PROTECTING THE HERD: A PUBLIC HEALTH, ECONOMICS, AND LEGAL ARGUMENT FOR TAXING PARENTS WHO OPT-OUT OF MANDATORY CHILDHOOD VACCINATIONS

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I. INTRODUCTION

In February 2011, a twenty-seven-year old unvaccinated woman with measles[1] took a series of flights from the United Kingdom to Washington,

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1. Rubeloa, commonly called measles, is a viral respiratory disease. *Measles (Rubeola): Overview of Measles Disease*, CDC, http://www.cdc.gov/measles/about/overview.html (last updated Aug. 31, 2009). Measles causes "fever, runny nose, cough and a rash all over the body." *Id.* Measles is nearly eradicated from the U.S., but each year approximately 200,000 people across the globe still die from it. *Id.* Measles is extremely contagious; 90 percent of people exposed who are not immune will contract the disease. *Measles (Rubeola): Transmission of Measles*, CDC, http://www.cdc.gov/measles/about/transmission.html (last updated Aug. 31, 2009) [hereinafter *Transmission of Measles*]. Measles is airborne and "can live on infected surfaces for up to 2 hours." *Id.* The Measles, Mumps, and Rubella vaccine prevents measles. *Measles (Rubeola): Measles Vaccination*, CDC, http://www.cdc.gov/measles/vaccination.html (last updated Aug. 31, 2009). "Widespread use of measles vaccine has led to a greater than 99% reduction in measles cases in the United States." *Id.* Before the vaccine, each year three to four million people in the U.S. contracted measles, "48,000 were hospitalized, and another 1,000

D.C., Baltimore, Denver, and Albuquerque, coming into contact with scores of other travelers and many airport employees.[2] Measles is "highly contagious," infecting 90 percent of unvaccinated people exposed to it.[3] The woman unintentionally put at risk people who were too young to be vaccinated, who could not be vaccinated because of a medical condition, who had vaccine failure, or whose vaccine immunity had waned (hereinafter this group will be referred to as "vulnerable community members").

In 2008, Megan Campbell's ten-month-old son contracted measles after being exposed at a San Diego pediatrician's office by an unvaccinated seven-year-old who had contracted measles while traveling in Switzerland.[4] The seven-year-old's parents had used California's philosophical exemption to opt out of mandatory vaccination for the child.[5] Campbell's son, who was too young to be vaccinated against measles,[6] spent three days in the hospital with a fever that ran as high as 106 degrees and a rash that quickly covered his head, arms, and chest.[7] "We spent 3 days . . . fearing we might lose our baby boy. He couldn't drink or eat, so he was on an IV, and for a while he seemed to be wasting away," Campell said.[8] Campbell's son was part of a measles outbreak in which twelve people were infected

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developed chronic disability from measles encephalitis," and between 400 and 500 people died. *Id.* "In 2009, only 71 cases of measles were reported in the United States." *Id.*

2. Ben Mutzabaugh, *CDC Warns of Possible Measles Exposure on Several U.S. Flights*, USA TODAY, Mar. 1, 2011, http://travel.usatoday.com/flights/post/2011/02/measles-flights-scare/144925/1.

3. *Transmission of Measles*, *supra* note 1. Measles typically is accompanied by a rash; people are infectious "from four days before to four days after the rash appears." *Id. See also supra* text accompanying note 1.

4. *Vaccines & Immunizations: Measles: Unprotected Story*, CDC, http://www.cdc.gov/vaccines/vpd-vac/measles/unprotected-story.htm (last updated Nov. 4, 2010); Ashley Shelby, Commentary, *Ashley Shelby: Opposed to Vaccination? Let's Make That Sting*, STAR TRIBUNE, Mar. 22, 2011, http://www.startribune.com/opinion/otherviews /118396204.html. In Switzerland, measles immunization rates are below the 95 percent level needed to "prevent measles from circulating in the community." Richard Knox, *Measles Resurgence Tied to Parents' Vaccine Fears*, NPR, April 5, 2010, http://www.npr.org/templates /story/story. php?storyId=125570056.

5. Knox, *supra* note 4.

6. The CDC recommends that infants receive the first MMR dose between twelve and fifteen months of age, and the second dose at four to six years of age. *Vaccines & Immunizations: Measles Vaccination*, CDC, http://www.cdc.gov/vaccines/vpd-vac/measles/default.htm#vacc (last modified Sept. 30, 2011).

7. *Vaccines & Immunizations: Measles: Unprotected Story*, *supra* note 4.

8. *Id.*

(including the index case) and 839 people were exposed,[9] including people who had come into contact with the index case at supermarkets and on an airplane.[10] Seventy-three of those exposed were unvaccinated children, including twenty-five children whose parents opted out of vaccinating them and forty-eight children "who were too young to [have been] vaccinated."[11] San Diego Public Health Officials quarantined those seventy-three children.[12] The total cost of the outbreak was $176,980, which included an average of $775 spent by each family of a quarantined child and $124,517 spent by the county containing the outbreak.[13]

Gillian Kilberg Hodge, a mother of two who lives in McLean, Virginia, had to endure a thirty-day quarantine after her ten-day-old newborn, Mackenzie, was exposed to measles at the pediatrician's office.[14] Hodge's two-year-old son had to receive a booster shot because he was too young to have completed his Measles, Mumps, and Rubella vaccine ("MMR") regimen.[15] Mackenzie had to be quarantined for thirty days because she was too young to be vaccinated and could present a risk to others as a carrier if she had contracted measles.[16] Hodge said, "[I] was worried about even being around other small children even without [Mackenzie] for fear that I would have some of her spit on me and would somehow expose another innocent baby. And I really didn't want to be responsible for an outbreak of the measles in D.C."[17] Despite the highly contagious nature of measles, none of the Hodges contracted measles, likely because they did not have direct contact with the infected patient.[18] "It's so scary to think you could be at the park enjoying a nice day with your kids and then the next day they could [have a] deathly disease. . . . I am a firm believer in vaccinations," Hodge said.[19]

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9. David E. Sugerman et al., *Measles Outbreak in a Highly Vaccinated Population, San Diego, 2008: The Role of the Intentionally Undervaccinated*, 125 PEDIATRICS 747, 747 (2010).
10. Knox, *supra* note 4.
11. *Id.*
12. *Id.*
13. Sugerman et al., *supra* note 9, at 751.
14. E-mail interview with Gillian Kilberg Hodge, Mother (Mar. 6, 2011).
15. *Id.*
16. *Id.*
17. *Id.*
18. *Id.*
19. *Id.*

Patients like Campbell's son and newborn Mackenzie were relying on herd immunity, the principle that if a significant portion of the community—for most diseases, more than 80 percent—is vaccinated, those who cannot be vaccinated will be protected from illness by the community members who are vaccinated because the vaccine has eliminated "chains of contagion."[20] Parents and guardians (hereinafter referred to as "parents") who choose not to vaccinate their children create two potential problems: (1) If their child becomes infected because he or she is not vaccinated, the child can expose vulnerable community members to a vaccine-preventable illness; (2) A cluster of unvaccinated people undermines herd immunity, creating the risk that disease will spread, so that even an uninfected unvaccinated child "exposes" others through the failure to vaccinate. At the heart of the argument for vaccination is that community members cannot identify a potential source of infection. This means that going to a hospital, a movie theater, or a shopping mall becomes a game of Russian roulette unless the community has herd immunity.

As increasing numbers of parents across the United States are taking advantage of their state's philosophical and religious exemptions from statutes mandating childhood vaccines, the risk to the health of their communities is growing. Not only are these parents undermining herd immunity, putting the entire community's health at risk, but their actions also are raising health care costs, since preventing illnesses through vaccination is substantially more cost-effective than treating the illnesses.[21] It costs approximately sixteen times more to treat vaccine-preventable illnesses than to vaccinate for them.[22] For instance, "[f]or every $1 spent on the MMR vaccine, $7 to $14 . . . are saved" and for every $1 spent on DTaP,[23] $27 are saved.[24] As a result of non-vaccination, each year in the

20. *See* Donald S. Kenkel, *Prevention*, *in* 1B Handbook of Health Economics 1677, 1694 (Anthony J. Culyer & Joseph P. Newhouse eds., 2000).

21. Steve P. Calandrillo, *Vanishing Vaccinations: Why Are so Many Americans Opting Out of Vaccinating Their Children?*, 37 U. MICH. J.L. REFORM 353, 380 (2004).

22. *Id.*

23. The vaccine for children is a combination, immunizing against diphtheria, tetanus, and pertussis and is called DTaP. *Pertussis (Whooping Cough): Prevention*, CDC, http://www.cdc.gov/pertussis/about/prevention.html (last updated Oct. 21, 2011). The CDC recommends five total doses of DTaP by the time a child is six years of age. *Id.*

24. Calandrillo, *supra* note 21.

U.S. thousands of adults contract vaccine-preventable diseases that cost $10 billion to treat and that produce 30,000 preventable deaths.[25]

Granting philosophical and religious exemptions becomes problematic when it begins to undermine a community's herd immunity. For polio, 80 percent of the community must be vaccinated to achieve herd immunity,[26] while measles requires above a 95 percent vaccination level in school settings.[27]

Parents have many reasons for not vaccinating their children, ranging from religious objections to concerns about the potential adverse consequences of the vaccines. This latter point has received a great deal of attention in recent years despite scientific evidence that such concerns are largely exaggerated.[28] But perhaps the greatest reason parents do not vaccinate their children is that there is little incentive to do so since it is possible to "free ride" on the herd immunity that arises from others' vaccinations. Yet the individual decision to rely on herd immunity, which imposes no direct cost to the parents or their children, undermines herd immunity, potentially hurting other community members. Bombarded by media coverage of the "vaccine controversy," it seems a rational choice to "protect" one's child by not immunizing him or her. In order to counteract the negative externality that arises from the refusal to vaccinate one's child, states should impose a tax on parents who do not vaccinate their children and use the funds generated by the tax to pay treatment costs of patients who contract vaccine-preventable illnesses; contribute to the Vaccines for Children Program, which "offers vaccines at no cost for eligible children";[29] and improve education about vaccinations. Such a tax would ameliorate the negative externalities by taxing those who take advantage of

25. Yvonne A Malonado, *Current Controversies in Vaccination: Vaccine Safety*, 288 J. AM. MED. ASS'N 3155, 3155 (2002).

26. Alan R. Hinman et al., *Concurrent Sessions: Tools to Prevent Infectious Disease: Childhood Immunization: Laws that Work*, 30 J.L. MED. & ETHICS 122, 125 (2002).

27. Thomas L. Schlenker et al., *Measles Herd Immunity: The Association of Attack Rates With Immunization Rates in Preschool Children*, 267 J. AM. MED. ASS'N 823, 826 (1992).

28. *See Vaccines & Immunizations: Basics and Common Questions: Some Common Misconceptions About Vaccinations and How To Respond To Them*, CDC, http://www.cdc.gov/vaccines/vac-gen/6mishome.htm#risk (last updated Feb. 18, 2011) [hereinafter *Vaccines & Immunizations: Basics and Common Questions*].

29. *Vaccines & Immunizations: VFC: For Parents*, CDC, http://www.cdc.gov/vaccines /programs/vfc/parents/default.htm (last updated Oct. 19, 2011). Eligible children include those who are uninsured, on Medicaid, underinsured—their insurer does not cover vaccinations or only covers certain vaccinations—or those who are American Indian or Alaskan Native. *Id.*

a religious or philosophical exemption and using those funds, in part, to counteract the externality by paying for treatment for those children who contract vaccine-preventable illnesses. It also would combat the free-rider problem by creating a cost to not vaccinating. This would make parents consider the seriousness of their choice not to vaccinate.

This Note will examine using a vaccine-refusal tax to generate revenue to provide treatment for vaccine-preventable illnesses, free vaccines, and education to improve falling vaccination rates, which will, in turn, benefit the health of individuals. Part II examines federal and state government power to mandate vaccination. Part III discusses the economic reasons for falling vaccination rates and the effects on the public's health. This section includes discussion of negative externalities, the recent rise of pertussis, the anti-vaccine movement, the effectiveness of vaccine laws, the prisoner's dilemma, and the tragedy of the commons. Part IV contends that taxation could improve vaccination rates, examines the constitutionality of a tax, and discusses some of the arguments against it. Part V discusses using the tax's revenue to pay for treatment of vaccine-preventable illnesses, to provide vaccines for low-income children, and to fund an education campaign about immunization.

II. PUBLIC HEALTH FOUNDATIONS: THE STATE'S POWER TO MANDATE VACCINATION

In the early twentieth century the Supreme Court established in *Jacobson v. Massachusetts* that reasonable public health regulations could restrict an individual's liberty when the community's health is at risk.[30] This created the foundation for public health intervention and mandatory vaccination statutes. When Reverend Henning Jacobson challenged the constitutionality of a fine for not complying with the City of Cambridge's mandatory smallpox vaccination, the Court held that Massachusetts's mandatory vaccination regulation was reasonable in light of recent smallpox outbreaks and that the protection of public health was within the state's police power;[31] therefore, the city could restrict Jacobson's liberty to

30. *See generally* Jacobson v. Massachusetts, 197 U.S. 11 (1905).

31. The police power can be defined as the "inherent authority of the state . . . to enact laws and promulgate regulations to protect, preserve, and promote the health, safety, morals, and general welfare of the people." LAWRENCE O. GOSTIN, PUBLIC HEALTH LAW: POWER, DUTY, RESTRAINT 91–92 (rev. & expanded 2d ed. 2008) [hereinafter GOSTIN, POWER, DUTY, RESTRAINT]. Additionally, "the state retains the power to restrict, within federal and state constitutional limits, private interests." *Id.* at 92

determine whether or not to receive immunization.[32] In the words of Justice John Harlan, "the liberty secured by the Constitution . . . does not import an absolute right in each person to be, at all times and in all circumstances, wholly freed from restraint."[33] The Court held that people are subject to "manifold restraints" necessary for "the common good."[34] Further, the Court used a "social-compact theory," in which citizens, by virtue of living in a community and enjoying its benefits and protections, owe duties to the community and its citizens.[35] Thus, the Court established that a state could restrict individual liberty when it is necessary for the public's health or safety, as long as the law is not "arbitrary or oppressive," and the means have a "'real or substantial relation' to their goal."[36]

Further, the Court in *Jacobson* established that regulations do not need to be based on universally held beliefs.[37] The Court held that "[t]he possibility that the belief may be wrong, and that science may yet show it to be wrong, is not conclusive; for the legislature has the right to pass laws which, according to the common belief of the people, are adapted to prevent the spread of contagious diseases."[38] Thus, even a regulation that faces some controversy about its scientific validity still is regarded as "a reasonable and proper exercise of the police power."[39]

The Court built upon this foundation by establishing that states may overrule parents when the public's interest is at stake, further fortifying the case for mandatory childhood vaccinations, even against a parent's wishes. In *Zucht v. King*,[40] the Court held that states had substantial power to

32. *Jacobson*, 197 U.S. at 35.

33. *Id.* at 26.

34. *Id.*

35. *Id.* at 26–27. *See also* Lawrence O. Gostin, Jacobson v Massachusetts *at 100 Years: Police Power and Civil Liberties in Tension*, 95 AM. J. PUB. HEALTH 576, 578 (2005).

36. Wendy K. Mariner, George J. Annas & Leonard H. Glantz, Jacobson v Massachusetts*: It's Not Your Great-Great-Grandfather's Public Health Law*, 95 AM. J. PUB. HEALTH 581, 583 (2005).

37. *Jacobson*, 197 U.S. at 35.

38. *Id.*

39. *Id.* Justice John Marshall explained the "police power" when he wrote that the state's police powers are "a portion of that immense mass of legislation, which embraces every thing within the territory of a State, not surrendered to the general government." Gibbons v. Ogden, 22 U.S. 1, 1 (1824). *See also* Wendy E. Parmet, *From* Slaughter-House *to* Lochner*: The Rise and Fall of the Constitutionalization of Public Health*, 40 AM. J. LEGAL HIST. 476, 478 (1996).

40. Zucht v. King, 260 U.S. 174 (1922).

protect children from infectious disease, including not allowing them to attend public school.[41] Moreover, the Court stated that "*Jacobson v. Massachusetts* . . . had settled that it is within the police power of the State to provide for compulsory vaccination."[42] Since *Zucht*, courts have upheld the constitutionality of "government mandates for vaccination as a prerequisite for public school attendance."[43]

Prince v. Massachusetts established that the right of parents to determine how to raise their children "is not absolute,"[44] further supporting the states' ability to mandate vaccination.[45] The Court held that although "the custody, care and nurture of the child reside first in the parents . . . the family itself is not beyond regulation in the public interest."[46] Therefore, the parent cannot keep the state from regulating parental decisions just because the decision involves the exercise of religion.[47] The Court held, "[a]cting to guard the general interest in youth's well being, the state as parens patriae may restrict the parent's control by requiring school attendance, regulating or prohibiting the child's labor, and in many other ways."[48]

Despite myriad developments in constitutional law, the Court continues to rely on the tenets of *Jacobson* in evaluating public health interventions.[49] Additionally, "federal and state courts . . . have repeatedly affirmed [*Jacobson*'s] holding."[50] The Court also has not accorded bodily integrity the status of a fundamental right, so it applies a balancing test

41. Ross D. Silverman, *No More Kidding Around: Restructuring Non-Medical Childhood Immunization Exemptions to Ensure Public Health Protection*, 12 ANNALS HEALTH L. 277, 281 (2003). *See also* PUBLIC HEALTH LAW & ETHICS: A READER 372 (Lawrence O. Gostin ed., rev. & updated 2d ed. 2010).

42. *Zucht*, 260 U.S. at 176.

43. PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 372.

44. ERWIN CHEMERINSKY, CONSTITUTIONAL LAW: PRINCIPLES AND POLICIES 809 (3d ed. 2006).

45. *See* Prince v. Massachusetts, 321 U.S. 158 (1944). Sarah Prince appealed from a conviction for violating child labor laws when a nine-year-old child for whom Prince was a custodian helped her distribute religious literature. *Id.* at 159.

46. *Id.* at 166.

47. *Id.*

48. *Id.* Parens patriae "refers to the state's role as sovereign and guardian of persons under legal disability (principally minors and incompetent persons)." GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 95–96. For more about the history of parens patriae see GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 95–98.

49. Gostin, *supra* note 35, at 580. Gostin contends that *Jacobson* would "indisputably" be decided the same way if the Court considered it today. *Id.*

50. *Id.*

when examining bodily integrity—rather than a strict scrutiny test—weighing the liberty interest against the state's interest and tending to weigh in favor of the state.[51] Further, the Court has repeatedly found that the police power is "a classically adequate justification under substantive due process" for deprivation of a liberty interest, so a state may "act for the purposes of protecting the health, safety, or morals of the community."[52]

III. AN ECONOMICS-BASED EXPLANATION OF FEAR OF VACCINES AND FALLING VACCINATION RATES

A. NEGATIVE EXTERNALITIES: THE EFFECTS OF FAILURE TO VACCINATE

In vaccination "externalities arise from the concept of 'herd immunity' where any given individual's chances of getting an infectious disease fall when others in the society are immune because of previous vaccinations."[53] Parents who opt out of vaccinating their children create negative externalities by threatening herd immunity. If herd immunity is lost, then the community is no longer protected from disease. This means that vulnerable community members bear the burden of the negative externality because they are now at risk for disease.[54] The costs to each individual include costs of treatment, loss of health or life, and lost wages.[55] The costs to society are the costs of containing an epidemic, including surveillance, notification, and quarantine costs, as well as lost productivity of community members and costs of treatment not borne by patients. [56]

Although there are more than forty vaccines available, the smallpox vaccine is the only one to have effectively eradicated its target disease.[57] Typically, as a disease fades away, demand for the vaccine decreases and

51. GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 130.

52. *Id.* at 135.

53. Kenkel, *supra* note 20, at 1694. *See also* Dagobert L. Brito, Eytan Sheshinski & Michael D. Intriligator, *Externalities and Compulsory Vaccinations*, 45 J. PUB. ECON. 69, 70 (1991) ("[T]he possibility of contagion from the unvaccinated population represents a negative externality in itself").

54. Of course those who choose to be unvaccinated also are at-risk for vaccine-preventable illnesses; however, they are simply bearing the cost of the decision not to vaccinate, not the negative externality, which by definition is imposed on a third-party.

55. *See* Amy A. Parker et al., *Implications of a 2005 Measles Outbreak in Indiana for Sustained Elimination of Measles in the United States*, 355 NEW ENG. J. MED. 447, 447, 454 (2006).

56. *See id.*

57. Pierre-Yves Geoffard & Tomas Philipson, *Disease Eradication: Private versus Public Vaccination*, 87 AM. ECON. REV. 222, 222 (1997).

then the disease returns.[58] Parents choosing not to vaccinate their children play a substantial role in this cycle.

1. Failure to Vaccinate Undermines Herd Immunity

The main negative externality of not vaccinating is that it undermines herd immunity; herd immunity is based on the fact that "any given individual's chances of getting an infectious disease fall when others in society are immune because of previous vaccinations."[59] Herd immunity is crucial to protecting individuals from vaccine-preventable illness. If enough people in a community are vaccinated, their collective immunity eliminates the chains of contagion so vulnerable community members are protected from disease by the rest of the community.[60] For most diseases, vaccination rates of 85 percent to 95 percent are necessary for herd immunity.[61]

Although there has not been a substantial dip in national immunization rates, pockets of low vaccine rates have developed in certain areas, threatening the herd immunity in those communities.[62] "[A]s exemptions proliferate, disease 'hot spots' are cropping up across the United States where large pockets of children have not received many or any of their mandatory immunizations."[63] In the past thirty years, personal exemptions have risen from 0.5 percent to 2 percent of people in the United States.[64] For example, Washington had a 6 percent rate of non-medical exemptions in 2006-2007, but within counties, the exemption rate varied from 1.2 percent to 26.9 percent.[65] In California, most of those who gain exemptions do so through a personal belief exemption.[66] For example, at Sebastopol

58. *Id.*

59. Kenkel, *supra* note 20, at 1694.

60. Calandrillo, *supra* note 21, at 420.

61. Katharine Mieszkowski, *Areas of Low Vaccination Rates Post Risk to Students*, N.Y. TIMES, Sept. 11, 2010, at A35A [hereinafter Mieszkowski, *Areas of Low Vaccination Rates*].

62. From 1991–2004 "[t]he mean exemption rate increased an average of 6% per year . . . [reaching] 2.54% in 2004, among states that offered personal belief exemptions. In states that easily granted exemptions, the rate increased 5% per year . . . to 2.51% in 2004." Saad B. Omer, *Nonmedical Exemptions to School Immunization Requirements*: *Secular Trends and Association of State Policies With Pertussis Incidence*, 296 J. AM. MED. ASS'N 1757, 1757 (2006).

63. Calandrillo, *supra* note 21, at 361.

64. Mieszkowski, *Areas of Low Vaccination Rates*, *supra* note 61.

65. Saad Omer et al., *Vaccine Refusal, Mandatory Immunization, and the Risks of Vaccine-Preventable Diseases*, 360 NEW ENG. J. MED. 1981, 1983 (2009).

66. Mieszkowski, *Areas of Low Vaccination Rates*, *supra* note 61.

Independent Charter School in Sebastopol, "only 12 percent of kindergarteners had received all mandated immunizations" and 88 percent of those not vaccinated had personal-belief exemptions.[67] In contrast, at an elementary school in Fremont and an elementary school in San Jose, 100 percent of kindergarteners had received all mandated immunizations; demonstrating that in some communities herd immunity is not threatened, while in other communities high numbers of exemptors create "pockets of low vaccination rates,"[68] which threaten herd immunity.[69] Marin County, a wealthy community of about 250,000 people[70] outside of San Francisco, has low vaccination rates.[71] Approximately 7 percent of Marin County kindergarteners had a personal belief exemption for immunization in 2010,[72] and Marin County accounted for 15 percent of California's reported pertussis cases in 2010.[73]

2. Loss of Herd Immunity Puts Community Members at Risk

Loss of herd immunity puts two main groups at risk: (1) vulnerable community members and (2) those who are purposely not vaccinated. Both groups are relying on herd immunity to protect them.

Vulnerable community members rely on herd immunity because they, themselves, cannot be vaccinated. Infants, for instance, "may be exposed to life-threatening illnesses" before they can be immunized.[74] Of the sixty-four cases of measles that occurred in the U.S. between January 2008 and April 2008, thirteen of those cases were in children too young to be vaccinated.[75] In fact, children who are too young to be immunized or who cannot be immunized tend to be "more susceptible to the complications of

67. *Id.*
68. *Id.*
69. *Id.*
70. U.S. CENSUS BUREAU, TABLE DP-1 PROFILE OF GENERAL DEMOGRAPHIC CHARACTERISTICS: 2000, *available at* http://demographics.marin.org/2000comdevcensus/ComDev_Docs/Marin%20County.pdf.
71. Marin Health & Human Servs., 2010 Marin County Fact Sheet: Kindergarten Immunization Rates, *available at* http://www.healthymarin.org/javascript/htmleditor/uploads/Marin_County_Kindergarten_Immunization_Rates_2010_20110311135213.pdf [hereinafter Marin County Fact Sheet]; Katharine Mieszkowski, *Vaccination Rate Lags As an Epidemic Spreads*, N.Y. TIMES, July 11, 2010, at A25A [hereinafter Mieszkowski, *Vaccination Rate Lags*].
72. Marin County Fact Sheet, *supra* note 71.
73. Mieszkowski, *Vaccination Rate Lags*, *supra* note 71.
74. Calandrillo, *supra* note 21, at 361.
75. Omer et al., *supra* note 65, at 1984. In fact, "[a]ll but one of the [cases] were either unvaccinated or did not have evidence of immunization." *Id.*

infectious diseases than the general population of children," so herd immunity is particularly critical for them.[76]

In addition, any person has the potential to become a vulnerable community member because each vaccine is not completely effective and its effectiveness may diminish over time.[77] Thus, even someone who is ostensibly healthy and fully vaccinated may actually be vulnerable to a given vaccine-preventable disease and, therefore, may contract the illness if herd immunity fails. Thus, herd immunity is important even for people who have been vaccinated.

Those who are purposely not vaccinated also rely on herd immunity to protect them from vaccine-preventable illnesses, so if herd immunity wanes, they are no longer protected.

3. Failure to Vaccinate Endangers the Unvaccinated Child

An additional problem with not vaccinating is that it also puts the unvaccinated child at risk. A 2000 study found that in at least one state, children whose parents choose not to vaccinate them for measles and pertussis were "22.2 times . . . more likely to acquire measles," and "5.9 times . . . more likely to acquire pertussis than vaccinated children."[78] "[F]or contagious diseases like measles and pertussis, it's hard for unvaccinated children to successfully hide among herds of vaccinated children."[79] In 2005, for example, an unvaccinated teenage girl contracted measles in Romania and unintentionally "caused the largest outbreak of measles in the U.S. in 10 years"[80] when she attended a 500-person meeting

76. *Id.*

77. Primary vaccine failure is when a vaccine does not provide the expected protection: "Vaccine failures are largely attributed to the lack of a primary antibody response." M. Paunio et al., *Secondary Measles Vaccine Failures Identified by Measurement of IgG Avidity: High Occurrence Among Teenagers Vaccinated at a Young Age*, 124 EPIDEMIOLOGY & INFECTION 263, 263–64 (2000). Secondary vaccine failure is when immunity from a vaccine wanes; "the determinants of quality and duration of vaccine-induced immunity are not fully understood." *Id.* at 264. To combat secondary vaccine failure, the CDC recommends booster shots for vaccines such as pertussis. *See Whooping Cough (pertussis)*, AdultVaccination.org, http://www.adultvaccination.org/whooping_cough_vaccine_pertussis_vaccination_adult_immunization.htm (last visited Mar. 8, 2012). See *infra* Part 3.A.5 for further discussion of primary and secondary vaccine failure of pertussis.

78. Daniel R. Feikin et al., *Individual and Community Risks of Measles and Pertussis Associated With Personal Exemptions to Immunization*, 284 J. AM. MED. ASS'N 3145, 3145 (2000).

79. Paul A. Offit, *Fatal Exemption*, WALL ST. J., Jan. 20, 2007, at A10.

80. *Id.*

in Indiana of people who largely did not believe in vaccination.[81] In this case, 94 percent of people who acquired measles from the girl were unvaccinated; two people who were vaccinated, yet contracted measles, had vaccine failure.[82] Nineteen people contracted measles from the index case—eighteen at the meeting and one during a social visit with the index case—fifteen other people later acquired it.[83] One study concluded that high vaccination rates in areas adjacent to the outbreak helped lower infection rates.[84] Parents not only place the wider community at risk, but also their own children when they refuse to allow them to be vaccinated.

4. Unvaccinated Children Become Disease Vectors, Putting Community Members at Risk

In addition to undermining herd immunity, unvaccinated children can act as vectors of disease, threatening the public's health. A 2000 study concluded that "personal exemptors put vaccinated children at risk of acquiring measles and pertussis[85] . . . [and] exemptors can transmit disease to vaccinated individuals."[86] The study found that "the frequency of exemptors in a county was associated with the incidence rate of measles . . . and pertussis . . . in vaccinated children."[87] Furthermore, "[a]t least 11% of vaccinated children in measles outbreaks acquired infection through contact with an exemptor."[88] The study's authors concluded that "[u]ntil vaccines become available that are 100% effective or a disease is eradicated, an increase in exemptors has the potential to precipitate communitywide outbreaks of vaccine-preventable diseases."[89]

81. *Id.*; Parker et al., *supra* note 55, at 447.
82. Parker et al., *supra* note 55, at 447.
83. *Id.* at 447–51.
84. *Id.* at 452.
85. Pertussis is a "highly contagious respiratory disease" caused by the bacteria *Bordetella pertussis*. *Pertussis (Whooping Cough)*, CDC, http://www.cdc.gov/pertussis (last updated Aug. 22, 2011). An "uncontrollable, violent coughing" is characteristic of the illness. *Id.* Infants and young children most commonly contract the disease. *Id.* The CDC notes that "[t]he best way to protect against pertussis is immunization." *Id.* The vaccine for pertussis is DTaP; the CDC recommends five total doses of DTaP by six years of age. *Pertussis (Whooping Cough): Prevention*, *supra* note 23.
86. Feikin et al., *supra* note 78, at 3149.
87. *Id.* at 3145.
88. *Id.*
89. *Id.* at 3150.

5. Case Study: Pertussis Demonstrates Danger Posed by Pockets of Exemptors

One vaccine-preventable illness, pertussis, has experienced a recent rise in cases,[90] illustrating the negative effects of allowing herd immunity to falter. The pertussis vaccine is effective only 80 percent of the time,[91] so herd immunity is particularly important to protect people for whom the vaccine is not effective. In addition, immunity wanes across time so the Centers for Disease Control and Prevention ("CDC") recommend a booster shot at ages eleven or twelve and again every ten years.[92] Pertussis is currently a concern for public health officials because of increasing numbers of reported cases.[93] There were reports of more than 27,000 pertussis cases in the U.S in 2010.[94] Pertussis incidence "has been increasing since 2007," and "continues to remain higher than in the 1990s."[95]

Moreover, some states have seen a particular rise in cases. In California, for instance, the number of cases reported to the state's department of public health in the first half of 2010 increased 418 percent from the previous year[96] and included ten infant deaths.[97] Eighty-nine percent of the cases were among infants younger than six months, who were too young to be full vaccinated.[98] Overall in 2010, there were 9143 reported cases of pertussis in California, which was "the most cases reported in 63 years."[99] Furthermore, as of September 2011, the state had a

90. *See Pertussis (Whooping Cough): Surveillance & Reporting*, CDC, http://www.cdc.gov/pertussis/surv-reporting.html (last updated Sept. 8, 2011).

91. Mieszkowski, *Vaccination Rate Lags*, supra note 71.

92. *Tetanus, Diphtheria (Td) or Tetanus, Diphtheria, Pertussis (Tdap) Vaccine: What You Need to Know*, CDC, http://www.cdc.gov/vaccines/pubs/vis/downloads/vis-td-tdap.pdf.

93. *See Pertussis (Whooping Cough): Surveillance & Reporting*, *supra* note 90.

94. *Pertussis (Whooping Cough): Outbreaks*, CDC, http://www.cdc.gov/pertussis/outbreaks.html (last updated Aug. 22, 2011).

95. *See Pertussis (Whooping Cough): Surveillance & Reporting*, *supra* note 90.

96. *Notes from the Field: Pertussis—California, January–June 2010*, 59 MMWR 817 (2010), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5926a5.htm. From January to June 2010, there were 1337 reported cases of pertussis. *Id.*

97. *Pertussis Report, September 15, 2011*, CAL. DEP'T OF PUB. HEALTH (2011), http://www.cdph.ca.gov/programs/immunize/Documents/PertussisReport20119.pdf.

98. *Notes from the Field: Pertussis—California, January–June 2010*, *supra* note 96.

99. *Pertussis (Whooping Cough): Outbreaks*, *supra* note 94. Note that the California Department of Public Health reports the number of cases for 2010 as 9146 and says that "[t]his number has been adjusted from prior reports." *Pertussis Report, September 15, 2011*, *supra* note 97.

reported 2462 cases, which were "relatively increased levels" compared with historic averages.[100] Similarly, Michigan has seen a "long term rising trend in the reported number of pertussis cases since about 1990."[101] Nine hundred and two cases were reported in 2009, while 1564 cases occurred in 2010.[102]

Often the raw statistics fail to convey the high cost of vaccine-preventable illnesses. For example, in 2010, when one-month-old Callie Grace VanTourhout of South Bend, Indiana, developed a cough, her mother took her to the doctor's office where the infant had to be resuscitated after she stopped breathing.[103] She was then admitted to the pediatric intensive care unit of a local hospital, but died of pertussis less than a week later.[104] She was "too young to even get her first dose of DTaP."[105] Callie was dependent on herd immunity to protect her from pertussis but because of falling immunization rates, herd immunity failed her. In 2008 public health officials in Joseph County, which encompasses South Bend, had reported concern about the state's low vaccination rates[106] because nearly 30 percent of children in Indiana were undervaccinated before they reached three years of age.[107] In 2010 Indiana experienced its highest rate of pertussis "since the 1950s," with 500 cases reported as of November 2010 and two infant deaths, including Callie Grace.[108]

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100. *Pertussis Report, September 15, 2011*, *supra* note 97.

101. *Pertussis (Whooping cough): Outbreaks*, *supra* note 94.

102. *Pertussis (Whooping Cough) in Michigan*, MICH. DEP'T OF CMTY. HEALTH, http://www.michigan.gov/mdch/0,167,7-132-2942_4911_4914-240419--,00.html (last visited Nov. 1, 2011).

103. *Vaccines & Immunizations: Pertussis: Unprotected Story*, CDC, http://www.cdc.gov/vaccines/vpd-vac/pertussis/unprotected-story.htm (last updated Nov. 4, 2010); Lara Salahi, *38-Day-Old Baby Dies After Persisting Cough*, GOOD MORNING AMERICA, Apr. 28, 2010, http://abcnews.go.com/GMA/OnCall/baby-whooping-cough-death-doctors-urge-vaccination-family/story?id=10492381.

104. *See Vaccines & Immunizations: Pertussis: Unprotected Story*, *supra* note 103; Salahi, *supra* note 103.

105. *Vaccines & Immunizations: Pertussis: Unprotected Story*, *supra* note 103. *See also* Salahi, *supra* note 103.

106. Leanne Tokars, *Concern Grows Over Indiana's Low Immunization Rate*, SOUTHBENDTRIBUNE.COM, Jan. 23, 2008, http://articles.southbendtribune.com/2008-01-23/news/26841903_1_low-immunization-rate-deadly-childhood-diseases-health-department.

107. *Vaccination Rate A Public Health Issue*, SOUTHBENDTRIBUNE.COM, May 12, 2008, http://articles.southbendtribune.com/2008-05-12/news/26911537_1_measles-outbreak-immunization-vaccination-rate.

108. *Whooping Cough Outbreak Reported in Indiana*, WISHTV8.COM, Nov. 22, 2010, http://www.wishtv.com/dpp/health/whooping-cough-outbreak-reported-in-indiana.

B. THE ANTI-VACCINE MOVEMENT

Resistance to and fear of immunization is not a modern phenomenon. Almost as soon as Dr. Edward Jenner developed his smallpox vaccination in the late eighteenth century,[109] people viewed it with distrust.[110] When the Supreme Court decided the seminal vaccination case *Jacobson*,[111] the public was engaged in a lively debate about smallpox immunization.[112] Anti-vaccinationists termed mandatory vaccination "the greatest crime of the age," and claimed it "slaughter[s] tens of thousands of innocent children."[113] Resistance to vaccination was so strong in the late nineteenth century in England that Parliament passed a statute giving an exemption to a parent who could prove that "he conscientiously believes that vaccination would be prejudicial to the health of the child."[114]

In the United States, however, "[o]pposition to childhood vaccines simmered mostly on the fringes"[115] until 1998 when *The Lancet*, a well-respected British medical journal, published a study by A.J. Wakefield linking autism to the MMR immunization.[116] The study turned out to be "an elaborate fraud" and twelve years later *The Lancet* retracted the study, but in the interim the public perception of vaccine safety was gravely damaged.[117] In fact, a 2000 survey showed that more than two-thirds of

109. Calandrillo, *supra* note 21, at 365.
110. *See* GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 122.
111. Jacobson v. Massachusetts, 197 U.S. 11 (1905).
112. GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 122.
113. *Id*.
114. *Id*.
115. Sandra G. Boodman, *Inside the Vaccine-Autism Scare*, WASH. POST., Jan. 16, 2011, at B01.
116. A.J. Wakefield et al., *Ileal-Lymphoid-Nodular Hyperplasia, Non-Specific Colitis, and Pervasive Developmental Disorder in Children*, 351 LANCET 637 (1998).
117. Boodman, *supra* note 115. The *Lancet* retracted the study in February 2010. *Retraction—Ileal-Lymphoid-Nodular Hyperplasia, Non-Specific Colitis, and Pervasive Developmental Disorder in Children*, 375 LANCET 445 (2010). Ten of the original thirteen authors renounced the study's conclusions, and the main author, Andrew Wakefield, was "stripped of his right to practice medicine." *Study Linking Vaccine to Autism Is Called Fraud*, N.Y. TIMES, Jan. 6, 2011, at A10. In 2011, the *British Medical Journal* concluded the study was "based on falsified data" after the journal conducted an investigation. Boodman, *supra* note 115. In the *British Medical Journal*, Brian Deer, an investigative journalist, found that the medical histories of the twelve children in the studies had been massaged to make it seem as though their autism-like symptoms appeared only after vaccination, when in reality some had developed well before vaccination and others well after. *See generally* Brian Deer, *How the Case Against the MMR Vaccine Was Fixed*, 342 BRIT. MED. J. 77 (2011), http://www.bmj.com/content/342/7788/Feature.full.pdf. It turns out

physicians "reported a 'substantial increase' in the number of parents expressing concerns" about vaccinations and that about 25 percent of parents believed that "too many vaccinations could weaken a child's immune system" and that children "received more shots than were good for them."[118] Even though Wakefield's research has been discredited for both its methods and conclusions, the link between autism and vaccines is cemented in many parents' minds.[119] A 2010 U.S. study showed that 30 percent of parents surveyed reported "concern" that "[v]accines may cause learning disabilities, such as autism."[120] After *The Lancet* retracted the research, anti-vaccination groups spoke out in support of Wakefield, the primary author. For example, Jenny McCarthy, an American actress and founder of Generation Rescue, a group that touts a link between vaccines and autism,[121] told CNN, "It is our most sincere belief that Dr. Wakefield and parents of children with autism around the world are being subjected to a remarkable media campaign engineered by vaccine manufacturers."[122] Similarly, Wendy Fournier, founder of the National Autism Association, said, "I cannot imagine for a second that Dr. Wakefield would have any

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Wakefield was working to create a lawsuit to sue vaccine manufacturers and wanted to find a bowel-brain syndrome. *Id.* at 77. Wakefield was on the payroll of a law firm for two years prior to the study. *Id.* Wakefield faked data in the study, changing the timeline about when one child's symptoms began, for instance, to establish a connection between the MMR vaccine and autism. *Id.* at 77–78. Moreover, although the study purported to make findings about regressive autism, only one of nine subjects described as having regressive autism actually had a diagnosis of regressive autism and three of them did not have autism at all. *Id.* at 78.

118. James Colgrove & Ronald Bayer, *Could It Happen Here? Vaccine Risk Controversies and the Specter of Derailment*, 24 HEALTH AFF. 729, 734–35 (2005).

119. In fact, Wakefield's study has had a substantial affect:

> By early 2002, 25% of parents [in the United Kingdom] believed that "the weight of scientific evidence suggests a link between MMR and autism," and another 39 percent thought that "there was equal evidence on both sides." By 2003, MMR immunization rates had fallen to 80 percent in the United Kingdom and to 62 percent in some parts of London.

Id. at 733. However, after Wakefield's research was questioned, rates began to rise again and by 2004, 82 percent of parents said they thought the MMR vaccine was "safe." *Id.*

120. Allison Kennedy et al., *Confidence About Vaccines In The United States: Understanding Parents' Perceptions*, 30 HEALTH AFF. 1151, 1153 (2011).

121. *See About: Background*, GENERATION RESCUE, http://www.generationrescue.org/about/background (last visited Nov. 1, 2011).

122. *Medical Journal: Study Linking Autism, Vaccines Is 'Elaborate Fraud,'* CNN HEALTH (Jan. 6, 2011, 1:04 PM), http://www.cnn.com/2011/HEALTH/01/06/autism.vaccines/index.html?iref=allsearch

reason to falsify data."[123] This is despite the fact that numerous research studies have been unable to find a link between vaccines and autism.[124]

Anti-vaccinationists have a variety of reasons for their resistance to immunization. For example, "[s]ome people object because they distrust scientists and health officials, fearing that vaccines are ineffective or induce injury; others object on grounds of religion or principle; and still others object to what they view as unwarranted government interference with their autonomy and liberty."[125] Moreover, as the incidence of a particular disease falls, people forget how dangerous the illness can be: "[I]mmunizations have become victims of their own success, eradicating from public memory the devastating aftermaths of once-common pediatric illnesses: deafness caused by mumps, blindness after measles and paralysis brought on by polio."[126] Since the illnesses that vaccines prevent have faded into memory, people view the risks of vaccines as greater than the risks of vaccine-preventable illness.[127] As Sonny Tat, MD MPH, an emergency department fellow at Children's National Medical Center in Washington, D.C., observed, "[p]arents forget just how sick these diseases make children."[128] Dr. Tat noted that in Vietnam, where children are not routinely vaccinated against Haemophilus Influenza, which can cause meningitis and is diagnosed and tracked with lumbar punctures, the disease is widespread.[129] Dr. Tat said he saw more children with Haemophilus Influenza in one day at a hospital in Vietnam than in three years of practicing at a tertiary care

123. *Id.*

124. Boodman, *supra* note 115. *See* INSTITUTE OF MEDICINE, IMMUNIZATION SAFETY REVIEW: MEASLES-MUMPS-RUBELLA VACCINE AND AUTISM (Washington: National Academies Press 2001); INSTITUTE OF MEDICINE, IMMUNIZATION SAFETY REVIEW: VACCINES AND AUTISM, (Washington: National Academies Press 2004). Note that despite studies showing no link between the MMR vaccine and autism, the Food and Drug Administration "recommended removal of thimerosal for use in recommended vaccines" because of widespread public pressure. Richard A. Epstein, *It Did Happen Here: Fear and Loathing On the Vaccine Trail*, 24 HEALTH AFF. 740, 742 (2005). A 2010 U.S. study showed that despite thimerosal's removal, 26 percent of parents surveyed reported "concern" that "[t]he ingredients in vaccines are not safe." Kennedy et al., *supra* note 120.

125. PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 367. "[R]esistance can result from social, religious, and ideological factors." Wendy E. Parmet, Richard A. Goodman & Amy Farber, *Individual Rights Versus the Public's Health—100 Years After* Jacobson v. Massachusetts, 352 NEW ENG. J. MED.652, 653 (2005).

126. Boodman, *supra* note 115.

127. Calandrillo, *supra* note 21, at 388–89.

128. Instant Message Interview with Sonny Tat, MD MPH, Children's Nat'l Med. Ctr. D.C., (Feb. 21, 2011).

129. *Id.*

hospital in San Francisco.[130] "In [the National Hospital of Pediatrics in Hanoi], children were lined up waiting to get lumbar punctures like they were waiting to buy groceries," he explained.[131] Additionally, he noted, "In developed countries today, we do lumbar punctures in infants much less frequently because the risk of meningitis is so much lower than it was in the past. This change in practice is directly attributable to vaccination."[132] Similarly, ethicist Angus Dawson notes that in the 1950s, parents in the U.S. "would line up for hours to ensure their children were vaccinated [against polio]" because "[p]olio was seen as a real threat, so there were few qualms about vaccination's undue risk."[133]

Some parents "systematically misperceive or overperceive the magnitude" of vaccination's risks, mistakenly concluding that "the dangers of vaccinating are worse than the benefits."[134] In fact, the risk of an adverse outcome from a vaccine-preventable illness is substantially higher than the risk posed by the vaccine.[135]

Risk of Severe Outcomes from Disease versus Vaccine[136]					
Disease	**Possible Severe Outcome**	**Risk of outcome**	**Vaccine**	**Possible Severe Outcome**	**Risk of outcome**

130. *Id.*
131. *Id.*
132. *Id.*
133. Angus Dawson, *The Moral Case for the Routine Vaccination of Children in Developed and Developing Countries*, 30 HEALTH AFF. 1029, 1030 (2011).
134. Calandrillo, *supra* note 21, at 388.
135. As with any medication, there are risks to vaccines. *Id.* at 389. In clinical trials of DTaP, for instance, the most severe problems associated with it were that some recipients experienced permanent brain damage, coma, long-term seizures, or lowered consciousness; these problems are "so rare it is hard to tell if they were caused by the vaccine." *Diphtheria, Tetanus & Pertussis Vaccines: What You Need to Know*, CDC, http://www.cdc.gov/vaccines/pubs/vis/downloads/vis-dtap.pdf.
136. *See Vaccines & Immunizations: Basics and Common Questions*, *supra* note 28.

Measles	Pneumonia Encephalitis Death	6% 0.1% 0.2%	**MMR**	Encephalitis Severe allergic reaction	0.0001% 0.0001%
Rubella	Congenital rubella syndrome	25%			
Diphtheria	Death	5%	**DTaP**	Continuous crying followed by complete recovery	0.1%
Tetanus	Death	20%			
Pertussis	Pneumonia Encephalitis Death	12.5% 5% 0.06%		Convulsions or shock followed by complete recovery Acute encephalopathy Death	0.007% 0 to 0.00105% None proven

Table 1: Risk of Severe Outcomes from Disease versus Vaccine

The CDC explains that "[m]ore serious adverse events occur rarely (on the order of one per thousands to one per millions of doses), and some are so rare that risk cannot be accurately assessed."[137] However, the rare side effects from vaccinations can sound frightening, particularly given that few parents believe their children will contract a vaccine-preventable illness, such as measles, or that the disease will be particularly serious. Also, people naturally tend to overestimate the risk of "low probability but high tragedy events," such as a severe adverse reaction to a vaccine, and tend to underestimate the risk of more common events, such as car accidents or contracting influenza.[138]

The media adds to parents' misperception of risk because it tends to cover the risks of vaccines much more than the risks of vaccine-preventable illness or the benefits of immunizations, making it difficult for parents to

137. *Id.*
138. Calandrillo, *supra* note 21, at 405.

distinguish between vaccine fearmongers and scientifically-based medical research.[139] Journalists have in the past covered "the vaccine controversy" without differentiating correlation or causation, often by allowing anti-vaccine advocates unopposed airtime for making their cases, and giving anti-vaccinationists the same attention and respect provided to research scientists, clinicians, and public health professionals.[140]

The Internet has been a particularly important source of information for the anti-vaccination stance.[141] A 2002 study found that anti-vaccination websites tend to "rely heavily on emotional appeal to convey their message," and that the majority of them claimed that vaccines cause such ailments as autism, sudden infant death syndrome, diabetes, and attention deficit disorder; that vaccines erode immunity; and that adverse reactions to vaccines are underreported.[142] The websites also included many personal stories that encourage "'false consensus bias'—the tendency to rely on personal experience rather than systematic, scientific evidence."[143] The majority of websites also provided information about gaining exemptions from mandatory immunization.[144]

Anti-vaccinationists tend to be from a certain segment of the population. Children whose parents chose not to vaccinate them tend "to be male, to be white, to belong to households with higher income, to have a married mother with a college education, and to live with four or more children."[145]

C. VACCINE LAWS SUBSTANTIALLY AFFECT VACCINATION LEVELS

Vaccine laws make a significant difference in immunization levels: "In the early 1970s, public health officials found that states with vaccine

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139. *See id.* at 388–89, 403.

140. Boodman, *supra* note 115. On an appearance on the television show *Oprah*, McCarthy, a former Playboy model and an actress, contended that the MMR vaccine was responsible for her son's autism. *Id.*

141. Calandrillo, *supra* note 21, at 402–03. Similarly, social media tools such as Twitter have "made it easier to find and disseminate immunization-related concerns and misperceptions. Kennedy et al., *supra* note 120, at 1151.

142. Robert M. Wolfe, Lisa K. Sharp & Martin S. Lipsky, *Content and Design Attributes of Antivaccination Web Sites*, 287 J. AM. MED. ASS'N 3245, 3245–46 (2002).

143. Calandrillo, *supra* note 21, at 403.

144. Wolfe, Sharp & Lipsky, *supra* note 142, at 3245.

145. Omer et al., *supra* note 65, at 1984. This information is based on data from the National Immunization Survey for 1995–2001, comparing unvaccinated children with children who were partially vaccinated. *Id.*

mandates had rates of measles that were 50% lower than states without mandates."[146] Similarly, when California in 1999 required that all seventh graders had to have been vaccinated against hepatitis B, immunization for hepatitis B increased from 70.6 percent of seventh graders to 89.9 percent of them—in some areas the increase was even more dramatic.[147] In San Diego, for example, hepatitis B vaccination rates went from 15.8 percent in 1998 to 68.5 percent.[148]

But the availability of exemptions also affects vaccination rates and incidence of vaccine-preventable disease: "Exemption rates average 2.5 percent in states that recognize philosophical exemptions or have simple exemption processes."[149] The results are evident in communities such as Ashland, Oregon, which has a 15 percent exemption rate as a result of the state's easily obtained exemptions.[150] Moreover, a 2006 study found an association between "increased pertussis incidence," and the "permitting [of] personal belief exemptions" or "easily grant[ed] exemptions."[151] The study concluded that "state exemption policies affect vaccine exemption rates as well as pertussis incidence."[152] The unadjusted analysis showed that states offering personal belief exemptions had pertussis rates more than double those of states allowing religious exemptions only.[153] In states with easily granted exemptions, pertussis incidence is 90 percent higher than in states without exemptions.[154]

D. THE PRISONER'S DILEMMA: RESISTANCE AT AN INDIVIDUAL LEVEL

At an individual level, the decision about whether to vaccinate can be modeled as a classic prisoner's dilemma game.[155] Game theory models

146. Offit, *supra* note 79.
147. Hinman et al., *supra* note 26, at 123.
148. *Id.*
149. PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 377.
150. *Id.*
151. Omer, *supra* note 62, at 1757.
152. *Id.* at 1761–62.
153. *Id.* at 1761.
154. PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 377.
155. Game theory attempts to capture individual behavior in situations—games—in which the individual's payoff depends on the choices of the other player. ROBERT COOTER & THOMAS ULEN, LAW & ECONOMICS 38–39 (5th ed. 2008). A prisoner's dilemma demonstrates why two people will not cooperate with one another. *Cf.* Chris T. Bauch, Alison P. Galvani & David J.D. Earn, *Group Interest Versus Self-Interest in Smallpox Vaccination Policy*, 100 PNAS 10564, 10564 (2003). In the prisoner's dilemma scenario, two people, prisoner A and prisoner B have been arrested for burglary. DAVID HEMENWAY,

situations in which individuals' decisions depend on other people's decisions.[156] Vaccination is this type of decision. Vaccinating entails some risk, since there can be adverse reactions to the vaccine. It also provides reward, since vaccinating protects from disease. Viewing vaccinations through the lens of game theory, assume a world in which there are only two people: Player 1 and Player 2, each of whom must make a decision about whether or not to vaccinate for one disease, polio, with one vaccine. The relative payoffs associated with each individual player's decision to vaccinate (or not vaccinate) for polio are shown in Figure 1.

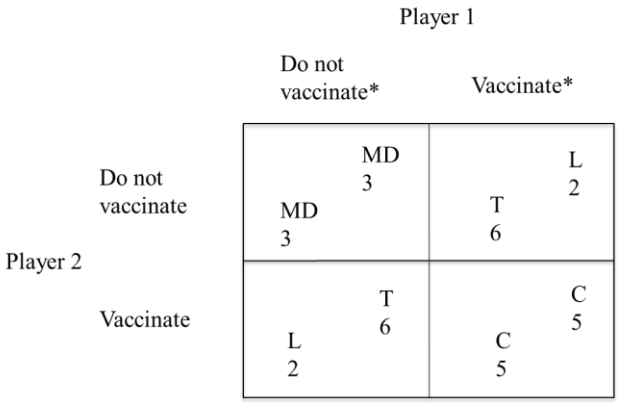

Figure 1: The Decision to Vaccinate

The payoffs in Figure 1 represent the total net payoff to each individual from his or her decision about whether to vaccinate for polio. These payoffs also incorporate an appropriate failure rate for the vaccine, which,

PRICES AND CHOICES: MICROECONOMIC VIGNETTES 252 (rev. ed. 1984). The district attorney tells each that they can either testify against the other or not, leading to four possible outcomes. *Id.* If prisoner A testifies for the prosecution (defects) and prisoner B remains silent, then prisoner A will go free while prisoner B receives a ten-year sentence. *Id.* If both prisoners remain silent (cooperate) then they will each serve a two-year jail sentence. *Id.* at 252–53. If they both testify, then each would receive a five-year jail sentence. *Id.* at 252. Given these payoffs and the inability for the prisoners to coordinate with each other, each has a dominant strategy to cooperate with the prosecution (defect) because irrespective of what the other prisoner does, each will maximize his individual payoff by testifying (defecting). *Id.* at 253.

156. HEMENWAY, *supra* note 155, at 252–53.

applied equally to both players, would not affect the nature of the prisoner's dilemma.[157]

In a world with just two participants, each player prefers to achieve the outcome in which he or she does not vaccinate, while the other player vaccinates.[158] The player prefers this because the player who did not vaccinate is protected from polio, but has not risked any adverse outcomes from the vaccination.[159] This payoff, "T," represents each player's temptation not to vaccinate. The temptation payoff is higher relative to other payoffs because the player who achieves this payoff enjoys herd immunity (everyone else in the world is vaccinated), without incurring any risks of an adverse reaction to vaccination.

On the other hand, each player's least preferred outcome is to singularly vaccinate when the other player chooses not to vaccinate. Here, the player who vaccinated incurs the costs of an adverse reaction to the vaccine, as well as the possibility of a vaccine failure, without protection from the other player (although he or she does receive protection from the vaccination). This payoff is represented by "L" for loss.

In between the high and low payoffs of T and L are the outcomes in which both players have either chosen to vaccinate or not vaccinate (represented by "C" for cooperation and "MD" for mutual defection, respectively). When both players choose to vaccinate, their individual payoffs fall between T and L because each gains the benefit of both the vaccine and herd immunity, but each also incurs the cost of a risked adverse reaction to the vaccine. Thus, the payoff for C is greater than L, but less than T. When both players choose not to vaccinate, they lose the benefit of herd immunity, but each also avoids any adverse reaction to the vaccine. Thus, the payoff for mutual defection, MD, is also greater than L and less than T.[160] Assuming the benefit of herd immunity (everyone else being vaccinated) combined with the benefit of a successful vaccine is greater than the risk of an adverse reaction combined with the risk of

157. In the United States, polio vaccination is 99 percent effective after three doses. Aamir Shahzad & Gottfried Kohler, *Inactivated Polio Virus (IPV): A Strong Candidate Vaccine for Achieving Global Polio Eradication Program*, 27 VACCINE 5293, 5293 (2009).

158. *See* HEMENWAY, *supra* note 155, at 7–8.

159. *See id.*

160. Arguably L should be greater than MD because the vaccinated player still achieves benefit from the vaccine's protection. However, I am analyzing the game in the context of vaccine fear in the post-Wakefield study era, in which parents believe vaccines are dangerous and vaccine-preventable diseases are unlikely to occur.

vaccine failure, then the net payoff for C must be greater than the net payoff for MD.

Given these relative payoffs, T > C > MD > L, it is a dominant strategy for each player to forgo vaccination. The strategy is dominant because it holds regardless of how the other player chooses to respond.[161] If Player 1 knew with certainty that Player 2 was going to opt out of vaccination, then it would be in Player 1's best interest to similarly forgo vaccination, in which case he or she would receive the value MD, which is greater than the value L. On the other hand, if Player 1 knew with certainty that Player 2 was going to receive the vaccination, it would similarly be in Player 1's best interest to opt out of vaccination, in which case he or she would receive the value T, which is greater than the value MD.

It is important to note that although forgoing the vaccination is a dominant strategy for both players individually, it creates a loss among the players jointly. The combined value of both forgoing vaccination (six) is significantly less than the combined value of both players receiving the vaccination (ten).

In fact, with vaccination, the perceived risk of vaccination lowers the perceived payoff of vaccination.[162] "In many cases, because of the success of the vaccination program itself, certain diseases are rarely seen, and hence individuals tend not to vaccinate because of a low perceived risk."[163] Then, media coverage of vaccination risks causes individuals to view the risk of vaccination as higher than the risk presented by the disease.[164] In England in the 1970s, concerns about the safety of the pertussis vaccine led to so many people refusing the vaccine that herd immunity dropped and there were "relatively large pertussis outbreaks."[165] Therefore, in the absence of something that increases the payoffs associated with vaccination, "persistently high levels of immunization will be difficult to maintain in countries with voluntary vaccination policies."[166]

However, "if certain payoffs could be *worsened*, the outcome of rational individualistic behavior can be improved" and the prisoner's

161. For a more in-depth discussion of game theory in the context of legal decisions see COOTER & ULEN, *supra* note 155, at 42.
162. Bauch, Galvani & Earn, *supra* note 155, at 10566.
163. *Id.*
164. *Id.*
165. *Id.*
166. *Id.*

dilemma could be overcome.[167] Thus, to solve the game, C must be more valuable than T. A tax decreases the value of T and, if set at an effective level, leads each player to vaccinate.[168] "Interestingly, [the players] are more likely to reach the preferred outcome . . . if certain payoffs are made *worse*."[169] In Figure 2 below, assuming the tax on not vaccinating is high enough to affect the player's choice, the payoff to not vaccinating has decreased.

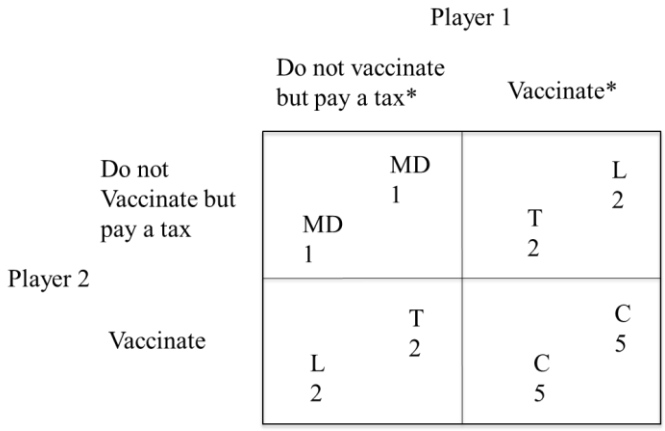

Figure 2: The Decision to Vaccinate in the Context of a Tax

Thus, instituting a tax on not vaccinating is one way to change the assessment of payoffs and encourage high levels of vaccination.

E. THE TRAGEDY OF THE COMMONS: RESISTANCE AT A COMMUNITY LEVEL

Applied at a group level, refusal to vaccinate is an instance of "the tragedy of the commons."[170] In the tragedy of the commons, each individual seeks to maximize his or her gain and, in doing so, exhausts the

167. *See* HEMENWAY, *supra* note 155, at 8.
168. *See id.* at 138.
169. *Id.* at 253.
170. For an explanation of "the tragedy of the commons," see generally Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243 (1968).

collective resources of the community; this hurts himself or herself and the community.[171] In applying the tragedy of the commons to vaccination, "a community free of infectious disease because of a high vaccination rate" is the common.[172] Because herd immunity substantially decreases the likelihood that an individual will contract an infectious disease, the rational decision for that individual is to forgo immunization because he or she can then avoid the small risk of adverse effects from the immunization; "[t]hus, when an individual in this common chooses to go unimmunized, it only minimally increases that person's risk [of contracting the vaccine-preventable] illness," because he or she will be protected by herd immunity.[173] However, as more people in the community vaccinate above the level necessary for herd immunity, the value of T increases. This is because the marginal benefit of vaccinating has dropped close to zero since herd immunity has already been established. Thus, as demonstrated above by the prisoner's dilemma, the dominant strategy is to not vaccinate. "Unfortunately, this triggers a classic collective action problem: increasing numbers of free-riders undermine society's ability to achieve a critical mass of people who are vaccinated."[174] As more individuals act in their rational best interest, herd immunity fails and infectious disease epidemics strike the community.[175]

Legislation mandating immunization for school attendance seeks to overcome the tragedy of the commons.[176] However, religious and philosophical exemptions undermine this solution. Just as the rational choice was to forgo vaccination in the absence of a mandate, the rational choice now becomes to obtain a religious or philosophical exemption. Moreover, because parents are typically making the decisions about

171. *Id.* at 1244 (1968). Hardin describes a pasture open to and shared by all herdsmen. *Id.* When a herdsman assesses the utility of adding another animal to his herd, the herdsman finds a positive utility of nearly +1 since he will receive all the profit from selling that additional animal. *Id.* The negative utility "is only a fraction of -1" because "the effects of overgrazing are shared by all the herdsmen." *Id.* Thus, the rational action is for the herdsman to make his herd bigger. *Id.* However, since all herdsmen are doing this, the resources of the commons will be exhausted. *Id.* Eventually, "[f]reedom in a commons brings ruin to all." *Id.*

172. Kevin M. Malone & Alan R. Hinman, *Vaccination Mandates: The Public Health Imperative and Individual Rights*, *in* LAW IN PUBLIC HEALTH PRACTICE 338, 339 (Richard A. Goodman et al. eds., 2d ed. 2007).

173. *Id.*

174. Calandrillo, *supra* note 21, at 361.

175. Malone & Hinman, *supra* note 172, at 339.

176. *See id.*

immunization for their children, they are acutely aware of the risks of immunization and rationally decide to let others' children take the risk while their children free ride on the resulting herd immunity.

The choices individuals make "depend on preferences, the costs associated with alternative options, and the decision maker's opportunity set."[177] To combat the free-rider, tragedy-of-the-commons problem in immunization, states must create a cost to opting out of vaccinations, so that immunization is the rational choice because it is less costly. Imposing a financial cost is an effective way of changing behavior. For example, after the price of cigarette packs increased 43.5 cents in 1998, smoking rates fell "13 percent among youths and by 5 percent among adults."[178] Similarly, increasing alcohol's price 10 percent results in a 5.5 percent decrease in the likelihood that a person "is a current drinker."[179] Likewise, "deductibles and cost sharing can be used to influence how much [health] care people consume."[180] The RAND Health Insurance Experiment[181] showed that when consumers have a substantial deductible, total dollars spent on health care is about 30 percent less than when the consumers receive free care.[182]

Thus, to impose a cost on opting out of immunizing one's children, the government should create a tax on immunization exemptions.

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177. Frank A. Sloan & Hirschel Kasper, *Summing Up*, *in* INCENTIVES AND CHOICE IN HEALTH CARE 353, 354 (Frank A. Sloan & Hirschel Kasper eds., 2008).

178. John Cawley, Reefer Madness, *Frank the Tank, or* Pretty Woman*: To What Extent Do Addictive Behaviors Respond to Incentives?*, *in* INCENTIVES AND CHOICE IN HEALTH CARE 163, 177 (Frank A. Sloan & Hirschel Kasper eds., 2008).

179. *Id.*

180. Henry J. Aaron, *To Find the Answer, One Must Know the Question: Health Economics and Public Policy*, *in* INCENTIVES AND CHOICE IN HEALTH CARE 21, 22 (Frank A. Sloan & Hirschel Kasper eds., 2008). Aaron notes that the "fundamental finding [from the RAND Health Insurance Experiment]—that variations in insurance provisions such as deductibles, stop loss, and cost sharing influence demand for care—is well established." *Id.* The RAND Health Insurance Experiment was a large research project that studied how the price of health care costs affected demand for care. Joseph P. Newhouse & Anna D. Sinaiko, *What We Know and Don't Know about the Effects of Cost Sharing on the Demand for Medical Care—and So What?*, *in* INCENTIVES AND CHOICE IN HEALTH CARE 85, 89 (Frank A. Sloan & Hirschel Kasper eds., 2008). Researchers "randomly assigned approximately 5,800 persons in 2,000 families who lived in one of six sites around the country to one of several health insurance plans that varied the demand prices the families faced." *Id.* The study occurred in the 1970s and early 1980s and observed participants for three or five years. *Id.*

181. See *supra* note 180 and accompanying text for an explanation of the RAND experiment.

182. Newhouse & Sinaiko, *supra* note 180, at 90.

IV. IMPROVING VACCINATION RATES THROUGH TAXATION

A. PIGOVIAN TAXES AND VACCINATION

Economist Arthur Pigou theorized that when there are negative externalities, taxation could change consumer choice, thereby eliminating the negative externalities.[183] "The effect of the tax . . . is to confront the generator of the externality with a price reflecting the damage" that he or she is imposing on other community members.[184] "[T]o internalize externalities, a civil authority should impose a marginal tax on the offending party set equal to the marginal damage imposed by the offense."[185] For instance, "taxation of alcohol and cigarettes is often justified on the grounds that consumption of these unhealthy products creates externalities [such as increased health care costs] unaccounted for in the untaxed price of a good."[186]

Thus, either the state or the federal government should institute a tax to account for the negative externality imposed by the failure to immunize. Parents will pay the tax for each year the child is unvaccinated until the child reaches the age of eighteen. The tax should be limited to those vaccinations for infectious diseases currently recommended by the CDC, as delineated in Table 2 below.

183. *See* Agnar Sandmo, *Optimal Taxation in the Presence of Externalities*, 77 SWED. J. OF ECON. 86 (1975).

184. *Id.*

185. Jules L. Coleman, *Economics and the Law: A Critical Review of the Foundations of the Economic Approach to Law*, 94 ETHICS 649, 654–55 (1984).

186. Jonathan Cummings, Comment, *Obesity and Unhealthy Consumption: The Public-Policy Case for Placing a Federal Sin Tax on Sugary Beverages*, 34 SEATTLE U. L. REV. 273, 288 (2010).

Recommended Immunization Schedule Ages 0-6 years, United States[187]					
Vaccine (Disease)	**Dose 1**	**Dose 2**	**Dose 3**	**Dose 4**	**Dose 5**
Hep B (Hepatitis B)	Birth	1-2 months	6-18 months	NA	NA
RV (Rotavirus)	2 months	4 months	6 months	NA	NA
DTaP (Diphtheria, Tetanus, Pertussis)	2 months	4 months	6 months	15-18 months	4-6 years
Hib (*Haemophilus influenzae* type b)	2 months	4 months	6 months	12-15 months	NA
PCV (Pneumococcal)	2 months	4 months	6 months	12-15 months	NA
IPV (Inactivated Poliovirus)	2 months	4 months	6-18 months	4-6 years	NA
Influenza (Influenza)	Yearly				
MMR (Measles, Mumps, Rubella)	12-15 months	4-6 years	NA	NA	NA
Varicella (Varicella)	12-15 months	4-6 years	NA	NA	NA
HepA (Hepatitis A)	12-18 months	12-18 months	NA	NA	NA

Table 2: Recommended Immunization Schedule

There are two ways to set this tax: (1) based on the marginal social cost of opting out of vaccinating, or (2) based on the lowest level that will induce people to vaccinate.

1. Using Marginal Social Harm to Set the Tax Level

For a tax on any activity or good to be efficient it must take care of the negative externality produced by that good or activity.[188] For example, "if alcohol prices do not reflect the full social costs of consumption (including the external costs), then consumers will drink too much, in the technical

187. *Recommended Immunization Schedules for Persons Aged 0 Through 18 Years—United States, 2011*, 60 MMWR 1 (2011), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6005a6.htm?s_cid=mm6005a6_w. Note that the chart above does not include recommended vaccinations for high-risk groups.

188. Willard G. Manning et al., *The Taxes of Sin: Do Smokers and Drinkers Pay Their Way?*, 261 J. AM. MED. ASS'N 1604, 1604 (1989).

sense that at the margin their drinks will be worth less to them than they cost."[189] One study estimated that in the late 1980s the external cost per ounce of alcohol consumed was forty-eight cents, which included the "lifetime[] discounted costs" imposed on others "through collectively financed health insurance, pensions, disability insurance, group life insurance, fires, motor-vehicle accidents, and the criminal justice system."[190] The study's authors contend that excise taxes should distinguish between internal costs—those borne only by the person engaged in the activity—and external costs—those borne by other people—and consider the "lifetime costs" of the activity.[191]

In the context of vaccinations, using the marginal social harm to set the tax is problematic because as more people become vaccinated and herd immunity increases, the marginal social harm of someone opting out of vaccination decreases to nearly zero. Thus, according to a strict economic interpretation, 100 percent vaccination is not optimal because the very last people who receive vaccines would be better off accepting the temptation value of defection.[192] Further, those who would not receive vaccinations unless made mandatory "are clearly made worse off" because they are forced to engage in an activity that they do not value, and arguably, at the margin, being vaccinated provides little to no additional benefit to the community because there already are enough vaccinated people to achieve herd immunity.[193]

There are still, however, benefits to having that last community member vaccinated. Those who cannot be vaccinated or may have vaccine failure could contract a vaccine-preventable illness from that person if he or she contracts a vaccine-preventable disease through travel, for instance. That person could then infect those vulnerable to vaccine-preventable illness. Economist Dagobert Brito and colleagues explain this as follows:

> In this case of a fifty-fifty chance that the vaccine will work, requiring vaccination for all improves social welfare. . . . [I]n the case of imperfect vaccinations the public goods element remains part of the problem. Half of

189. Philip J. Cook & Michael J. Moore, *The Economics of Alcohol Abuse and Alcohol-Control Policies*, 21 HEALTH AFF. 120, 129 (2002).

190. Manning et al., *supra* note 188, at 1604, 1608.

191. *Id.* at 1604. In fact, later studies argued that Manning and colleagues had produced too low an estimated cost because they failed to include such external costs as nonfatal highway injuries. Cook & Moore, *supra* note 189, at 129.

192. Kenkel, *supra* note 20, at 1694.

193. *Id.* at 1695.

> the vaccinated individuals are affected by the aggregate level of vaccination. Hence some individuals who would be vaccinated under the market allocation are better off as a result of compulsory vaccination since more people are vaccinated. Intuitively, a fifty-fifty chance for all is better than such a chance for those who choose vaccination plus a greater chance of infection for the unvaccinated population.[194]

Thus, having 100 percent vaccination levels is beneficial for certain individuals.

Establishing the exact marginal social cost of not vaccinating is beyond the scope of this Note. However, in establishing our tax, the full external costs of vaccine-preventable illnesses should be taken into account. When looking at the marginal cost of not vaccinating, policymakers should at least consider the following: the costs of treatment, containing the disease, additional vaccinations, adverse outcomes including death, and missed time from school and work.[195] One study estimated that the cost of just containing the 2005 measles outbreak in Indiana was $167,685.[196] Assuming a world in which measles is the only infection and using the numbers from the 2008 outbreak in Indiana, we can approximate the lower bound of an efficient tax level. If the total cost of the outbreak was $176,980, which included the cost of quarantining exposed children, cost of containment, and cost of treatment, then $2424 would be needed per unvaccinated child to cover the full cost of the disease.[197] Although calculating the most effective tax level is beyond the scope of this Note, this methodology and figure provides an approximation of a minimum tax level based on the outbreak of one disease. The potential for additional outbreaks from other diseases would likely increase this figure. However, the logical extension of our measles example is that one could set the tax at $2000 per child per year without incurring a net loss to society from collecting taxes that might exceed the cost of the externality.

2. Using Willingness-to-Pay to Set the Tax Level

Alternatively, policymakers could set the tax by determining the lowest tax that would induce people to vaccinate. Motivations surrounding vaccinations are complex because individual vaccination decisions are

194. Brito, Sheshinski & Intriligator, *supra* note 53, at 84–85.

195. *See* Sandra W. Roush, Trudy V. Murphy & Vaccine-Preventable Disease Table Working Group, *Historical Comparisons of Morbidity and Mortality for Vaccine-Preventable Diseases in the United States*, 298 J. AM. MED. ASS'N 2155, 2155 (2007).

196. Parker et al., *supra* note 55, at 447, 454.

197. Sugerman et al., *supra* note 9, at 751.

"prevalence elastic," meaning that as the prevalence of a disease rises, so does demand for vaccination.[198] Looking at the incidence of measles over 1984-1990 in the United States, economist Tomas Philipson found that "the prevalence of measles in . . . [a] state of residence reduces the age in months at which the first measles vaccination occurs."[199] Conversely, in communities with a high level of vaccination, the individual marginal benefit of vaccinating is low; however, once there is a disease outbreak in a given community, the marginal benefit of vaccinating increases.[200] Therefore, determining the tax level that will induce a parent to vaccinate is dependent on the prevalence of vaccine-preventable illnesses in his or her region. This, in turn, is dependent on the number of other parents who are opting out of vaccination for their children. Thus, in areas with fewer exemptors, a tax would likely need to be set at a higher level than in areas with many exemptors and a higher prevalence of illness. However, differentiating among communities creates unneeded complexities. Instead, policymakers should determine the willingness-to-pay of a parent in an area with few other exemptors and set the tax at that level for all areas.

3. Scaling the Tax Based on Vaccination and Income Level

The tax also should be scaled based on how many vaccinations parents choose not to give their child. This scale is meant to encourage vaccination at whatever level possible. If the tax was simply a blanket tax whether parents vaccinated for one or all of the illnesses, this could create a perverse incentive for a parent who wanted to opt out of just one vaccination to then decide to opt out of all of them.

Pigovian taxes are regressive, so critics may argue that the vaccine-refusal tax would impose an unfairly heavier burden on people with lower incomes. By taxing everyone equally, parents with lower incomes would pay the same as those with higher incomes, so the wealthier person would pay a smaller percentage of his or her income.[201] We could account for this disproportion, however, by adjusting for wealth so that lower income parents would pay a lower tax for not vaccinating. If we decide to institute

198. Tomas Philipson, *Private Vaccination and Public Health: An Empirical Examination for U.S. Measles*, 31 J. HUM. RESOURCES 611, 612 (1996); Kenkel, *supra* note 20, at 1695. In other words, with "prevalence elastic demand, as disease prevalence falls because of the prevention decisions by others, some consumers free ride and fail to purchase prevention themselves." *Id.*

199. Philipson, *supra* note 198, at 611.

200. *See* Kenkel, *supra* note 20, at 1695.

201. Cummings, *supra* note 186, at 294.

a federal tax, adjusting by income may become important to ensuring the tax is constitutional.

B. CONSTITUTIONALITY OF A FEDERAL TAX

A federal tax would be the most effective approach to increasing vaccination rates because with a state tax people could move to a state that had not instituted the tax simply to avoid the tax. People moving to avoid a state tax would cause larger pockets of unvaccinated people in certain regions, further weakening herd immunity. While a federal tax could strengthen vaccination, it also could face serious constitutional challenges.

The federal government derives its taxing power from Article 1, Section 8, Clause 1 of the Constitution, which states: "Congress shall have Power To lay and collect Taxes, Duties, Imposts and Excises."[202] The Court has held that "Congress's power to tax is extremely broad."[203] Edward Kleinbard, a tax scholar, notes that "the Constitution can best be understood as contemplating that the principal remedy for harsh, oppressive, or stupid tax legislation is to vote the rascals out."[204] The constraints that the Constitution places on Congress's power to tax are that direct taxes must be apportioned among the states[205] and must be "in Proportion to the Census or Enumeration."[206] Thus, the Court nearly always upholds the federal government's power to tax.[207] As Kleinbard points out,[208] in *McCray v. United States*, the Court held that the judiciary does not have the power to negate Congress's exercise of the taxing power even when "the result of the enforcement of [the tax] might be to indirectly affect subjects not within the powers delegated to Congress."[209] However,

202. U.S. CONST. art. 1, § 8, cl. 1; CHEMERINSKY, *supra* note 44, at 273.

203. KATHLEEN S. SWENDIMEN, CONG. RESEARCH SERV., R40846, HEALTH CARE: CONSTITUTIONAL RIGHTS AND LEGISLATIVE POWERS 10 (2011), *available at* http://healthcarereform.procon.org/sourcefiles/CRS_Constitution_Rights_HR3590.pdf.

204. Edward D. Kleinbard, *Constitutional Kreplach* 756, 757 (Univ. of S. Cal. Law Sch., Law & Econ. Working Paper Series, Paper No. 119, 2010), *available at* http://law.bepress.com/cgi/viewcontent.cgi?article=1173&context=usclwps.

205. U.S. CONST. art 1, § 2, cl. 3.

206. U.S. CONST. art 1, § 9, cl. 4. Note that the 16th Amendment gave Congress the power to collect income taxes without apportionment among the states. U.S. CONST. amend XVI.

207. Kleinbard, *supra* note 204, at 758.

208. *Id.*

209. McCray v. United States, 195 U.S. 27, 64 (1904).

if Congress violates the Constitution's other checks through the taxing power, then the Court would likely hold the tax invalid.[210]

Congress may use a tax to accomplish a regulatory purpose, but that tax must also have a revenue-raising purpose in order to be held valid.[211] In *United States v. Doremus*, the Court held that as long as there was a reasonable relation to the constitutional authority to tax, a tax "cannot be invalidated because of the supposed motives which induced it."[212] Further, in *United States v. Butler*,[213] the Court held that Congress has "broad power to tax . . . for the general welfare" as long as the tax "does not violate other constitutional provisions."[214] In fact, the federal government's taxing power is typically used to regulate "risk behavior and influence health-promoting activities."[215] The Supreme Court has upheld a variety of federal taxes aimed at protecting society from unhealthy or dangerous activities, such as excise taxes on firearms, alcohol, and tobacco.[216] Likewise, federal tax policy has sought to influence individual decisions that adversely affect public health, for instance through gasoline taxes to lower gasoline consumption.[217] For example, the Court has explicitly stated that "a tax does not cease to be valid merely because it regulates, discourages, or even definitely deters the activities taxed."[218] In fact, unless a tax requires "behavior conformance extraneous to any tax need," courts will likely uphold a federal tax as long as it is not violating other provisions of the Constitution.[219]

There is, however, a vigorous debate among scholars about whether Congress could use the taxing power to encroach upon a power specifically reserved to the states. In the *Child Labor Tax Case*, the Court quashed Congress's effort to regulate an activity clearly within the states' police

210. Kleinbard, *supra* note 204, at 759.
211. *See, e.g.*, United States v. Doremus, 249 U.S. 86, 93 (1919).
212. *Id.*
213. *See generally* United States v. Butler, 297 U.S. 1 (1936).
214. CHEMERINSKY, *supra* note 44, at 274.
215. GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 101.
216. *Id.* at 101–02.
217. *Id.* at 102.
218. United States v. Sanchez, 340 U.S. 42, 44 (1950) (citing Sonzinsky v. United States, 300 U.S. 506, 513–14 (1937). *See also* GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 101.
219. GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 101.

power.[220] In examining the Patient Protection and Affordable Care Act of 2010 ("PPACA"), which imposes a tax on individuals who fail to buy health insurance,[221] Randy Barnett, a constitutional law scholar, contends that the *Child Labor Tax Case* means Congress's tax power is, indeed, limited when it encroaches on state police power.[222] Barnett explains that any other interpretation would mean that "Congress would be able to penalize or mandate any activity by anyone in the country, provided it limited the sanction to a fine enforced by the Internal Revenue Service."[223] He believes that "[t]his is a congressional power unknown and unheard of before 2010," and "would effectively grant Congress a general police power."[224] In contrast, Brian Galle, a tax scholar, contends that conditional taxes—"taxes used to achieve some regulatory end"—are not limited to Congress's constitutionally enumerated powers.[225] Rather, "Congress may condition exemptions from a tax on any criteria it chooses—other than those expressly prohibited by the Constitution, such as restrictions on free speech."[226] Galle points to *United States v. Kahriger*,[227] in which the Court found that a federal tax on gambling was valid despite "its obvious purpose to restrict gambling and the uncertainty as to whether the commerce power authorized Congress to enact such a restriction."[228] The Court held that "[u]nless there are [penalty] provisions extraneous to *any* tax need, courts are without authority to limit the exercise of the taxing power."[229] Thus, the fact that mandatory vaccination has traditionally been part of states' police power[230] could create a hearty debate about the constitutionality of the vaccine-refusal tax.

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220. *See* Bailey v. Drexel Furniture Co. (*Child Labor Tax Case*), 259 U.S. 20 (1922). *See also* Randy E. Barnett, *Commandeering the People: Why the Individual Health Insurance Mandate is Unconstitutional* 22–23 (Georgetown Pub. Law & Legal Theory, Research Paper No. 10-58, 2010), *available at* http://scholarship.law.georgetown.edu/facpub/434/.

221. Patient Protection and Affordable Care Act, Pub. L. No. 111-148, 124 Stat. 119 (2010) (codified in scattered sections of U.S.C.).

222. *See* Barnett, *supra* note 220, at 27.

223. *Id.*

224. *Id.*

225. Brian Galle, *Conditional Taxation and the Constitutionality of Health Reform*, 120 YALE L.J. ONLINE 27, 28 (2010).

226. *Id.*

227. United States v. Kahriger, 345 U.S. 22 (1953) (holding that an excise tax that had a regulatory effect was, nevertheless, valid).

228. Galle, *supra* note 225, at 29.

229. *Kahriger*, 345 U.S. at 31 (emphasis added). *See also* Galle, *supra* note 227, at 29.

230. *See supra* Part II.

But Congress's constitutional power to levy taxes may not extend to a vaccine-refusal tax. The federal government is limited to imposing indirect taxes, which include "duties, imposts, and excises," or direct taxes, which include income taxes.[231]

1. Vaccine-Refusal Tax Is Not an Indirect Tax or a Direct Tax

Law professor Steve Willis and Nakku Chung, a graduate of the Levin College of Law, define excise taxes as taxes that tend to be imposed on activities, property use, or property transfer and that usually "may be passed on to another, such as a customer."[232] Under this definition, it would be difficult to define the vaccine-refusal tax as an excise tax because the cost of vaccinating is difficult to pass on, vaccinating is likely not the sale of a good, and not vaccinating is even further removed from the sale of a good.

Nor is a vaccine-refusal tax likely a direct tax. Article 1, Section 9, Clause 4 of the Constitution requires that direct taxes be apportioned among the states by population,[233] unless the direct tax is an income tax, in which case it is exempt from the apportionment requirement under the Sixteenth Amendment.[234] Thus, the vaccine-refusal tax is not a direct tax because it does not make sense to apportion it by state population.[235]

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231. Steven J. Willis & Nakku Chung, *Constitutional Decapitation and Healthcare*, 128 TAX NOTES 169, 172 (2010).

232. *Id.* at 177. The PPACA has provided fodder for debate about taxing the failure to act. Although almost all indirect taxes are imposed on activities, property use, or property transfer, Willis and Chung contend that there are nine taxes on the failure to act. *Id.* n.84. Examining the PPACA, law professor Erik Jensen, concludes that "[i]f the penalty under the individual mandate is an *indirect* tax, it will probably be constitutional." Erik M. Jensen, *The Individual Mandate and the Taxing Power* (Case Research Paper Series in Legal Studies, Working Paper No. 2010-33, 2010), *available at* http://ssrn.com/abstract=1683462. He also notes that while some commentators believe such a tax might be unconstitutional under the Uniformity Clause, "the cap on the penalty will take care of the uniformity problem: The cost of insurance might vary across the nation, but the cap will be determined using a *national* average." *Id.*

233. U.S. CONST. art 1, § 9, cl. 4.

234. U.S. CONST. amend. XVI.

235. Apportioning by vaccination prevalence would make more sense, but that would not turn the tax into a direct tax. There is a healthy debate about the exact meaning of the direct taxation section of the Constitution. Constitutional law scholar Bruce Ackerman argues that Article I's direct tax clauses "should be narrowly construed and should not serve as constitutional bars to any of the wide range of reform proposals now under discussion." Bruce Ackerman, *Taxation and the Constitution*, 99 COLUM. L. REV. 1, 1 (1999). That debate, unfortunately, is beyond the scope of this Note. However, if it results in the PPACA

2. Vaccine-Refusal Tax Would be Defined as an Income Tax

The vaccine-refusal tax could be structured so that it is based on income, similar to the way the individual mandate in the PPACA is structured.[236] A parent would be required to pay a certain amount based on income down to a certain income level, and a parent below that income level would pay a nominal amount. If a parent could demonstrate that he or she has vaccinated their child, the parent would be excused from the tax. Whether or not this argument works, however, will depend on whether the PPACA is seen as an income tax. Galle contends that it is an income tax because "whether a family pays $695 or some other amount depends on the household's income. . . . [and] the obligation to pay the minimum $695 tax is subject to exemptions for personal hardship, which are also determined with reference to income."[237] The federal government contends that:

> [The PPACA] amends the Internal Revenue Code to provide that a non-exempt individual who fails to maintain the minimum level of insurance shall pay a monthly penalty, calculated by reference to the taxpayer's household income, included with the taxpayer's tax return, and assessed and collected in the same manner as other penalties imposed under the Internal Revenue Code. . . . The practical operation of the provision is as a tax.[238]

But, Erik Jensen, another tax scholar, argues that it is not an income tax.[239] He notes that although calculations of income are needed to compute the amount of the penalty, the cap on liability means it affects people in different income brackets in the same way; therefore, it is not an income tax.[240] Kleinbard, however, contends:

> On its face, [the PPACA] functions as an income tax. It is a section of the Internal Revenue Code. Low-income taxpayers are exempt . . . the amount collected is measured as a percentage of income . . . (subject to a floor and a

being considered a constitutionally valid direct tax, it may need to be applied to the vaccine-refusal tax.

236. Patient Protection and Affordable Care Act, Pub. L. No. 111-148, 124 Stat. 119 (2010) (codified in scattered sections of U.S.C.).

237. Galle, *supra* note 225, at 31.

238. Brief for Appellees at 59, Thomas More Law Ctr. v. Obama, No. 10-2388 (6th Cir. filed Jan.14, 2011).

239. *See* Jensen, *supra* note 232, at 38–44.

240. *Id.* Jensen explains that "someone with annual income of $1 billion who does not acquire suitable insurance will pay exactly the same penalty, the cap—the cost of bronze level coverage—as someone with *one-one thousandth* of that income." Erik M. Jensen, *Prepositions in the Constitution: Duties* of *Tonnage and Taxes* on *Incomes* 1, 5 (Sch. of Law, Case Western Reserve Univ., Case Research Paper Series in Legal Studies, Working Paper No. 2011-2, Jan. 2011), *available at* http://ssrn.com/abstract=1736684.

ceiling), and the amount is includable on a taxpayer's federal income tax return.[241]

3. A Tax Versus a Penalty

In addition, the vaccine-refusal tax may be seen as a penalty rather than a tax, in which case the federal government would need to use another enumerated power to institute it. Again, this is dependent on whether the PPACA is viewed as a tax.

For example, some scholars argue that the PPACA is indeed a penalty, not a tax: "If the individual mandate works perfectly, everyone will be incentivized to acquire insurance, no penalties will be paid, and government revenues will not be directly increased at all."[242] Thus, they conclude that the statute does not have a "taxing purpose" and therefore "has no independent reason for existence," so it is a penalty, not a tax.[243]

Other scholars have contended that it certainly is a tax.[244] In addition to arguments about why it qualifies as an income tax discussed above, they contend that it does not matter whether or not Congress labeled it a tax.[245] A group of one hundred law professors from universities across the United States wrote an open letter in which they argued that the "penalty" is a tax: "[T]he Supreme Court has expressly held that a law amounts to a tax for constitutional purposes if it raises revenue. As the Court explained, the only concern is a law's 'practical application, not its definition or the precise form of descriptive words which may be applied to it.'"[246]

However, as of February 2012, there was no clear resolution to the debate about whether or not the PPACA is a tax. The United States Court of Appeals for the Sixth Circuit upheld the law, but declined to determine whether the individual mandate was a legitimate use of Congress's taxing power.[247] In contrast, the Eleventh Circuit Court of Appeals concluded that

241. Kleinbard, *supra* note 204, at 760.
242. Jensen, *supra* note 232, at 4.
243. *Id.*
244. *See Over 100 Law Professors Agree on Affordable Care Act's Constitutionality*, CTR. FOR AM. PROGRESS (Jan. 2011), http://www.americanprogress.org/issues/2011/01/pdf/law_professors_ACA.pdf.
245. *See id.*
246. *Id.*
247. *See* Thomas More Law Ctr. v. Obama, 651 F.3d 529 (6th Cir. 2011).

the individual mandate is not a tax.[248] First, the court held that the plain language of the law makes it clear that "the individual mandate is not a tax, but rather, as the statute itself repeatedly states, a 'penalty.'"[249] Further, the court noted that there is a legal distinction between taxes and penalties, and that Congress has specifically enacted taxes in the Act in provisions other than the individual mandate.[250] In addition, the court noted that Congress pointed to the Commerce Clause as its source of its power for enacting the law: "The very nature of congressional findings about the individual mandate further amplifies that Congress designed and intended to design a penalty for the failure to comply and not a tax." [251] In fact, the Eleventh Circuit held that Congress's tax power "does not provide an alternative constitutional basis for upholding this unprecedented individual mandate."[252]

Meanwhile, the Fourth Circuit held that Virginia lacked standing because the individual mandate "imposes no obligation on the sole plaintiff, Virginia,"[253] so the court remanded the case "with instructions to dismiss."[254] In another case challenging the individual mandate, the Fourth Circuit may have given a boost to the argument that the individual mandate is a tax.[255] The court dismissed for lack of jurisdiction because the "suit constitutes a pre-enforcement action seeking to restrain the assessment of a tax."[256] The court held that the Anti-Injunction Act ("AIA") meant the court did not have jurisdiction to hear the case.[257] The AIA provides that "no suit for the purpose of restraining the assessment or collection of any tax shall be maintained in any court by any person, whether or not such person is the person against whom such tax was assessed."[258] The Fourth Circuit noted that "the term 'tax' in the AIA reaches any exaction imposed

248. *See* Florida v. U.S. Dep't of Health & Human Servs., 648 F.3d 1235 (11th Cir. 2011). Note that the court held that the individual mandate was severable from the rest of the law. *See id.* at 1320–28.

249. *Id.* at 1315.

250. *Id.* at 1316–1317. The court noted, for instance, that at 26 U.S.C. § 4191(a) there is "an Excise Tax on Medical Device Manufacturers." *Id.* at 1316.

251. *Id.*

252. *Id.* at 1241.

253. Virginia *ex rel*. Cuccinelli v. Sebelius, 656 F.3d 253, 267 (4th Cir. 2011).

254. *Id.* at 273.

255. *See* Liberty Univ., Inc. v. Geithner, No. 10-2347, 2011 U.S. App. LEXIS 18618 (4th Cir. Sept. 8, 2011).

256. *Id.* at *6.

257. *Id.*

258. 26 U.S.C. § 7421 (2006).

by the Code and assessed by the tax collector pursuant to his general revenue authority," and held that the individual mandate fulfills that description.[259]

The debate about whether the individual mandate is a penalty or a tax will likely soon be solved, because in September 2011, the Justice Department asked the Supreme Court to rule on the Eleventh Circuit decision, and the Supreme Court has agreed to consider the issue with oral argument scheduled for late March 2012.[260] If the Supreme Court holds that the PPACA is not a tax, we would have to restructure the vaccine-refusal tax or use another constitutional power to implement it.

C. ARGUMENT FOR INSTITUTING STATE TAXES ON THE USE OF VACCINE EXEMPTIONS

A state's power to institute taxes is limited by its constitution.[261] When taxing a state resident engaged in an activity that takes place entirely within a state, the federal constitution does not typically limit the state's taxing powers.[262] Further, immunization policy has traditionally been part of states' police powers,[263] so a state tax on immunization does not raise federal pre-emption issues.[264] Finally, taxing the decision not to vaccinate is a legitimate public health activity. In fact, at issue in *Jacobson* was Jacobson's refusal to pay the five-dollar fine that the city imposed for not complying with the smallpox vaccination.[265] Thus, the case that established the foundation for mandatory vaccination,[266] also established the foundation for taxing those who do not comply with mandatory vaccination.[267] Therefore, each state can impose a tax on parents who opt

259. *Liberty Univ.*, 2011 U.S. App. LEXIS 18618, at *31–32.

260. *See* Adam Liptak, *Supreme Court Is Asked to Rule on Health Care*, N.Y. TIMES, Sept. 28, 2011, at A18; Lee Ross, Obama Administration Defends Health Care Overhaul in First Supreme Court Brief, FOX NEWS.COM (Jan. 06, 2012), http://www.foxnews.com/politics/2012/01/06/obama-administration-makes-health-care-overhaul-case-to-supreme-court/; Lyle Denniston, U.S. Urged More Health Care Argument, SCOTUSBLOG (Feb. 3, 2012, 8:31 PM), http://www.scotusblog.com/2012/02/u-s-urges-more-health-argument/#more-138385.

261. John Karayan, *Federal Constitutional Law Affecting State Taxation, in* BENDER'S STATE TAXATION: PRINCIPLES AND PRACTICE § 1.01 (2011).

262. *Id.*

263. *See supra* Part II.

264. *See* Karayan, *supra* note 261.

265. *See* Jacobson v. Massachusetts, 197 U.S. 11, 12–13 (1905).

266. *Id.* at 26–27.

267. *Id.* at 12, 39.

out of mandatory vaccination for their children because these parents are imposing negative externalities on other community members.

For the tax to be truly effective all states must institute it. Otherwise, people who wish to avoid the tax and still not vaccinate their children could simply move to another state. Since vaccine-preventable illnesses can cross state lines, failure by some states to participate in instituting the tax could markedly undermine the program—for example, if parents who refused to vaccinate congregated in states without the tax it could create even greater pockets of unvaccinated people and substantially lower herd immunity.

D. SUBSIDY FOR VACCINATION COMPLIANCE

Alternatively, the government—most likely the state governments for the reasons previously discussed—could provide a subsidy for those parents who vaccinate their children. A subsidy can influence behavior if it is set at a level high enough to change parents' evaluation of the payoffs of vaccination. Returning to our prisoner's dilemma analysis, the subsidy lowers T, the value of temptation to not vaccinate.[268] Assuming we have correctly calculated the level of tax, we should set the subsidy equivalent to the tax. Subsidies can be a politically easier intervention to enact because rather than "punishing" people for not vaccinating, they are "rewarding" those who do vaccinate.

Subsidies, however, can be less effective than taxes because of "loss aversion": people value a loss more highly than they value a gain.[269] Even though the parents who choose not to vaccinate would be forgoing the same amount of money under a subsidy as they would a tax, they may value that loss less and not know they are losing money. The government would need to ensure taxpayers knew they were forgoing a subsidy by choosing not to vaccinate.

A substantial difficulty with the subsidy is identifying the source of the funds. A combination of a tax and a subsidy could help alleviate this problem, such as taxing those who do not vaccinate and using that money to provide a subsidy. However, there would be many more people who would receive the subsidy than would receive the tax because vaccination levels are high in most communities.[270] Therefore, unless the subsidy was set at a much lower level than the tax, the government would still need to

268. *See* HEMENWAY, *supra* note 155, at 252–53.
269. COOTER & ULEN, *supra* note 155, at 438–39.
270. *See supra* Part III.C.

identify a source of funds for the subsidy, which would likely be problematic.

Moreover, because vaccination rates are so high, using a subsidy to lower the numbers of exemptors is too broad an action. Most people do not need an additional incentive to vaccinate. Therefore, providing a subsidy at a level that would induce behavior change would likely to be too costly to be rational or effective. Instead, a tax better targets and penalizes the few people who choose not to vaccinate by forcing them to pay, thereby associating a financial loss with their decision.

E. NO RELIGIOUS EXEMPTION TO THE TAX

Under the vaccine-refusal tax, there should be an exemption for children who cannot be vaccinated because of a medical condition, as determined by a physician. However, there should not be a religious or philosophical exemption to the tax. When the public's health is at risk, it is legitimate to differentiate between the clinical opinion of a trained medical professional that a child's health is endangered by vaccination and the philosophical or religious belief of a parent that the child should not be vaccinated. The Supreme Court has held that the free exercise of religion does not allow people exemption from laws that protect the public's health, such as those mandating vaccination.[271] In *Employment Division v. Smith*, a group of Native Americans challenged an Oregon law prohibiting the use of peyote under the Free Exercise Clause.[272] The Supreme Court stated, "We have never held that an individual's religious beliefs excuse him from compliance with an otherwise valid law."[273] Additionally, the Court explained that the "right of free exercise does not relieve an individual of the obligation to comply with a 'valid and neutral law of general applicability on the ground that the law proscribes (or prescribes) conduct

271. *See e.g.*, Emp't Div., Dep't of Human Res. of Or. v. Smith, 494 U.S. 872 (1990) (holding that a law banning peyote use did not violate the First Amendment), *superseded by statute*, Religious Land Use and Institutionalized Persons Act of 2000 (RLUIPA), 114 Stat. 803, 42 U.S.C. § 2000cc et seq., *as recognized in* Sossamon v. Texas, 131 S. Ct. 1651 (2011).

272. *See id.* at 874. Chemerinsky explains the *Smith* decision: "[N]o matter how much a law burdens religious practices, it is constitutional under *Smith* so long as it does not single out religious behavior for punishment and was not motivated by a desire to interfere with religion." CHEMERINSKY, *supra* note 44, at 1248.

273. *Smith*, 494 U.S. at 878–79.

that his religion prescribes (or proscribes).'"[274] Subsequently, the Court applied *Smith* in *Church of the Lukumi Babalu Aye, Inc. v. City of Hialeah*, in which the Court examined a city ordinance restricting cruelty to animals, as challenged by a particular religious group that engaged in animal sacrifice in its religious practice.[275] The Court held that "a law that is neutral and of general applicability need not be justified by a compelling government interest even if the law has the incidental effect of burdening a particular religious practice."[276] Although the majority of states offer religious exemptions to mandatory immunization statutes,[277] a decision by the Mississippi Supreme Court suggests that they likely do not need to offer an exemption for their immunization statute to be constitutional.[278] Therefore, taxing those who opt for a religious or philosophical exemption would likely not be unconstitutional.

In fact, states did not widely begin offering religious exemptions from vaccination until the 1970s when the Child Abuse Prevention and Treatment Act of 1974[279] and regulations adopted by the Department of Health, Education, and Welfare, the precursor of HHS, "conditioned federal funding upon passage of such [religious] exemptions."[280] Although this mandate has since been repealed,[281] forty-eight states continue to offer religious exemptions to mandatory vaccination.[282] Mississippi and West

274. *Id.* at 879 (quoting United States v. Lee, 455 U.S. 252, 263 n.3 (1982) (Stevens, J., concurring).

275. *See* Church of the Lukumi Babalu Aye, Inc. v. City of Hialeah, 508 U.S. 520 (1993) (holding that a law that targeted only one religious group was not a neutral law of general applicability and thus violated the First Amendment).

276. *Id.* at 531.

277. GOSTIN, POWER, DUTY, RESTRAINT, note 31, at 380.

278. Brown v. Stone, 378 So. 2d 218, 223 (Miss. 1979) (holding unconstitutional a state statute that gave members of recognized religious denominations an exemption to mandatory immunization).

279. Child Abuse Prevention and Treatment Act, Pub. L. No. 93-247, 88 Stat. 4 (1974) (codified as amended in scattered sections of 42 U.S.C.).

280. Silverman, *supra* note 41, at 282.

281. *Id.*

282. GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 384; PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 380; Silverman, *supra* note 41, at 282. Most states only require the "submission of a form, or an affidavit, stating opposition based on religious grounds." Silverman, *supra* note 41, at 283. Some states actually scrutinize the petitioner to determine if the religious beliefs are "genuinely and sincerely held." *Id.* at 282–83. Only a few states require the petitioner to be part of an established, organized, or recognized religion. *Id.* at 282. However, many states have removed that requirement, and those statutes have largely been struck down as unconstitutional under the Equal Protection, Free Exercise, and Establishment clauses. *Id.* at286–93.

Virginia are the only states that currently offer no religious exemption.[283] Twenty states also grant philosophical exemptions.[284]

Most courts have upheld the constitutionality of the religious exemptions, but in *Brown*,[285] the Mississippi Supreme Court held that religious exemptions endanger other students' health.[286] The court held that even in the face of parents seeking religious exemptions from vaccination, the state had an "overriding and compelling public interest" in protecting children.[287] The court identified the failure rates of vaccines and the benefit of herd immunity as factors in its decision, holding that religious exemptions violate the equal protection rights of children who do not receive the exemption.[288] Other state courts, however, have not yet followed Mississippi, and the U.S. Supreme Court has not addressed whether or not religious exemptions to vaccine mandates are constitutional; therefore, most states continue to offer them.

A 2002 Arkansas district court case demonstrates how some other courts view religious exemptions from vaccinations.[289] In that case, *Boone v. Boozman*,[290] a mother challenged an Arkansas statute that required mandatory immunization for school attendance, but provided an exemption if "immunization conflict[ed] with the religious tenets and practices of a recognized church or religious denomination."[291] The court found that the statute discriminated against a "nondenominational, nonsectarian individual with a sincerely held individual religious belief, or churches and religious denominations that do not have explicit policies on immunization but may

283. PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 380.
284. *Id.*
285. Brown v. Stone, 378 So. 2d 218 (Miss. 1979).
286. *Id.* at 222 –23.
287. *Brown*, 378 So. 2d at 222.
288. Silverman, *supra* note 41, at 283–84.
289. Boone v. Boozman, 217 F. Supp. 2d 938, 941, 957 (E.D. Ark. 2002) (holding that a state statute that allowed a religious exemption from mandatory vaccination for only recognized religions violated the First Amendment).
290. *Id.*
291. ARK. CODE ANN. § 6-18-702 (2002), *invalidated by* Boone v. Boozman, 217 F. Supp. 2d 938 (E.D. Ark. 2002), McCarthy v. Boozman, 212 F. Supp. 2d 945 (W.D. Ark. 2002) (current version at ARK. CODE ANN. § 6-18-702 (2011)). Arkansas amended the statute to remove the requirement of a recognized church and add a philosophical exemption. An Act to Revise the Religious Exemption to the School Immunization Requirements, 2003 Ark. Acts 999, § 1 (codified as amended at ARK. CODE ANN § 6-18-702 (2011)).

leave such matters to individual religious conscience."[292] The court added, however, that the mandatory immunization statute was a "permissible exercise of the State's police power."[293] Therefore, the court severed the religious exemption clause, upholding the mandatory immunization statute but without allowing for religious exemptions.[294] The court held that the "constitutionally-protected free exercise of religion does not excuse an individual from compulsory immunization; in this instance, the right to free exercise of religion and parental rights are subordinated to society's interest in protecting against the spread of disease."[295]

Similarly, in *McCarthy v. Boozman*,[296] the court was "sympathetic to the state's interest in guarding against moral objections to or general fears of immunization," but nevertheless held that "limiting the rights under the statute to those in 'recognized' religions failed the Lemon three-prong test."[297] Arkansas amended its laws to remove the recognized religion requirement and add a philosophical exemption.[298]

Finally, offering a religious exemption has become a way for many people to receive an exemption under the auspices of religious belief. Because courts have struck down segments of statutes that require the religious belief to be part of a generally accepted or organized religion,[299] states should only use a "sincerely held" religious belief requirement as a way to screen out those people who are merely using the religious exemption to avoid vaccination. Determining whether a religious belief is sincerely held, however, is so onerous and costly for cash-strapped school districts that states may begin to simply allow objectors to fill out a form,

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292. *Boone*, 217 F. Supp. 2d at 947.

293. *Id.* at 954.

294. *Id.* at 957.

295. *Id.* at 954.

296. McCarthy v. Boozman, 212 F. Supp. 2d 945, 949 (W.D. Ark. 2002) (holding that an Arkansas statute's provision that allowed for exemption from vaccination for members of recognized religious organizations violated the First Amendment and the Fourteenth Amendment).

297. Silverman, *supra* note 41, at 292. If a law is not discriminatory then courts use a test established in *Lemon v. Kurtzman*, 403 U.S. 602 (1971). CHEMERINSKY, *supra* note 44, at 1202. Chemerinsky explains that "the government violates the establishment clause if the government's primary purpose is to advance religion, or if the principal effect is to aid or inhibit religion, or if there is excessive government entanglement with religion." *Id.* at 1183.

298. *See supra* text accompanying note 291.

299. Boone v. Boozman, 217 F. Supp. 2d 938, 941, 957 (E.D. Ark. 2002); *McCarthy*, 212 F. Supp. 2d at 949.

and may refrain from engaging in any review of the sincerity of the objection.[300]

Thus, not providing a religious or philosophical exemption to a tax imposed upon those who fail to adhere to mandatory vaccination laws does not violate the Constitution.

F. ARGUMENTS AGAINST PIGOVIAN TAXES

One of the primary arguments against a Pigovian tax on not vaccinating is that it interferes with liberty. Many anti-vaccinationists argue that mandatory vaccine laws impinge both on bodily integrity and parental rights.

1. Bodily Integrity

Some commentators have written that the argument against Pigovian tax policies "supposes that the values of liberty and autonomy should take precedence in policy-making decisions over other values, such as increased public health and general welfare, and any increase in paternalistic policy making involves a reciprocal decrease in autonomy."[301] As *Jacobson* established, the U.S. actually values the protection of public health over an individual's absolute right to autonomous decision-making.[302]

The Supreme Court has ruled that "some liberties are so important that they are deemed to be 'fundamental rights,'" and the government cannot infringe upon those rights unless the regulation at issue meets the test for strict scrutiny.[303] Although "[t]he Court has found a constitutionally protected liberty interest in bodily integrity . . . it has yet to hold that such an interest is 'fundamental.'"[304] Instead of heightened scrutiny, the Court applies rational basis review.[305] "Laws that restrict nonfundamental liberty

300. *See* Silverman, *supra* note 41, at 286–89. *See also generally* Turner v. Liverpool Cent. Sch., 186 F. Supp. 2d 187 (N.D.N.Y. 2002) (holding that a mother who claimed a religious exemption to vaccinating her child based on the Congregation of Universal Wisdom beliefs had a "sincere" belief and, therefore, qualified for the religious exemption). The case set "a low threshold to qualify for religious exemption." Silverman, *supra* note 41, at 288.

301. Cummings, *supra* note 186, at 291.

302. *See* Jacobson v. Massachusetts, 197 U.S. 11 (1905).

303. CHEMERINSKY, *supra* note 44, at 792.

304. GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 141.

305. *See* Mariner, Annas & Glantz, *supra* note 36, at 585. *See also* CHEMERINSKY, *supra* note 44, at 794.

rights need only be 'rationally related' to any 'legitimate state interest.'"[306] In examining liberty interests that are not fundamental rights, "the Supreme Court balances a person's liberty interests against relevant state interests."[307]

In *Mills v. Rogers*, for example, the Court assumed for the discussion that an individual has a liberty interest in avoiding forced administration of anti-psychotic medicine, but then also recognized that competing state interests might outweigh that liberty interest.[308] Such a competing state interest could include the protection of the public's health. Similarly, in *Washington v. Harper*, the Court held that when a person with a "serious mental illness" poses a danger to others, medical treatment can be imposed.[309] In *Cruzan v. Director of the Missouri Department of Health*, the Court recognized that "determining that a person has a 'liberty interest' under the Due Process Clause does not end the inquiry; whether respondent's constitutional rights have been violated must be determined by balancing his liberty interests against the relevant state interests."[310]

The Court has been "highly permissive of public health regulation" under rational basis review,[311] and "[t]he police power represents a classically adequate justification [for public health regulation] under substantive due process."[312] The government, therefore, can burden an individual's liberty when working to protect the health or safety of the community.[313] For instance, in *Wisconsin v. Yoder*, the Court recognized that "activities of individuals, even when religiously based, are often subject to regulation by the States in the exercise of their undoubted power to promote . . . health, safety, and general welfare."[314]

306. Mariner, Annas & Glantz, *supra* note 36, at 585.

307. PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 397.

308. Mills v. Rogers, 457 U.S. 291, 299 (1982).

309. Washington v. Harper, 494 U.S. 210, 227 (1990) (holding that a Washington policy allowing prison officials to forcibly administer medication to inmates did not violate a prisoner's right to due process because he was a danger to others and himself). *See also* PUBLIC HEALTH LAW & ETHICS: A READER, *supra* note 41, at 397.

310. Cruzan v. Dir., Mo. Dep't of Health, 497 U.S. 261, 279 (1990).

311. GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 138.

312. *Id.* at 135.

313. *See id.*

314. Wisconsin v. Yoder, 406 U.S. 205, 220 (1972).

2. Parental Rights

Meyer v. Nebraska defined parenting rights as a fundamental right.[315] Similarly, in *Pierce v. Society of Sisters* the Supreme Court stated that the child is "not the mere creature of the state."[316] Nevertheless, the Court has also recognized limits to parents' rights to make decisions about their children. As previously discussed, in *Prince v. Massachusetts*, the Court upheld the application of child labor laws even though they limited a parent's freedom to make decisions for her children and freely exercise her religion.[317] The Court noted that "the family itself is not beyond regulation in the public interest."[318]

Because parental rights are fundamental, however, courts use strict scrutiny to examine legislation that burdens them.[319] In applying strict scrutiny, the Court examines whether the right is infringed upon by the government action, whether that infringement is justified by a compelling government interest, and whether the means are narrowly tailored to the legislation's goal.[320]

Here, our vaccine exemption tax is justified by a compelling government interest, which is upholding herd immunity and protecting vulnerable community members from vaccine-preventable illnesses. Protecting the public's health has traditionally been a purpose sufficient for burdening individual liberty.[321] Our goal is to account for the negative externality created by vaccine exemptions by taxing those exemptions. This tax is narrowly tailored because it specifically targets the people creating the negative externality. Thus, this is a legitimate and constitutionally-permissible public health intervention.

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315. Meyer v. Nebraska, 262 U.S. 390, 399–402 (1923). *See also* CHEMERINSKY, *supra* note 44, at 809. Chemerinsky explains that "the Supreme Court declared unconstitutional a state law that prohibited teaching in any language other than English in public schools." *Id.* Using a substantive due process analysis, the Court found that "the statute violated the right of parents to make decisions for their children." *Id.*

316. Pierce v. Soc'y of Sisters, 268 U.S. 510, 534–35 (1925) (holding that the legislature interfered with parental rights when it required all students to attend public school). The Supreme Court declared unconstitutional a state law that required children to attend public schools. CHEMERINSKY, *supra* note 44, at 809.

317. *See generally* Prince v. Massachusetts, 321 U.S. 158 (1944).

318. *Id.* at 166. *See also* CHEMERINSKY, *supra* note 44, at 809.

319. *See Meyer*, 262 U.S. at 399–402; CHEMERINSKY, *supra* note 44, at 792.

320. CHEMERINSKY, *supra* note 44, at 794.

321. *See* GOSTIN, POWER, DUTY, RESTRAINT, *supra* note 31, at 135.

Critics also may argue that having a tax completely negates any state-granted religious or philosophical exemption.[322] They could contend that if there is a valid ground for a religious or philosophical exemption, then is it right to impose a financial cost? And, if it is right to impose a financial cost, then why allow the exemption?

These critics err in presuming that a person with a valid religious or philosophical objection to vaccination necessarily values that objection more than the cost that the objection and the associated refusal to vaccinate impose on society. If at least some exemptors value their belief against vaccination less than the cost imposed on society, then the justification for an outright exemption is significantly weakened, since it would only reduce social welfare.

An appropriately set tax, one that roughly covers the marginal social harm of refusing to vaccinate, can be viewed as a conditional exemption: one that specifically exempts from vaccination only those who value their religious or philosophical objections more than the harm imposed on society. Those who value their exemption less than the cost imposed on society will simply choose to vaccinate and these choices will be consistent with social welfare. Rather than a tax on belief, this is a tax on creating a negative externality. Regardless of whether it is for religious, philosophical, or convenience reasons, the decision to opt out of vaccination creates negative externalities, so that decision is taxed.

Of course, there is always a danger that the tax may be set too low or too high, so that some exemptors will pay too much or too little relative to the costs of their objection to society. But this critique applies equally to both those who favor a tax and those who favor exemptions, as the latter are merely advocating a tax set at zero. Likewise, not having any exemption can be viewed as an infinitely high tax. The optimal outcome is, more likely, somewhere in between.

Finally, other critics may argue that taxing those who do not vaccinate could increase hostility toward the government, public health efforts, and vaccination, since the government would be burdening parents' ability to opt out of vaccination.[323] Making parents feel that they have no choice might actually make parents even more resistant to vaccination. However,

322. Discussion with Alexander Capron, Scott H. Bice Chair in Healthcare Law, Policy, and Ethics, and Professor of Law and Medicine, University of Southern California Gould School of Law, in L.A., CA (Mar. 29, 2011).

323. *See* Silverman, *supra* note 41, at 293.

given the rise of pockets of exemptors, which undermines herd immunity and threatens the public's health, and the increase in vaccine-preventable diseases such as pertussis, the government needs to ensure that as few people as possible are taking exemptions. As explained in Part III, the tax ensures that parents feel the true cost of taking an exemption so they will not avoid vaccination lightly.[324] Moreover, it also emphasizes the seriousness of taking an exemption, so that those taking an exemption do not do so simply out of convenience.

V. USING THE TAX REVENUE TO INCREASE VACCINATION

To connect the tax closely to the revenue generated, the revenue should be used to pay for the treatment of children who contract vaccine-preventable illnesses, the community's costs of containing an outbreak, free vaccination for lower-income children, and education about vaccination.

Since the tax seeks to address the negative externality created by failure to vaccinate, the revenue of the tax primarily should be used to pay the treatment costs of children who contract vaccine-preventable illnesses, and to help pay the public health costs of containing a vaccine-preventable illness outbreak. For example, the measles outbreak in Indiana cost more than $100,000 in containment and treatment costs.[325] The tax revenue could help reduce these costs.

A federal initiative, the Vaccines for Children Program, offers vaccinations at no cost to eligible children, including those who are uninsured, on Medicaid, or underinsured.[326] As of 2005 this program covered immunization costs for more than 50 percent of children in the United States.[327] Some of the revenue from the vaccine-refusal tax could be used to expand this program.

Revenue should also be used to improve education about immunization. An important aspect of an education campaign is to better arm health care professionals and school administrators with information

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324. *See supra* Part III.

325. Parker et al., *supra* note 55, at 447, 454.

326. *See Vaccines & Immunizations: VFC: For Parents*, *supra* note 29. Underinsured children are those children whose insurers do not cover vaccinations, or only cover certain vaccinations. *Id.*

327. Gary L. Freed, *Vaccines Policies Across the Pond: Looking at the U.K. and U.S. Systems*, 24 HEALTH AFF. 755, 756–57 (2005).

about vaccinations, so they can effectively discuss the issue with parents.[328] For example, "[g]iven the way in which safety controversies can rapidly and unexpectedly balloon, clinicians must be constantly alert to the potentially devastating impact of vaccine controversies and prepared to discuss vaccine safety concerns with parents."[329] Two studies have demonstrated that providers' practices and willingness to address parents' concerns are among "the most important determinants of the immunization status" for children who receive care in private pediatrics practices.[330] In addition, parents of vaccinated and unvaccinated children alike cite health care providers "as the most frequent source of information about vaccination."[331]

An important aspect of the tax would be to use its revenue to improve vaccination rates through a public education campaign. The goal should be to combat misinformation through a series of television advertisements, Internet advertisements, and the creation of additional websites that offer information about the benefits and risks of vaccination and the risks to the public's health posed by forgoing vaccinations.[332] For example, "[p]erhaps the most practical way to help curb exemption abuse is to correct any misinformation about vaccinations so that fewer individuals will improperly seek exemption for this reason. Public informational campaigns can be used to this end."[333]

The education campaign also should provide educational literature to parents when they decide to opt out of vaccinating their children. The CDC's National Immunization Program has, for instance, "identified and refuted several common misconceptions regarding vaccination," so the public education campaign should specifically target those ideas.[334]

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328. *See* Silverman, *supra* note 41, at 293.

329. Colgrove & Bayer, *supra* note 118, at 736.

330. James A. Taylor et al., *The Influence of Provider Behavior, Parental Characteristics, and a Public Policy Initiative on the Immunization Status of Children Followed by Private Pediatricians: A Study from Pediatric Research in Office Settings*, 99 PEDIATRICS 209, 213 (1997). *See also* Doren D. Fredrickson et al., *Childhood Immunization Refusal: Provider and Parent Perceptions*, 36 FAM. MED. 431, 434–37 (2004).

331. Omer et al., *supra* note 65, at 1985.

332. *See* Silverman, *supra* note 41, at 293.

333. Alicia Novak, Comment, *The Religious and Philosophical Exemptions to State-Compelled Vaccination: Constitutional and Other Challenges*, 7 U. PA. CONST. L. 1101, 1127–28 (2005).

334. *Id.* at 1127. Among those common misconceptions are "the ideas that disease reduction is not due to vaccination but rather to improvements in hygiene and sanitation; that most people who become sick with diseases are vaccinated; that vaccines regularly

VI. CONCLUSION

Parents who opt out of vaccinating their children put everyone in the community at risk for contracting a vaccine-preventable illness. Thus, their decision to free ride on the community's herd immunity creates a negative externality that threatens the community's health. To ensure that parents internalize this externality, either the federal government or the states should institute a vaccine-refusal tax. The revenue from this tax should be used to pay the costs of treatment for people who contract vaccine-preventable illnesses and the community's costs of containing the outbreak. The revenue also should be used to increase the funds available to pay for vaccines for low-income children and to create an education campaign to better educate clinicians and parents about immunization.

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cause harmful side effects and illnesses; and that vaccinations are no longer necessary in the United States because of the elimination of diseases." *Id.*