

Sustaining and Increasing Confidence in Vaccination across the Lifespan: Recommendations from the National Vaccine Advisory Committee

Approved on September 22, 2022

Introduction

Vaccines have prevented disease for more than two centuries¹, and have been touted as one of the most effective public health interventions^{2,3}—saving millions of lives every year and preventing illnesses in communities throughout the globe.^{4,5} Yet, every year, tens of thousands of Americans get sick from diseases that could be prevented by vaccines – many of them are hospitalized, some of them have died. As this report was approved, more than two years into the COVID-19 pandemic, the United States (US) has exceeded one million deaths and well over 95 million Americans have been diagnosed with the disease. One analysis found 318,981 lives could have been saved if all adults had been vaccinated during the period of January 1, 2021 to April 30, 2022.⁶ These numbers illustrate how vaccine hesitancy and refusal have become important contributors to illness and death in America. As the pandemic caused delays in routine vaccination worldwide^{7,8} there is an even greater need to build vaccine confidence.

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Before the COVID-19 pandemic began researchers started to sound an alarm⁹ as the proportion of parents opting their child out of required school-entry vaccinations increased, when more states and large metropolitan centers granted nonmedical exemptions.¹⁰

Currently, 44 states and Washington D.C. grant religious exemptions and 15 states allow philosophical exemptions.¹¹ The reasons for this trend are multifactorial and likely encompass a drop in parents' vaccine confidence, though this has not been confirmed empirically.^{12,13,14}

Despite clear scientific evidence consistently confirming the safety and benefits of vaccines¹⁵, deep-seated fears, conspiracy theories, and political ideologies associated with low vaccine confidence have caused delays or refusals of timely vaccination in segments of society.¹⁶ For example, the measles outbreaks in and around New York City in 2018 and 2019 were concentrated in geographic areas with low vaccination rates due to concerns about vaccine safety exacerbated by targeted antivaccination campaigns.¹⁷ The outbreak began when one unvaccinated child introduced measles to the community, causing serious illness and a resource-intensive response by public health officials. Moreover, with the COVID-19 pandemic causing delays in routine vaccination worldwide in people of all ages^{18,19} increases in vaccine confidence could save lives in communities across the globe.

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We find ourselves at a time when high vaccine confidence is essential, but also less assured, and more difficult to achieve as intentional disinformation and unintentional misinformation challenge vaccination efforts.^{20, 21} This is a critical time to educate the public about the robust systems in place to assess and achieve vaccine safety and quality, which involve both government, industry, and academic researchers. Awareness and understanding of vaccine effectiveness and safety are crucial to ensuring sound decisions about vaccination are being made. As many people still need to catch-up on routine vaccinations missed during the pandemic^{22,23}, maintaining and improving confidence in vaccination is essential, along with other public health measures, to mitigating the pandemic²⁴ and other vaccine-preventable diseases to improve the health of all Americans.

Key Definitions

Experts have called for conceptual and definitional clarity in research on vaccination uptake.²⁵ Investigations into why people get themselves or their children vaccinated have focused on an array of important constructs, including attitudes, confidence, hesitancy, intentions, refusal, and delay. The constructs themselves and how they relate to each other have received less attention. The result has often been the interchangeable use of loosely defined terms of distinct constructs. This has created confusion in the research literature that is manifest in a lack of clarity on the implications of research findings and their application to policymaking and vaccination programs.

Fortunately, an increasing consensus has formed around conceptual definitions for many of these constructs.²⁶ Attitudes reflect how individuals think and feel about vaccination and includes confidence. Intentions are one's motivation to get vaccinated and includes hesitancy. Behavior is what one does, and includes vaccine refusal, delay, uptake, and coverage. Consensus has also emerged around how these constructs are ordered: attitudes inform intentions, which shape behavior.²⁷ However, it is important to recognize that behaviors, particularly group behavior, can also reinforce or modify attitudes.

Since vaccine confidence is the subject of this report, we focus on defining vaccine confidence and distinguishing it from other vaccine-related constructs and concepts. To date, the field lacks both clear metrics and a comprehensive conceptual study of vaccine confidence, its antecedents, or its discriminating characteristics.

For the purposes of this report, the NVAC therefore defines vaccine confidence as: a belief that vaccines work, are very safe, and are part of a trustworthy medical system. This definition of vaccine confidence is consistent with the Centers for Disease Control and Prevention (CDC) as well as the World Health Organization (WHO).²⁸

In addition, the NVAC distinguishes vaccine confidence from and defines the following terms:

- **Vaccine Hesitancy:** A motivational state of being conflicted about, or opposed to, getting vaccinated, which includes intentions and willingness to vaccinate.
- **Vaccine Refusal:** Declining a vaccine when offered.

- **Vaccine Delay:** Receipt of a vaccine after the recommended age as the result of a deliberate choice, passive inaction, or forces external to the individual, such as a vaccine shortage.
- **Vaccine Uptake:** The receipt of a vaccine.
- **Vaccine Coverage:** The proportion of the eligible population who received a vaccine.

Acronyms Used in this Report

- Agency for Healthcare Research and Quality (AHRQ)
- Assistant Secretary for Health (ASH)
- Centers for Disease Control and Prevention (CDC)
- Department of Health and Human Services (HHS)
- Food and Drug Administration (FDA)
- Human papillomavirus (HPV)
- Measles, Mumps, and Rubella (MMR)
- National Institutes for Health (NIH)
- National Vaccine Advisory Committee (NVAC)
- United States (US)
- Vaccine Confidence Subcommittee (VCS)
- World Health Organization (WHO)

Scope of Report

While one goal of increasing vaccine confidence is to improve uptake, this report is not principally about vaccine uptake. The NVAC acknowledges that vaccine confidence and hesitancy are not the only factors causing vaccination receipt, delay, or refusal. Vaccine uptake involves factors other than confidence in vaccination, such as access to vaccines and an ability to afford the costs associated with vaccination. Vaccine confidence, however, is important beyond uptake for maintaining trust in vaccination recommendations and fostering a more resilient public, with that resiliency reflected in willingness to accept new information, new vaccines, and evolving science.

This report is a follow-on report to the NVAC report published on June 10, 2015, *Assessing the State of Vaccine Confidence in the United States*, which solely focused on recommended childhood vaccines in America. This report explores vaccine confidence across the lifespan as well as vaccine confidence in specific vaccines, and summarizes research conducted and evidence compiled since 2015. Both reports offer recommendations for strategies to maintain and improve vaccine confidence.

What is New in Vaccine Confidence Since 2015?

Over the past seven years, the NVAC has provided expert guidance on improving vaccine confidence in response to outbreaks, new vaccine recommendations, and a growing vaccine-related research base. The former National Vaccine Program Office and the Office of Infectious Disease and HIV/AIDS that now houses the National Vaccine

Program have funded and encouraged research, hosted several meetings to increase collaboration and coordination to improve vaccine confidence, and released a national vaccine plan, which includes a goal to increase knowledge of and confidence in routinely recommended vaccines.²⁹

The CDC,³⁰ the US Food and Drug Administration (FDA),³¹ the National Institutes for Health (NIH)³², and the Agency for Healthcare Research and Quality (AHRQ)³³ have all invested in improving vaccine confidence at the national level, and several groups have invested in improving vaccine confidence at state and local levels. In 2019, vaccine hesitancy was named one of the top ten public health threats globally by the World Health Organization³⁴ and CDC launched the *Vaccinate with Confidence* strategic framework to strengthen public trust in vaccines and reduce the burden of vaccine-preventable outbreaks.³⁵ Despite these efforts, in 2019 we saw a surge in measles cases not seen since the illness was eliminated in the United States almost twenty years before.³⁶ Some of the reasons cited for this outbreak include the specific targeting of ethnic and religious groups by antivaccine activists, and reductions in vaccine coverage in areas allowing exemptions for nonmedical reasons.³⁷

In March 2020, WHO declared SARS-CoV-2 (the virus that causes COVID-19) a global pandemic. Since December 2020 when the first COVID-19 vaccine was authorized for emergency use, the value of vaccines in mitigating the pandemic and preventing deadly infectious diseases has been on display. The public health and medical communities have also experienced new and emerging vaccine confidence threats, including significant increases in vaccine misinformation and disinformation. Anti-vaccination advocates have increased their outreach to broader online and in-person audiences, and proactively engaged and mobilized groups of people beyond those more typically focused on childhood vaccines.^{38,39}

With the emergence of COVID-19, historic investments have been made to build vaccine confidence nationally as well as in specific communities across the nation. For example, the Department of Health and Human Services (HHS) COVID-19 public education campaign, *We Can Do This*, aims to increase both public confidence in and uptake of COVID-19 vaccines, among other goals, at the national level. To expand reach and increase effectiveness in achieving objectives, the campaign has engaged a broad range of community organizations, local leaders, and others who share the goal of improving vaccine confidence and uptake in local communities.

Likewise, the Surgeon General of the United States has made addressing health misinformation a top priority, and recently issued an advisory⁴⁰ to call attention to the issue, stating “Amid all this information, many people have also been exposed to health misinformation: information that is false, inaccurate, or misleading according to the best available evidence at the time. Misinformation has caused confusion and led people to decline COVID-19 vaccines.... For example, a recent study⁴¹ showed that even brief

exposure to COVID-19 vaccine misinformation made people less likely to want a COVID-19 vaccine. Misinformation has also led to harassment of and violence against public health workers⁴², health professionals⁴³, and other frontline workers tasked with communicating evolving public health measures.” The groups contributing to the spread of vaccine disinformation through social media include political organizations⁴⁴ rallying behind concepts of health freedom,⁴⁵ and non-governmental organizations identified by the Center for Countering Digital Hate⁴⁶ as the ”disinformation dozen.”

Charge

The Assistant Secretary for Health (ASH) charged the committee on June 4, 2019, with writing a report that describes “the determinants of vaccination confidence across the lifespan, *suggestions as to what HHS can do to improve confidence in all recommended vaccines, and guidance on the utilization of evidence-informed best practice from a variety of research fields such as anthropology, psychology, and economics on how to successfully foster vaccine confidence through public, provider, and policy interventions.*”

The ASH also asked the NVAC to:

- Synthesize and summarize existing evidence and applicable research addressing vaccine confidence, as applicable to age groups and/or specific vaccines that has occurred since 2015 when the first NVAC report on vaccine confidence was published.
- Recommend new and implementable strategies and approaches for sustaining and increasing confidence across the lifespan.

Process

In response to this charge, the NVAC established the Vaccine Confidence Subcommittee (VCS) comprised of NVAC members, a broad array of federal and non-federal stakeholders including both ex-officio and liaison members of the committee and experts not on the NVAC. The subcommittee met regularly to make decisions about the literature review, hear presentations, review research and data points, develop recommendations, and reach consensus on the recommendations in this report. Experts in vaccine confidence presented at both the NVAC meetings and the VCS meetings, which contributed to information and recommendations in this report.

The co-chairs also presented progress updates to the full committee several times during the development of the report, including to review and vote on a [letter to the Assistant Secretary for Health on building confidence for COVID-19 vaccine development](#). This letter was approved by the NVAC on September 23, 2020.⁴⁷ The NVAC members received drafts of this report by email for input and the committee was updated regularly during the report development. This report was approved by the NVAC on September 22, 2022.

Vaccine Confidence Determinants Across the Lifespan

Many factors influence confidence in vaccines and vaccination of children and adults, including social, cultural, behavioral, religious, philosophical, and political factors as well as individual and group values, and vaccine-specific characteristics and information.^{48,49,50,51,52} Some vaccine skeptics also hold and disseminate non-scientific views of how viruses and the immune system work.⁵³ Building and maintaining vaccine confidence is complex and includes factoring in specific vaccines and recommendations, individual and health care providers' previous experiences, the availability and visibility of both accurate information and misinformation, trust in public health and government, and the severity of disease(s) the vaccine prevents. Additionally, factors outside the scope of this report, such as awareness of vaccination recommendations and access to recommended vaccines, play important roles in vaccine uptake.

While the concepts of vaccine confidence and hesitancy are important to vaccine uptake, research indicates that people can accept vaccines while still being hesitant, be both hesitant and confident in different aspects of a vaccine, or confident in some vaccines while being hesitant about others. For example, one can believe that a vaccine has a strong safety profile but lack confidence in the vaccine's capacity to prevent infection.⁵⁴

Vaccine confidence falls along a continuum that ranges from high to low^{55, 56} and this can shift during life events or as people receive accurate information or misinformation. Research suggests that those who have questions related to vaccines or who are not strongly opposed to vaccination are the most likely to respond positively to efforts to increase their confidence. Conversely, such efforts can strengthen resolve among people who are strongly opposed to vaccines.⁵⁷

Both evidence-based information and misinformation influence vaccine decision-making, which opens the door for false claims and inaccurate understanding of the risk of vaccine-preventable diseases to reduce confidence. Misinformation and disinformation about childhood vaccines tends to focus on the safety and efficacy of vaccines^{58, 59} despite a well-established and strong safety record and effectiveness review for each recommended vaccine^{60,61,62}. Besides misleading people, misinformation and disinformation can cause confusion, which prevents people from acting altogether.^{63,64} Likewise, researchers identified cognitive biases⁶⁵ that can contribute to the decisions and judgements people make about vaccines, such as confirmation bias, or the inclination to seek out information that confirms existing beliefs and omission bias, or the belief that inaction is more acceptable than an action, even if the inaction may cause harm.

Beliefs, such as natural products being safer and/or more effective, distrust in public health authorities^{66,67} and the government or the vaccine industry, or valuing individual liberties over societal benefits also influence vaccine confidence. One recent study found that anti-vaccination attitudes were highest in people who believed in conspiracy theories, reported a low tolerance for messages that conflicted with their freedom of choice, had an aversion towards blood and needles, and held individualistic or hierarchical world or societal views.⁶⁸

Children

In the United States, vaccination coverage of children and adolescents is high, as reflected in CDC data⁶⁹ both before the pandemic and afterwards. CDC reports high national vaccination coverage data for all childhood recommended vaccines⁷⁰, though with notable decreases during the COVID-19 pandemic⁷¹ and troublesome disparities in age, race, ethnicity, and geographic location for many vaccines. For example, recent influenza vaccine coverage reported by CDC, indicated that children ages 6 months to 4 years had higher seasonal influenza vaccine coverage than children ages 5-12 years or 13-17 years of age, and significant racial and ethnic disparities in influenza vaccine coverage persist.⁷² Gallup surveys suggest that most American parents find it extremely or very important to vaccinate their children. However, less parents (84%) reported this in 2019 and 2015 than in 2011 (94%).⁷³

Vaccination uptake for teens varies by vaccine, with some high coverage rates and some rates that are lower, including some disparities.⁷⁴ Historically, human papillomavirus (HPV) vaccine coverage has been lower than most other routine vaccines for adolescents but has continued to improve from 71.5% of adolescents in 2019 to 75.1% in 2020 receiving one or more doses of HPV vaccine. Likewise, the percentage of adolescents who were up to date with their HPV vaccines increased from 54.2% in 2019 to 58.6% in 2020.⁷⁵

In the United States, HPV vaccination rates are lower in rural communities than in urban areas.⁷⁶ Several studies detail hesitancy in HPV vaccination that corresponds with under-vaccination and refusal.^{77,78,79,80,81} With the HPV vaccine, in particular, despite evidence that the HPV vaccine is highly effective and very safe⁸², research findings suggest an urgent need to

increase HPV vaccine confidence, as some parents raise concerns about the effectiveness and side effects of the cancer-preventing vaccine.^{83,84}

Additionally, while researchers have shown that HPV vaccination is not associated with sexual activity,⁸⁵ some parents continue to voice concerns about earlier sexual activity onset with HPV vaccination.^{86,87} Researchers report several parental determinants related to HPV vaccine hesitancy or confidence, including medical mistrust^{88,89}, exposure to negative vaccine information,⁹⁰ thoughts that the vaccine is still too “new”^{91,92}, and a lack of understanding of the protective benefits.⁹³

In looking at childhood vaccines more broadly, vaccine hesitancy studies have shown common vaccine safety concerns, perceptions of disease susceptibility and severity, and distrust of public health authorities.⁹⁴ The same researchers found that higher percentages of non-Hispanic Black and Hispanic races were more hesitant toward childhood vaccinations than those reporting non-Hispanic White race. This is reinforced in other studies noting disparities in vaccine hesitancy for parents of children of racial and ethnic minorities.^{95,96,97} Additionally, mothers were more likely to report hesitancy than fathers, especially if they had less than a high school education.⁹⁸

Data from both the 2018 and 2019 US National Immunization Survey, show 23.6% of parents reported hesitancy toward childhood vaccines. CDC estimates this may have contributed to 15%-25% of under-vaccination in children during those years.⁹⁹ Differences exist among racial and ethnic minorities compared to the non-Hispanic White population. As minority populations are overall affected with poorer health outcomes, concentrated efforts in these populations are needed to tailor messages, correct misinformation, and address parental concerns, such as the number of vaccines a child receives at one time and the side-effects of vaccination.¹⁰⁰

Measles and Vaccine Confidence

Even though measles was eliminated in the US in 2000, the virus continues to cause outbreaks in the US, with over 300 cases tied to the California Disneyland outbreak that started in 2014. By 2018, measles resurged at global levels, which led to measles outbreaks across the US in 2018 and 2019.¹⁰¹ In 2019, the US almost lost its measles elimination status with 1,282 cases¹⁰², the greatest number of measles cases reported in the country in almost 30 years. In the same year, four other countries lost their elimination status, and the World Health Organization reported 40-700% increases of measles cases in specific regions.¹⁰³ The outbreaks in the US in 2018 and 2019 occurred in mostly unvaccinated children in geographical areas with “eroded vaccine confidence.”¹⁰⁴

Measles is highly infectious and requires very high vaccine coverage to prevent transmission in communities. The most serious complications include encephalitis (an infection that causes brain swelling), blindness, and serious respiratory infections, such as pneumonia. The measles vaccine, however, is extremely safe and effective^{105,106}, and the World Health Organization estimated measles vaccination [prevented 23.2 million deaths from 2000-2018](#).¹⁰⁷ Unfortunately, the World Health Organization also reported that measles vaccination coverage has decreased globally to below the threshold needed to maintain herd immunity.¹⁰⁸ In the US, data from the 2020-21 school

year, show 93.9% national coverage for measles, mumps, and rubella vaccination in children attending kindergarten.¹⁰⁹

However, measles vaccination has declined in some areas of the US. For example, the Michigan Department of Health found a decline in coverage of measles vaccination coverage in children in the 16-month cohort from 76.1% in May 2019 to 70.9% in May 2020. Researchers found even a 5% decline in measles vaccination coverage could result in an estimated increase of three times the number of measles cases in kids aged 2-11 years in the US each year, with at least \$2.1 million in additional costs.¹¹⁰

One of the most harmful pieces of disinformation, a discredited and redacted journal article, may have caused shifts in vaccine confidence, some Americans views of the safety of the measles, mumps and rubella vaccine, and continued misinformation over the last 24 years.¹¹¹ Fears about this vaccine appear to have intensified after anti-vaccination activism targeted specific populations, such as Orthodox Jewish communities in New York and a Somali American community in Minnesota. For example, in Minnesota, measles vaccination dropped sharply in Hennepin County from 92% in 2004 to 42% in 2016 after anti-vaccine groups repeatedly targeted the community with incorrect information about the safety of the measles, mumps, and rubella vaccine. The next year, in 2017, because vaccination coverage was so low, measles spread rapidly resulting in 75 cases, 91% of which were unvaccinated.¹¹²

This outbreak reveals how spreading incorrect, non-scientific, anti-vaccine information can contribute to declines in vaccine confidence and dangerous dips in coverage.^{113,114} Notably, culturally tailored communication was used to spread dangerous misinformation as well as in the public health response to increase vaccination rates to thwart the outbreak.¹¹⁵

Adults

Overall adult vaccination rates remain relatively low and continue to lag well behind those for children. The annual burden of vaccine-preventable diseases remains high among adults^{116, 117} and racial and ethnic disparities persist in adult vaccine coverage.^{118, 119, 120, 121} Americans aged 65 years and older are more likely than younger adults to receive the influenza vaccine¹²² and the pneumococcal vaccine.¹²³ Influenza vaccine coverage among pregnant people is also well below national targets.¹²⁴ CDC finds that about 45% of pregnant people did not receive the recommended flu or whooping cough vaccines, leaving them and their infants more vulnerable to potentially serious illnesses.¹²⁵

Trust in health care providers is associated with more positive vaccine attitudes and behaviors documented in multiple studies related to vaccine coverage among children as well as adults, pregnant people, and rural residents.^{126,127} These studies indicated that knowledge of recommended vaccines and their efficacy and safety can help build health care providers' confidence in vaccines and their willingness to confidently recommend the vaccine to their patients. A provider recommendation of influenza vaccination is the single most important predictor of uptake in pregnant people.^{128,129} Barriers to maternal vaccination include knowledge, attitudes, and beliefs about the vaccine, the safety of the vaccine for both the mother and the child, as well as provider knowledge about the vaccine.^{130, 131, 132}

Distrust of vaccines continues to be a pervasive issue especially among Black people and Hispanic Americans.^{133, 134, 135, 136} Researchers found Black Americans were more likely to be vaccinated when they had higher confidence or trust in their physicians. Historically, influenza vaccination coverage has differed with confidence or trust in the physician as well as with gender, age, insurance coverage, and acculturation in this group.¹³⁷ Quinn and colleagues reported lower trust in vaccines and the vaccine process, higher perceived risk of vaccines, and less knowledge of the vaccine as predictors for lower influenza vaccine uptake among Black respondents when compared to White respondents.¹³⁸

Black Americans perceived a higher risk of vaccine side effects, and lower risk from influenza itself. Black Americans were also more likely to report barriers to vaccination, were more hesitant about vaccines in general and the influenza vaccine specifically, more likely to believe in conspiracy theories and more likely to use natural remedies as an alternative to getting vaccinated. For Black Americans, racial bias and discrimination in a health care setting emerged as important influences on key issues such as perceived vaccine risk, lower knowledge, and reduced likelihood of vaccine uptake.¹³⁹

These factors seem to translate to Black health workers as well. In a study that examined vaccine confidence relating to the uptake of seasonal influenza vaccine, Black health care providers had lower vaccine uptake than White health care providers, primarily due to concerns about the safety, effectiveness, and necessity of the influenza vaccine.¹⁴⁰ Immunization coverage data are available for Native Americans and Alaska Natives and disparities exist,¹⁴¹ however insufficient research on vaccine confidence in this population prevents drawing firm conclusions. Some reasons cited for disparities in immunization rates in these communities include past trauma and persistent racial inequities in current health care treatment.¹⁴²

COVID-19 and Vaccine Confidence

The COVID-19 pandemic has affected global health¹⁴³ and the US has experienced extensive morbidity and mortality. As of September 19, 2022, the CDC reports 1,047,741 deaths with 95,412,766 confirmed cases of COVID-19.¹⁴⁴ Since the initial announcements that vaccines were being developed for COVID-19, numerous surveys have been conducted gauging the public's willingness to receive the vaccines.^{145, 146, 147, 148, 149, 150} While the overall willingness to take these vaccines has increased in the US, segments of the population continue to report hesitancy in the COVID-19 vaccines.^{151, 152}

The US is in the midst of the largest and most complex vaccination campaign in its history--with CDC reporting more than 224 million Americans who are fully vaccinated.¹⁵³ However, disparities exist, with southern states exhibiting the lowest levels of COVID-19 vaccination, especially among young people. A 2021 survey of American Indians and Alaska Natives conducted by the Urban Indian Health Institute found that 75% of survey participants were willing to receive a COVID-19 vaccine and 2 out of 3 survey respondents were confident that the vaccines were adequately tested for safety and effectiveness among native peoples.¹⁵⁴ Importantly, 74% believed getting vaccinated is their responsibility to their community.¹⁵⁵ By highlighting culture and language, researchers also found increased support for vaccination.¹⁵⁶

Differences in adult vaccination rates exist in rural areas, with CDC finding both higher rates of COVID-19 infection, as well as higher rates of deaths, in rural communities than urban ones.¹⁵⁷ While access to health care and vaccines likely plays a role in this disparity, CDC also finds that vaccine hesitancy plays a role in driving lower COVID-19 vaccination rates in rural areas.¹⁵⁸ The Kaiser Family Foundation reports that adults in rural areas were nearly three times more likely to state they will definitely not get a COVID-19 vaccine than adults in urban areas.¹⁵⁹ In addition to a rural-urban split in vaccine uptake, research findings show a strong political and partisan divide in COVID-19 vaccine acceptance, with far lower rates in conservative areas of the south, Appalachia, and the Mountain West.¹⁶⁰

Specific factors relating to lower COVID-19 vaccine confidence include the rapid development and approval process for these vaccines and lack of trust in the public health authorities and government.^{161, 162} Black Americans, those with lower income, less educated individuals, younger Americans, and those living in rural areas are less likely to report getting a COVID-19 vaccine or the intent to do so.^{163, 164, 165, 166, 167, 168}

Many rural Americans perceive the SAR-CoV-2 coronavirus as being less severe or serious than their urban and suburban counterparts and are more likely to believe the seriousness of this illness is generally exaggerated.¹⁶⁹ In addition to low vaccination rates in rural areas in the southern US, vaccine hesitancy and refusal very much ran along a political divide growing from health freedom ideologies.¹⁷⁰ Thus, those identified as “White Republicans” ranked among the most hesitant to COVID-19 vaccines.¹⁷¹ The most recent COVID-19 vaccination data shows uptake rates for at least one dose exceeding 90% for people 50 years old and older.¹⁷² This suggests that as risk for severe COVID-19 complications increase, political ideology has less influence.

To focus on building confidence in COVID-19 vaccines by “building trust, empowering health care personnel, and engaging communities and individuals, CDC expanded its *Vaccinate with Confidence* framework.”^{173,174} CDC also developed other tools, such as a rapid assessment guide to help prioritize intervention strategies to increase confidence of COVID-19 vaccines.¹⁷⁵ Likewise, other groups such as the Societal Experts Action Network of the National Academies of Sciences, Engineering, and Medicine, the National Academy for State Health Policy,¹⁷⁶ and provider groups¹⁷⁷ have also developed guidance and consulted to promote COVID-19 vaccine confidence.¹⁷⁸ CDC also now reports vaccine confidence data by COVID-19 vaccine coverage. For example, Figure 1, a snapshot of trend data at the national level, shows indicators, such as many or almost all friends and family vaccinated by their vaccination status and intent.¹⁷⁹

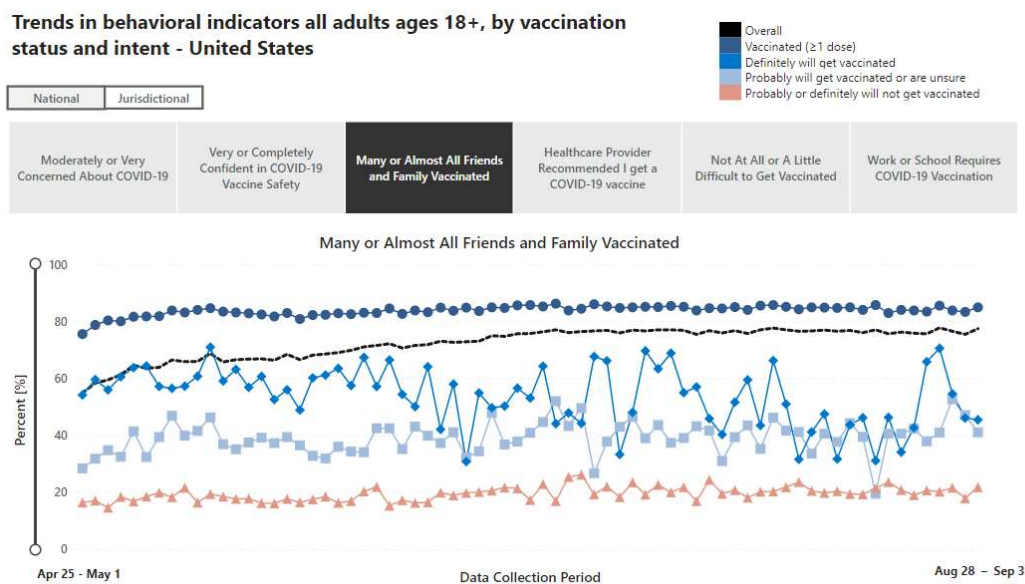


Figure 1: Trends in behavioral indicators are available at <https://covid.cdc.gov/covid-data-tracker/#vaccine-confidence>. In this example, those reporting moderately or very concerned about COVID-19 is displayed by vaccination status and intent.

Recommended Strategies and Approaches

Investing in Vaccine Confidence Research and Data

No single solution currently exists for increasing vaccine confidence in all vaccines or populations.¹⁸⁰ Some evidence exists on ways to increase vaccine confidence, but little evidence is available on whether increasing confidence leads to higher vaccine uptake. Thus, it is crucial to employ a diverse set of strategies and solutions to address the multi-faceted and complex issue of vaccine confidence. While peer-reviewed research on potential strategies to increase vaccine confidence has greatly increased, much uncertainty remains. For example, public health advocates need more research and evaluation of strategies to provide an evidence base for their work.

Limited vaccine confidence data are available, including for Native Americans and Alaska Natives; Asian Americans and Pacific Islanders; lesbian, gay, and bisexual people; transgender people; adolescents aged 12-17 years and young adults aged 18-25 years; people with chronic conditions; and those living in rural communities or areas with higher than average or unique vaccine confidence values. Likewise, while some vaccine confidence research has been published for many recommended vaccines; more research is needed to adequately understand the barriers and opportunities to increase confidence for routine vaccines. The NVAC calls for increased conceptual clarity in the field and the NVAC offers the following research-based recommendations.

Recommendation 1.1 The ASH should convene an interagency work group to identify and describe all vaccine confidence research funded by HHS and its partners, provide this information publicly for researchers, and then develop a scientific research agenda to address additional gaps and ensure coordination and efficient and effective use of resources.

Recommendation 1.2: HHS should facilitate and fund research and data collection to assess vaccine confidence in the subpopulations listed above for specific ACIP-recommended vaccines to further increase knowledge that can guide the development of tailored strategies to increase vaccine confidence. Long-term investments in large, serial, cross-sectional surveys of parents of adolescents and adults, using standardized measures, would enable researchers to identify vaccine-related knowledge, attitudes, and confidence as well as examine responses by subpopulations over time. Funding additional research in this area will increase understanding of what works to improve vaccine confidence in individuals. For example, new research could better characterize the influence of scientific, medical, and civil leaders at both the community and national levels. Additional research is also needed to identify provider-level communication strategies that are effective in improving patient vaccine confidence and uptake.

Recommendation 1.3: The ASH should facilitate the timely assessment of vaccine confidence in each of the subpopulations listed above. CDC should then publish and make available trend data to measure specific progress across populations and for all recommended vaccines. For

example, the CDC partnered with the US Census Bureau to use data from the Bureau's Household Pulse Survey and added a set of questions about COVID-19 vaccinations and attitudes towards the vaccine in January 2021.¹⁸¹ Currently, the CDC also provides online estimates of COVID-19 vaccine confidence and hesitancy by state and at the county level.¹⁸² While difficult and expensive to do, CDC should identify resources to publish vaccine confidence and hesitancy data at the state and county level for each recommended vaccine in the US. These data should also be made available to external experts with funding for analysis and publication.

Recommendation 1.4: CDC should evaluate the impact of the COVID-19 State of Vaccine Confidence Insights Report with internal and external stakeholders and consider expanding these reports for each routinely recommended vaccine in the US as well as provide insights in increasing health care provider confidence.

Recommendation 1.5: The ASH should fund additional research to improve understanding of what works to improve vaccine confidence in individuals who are questioning vaccination or those who are low to moderate in the vaccine confidence continuum.

Building Trust in Government and the Vaccine Enterprise

The 2022 Edelman Trust Barometer special report on trust and health found a 21% difference in vaccination rates between those with higher and lower trust of the health system, including the government's role in it. Additionally, people who trust the health ecosystem more were found to be more accepting of changing vaccination recommendations than those with lower trust. The report concluded that trust in government was a strong predictor of intent to vaccinate.¹⁸³ The Pew Research Center also found public trust in government remains low with less than one-quarter of Americans currently reporting that they can trust the federal government to do what is right "just about always" (2%) or "most of the time" (22%).¹⁸⁴ A recent poll found that 52% of Americans have a great deal of trust in CDC while only 41% of Americans trust state health departments.¹⁸⁵ Additionally, previous polling and research regarding trust in the vaccine process is also low.^{186, 187} To improve trust in government and the US vaccination system, the NVAC provides the following recommendations.

Recommendation 2.1: HHS and other federal agencies and partners should continue to disseminate evidence-based information about vaccines, vaccination, and vaccine-preventable diseases, including transparent and timely information about vaccine safety and effectiveness to the public and professional audiences. This information should be tested and reviewed to ensure the messaging is culturally and linguistically appropriate and targeted to reach under-resourced groups, as well as those who report a lack of confidence in vaccination. The NVAC encourages HHS to continue working with partners to encourage consistent messaging across the vaccine system and to seek ways to provide rapid and rigorous safety data.

Historically, post-authorization safety science has not been adequately funded. While COVID-19 supplemental funds allowed for expansion of activities to monitor the safety of COVID-19

vaccines, additional funding to improve data and information for all vaccines, all ages, and all outcomes would provide the public, health care professionals, and policymakers with essential information. The *Budget for the US Government* for fiscal year 2023 potentially provides for additional funding to enhance existing safety systems and networks through two separate legislative proposals: the Pandemic Preparedness Early Warning and Situational Awareness activities and the Vaccine for Adults Budget initiative.

Recommendation 2.2: To ensure that vaccine safety and confidence funding does not become stagnant, and as new vaccines are introduced, additional funding is available, the NVAC recommends HHS, other federal agencies involved in vaccination, and Congress continually assess funding for vaccine safety and confidence. This could include funding for new vaccination efforts or funding specifically for vaccine safety and confidence assessments. Funding should be considered in new legislation and other budget mechanisms, such as excise taxes or user fees.

Recommendation 2.3: During vaccine preventable disease outbreaks, HHS should continue to proactively respond so they are first, right, and credible. To support this, HHS should invest in additional crisis communication training for HHS leaders, spokespeople, and health communicators. The NVAC encourages continued efforts to disseminate data and information in effective ways and get the right message to the right person from the right messenger.

Recommendation 2.4: CDC and FDA should increase the dissemination of vaccine safety and efficacy data and information.^{188, 189}

Recommendation 2.5: HHS should develop a list of the vaccine confidence, information, and education activities funded from Section 2302 of the American Rescue Act of 2021 and provide an overview of what was learned from these activities.

Educating and Empowering Health Care Providers

Research continues to show that health care providers are the main influencers in vaccination decisions and are important to maintaining high levels of immunization across the lifespan. Health care providers also bridge the gap between health care policy makers and patients.¹⁹⁰ Vaccinated clinicians are more likely to recommend vaccines to their patients.^{191, 192} Increasing health care provider knowledge, awareness, and confidence as well as decreasing their vaccine skepticism or lack of trust is key to improving vaccine confidence and vaccine uptake in their patients.^{193, 194} For example, one study found that 8 in 10 Americans will turn to their health care provider when deciding to get a COVID-19 vaccine.¹⁹⁵

Low vaccine confidence exists among some health care professionals.^{196,197,198,199,200} Therefore, it is strategically important for HHS to provide messages, materials, and data specifically to increase vaccine confidence in these audiences. This includes doctors, pharmacists, nurses, nursing assistants, community health workers, and other health care workers, including those at health departments across the country. Vaccine safety data and knowledge of specific

vaccines can help assuage these concerns and increase willingness to recommend those vaccines.²⁰¹ Research studies have found that providers also trust people like themselves, other medical professionals, more than public health authorities or government officials.^{202, 203, 204}

Confident, well-informed health care professionals who can effectively communicate the benefits of immunization are central to achieving vaccine confidence. The NVAC recommends HHS place a high priority on providing clinicians with the support and resources they need to positively influence vaccine confidence in their patients. To achieve this, providers must have adequate training and education regarding the evidence supporting childhood, adolescent, and adult vaccination.²⁰⁵

Recommendation 3.1: HHS should evaluate the effectiveness of current messaging and media strategies in improving vaccine confidence among health care professionals and then disseminate tested messages in effective paid and unpaid media platforms.

In 2015, the NVAC recommended the development of curriculum and communication training for health care providers that focused on vaccine confidence.^{206,207} However, while evidence-based curriculums are available to teach students,^{208,209} most schools preparing students for careers in health care offer only a few hours of learning on the topic, if any.^{210, 211}

The National Academy of Medicine, in a report on strategies for improving immunization among Medicare patients, found that developing trust with patients as well as being knowledgeable and educated about vaccinations at different health care levels (physician, nurse, pharmacist) increased confidence for both the person recommending the vaccine and the patient receiving the vaccination. Capacity building strategies, including training, technical assistance, and other support have been found to increase clinicians' adoption and implementation of evidence-based interventions.^{212, 213}

Recommendation 3.2: HHS should work with partners to provide health care professionals with training to recognize and reduce racism and discrimination and evidence-based ways to disseminate information to improve confidence in people who lack trust in the system or their provider. This training should establish criteria for appropriate inclusive delivery of vaccination services, such as respectful treatment of patients, outline ways to provide effective assessments, and provide lessons from inclusive facilities. This training should also be evaluated to better understand effectiveness.

Recommendation 3.3: HHS should continue to work with health care professionals to improve the quality and strength of their recommendations to influence confidence in vaccines. For example, the use of presumptive, announcement-style language rather than conversational participatory style language results in higher vaccination uptake for childhood vaccinations.^{214, 215, 216, 217}

Recommendation 3.4: HHS should continue to engage a variety of professional organizations and health care professionals with easy-to-understand information about vaccine recommendation changes.²¹⁸

Recommendation 3.5: HHS should work with medical, nursing, pharmacy, dental, and alternative medicine schools, as well as residency-in training programs and licensing boards, to assess what vaccination content currently exists in their education or training programs or on their certification or recertification exams. HHS should then develop evidence-based curricula and exam questions to empower clinical professionals throughout their careers with the most up-to-date evidence on how vaccines work and how to best recommend them to patients. The NVAC encourages schools to use skill in making a strong vaccine recommendation as a quality metric and measure the quality of this education and training to health care professionals. Research also indicates that personal stories of professionals, who have cared for sick patients with vaccine-preventable diseases, can be shared with descriptions about why they vaccinate, to help vaccine-hesitant clinicians get COVID-19 vaccines.^{219, 220}

Recommendation 3.6: HHS should develop, or fund the development of, additional vaccine confidence training for students in other health care schools or settings, such as nursing home aids or community health workers to provide strategies and information to make a strong vaccine recommendation and to improve their confidence in vaccines and vaccination.

Fostering Community Engagement and Education

Community engagement is key to increasing vaccine confidence in areas with high vaccine mistrust. Vaccine confidence can also be improved in communities throughout the country by engaging the public, providers, and medical systems to educate about the continual medical need for on time immunization, the safety and effectiveness of recommended vaccines, and the societal benefits of vaccination. By engaging communities in civil discourse about the role of immunization in health, the importance of specific vaccines to individual health and the health of the community, as well as better ways to balance individual liberties and public health needs, HHS can develop informed strategies to improve vaccine confidence and uptake.

Recommendation 4.1: HHS should create new collaborations and nurture existing partnerships with a variety of community organizations to bring different perspectives into vaccination discussions and engage diverse communities to share information, tailor immunization activities, and create community-based strategies. For example, local groups can provide trusted messengers to adapt messaging as science changes or when spread of a vaccine-preventable disease increases in a community. In engaging with specific communities, you can also learn targeted ways to improve vaccine confidence, address specific concerns and motivations, and understand how vaccine decision making is informed by not only the identity of the social group or community, but also the community practices in gathering and processing information.

For example, researchers report that reasons for Black Americans' lower vaccine confidence in seasonal influenza vaccine is due to concerns about vaccine side effects, social norms that do not support vaccination, and low knowledge about the flu and the vaccines that prevent it.²²¹

Research findings also show that Black Americans are not receiving strong recommendations and specific offers of the vaccine in their health care visit.²²² This illustrates an opportunity for engagement with health care providers and Black communities and families. Research on increasing influenza vaccine confidence among Black Americans found that engaging community organizations, faith groups, and trusted civic and local leaders helped to promote the importance of flu vaccination and protect the broader community.²²³

Fitting in with social norms is a factor in the decision to vaccinate or not, and contrary to former reporting of guilt or shame associated with being labeled anti-vaccine, getting vaccinated may be a basis for exclusion from specific social settings. Thus, resources providing challenging, but non-combative responses to vaccine-negative comments within specific social networks and communities could be one strategy for HHS to pursue.²²⁴ While community engagement strategies to improve vaccine confidence have been studied, the NVAC encourages additional research in this area.

Recommendation 4.2: HHS should fund, evaluate, and publish findings on community engagement, focusing on vaccines for which it is less clear on the role community plays on improving vaccine confidence, such as tetanus or shingles. The findings from these evaluations should also be woven into practices and policy efforts.

In terms of education, the NVAC previously recommended the development of age-appropriate curricula to improve “knowledge of vaccines, how vaccines work,” and accurate information about vaccines safety in a recent report about COVID-19 vaccination.²²⁵ As part of this effort, the NVAC recommends HHS expand this to include vaccination in general, as well as all vaccinations recommended for the student or their family members. Another strategy is an educational outreach and social marketing intervention called “the immunity community” which has shown improvements in vaccine-related attitudes, including reducing vaccine hesitancy.²²⁶

Recommendation 4.3: HHS should work with the Department of Education and/or other educational partners to develop or fund a curriculum for middle school students to teach them about the value of vaccines, how vaccines work, and the strong safety profiles of vaccines. The curriculum should be tested and evaluated to determine how well it supports accurate vaccine decision-making and increases vaccine confidence, with specific efforts to evaluate this in communities of color and students with chronic conditions or disabilities. Likewise, this curriculum should teach how to assess the credibility and reliability of sources and distinguish evidence and scientific dissent from science denialism.²²⁷

Advancing Communication Strategies to Increase Vaccine Confidence

Public health agencies can and should do more to develop effective communication tools that address knowledge gaps related to vaccines and the perceived risks of the vaccine.^{228,229}

Strategies need to be tailored, targeted, and timely to specific vaccines and specific sub-populations. The strategies should address concerns and educate to shape beliefs using plain language and be transparent when it comes to the safety and benefits of vaccines, especially because vaccine hesitancy varies by vaccine and is highly context specific.²³⁰

The Guide to Community Preventive Services found that materials promoting a discussion between patient and providers are the most useful, especially for adult vaccinations.²³¹ For health care providers, carefully designed health education materials that can be used in an office setting, such as posters and brochures, form the basis of the discussion between provider and patient.²³² Nowak and colleagues have conducted extensive research on communication about flu vaccination to craft materials that address key messages about vaccine safety, risk, and effectiveness. Visuals are important as well, especially those that reflect diverse patient populations by race, age, and gender.²³³

It is equally urgent to identify community leaders from regions of the country with low vaccination coverage, especially in the southern United States, Appalachia, and the Mountain West. In some cases, such activities would include expanded outreach in rural areas. While in others, where a strong partisan or political divide is present, it may be necessary to court community vaccine champions, such as prominent members of the clergy or current and past elected officials.

Recommendation 5.1: The ASH should ensure that HHS utilizes American Rescue Act funds to provide culturally and linguistically appropriate communication materials that are tailored, context-specific, and tested to ensure they are useful to the audience, increase vaccine confidence, and do not include images with needles. Research from cultural anthropology and behavioral science finds that lived experiences matter and vaccine decision making are strongly influenced by what people think others around them are doing or expecting them to do.^{234, 235} Therefore, the NVAC encourages using communications strategies to advance community-based influence, such as storytelling, targeted grassroots campaigns, and town halls that employ effective and trusted ambassadors.

Messaging in the form of storytelling with the use of gist, defined as a bottom-line meaning, emotive anecdotes and imagery has been shown to be among the most persuasive messaging strategies.²³⁶ Sharing narratives is a popular and effective method to disseminate anti-vaccine content on social media and should be promoted to support vaccine confidence and uptake.^{237, 238} Popular celebrities and politicians are known to be instrumental in spreading both pro and anti-vaccination news.²³⁹

Recommendation 5.2: HHS should identify and increase the use of trusted messengers in communities and on social media to help disseminate information and share pro-vaccination

narratives. A study that examined sharing of Facebook posts during the Disneyland measles outbreak, determined that posts with gist were shared the most often, followed by those with actual statistics.²⁴⁰ Broniatowski et al²⁴¹ propose a ‘gist’ communication framework that combines factual evidence with the use of a linking phrase such as ‘so, the reason that is important is... the thing to remember is...’, thereby creating gist or a key takeaway that aids in comprehension and recall.²⁴²

Community engagement literature²⁴³ suggests strategies for developing communication to reinforce the social norm of vaccination, answer tailored questions, and use gist, or a key takeaway, to communicate about the increased risk of serious complications or address risk of vaccine side effects.²⁴⁴

A major contributor to heightened emotions surrounding vaccination is that “coordinated anti-vaccination groups manipulate emotions to promote misinformation and conspiracy theories, sow confusion, and create division.”²⁴⁵ Analyses of anti-vaccination websites showed that over three quarters of the websites examined leveraged emotional appeals (i.e. vaccines as violation of civil liberties or mistrust of experts and government organizations) and between 20%- 50% of the websites underplayed the risk and severity of vaccine-preventable diseases.^{246, 247, 248}

A study of anti-vaccine Twitter accounts showed that anti-vaccine accounts were more likely than pro-vaccine accounts to express anger.²⁴⁹ Negative and positive emotions play a role in vaccine confidence by attending to negative emotions such as fear and anxiety and raising awareness of emotional manipulations by anti-vaccine disinformation efforts, while at the same time activating positive emotions such as altruism and hope.^{250, 251, 252}

The role of non-human accounts on Twitter was described as the role of “two types of inorganic users, ‘bots’ accounts which generate automated content and ‘trolls’ accounts which misrepresent their identity and attempt to purposefully instigate conflict.”²⁵³ Content-polluting bots were most likely to amplify anti-vaccination content where troll accounts tended to amplify both pro-and anti-vaccine content, thereby creating a false sense of balance regarding the safety and benefits of vaccination.” The use of bot accounts is also widespread in the dissemination of information regarding COVID-19 on social media, especially on Twitter.²⁵⁴ Ahmed et al demonstrated that the use of Twitter and Facebook as sources of health information and influenza knowledge has a significant inverse association with influenza vaccine uptake, which propagates misinformation by employing vivid narratives and powerful imagery.²⁵⁵

Recommendation 5.3: HHS should evaluate the feasibility of developing community-driven responses to myths, misinformation, and disinformation about vaccine-preventable diseases and vaccines to educate the public so they can make informed decisions driven by science.

Studies evaluating individually tailored versus untailored education materials for improving vaccination intention and positive vaccination attitudes for the MMR (measles-mumps-rubella) vaccine among parents who were identified as vaccine hesitant found that the tailored

materials had a greater impact on positive vaccination intention and attitudes towards vaccination compared to untailed information provided through general educational web pages.²⁵⁶ Another study introduced an internet based platform with vaccine information and interactive social media components to improve parents' vaccine-related attitudes and found that parents who received vaccine information with social media components were more likely to vaccinate their child as compared to those who received the usual care information.²⁵⁷

Salmon et al²⁵⁸ introduced "MomsTalkShots" a phone, tablet, and computer app to a cohort of mothers with the goal to increase the uptake of maternal and infant vaccines as well as to encourage communication between mothers and pediatricians. The results revealed the mothers found the app helpful, trustworthy, interesting, and clear to understand. The website was very well received even among women who were initially vaccine hesitant and who did not intend to vaccinate themselves and their infants according to the recommended vaccination schedule. Use of this tailored website increased maternal influenza vaccine uptake, vaccine uptake of family and friends (for cocooning), and decreased concerns about infant vaccines one year after birth. A COVID-19 version is now available at www.letstalkcovidvaccines.com which tailors information including credible sources, personal stories, and information through animation to the user's language, populations of interest, vaccine intentions, and underlying concerns.

In a study that looked at effective communication techniques to parents' concerns about the HPV vaccine, vaccine confidence improved when parents were exposed to messages that addressed their lack of knowledge about HPV or messages that included information about cancer prevention. Parents were less confident in the vaccine when exposed to messages in which urgency to vaccinate was expressed.^{259, 260} Other studies have found that urgency is important when first raising the topic of vaccination and recommending it,²⁶¹ but expressing urgency for vaccination when addressing questions and concerns may be counterproductive.²⁶²

Recommendation 5.4: As people pay more attention to negative information^{263,264}, the ASH should convene a meeting of experts in HHS and outside of HHS to develop, fund and implement a comprehensive strategy for addressing misinformation and disinformation in a timely manner. The success of such methods may be explained through the fuzzy trace theory whereby individuals integrate information in two methods through verbatim memories which includes all precise details and through gist memories, which contain the bottom-line basic meaning.²⁶⁵ The gist memories endure over time, but the verbatim memories fade quickly. Thus, decisions are usually made based on gist memories and social media posts expressing gist are more likely to be shared^{266, 267} in contrast to data and evidence-based medical literature offered on pro-vaccine platforms, which may be less emotional than personal anecdotes offered by social media.²⁶⁸

We must better understand the major sources of antivaccine disinformation, including non-governmental organizations identified by the Center for Countering Digital Hate, political extremists' groups and news outlets, and foreign governments acting on behalf of their state,

such as the Russian Government.²⁶⁹ Experts should be identified with skill in countering state and non-state actors, including those outside the traditional health sector. Interagency collaboration should be considered between HHS and other branches, such as the Departments of Homeland Security, Justice, Commerce, and State.

Recommendation 5.5: To increase trust and reach of science-based information, HHS should fund or develop training for health care professionals on using social media communication. This training should provide strategies for patients and other community members on these platforms and ways to better leverage social networks to deliver effective messages.^{270, 271} It is essential for social media companies to identify and flag potentially harmful misinformation and consider active promotion of content from public health agencies as is done through partnerships, such as Facebook’s partnering with UNICEF, WHO, and others.²⁷² For example, Pinterest has re-directed vaccine-related searches to a small set of handpicked results from public health organizations including WHO and CDC and have disabled ads and comments on these topics to prevent vaccine misinformation or the influence of outside nonscientific entities.²⁷³ Twitter has also implemented tools to label tweets as containing misleading information and provides links to validated sources of information.²⁷⁴ While more research is needed, exposure to anti-vaccine content may have an impact on increasing vaccine hesitancy among susceptible parents.^{275, 276} Such analyses should also go beyond social media in order to identify the sources of disinformation and misinformation, with consideration of an interagency US Government task force to combat this at the highest levels.

Recommendation 5.6: The ASH should convene high-level meetings with health and national security experts to assess the vaccine misinformation and disinformation ecosystem. In these meetings, participants should identify sources, dissemination tactics, finances, and actors to identify ways to combat dangerous and inaccurate information as well as hate speech related to vaccination.²⁷⁷

Conclusion

Despite the overwhelming benefits of vaccination and the strong scientific consensus that recommended vaccines are both very safe and effective, research shows that vaccine confidence motivates people to get vaccines for themselves and their children. A lack of confidence in vaccination is a threat to public health and undermines vaccine uptake at local, national, and global levels. To protect the public, we must improve overall confidence in vaccination and with specific vaccines, so more people make the decision to vaccinate on time and feel confident in doing so.

The NVAC made 25 recommendations to improve vaccine confidence in the United States and respond to global threats of vaccine hesitancy. The recommendations are organized into five categories: (1) Investing in Vaccine Confidence Research and Data, (2) Building Trust in Government and the Vaccine Enterprise, (3) Educating and Empowering Health Care Providers (4) Fostering Community Engagement and Education, and (5) Advancing Communication Strategies to Increase Vaccine Confidence. Since the NVAC approved the last report on vaccine

confidence, important research and efforts have been made to increase understanding of the determinants of vaccine confidence across the lifespan and for specific vaccines. New survey data, research, and programmatic efforts show promise in our ability to increase and sustain American's confidence in vaccines and vaccination. The investments being made to improve vaccine confidence will help respond to outbreaks and show promise to reduce the burden of vaccine-preventable diseases throughout the lifespan of all Americans.

Disclaimer

The views represented in this report are those of the National Vaccine Advisory Committee. The positions expressed and recommendations made in this report do not necessarily represent those of the US Department of Health and Human Services, the US government, or the individual members or advisors who served as authors of, or otherwise contributed to, this report.

Declaration of Conflicting Interests

All of the NVAC voting members, except the two industry representative members, and all federal employee members and technical advisors are subject to ethics regulations issued by the US Office of Government Ethics, including an annual confidential financial disclosure and ethics training. Each member was carefully screened in advance to assess personal, professional, and financial interests that may compromise their ability to be objective in giving advice.

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