

# INTRODUCTION

## VACCINE HESITANCY IN THE INDUSTRIALIZED NORTH

In January 2019 the World Health Organization (WHO) listed “vaccine hesitancy” as a top ten global health threat, sharing the distinction with known killers like air pollution, climate change, and population displacement due to conflict and war (World Health Organization 2019).<sup>1</sup> The WHO’s “Ten Threats to Global Health in 2019” was an eclectic list, ranging from drug-resistant pathogens to noncommunicable diseases related to obesity and physical inactivity and to the health impacts of climate and humanitarian crises. Consistent with a population health approach to health promotion (Evans et al. 1994; Valles 2018),<sup>2</sup> the list incorporated both “upstream” and “downstream” causes of poor health. Some, like Ebola and dengue, are proximal causes of morbidity and mortality, while others, like fragile and vulnerable settings and air pollution, are “upstream causes,” or socially mediated determinants of health. Vaccine hesitancy stands out on this list of factors for negative health outcomes for being an attitude, as opposed to a pathogen or context. Indeed, despite a strong scientific consensus in favor of vaccines, vaccine hesitancy persists and impairs public health strategies for infectious disease control.

Vaccine hesitancy refers to an attitude of ambivalence regarding vaccines. It is distinct from vaccine refusal, which is a behavior. Vaccine hesitancy runs along a spectrum from mild to severe uncertainty about whether vaccines are

safe, effective, and necessary. While attitudes and behaviors are linked, vaccine hesitancy does not fully determine vaccine acceptance or refusal. When deciding on childhood vaccines, some hesitant parents will vaccinate according to the recommended schedule, some will refuse all vaccines, and others will pursue modified schedules. These alternative schedules might be selective, where children receive some vaccines but not others; temporally delayed, where children begin immunizations when they are older and the schedule is administered over a longer period of time; or some combination of both. Some parents seek to unbundle combination vaccines like the MMR (measles, mumps, rubella) or the MMRV (measles, mumps, rubella, varicella) in favor of separate vaccines for each disease administered over multiple healthcare visits rather than in one appointment.

Vaccine hesitancy is a relatively new research priority for public health. Previously, research had instead focused on rates of vaccine acceptance and refusal (Dubé et al. 2013; Yaqub et al. 2014). The WHO Strategic Advisory Group of Experts (SAGE) on Immunization recognized this growing research need as early as 2001. Their meeting reports detailed difficulties across the globe for eradication programs due to vaccine hesitancy.<sup>3</sup> The 2011 SAGE meeting report warned that hesitancy surrounding vaccines and immunization services, as well as vaccine refusal, threatened to undermine decades of progress and the objectives of the WHO's Decade of Vaccines Global Vaccine Action Plan (2011–2020). The group requested the establishment of a working group on vaccine hesitancy, and in 2012, the Strategic Advisory Group of Experts Working Group on Vaccine Hesitancy was formed. The new group was convened to address the gap between public perception of vaccines and the scientific consensus (Schuster, Eskola, and Duclos 2015).

This research shift also reflected a growing agreement among public health researchers that vaccine *hesitancy* was a more informative analytic concept than vaccine *refusal*. In the industrialized<sup>4</sup> North,<sup>5</sup> where vaccines are widely available due to relatively stable health systems infrastructures, the great variation between vaccine hesitancy and refusal is important. American survey data measure 20 to 40 percent of American parents with small children harboring some uncertainty about vaccines, with the wide variance explained by how tightly one limits the range of ambivalent attitudes (Opel et al. 2011; Largent 2012).<sup>6</sup> In Canada, a 2017 survey revealed roughly 25 percent of parents with young children are vaccine hesitant (Greenberg, Dubé, and Driedger 2017). Hesitancy numbers are much higher than rates of refusal of childhood vaccines, which sit steady at 2 to 3 percent in both countries. In France, pediatric vaccination rates are lower than

optimal, but far less dramatic than the country's rates of vaccine hesitancy. One in three people in France think that vaccines are unsafe, and France measures the highest rates of vaccine hesitancy in the world (Wellcome Global Monitor 2019).

Not only does “hesitancy” capture a larger subset of the population than “refusal,” but focusing only on vaccine uptake and refusal rates and neglecting the underlying attitudes is likely to lead us to underestimate the challenge of maintaining vaccination programs in the future. It is in the interests of public health to know what makes some hesitators vaccinate their children despite their misgivings, while others do not. Further, it is in the interest of public health to understand what efforts can be made to tip the scale in favor of vaccine acceptance. While committed vaccine refusers may not budge on the issue, many vaccine hesitators may be reached in order to turn the dial from skepticism to confidence in vaccines (Leask 2011). Conversely, failing to communicate effectively with this group can harden vaccine-skeptical views, turning vaccine hesitators into vaccine refusers (Leask et al. 2012).

One of the first tasks of the SAGE Working Group on Vaccine Hesitancy was to define the concept. A 2014 report offered the following definition: “Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence.” The group's report articulated the scope and determinants of vaccine hesitancy (for a summary, see MacDonald et al. 2015), both of which pointed to the context specificity of vaccine hesitancy. The determinants are captured in the report's “Three C's”: complacency, convenience, and confidence. Complacency (i.e., willingness to go along with the recommended schedule) is determined by individuals' perception of the risk and value of vaccines. Convenience refers to the accessibility of the vaccines (cost, availability, etc.), while confidence refers to “trust in the effectiveness and safety of vaccines, the system that delivers them, including the reliability and competence of the health services and health professionals and the motivations of policy-makers who decide on the needed vaccines” (MacDonald et al. 2015).

Those factors explain what the data show—that vaccine hesitancy varies among different populations. There are geographical, ideological, historical, and philosophical differences that create pockets of highly vaccine-confident individuals and clusters of vaccine-hesitant and vaccine-refusing people. These communities may live near each other, thus creating tension within schools, neighborhoods, towns, and cities.

The SAGE Working Group's definition of vaccine hesitancy also captures the numerous levels of concern surrounding vaccines. Research shows that public concerns are not confined to vaccine safety but include vaccine policies, recommendations, and costs. All these factors make public decision making related to vaccine acceptance complex: it is not driven by scientific evidence alone, but rather depends on a mix of scientific, psychological, sociocultural, and political reasons (Larson et al. 2011).

While it is tempting to think that vaccine hesitancy and refusal are products of misinformation on social media and the sway of celebrity "anti-vaxxers," vaccine hesitancy is as old as vaccines themselves. The first vaccine, Edward Jenner's<sup>7</sup> cowpox inoculation<sup>8</sup> against smallpox, invented in 1796, met religious objection on the grounds that the vaccine introduced into human bodies "substances originating from God's lowlier creatures," namely cows (Edward Jenner Society 2019; see Morgan and Poland 2011). Such were the localized anxieties of Jenner's time. Today, vaccine skeptics like Andrew Wakefield, Barbara Loe Fischer, Meryl Dorey, and (until recently) Jenny McCarthy are the products, not the causes, of contemporary vaccine anxieties.

Anti-vaccine influencers are vilified by health experts and journalists, yet their crafted vaccine-skeptical messages often give voice to fears that were already simmering. American historian Elena Conis ties vaccine skepticism to a fast-growing vaccine schedule and a cultural backdrop, originating in the socially transformative late 1960s, that questioned establishment practices and put many societal norms under scrutiny (Conis 2015a). The environmental movement of the 1960s brought concerns about toxic chemical exposure to public attention, as well as antipathy toward big industry. The patients' rights and women's health movements entrenched a new norm of patient autonomy and challenged the paternalism and unquestioned authority of medicine and other expert institutions (Conis 2015a; 2015b). It is against this cultural backdrop, Conis argues, that contemporary challenges to vaccines and vaccination practices began to grow. Another American historian, Mark Largent, situates modern American vaccine anxiety in changes to the vaccine schedule in the early 1990s, when the list of mandatory vaccines began to grow and some fringe critics vocalized concerns (Largent 2012, 36). Both Conis and Largent agree that it is "modern American cultural and ideological notions, not the centuries-old religious opposition to vaccination, [that] form the basis of today's anti-vaccination movement in the United States" (Largent 2012, 36).

Comparative research into vaccination programs converge on one common

denominator: vaccination programs are highly politicized. In 2019 several US states considered the removal of nonmedical exemptions for school-entry immunization requirements, while other states relaxed restrictions. In Europe, anti-vaccine views have been folded into populist political movements. The success or failure of vaccine programs are determined by multiple levers of vaccine confidence: in the product, the provider, and the policy (Larson et al. 2015), as well as the broader government and/or nongovernmental organizational infrastructure supporting vaccination programs.

## VACCINE HESITANCY AND SOCIAL PRIVILEGE

A unique feature of vaccine hesitancy in the industrialized North is that the most vocal vaccine hesitators and refusers are affluent and educated, that is, they are people who are largely supported by the systems of power and privilege in place. This is an unusual trend in public health and health promotion, wherein higher wealth and education typically predicts more active pursuit of good health (i.e., eating healthy food, exercising, time for leisure).<sup>9</sup> In America, much attention has been drawn to the staggeringly low rates of vaccination among wealthy coastal Californians (Yang et al. 2016; McNutt et al. 2016; Bonnerfield 2015),<sup>10</sup> whose resistance to vaccines has been described by leading vaccine advocate Dr. Paul Offit as “an ignorance ironically cloaked in education, wealth, and privilege” (Offit 2014).<sup>11</sup> The connection between affluence and vaccine resistance and refusal is visible in other parts of the United States and in other high income countries like Canada (Parmar 2019), Australia (Soekov 2018; Calligeros 2015) and New Zealand (Meier 2017; Duff 2019).

The comparative global data on vaccine hesitancy (Wellcome Global Monitor 2019) finds the highest rates of vaccine hesitancy in the most economically developed nations and the lowest levels in countries on the other end of the development spectrum. Bangladesh and Rwanda have the highest reported levels of vaccine confidence in the world, followed closely by Ethiopia and India (Wellcome Global Monitor 2019). The chief executive of Gavi, the Vaccine Alliance,<sup>12</sup> Seth Berkley, has commented on this division: “In developing countries, where deadly diseases like diphtheria, measles or whooping cough are more common, I’ve seen mothers queue for hours to make sure their child is vaccinated . . . It is in wealthier countries, where we no longer see the terrible impact these preventable diseases can have, that people are more reticent. This reticence is a luxury we can ill afford” (in Bosely 2019). The presumed connection between

negative vaccine sentiments and privilege is reinforced by broad global comparisons. However, along with oversimplifying the picture of vaccine hesitancy in the industrialized North, comments like Berkley's also misrepresent the state of vaccine confidence in the Global South. While some populations in low- and low-middle-income countries clamor for access to childhood vaccines amid poor access to healthcare, other lower-income countries struggle with pernicious cultural associations of vaccine programs with state-sanctioned genocide or foreign imperialism (Leach and Fairhead 2007). Rumors circulate in Nigeria that polio vaccines offered to Muslim children are infected with HIV and cause infertility (Nwaubani 2016); in Gambia, that they strengthen childhood soldiers and make them more violent (Leach and Fairhead 2008; 2007, chapters 5 and 6). Pakistani health workers have been killed in response to rumors that they were promoting poisonous polio vaccines (Shahzad and Ahmad 2019).

The enduring picture of vaccine hesitancy in the industrialized North as a problem of privilege is incomplete due to gaps in the research. Most research into vaccine hesitancy in high income countries has been conducted on white participants, where the link between higher household income and increased vaccine hesitancy holds strong (Smith et al. 2004). Only recently has a widely used measurement tool for vaccine hesitancy, the Parent Attitudes about Childhood Vaccines (PACV), been tested and validated for use on inner-city racialized American populations (Orr and Beck 2017).<sup>43</sup> Without the availability of reliable research tools, there has been limited opportunity for important cross-cultural comparison in vaccine hesitancy. Studies into vaccine hesitancy tend to mention the lack of racial and ethnic diversity within their study populations as a limitation of the study. Yet a strong effort to reverse this limitation by actively recruiting and retaining people of color as participants in vaccine hesitancy studies has not transpired. Instead, convenience sampling<sup>44</sup> and survey research that permits self-selection bias<sup>45</sup> are still widely used for recruitment. All the while, the scant research that is available on vaccine hesitancy among racialized Americans suggests that underexploration in this area is a major oversight that contributes to a limited understanding of vaccine hesitancy within more affluent countries.

A study involving six small focus groups on Black American mothers' attitudes about vaccination (Shiu et al. 2005) revealed high levels of apprehension. The fifty-three Atlanta-based participants were concerned about adverse events following immunization, expressed distrust of medical professionals, and wanted more information about vaccine ingredients, vaccination, and the rationale for state-level vaccination requirements for school and daycare entry. The study had

no comparison group and therefore lacked generalizability. A follow-up survey study (Shiu et al. 2006) pursued comparison of vaccine safety attitudes by race and ethnicity in order to offer more generalizable findings that could be statistically analyzed. The study designed questions based on the initial focus group findings and administered the questions to a nationally representative sample.<sup>16</sup> The survey results showed that Black and Hispanic participants with low income and less education had more negative attitudes toward vaccines and toward their child's healthcare providers than white participants (Shiu et al. 2006). When asked to rate their level of vaccine concern from 1 to 5, with 5 indicating "very concerned," 40 percent of Black parents and 32 percent of Hispanic parents ranked their concern as 5 compared with 15 percent of white parents. Lower levels of education and household income were also significantly associated with high-level concern (Shiu et al. 2006, 246). Compared to white parents, Black parents were more likely to want more knowledge about vaccine ingredients to ensure they are safe, to not trust their child's healthcare provider, to disagree that their child's healthcare provider was easy to talk to, and to agree that school or daycare immunization rules influenced their decision to immunize (Shiu et al. 2006, 247). Gellin et al. (2000) had similar findings in a nationally representative phone survey involving sixteen hundred participants. Both Shiu et al. (2006) and Gellin et al. (2000) found Hispanic parents to be more likely to want to know more about vaccine ingredients than white parents (Shiu et al. 2006, 247; Gellin et al. 2000, 110).

Prislin et al. (1998) found that Black Americans had greater doubts about the protective value of vaccines, resulting in decreased vaccine acceptance, when compared with Hispanic and white Americans. Freed et al. (2010) conducted a national telephone survey and found Hispanic parents to be more concerned about the serious adverse effects of vaccines, and yet at the same time more likely to follow their doctors' vaccine recommendations, than comparison groups. They were also less likely to have ever refused a vaccine. This last finding highlights that disempowerment, rather than vaccine confidence, can underlie vaccine uptake within marginalized communities. Lacking social privilege and economic capital compels some groups to vaccinate despite harboring vaccine concerns. In this sense, it is the privileged in the industrialized North that are most afforded the right to be vocal about their hesitations, a legacy of historical and ongoing oppression.

Nonetheless, the narrative of vaccine hesitancy as a folly of "affluenza,"<sup>17</sup> the unhealthy and unwelcome psychological and social effect of affluence, still



endures in vaccine discourse and research. For example, Wagner et al. (2019) noted that “more affluent individuals in high-income countries appear to be more vaccine hesitant and may have lower vaccine uptake” and cited research by Dempsey et al. (2011), Luthy et al. (2009), and Hedge et al. (2019). Yet the cited authors fail to justify the claim.

Dempsey et al. (2011) studied parental preference for alternative vaccine schedules and found that while being white and having a higher income increased the likelihood of pursuing an alternative schedule, so did not having a regular healthcare provider (which is not typical of affluent Americans). Furthermore, the researchers noted that survey respondents might have employed different understandings of “alternative schedule,” which would skew the results. While the researchers were referring to delayed and selective vaccine schedules favored by parents who think the national vaccine schedule is dangerous, respondents could have self-identified as following a delayed/alternative vaccine schedule because they were behind on immunizations due to poor access to healthcare (an attribute of low socioeconomic status). In the end, the connections between alternative vaccination and vaccine hesitancy, and vaccine hesitancy and affluence, are not fully formed. The second cited study, by Luthy et al. (2009), investigated vaccine hesitancy in Utah, using a study population that mostly self-identified as white (70.4 percent of the seventy-one participants who identified their race). The research team offered no subgroup analysis of racial differences in vaccine attitudes, perhaps because the validity of any comparison would be questionable. The final paper cited by Wagner et al. (2019) in alleged support of the thesis that vaccine hesitancy in high income countries is a problem of affluence and privilege offered a comparative look at race and socioeconomic status as determinants of pediatric vaccine compliance; however, the authors, Hedge et al. (2019), were unjustified in their interpretation of the data to suggest affluence was the primary predictor of vaccine hesitancy. Hedge et al. (2019) mapped immunization information from the Michigan Care Improvement Registry to the state’s census data to determine neighborhood variations in vaccine uptake. The researchers found the lowest levels of childhood vaccination rates in the wealthy white Detroit suburbs, followed closely by low vaccination rates in mostly Black inner-city Detroit neighbourhoods. They reasoned that low levels of childhood vaccination in the affluent suburbs were a consequence of vaccine hesitancy. Vaccine hesitancy research supports this interpretation. The explanation for low vaccination rates in communities with low socioeconomic status were assumed by the researchers to be a consequence of poor access to healthcare.



While poor access to healthcare is associated with undervaccination (Smith et al. 2004; Bhat-Shelbert et al. 2012), there was no justification for assuming that poor access captured the entirety of underserved populations' relationships to vaccines; the question of whether vaccine hesitancy played a role here was not asked. In summary, vaccine hesitancy is understudied in marginalized groups. The research narrative of vaccine hesitancy as a problem of affluence follows from a limited scope of investigation, and, though popular, does not distinguish between being vaccine hesitant and being *vocally* vaccine hesitant because of social privilege. Further study and deeper investigation must be undertaken to capture the complexity of vaccine hesitancy in diverse populations.

### THE WAR ON SCIENCE FRAMEWORK

The term *war on science* is commonly used in (mostly American) English-language journalism.<sup>18</sup> *National Geographic's* March 2015 magazine cover<sup>19</sup> featured the title "The War on Science" followed by the smaller script:

Climate Change Does Not Exist  
 Evolution Never Happened  
 The Moon Landing Was Fake  
 Vaccinations Can Lead to Autism  
 Genetically Modified Food is Evil

The bold text and sparse imagery is foreboding. The pages of the magazine give no further explanation about the supposed war, and how the listed public controversies tie into a war on science. The feature article makes no mention of such a war in its analysis of "Why Do Many Reasonable People Doubt Science?" (Achenbach 2015). Instead, the meaning of the stark cover page was taken to be understood; *National Geographic* readers were assumed to already know that science is under attack.<sup>20</sup> Writing in the *Scientific American Blog* two years later, environmental scientist and public speaker Jonathan Foley captures the anxious sentiment: "Make no mistake: There is a War on Science in America . . . This attack on science, and on knowledge itself, goes beyond anything we have seen in America before. And it is not only dangerous to science, it is dangerous to our nation and the world" (Foley 2017)

Defenders of science find moral high ground in a tandem defense of science and democratic values, arguing that the universal findings of science are

expressions of humanity's curiosity without deference to private interests, be they religious, corporate, or other. Questioning the scientific consensus is thereby understood as threatening cherished democratic ideals. Thus, the stakes of this "war" are understandably high. As a whole, the *war on science* refers to conflict between science and society, as well as to the worry that science may not win.<sup>21</sup> Many English-language editorials and nonfiction books now instruct readers on who is waging this war, why it matters, and what we can do about it (Otto 2016; Rosenberg and Rest 2018; Foley and Arena 2018; Editorial Board 2017; Parker 2017). The metaphor itself, however, is never examined. How well does it frame the tensions between science and society? How does it shape response to the problem?

Wars and battle metaphors frame the issue as us versus them, good versus evil. Such framing minimizes the need to understand the perspective of the other, or to find compromise. Vaccine hesitators and refusers are uncharitably represented in popular media, and sometimes in academic sources, as scientifically illiterate (chapter 1), irrational (chapter 2), and willfully antisience and anti-expertise (chapter 3). All the while, the actual concerns of vaccine hesitators are dismissed or ignored, leaving little room for workable solutions. Under the war framework, outreach is misdirected; at the same time, ineffective communications often harden vaccine skeptical sentiments and increase public resentment.

Wars erupt when political negotiation and compromise have been exhausted or are anticipated to end in deadlock. Communications researchers explain that framing an issue as a battle suggests that people need to choose sides and vanquish their opponents to succeed, thereby making it harder to find a reasonable path forward (Nisbet and Scheufele 2009). The war on science metaphor should therefore be applied cautiously, for both descriptive and prescriptive reasons. In this book, I argue that characterizing vaccine hesitancy and refusal as a war on science is both descriptively inaccurate and normatively unhelpful.

Appeals to the good science of vaccines, the public health importance of high vaccination rates, and the prudence of strictly enforced vaccination laws feature daily in many news feeds. At the same time, representations of the people who challenge the public benefits of vaccination are typically limited to caricature.<sup>22</sup> This happens despite available social science research into vaccine hesitators. Vaccine hesitant parents are the subjects of qualitative studies—surveys, interviews, ethnographies—all of which lend small bits of understanding regarding why parents hesitate regarding vaccines and what could be done to reduce those misgivings. An alternative story emerges from the research to show vaccine

hesitators are not, for the most part, hateful, ignorant about science in general, chemophobic,<sup>23</sup> or selfish. They want to do what is best for their children and struggle to operationalize that aim because, by my reading, they have low trust in scientific and medical experts, the very people tasked with guiding parents to make healthy choices for their children. This interpretation of the situation as a crisis of trust arises from sociological analysis of parent testimonials and is philosophically supported by a robust science studies literature on science and trust, specifically the role of trust in knowledge production and legitimation (see chapter 5).<sup>24</sup>

The contrivance of an unreachable enemy “anti-vaxxer”<sup>25</sup> structures limited possibilities for resolution of the supposed war. Public health and government bodies have historically oscillated between persuasion and regulation for addressing vaccine hesitancy and refusal (Colgrove 2006). The war metaphor affects these efforts by creating an image of vaccine hesitators and refusers as persistent and obstinate; if this image is true, then persuasion is impractical and ineffective for addressing the dangerous situation. The high stakes war language makes stringent regulation, such as punitively enforced vaccine requirements with narrow exemption criteria, both justified and necessary. This “hardline approach” to vaccine compliance is increasingly supported by vaccine advocates working in public health and government (noted by Rainford and Greenberg 2015) and science journalism (noted by Goldenberg and McCron 2017).

In this alleged “war on science,” the enemy is fought by besieged vaccine proponents. Healthcare workers, public health practitioners, and science researchers combat torrents of online misinformation and are often targeted and harassed for these efforts (Karlmannglasta 2019; Georgiou 2019). The war on science metaphor can appeal to battle-weary vaccine advocates who hold that the science is settled and wonder why some members of the public are not convinced. The “death of expertise” might be particularly appealing to physicians and nurses, who find themselves debating vaccine safety and efficacy with patients who read something on the internet. After all, it certainly *feels* as though science and scientific expertise are under attack.

But public refusal to follow vaccine recommendations in fact comprises many things beyond a supposed “war on science”: a political act that refuses community solidarity and rebuffs shared responsibility for public health, a suspicion of scientific and medical institutions that have participated in historical social injustices,<sup>26</sup> a rejection of government intrusion on personal affairs, a reinstatement of family autonomy, a demand for less medical intervention and less corporate

medicine (especially for children), and to some, a sign of good parenting. Vaccination is as much a civic act as it is a personal health decision (Kaufman 2010). The welfare of the many depends on the actions of individuals. Population-level protection (herd immunity<sup>27</sup>) is achieved when most otherwise healthy individuals are vaccinated. Because the risks associated with most vaccines are borne by the youngest members of the population (as recipients of childhood vaccinations), the public reaction of unease to any perceived problem with a vaccine is justified. Further, because vaccination requires government-led coordination, funding, and enforcement to achieve the collective goal of public health, public perception of vaccines is imbricated with the larger ethical tension between individual choice and collective need. The debate also highlights a specific political flashpoint in contemporary liberal democratic society, namely, the question of when the autonomy of the family can and should be pierced by the state.

While the arguments over vaccines are often centered on the science—with vaccine advocates pointing to the strong consensus on vaccines and vaccine skeptics collating their own research in order to generate a narrative of suppressed science demonstrating vaccines to be unsafe, ineffective, or unnecessary—the science largely serves as a placeholder for the values at stake. Similarly, research into environmental science policy controversies shows that it is not the science of science-based policy decisions that is dividing the publics,<sup>28</sup> but the values at stake in contentious policy decisions (Sarewitz 2004; Carolan 2008). At issue is what follows practically from accepting the science as true. This finding is applicable to childhood vaccine controversy as well. Both sides of the dispute make scientific efforts to rise above political debate (chapter 4) when they furiously point to the science to justify their claims. The evidence, however, serves as proxies for the values that are on the line, such as individual liberties vs. common goods, medical progress vs. “natural” living, what duties we have toward others and toward future generations, among other values debates. None of these issues are easily settled and, importantly, none will be settled by the science of vaccines.

It is only through the lens of the alleged war on science that vaccine hesitancy appears to be an intractable problem. This book offers a rethinking of vaccine hesitancy. I argue for an alternate framework to better capture the phenomenon. This framework, a crisis of trust, recasts vaccine hesitancy as a sign of poor public trust of medical and scientific institutions rather than a war on scientific knowledge and expertise. Such a recasting permits new formulations for understanding and addressing this divisive public health issue.

## REFRAMING VACCINE HESITANCY AS A CRISIS OF TRUST

Frameworks structure how we view a problem and respond to it. The framing of vaccine hesitancy and refusal as a “war on science” and rejection of expertise is of little service to the effort to increase vaccine confidence and protect public health. It reduces the controversy to the status of vaccine science. But vaccine debates are about much more than vaccines, instead capturing a cluster of temporally, geographically, and historically specific concerns. In liberal democratic societies, those concerns include how technology shapes our lives; who decides and/or regulates technological intrusions on our lives; knowledge and power; science for the people vs. science for corporate interests; government overreach; individual liberty and family autonomy; globalization, multiculturalism, pluralism; community cohesion; health disparities; income inequality; and other issues.

These are concerns about justice and values rather than scientific knowledge, yet both the status of vaccine science and the integrity of science as a knowledge-producing enterprise figure prominently in the airing of these anxieties. The supposed war on science is happening amid a trend of public disaffection and distrust within OECD countries (Dalton 2004; Pharr and Putnam 2000; Roger 2010), as growing numbers of people are losing the conviction that democratic systems are governed equitably, with institutions and experts working for the benefit of everyone rather than privileging the interests of the few.<sup>29</sup> The “age of distrust” has been characterized by *New York Times* editor Roger Cohen as the feeling by “ordinary folk” in advanced industrialized nations that “the system is rigged, that elites are not in it for the people, but rather the money” (2016). This feeling, according to Cohen, has invited this historical moment’s surge in nativist, authoritarian, and closed-border politics, in tandem with a cultural shift away from liberalism. These trends, by his account, challenge “some of the very foundations of the postwar world and the spread of liberal democracy—free trade, free markets, more open borders, fact-based debate, ever greater integration.”

Scientific production of universal knowledge is a key feature of liberalism’s governing apparatus insofar as science produces the common ground (facts) for political engagement. Scientific facts are supposed to be nonpartisan and thereby acceptable to all sides of political debate (see chapter 4). Yet some perceive science as an agent of state power rather than a means for generating universal knowledge.<sup>30</sup> For example, the 2018 Wellcome Global Monitor found that about one in five individuals feel excluded from the benefits of science (Qaisar 2019; Wellcome Global Monitor 2019), and 3M’s 2019 annual State of Science Index

found one-third of its fourteen thousand respondents, from around the world, were skeptical about science (3M State of Science Index 2019).

But where Cohen sees collapse of liberal institutions and others see a war on science and the death of expertise, I see a crisis of trust in scientific institutions and governing agencies. True, crisis can be the prelude to a catastrophic event, like a war on science or the end of expertise. It can also invite a different kind of social change. Against the apocalyptic decrees that arise from the war and death metaphors characterizing much of the discourse of vaccine hesitancy and public resistance to science more generally, the language of crisis encourages a rethinking of strategies and a redeployment of resources in order to avoid catastrophe. Crisis marks an unstable time, an important critical juncture that requires careful and thoughtful action. This book is thereby not only a diagnosis of the problem of vaccine hesitancy but also a framework for action by expert members of the broad institutional apparatus that governs health science research, health professional practice, and the regulation of health products.

## OVERVIEW OF THIS BOOK

This book is divided into two parts, each of which presents a framework for understanding and addressing vaccine hesitancy and refusal. Part 1 (chapters 1–4) examines the dominant framework—the war on science and rejection of expertise—showing how the war metaphor shapes most of the academic and public discourse on vaccine hesitancy and refusal, and how vaccine hesitancy is thereby constructed as an unfixable problem necessitating hard line legislative action. The war on science metaphor is evident in the past decade of English-language health sciences research, as well as popular science and politics. In many ways, the description fits, as public controversies over childhood vaccines unfold as battles over scientific evidence. There is, on one side, a significant body of literature supporting the scientific consensus, against which opponents pick out selective and often disreputable counterevidence. Experts and public commentators then think to “win” by parsing out the evidence, for example, by emphasizing the robust consensus and debunking myths about vaccines (i.e., Public Health 2019; Mammoser 2019; Gatenby 2019; Doc Bastard 2019). When those efforts do not persuade the skeptics (and the data shows that it does not), the response has not been to question its terms of engagement but rather to bemoan the tenacity of anti-vaccine views.

The *war on science* is an umbrella term capturing three overlapping popular

narratives on vaccine hesitancy: scientific illiteracy among the publics (chapter 1); cognitive biases among the publics (chapter 2); and anti-expertise and science denialism among members of the publics (chapter 3). The focus of all three narratives is, notably, on the enemy publics (“them”), with little attention to the valiant “us” in the war on science. I draw from philosophy of science, social epistemology, and science communications scholarship to generate a more contextual understanding of how scientific claims are incorporated into public understanding and decision-making (chapter 4). I highlight the importance of trust in public uptake of scientific claims, as well as the success of scientific institutions in fulfilling their mandates (chapter 5). Part 2 offers an alternative and enabling framework, a *crisis of trust*, to understand vaccine hesitancy (chapters 5–6, conclusion).

Vaccine hesitancy, I argue, is the result of unsuccessful science-public relations. The success of those relationships, like all relationships, hinges on trust. I aim to show that trust is not secondary to good science in support of vaccination; it is, rather, central to the very controversy over vaccines. Vaccine hesitators and refusers see a failure of scientific integrity around consensus claims in general, and/or vaccines in particular. They frequently report feeling disrespected and silenced by their physicians upon voicing their concerns. They then may turn to unconventional sources. Faced with uncertainty regarding important health decisions, they are reconsidering their reliance on experts and expertise (chapter 6).

Vaccine hesitancy is recharacterized here not as the product of a war on science, but as a sign of poor public trust in scientific institutions. The argument that there exists a public trust deficit redraws the lines of responsibility away from the wayward or misguided publics, toward a reexamination of integrity and relationships in science and medicine. This finding is meant to encourage the broad community of health providers to be part of the solution. I note that those most committed to the war on science framework—scientific experts, public health practitioners, and healthcare providers—often undermine their own unique positions to remedy the conflict when they subscribe to the frustrated view that expertise is dead (chapter 3). Rather than being a casualty of war (chapter 3), expertise is instead recalibrated by the publics in this environment of low public trust in expert institutions (chapter 6). A re-centering of the expert as part of a (healthy) science-publics relationship forms my guiding proposal to work to restore public trust in scientific institutions.

Vaccine hesitancy and refusal is studied intensely by scholars from a wide variety of disciplines, ranging from public health and epidemiology to behavioral



psychology, folklore and rhetoric, science communications, history, bioethics, and critical theory. I have benefited from reading widely and incorporating diverse empirical and theoretical insights from this multidisciplinary body of research. I turn a critical lens on English-language health science and communications research, as well as news media, to characterize the two frameworks for understanding vaccine hesitancy considered here. I evaluate them with consideration of research into science and values, the science-publics interface, science and democratic governance, and health equity.

Vaccine hesitancy and/or refusal has received some attention from a small group of humanities scholars (mainly historians). I situate myself most closely in terms of methods with the cultural, conceptual, and textual research of historian of science Mark Largent, who offers a personalized history of American vaccine hesitancy in *Vaccines* (2012); fellow philosopher Mark Navin, who investigates epistemic and ethical dimensions of vaccine denialism and vaccine refusal in *Values and Vaccine Refusal* (2015); and feminist cultural theorist Bernice Hausman. The latter's 2019 monograph *Anti/Vax* was published right as I was finishing the full draft of this book manuscript and so I did not fully benefit from her scholarship in the development of my own thinking. Like Hausman, I used my theoretical orientation (in the philosophy of science, in my case) to offer a reframing of the vaccine debate in what I see as more productive terms. What we, this small group of humanities scholars working on vaccines, have in common is the predilection to see vaccine hesitancy and refusal as signs of something bigger than what is captured in the language of the debate.<sup>31</sup> We all point to broader social structures in which vaccine controversy takes place. I tackle the framing of science and policy in democracy more explicitly than others have previously, making it a central focus of the analysis. I also see the crisis of trust in science and public health as inextricably tied to historical and contemporary structures of inequality and injustice that permeate our institutions and act to solidify power and privilege at the expense of underserved and marginalized groups (chapter 5). Vaccine hesitancy is not primarily a "knowledge deficit" in action (see chapter 1), but a complex set of social, historical, and personal anxieties resulting in the expression of poor public trust in science and the health professions (chapters 5–6, conclusion).