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Research Article

Changing Climate on Vaccine Hesitancy as it Relates to the COVID19 Pandemic

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Abstract

This review paper will seek to investigate how the changing climate on vaccinations as it relates to COVID impacts public health, vaccine law and the various factors affecting vaccination rates.

The paper shows that a multitude of factors affect vaccination rates. This includes but is not limited to fear of side effects and mistrust of the government due to the speed in which the vaccine came out. But it is not only people who oppose vaccines that are the reason behind why vaccine rates are low. There are also people who don't get the vaccine because they don't want to find the time. The low vaccine rates can be fought by educating the general public on the importance of immunizations in ending this pandemic. The changing climate on vaccinations also affects public health because it prevents herd immunity from being achieved. If herd immunity isn't achieved cases will continue to rise and the populations that can be vaccinated such as newborns will be put at greater risk. Lastly, the changing climate also affected vaccine law because states are unable to mandate immunizations like they can do with other common vaccinations such as meningitis. Peoples hesitancy to get the vaccine has tied the hands of the state and they can no longer require the COVID shot at schools or workplaces.

Keywords: Covid -19; Vaccine Scene; Resistance to Vaccine; Access to Vaccines; Public Health Challenges due to Vaccine; Vaccine Hesitancy for Covid-19 Vaccine

Introduction

Contrary to scientists predictions, the production and distribution of a vaccine to a dangerous disease, the coronavirus, did not result in increased vaccination rates. Past research has suggested that more awareness and attention brought to a disease is correlated to a positive attitude towards a vaccine. The opposite has occurred with the release of the corona vaccine. Multiple panels of Americans' attitudes towards the vaccine have shown a negative outlook on not only the vaccine for the COVID pandemic, but also a growing distrust in other, older vaccines such as influenza. Researchers have worked the past year to find a reason as to why there is a growing distrust and hesitancy to get the vaccine. The decreased vaccination rates have had significant impacts on public health in America and the way citizens view vaccines may be impacted in a widespread manner that has not been seen before.

Vaccinations are a widespread tool for prevention: Public Health approach

Vaccinations are a widespread tool used by public health professionals to keep pandemics at bay and prevent diseases that can be avoided. According to the World Health Organization, vaccines are responsible for saving an estimated 10 million lives between 2010 and 2015 only [1]. If the trend of distrust in vaccines

continues, it may cause detrimental effects to public health world wide. There are several vaccines available including chicken pox, measles, whooping cough, polio etc. All these diseases are deadly and the vaccines have helped dramatically reduce the prevalence of these illnesses. The chicken pox vaccine, for example, came out in 1995 and now there are roughly 1700 hospitalizations a year. This number is a drastic decline when compared to the 10,000 hospitalizations that occurred annually prior to the distribution of the vaccine. Now that most public school institutions require the chickenpox vaccine, the number of cases now is an extreme difference from 30 years ago, as seen in the prevalence of chickenpox in adults versus the younger generations [2]. 95% of American adults have had chickenpox before age 18. However, as of 2016, only 4.2% of American children have had chicken pox [3]. Many of these diseases such as chicken pox are highly contagious so herd immunity is key for a vaccine to be effective for the general public. According to the CDC, if one person has chicken pox, up to 90% of people around them who aren't vaccinated will also contract the disease [4]. Herd immunity allows the community as a whole to be protected rather than just those who are vaccinated. Herd immunity is essential to help those people of the population that can't get vaccinated.

Situation with Covid -19 vaccine

In the situation of the COVID vaccine it includes children under the age of 5, people who have tested positive and need to wait, people with medical conditions and drug allergies. According to the Mayo Clinic, the two ways to achieve herd immunity is through natural infection of the population or vaccination. Natural infection means enough of the population has contracted the disease and developed antibodies. Although in some situations this immunity plan would work, there are several reasons why it doesn't work in the battle against COVID. The first problem is that people run the risk of reinfection. The disease is constantly mutating itself so just because someone gets COVID once, doesn't mean they contract it again. Additionally, COVID can have serious health implications where running the risk of natural immunity is not worth it. Experts estimate that if 70% of the American population got and recovered from COVID, the pandemic would be over. However, this would lead to detrimental effects on people's health especially the immunocompromised and elderly. According to the National Institute of Allergy and Infectious Disease, 40% of Americans who have had COVID are asymptomatic [5]. For this reason, many people believe running the risk of contracting COVID won't be too dangerous. However, 1 in 6 people display severe symptoms. And contrary to many popular beliefs, it is not only the older population that is deeply affected by COVID. Anyone is susceptible to falling sick to the unpredictable disease. Therefore, the safer way to reach herd immunity is through the second option, vaccinations. One of the benefits of vaccinations is that it achieves herd immunity while avoiding illness. However, vaccinations also have their downfalls. The major one that will be addressed in this paper is vaccine hesitancy. It is very difficult to achieve herd immunity if a percentage of the population refuses to be vaccinated. Additionally, there is the issue of not knowing how long a vaccine will provide immunity. Pfizer and Moderna both recently just approved booster doses but it is still unclear if boosters will need to be given annually. Lastly, there is the issue of distribution. Distributing a vaccine globally is no easy feat. If an unvaccinated population comes in contact with another unvaccinated or vaccinated population, there is an increased risk of spread of infection. In order for herd immunity to be effective via immunization, the majority of the population must be vaccinated and this is inhibited by the variation in vaccination rate across different countries and populations. This paper will address the changing climate on vaccine hesitancy as a result of the Coronavirus pandemic by discussing the factors influencing vaccine rates, the effects it has on public health and the role of the law in mandating vaccinations.

Abnormal challenges I Covid-19 vaccine development

Normal vaccines can take anywhere over ten years to develop. The COVID vaccine, on the other hand, took under a year. For the first time, FDA gave emergency authorization for the Pfizer vaccine. This rapid approval of a vaccine sparked many peoples belief that the vaccine making process was rushed, and therefore, not reliable. Prior to the authorization of the vaccine, according to a study in Nature Medicine in October 2020, only 71.5% of respondents from the nineteen countries surveyed would accept COVID vaccines [6]. However, by the following year, October 2020, more than seven billion COVID vaccines have been administered globally. Although this many seem like a large number, vaccine hesitancy still prevails across the world.

A license for administering a vaccine is a long process. The Public Service Act of 1944 mandated that the distribution of

a vaccine would require a license. There are several stages to developing a vaccine. First there is the exploratory stage, which usually lasts around two to four years. Then there is the pre-clinical stage in which scientists use processes such as animal testing to verify the safety of the preliminary vaccine and its efficiency. This stage lasts another one to two years and many developing vaccines don't make it past this stage. Once scientists have made appropriate modifications, a private company who is interested in sponsoring the production of the drug, can send an application to the DEA. This sponsorship usually includes more animal testing and clinical trials. The vaccine is reviewed by the board and the FDA has thirty days to ether approve or deny the application. Approval of the vaccination leads to three phases of testing. After three stages of testing, the FDA establishes VAERS: the Vaccine Adverse Event Reporting System. Any possible side effects are reported. This is a voluntary system in which anyone who experiences a side effect can report it to VAERS. The vaccine is now ready for distribution [7]. There are several reasons as to why the COVID vaccine was able to jump start the process towards approval. For example, it typically takes ten months for the FDA to even get to the application for a new drug, but the COVID vaccines were able to skip this waiting period due to the urgency of the pandemic. The Pfizer vaccine got reviewed and authorized for emergency use twenty one days, which means approximately 283 days got saved when compared to the normal ten month wait period. The pharmaceutical companies also had large grants from the government so they had the funds to rush research. The COVID vaccine also avoided the ethics committee review which saved eleven months for the development of the vaccine [8]. Although the process was sped up, no safety steps were skipped. The common misconceptions for those who are hesitant to get the vaccine is that the rapid production of the vaccine must mean it's not effective and the process was too rushed to be good. However, this faster process just showed how fast science can be if unnecessary waiting times are eliminated. There is no need to question the efficiency of the vaccines. A large percent of the unvaccinated have distrust in the government and the vaccine producing process so they have refrained from getting the vaccine. Both vaccines, Moderna and Pfizer, have been proven to be 95% effective. The vaccines have little to no serious side effects and the entire vaccine production process was closely monitored by the FDA. The speed in developing the COVID vaccine is one of the reasons why people have increased hesitancy to be protected from the disease.

Covid -19 vaccine hesitancy

Although there may be many reasons as to why people are hesitant to receive the COVID vaccine, another reason in addition to the vaccine being released so fast is the fear of side effects. Common reactions to the vaccine at the shot side include redness, swelling and muscle soreness. Some people may also experience body aches, tiredness, headaches, chills, fever and nausea. However, for two to five people in the U.S. for every million people in the U.S anaphylaxis has occurred. Although this may scare some people out of getting the vaccine, anaphylaxis is a possible side effect to every vaccine. Anaphylaxis is a form of severe allergic reaction [9]. Luckily, in the situation that this severe allergic reaction may occur, vaccinators are trained with how to respond appropriately. Vaccinating sites will have an epi pen on site. Vaccinators will administer the epinephrine which will prevent or decrease the chances of a laryngeal edema, hypotension and shock [10]. In addition to having epinephrine on hand, vaccinators might have other supplies including but not limited to pulse oximeter, oxygen, IV fluids, blood pressure monitor, intubation kit and antihistamines [11]. There are a lot of steps taken to ensure that in the very rare event that a reaction does occur, the health care providers are ready to handle it. It is also important to realize that the side effects are temporary, and doesn't mean the receiver has COVID. Symptoms typically last a day or two. The side effects happen because the body is developing the antibodies and learning how to fight against COVID. Although these symptoms may cause temporary discomfort, it is better than having to deal with the serious long term effects of COVID. Although research is still ongoing about the long term effects of COVID, the Mayo Clinic has already made note of some effects that have persisted in patients diagnosed with COVID. These long term effects include fatigue, shortness of breath, joint pain, chest pain, memory problems, fast heart rate, loss of taste or smell, depression or anxiety and dizziness when you stand [12]. Evidently, risking a few side effects for two days is better than experiencing those effects in the long term. Beyond fear of side effects, another factor influencing vaccination rates is mistrust in institutions. Radical social media has presented the idea that the COVID vaccines have microchips in them so the government can track Americans. Although this may sound ridiculous to many, it is a fear that drives people against better judgement and to avoid vaccination. These conspiracies are popular on social media platforms such as TikTok and it only fuels the general public's distrust of the government,

and by association, the vaccine. Another popular belief is that global elites such as Bill Gates can track those with a microchip. According to Dr. Matt Laurens at the University of Maryland School of Medicine, the size of a microchip like that would need to be larger than what could be present in a vaccine. Additionally, a microchip would require a power source which is not present in the human body. Overall, factors influencing vaccination rates include but aren't limited to emergency authorization of the COVID vaccine, side effects and fear of institutions.

Vaccine hesitancy is a public health challenge

When vaccination rates take a dip, there is a drastic effect on public health. As discussed earlier, lower vaccination rates majorly impact herd immunity. Herd immunity is not only relevant to COVID, but is important to stop the spread of all diseases. A wide variety of diseases including but not limited to measles, mumps, diphtheria and chicken pox have all achieved her immunity through vaccination. There have been measles outbreaks in communities that lose their herd immunity. Measles outbreaks are extremely dangerous as they can spread very easily. 9 out of 10 people who aren't protected against measles will get the disease [13]. The most known outbreak happened in New York about two years ago. The outbreak began when an unvaccinated child returned home from Israel to New York. Almost ninety percent of the patients who were identified to have measles were unvaccinated [14]. The outbreak was highly risky because the most affected population was children. Children experience more intensely than adults. The side effects in the children include hospitalization, admittance into the intensive care unit and pneumonia. As a result of the measles outbreak, the government promoted measles vaccinations. After the government spent a little over eight million dollars on promoting vaccination rates, vaccination rates went from almost eighty percent to over ninety percent.

Outbreak of measles and other diseases is a constant threat. Evidently, vaccination rates have significant effects on the general public's health. It can help prevent outbreaks and keep children safe. Herd immunity is essential to help control and minimize the spread of COVID and other diseases. Herd immunity is when enough of a population gets vaccinated or safe from a disease so that people who are susceptible to the disease or unable to be vaccinated can be protected as well. This is essential because herd immunity protects the community as a whole rather than just those who can be vaccinated. A percentage of the population must be susceptible to getting the disease in order for it to spread. This percentage of the population is called the threshold population. When the proportion of the population immune to the disease is greater than the threshold population, herd immunity is achieved. This is an important percentage to know because the more contagious a disease is, the greater the percentage of people who need to be protected against the disease. As mentioned briefly in the introduction, herd immunity can be achieved through two primary routes. First there is natural infection and then vaccines.

Herd immunity and public health

Herd immunity can be achieved through natural infection if enough of the population has gotten the disease and developed the antibodies so that if they contract the disease again, they can successfully combat it. Although this is an effective method of achieving herd immunity, there are some problems with this method. First off, there is the risk of reinfection. It is unsure in the case of COVID if you can get the same variant again after already having it once. Additionally, achieving herd immunity through natural infection can possibly serve as a serious health risk to the general population. If people were to get immunity to COVID by contracting the disease, they may experience the serious side effects of the disease. Not only would people experience short term illnesses, but they would experience long term effects such as fatigue, shortness of breath, memory issues and depression or anxiety. Therefore, although this method of achieving herd immunity would be effective at protecting the community at large, it runs the risk of putting many people at risk. As of December 10th 2021, over 700,000 people in the U.S. have died from COVID [15]. The disease is continuing to be studied but as of now, one in eight people who have had COVD still experience some persisting symptoms ten months after contracting the disease [16]. The dilemma scientists run into when trying to achieve herd immunity is whether the risk of people dying and experiencing long term effects is worth the benefit of protecting the population as a whole. One has to consider the fact that herd immunity will protect the most vulnerable members of the community.

Vaccine hesitancy and threat to vulnerable people

The most vulnerable members of a community for a variety of diseases include but are not limited to newborns, pregnant

women, immunocompromised people such as those receiving organ transplants or chemotherapy. Another manner of achieving herd immunity is through vaccinations. The major benefit to vaccinations in comparison to natural infection is avoiding actual sickness. If immunity can be achieved without experiencing symptoms or risking death then it is the better option objectively. Nevertheless, that doesn't mean there aren't negativities to attaining herd immunity through vaccinations. As discussed earlier, vaccine hesitancy keeps a lot of people from getting vaccinated. If the percent of the population that is vaccinated isn't greater than the threshold population, it becomes much more challenging to actively combat a disease. Vaccine hesitancy becomes a concern when achieving herd immunity through vaccination. Another flaw in achieving herd immunity through vaccinations is the uncertainty in knowing how long a vaccine will keep an individual protected. As scientists continue to learn more about the disease and the COVID vaccine, they can see whether or not boosters are needed and the efficiency of the vaccine in the long term. As of now, booster doses have been recommended for those who have received their first and second dose. The argument that the public saw arise in regards to the booster dose was how many times or how often does one need the booster dose and who should get it. Originally, the CDC recommended that the population over 65 and the immunocompromised get the booster dose as an extra layer of protection. But now, the booster is available to everyone. A reason as to why the booster became available to everyone could be the rapid spread of the Omnicron variant. Scientists have come to realize that only two doses of a vaccine will provide much less protection against this new variant when compared to having three doses. Scientists have also come to the conclusion that regardless of a patient's initial manufacturer of the vaccine, the Pfizer booster will provide a patient with seventy to seventy-five percent more protection against symptomatic infection. If people continue to question the reliability of vaccines, public health will take a huge hit because these new variants are becoming more deadly and the vaccine is becoming more important than ever. Another concern with using immunizations as a means of achieving herd immunity is uneven vaccine distribution. Distributing a vaccine globally is no easy feat and governments need to have the proper planning and resources to coordinate an efficient roll out of immunizations. If a country or region is unable to distribute vaccines equally in all areas, then COVID can spread from community to community. Although vaccinations are an efficient way of achieving the best public health, there are certain problems that prevent it from being successful in battling the COVID pandemic. These reasons include vaccine hesitancy, questions regarding how long protection against COVID with the vaccine will last, and distribution of the vaccine. All these concerns affect public health.

Public health and vaccine hesitancy whom to blame?

The definition of public health is the "health of the population as a whole, especially as the subject of government regulation" [17]. Public health can be targeted in a multitude of different tactics. Public health experts attempt to achieve this by teaching their constituents about healthy lifestyles, detecting, and responding to infectious diseases. However, the most important aspect of public health as it relates to the topics of this paper is disease prevention. Vaccines are one of the most effective ways of preventing disease, so when not enough of the population is getting vaccinated, public health experts and government officials are faced with serious issues like pandemics. This changing climate on vaccinations and the inability to get enough of the population vaccinated will continue to have detrimental effects on public health. An example of this can be seen through the devastating effects of the omicron variant.

Covid- 19 variants is that a reason for vaccine hesitancy?

On November 26, 2021, the World Health Organization officially declared Omicron as a variant of concern. Four days later the first case of Omicron was diagnosed in the United States [18]. As the variant is very new, researchers are still unsure of exactly how it differs from the original corona variant and the Delta variant.

However, scientists have been able to arrive at a few questions regarding the variant, all which indicate that this new variant will be an even bigger concern than the Delta variant. For starters, researchers believe the Omicron variant will spread easier than the original and Delta variant. Scientists are still undergoing tests and observations to determine if Omicron can be classified as deadlier than the other two variants. However, conducting this research isn't easy. A major challenge scientists have is the different factors that are influencing the survival rate of the variant. The variant is spread globally so there is an abundance of variables that influence the variant's severity. An example of this is that a mild outbreak in South Africa doesn't necessarily mean that the variant isn't deadly. It could mean that because the population is relatively young they

are better able to fight off the disease. Or it could mean that they have already had previous exposures to COVID and therefore, have developed antibodies that can help them combat the Omicron variant. As the sample size gets larger, researchers can effectively determine if the Omicron variant is truly as deadly as it seems. Once Omicron has spread more, scientists can compare factors such as age, vaccination status and symptoms to further study the variant. Another problem with studying the Omicron variant is that most of the positive results are popping up in the wealthier countries. This doesn't necessarily mean that only the wealthy countries have the Omicron variant, but in these countries people have access to testing so accurate positive cases can be recorded. As of now, many researchers believe there is a good possibility that Omicron might necessarily be more dangerous. But there is a near certainty that it is more contagious. This new variant that mutated over fifty times, is further proof that vaccinations are essential to stopping the spread of an even more contagious variant. However, if people are hesitant to get vaccinated for a variety of different reasons, not only will Omicron spread rapidly, but so will the new variants that can form rapidly. A major concern for many at news of a new variant on the rise is whether or not the vaccines will be effective in fighting Omicron. According to the CDC, the vaccines are currently expected to be effective at protecting the vaccinated public from the variant. However, that doesn't mean infections are entirely impossible. Just like with the Delta variant, the vaccine is expected to help prevent hospitalizations and severe illnesses and death [18]. The prevalence of the Omicron variant emphasizes the importance of vaccines and boosters. The CDC continues to emphasize the importance of vaccines as the most effective method of protecting people from contracting the virus, slowing the spread and reducing the chance of new variants arising. According to the CDC, vaccines are the most efficient way of achieving ideal public health during this pandemic. Even though the Omicron was just recently first discovered in late November, it has already spread to more than fifty countries. South Africa had an 82% increase in hospitalizations due to COVID in the week of December fourth. Scientists are a bit concerned that even though between sixty to eighty percent of the South African population have already been exposed to a previous form of COVID, they are still being affected by this new variant. However, this likely can be explained by the fact that only thirty five percent of the South African population is vaccinated [19]. This statistic yet again goes to show that vaccinations are the general public's best bet at maintaining optimal health. However, in areas where getting a vaccine is difficult may make it hard to attain herd immunity through vaccination. South Africa is likely trying to achieve herd immunity through natural infection but clearly it is not effective at fighting against all variances of COVID. For starters, South Africa did not begin their vaccination efforts until May, which is 6 months after the U.S. and other western countries began vaccinating the public. In combination with the late start, South Africa also faces the dilemma of vaccine hesitancy like in the U.S. and other countries. It also isn't easy to get vaccines to all areas of South Africa. In order to help combat this problem, global bodies such as the World Health Organization have called on the U.S. and other first world countries to help with the distribution of vaccines to these countries and areas that have more trouble getting a hold of vaccines. According to Ron Wheelan, the head of COVID task team in south africa, the vaccination rates in the country had peaked at about 211,000 shots a day but has since then fallen to about 110,000 shots a day [20]. The country has asked that shipments cease because they already have a lot of vaccines. The problem arises with distributing the vaccines throughout the country. It is likely that due to inefficient methods of distributing the vaccine, the Omicron variant has spread so easily throughout South Africa. The outbreak of the recent Omicron variant has gone to show the importance of having a vaccinated general public in order to maintain public health and combat the pandemic.

Did the increasing vaccination helped to arrest the Covid-19 infections

Another factor that public health experts need to focus on to increase vaccination rates and therefore, public health, is education regarding the vaccine. Although a multitude of vaccines and locations are available, people are unwilling to get the vaccine. Many people aren't educated about the importance of getting vaccinated and therefore don't make any time in their day to get their shots. According to a U.S. census, about thirty million Americans who are open to getting the coronavirus vaccine have not actually gotten it yet [20]. Shockingly enough, this is a higher percentage of the population than the twenty eight million Americans who said they would never get the vaccine. Although the media tends to focus on anti vaxxers as the only population that doesn't get vaccinated, there is also a large community of Americans who don't want to find the time to get the vaccine. If public health experts are successfully able to educate the population on the importance of vaccinations people will no longer see getting the vaccine as a chore, but as a

responsibility to all human beings. Overall, changing climate on vaccinations has significantly affected public health as seen in the Omicron variant, the percentage of Americans who don't choose to get vaccinated and the difficulty in meeting herd immunity.

Legal aspects of vaccinations

There are many laws surrounding vaccinations. The changing climate on vaccine hesitancy is an example of why government officials felt the need to implement laws mandating vaccinations. Most public schools require vaccinations for all children but there are a few private schools that don't have this same requirement. These rules can vary by states and schools. In order to enter public school in Florida, the child must be vaccinated for DTaP, MMR, IPV, Varicella, Hib, Pneumococcal conjugate and Hepatitis B [21]. These mandated vaccines have helped nearly eradicate many diseases from the U.S.. However, it still remains a very sensitive subject as many people feel that mandating vaccinations is a violation of freedom rights. A reason as to why vaccines should be mandatory is that it is one of the most effective methods of public health interventions and it saves countless lives annually. The only basic human right that performs better at keeping people healthy is clean water [22].

A reason as to why parents may not give their children mandated vaccines is because they don't see the effects of the disease because vaccines are successful at keeping them at bay. If parents could see the devastation of vaccine preventable diseases such as Meningitis or Hepatitis B, they would opt for their child to get the shot. When vaccine rates decline, there is an increase in disease. Hence, vaccines may need to be mandated to encourage the general public to get their immunizations. Additionally, as seen earlier, without a mandate it is very likely that capable Americans don't get vaccinated simply because they don't understand the importance. Vaccine law helps eliminate this group of Americans because they will no longer see immunizations as a chore, but as a responsibility. It is important to realize that there are exceptions to this mandate. If vaccinations go against a person's religion or philosophy, many states will waive the requirement. Not all states will accept philosophical reasons as an acceptable reason to skip out on vaccinations. This is where people became very concerned with mandated COVID vaccinations. As previously addressed, vaccine hesitancy has increased once the COVID vaccine came out. The release of the COVID vaccine brought up many concerns that this vaccine as well will be mandated. Research has shown that mandating vaccines isn't the only way to achieve high vaccination rates. The UK does not require vaccines and yet they have a very high uptake of vaccines. A likely cause of this could be talking concerns out with a physician. If people have the chance to discuss their concerns with a doctor, they are more likely to get vaccinated. As schools prepared to open up in August of 2021, the question of whether or not vaccines would be mandated in school arose. However, in April, the Florida legislature passed a bill that prevents schools from mandating COVID vaccinations. The governor also passed a bill to prevent the requirement of "vaccination passports". Some may argue that mandating vaccinations is a violation of freedom but in a Supreme Court case in May 1901, it was determined that states can mandate vaccines if it is in the best interest of the general public's health. In this case, a small epidemic of smallpox had begun in Boston and as a response, the state introduced free vaccine clinics. When the cases of smallpox still did not go down they decided to mandate the vaccine [23]. On November fourth President Biden declared that all federal contractors or businesses with more than a hundred employees would require proof of full vaccination [24]. This mandate faced immediate backlash. Lawsuits arose and finally a month later a large proportion of the vaccine requirements were temporarily blocked. Clearly the changing climate on vaccine hesitancy as it relates to COVID has prevented the states from mandating vaccines like many previous illnesses that have vaccines. The inability to mandate vaccines may have detrimental effects on public health.

Conclusion

Overall, this paper sought to show the changing climate on vaccine hesitancy as a result of the Coronavirus pandemic by discussing the factors influencing vaccine rates, the effects it has on public health and the role of the law in mandating vaccinations. There were a variety of factors influencing vaccination rates including the speed in which the vaccine came out and fear of side effects. The changing opinions on vaccinations also affected public health. It has made it more difficult to reach herd immunity. It has allowed the formation and spread of variants of coronavirus like Delta and Omicron which can be deadlier and more contagious. The varied opinions on vaccinations also impacted how people saw vaccine law. The coronavirus vaccine so far hasn't been able to be mandated by states like different vaccines have been able to. All these reasons go to show that Americans post corona opinions on vaccinations has had a multitude of serious effects.

Future Trends

It is difficult to predict what the future of COVID will look like. The virus itself is very unpredictable. Scientists at first never believed the corona virus would turn into a pandemic. Scientists have attempted to predict what the future would look like under different scenarios. For example, in one scenario, no new variants are formed and there is no childhood vaccination. In this prediction, in a 6 month period, only a hundred and twenty deaths would occur. This is a drastic difference from the current rate of two thousand deaths per day. The future of COVD is dependent on a variety of factors including vaccine rates and the development of new and deadlier variants. However, it is agreed upon by most scientists that if herd immunity isn't achieved by vaccinations, the number of cases and deaths will continue to increase.

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