

5-22-2020

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Recommended Citation

Neumann, Grace M., "A Public Health Recommendation Countering the Online Anti-Vaccination Movement" (2020). *University Honors Theses*. Paper 876.
<https://doi.org/10.15760/honors.897>

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A Public Health Recommendation Countering the Online Anti-Vaccination Movement

by

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An undergraduate honors thesis submitted in partial fulfillment of the requirements for the degree of

Bachelor of Science

in

University Honors

and

Public Health; Health Sciences

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2020

Introduction and History

As the field of public health continues to broaden its scope of research and practice, there is one critical issue that repeatedly presents challenges for members of the community health field. The anti-vaccination movement (AVM, or Anti-Vaxx) is a movement that seems to be growing in force and power, even with the constant scientific research by health professionals being presented on the contrary. This thesis will take both a historical, and current public health approach to understanding why people for generations have been against vaccinations that would ultimately improve their quality of life. Whilst there are many mechanisms by which anti-vaccination in spread, this recommendation will solely examine the method of online distribution by mode of internet forums, articles, and social media. Specifically, this thesis will examine how historical aversion to vaccination practices has shaped the movement now, absorb the information of previous public health recommendations countering the anti-vaccination movement, cite online evidence showing that the current movement is still prevalent, and provide a recommendation to counter the current anti-vaccination issue.

In the late 18th century, Edward Jenner first developed the idea of vaccination. This idea of introducing a disease to a healthy person's immune system, so that they may form antibodies and an immune response to it, was already widely recognized in countries such as China, Africa, and India. Prior to Edward Jenner however, the process was more widely known as inoculation or variolation. This practice involved taking a sample (likely from a pustule or lesion) of an infected person and injecting it subcutaneously into the skin of a healthy person. This caused an immune response in the healthy individual with the expectation that upon later infection this

individual's immune system would recognize and attack the disease before presenting illness. Notice, the transfer was from human subject to human subject ¹.

In the mid to late 1790's, England, like many other countries, was experiencing an outbreak of smallpox. Smallpox is a virus presenting as puss-filled lesions on the skin causing fever, and viremia—which eventually led to the deaths of over 300 million individuals and 300,000 deaths in London alone ². Edward Jenner, understanding the science behind inoculation, noticed that many livestock were suffering from a lesion-presenting illness very similar to smallpox, known as cowpox. Jenner summoned a local dairymaid, who had acquired the cowpox virus through her work, to be his first test subject, alongside a healthy 8-year-old boy. Jenner removed a sample of drainage from the lesion on the dairymaid and injected it into the skin of the child. For ten days following the inoculation, the boy experienced fever, malaise, axillary discomfort and loss of appetite. Following this period however, the child fully recovered as if just experiencing a minor cold. After the boy's recovery, Jenner then took a sample from a fresh smallpox pustule and injected it into the same child. Jenner observed the boy for three weeks, and the child never presented with any symptoms of illness or infection ¹. Jenner believed he had just discovered a highly successful solution to preventing a larger outbreak of smallpox, and many scientists were widely supportive of his claims. The public, however, were less receptive to Jenner's solutions, and in fact, worked tirelessly to prove information contrary to the new findings.

Many of the fears surrounding early vaccination practices were based in the belief system that the live virus taken from bovine subjects would produce cow-like features in humans. The first round of inoculations did contain live viruses (from livestock), leading to more intense fear and aversion. In a newspaper cartoon illustrated by James Gillray in 1802 (Fig.1) the artwork

personifies some of the fears of the public during this era ³. Many of these fears were proven to be unsubstantial, given the results of the first set of vaccinations, but still there were groups of individuals who were convinced vaccines would do more harm than good ⁴. After the public's fear of livestock shapeshifting dissipated due to a better understanding of the vaccine practice, a new fear of government control and persuasion emerged and proliferated during both the smallpox epidemic, and then following into the pertussis and typhoid outbreak, as well as during the polio epidemic ⁵.

In 1853, England and its neighboring country, Wales, enacted the Compulsory Vaccination Act, stating that all infants born of this country, by law, must be vaccinated for smallpox by the time they reach three months of age. This law shifted the fears and focus of the anti-vaccination movement from that of physical deformation and cow-like projections, to a more widescale concern of overarching government control. English citizens felt as though the mandating of vaccines was an encroachment on their rights and their freedom, and that the terminal age for vaccination was far too low—that infants should not have to be vaccinated until they were grown and could make the choice for themselves. Scientists and practitioners alike attempted to prove to the greater public that the young age of compulsory vaccination was in place so as to protect, what is now known as the immune system, from damage as early as possible. The public, however, continued to view this practice as the government preying on the vulnerable ⁶.

In the mid-1970's, vaccines such as the pertussis and typhoid immunizations caused great controversy in the classism debate. Many communities held a belief that it was the lower-middle class, "blue-collar", impoverished people that were carriers of the diseases. This belief initiated the mandatory vaccinations movements in many European communities and allowed those in the

elite class to believe they were immune to all epidemics because they were “clean” due to their wealth ⁷. This caused a huge divide in the vaccination movement, because poor individuals believed they were being vaccinated as punishment, and wealthy individuals opted out of the mandatory practice, or believed being vaccinated was a sign that they were in trying financial times ⁸. Those in poverty felt as though a large majority of their communities were been targeted for vaccine testing and trial. This fear resided mainly in groups of people of color who have ancestral histories of being targeted for medical testing practice. During the same period, the Tuskegee Syphilis Trials were being conducted, which later in history would solidify the fears of the public that the government was indeed unethically testing on minority communities ⁹. This avoidance of vaccines in the elite communities, and fear of the practice in minority communities created a wave of infection that even those who had been vaccinated, were no longer immune to. Even wealthy physicians, chose not to be vaccinated due to their belief they were “above illness” and ended up contracting the disease, infecting patients, and dying before they were able to seek a treatment that was not readily available at that time ⁶.

In the more modern era, people are still very weary of this public health practice. Due to upheld, misconstrued beliefs generated by the public with no scientific basis, as well as new “research” that vaccines cause chromosomal deficiencies and learning disabilities in children, the Anti-Vaxx movement is as prevalent as ever. The most prominent example of contemporary anti-vaxx concerns might be the work done in 1998 by British doctor, Andrew Wakefield, who published a study in *The Lancet* journal claiming that the measles, mumps and rubella (MMR) vaccine causes gastrointestinal and neurological issues in children under 12 years old. Looking back, this study was a clear misconception of correlation vs. causation. The study results showed that out of the only twelve participants, many had gastrointestinal issues and developmental

regression occur in late childhood. The similarity in all of these cases was that each of the participants had received the MMR vaccine previously. ¹⁰ Where this study failed is that there is no evidence of other hypotheses, the participants and their families entered this study with the assumption that it was the vaccine that caused their child's illness. This was not an unbiased diagnosis; it was a study shaped for the researchers' benefit. This information sparked what is the current "vaccines cause Autism" debate, which has only contributed to the mounting obstacles public health officials must face in order to protect communities. The Wakefield experiment has since been disproven and marked as "retracted" by the publishing journal, but not before many already concerned citizens obtained the information and used it to shape their own belief systems and non-evidence-based practices.

Public Health and Previous Vaccination Advocacy

The importance of a tailored, evidence-based public health response to the anti-vaccination movement is crucial to countering the information being served to the general public by other sources. A multifaceted approach is crucial when constructing an integrated public health recommendation so as to address the different fears, beliefs, practices, and histories of the people within a community ¹¹. In this section, this thesis now turns to analyze historical accounts of successful and failed public health responses to the anti-vaccination movement.

The most crucial step in creating a valid public health recommendation is identifying the issue at hand. Currently the anti-vaccination movement is proliferating in many countries and among groups of individuals, so the responsibility of public health officials is to understand the thought process behind these groups, and produce a recommendation answering the question of

“why should we care?”. This recommendation must be structured in a way that reaches both higher-level science professionals so as to confirm the efficacy behind the information, as well as the general public, with an assumed lack of science background and possibly even an antipathy toward scientific experts in general. Public health organizations will tailor their response based on previous recommendations both historically and currently and observe which aspects have been successful and which have failed or need revisions so as to provide a more relevant recommendation ¹¹.

The issue of declining rates of vaccination, in conjunction with an increase in support in anti-vaccination practices, presents a threat to a community’s herd immunity. Herd immunity, also known as community immunity, is a situation where a sufficient number of individuals have been exposed to a pathogen (whether that be through vaccination or active illness) that their immunity protects individuals who have not been exposed ¹². This mechanism of immunity is only effective, however, if the *majority* of community members are immune (again, through vaccination or active illness). Herd immunity is an effective tool in protecting communities when certain individuals are unable to be exposed, whether that be due to age, immunocompetency, or other contributing factors. The idea is that healthy members of their community will protect them, by doing their part and being vaccinated so as to stem the spread of illness. In theory, herd immunity should always be effective, given the substantial scientific research in support of it. However, there is a contraindication with the idea of “herd-mentality” where one leader-type presents an idea and there is a rapid cascading effect of support. Many anti-vaccination supporters live and work in the same communities, send their unvaccinated children to the same schools, ride the same transportation, and shop at the same stores. This observation of constant,

high exposure and low rates of vaccination in any given community, severely damages the effectiveness of the community's herd immunity ¹³.

If the idea of herd immunity was thought of as a bubble, protecting all those encompassed within it, the anti-vaxx movement is the point that ruptures the bubble. This defeat of a community's herd immunity is what makes, again, everyone susceptible to a certain illness. If say, there was a community of 100 people, 75 of whom are unvaccinated, and a pathogen was released—the 25 individuals who are vaccinated are the only people who are protected, the other 75 are at risk of contracting and spreading the disease and the 25 vaccinated individuals' immunity cannot protect the others (Fig. 2) ¹⁴. This breach in the efficacy of herd immunity, as a result of vaccine avoidance, is causing a resurgence in disease prevalence of pathogens that have already been eliminated or eradicated. In the United States alone, there have been several outbreaks of measles within the last two years. More specifically, in Clark County, Washington in early 2019, there was an outbreak infecting 87 individuals, 53 of whom were children under the age of 10. This initiated a state of emergency in this county, as medical professionals were unprepared to treat an illness that was believed to be eradicated previously ¹⁵. Rates of 96%-99% vaccination are required for the protection of communities, and with the rise in population of the earth and ever-decreasing vaccination rates, the ratio is becoming skewed and immunity to diseases, such as measles, is decreasing ¹⁶.

The anti-vaccination movement has had spikes of information supporting its claims, since the inception of vaccine practice. As mentioned previously, the smallpox vaccine aversion held its own prevalence as vaccination was a new practice, and humans by nature are skeptical of novelty. For example, in 1980 in the U.K., in conjunction with the pertussis vaccine, information was published stating that the vaccine caused thirty-six different neurological conditions;

immediately following this publication, vaccination rates fell from 81% to 31%, creating an outbreak. This outbreak birthed an enormous strain on the National Health System (NHS), as they had to begin treating an illness they had thought obsolete, all over again. Perhaps the most currently relevant, and most detrimental example of this, is the Wakefield study published in *The Lancet* journal. Although *The Lancet* subsequently retracted the publication, the information had already reached the general public. As a result, vaccination rates for the MMR vaccine fell from 92% to 60% in London after the publication of this study once again causing an outbreak that the NHS was unprepared for¹⁷. This steep decline in vaccination rates, after the release of one article, alerted public health organizations that the motivations behind the anti-vaxx movement may not be as clear as previously assumed.

Unbeknownst to the other researchers during the Lancet study, Andrew Wakefield was receiving funding from prevalent anti-vaccination groups as payment for the production of sound research supporting their beliefs. When this information came to light, Wakefield both lost his medical license as well as his access to research facilities, which the NHS assumed would disparage his credibility enough to shift the vaccination rates back to the pro side. However, instead of his defamation causing a lack of support, Wakefield gained a huge following in the anti-vaxx community. Groups of individuals were willing to pay Wakefield to conduct more research in the hopes of creating an even larger divide in the vaccine debate. This allowed anti-vaccination groups newfound access to the healthcare field and a plethora of information to deny and refute, allowing them greater accessibility to new groups of potential anti-vaxx supporters¹⁸. With this newly-allocated access to healthcare and data, there was a shift in anti-vaxx groups' opinions on medical professionals. Whereas before, anti-vaccination supporters notoriously

avoided physicians and medical advice, now the idea was that doctors and other professionals could draw a great deal of support—if they support the anti-vaxx claims.

According to *The Unicist Research Institute*, superiority complexes are quite common in individuals who feel that their own knowledge is insufficient, or that they themselves lack intuition. In summary this illustrates why the need to feel superior is classified as a defense mechanism, the individual feels threatened and in an attempt to protect their reputation, they develop an overarching superiority complex¹⁹. This directly relates to the anti-vaccination issue because if communities feel that their knowledge and education is being reduced to purely a lack of scientific background, the likelihood they will become defensive increases exponentially. In a study published in *The Journal of Social Science and Medicine*, a survey of 1,310 individuals who self-reported as anti-vaxx, produced results in sync with the idea of superiority complexes in those with knowledge inferior to the subject matter. Out of the subjects tested, 36% believed they knew more than doctors, and 34% said they were more knowledgeable than scientists. The questions asked during the interview were based on the subject matter of Autism, the causes of, and the link between vaccines and the disorder ²⁰. These results directly relate to the psychological principle of the Dunning-Krueger Effect, which states that individuals with a low threshold for knowledge and information tend to overestimate their abilities, whilst underestimating those who score or perform better. Instead of these individuals attempting to improve their knowledge base, they seek to disparage the reputations of those who performed superiorly to them. ²¹ As will be discussed in greater detail below, rather than waging a war of knowledge between those who have access to scientific information and those who do not, public health officials must meet these communities at their level of knowledge, by listening to the concerns of the people and in turn, preventing the provocation of a defensive response as a result

of uncertainty. Equality is important here, as individuals will be more receptive to new information, when they feel as though they are a welcome part of a discussion, rather than subordinate.

In any given scenario, individuals assuming they know more than professionals could cause harm to said field. However, it is extremely detrimental in the vaccine debate because a science background is precisely what is necessary to be able to understand vaccines accurately; what they do and how they work. The issue with this divide in knowledge is that the people who have access to and know how to sift through scientific data and research are not the people who need to be convinced of vaccines efficacy, they are already well aware due to their access to resources. The individuals who need access to this data are those with low scientific literacy, who will believe the first article that appears and do not know the dangers of misinformation behind non-peer-reviewed research ²². Backing this lack of information are seemingly trustworthy individuals (doctors, celebrities, community leaders) who prey on the lack of knowledge known to be present in the groups they are trying to entice. People trust these doctors and celebrities because they view them as successful and hold them to a high standard, and these leaders can often be too accepting of the weary individual due to their observed vulnerabilities.

Imagine being a new parents, on the fence about vaccinating their child. On the one hand there is copious information from the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) saying that vaccination is important, safe, and effective. They present a large amount of scientific research and data to back their claims and offer information on vaccine ingredients and risks. On the other hand, a famous celebrity posts on a blog all about the dangers of vaccination, their huge following of parents just like them, and natural remedies for preventing illness. The vulnerable parents are drawn to a community who

also wants to protect their children, and welcomes them with open arms. This reaction then results in these new parents attending their new-baby doctor's appointment, with their mind already made up about vaccines ¹⁶.

This surge of new-parents choosing not to vaccinate their children, is not a new idea, but does present another challenge for public health policy makers. Social media is currently the most nuanced, effective, and diverse mechanism for putting information out into the world. Most individuals have an account on some platform or another, and the algorithms behind the sites allow individuals to tailor their browsing experience. Initially, users will see the generic, neutral posts of things alike to many (food, animals, scenery), but as the user continues to interact with certain posts, the algorithm learns what content is enjoyed and which content to avoid. After only a few days of use, the new presented content is more refined to posts such as vegan food, Bernese Mountain dogs, and sandy beaches, rather than the generic ²³. This tailored access to information, poses a significant challenge to public health educators, because if someone who identifies as anti-vaxx only interacts with information that supports their beliefs, that is all they will see on their feed.

In the past, public health policy officials have attempted to negate claims made by the anti-vaccination movement by countering with scientific evidence and data proving the efficacy of vaccines. Where one article posts a direct correlation between the MMR vaccine and their child's autism, at nearly the same time a scientific study proving no correlation between the two is shared with the world. Policy makers have attempted to void the knowledge of prominent anti-vaxx leaders by disproving studies and removing their licensure, if any. Another policy attempted a movement rewarding providers who were able to vaccinate the largest numbers of children in a community, with a monetary sum ¹⁷. Other public policy movements have

attempted “scare tactics”—they procure graphic images of the outcomes of vaccine-preventable illnesses. These same recommendations usually attach extensive data and graphical results also in attempt to create fear around avoiding vaccinations. This idea of fear as motivation was also, closely thereafter, adopted by the Drug Abuse Resistance Education (DARE) movement, in an attempt to frighten vulnerable teens into resisting drugs and alcohol by way of graphic images. Both recommendations backfired and were revoked, as the anti-vaxx movement began using the graphic images as proof of the side-effects of being vaccinated, instead of the contrary, and the DARE movement created a generation of experimental teens unaware of the actual effects of drugs on the body ²⁴.

Another mechanism by which specifically online sources attempted to aide in promoting vaccination, was the filtering and censorship on personal social media pages. Sites such as Facebook, Instagram, and Twitter originally instated a complete censorship of all vaccine information. These platforms initially removed content discussing vaccines, vaccination, and immunity, on both sides of the debate. At the time, this seemed like a successful mechanism in reducing the amount of misinformation available to the public. However, these restrictions created different issues, some even more harmful to the vaccine debate. The censorship caused a large gap in previously free-flowing medical information, and many weary individuals began searching for information elsewhere. Later however, medical marketers realized that social media is an effective tool in reaching the public, and petitioned the social media platforms to allow only pro-vaccination information to be posted on these sites. In theory, this was good. This would mean the public would only have access to information promoting vaccines and would ideally change their beliefs towards vaccine support, because all of their media was stating vaccines were beneficial. This theory instead backfired, because groups of individuals who were

against vaccination then felt silenced and demoted, and were no longer allowed to post on their personal pages about a movement they were passionate about. Through this, groups of anti-vaccination individuals were able to retaliate and provided with a leg to stand on, given that these social media platforms had encroached on their rights²⁵.

The failures of previous anti-vaxx counter argument recommendations, created a need for a different solution. Governing public health bodies, such as the World Health Organization (WHO), began to realize the need to optimize education and active listening in the vaccine debate. In 2016, the World Health Association released a public recommendation titled, *How to Respond to Vocal Vaccine Deniers in Public*, a publication providing support to all individuals attempting to argue the necessity for vaccines against those who are adamantly against them. This recommendation has been adopted by many healthcare professionals and used in conversations with patients, as well as those with a high public standing such as elected political entities and celebrities. The importance of the information provided in the publication is crucial to the psychology behind countering the anti-vaccination movement. The WHO suggests methods for active listening, tailoring education for its intended community, how to respond in passionate discussions, and understanding body language. These methods have been the first effective tools in understanding the anti-vaxx movement. In the past, the publication claims, anti-vaxxers have felt belittled for their lack of science background, so their mode of defense is to retaliate. With the recommendation produced by the WHO, those in the anti-vaxx communities have an opportunity to be heard, and then a response can be formulated based on the knowledge level being demonstrated ²⁶. This recommendation provided by the World Health Organization, is known to be highly successful in shifting the narrative behind anti-vaxx communities. In public health, the responsibility to constantly update information accessible to the public is the

requirement of the field. As the resources necessary to form an anti-vaxx argument continue to multiply, public health officials need to be ready to counter the argument equally. Information is constantly changing and is ever-available now due to the internet and social media. Policy makers must adapt to provide information on the same platforms, so as to mold and support the newest generation of individuals making vaccination choices, as recommended by the WHO ²⁶.

Evidence: Spreading Anti-Vaxx Information Online and in Social Media

An important component of a nuanced public health recommendation, is the awareness of access to countering information. It is nearly impossible to combat anti-health information, if the mechanism in which it is reaching its audience is not understood. Regarding the anti-vaccination movement, there are currently many viewpoints and opinions that hold prevalence in societal decision-making. These categories of information must each be approached in a different manner, as they have different motivations, fears, and knowledge bases. A recommendation countering the anti-vaccination movement, is not a one-size-fits-all solution. The recommendation must accept and acknowledge the fears and aversions of all the people it attempts to protect, meaning that the policy must be multifaceted, and well informed prior to publication. This study analyzed online publications such as blog posts, social media accounts, and online forums, in order to further understand the reasons for vaccine aversion and the language behind the anti-vaccination movement online. As there are likely many other communities within the anti-vaccination movement, the groups that choose to publish their anti-vaxx information online, were studied intently. Based upon the survey of online anti-vaccination

information, anti-vaxx individuals have been classified into distinct groups based upon the categories of information posted, and language within their arguments.

Minority Groups' Distrust in Medicine

Historically, it has been widely recognized that many communities of people of color have been the victims of medical experimentation and testing. One prominent example is that of the Tuskegee syphilis trials beginning in 1932, wherein African American males were targeted for observation of the disease. Some men already had it, while others were unknowingly infected holding the belief that they were the controlled variable in the experiment so to allow scientists to observe the effects and lethality of the disease. A treatment for syphilis had already been produced, which is why many black men agreed to participate in the study, they believed they were receiving treatment, when in actuality they were receiving no treatment and becoming more ill as the trial went on. It was not until 1947, when a cohort of African American medical students were rotated through the unit believed to be treating the syphilis patients. They noticed that although in communities the rates of syphilis were vastly decreasing, in the controlled environment it seemed that none of the patients conditions were improving. This discovery resulted in a nationwide apology made by President Bill Clinton, as well as lifetime settlements and medical coverage for the victims and their families ²⁷.

In current online discussions, the narrative behind the fears of racism in medicine are often rooted in the same histories as mentioned above. A prominent Instagram account with the handle, @BlacksAgainstVax, commonly posts photos of the Tuskegee Trials. One in particular is a photo of a white man, surrounded by black men all receiving an injection of some kind, likely the assumed “treatment” offered during the trials. The caption below the photo states,

“Remember Tuskegee! They came for you once and they will do it again. Don’t let your children fall victim to their lies again!”²⁸. These individuals fears are not unfounded, and directly highlight the importance of listening to a communities fears prior to issuing a vaccination recommendation. Black individuals with a history of being tested upon in medicine will likely not respond well to an overload of scientific information, as their fears are not based in failed science, but rather the loss of loved ones and a severe mistrust in medical practices.

Similarly, but in an entirely different cultural group and community, Native American populations have knowingly been tested upon for vaccines specifically. Due to the nature of the history of the Native American people, when Europeans colonized native land, they brought with them the diseases of their countries. At this time, the largest threats to public health were smallpox, pertussis, and typhoid. While European communities had long since been exposed to these pathogens, via either vaccination or infection, the Native American communities were not immune to this new wave of disease, and due to this became very ill, very quickly. Europeans capitalized on this opportunity to modify and improve their already existing vaccines for the previously mentioned illnesses by using the native people as subjects. The Native American people were already overwhelmed by the sheer number of Europeans who were taking their land and destroying their communities, that they did not have the ability to defend their health and well-being. They succumbed to the pressure of the European healthcare system and were tested on for vaccine improvement for many years, resulting in the death of thousands of native individuals and the deeply instilled fear of the white-man’s control ²⁹.

Currently, growing numbers of accounts of white-anti-vaxx groups targeting minority communities for their assumed distrust in medicine are creating a new narrative surround the issue of racism and vaccine hesitancy. In an article published by *ABC News*, and interview with

author Harriet Washington, a black woman who wrote the book “Medical Apartheid” that focused on the history of African American individuals being mistreated in medicine, was released. During the interview, Washington explained that she was contacted by prominent anti-vaxx leader, Robert Kennedy online and was asked to be a spokesperson for the anti-vaxx movement. Washington declined, as she stated she supported vaccination as it is a practice that saves lives, while her field of writing focuses on historical medical abuse of people of color. Upon her refusal, Kennedy became irate and claimed that Washington was being disloyal to her fellow African Americans by not refuting vaccination practices ³⁰. This creates yet another obstacle for public health officials, if the anti-vaxx community is also acknowledging the fears of past racial trauma, and using them to their advantage to skew the debate negatively.

Clearly, the fear of government control and the gross mistrust of healthcare in minority communities creates a barrier in terms of community vaccination rates. Another component of this aversion to vaccines is cultural practices in the aforementioned communities as well as those of both Latino and Asian descent. A key principle held in these communities is that of respect for elders and protection of family. Many avoid vaccines out of fear, but others avoid them purely because generations prior have never been vaccinated. This previous lack of vaccinations is likely due to a low health literacy, coupled with the closeness of said communities. In tight-knit rural communities, there is low risk of spreading illness if the pathogen never enters a community in the first place. This is common, historically, in migrant farm working communities, and rural, country groups where the likelihood of tourism or outside visitors is slim. In modern times however, the spike in tourism, gentrification, and infrastructure development is putting these communities at risk more so than ever before. What was once a

protected, closely-packed community of healthy individuals, is now a breeding ground for vaccine preventable illnesses ³¹.

Fear of vaccination and medicine in general due to racism, classism, or previous trauma, is a valid and acceptable reason for those individuals to avoid a reuptake of trauma in their lives. However, fears of being targeted by the government and privileged individuals are a different obstacle for public health policy makers to tackle.

Wakefield Followers and “Mommy Bloggers”

Another widely accepted anti-vaxx proclamation is the idea that vaccines are toxic, and pose a greater risk to the health of communities than the illness they prevent. This is a belief directly held by a sub-group of anti-vaccination movement supporters categorized here as “Wakefield Followers,” who not only still support the idea that these vaccines cause autism and other neurological deficits, but now have found a way to turn the effects of vaccination success against the vaccines themselves. One initial claim following the retraction of *The Lancet* Wakefield study, was not that the MMR vaccine itself caused autism, instead that the sheer number of mandatory vaccines are overwhelming a child’s immune system and causing them to be “susceptible to autism” ³². For the sake of acknowledgement of people’s fears and beliefs, it is important to note that autism is not caused by a pathogen, and therefore does not illicit an immune response in the human body. Autism is a neurological condition that is diagnosed during the developmental stage in children’s lives. Autism falls on a spectrum meaning that cases can range from mild to severe, and the disorder is often accompanied by difficulty interacting socially and in turn effecting the formation of important developmental connections. Autism is

not infectious, and therefore cannot be introduced into the body, such as in a vaccine, as many people claim ³³.

One of the main reasons that many anti-vaxx individuals held so tightly to this belief of a connection between developmental disorder and vaccines, was due to the status that Dr. Wakefield held at the time of his research. Wakefield was a trusted pediatrician, highly renowned in his field, so when parents who were likely already weary of vaccines discovered an physician willing to prove how harmful the practice was, that was all the support they needed ³⁴. Before public health officials were alerted to what exactly was occurring during this study, and what the hidden motivations were, there was suddenly groups of parents not only declining mandatorily regulated vaccines, but they were citing their information as coming from a doctor, someone who worked in the field. This was a new obstacle for policy makers because how were public health officials supposed to demerit one physicians claims, but inform the public to trust another? If doctors are the most highly educated in the field of medicine, why is not all medical information the same? This realization came far too late for public health however, there was already a large mistrust in medical providers on the rise, as well as an unprecedented corruption in medicine. What public health officials thought would be solved by discrediting unsound medical information, turned into the public creating and producing their own research, and vulnerable parents wholeheartedly believing it ³⁵.

One of the most common platforms with anti-vaxx information based on the Wakefield study, is Facebook. As mentioned previously, Facebook has made past attempts to censor vaccine information, but this filtering has since lessened after the argument that censorship is an encroachment on ones rights. A prominent anti-vaxx group on Facebook, titled “Moms against vaccines” posts daily, videos and photos of sick children, laboratory tests, and articles with

certain information highlighted that seems to support the idea that vaccines are harmful. Even within the profile picture of the account is a quote that reads, “Until you are outraged over how many children are injured and killed each year by VACCINES, don’t talk to me about *measles!*” which once again propagates the idea that measles is a mild illness, and that vaccines are the real danger ³⁶. This information is now easily accessed by anyone online, and is highly dangerous given that it uses graphic images to entice readers to the page, and subsequently provides copious amounts of “data” once entered.

The Wakefield movement held power over the vaccine debate for many years, well into the early 2000’s. However, as the public’s need for sound medical research to support their anti-vaxx movements drifted farther from scientific laboratory testing and instead in the direction of homeopathic remedies and ancient medical practices, the anti-vaxx movement began preaching their claims on the nuanced social media, where the right to free speech at the time was unregulated. As depicted in Figure 3, people’s motivations against vaccination exploded into a web of uneducated beliefs and misconceptions on the practice of vaccination and vaccine components.

All-natural and Organic

A prevalent argument now, in the support of the anti-vaccinating movement is the claim that “natural is better”. This belief falls into two different subcategories; one of which being natural in the sense that nothing foreign is introduced to the body, and the other suggesting that natural remedies such as plant-based eating, essential oils, and sun-therapy can cure the body of illness without medical intervention. Both of these arguments commonly find acceptance in vulnerable groups such as stay at home moms, mothers with already sick children, and new

parents³⁷. This seemingly increasing desire for a less subsidized, overseen, and chemical fueled lifestyle is taking hold in many different communities. Key words such as “natural living,” “alternative lifestyle,” “off the grid healthcare,” and “holistic healing” are modernized, commonly searched terms for newer parents. What many do not realize is that these terms are merely a nuanced way of searching for what life was like before modern medicine, when illnesses were indeed treated with plant based remedies and homeopathic tinctures. A common online, anti-vaxx hotspot is *OffTheGridNews.com*, a website dedicated to publishing natural remedies for chronic and acute illnesses. This website's main followers and subscribers are new moms, usually affluent and fall within the category of “all-natural” meaning they refuse any synthetic chemicals being used in healthcare. In a specific article published on *OffTheGridNews.com* titled, *Natural Vaccination Alternatives for You and Your Kids*, information regarding options other than vaccination to boost immunity are listed with little data backing them up. Suggestions such as breastfeeding for longer periods of time, taking probiotics and vitamin supplements, maitake mushrooms, manuka honey, and a plant based diet are given as alternatives to initiating an immune response in the body via vaccination³⁸. The danger in articles such as this, is obvious. Spreading misinformation to the vulnerable public will cause a wave of belief followed by an aversion to the medical practice in question. However, the science behind articles such as this one is actually what poses a greater threat to public health initiatives.

A common finding in vaccine-hesitant individuals is a misunderstanding of the difference between a virus and a bacteria. Remedies such as tea tree oil, coconut extract, and eucalyptus leaf extract that are commonly supported on anti-vaxx sites, all hold anti-septic properties, but carry no weight when it comes to preventing viral infections. Claims such as these demonstrate the lack of understanding in many anti-vaxx communities in fields such as immunology, and

virology. The understanding of the mechanism of action behind vaccines has become so lost in the sea of anti-government, anti-chemical, and anti-science narratives that many individuals have lost the ability to conceptualize how vaccines actually help stop the spread of disease ³⁹. These communities understand the importance of immunity, they believe the illness is real, but they do not often realize how a vaccine supports their goal of immunity. In a quote taken from a prominent anti-vaccination Facebook page stating, “I understand why some parents do not want those chemicals in their children’s bodies. I think instead of chemical shots, the doctors should give a small piece of the virus, so the body can build natural immunity” to which Rich Davis, a clinical microbiologist responded, “Did you know that if you go anti-vax hard enough, sometimes you circle all the way back to inventing vaccines?”⁴⁰. Statements such as these highlight the gross misunderstanding behind how vaccines work and what they do. A lack of general scientific knowledge is one of the greatest barriers to vaccine support.

Common amongst many anti-vaccination Facebook groups, Instagram accounts, twitter pages, and TikTok handles, are cliques of mothers who post information on the ingredients found in vaccines, why these additives are toxic, and how they could never “poison” the child they care for. Many weigh the pros and cons of vaccine additives with the illnesses they prevent. In an anti-vaccination blog, published by the New York times, mothers protesting outside a Centers for Disease Control and Prevention office in Atlanta, Georgia are captured in an image holding homemade signs with writing that states “Vaccines=trading mild illnesses for chronic diseases”. These demonstrators are protesting the MMR vaccine once more, and projecting their belief that autism is a chronic disease, while measles is a mild illness ⁴¹.

Statements such as the claim that measles is a “mild illness” are proof alone that vaccines are effective. Humans often act out of fear, and if these mothers are more fearful of autism than

the deadly measles virus, then they likely have not seen the effects that this fatal illness can have on children. As put poignantly by Dr. Paul Offit, a creator of the successful rotavirus vaccine, “vaccines are a victim of their own success, we have largely eliminated the memory of many diseases” (Offit, 2019). This statement is then supported in many of the anti-vaxx blog postings which begin to question if the diseases people are vaccinated for were ever really widespread. Statements such as “if polio was actually an epidemic, more people would have died and the disease would have been eradicated that way” and, “convenient that diseases began disappearing right as people started washing their hands and sanitizing their items” spark ideas in vulnerable individuals that maybe vaccines are unnecessary and that diseases would just be naturally eradicated over time without any intervention ³⁶.

One upstanding fear among this group is that of the preservative, Thimerosal, a derivative of mercury used to keep vaccines shelf-stable for longer. Many of the mothers who strive to be “all natural” also subscribe to a group known as MAMA (Moms Against Mercury Amalgams). This group posts monthly articles, all regarding avoiding mercury poisoning, whether that be by denying vaccines, avoiding the dentist, and purchasing special cookware, the moms behind this group are afraid of the dangers of mercury in the body ⁴². The danger in this information being spread online falls into an interesting dichotomy where, yes, mercury poisoning is indeed very dangerous, so the claims of MAMA and other groups are not unfounded. However, in order for mercury poisoning to occur an individual would need to experience significant mercury exposure ($>20\mu\text{g}/\text{m}^3$) for more than several years, and the thimerosal content is significantly less than that, as well chemically different entirely from the mercury commonly found in the environment ⁴³. This information, however, is not included on the MAMA page, and should be queried as to

whether or not groups such as these know this information and choose not to share, or if the content of vaccines is not fully understood.

An Instagram account with the handle, @Agenda_Wake_Up which posts mainly anti-vaxx information regarding the ingredients in vaccines, recently posted a photo that received significant attention online. The photo is of a small, plastic, baby doll with twenty-two syringes impaling the plush body. The comment below reads, “IF YOU VACCINATE-In the first 6 years of life your child receives the following...” and continues on to list dosages of many vaccines additives and the harm they cause to the human body⁴⁴. The information on this page has since been flagged as “false and dangerous” and users must acknowledge such before viewing the post. Posts such as these illustrate the language and misinformation being spread on all-natural, anti-vaxx pages, and it is important for public health officials to be aware of the knowledge behind these groups. Clearly, such groups are aware of the ingredients in vaccines, but do not possess a full understanding of the true effects on the human body.

Anti-Government and Conspiracy Theorists

The final major anti-vaxx motivation is that of escaping government control. Many new parents feel overwhelmed by the amount of vaccines required and do not have enough of a science background to comprehend if vaccines are ethical or not. The anti-vaxx community, ever growing in size and support, seeks out these weary parents and provides them with information they can read and understand providing information along the basis of vaccines being created to brainwash children in becoming government constituents, and how the vaccine debate is a mechanism for the government to control its citizens genetic makeup and seize their autonomy⁴⁵. Underlying within this fear of government control, is the belief that “Big Pharma” is

manufacturing vaccines to cause illness in children and then these sick children will require more pharmaceutical support to survive, hence putting more money into the pockets of Big Pharma. Anti-vaxx supporters ask for proof that vaccines are to thank for the eradication of widespread disease, rather than it being the vaccinated who caused the widespread illness. These are the same individuals who believe that the government is using its citizens as hosts, to promote the spread of disease, and create a greater need for healthcare. There is widespread conspiracy among anti-vaxx subgroups, resulting in widespread fear, and causing a manufactured mindset of “doing nothing, is better than doing the wrong thing” ³².

Alongside the fears of total government control, are the conspiracies that governments are using their people as pawns in an attempt to feed the larger corporations and business and absorb the profits once these individuals require medical care. In a cartoon by Ben Garrison, published in the online, YouTube-based show *Info Wars*, these underlying fears are artfully depicted in a satirical, colorful image, with the message that vaccines are used as a form of control. In the image (Figure 4), the readers eyes are first drawn to the words “forced vaccinations” in a bold heading. Below that is the image of a man with a tattoo that reads “Property of U.S. Government” and above this message the individual is being injected with three syringes labeled “ formaldehyde”, “aborted fetal matter” and “thimerosal” which is likely illustrated to highlight the ingredients of vaccines ⁴⁶. Illustrations such as these, flood online anti-vaccination sites and provide a sense of humor, in order to entice readers and weary individuals.

Many of the sites who publish these cartoons, also contain political undertones, as the vaccine debate becomes increasingly swayed by government officials, instilling the idea that an individual should hold a certain opinion on vaccines if they belong to a certain political party. In an article published by *HealthPolicyWatch.org*, it is becoming increasingly apparent that

individuals who carry more conservative viewpoints, tend to avoid and deny vaccines at a much higher rate than those who stand on the more liberal side of their beliefs. As of now, it is unknown whether individuals who hold-strongly to their anti-vaxx beliefs are more drawn to the right-wing political argument or if a certain political party is able to shape it's followers beliefs upon receiving support ⁴⁷. Either way, this poses an ever growing issue for policy makers, if in order to promote vaccine uptake, officials much refute the beliefs held by an entirely established political party.

Many public health recommendations have had great success in countering the anti-vaccination movement. However, as motivations and sources of information change, the previous recommendation can become null and void if not updated to match the current threat of misinformation. This recommendation will take into account both fears and aversions that were prominent historically, and use successful counterarguments and mechanisms to shape a tailored approach to countering the anti-vaccination movement both currently and for future instances of anti-vaccination practices.

Recommendations

As previously stated, in order to combat the threat of the anti-vaccination movement, a public health recommendation must be multi-faceted, and tailored to meet the needs of the specific communities it is addressing. As an example, a recommendation constructed to address the fears and aversions of affluent, white, "Mommy Bloggers", would have little to no affect in minority communities whose fears and previous traumas are vastly different in comparison. This is why the importance of first listening to and acknowledging the fears and opinions of each

distinct community, as directed by the WHO article, is essential to producing a valid recommendation, and in turn creating safer communities.

Minority Groups' Distrust in Medicine

Although the history of racism and racial bias is complex and incredibly devastating to many communities in the past and as well as the present, the solution to combating the anti-vaccination issue as well as aversion towards modern medicine as a whole, can be quite simple. The necessity of rebuilding trust and credibility within these previously traumatized communities is imminent. Acknowledgment and profuse apology are long overdue to these communities. The lack of accepting responsibility by the medical field, is causing an obstacle in both action and communication within the public health sphere. A solution largely recognized in the field of psychology used for rebuilding trust is known as the 3I Strategy. The three I's stand for Interaction, Information, and Involvement. Simplified, this strategy equates to acknowledgment of past failures or biases, educating communities in a comprehensible manner, and acting on promises made by officials. This strategy first became used in the medical field in 1978, when the World Health Organization (WHO) published the *Declaration of Alma-Ata*. This publication was constructed for use in the Middle East, during a time where there was little trust in healthcare and many sick individuals were not seeking necessary care due to this mistrust. The *Declaration of Alma-Ata* produced a recommendation for healthcare professionals with three simple steps to regain the trust of their communities, acknowledge the fears and trauma resulting in the avoidance behavior, provide information and education to communities so individuals can understand why care is necessary, and act on promises made to demonstrate credibility ⁴⁸.

This recommendation can be utilized in shaping a solution to minority communities avoiding and refusing vaccines. Community leaders must first listen to and acknowledge the fears and mistrust held by these communities, instead of silencing them. After fully comprehending why these communities choose not to be vaccinated, officials can then provide information and education based on what the communities have shared. Following this, the crucial part is action. These communities have held fear towards the medical field for a long time, this solution will not solve this issue quickly. Effort must be made to prove to these communities that the field of medicine can be trusted, and that it exists to keep them safe and healthy. Without action, words only carry so much weight in changing the narrative around widespread vaccination.

The 3I strategy will not only be beneficial in supporting the use of vaccines in minority communities, but also in combating many other groups of people who are against vaccination. While the fears and aversions held by minority communities are certainly different than those held by other groups, such as the Wakefield study supporters, this psychological approach could have great success in combatting the issue of low vaccination rates across the board.

Wakefield Followers and “Mommy Bloggers”

The beliefs held by the Wakefield study followers are largely based in fear of illness as a side effect of vaccination. Rather than silencing these fears by producing counter studies stating there are no correlations between vaccines and neurological conditions, policy makers instead need to continue to listen to and acknowledge these fears. In a larger scope, the individuals who are fearful of their children being diagnosed with these conditions, are simply trying to protect their families. There is no mal-intent behind not vaccinating, purely a lack of understanding and

background. When looking at it from this perspective, the issue becomes less that of combatting a vicious group of “Anti-Vaxxers” and instead trying to level with parents who believe they are doing what is best for their children. Labeling people with the term “Anti-Vaxxer” is isolating, and does not present much of an opportunity for cohesion of shared education between pro-vaccination and anti-vaccination groups.

Silencing the anti-vaccination movement will not make it disappear, or even lessen in power. Individuals will continue to refuse vaccinations so long as they believe they are doing the right thing. Historically, trying to repress the beliefs and opinions of communities against vaccinations have had no effect on the rates of vaccinations in those communities. The common response to feeling inferior in knowledge, is to retaliate with a false sense of superiority, as mentioned previously in the *Unicist Research Institute* study. Overloading these communities with scientific evidence and data, simply will not be effective in making any kind of change within the vaccine debate. Clearly, a different solution is required. Policy makers must, again, listen to and acknowledge the fears behind these parents’ choices to not vaccinate their families. Many of these parents have questions that just end up being more eagerly answered by anti-vaccination groups prior to a response from a local health authority. This is what needs to change. Let families ask questions about vaccines, practices, science, side effects, anything that warrants their concern. In doing so, public health officials will be able to understand the hesitancy behind vaccination and tailor a response that both acknowledges that these fears are present, and provide information and education restating the efficacy behind vaccines, in a way these families can comprehend and appreciate.

All Natural and Organic

Continuing with the solution of listening and acknowledging, public health officials encounter a different issue when it comes to combating vaccine hesitancy in groups that are anti-chemical and believe in natural healing. These groups are less opinion and fear based, and more scientific in their practices. These individuals already know the ingredients in vaccines, and their effects on the human body. While the fear and aversions are different than other communities, the solution in promoting vaccination is relatively the same. Fears surrounding vaccine ingredients, such as Thimerosal, are exactly the statements that must be listened to, before a supportive recommendation can be made. This is where public health officials must recognize the disconnect in formation and education. While those who work and practice in the medical field know that Thimerosal is chemically different than Mercury and in low enough doses (such as vaccines) causes no harmful side-effects in humans, many in these anti-vaxx communities believe that they are essentially injecting toxins into their bodies if they choose to be vaccinated. Officials must acknowledge this gap in information, and understand why this practice might be avoided. They must then tailor information and education that both recognizes the validity of chemical compounds' presence in vaccine and proves that these substances do not cause harm to the human body. An open-line of communication will be crucial in securing the trust of these communities, and transparency in the science behind vaccine creation will encourage a recognition of the intelligence these communities already possess.

Anti-Government and Conspiracy Theorists

Another valid form of intelligence, is awareness. Conspiracy theorists and those who fear total-government control did not form their opinions and beliefs without reason. This is an important component in acknowledging communities against vaccination whose main hesitancy

is the rejection of government control over their bodies and their rights. While, once again, the importance of acknowledging and listening to these beliefs is highly important, another crucial component is highlighting the separation between government and public health. While the two disciplines often coincide and collaborate on local and national issues, the field of public health has different motivations and goals in comparison to governments. This is a dichotomy not often understood or recognized by communities. Whilst not completely shifting topics over to the pharmaceutical companies, also called “Big Pharma”, the fears stated by conspiracy theorists that pharmaceutical companies are using vaccines to create a higher demand for their products make sense. These fears are not without research founded in failed clinical trials, and the ever increasing prices of prescription medication. Without a background in medical sciences, the ethics behind pharmaceutical companies and medicine can seem a bit cloudy at times. This is important to recognize that the beliefs held by individuals who avoid vaccines are founded in information and data that is comprehensible to them.

Again, public health officials understand the efficacy and manufacturing vaccines and know it is an ethical practice, but these officials are not the individuals who need to be convinced. These officials must recognize and acknowledge the concerns people have regarding the safety of their bodies and their rights and shape their response and education around such. Let them ask questions, and test the theories behind their beliefs. Officials have access to the information to counter the scientific questions, and must lend an empathetic ear to provide a response to the questions based in fear and safety. Again, transparency and consent will be crucial here. Forcing vaccination upon anyone will create a defensive individual, but especially so in someone who already fears tiered control and pressure.

Conclusion

Public health officials must be prepared to adapt to ever-changing misinformation and evidence. As stated previously, there have been many historical successes and failures in countering the vaccine debate, but the one aspect that has prevailed throughout, is listening before acting. Going forward, this study will likely be beneficial in promoting the acceptance of the proposed COVID-19 vaccine. The relevance of this study holds a unique application in countering the already-forming anti-COVID-19 vaccination movement. Many of the fears surrounding this vaccine remain the same as discussed previously, whereas other aversions are newly emerging, specific to this coming practice. In many of the same online forums and sites previously cited in this study, evidence of fear surrounding the rate at which this vaccine is entering production as well as uncertainty in the dosage and schedule behind the potential immunization is becoming increasingly prevalent ⁴⁹.

In an article titled *Get Ready for a Vaccine Information War*, published by the *New York Times*, it is clear that the necessity of proper campaigning for the coronavirus vaccine is crucial. Already, conspiracies surrounding the release of the virus being intentional by the Chinese government, or that public health officials are part of an anti-conservative cult, using the pandemic as means to sway votes in the upcoming 2020 election, are reaching thousands of communities who are already weary of a new vaccine ⁵⁰. Due to the urgency of need for herd immunity against the SARS CoV-2 virus, the vaccine production is given clearance to bypass clinical trials in animals, and move directly to human subjects. This clearance is similar of that given to the annual influenza vaccine, as scientists must begin research for the next-year's dose, immediately after release of the current year's ⁴⁹. Alongside expediting the vaccine production,

comes the restriction of certain activities for those who are unvaccinated. It is possible that as the vaccine is released, individuals will not be allowed to attend public events or travel, if they are not immune to the COVID-19 virus. These restrictions will likely appear similar to the historical mandatory vaccination practices that many anti-vaxx communities use to prove their rights are being infringed upon⁵⁰.

This current pandemic is a public health emergency, and will require a succinct, yet effective response in order to assure the health and well-being of communities. Public health officials have long since been battling the anti-vaccination movement as it grows in force and power, but must continue to acknowledge and listen to the people before creating policies. In combatting specifically the avoidance of the COVID-19 vaccine, policy makers must directly address the fears and aversions of the specific vaccine. It must be made clear that the fears surrounding the fast-tracking of the vaccine are heard and understood, and then provide information that addresses the specific fear and demonstrates that the vaccine is still safe, despite its rapid production. This pandemic will test the resources and communication skills of many public health agencies, but officials must be prepared to adapt to any opportunity of new misinformation being released.

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Figure 1. Artwork by James Gilray (1802), published in local London newspaper, depicting cow-like projections on humans after receiving the "cow-pock" vaccine

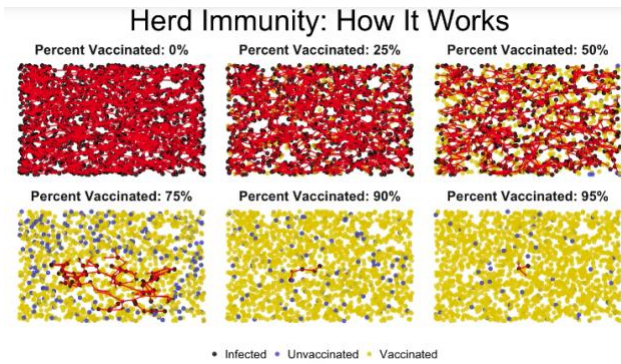


Figure 2. Herd Immunity: How It Works imgur.com

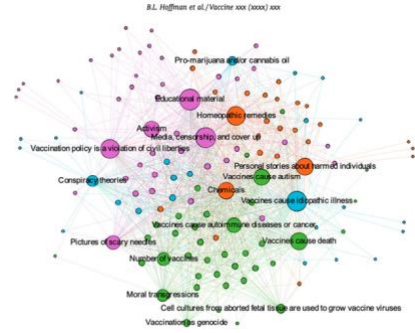


Figure 3. Motivations behind anti-vaxx groups

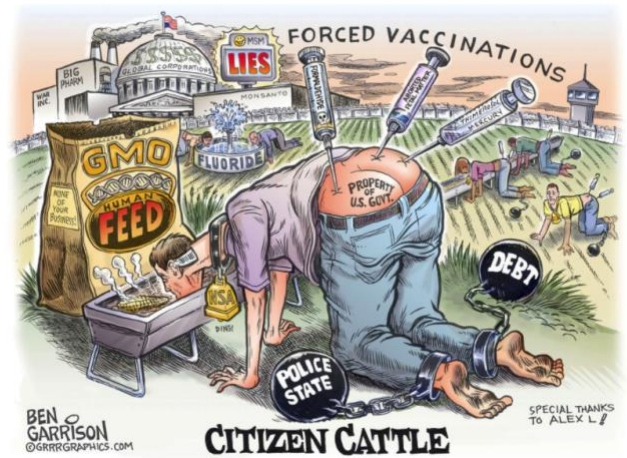




Figure 4. Political cartoon illustrating conspiracies behind mandatory vaccinations

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