Sears on probation for 35 months, during which time his practice of medicine will be monitored.⁴⁰⁷

Concern has risen about such negligent doctors or even physicians who “monetize their license”⁴⁰⁸ by selling exemptions. Members of the Health Officers Association of California, who dealt with medical exemptions in the wake of SB-277, told of some bizarre schemes to circumnavigate vaccinations and acquire questionable doctors’ exemptions. “I’m getting a very high volume of medical exemptions from one provider...[Patients are] not charged for the office visit; they’re charged to view a video. She used to just give permanent medical exemptions, and now she’s giving temporary [exemptions] for three months...Now families have to go back every three months and pay \$300 to get their temporary medical exemption updated...” said an immunization coordinator.⁴⁰⁹ In some cases, the exchange of exemptions for money is not even conducted in person: “When we talk to the parents, come to find out they never actually were examined by this physician. They just made a phone call and got this letter for \$100,” a communicable disease coordinator said.⁴¹⁰

There have been attempts to intimidate health officials assigned with evaluating medical exemptions:

Board of California, Department of Consumer Affairs, State of California, in Accusation document, 5.

⁴⁰⁷ “In the Matter of the Accusation Against: Robert William Sears, M.D., Physician’s and Surgeon’s Certificate No. A 60936,” in Decision document, 3, 5.

⁴⁰⁸ Pan and Reiss, “Vaccine Medical Exemptions.”

⁴⁰⁹ Mohanty et al., “Experiences With Medical Exemptions.”

⁴¹⁰ Mohanty et al., “Experiences With Medical Exemptions.”

“When they named me and my boss and our county [in a federal civil lawsuit], it was really a way to try and scare us away from doing our job and to signal to other local health officers that this is what they have coming to them if they continue to do their job,” said a health officer in an urban jurisdiction.⁴¹¹ Health officials do not intend, however, to question the authority of doctors who write exemptions. “We’re not the auditors of the physicians. If a licensed physician in California says this child has a medical exemption, we’re not going to go do investigative work to say oh no, that’s not valid,” said one health official. “That would be an entirely different role for the health department that I don’t really think we should be in. So, we trust their judgment that there’s a medical exemption....”⁴¹²

The issue boils down to the proportion of medical exemptions that communities can withstand before they jeopardize herd immunity, and also to what extent the community can persuade parents to vaccinate their children. Medical exemptions are not simply a legal issue; they have epidemiological consequences since community safety from infectious disease is at stake.⁴¹³

Neglecting Vaccinations and States of Emergency

Senate Bill 277, along with prevention of spurious medical exemptions, protect counties and avoid situations where state authority asserts heightened control of

⁴¹¹ Mohanty et al., “Experiences With Medical Exemptions.”

⁴¹² Mohanty et al., “Experiences With Medical Exemptions.”

⁴¹³ James Colgrove, *State of Immunity: The Politics of Vaccination in Twentieth-Century America* (Berkeley: University of California Press, 2006), 13.

communities for public safety. The recent declarations of states of emergency in the Orthodox Jewish communities in Brooklyn and Rockland County are two cases that demonstrated what authorities can and will do to maintain public health if vaccinations are neglected and outbreaks run rampant.⁴¹⁴

In the fall of 2018, a measles epidemic erupted in Williamsburg, Brooklyn. New York City Mayor Bill de Blasio declared a state of emergency requiring unvaccinated children to receive the measles vaccine or face a city violation and possibly a fine of \$1,000.⁴¹⁵ By the following mid-April, 329 cases were confirmed—largely confined to the ultra-orthodox Jewish community.⁴¹⁶ Hospitals admitted twenty-one patients, of which the intensive care unit admitted five. Despite some progress addressing the problem, de Blasio decided, “it was time to take a more muscular approach.” The city’s health commissioner, Dr. Oxiris Barbot, noted that “the point here is not to fine people but to make it easier for them to get vaccinated.”⁴¹⁷ The executive order pulled nearly 6,000 children from school, distributed almost 17,000 doses of the MMR vaccine in twenty-six weeks, and launched a health campaign where health officials, doctors, and rabbis demonstrated the value of immunizations.⁴¹⁸

⁴¹⁴ Pager and Mays, “New York Declares Measles Emergency.”

⁴¹⁵ Pager and Mays, “New York Declares Measles Emergency.”

⁴¹⁶ Tyler Pager, “Measles Outbreak: Yeshiva’s Preschool Program Is Closed by New York City Health Officials,” *New York Times*, April 15, 2019.

⁴¹⁷ Pager and Mays, “New York Declares Measles Emergency.”

⁴¹⁸ Gold and Pager, “New York Suburb Declares Measles Emergency.”

Even so, a preschool did not cooperate with authorities and became the first school to be shut down by the city to stave off the epidemic. Officials closed the United Talmudical Academy's preschool, which serves 250 students, for violating a Health Department order that required it to provide medical and attendance records during the outbreak. Previously, the city issued violations to twenty-three yeshivas and day cares for not following the order. Nick Paolucci, the spokesman for the city's Law Department, said that they "are confident that the city's order is within the health commissioner's authority to address the very serious danger presented by this measles outbreak."⁴¹⁹

Failing to follow the city's emergency order, the court issued summons to three parents, who will be charged \$2,000 if they fail to respond. It has been at least a century since authorities have issued fines for such violations.⁴²⁰ A Brooklyn judge sided with New York officials to uphold the order and dismissed a lawsuit from a group of parents who claimed the order overstepped the city's authority. Judge Lawrence Knipel said, "A fireman need not obtain the informed consent of the owner before extinguishing a house fire. Vaccination is known to extinguish the fire of contagion."⁴²¹

Rockland County, a northern suburb of New York City, went as far as to bar unvaccinated children from public

⁴¹⁹ Pager, "Measles Outbreak."

⁴²⁰ Lena H. Sun, "Parents of 3 NYC Children Face \$1,000 Penalty for Violating Measles Order," *The Washington Post*, April 19, 2019.

⁴²¹ Francesca Paris, "Judge Upholds Mandatory Measles Vaccinations As New York Closes More Schools," *National Public Radio*, April 19, 2019.

places. The outbreak within Rockland also was mostly contained within the Orthodox Jewish community, which has ties to Brooklyn. Rabbi Yakov Horowitz, founding dean of Yeshiva Darchei Noam, supports vaccinations but was concerned that Rockland's declaration may lead to harassment against ultra-Orthodox Jews. In addition, Lawrence Gostin, Professor of Global Health Law at Georgetown University, said that the order was constitutionally problematic. Gostin advocates mandatory vaccinations for school entry, but questions the constitutional legitimacy of prohibiting children from public places.⁴²²

Conclusion

The vast majority of the public is on board with vaccinating against preventable diseases. Vaccine hesitancy is not a matter of scientific controversy, but rather an effect of misinformation and confusion within small pockets of the population about the safety of immunization and the dangers of measles. Having once declared the elimination of measles, the United States once again suffers from epidemics across the country. As Oregon pushes forward with legislation in line with SB-277, their measles epidemic may be the impetus needed to pass their House Bill 3063. States will need to handle unscrupulous medical exemptions as they come to pass similar legislation preventing religious and philosophical exemptions for school-entry vaccinations. These exemptions are not completely legal issues. They have epidemiological significance when they threaten to lower vaccination rates below herd immunity. SB-277 is a model

⁴²² Gold and Pager, "New York Suburb Declares Measles Emergency."

of effective state legislation that keeps communities safe and avoids the threats of serious epidemics—as seen recently in Brooklyn and Rockland County that warranted declarations of emergency to quell outbreaks. The measles outbreak in Disneyland caused California to reconsider its vaccination policies. SB-277 increased vaccination rates, and if adopted by other states, they too could have similar success. While measles has re-surfaced from American history, significant policy changes are poised to eliminate so much preventable suffering.