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## Behavioral and Epidemiological factors behind Vaccine Hesitancy in The United States

Maggie Hanusek

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## ABSTRACT

Behavioral and Epidemiological factors behind Vaccine Hesitancy in The United States

By

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April 21, 2022

Vaccines are by far the most significant achievement in public health over the last century, saving millions of lives. Vaccination provides immunity as well as protection against certain infectious diseases, and the majority of vaccines contain a weakened version of a disease-causing microorganism. But why do people continue to be skeptical of vaccines and what they can do to improve their health? Vaccines, in general, can evoke strong biological, cultural, social, and political reactions all over the world, not just in the United States.

Vaccine history is extremely complex, and it is still ongoing today as new diseases emerge. The anti-vaccine movement has existed since the development of vaccines by Edward Jenner in 1796. It is critical to understand the past and continue building on what we know today through new vaccine research & technology. Diseases today are far more complex than in the past, but advances in technology have enabled us to combat diseases in ways we could never have imagined. The war on diseases is never-ending and will continue as long as humans exist. But why are people becoming more hesitant to get vaccinated than ever before, or refusing to get vaccinated at all?

Today, the ongoing pandemic and the new COVID-19 vaccine are the main topics on which vaccines are being discussed in major news outlets. Many people have turned to the vaccine to protect themselves from the virus, but many are still skeptical that the vaccine is safe or effective. This has pushed vaccine hesitancy to the forefront of the pandemic, and it has become a hot topic not only in the United States, but in countries all over the world.

Behavioral and Epidemiological factors behind Vaccine Hesitancy in The United States

By

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BS, Appalachian State University

A Capstone Submitted to the Graduate Faculty  
of Georgia State University in Partial Fulfillment

of the

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MASTER OF PUBLIC HEALTH

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APPROVAL PAGE

Behavioral and Epidemiological factors behind Vaccine Hesitancy in The United States

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## Author's Statement Page

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\_\_\_\_Maggie Kate Hanusek\_\_\_\_\_  
Signature of Author

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## **I. Introduction to Vaccines**

Vaccines have been the greatest achievement in Public Health for the past century and have saved millions of lives. Vaccination provide immunity or protection against certain infectious diseases and most vaccines contain the weaken version of a disease-causing microorganism. But why is it that people still doubt vaccines and what they could do to benefit their health? Vaccines have a very long and hard history that is still going on in present day. In general, vaccines can cause powerful biological, cultural, social, and political reactions globally, not only in the United States. The first vaccine was developed in 1796 by Edward Jenner who took pus from a cowpox lesion on a milkmaid's hand and injected it into a small eight-year-old boy (Stern & Markel, 2005). This discovery led to the early development of vaccines, but the real discovery happens in Louis Pasteur's lab 80 years later. In the late 1800s, Pasteur was a well-known researcher and was extremely interested in the study of disease, just like Jenner was years before. At the time, he was studying chicken cholera (*Pasteurella multocida*) which was a diarrheal disease that was killing off the breeding chicken population (VBI Vaccines, 2016). The story of his discovery was not the usual story but indeed an accident because of his assistant leaving old cultures out exposed to heat or oxygen. In the end, he had injected the chickens with an old culture that unexpectedly showed only mild signs of the disease and survived. Utilizing weakened forms of diseases to provide immunity was not a new idea, but Pasteur was the first to apply it in a laboratory setting, influencing all virologists who came after him. Later in his career, he was involved in the development of the anthrax vaccine, which was used in animals rather than humans, and the study of rabies but had major difficulty with producing the vaccine in a laboratory. At the time he did not realize why he could not identify the microorganism in his lab, but rabies is a viral disease rather than a bacterium. He started to inject the virus through rabbits,



instead of humans, which made the virus less dangerous. After injecting both rabbits and dogs with the virus, Pasteur was ready to treat his first-ever human patient, a nine-year-old boy, who was attacked by a feral dog. The boy survived and, again, Pasteur became a hero and helped further the field of virology.

In the nineteenth century, the discovery of bacterial toxins and methods of inactivating whole bacteria were key innovations. Daniel Salmon and Theobald Smith were the first to report the use of virus inactivation for vaccine purposes. Inactivation was applied to pathogens like typhoid, plague, and cholera bacilli. Roux, Yersin, Behring, and Kitasato recognized extracellular bacterial toxins and help develop toxoids (inactivated toxins) (Plotkin, 2014). In the mid-twentieth century, the focus was on the growth of viruses in cell culture which was led by John Ender, Frederick Robbins, and Thomas Weller. One of the most notable vaccines to come out of the twentieth century was the poliovirus vaccines by Jonas Salk and Albert Sabin (Plotkin, 2011). The polio vaccine was a huge success and soon became a part of the World Health Organization (WHO) global vaccine program called the United Nations Children's Fund (UNICEF). Samuel Katz and John Enders developed a classical attenuated-virus vaccine against measles, then Maurice Hilleman contributed to the discovery of the mumps virus, and soon after Thomas Weller with the rubella virus (Plotkin, 2011). Soon after in the 1970s, the varicella-zoster virus vaccine was established by Michiaki Takahashi, by passing the virus through guinea pig cells (Plotkin, 2011). Genetic engineering also became a major contributor in the process of producing vaccines. The Hepatitis B virus was the first vaccine to be developed by genetic engineering which established the antibodies against the antigen protects against infection (Plotkin, 2011). This was a huge step in the right direction for vaccine production and truly impacted the next vaccines to come. Today, many vaccines are still used and are distributed all

around the world to help control diseases. Many children now have childhood immunization that they receive from the minute they are born to their teenage years. These vaccines consist of MMR (measles, mumps, and rubella), Hepatitis A, Hepatitis B, DTaP (Diphtheria, Tetanus, and acellular pertussis), Varicella, and many more (CDC, 2021). Vaccines have been around for more than 200 years, and scientists will continue to conduct extensive research in this field.

Today the main issue that puts vaccines in major news outlets is the ongoing pandemic and the new COVID-19 Vaccine. COVID-19 originates from the coronavirus family and is caused by a SARS-CoV-2 virus (CDC, 2020a). The most recent coronavirus outbreaks before COVID-19 were severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS). COVID-19 is spread by droplets that can either come from breathing, coughing, sneezing and more. Corona, meaning crown, refers to the coronavirus's appearance that the spike proteins look like a crown under a microscope (CDC, 2020a). Many people have turned to the vaccine to protect themselves from the virus, but many still have not been convinced that the vaccine is safe enough or that it has a high efficacy. This has put vaccine hesitancy at the forefront of this pandemic, and it has been a hot topic not just for the United States but for other countries across the world.

The history of vaccines is far from over and still ongoing with new diseases emerging. It is vital to understand the past and continue to build on the knowledge that we have with new research in vaccine production. Diseases today are profoundly more complicated than in the past, but the advancement in better technology has helped combat diseases in ways we could never have imagined. The war on diseases is never-ending and will continue provided that humans are still alive. But why is it that more than ever people are either becoming hyper hesitant toward a vaccine or have now refused to get vaccinated at all?

## II. Pre-COVID-19 Pandemic: Anti-Vaccination

With the rise of vaccines comes a movement of people that are against vaccines and won't get vaccinated at all. Anti-vaccination are groups of people who are against being vaccinated themselves and potentially not having their children be vaccinated. Even though vaccines help decrease the likelihood of disease and infections many people believe that vaccines cause more harm than good. The anti-vaccination movement is not something that is considered "new" because it has been around for centuries. We can trace anti-vaccination groups as early as the 1800s with Edward Jenner's smallpox vaccine in London. Under the Vaccination Act of 1853, all infants were entitled to vaccination within the first three months of their lives, and parents who refused to do so could be fined or even imprisoned (Wolfe & Sharp, 2002). Soon after the Act of 1867 raised the requirement age from three months to fourteen years old with the same penalties if disregarded. With these laws being passed groups like The Anti-Compulsory Vaccination League was organized in 1867 in response to the new laws (Wolfe & Sharp, 2002). This was just the start of pushback against vaccination mandates and requirements. One of the main concerns was that these laws were against their liberty and choice of whether to get vaccinated. Demonstrations were seen across Europe in the fight against mandated vaccines but in Leicester, in 1885, over 100,000 marched against the vaccines laws and in 1898 penalties were removed and allowed parents to make their own decisions when it comes to immunization. In North America, states began to enforce vaccine laws and the first U.S. law required vaccine was smallpox, it was widely used to help prevent outbreaks throughout the middle of the 19th century. Irregular physicians, individuals that advocate for unorthodox medical theories, critique the use of vaccines which inevitably lead to the decrease in smallpox vaccines which cause a major reappearance in the 1870s (Omer et al., 2009). The government tried to increase

enforcement with vaccines but states like California, Illinois, Indiana, Minnesota, Utah, West Virginia, and Wisconsin pushed back and were successful. *Jacobson v. Massachusetts* was a landmark case in 1905, which has since served as the foundation for public health law, the U.S. Supreme Court endorsed the rights of states to pass and enforce compulsory vaccination laws (Omer et al., 2009). This led to the government letting the states have power over the implementation of immunization requirements. Throughout the 20th century, outbreaks occurred in schools across the United States and efforts were made to increase and strengthen immunization laws. By the 1980s, all 50 states had school immunization requirements for young children entering school (Omer et al., 2009). The strengthening of immunization laws has had major impacts in maximizing vaccination rates in school across the country and have played a key role in the success of pediatric immunization programs. Some studies have been conducted to see if there is any correlation to personal exemptions and increase risk in vaccine preventable diseases. Feikin and his colleagues (2000) evaluated the risk of personal immunization exemption with measles and pertussis in a Colorado community amongst ages 3 to 18 years old from 1987-1988. The study concluded that children who were unvaccinated were 22 times more likely to be infected by measles and 6 times more likely to be infected with pertussis than children who were vaccinated (Feikin et al., 2000). Which indicates that individual who use personal exemption to avoid getting vaccinated pose a threat to themselves and the community they live in. The use of childhood immunization programs and school vaccines mandates have shown to be very successful in providing protection against outbreaks. Nevertheless, this is only the beginning of vaccine skepticism in the United States, which will almost certainly never go away and will always be a challenge.

Vaccination opponents have always been voiced in different regions of the globe since the emergence and expansion of vaccines usage citing theological, skeptical, and legal barriers as justification. One of the most common reasons for the refusal of a vaccine at an individual level is religion. The ethical dilemmas associated with using human tissue cells to create vaccines, as well as religious beliefs that the body is sacred, should not receive certain chemicals or blood or tissues from animals and should be healed by a god or by natural means, are all factors that influence vaccine objectives. Religious reasons for not getting vaccinated started as early as Jenner's development of the smallpox vaccine and have been on the rise in recent years. Hindu, Protestant, Orthodox Jewish, and Jehovah's Witness communities have concerns specifically and instigating debates about the MMR vaccines (Hussain et al., 2018). Many religions, like Hindus, Protestants, Muslim, or Jewish communities, have moral values when it comes to abortion and since originally the MMR vaccine contained cells from abortion fetal tissue many individuals within these communities opted out of become vaccinated with this certain vaccine. The problem with certain communities who refuse vaccination is that they tend to fall under the herd immunity threshold which can lead to outbreaks. Most religious communities tend to be in the same general area and attend religious gatherings weekly. One example is the measles outbreak in Philadelphia, in 1990, that occurred among unvaccinated preschool age children who attend fundamentalist churches that did not accept vaccination and by 1991 there had been 983 measles cases reported to the Philadelphia Public Health Department (Rodgers et al.,1993). As a result, public health officials are concerned about the growing number of religious vaccine exemptions and have warned people that they are increasing their risk of contracting vaccine-preventable diseases.

Another major issue that makes individuals hesitant about vaccines is skepticism, mistrust, and misinformation about vaccines. Vaccines hesitancy is one of the top ten global threats of 2019 according to the World Health Organization (Geoghegan et al., 2020). Ever since vaccination was introduced in the late 1700s people have always had concerns about its safety and efficacy. Many of these concerns stem from misinformation and propaganda from various anti-vaccination groups, social media, celebrities, and news outlets. The misrepresentation of vaccines can be extremely harmful to the population because if people are not getting vaccinated then outbreaks tend to occur when they could have easily been prevented. Misinformation has led to people thinking that vaccines cause autism, that we over-vaccinated our children, that vaccines weaken the immune system, that giving a vaccine too early can impact neurodevelopment, vaccines are made with human or animal DNA, vaccines can cause autoimmune disease, and vaccines have life-threatening side effects. These accusations are false and extremely dangerous to the population that could be searching for information about vaccines. A former British doctor and researcher named Andrew Wakefield published a paper in *The Lancet* that gave a lot of credence to the debunked claim that the vaccine against measles, mumps, and rubella (MMR) leads to autism in children (Hussain et al., 2018). This was later proven wrong, and Andrew Wakefield was stripped of all his medical authority. Misinformation has led to parents questioning if children are receiving too many vaccines at a young age. Most children receive immunization in the first year of life which has made parents rethink if overvaccination could potentially affect their child's immune system and neurodevelopment. It is recommended that vaccination is timed to coincide with the waning of maternal antibodies, the maturation of the immune system, the susceptibility to disease, and the effectiveness of vaccination (Geoghegan et al., 2020). In recent years, the number of vaccines given to young

children has increased but the immunologic components have declined. Another misconception is that if we receive multiple vaccines then it could weaken the immune system. In a study comprised of 805,206 children born in Denmark between 1990 and 2001, a decrease in vaccination did not adversely influence hospitalization with non-vaccines-target infections (Geoghegan et al., 2020). Data has shown to disprove that vaccines could weaken the immune system and put people at risk. Most people's misconception comes from gathering information that they see on the internet or even social media. While the internet is beneficial to find information that individuals need it can also house false or misleading information that keeps one from vaccinating themselves or even their children. Many Americans use the internet to obtain information about their health and about 55% report say that the internet has influenced their decision when it comes to their health and wellbeing (Garett & Young, 2021). Social media has taken off in the last decade and has turned into a place where you can find health misinformation. According to one study, public usage of social media to coordinate action related to the idea that vaccinations are harmful, and general misinformation on social media were associated with lower vaccination rates and unfavorable social media post (Garett & Young, 2021). Many young adults rely on social media to inform them about health topics and what's going on in the world. When compared to other socioeconomic characteristics or safety concerns, social media exposure has been demonstrated to account for a greater fraction of the diversity in vaccination coverage. To combat the spread of misinformation platforms like Facebook and YouTube have tried to monitor information about vaccines and other health issues but have not been entirely successful.

Vaccine hesitancy also comes from large corporations and government pushed back on mandates like school-required vaccines. States across the United States have required vaccines to

be able to start in public school. Many of the vaccines required for school attendance help prevent outbreaks and keep the school safe. Now if you don't want to vaccinate your child then there is an exemption that you can pursue. There are exceptions for medical, philosophical, or personal beliefs, as well as religious reasons. Each state has its own set of laws mandating vaccines and exceptions which can cause some variability. Some states have an “easy” exemption process in which parents need to sign an electronic form, but other states require that parents need the exemption form signed off by a medical provider or the public health department each year. These exceptions could range from children who are immunocompromised, allergic or have other medical problems that prevent them from being vaccinated. Religious or philosophical reasons are based on individual choice rather than medical, but Mississippi and West Virginia are the only states that don't permit religious exemption (Siddiqui et al., 2013). The easy exceptions process has been associated with an increased risk of schools having outbreaks and in recent years there has been an increase in parents seeking non-medical exemptions.

Reason for not getting vaccinated often fall into three categories: lack of confidence, compliance, and convenience. The lack of confidence in the vaccine's safety or effectiveness, compliance (thinking that children or adults could never become infected by a certain disease) and convenience, meaning that immunization are not available or accessible to them. New vaccines and medicine are supposed to be viewed as triumphs, but many people view them as profit revenues for larger pharmaceuticals companies. Therefore, many physicians, scientists and public health officials consistently defend the research and continue to recommend vaccination. This is where primary care physicians play a crucial role in influencing parents who tend to be vaccine-hesitant rather than vaccine refusers. A primary physician must start early on educating



parents, present vaccination as the default approach, be honest about the side effect, reassure parents on vaccine safety, build trust with the parent, and focus on the protection for the child and the community (Shen & Dubey, 2019). But in the long run, individuals who decide not to get vaccinated not only put themselves at higher risk but others at risk for transmitting vaccines-preventable diseases. Regardless of why an individual chooses not to get vaccinated the overall theme tends to be that people believe that vaccines do more harm than good. Whether it is a religious, medical, or personal reason it comes down to if you believe that being vaccinated will help you or hurt you. Even though vaccines hesitancy is not a new concept, it continues to be a significant public health problem that probably will not go away anytime soon.

### **III. During Pandemic: COVID Vaccine and Political Issues with Vaccination**

The first detection of potential COVID-19 cases was back in December of 2019 in Wuhan, China and soon after on January 21, 2020, the United States had its first case in the state of Washington (CDC,2022). This was just the beginning because, on March 11, 2020, the World Health Organization declared COVID-19 a global pandemic. After that, the world and the United States completely shut down and life as we know it came to a halt. For most of 2020 people were looking for a way out or even a solution to the COVID-19 crisis. On December 11, 2020, the FDA issued an Emergency Use Authorization for the first-ever COVID-19 vaccine which was Pfizer, and not soon after on December 18 Moderna was also approved (CDC, 2022). Today more than 253.3 million people in the United States have at least one does of Moderna, Pfizer or J&J and 215.5 million people are fully vaccinated with either Moderna or Pfizer (CDC, 2020b). In the world more than 62.7% of the population has received at least one dose of a COVID-19 vaccines, about 10.7 billion doses have been administered globally and at least 22.83 million are

administered every day (Ritchie et al., 2020). In the United States, there are only three vaccines available for everyone; Moderna, Pfizer or J&J, but multiple vaccines are being distributed to other countries like Novavax, Oxford-AstraZeneca, Sinovac, Sinopharm, and many more (Ritchie, 2020). Oxford-AstraZeneca is available in 181 countries, Pfizer is available in 154 countries, Moderna is available in 86 countries, Sinovac is available in 49 countries and J&J is available in 81 countries (CDC, 2020b). Even with all the vaccine's availability, lower income countries are still struggling to get people vaccinated with the lack of supplies that they have. Only 12.3% of people have received at least one dose of a COVID-19 vaccine who live in low-income countries (Ritchie et al., 2020). Wealthy countries have start to stockpile vaccine which has left lower-income countries at a disadvantage. Most of the vaccines are being distributed to countries like the United States, the United Kingdom, the European Union, Canada, and Japan because they have the resources to pay. More than a third to half of the vaccines are going unused or have been expired within the last year (Aizenman,2021). When the vaccines first came out it was understandable to overbuy because countries were in crisis mode but now that the vaccines are readily available there is no need to stockpile. One possibility is for countries to begin allocating a portion of their monthly purchasing privileges to other countries in need. The Gavi COVAX Advance Market Commitment has been funded to help bring COVID-19 vaccines to lower-income countries by establishing a Pandemic Vaccine Pool of a minimum of 600 million additional doses (Gavi, 2022). This will assist in addressing uncertainty and risk in the virus's development, providing packaged money to boost delivery systems in recipient countries, and covering critical additional expenditures.

It has almost been over a year since the United States started to roll out the distribution of the COVID-19 vaccine. In the beginning the vaccine were rolled out in waves depending on your

age, medical disadvantages, or a healthcare employee. Now you can go down to your local pharmacy or public health department and sign up to get vaccinated free of charge. So why is it that only 64.9% of the country is fully vaccinated? The states with the highest vaccination rate are Vermont, Massachusetts, Maine, Connecticut, Rhode Island, Maryland, New Jersey, New Hampshire, Washington, and New York (Holcombe et al., 2021). The states with the lowest vaccination rate are Alabama, Mississippi, Wyoming, Idaho, Louisiana, Arkansas, West Virginia, Georgia, Tennessee, and North Dakota (Holcombe et al., 2021). The overall trend is that the most vaccinated regions are the Northeast while the least vaccinated regions tend to be the South. The Northeast experienced a lot more restriction when it was locked down compared to the South with some areas not even acknowledging the lockdown restrictions. Vaccine apprehension in the overall population has also been linked to parameters such as gender, age, race, socioeconomic background, and education level (Yasmin et al., 2021). The Kaiser Family Foundation provided information (Figure 1) on which populations had the highest vaccination rate, which are older adults (65 and older), people who have serious health conditions, college graduates, and Democrats. African American and Hispanic adults tend to lean towards the “wait and see” category, while Republican, rural residents, and White Evangelical Christian are the majority of people who have decided not to get vaccinated according to figure 1. Other groups that consider themselves in the “wait and see” category are ages between 18-29 (15%) and individuals over the age of 65 who are uninsured (15%) in figure 1. Even groups who have a high percentage of individuals who have at least received one dose of the COVID-19 vaccine will always have some portion of that population that disagree. In general, 73% of the population believes that more people should receive the vaccination to help limit the spread of COVID-19,

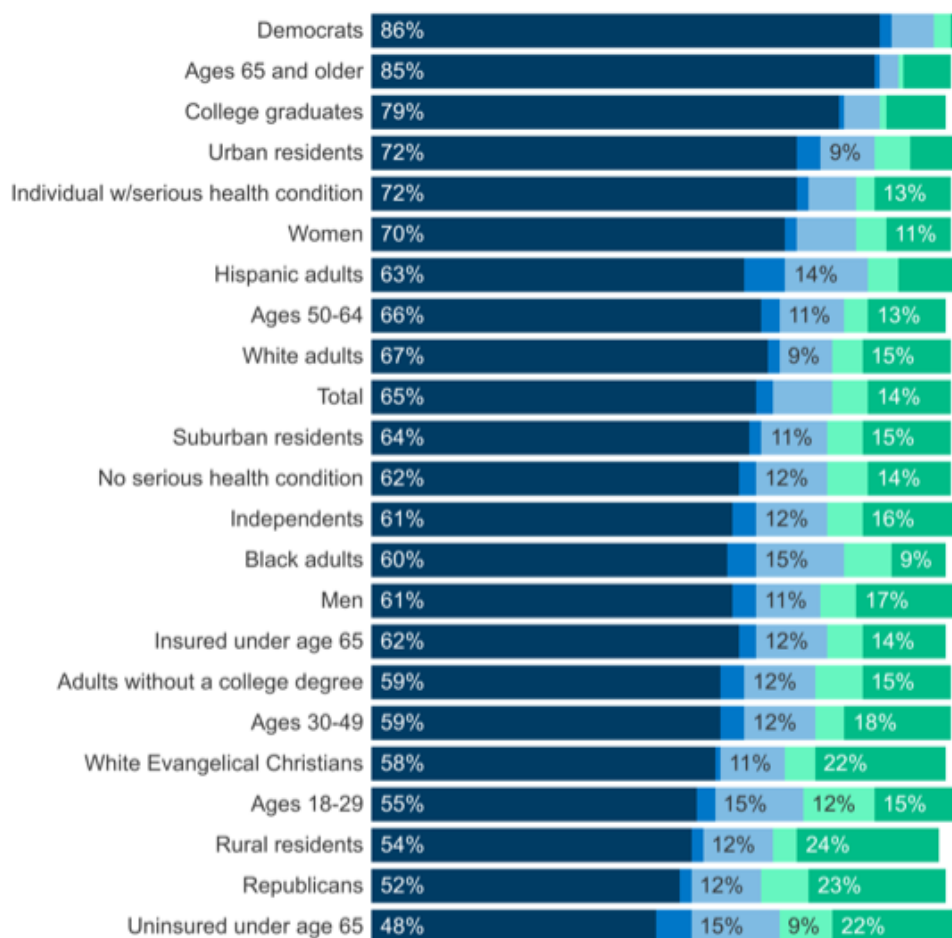
while 22% believe that the number of cases is so low that there is no need for additional people to obtain the vaccine. (Lopes & Stokes, 2021).

**Figure 1: KFF COVID-19 Vaccine Monitor (June 8-21, 2021)**

## Across Most Subgroups, At Least Half Report Receiving A COVID-19 Vaccine

Have you personally received at least one dose of the COVID-19 vaccine, or not? As you may know, an FDA-authorized vaccine for COVID-19 is now available for free to all adults in the U.S. Do you think you will...?

■ Already received at least one dose
 ■ Get vaccinated ASAP
 ■ Wait and see
 ■ Only if required
 ■ Definitely not



NOTE: See topline for full question wording.

SOURCE: KFF COVID-19 Vaccine Monitor (June 8-21, 2021)

KFF COVID-19  
Vaccine Monitor

Lopes & Stokes, 2021. (20. KFF COVID-19 Vaccine Monitor: June 2021. KFF)

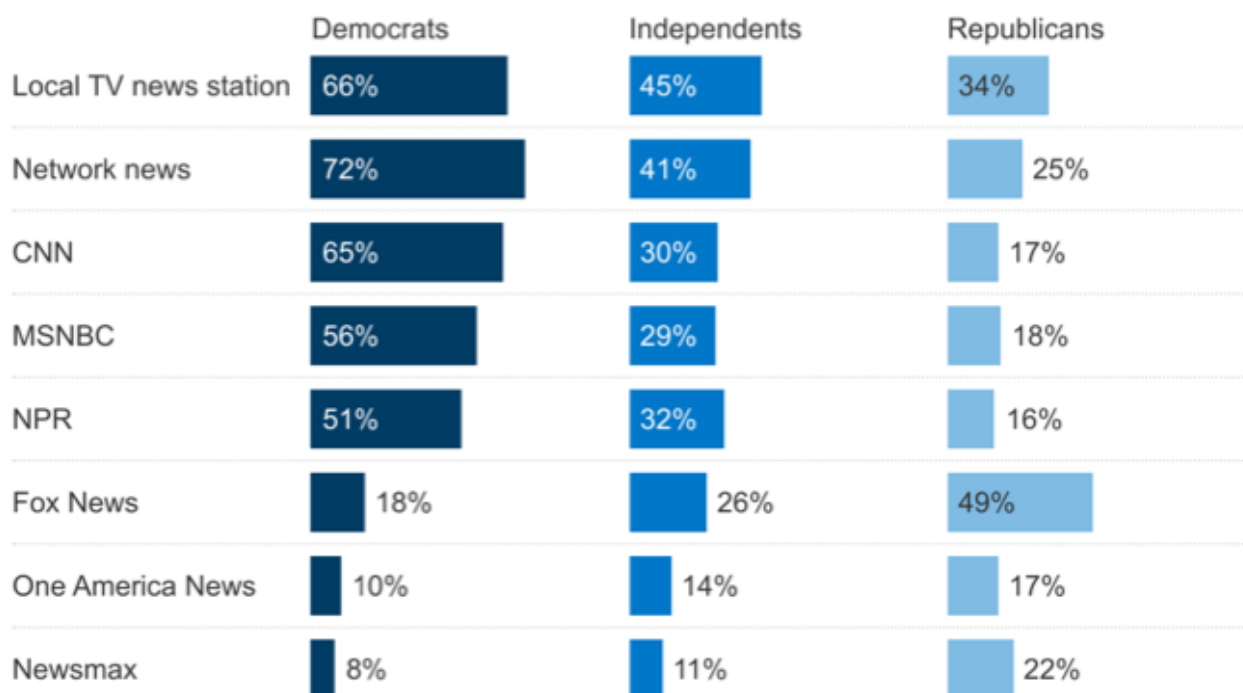
Several factors contribute to people not getting vaccinated, including the vaccines being too new or being rushed to market too quickly, concerns about side effects or safety, distrust in the government (especially people of color and other who have experience betrayal of their trust), or doubts about the benefits of vaccination based on outbreak infections. (Shmerling, 2021). Others stated that they didn't not have enough time, did not have transportation to get the vaccine, could not miss work or simply some people have a fear of needles or receiving a shot (Shmerling, 2021). When determining the population of unvaccinated it turns out to be two groups; avoiding the vaccines at all costs and those who consider themselves undecided about the vaccine. The vast major of people who refuse the coronavirus vaccines are a mix people but disproportionately white, rural, evangelical Christians and politically conservative (Bosman, 2021). On the other hand, many individuals have put off or waited to get vaccinated and that population tends to be a diverse urban group which include younger people, Black and Latino Americans, and Democrats (Bosman et al., 2021). These are the individual that make up about 20% of the adult population that is currently unvaccinated (Bosman et al., 2021). Many individuals believe that the production of the vaccines was too quick, have major concerns about safety or efficacy, and are not sure what the long-term effects of becoming vaccinated are. At first, people were hesitant to get vaccinated because technically it was only approved for emergency use but now the FDA has fully approved the COVID-19 vaccines. It's critical to comprehend that advanced knowledge and testing went into the COVID-19 vaccine's development. Numerous trials and studies were conducted to ensure the safety and efficacy of the COVID-19 vaccines. Many studies are still ongoing to determine the long-term effects of the vaccines but will need many years of research to collect sufficient data. While other are hesitant about getting immunized because of the lack of trust in the government, public health officials, and medical providers that continue to push for

individuals to get vaccinated. This has made the COVID-19 pandemic widely politicized in the United States which has decrease the trust in public health. Some of this mistrust is coming from news outlets, political leaders, social media, and government officials who many people relay on to give accurate information. Politics has also played a massive role in whether they believe in the COVID-19 vaccine or not. Because of deep political tensions in this decision, COVID-19 vaccine resistance appears to be different. This is a critical decision because these choices have seriously hindered efforts to control the COVID-19 virus. In most cases of vaccine hesitancy in the past, many people didn't include their political views on whether they were vaccinated. Since the pandemic and the COVID-19 vaccine, the deciding in some cases has truly been because of the political environment that we are in today. Political leadership, in the beginning, was downplaying the danger that COVID-19 truly presents to society and many people tend to believe who is in power. Many protests and rallies have been held over vaccine mandates, face mask protocols, and CDC guidelines. This has led to a political divide between people who are vaccinated and people who are not vaccinated. In recent years, the media has also become extremely polarizing between the Democrats and Republicans parties. People tend to obtain information about COVID-19 pandemic or vaccine either through a news outlet or social media. While many Democrats get information from networks like CNN (65%), MSNBC (56%) and NPR (51%), the opposite is for Republican who watch networks like Fox News (49%) according to figure 2. Democrats obtain 66% of there information about COVD-19 from local television station while only 34% of Republican use their local television station (see figure 2). Because Republicans and Democrats get their news from different sources, there is a significant gap between the parties in terms of what information they are receiving about COIVD-19.

**Figure 2: KFF COVID-19 Vaccine Monitor: Media and Misinformation.**

## Democrats And Republicans Trust Different News Sources For COVID-19 Information

Percent who say they trust information about COVID-19 they see or hear on each the following a **great deal** or a **fair amount**:



NOTE: See topline for full question wording.

SOURCE: KFF COVID-19 Vaccine Monitor (October 14-24, 2021)

**KFF COVID-19  
Vaccine Monitor**

Lopes & Stokes, (2021, November 8). KFF COVID-19 Vaccine Monitor: Media and Misinformation. *KFF*.

The younger generation has used multiple way of obtaining COVID information whether that's media platforms like Facebook, Twitter, Instagram, or YouTube rather than just using different news networks. Even though social media can be an easy and accessible way to obtain information it can also house misinformation that has affect the pandemic. These types of platforms can spread misinformation quickly to a large amount of people which makes it hard to

control at times. Before the vaccine was even available posts on social media presented a range of falsehoods saying that the vaccine could alter your DNA, affect women's fertility, or the vaccine contained a microchip so the government could monitor the population (Albrecht, 2022). Social media is very much ingrained into our lives, so these types of accusations make many people think twice.

Disease control has been the overall goal since the pandemic started: to slow down the spread of disease in a way that does not overwhelm our medical system. The government has implemented multiple strategies to try to combat the spread of disease like social distancing, wearing face mask, emphasizing hand washing, and even lockdowns. This has helped the spread of the disease, but this has not solved the overall problem. The COVID-19 vaccine can help us control the spread of disease and potentially bring an end to the pandemic. For the vaccine to even work, people need to get vaccinated, and if people don't get vaccine the vaccine will not work, simple as that. Since the roll out of vaccines in early 2021, the government and health officials have been a huge advocate for individuals to get vaccinated. In many cities, there have been massive vaccination sites to help the influx of people who wanted to get vaccinated, and the government has pointed out that anyone who wants to get vaccinated can get vaccinated. But for many the hesitation to get the COVID-19 vaccines has increased rather than decreased in the last year. The vaccine mandates have made certain individual feel like the government is infringing on their rights to make their own decision about the COVID-19 vaccines. Some companies, restaurants, universities/schools, entertainment/events and other have required proof of vaccination. Many employers have also made their own vaccine mandate, and in some cases if employees don't comply with the new rules than they could be at risk for losing their job. Vaccines mandates have in some cases deterred people from getting vaccinated but on the other



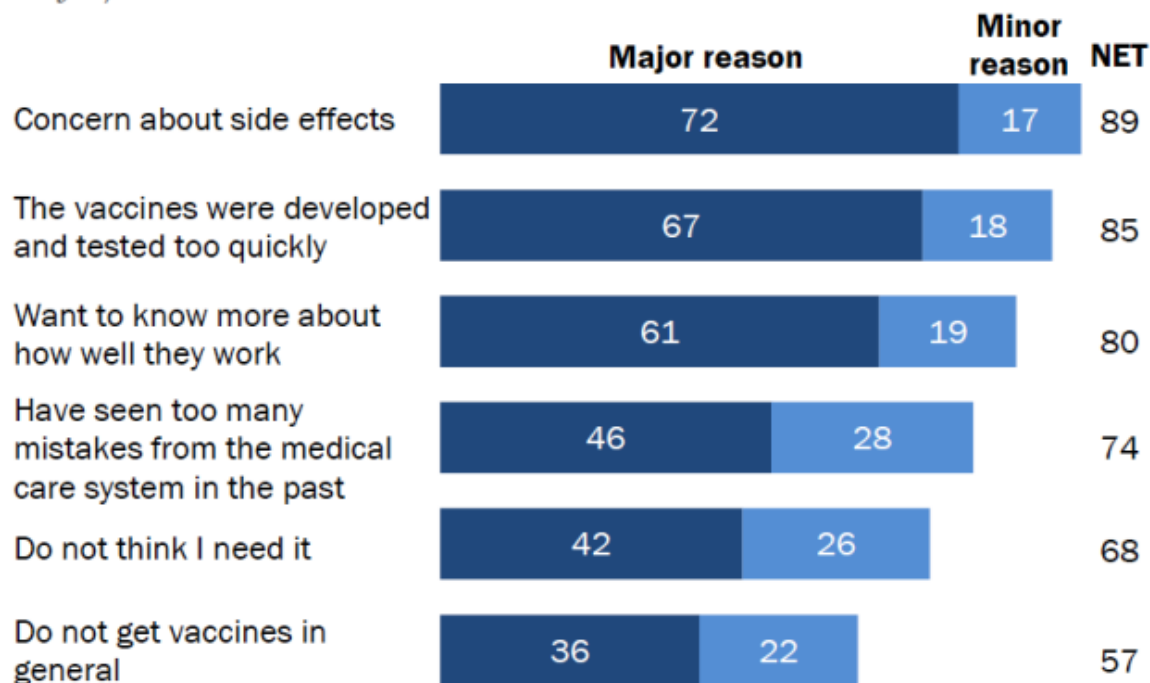
has pushed the “wait and see” group to get vaccinated. Acceptance of the COVID-19 vaccine is a huge indicator of the uptake in immunization in the United States and the world. To gain the public trust it is critical that the government is completely transparent and precise when providing vaccine information.

#### **IV. Survey Results**

Concerns about the COVID-19 vaccine ranged from unknown side effects, waiting to see if it is safe, not trusting the vaccines, and some believe they did not need the vaccines. The biggest issue, shown in figure 3 from Pew Research Center, is that 72% of American are concerns about side effects while 67% say the vaccine was developed and tested too quickly. Figure 3 also indicates other reason why individuals are unvaccinated like wanting to know more about how the vaccines works (61%), seen too many medical mistakes in the past (46%), do not think they need the vaccines (42%), and individuals who do not get vaccines in general (36%).

**Figure 3: Those disinclined to be vaccinated cite concerns about the side effects, pace of vaccine development and desire for more information as top reasons why: *Pew Research Center Science & Society.***

*Among the U.S. adults who say they probably/definitely will NOT get a vaccine to prevent COVID-19, % who say each of the following is a major/minor reason*



Note: Based on those who say they definitely/probably will NOT get a vaccine to prevent COVID-19. Respondents who gave other responses or did not give an answer are not shown.

Source: Survey conducted Feb. 16-21, 2021.

"Growing Share of Americans Say They Plan To Get a COVID-19 Vaccine – or Already Have"

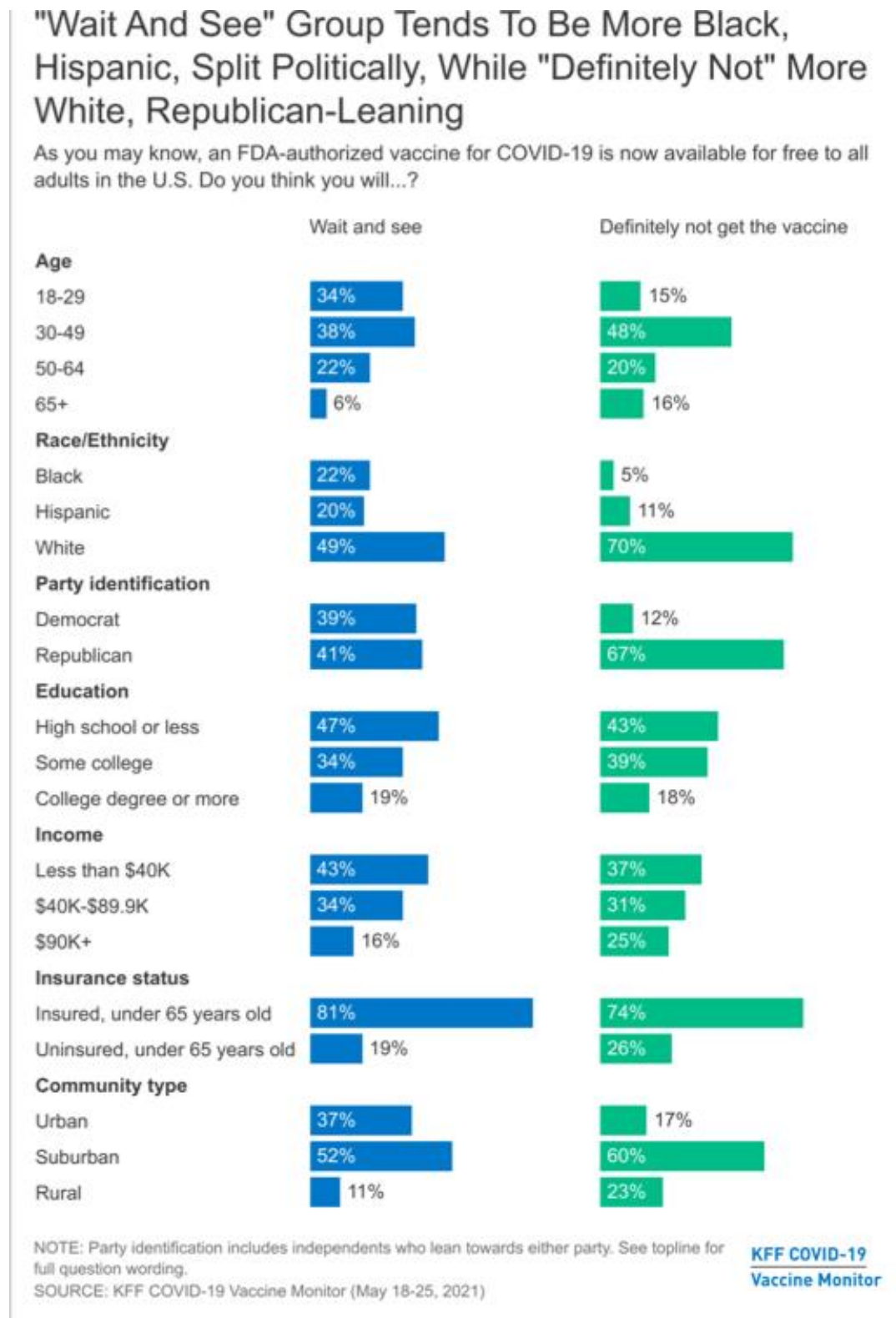
**PEW RESEARCH CENTER**

Funk, C., & Tyson, A. (2021, March 5). Growing Share of Americans Say They Plan To Get a COVID-19 Vaccine – or Already Have. *Pew Research Center Science & Society.*

During the pandemic there has been three distinct groups and their views on the COVID-19 vaccine, which is individuals who are certain they will be vaccinated, "wait and see" and "definitely not". The demographics of the "wait and see" group is ages 18-49 years old, mostly

white, evenly split between political parties, has an education of high school or less, makes less than \$40,000 a year, and tends to live in a suburban area shown in figure 4. Of those who want to 'wait and see', 49% were White, 22% were Black and 20% were Hispanic. The demographics of the "definitely not" group is predominantly ages 30-49, white, republican, education level of either high school or some college, make less than \$40,000 a year, and tends to live in a suburban area shown in figure 4. Of those who report that they will 'definitely not' get the vaccine, 67% were Republican while only 12% were Democrats. This report breaks down the percentage of individuals by demographics (age, race, party, education, income, and community type) of both the "wait and see" and the "definitely not" groups which shows that within each demographic there is still some concern about getting the COVID-19 vaccine.

Figure 4: (Source: Kaiser Family Foundation Survey, June by The New York Times)



Sparks, G. (2021, June 11). KFF COVID-19 Vaccine Monitor: Profile Of The Unvaccinated. *KFF*

Many of the “wait and see” group are waiting for the full F.D.A approval, personal physician to provide the vaccine or even if it is required to fly. But the “definitely not” group has less motivation and extremely hard to change their minds about get vaccinated even through it has been approved by the F.D.A or even if it was required to fly. Obstacles with obtaining the vaccine, potentially hidden cost or just waiting until someone they trust can prove the vaccine are fears or worries that many individuals have whom are not yet vaccinated (Bosman,2021). The outspoken critics aren't necessarily worried about becoming seriously ill from COVID-19 but have major mistrust in the government and pharmaceutical companies that make the vaccines. The Kaiser Family Foundation found the top reason why American are not getting vaccinated by vaccination intention, race/ethnicity, and political party in table 5 (Lopes, 2021). The top reasons why individuals are not vaccinated comes down to either side effects or the vaccine is too new (see table 5). The concern that the vaccine is too new is a problem whether you’re in the “wait and see” or “definitely not” group, Black, Hispanic, White, Democrat, Independent or Republican. 55% of Republican thought that they did not need to get vaccinated at all whereas only 36% of Democrats thought that they did not need the vaccine. African American (55%), Hispanics (60%) and White (54%) say that the one of the reasons for not becoming vaccinated are the unknown side effects of the COVID-19 vaccine. 50% of individual who considers themselves in the “definitely not” group say that the COVID-19 vaccine is not safe to administer verse 31% of individual who considers themselves in the wait and see” group feel that it is safe to administer. Overall, table 5 shows that a portion of American have numerous concerns when it comes to the COVID-19 vaccine and it doesn’t not matter what your race/ethnicity, COVID-19 vaccination intention, or political party are.

**Table 5: KFF COVID-19 Vaccine Monitor: June 2021.**

Percent who say each is a MAJOR reason why they haven't gotten vaccinated:	Total unvaccinated	COVID-19 Vaccination intention		Race/Ethnicity			Party ID		
		Wait and see	Definitely not	Black	Hispanic	White	Dem.	Ind.	Rep.
The vaccine is too new	53%	67%	52%	55%	54%	54%	63%	50%	51%
Worried about side effects	53	57	61	55	60	51	57	54	51
Just don't want to get the vaccine	43	25	63	30	34	48	36	34	55
Don't trust the government	38	29	55	31	34	40	25	35	47
Don't think they need the COVID-19 vaccine	38	21	54	27	42	38	25	28	47
Do not believe the COVID-19 vaccines are safe	37	31	50	29	38	40	30	34	46
Don't trust vaccines in general	26	19	38	27	21	26	27	27	26
Have a medical reason why they can't get the vaccine at this time	14	14	17	7	18	15	9	17	14
Too busy or have not had time to get it	12	13	6	17	22	9	17	10	5
Don't like getting shots	12	12	10	17	14	10	22	12	4
Worried about missing work	7	7	3	9	18	3	11	8	3
Difficult to travel to a vaccination site	6	9	3	5	13	4	7	7	4
Not sure how or where to get the vaccine	5	7	2	6	13	2	6	5	1
Worried they will have to pay to get the vaccine	5	7	1	10	12	2	6	6	1

Lopes & Stokes, 2021. (20. KFF COVID-19 Vaccine Monitor: June 2021. *KFF*)

## V. Future Vaccinations Issues

When looking at future vaccination trends, it's critical to investigate the impacts of both the past and the present tendencies. As a result of the COVID-19 pandemic, there has been an increase of global awareness for the importance of comprehending the complex political, social, and behavioral factors that influence public support of effective, scientifically rigorous, and morally acceptable recommendations to reduce transmission, including vaccine acceptance in the future (Dubé et al., 2021). To identify the issue, it is important to understand the difference between vaccine-hesitant and anti-vaccines. Many people use these words interchangeably, but they mean two different things. As opposed to the dichotomous anti-versus pro-vaccine perspective, vaccine hesitancy refers to a spectrum of possible attitudes and behaviors ranging from active vaccine demand to complete vaccine refusal. People who consider themselves vaccines hesitant can range from delaying vaccinations, may be reluctant but still accept, or even refuse certain vaccines but not all. Anti-vaccine is a term used to designate people who publicly voice their concerns and devote part of their time to the Anti-vaccine movement (Dubé et al., 2021). When communicating vaccine information, it is vital to know the individual's attitudes and beliefs towards vaccines. It is important to target the younger ages groups when it comes to influencing vaccine behavior because they are the next generation of individual who will become parents and make their own decisions about vaccines. By using a combination of communication channels, such as interpersonal, community-based, and mass media channels, is preferable over a single channel approach because it has a better chance of changing mindsets (Arede, 2019). This is critical moving forward because we cannot continue to use the same strategies and expect the same results. Focusing more on the local vaccination cultures, researchers can identify on a personal level why individuals either refuse or accept vaccines. Contexts like social, cultural,

historical, and political factors influence how people feel about and decided on vaccination. Because vaccine information is used in the decision-making process around vaccination, public health must devise an effective strategy for communicating vaccine information to the public.

The benefits of vaccines include increased life expectancy, protection from new and re-emerging health threats, and increased productivity. The best tool to control the spread of infectious diseases and improve global health is vaccines. Effective policies that encourage vaccine development, ensure vaccine financing, and improve access to vaccines are necessary to achieve the benefits associated with vaccination for the population. Continuing to fund platforms like the U.S. Vaccines for Children Program, which helps children have free access to all CDC-recommended vaccines, has helped increase the uptakes of childhood vaccines. The Expanded Program on Immunization was launched in 1974 to increase access to vaccines, and today Gavi (the Vaccine Alliance) helps provide financial support to make sure that children in low-income countries also have access to vaccines (Gerberding & Haynes, 2021). These programs continue to advocate for immunization and increase disease control around the world but the key to increasing immunization depends on trust. Vaccine confidence is based on belief in the products' safety and efficacy, trust in vaccine manufacturers and healthcare providers who administer vaccines, and trust in lawmakers who assess scientific evidence and issue vaccination recommendations. Long-term public health consequences include not being successful in gaining the trust of the individual or population at risk. Developing a better understanding of community dynamics, sociocultural factors, and local knowledge, as well as how vaccine criticism may impact vaccine acceptance, is more important than ever (Dubé et al., 2021).



## **VI. Discussion**

The COVID-19 pandemic truly tested the limits of the American health care system and other health care systems around the world. Health care has seen more change in the past two years than it has seen in a decade with a range of advantages and disadvantages. Long-standing cracks in the foundation of the United States' health-care system were magnified by the pandemic, which exposed those cracks to a population that had never seen them before (Schumann, 2021). The United States was not prepared for the magnitude of how much the COVID-19 pandemic would affect society. This novel virus has revealed the United States to be inadequate, overconfident, and ineffective when it comes to pandemic preparedness. This pandemic has shown the major health inequity and the need for stronger public health policies in the United States. Individuals who are unable to telework, those living in high-density housing, people who tend to work low-paying jobs like grocery store or fast food, or essential jobs like nurses or doctors, and individual who have preexisting condition have been disproportionately affect by COVID-19 (Juliano et al., 2021). Even though many public health officials understand the disparities in health status by race, ethnicity, and income, the pandemic magnified these issues. People of color and individuals with fewer resources unreasonably have been effect by the economic crisis that COVID-19 has cause by business closures and job losses. This has emphasized the need to address these concerns not just for people who have access to health care but for everyone.

Another issue was the lack of centralized control and information from the federal government which gave states all the flexibility to address COVID-19 however they wanted to. As a result, states developed their own control measures, resulting in disparate responses, patchy case suppression, competition for PPE and ventilators, and continued disease spread (Daszak et

al., 2021). Many states took CDC guidelines seriously and shut down while other states lifted mandates as early as the summer of 2020. This showed the lack of leadership and organization at both the state and federal level which had an impact on the control and spread of COVID-19 in the United States. There also was no centralized resource to obtain COVID-19 information from, and it seemed like at times some departments were not on the same page when it came to COVID-19. White House, the US Department of Health and Human Services, the Food and Drug Administration, and the Centers for Disease Control and Prevention have all said conflicting messages, which has undermined public confidence in federal decision making and commitment to a robust partnership between federal, state, and local agencies (Juliano et al., 2021). With the lack of a coherent national approach in the United States, millions of lives have been lost due to the virus. This will likely not be the last viral outbreak that affects the United States, so planning and preparing for the next pandemic is the key to success.

Nevertheless, the pandemic has brought significant value and awareness to the field of public health. Underfunding of our local, state, federal, tribal, and territorial public health systems is getting renewed attention. There is a need to increase the capacity of public health authorities to prevent and respond to several threats, both emerging and routine. Individuals are now understanding the value that a local public health department brings to a community. It is more important than ever for public health officials to preach that preventing diseases like COVID-19 is simpler and ultimately far less expensive than treating them. Prevention is key rather than treatment when it comes to disease control but to have a prevention plan public health needs significantly more funding to implement these control measures. Our healthcare system is typically dominated by a narrative that emphasizes medical treatment and tertiary prevention,

public health and community leaders must be willing to push an agenda that emphasizes community health, primary prevention, and wellness.

For more than 100 years, the United States has not experienced difficulties posed by a global pandemic such as COVID-19. To move forward and rebuild it is essential to learn from our mistakes and achievements during this pandemic. This pandemic has tremendously impacted every part of society and showed at the local, state, and federal levels how unprepared we were as a country. The early response to this novel virus revealed that prior planning did not pay enough attention to the political consequences of public health actions, nor did planners' control for public officials willingly ignoring, weakening, and undermining public health authority to avoid the costs of economic instability or to strengthen their reelection chances in such a profound and dangerous way (Juliano et al., 2021). The need to increase the use of disease surveillance which will help us target certain at-risk communities and provide intervention to stop the spread of disease. Also creating a more responsive healthcare system that could withstand health-related emergencies or outbreaks. Even continuing to research the interventions that were used during the pandemic to see if they were useful and effective. Public health is vital to society at a federal, state, and local level to help prevent disease and limit the impact that disease can have on society.

## **VII. Conclusion**

Public Health officials rely on vaccines to help control and stop the spread of disease across the world. Individuals who are either vaccine-hesitant or anti-vaccine are at a risk for diseases that could be prevented by getting vaccinated. They are also at risk for spreading vaccine-preventable diseases which put others in harm. It is essential that public health officials and primary care providers continue to educate people about the effectiveness of being vaccinated and how it not only helps you but the people around you. Individuals will continue to make their own decision when it comes to vaccines but educating them in the process is important. A lot of trusts have been lost during the pandemic, whether it is at the local, state, or federal level when it comes to vaccines. Future research must prioritize at an individual level the behavioral aspects of why people decide to get vaccinated or not too. Vaccines will continue to evolve with better and new technology but if there is no one receiving the vaccine how can it become beneficial?

## Reference

Aizenman, N. (2021, November 10). Why low income countries are so short on COVID vaccines.

Hint: It's not boosters. *NPR*.

<https://www.npr.org/sections/goatsandsoda/2021/11/10/1052078529/why-low-income-countries-are-so-short-on-covid-vaccines-hint-its-not-boosters>

Albrecht, D. (2022). Vaccination, politics and COVID-19 impacts. *BMC Public Health*, 22(1), 96.

<https://doi.org/10.1186/s12889-021-12432-x>

Arede, M., Bravo-Araya, M., Bouchard, É., Singh Gill, G., Plajer, V., Shehraj, A., & Adam Shuaib,

Y. (2019). Combating Vaccine Hesitancy: Teaching the Next Generation to Navigate Through the Post Truth Era. *Frontiers in Public Health*, 6.

<https://www.frontiersin.org/article/10.3389/fpubh.2018.00381>

*Birth-18 Years Immunization Schedule* | CDC. (2021, June 16).

<https://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html>

Bosman, J., Hoffman, J., Sanger-Katz, M., & Arango, T. (2021, July 31). Who Are the

Unvaccinated in America? There's No One Answer. *The New York Times*.

<https://www.nytimes.com/2021/07/31/us/virus-unvaccinated-americans.html>

CDC. (2020a, February 11). *COVID-19 and Your Health*. Centers for Disease Control and Prevention. <https://www.cdc.gov/coronavirus/2019-ncov/your-health/about-covid-19/basics-covid-19.html>

CDC. (2020b, March 28). *COVID Data Tracker*. Centers for Disease Control and Prevention. <https://covid.cdc.gov/covid-data-tracker>

CDC. (2022, January 5). *CDC Museum COVID-19 Timeline*. Centers for Disease Control and Prevention. <https://www.cdc.gov/museum/timeline/covid19.html>

Daszak, P., Keusch, G. T., Phelan, A. L., Johnson, C. K., & Osterholm, M. T. (2021). Infectious Disease Threats: A Rebound To Resilience. *Health Affairs*, *40*(2), 204–211. <https://doi.org/10.1377/hlthaff.2020.01544>

Dubé, È., Ward, J. K., Verger, P., & MacDonald, N. E. (2021). Vaccine Hesitancy, Acceptance, and Anti-Vaccination: Trends and Future Prospects for Public Health. *Annual Review of Public Health*, *42*(1), 175–191. <https://doi.org/10.1146/annurev-publhealth-090419-102240>

Feikin DR, Lezotte DC, Hamman RF, Salmon DA, Chen RT, Hoffman RE. Individual and Community Risks of Measles and Pertussis Associated With Personal Exemptions to Immunization. *JAMA*. 2000;284(24):3145–3150. doi:10.1001/jama.284.24.3145

- Funk, C., & Tyson, A. (2021, March 5). Growing Share of Americans Say They Plan To Get a COVID-19 Vaccine – or Already Have. *Pew Research Center Science & Society*.  
<https://www.pewresearch.org/science/2021/03/05/growing-share-of-americans-say-they-plan-to-get-a-covid-19-vaccine-or-already-have/>
- Garett, R., & Young, S. D. (2021). Online misinformation and vaccine hesitancy. *Translational Behavioral Medicine*, 11(12), 2194–2199. <https://doi.org/10.1093/tbm/ibab128>
- Geoghegan, S., O'Callaghan, K. P., & Offit, P. A. (2020). Vaccine Safety: Myths and Misinformation. *Frontiers in microbiology*, 11, 372. <https://doi.org/10.3389/fmicb.2020.00372>
- Gerberding, J. L., & Haynes, B. F. (2021). Vaccine Innovations — Past and Future. *New England Journal of Medicine*, 384(5), 393–396. <https://doi.org/10.1056/NEJMp2029466>
- Golden, S. H. (2021, November 10). *COVID-19 Vaccine Hesitancy: 12 Things You Need to Know*.  
<https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/covid19-vaccine-hesitancy-12-things-you-need-to-know>
- Holcombe, J. H., Steve Almasy, Madeline. (2021, August 18). *If you live in a state with a low vaccination rate, you're 4 times more likely to be hospitalized and more than 5 times more likely to die*. CNN. <https://www.cnn.com/2021/08/18/health/us-coronavirus-wednesday/index.html>

- Hussain, A., Ali, S., Ahmed, M., & Hussain, S. (2018). The Anti-vaccination Movement: A Regression in Modern Medicine. *Cureus*, 10(7), e2919. <https://doi.org/10.7759/cureus.2919>
- Juliano, C., Castrucci, B., & Fraser, M. R. (2021). COVID-19 and Public Health: Looking Back, Moving Forward. *Journal of Public Health Management and Practice*, 27, S1. <https://doi.org/10.1097/PHH.0000000000001300>
- Lopes, L., Stokes, M., & 2021. (2021, November 8). KFF COVID-19 Vaccine Monitor: Media and Misinformation. *KFF*. <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-media-and-misinformation/>
- Lopes, L., Stokes, M., & 2021. (2021, June 30). KFF COVID-19 Vaccine Monitor: June 2021. *KFF*. <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-june-2021/>
- Lopes, L., Stokes, M., & 2022. (2022, February 1). KFF COVID-19 Vaccine Monitor: January 2022 Parents And Kids Update. *KFF*. <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-january-2022-parents-and-kids-update/>
- Louis Pasteur and the Development of the Attenuated Vaccine*. (2016, November 23). VBI Vaccines. <https://www.vbivaccines.com/evlp-platform/louis-pasteur-attenuated-vaccine/>



- Omer, S. B., Salmon, D. A., Orenstein, W. A., deHart, M. P., & Halsey, N. (2009). Vaccine Refusal, Mandatory Immunization, and the Risks of Vaccine-Preventable Diseases. *New England Journal of Medicine*, 360(19), 1981–1988. <https://doi.org/10.1056/NEJMsa0806477>
- Plotkin, S. A., & Plotkin, S. L. (2011). The development of vaccines: how the past led to the future. *Nature Reviews Microbiology*, 9(12), 889–893. <https://doi.org/10.1038/nrmicro2668>
- Plotkin, S. (2014). History of vaccination. *Proceedings of the National Academy of Sciences*, 111(34), 12283–12287. <https://doi.org/10.1073/pnas.1400472111>
- Plotkin S. A. (2005). Vaccines: past, present and future. *Nature medicine*, 11(4 Suppl), S5–S11. <https://doi.org/10.1038/nm1209>
- Ritchie, H., Mathieu, E., Rodés-Guirao, L., Appel, C., Giattino, C., Ortiz-Ospina, E., Hasell, J., Macdonald, B., Beltekian, D., & Roser, M. (2020). Coronavirus Pandemic (COVID-19). *Our World in Data*. <https://ourworldindata.org/covid-vaccinations>
- Rodgers DV, Gindler JS, Atkinson WL, Markowitz LE. High attack rates and case fatality during a measles outbreak in groups with religious exemption to vaccination. *Pediatr Infect Dis J*. 1993 Apr;12(4):288-92. doi: 10.1097/00006454-199304000-00006. PMID: 8483622

- Schumann, J. H. (2021, May 13). How Health Care In The U.S. May Change After COVID: An Optimist's Outlook. *NPR*. <https://www.npr.org/sections/health-shots/2021/05/13/996233365/how-health-care-in-the-u-s-may-change-after-covid-an-optimists-outlook>
- Shen, S. C., & Dubey, V. (2019). Addressing vaccine hesitancy: Clinical guidance for primary care physicians working with parents. *Canadian family physician Medecin de famille canadien*, 65(3), 175–181.
- Shmerling, R. H. S. (2021, August 25). *Unvaccinated and misunderstood? Let's talk*. Harvard Health. <https://www.health.harvard.edu/blog/unvaccinated-and-misunderstood-lets-talk-202108252580>
- Siddiqui, M., Salmon, D. A., & Omer, S. B. (2013). Epidemiology of vaccine hesitancy in the United States. *Human Vaccines & Immunotherapeutics*, 9(12), 2643–2648. <https://doi.org/10.4161/hv.27243>
- Sparks, G. (2021, June 11). KFF COVID-19 Vaccine Monitor: Profile Of The Unvaccinated. *KFF*. <https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-profile-of-the-unvaccinated/>
- Stern, A. M., & Markel, H. (2005). The History Of Vaccines And Immunization: Familiar Patterns, New Challenges. *Health Affairs*, 24(3), 611–621. <https://doi.org/10.1377/hlthaff.24.3.611>

Wolfe, R. M., & Sharp, L. K. (2002). Anti-vaccinationists past and present. *BMJ*

(Clinical research ed.), 325(7361), 430–432. <https://doi.org/10.1136/bmj.325.7361.430>

*World leaders launch call for renewed support for vaccination in 2022 as part of the global fight against COVID-19.* (n.d.). Gavi. Retrieved February 27, 2022, from

<https://www.gavi.org/news/media-room/world-leaders-launch-call-renewed-support-vaccination-2022-part-global-fight>

Yasmin, F., Najeeb, H., Moeed, A., Naeem, U., Asghar, M. S., Chughtai, N. U., Yousaf, Z., Seboka, B. T., Ullah, I., Lin, C.-Y., & Pakpour, A. H. (2021). COVID-19 Vaccine Hesitancy in the United States: A Systematic Review. *Frontiers in Public Health, 9*, 770985.

<https://doi.org/10.3389/fpubh.2021.770985>