

This PDF is available at <http://nap.edu/26068>

SHARE



Strategies for Building Confidence in the COVID-19 Vaccines (2021)

DETAILS

21 pages | 8.5 x 11 | PDF

ISBN 978-0-309-16213-5 | DOI 10.17226/26068

CONTRIBUTORS

National Academies of Sciences, Engineering, and Medicine

SUGGESTED CITATION

National Academies of Sciences, Engineering, and Medicine 2021. *Strategies for Building Confidence in the COVID-19 Vaccines*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26068>.

GET THIS BOOK

FIND RELATED TITLES

Visit the National Academies Press at NAP.edu and login or register to get:

- Access to free PDF downloads of thousands of scientific reports
- 10% off the price of print titles
- Email or social media notifications of new titles related to your interests
- Special offers and discounts



Distribution, posting, or copying of this PDF is strictly prohibited without written permission of the National Academies Press. (Request Permission) Unless otherwise indicated, all materials in this PDF are copyrighted by the National Academy of Sciences.

Copyright © National Academy of Sciences. All rights reserved.

Authors: Emily K. Brunson*
Alison Bутtenheim**
Saad Omer***
Sandra Crouse Quinn****

This rapid expert consultation was produced through the Societal Experts Action Network (SEAN), an activity of the National Academies of Sciences, Engineering, and Medicine that is sponsored by the National Science Foundation and the Alfred P. Sloan Foundation. SEAN links researchers in the social, behavioral, and economic sciences with decision makers to respond to policy questions arising from the COVID-19 pandemic. This project is affiliated with the National Academies' Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats, sponsored by the U.S. Department of Health and Human Services, Assistant Secretary for Preparedness and Response.

SEAN is interested in your feedback. Was this rapid expert consultation useful? For further inquiries regarding this rapid expert consultation or to send comments, contact sean@nas.edu or (202) 334-3440.

*Associate Professor, Department of Anthropology, Texas State University

**Associate Professor of Nursing and Health Policy, University of Pennsylvania School of Nursing and Perelman School of Medicine

***Director, Yale Institute for Global Health; Associate Dean and Professor of Medicine, Yale School of Medicine; and Susan Dwight Bliss Professor of Epidemiology of Microbial Diseases, Yale School of Public Health

****Professor and Chair, Department of Family Science, and Senior Associate Director. Maryland Center for Health Equity, School of Public Health, University of Maryland

*The National
Academies of*

SCIENCES
ENGINEERING
MEDICINE

EXECUTIVE SUMMARY

Public engagement and effective communication through clear, transparent messaging will play a central role in building confidence in the COVID-19 vaccines. This rapid expert consultation describes a variety of public engagement and communication strategies that can be implemented at the national, state, and local levels to change patterns of interaction with the public, address hesitancy about the vaccines, and build trust.

In general, given the prevalence of local concerns and information needs, it is important to support local communities with the resources needed to engage people and reinforce information coming from the federal and state levels. Strong community engagement aimed at identifying and understanding local concerns will help determine what messaging, delivered by whom, will be most effective. Moreover, it will be essential to provide people who are hesitant, reluctant, distrusting, or otherwise unmotivated with respect to the COVID-19 vaccines with the resources, information, and support they need to make the vaccination decision that is right for them. This rapid expert consultation highlights overall strategies for engaging the public and building community trust (Box 1), as well as strategies focused specifically on communicating effectively to ensure demand for and promote acceptance of the vaccines (Box 2). These strategies are informed by five principles for effective risk communication:

1. Do not wait.
2. Be credible.
3. Be clear.
4. Express empathy and show respect.
5. Acknowledge uncertainty and manage expectations.

This rapid expert consultation also presents current data about people's motivations, which are informed by perceptions and social norms. These motivations, combined with pragmatic considerations, will determine the uptake of the COVID-19 vaccines. Given that any issues in the early stages of the vaccination program may affect motivation and confidence in the vaccines, distribution, allocation, and patient experience at vaccination sites are important to achieving herd immunity.

BOX 1

Six Strategies for Engaging Communities to Combat Mistrust and Build Public Confidence in COVID-19 Vaccines

1. Form Partnerships with Community Organizations
2. Engage with and Center the Voices and Perspectives of Trusted Messengers Who Have Roots in the Community
3. Engage across Multiple, Accessible Channels
4. Begin or Continue Working toward Racial Equity
5. Allow and Encourage Public Ownership of COVID-19 Vaccination
6. Measure and Communicate Inequities in Vaccine Distribution

BOX 2**Nine Communication Strategies for Ensuring Demand for and Promoting Acceptance of COVID-19 Vaccines**

1. Meet People Where They Are, and Don't Try to Persuade Everyone
2. Avoid Repeating False Claims
3. Tailor Messages to Specific Audiences
4. Adapt Messaging as Circumstances Change
5. Respond to Adverse Events in a Transparent, Timely Manner
6. Identify Trusted Messengers to Deliver Messages
7. Emphasize Support for Vaccination Instead of Focusing on Naysayers
8. Leverage Trusted Vaccine Endorsers
9. Pay Attention to Delivery Details That Also Convey Information

INTRODUCTION

Ensuring strong demand for and promoting acceptance of the COVID-19 vaccines is critical to achieving herd immunity, protecting the most vulnerable populations, and reopening social and economic life (NASEM, 2020a). To this end, two distinct challenges must be overcome. First, people who are willing and eager to be vaccinated must be able to do so easily, with minimal friction and hassle; second, people who are hesitant, reluctant, distrusting, or otherwise not motivated with respect to being vaccinated need resources, information, and support for making the vaccination decision that is right for them. Each of these challenges requires different strategies. This rapid expert consultation provides guidance on meeting the second challenge. It is intended to assist decision makers in building public confidence in the COVID-19 vaccines and in communicating with the public about the vaccination process and rollout by highlighting strategies for public engagement and message delivery to ensure demand and promote acceptance.^{1,2} While it does not outline a national vaccine marketing strategy, the principles and strategies outlined herein will be critical in the design of such a campaign.

¹The full statement of task for this rapid expert consultation is as follows: “The National Academies of Sciences, Engineering, and Medicine will produce a rapid expert consultation to assist decision makers in building public confidence in SARS-CoV-2 vaccines, with special attention to communities at higher risk of contracting and dying from the disease, including underserved and vulnerable communities. Drawing from research on decision making, changing beliefs and attitudes, community engagement, and how to reach and engage diverse audiences, this document will identify strategies of communication that are likely to promote uptake of FDA-approved vaccines to prevent COVID-19. This rapid expert consultation will be designed to be of practical use to decision makers, but will not recommend specific actions or include other recommendations. It will be reviewed in accordance with institutional guidelines.”

²A number of other organizations and agencies have produced guidance on this issue, and those references may also be of use to state and local decision makers. See, for example, “Language That Works to Improve Vaccine Acceptance Communications Cheat Sheet” (www.changingthecovidconversation.org) (accessed January 19, 2021); “COVID-19 Vaccination Communications Toolkit” (<https://www.cdc.gov/vaccines/covid-19/health-systems-communication-toolkit.html>) (accessed January 19, 2021); and “A Communicator’s Tip Sheet for COVID-19

Evidence from the behavioral, psychological, and social sciences demonstrates that people's motivations—their readiness, willingness, intention, or hesitancy—are informed by the information they process; by how they think and feel (their perceived risk, worry, confidence, trust, and safety concerns); and by social processes (recommendations from health care providers, social norms, gender norms, equity, and information processing and sharing). Evidence from anthropology indicates that individuals' motivations are further influenced by cultural understandings of the body, disease, and appropriate types of health care. Motivations can also be influenced by perceptions and beliefs about equitable allocation, distribution, and delivery of services as early vaccination programs roll out. Research from New Jersey's and Rhode Island's COVID-19 testing programs, for example, showed that customer experience challenges at point-of-care testing sites deterred some individuals intending to receive a COVID-19 diagnostic test and discouraged others from repeat testing (Policy Lab et al., 2020). Motivations thus formed interact with practical considerations (e.g., vaccine availability, costs, service quality) to determine vaccination uptake (Brewer et al., 2017).

Of course, context is also important. In particular, it is critical that the efforts of trusted messengers be coordinated. The public has already been receiving information about the COVID-19 vaccines and vaccination efforts from multiple sources, including state and local government entities, local news and community channels, physicians, and employers, among others. The messaging from these sources can be conflicting, which helps to undermine vaccine confidence and trust in public health authorities. Therefore, efforts to influence the shape of public discussion of vaccine issues may be as important as any direct persuasive communication.

Moreover, the pandemic conditions are dynamic and will continue to change as distribution of the COVID-19 vaccines continues and evolves, and ongoing monitoring of beliefs and attitudes will be needed so that messaging can be adjusted as the vaccines become widely available. The ways in which the principles described herein are operationalized will vary based on local context, so that ongoing testing of messages to learn which work best may be needed to optimize communication efforts. Dedicating more resources and technical assistance to local efforts in conjunction with national campaigns could support rapid learning and ultimately increase vaccine acceptance at the community level.

UNDERSTANDING COVID-19 VACCINE HESITANCY

The public's opinions on vaccination fall along a continuum, ranging from those who fully accept vaccines, to those who are vaccine hesitant (two groups that collectively represent the majority of the population), to those strongly or unequivocally opposed to vaccination (a very small minority of the population). It is the middle group that is most likely to respond positively to intervention (Gust et al., 2008a, 2008b). Previous research has found that communications focused on reaching those who are hesitant rather than those firmly opposed to vaccination will be most effective at increasing uptake (NASEM, 2020b), while focusing on those firmly opposed to vaccination will exaggerate and may contribute to the problem.

Since the first COVID-19 vaccine was authorized in December 2020 in the United States, public confidence in COVID-19 vaccines has risen relative to reported attitudes regarding a hypothetical vaccine in early 2020 (Hamel et al., 2020). Relevant details from recent polling are

Vaccination" (https://obssr.od.nih.gov/wp-content/uploads/2020/12/COVIDTipSheet_Final.pdf) (accessed January 19, 2021).

included in Box 3. As these data reveal, hesitant individuals are not a monolithic group, and hesitancy is not static. As summarized in Box 3, much of the existing hesitancy regarding COVID-19 vaccination revolves around a desire to wait and see how others will respond physically to being vaccinated, as well as technical questions related to the vaccine's safety and efficacy (e.g., "Should I get the vaccine if I'm pregnant?"), which in some cases are accompanied by mistrust of medicine, public health, and government. The desire to "wait and see" is not unique to the COVID-19 vaccination experience. Research on H1N1 vaccine uptake in 2009–2010 shows that, at least in some populations, concerns about the new vaccine affected confidence in the vaccine (Hausman et al., 2020). Although the H1N1 vaccine was approved through the standard FDA process, there were initial concerns that it could have been released under the Emergency Use Authorization mechanism. Quinn and colleagues (2009) found that in that case, intent to take such a vaccine was extremely low, with African Americans being the most reluctant. The phased rollout of available COVID-19 vaccines, all authorized under the EUA mechanism, may provide an opportunity for responding to hesitancy in this respect: officials can make safety and effectiveness data transparent and accessible, especially as additional vaccines are authorized. Acknowledging people's uncertainty and their desire for more data becomes possible as vaccination programs continue.

Specific concerns among those who are vaccine hesitant vary widely, although they tend to cluster geographically and/or culturally. Mistrust of a vaccine in communities of color is of particular concern given that ethnic and racial minority groups in the United States have been disproportionately harmed by the pandemic: individuals from Black, Hispanic, and American Indian/Alaska Native communities all have experienced COVID-19 mortality rates nearly three times higher than the rate among White individuals, as well as higher rates of hospitalization due to the disease. These groups are also more likely to have underlying conditions that place them at higher risk for severe outcomes and complications related to the virus (CDC, 2020a, 2020b).

Mistrust of a vaccine in communities of color is grounded in current experience with structural inequities that permeate public health, medicine, and social services in the United States. Beyond a system that is not reliably trustworthy for many populations, a painful legacy of health care discrimination, medical research exploitation, and unconsented experimentation on Black, American Indian/Alaska Native, Latinx, and other communities that have experienced racism has contributed to justified distrust of government-sponsored medical research and resultant reluctance to become vaccinated (Frakt, 2020; Gamble, 1997; Hoffman, 2020; NASEM, 2020a).³ This distrust will not be easy to overcome, but the glaring racial and ethnic disparities in the impact of the pandemic will only worsen if decision makers fail to address it.

³“Examples include the infamous Tuskegee study—in which hundreds of Black men in Alabama were lied to about being treated for syphilis while the disease was allowed to run its course; the Edmonston-Zagreb vaccine trial, during which parents of immunized infants (mostly Black and Latinx) were not informed that the vaccine used was an unapproved experimental vaccine; and less well known but equally abhorrent instances of unconsented sterilization of Latinx and American Indian and Alaska Native women (Carpio, 2004; Gamble, 1997; University of Wisconsin, 2018). This legacy leaves many communities of color wary of participation in medical research, suspicious of initiatives to engage them in health promotion or surveillance efforts, and, in many cases, reluctant to become vaccinated (Hoffman, 2020)” (NASEM, 2020a, p. 190).

BOX 3**Highlights from the Kaiser Family Foundation's COVID-19 Vaccine Monitor Project, January 2021**

Attitudes about the COVID-19 vaccination are changing rapidly. Reported here are the most recent data available at the time of publication. Current data are available from the SEAN Survey Archive at https://covid-19.parc.us.com/client/index.html?mc_cid=a543a1dc66&mc_eid=656554d0a6#.

Among respondents to a public opinion survey conducted by the Kaiser Family Foundation's (KFF's) COVID-19 Vaccine Monitor project between January 11 and 18, 2021, 41 percent said they would get the vaccine "as soon as possible," and 39 percent said they would "wait and see" (6% said they had already received the vaccine). Compared to results from KFF's December Vaccine Monitor update, the share of adults willing to get the vaccine "as soon as possible" increased, including among Black and Hispanic individuals. However, Black and Hispanic respondents and those aged 18–29 were demographically overrepresented in the "wait and see" group, while "Democrats," those aged 65 and older, Whites, health care workers, and those with someone with a chronic health issue in their household were overrepresented in the "already vaccinated" and "as soon as possible" groups (Hamel et al., 2021).

Although the sentiment reflected in these findings is promising, 13 percent of respondents said they would "definitely not" get the COVID-19 vaccine and 7 percent said they would get it "only if required" (Hamel et al., 2021). These figures are concerning given the anticipated high level of vaccination coverage needed to achieve herd immunity in the United States, previously estimated at 60–70 percent of the population but now expected to be higher (likely closer to 90%, although the exact figure remains unknown) (CDC, 2020; McNeil, 2020; Omer et al., 2020). Thirty-three percent of "Republicans" said they would either "definitely not" get the COVID-19 vaccine or only get it if required, as did 29 percent of rural residents, 21 percent of Black respondents, 28 percent of essential workers, and 21 percent of "independents" (Hamel et al., 2021).

Among those who said they would "definitely not" get the COVID-19 vaccine, the primary concerns included the possibility that the vaccines are not as safe as they are said to be (81%); the unknown long-term effects of the vaccines (77%); the possibility of serious side effects (73%); and the possibility that the vaccines are not as effective as they are said to be (66%). Black and Hispanic respondents who had not yet been vaccinated reported higher levels of concern across these same four factors compared to White respondents (Hamel et al., 2021).

STRATEGIES FOR PUBLIC ENGAGEMENT TO COMBAT MISTRUST AND BUILD CONFIDENCE IN THE COVID-19 VACCINES

Public engagement is critical to overcoming mistrust and building confidence in the COVID-19 vaccines. Public engagement is more likely to be impactful (and build trust beyond COVID-19 vaccination programs) if the process is established and designed so that public values (ascertained through engagement) can be translated into practice and policy. Public health practitioners—if given the necessary resources—can create a strong infrastructure that helps earn community trust by building relationships that encompass organizing for policy change,

providing accessible COVID-19 testing and treatment, listening to the needs of communities, addressing the structural factors that create greater exposure to and poorer treatment for COVID-19, and ensuring the equitable allocation of vaccines. This section summarizes six public engagement strategies designed to combat mistrust and build confidence in the COVID-19 vaccines.

1. Form Partnerships with Community Organizations

Partnerships with community organizations that have strong existing community relationships are critical. These organizations are close to their audiences; know how to tailor information to those audiences effectively; and, most important, have trusted leaders who can be effective spokespersons. Research shows that credible partnerships require early two-way dialogue to establish trust and build a shared vision for addressing a problem, citizen involvement in the decision-making process, and sharing of information in a way that is understandable and responsive to local needs (NASEM, 2020a; Quinn et al., 2020). A good example is a communication planning strategy for building partnerships at a New Jersey environmental agency, which included the following steps: identify the issue; set goals; know the issue, audience, and constraints; assess audiences; identify messages and methods; implement a communication strategy; and evaluate, debrief, and follow up (Pflugh et al., 1992). Local governments thus could utilize or leverage existing relationships, social capital, and resources to build vaccine confidence. Potential partners might include faith-based networks, existing community health worker programs, or local advocacy and activism groups (e.g., organizers of get-out-the-vote efforts or the census, or neighborhood coalitions formed to improve walkability or green spaces).

2. Engage with and Center the Voices and Perspectives of Trusted Messengers Who Have Roots in the Community

Evidence suggests that efforts to counter vaccine hesitancy and promote vaccination need to emphasize putting “people at the center” of those efforts (Schoch-Spana et al., 2020). Research has highlighted the potential effectiveness of dialogue-based interventions, including social mobilization and engagement with community leaders and trusted community representatives, as well as the importance of community involvement in creating, adjusting, and implementing these solutions to ensure adequate buy-in and trust (Dubé et al., 2015; Jarrett et al., 2015; NASEM, 2020a). Social media or advertising campaigns encouraging community members to share why they choose to get vaccinated—such as the “whatsyourwhy” factor and “blackwhysmatter” social media hashtags—can be persuasive.

Central to this strategy is developing long-term relationships with trusted community members—a process that takes time but is essential. If such relationships are not already in place, local health departments can begin by listening to community members’ concerns and providing support and resources to ensure that they have culturally appropriate information about the vaccines and, most critically, equitable access to vaccination.

3. Engage across Multiple, Accessible Channels

Community engagement will need to occur across a variety of channels well suited to reaching vulnerable populations, including people who cannot attend public meetings (e.g., because they work, live remotely, are incarcerated, or are undocumented), who have limited broadband service, who speak languages other than English, or who cannot use written text

(NASEM, 2020a). Determining which channels are most appropriate for particular populations is essential. State and local leaders can choose to communicate through town hall meetings, special community events, or faith-based gatherings.

4. Begin or Continue Working toward Racial Equity

Public engagement around vaccination, particularly with communities of color, needs to begin with acknowledgment of existing inequities. A health department could, for example, garner supporters and allies—and elevate racial equity—by recognizing how systemic racism has disadvantaged these communities and explaining how the department is working to create health for all communities.

Talking about vaccines in isolation risks reinforcing deeply held beliefs that health (or ill health) is purely a matter of individual behaviors (such as choosing to get vaccinated) and obscuring the broader structural factors—such as housing, jobs, and health care access—that also impact health. It is critical for authorities to acknowledge these broader shortcomings in health equity, to frame the COVID-19 vaccines as one of several tools that can help advance equity in communities most affected by the pandemic, and to reassure those communities that this type of work will continue beyond the pandemic. The pandemic has exposed myriad health disparities, and public health policies and action, including vaccination, need to reflect a deeper commitment to equity (Berkowitz et al., 2020).

An example of such an effort is the Bay Area Regional Health Inequities Initiative, a coalition of health departments and community partners in California’s Bay Area focused explicitly on the advancement of health equity, racial justice, and economic opportunity. The group works across nine counties and has recently focused its efforts on COVID-19 response while continuing to highlight the importance of broader social determinants of health in shaping community health outcomes, particularly among communities of color (Bay Area Regional Health Inequities Initiative, 2020; Kritz, 2020).

5. Allow and Encourage Public Ownership of COVID-19 Vaccination

As noted earlier, while trust is critical to vaccine acceptance, trust in public health is low within some populations, including many communities of color. Public ownership of COVID-19 vaccination through public oversight and community engagement can inspire greater confidence in COVID-19 vaccination. Best practices for public ownership include actively seeking engagement with the public, listening to feedback and adapting accordingly, establishing local public oversight committees, and implementing bottom-up approaches with community members leading solutions. Research has also highlighted the benefits of public ownership of vaccination through governance structures that involve community members, noting the potential for those mechanisms to drive trust and improve access (Schoch-Spana et al., 2020). Also beneficial is emphasizing vaccination as a public good (e.g., “I am doing this because my vaccination helps the community at large, and I care about my fellow citizens”).

6. Measure and Communicate Inequities in Vaccine Distribution

Real-time measurement of inequities in vaccine distribution and communication of those findings to the public is critical to building trust. Communities could disaggregate vaccine distribution across the 15 factors that make up the Centers for Disease Control and Prevention’s (CDC’s) Social Vulnerability Index and publish that information on public dashboards, for

example. Decision makers will need to monitor this information and work with community leaders to implement solutions as inequities arise.

EFFECTIVE COMMUNICATION TO BUILD CONFIDENCE IN THE COVID-19 VACCINES

Principles for Effective Communication

This section highlights five principles of effective risk communication, adapted from guidance issued by the CDC: (1) do not wait; (2) be credible; (3) be clear; (4) express empathy and show respect; and (5) acknowledge uncertainty and manage expectations. These principles can inform communication efforts and the development of strategies and tactics for building confidence in the COVID-19 vaccines and promoting uptake.

Do Not Wait

Begin Communicating Immediately. Once formed, attitudes are difficult to change (Weber and Johnson, 2006). Therefore, COVID-19 vaccination programs will need to develop their communication strategy as soon as possible. Because most people form judgments about new ideas based on narratives they have developed from past experiences, communication approaches could cue or activate people's existing mental models to recognize the COVID-19 vaccine as something with which they are already familiar (i.e., the prototypical childhood vaccines, which are widely accepted in the United States).

Be Credible

Be Consistent and Transparent. Transparency is key, particularly as new data become available. Any vaccine will likely have some side effects and risks associated with its use, and these need to be communicated clearly in ways appropriate for and accessible to target audiences. Likewise, unknowns about the vaccines (e.g., whether they will prevent transmission of the virus as well as symptoms; when the general public will be vaccinated) need to be acknowledged as such. Greater transparency about the vaccine authorization and distribution process, for example, could potentially address concerns about the politicization of the process (Quinn et al., 2020).

Be Clear

Use Accessible, Jargon-free Messages. Accessible communications that avoid jargon and are tailored to the literacy level of the target audience are important. Avoiding jargon is not a matter of merely removing difficult chemical or biological terms from messages, but also entails examining seemingly simple terms for overlooked problems (e.g., whether “significant” refers to statistical or substantive significance). Tailoring messages to the health literacy and numeracy levels of the target audience will also foster greater understanding.

Express Empathy and Show Respect

Avoid Dismissing Concerns. Ensuring that people feel heard—not dismissing their concerns—is important because if people do not feel heard, they are unlikely to listen. Instead, effective communications require listening to people's concerns, rephrasing and restating those

concerns, and presenting relevant new information with empathy. For example, responses to misinformation could begin with, “I see that you have concerns about X. There’s a lot of information out there, and some of it is true, and some of it is not true. Let me tell you what I know....”

Acknowledge Uncertainty and Manage Expectations

Acknowledge Uncertainty. During a pandemic, what is and is not known changes constantly, and policy and programs change accordingly. Even now, as the vaccine rollout continues, some people interpret the changes in dose availability and allocation and priority groups as signs of incompetence or mistakes on the part of government or scientists. According to Quinn and colleagues (2013), preparation for uncertainty contributes to the public’s acceptance of such change and trust in associated communication. With respect to COVID-19 vaccination, the public could be prepared with such statements as, “While we’d like this to move faster, we cannot always predict how many doses we will have each week, and our limited doses mean it will take longer to vaccinate people.”

Don’t Overreassure. The vaccine rollout will take significant time and effort. Honestly sharing realistic projections of the timeline could help manage people’s expectations. Conversely, overpromising how quickly the process will proceed could undermine trust. Also crucial in ensuring that reasonable expectations are set is clear guidance on how to sign up for vaccination appointments and the various avenues for doing so. Sharing this planning information proactively and widely will help manage expectations and reduce frustration, and ideally will encourage fair coverage of the process as it unfolds.

Communication Strategies for Promoting Acceptance of the COVID-19 Vaccines

There is no single solution to vaccine hesitancy. Rather, multiple nuanced approaches are key to ensuring that those who are hesitant do not evolve to outright vaccine refusal and that existing health inequities are addressed. This section summarizes nine best practices for communication strategies designed to build confidence in the COVID-19 vaccines.

1. Meet People Where They Are, and Don’t Try to Persuade Everyone

Models identifying stages of behavior change suggest that information and resource needs differ for people who are “considering” a particular self-protective action, such as vaccination (Why should I adopt it?) versus those who have decided to take the action (How do I go about doing it?). Thus, it is important to develop different messages for those who are willing to be vaccinated and need information on how to do so and those who are hesitant but open to learning more. Moreover, trying to persuade those who are completely opposed to vaccination is not a wise use of resources (Public Health Institute, 2020), especially given that, as noted earlier, most people who are unwilling to get vaccinated immediately can be considered hesitant or skeptical, with just a small portion of the population being absolutely opposed to vaccination (Bruine de Bruin et al., 2019).

Research on COVID-19 vaccination, and routine vaccination more broadly, emphasizes the importance of empathy as key to interacting with those who may be vaccine hesitant or skeptical, including through such techniques as motivational interviewing between providers and patients (Ferreri, 2020; Gagneur, 2020; Martin, 2021; Maurici et al., 2019). For these exchanges,

it is important to use such phrasing as, “I understand that you might have questions about the vaccine, and I’m here to answer them as best I can....”

2. *Avoid Repeating False Claims*

Correcting information that is inconsistent with scientific evidence is difficult under most circumstances (Cook and Lewandowsky, 2011; Lewandowsky et al., 2012; NASEM, 2017). It should be noted, moreover, that repeating false claims and misinformation risks inadvertently amplifying and strengthening that information. Occasionally, however, public health practitioners may have to address false claims (Ecker et al., 2017). In these situations, it is important to warn recipients before confronting them with the false information (e.g., “The following claim is misleading...”) and to emphasize the facts over the misinformation (MacFarlane and Rocha, 2020). Practitioners can also use a pivot approach to avoid addressing and correcting false claims and misinformation directly, instead diverting the listener to consider concerns about the risk of disease (Omer et al., 2017). According to MacFarlane and Rocha (2020), additional strategies for debunking misinformation and overcoming its effects include preemptively explaining flawed arguments, using visual representations to increase data comprehension (Dixon et al., 2015), and providing alternative explanations of the debunked phenomenon (e.g., that purveyors of misinformation are interested in selling different remedies or support a political ideology) (Ecker et al., 2010).

The nation’s polarized media environment also means that people are receiving very different messaging about the pandemic, and at the same time, the spread of information has become more “bottom-up” than “top-down.” Evidence indicates that, instead of treating skeptics as the “other” and adopting a “those people” attitude toward vaccine-hesitant individuals, it is best to adopt an approach that encourages empathy (Hausman, 2020).

3. *Tailor Messages to Specific Audiences*

Messages will be received differently by different groups. To be effective, communication about the COVID-19 vaccines needs to reflect an understanding of the targeted audience, including their concerns and motivations and whom they trust. It is essential to recognize that the information needs of diverse audiences may or may not match communicators’ assumptions about those needs. If the audience does not deem the information provided to be relevant or responsive to their information needs, they will ignore it.

Successful communication strategies therefore emphasize population segmentation, recognizing the need to develop different strategies for different subgroups, as characterized by epidemiological, psychographic, and demographic variables. Effective communication will use appropriate approaches to reach vaccine-hesitant audiences that differ by age, gender identity, marriage status, education level, refugee and immigration status, health behaviors/norms, and race and ethnicity, as well as the socially marginalized. Survey data can provide information relevant to target audiences, such as existing beliefs and content to avoid, which can inform development of the messages they receive (see, e.g., Amin et al., 2017; Parvanta et al., 2013; Rutjens et al., 2018). Data from qualitative studies that rely on first-hand explanations can also be used to develop messages that will resonate with particular audiences.

It is important as well to consider tailored messaging needs down to the individual level, including through such strategies as the aforementioned motivational interviewing (Gagneur, 2020), despite the anticipated difficulty of widespread scale-up of such strategies. For example, messaging that explains why the COVID-19 vaccines cannot alter DNA might cause more harm

than good if disseminated widely to an audience not already concerned about this misconception. However, particular individuals may benefit from hearing this message or others like it. This example highlights the importance of tailored individual conversations rather than broadly disseminated communications in certain contexts.

4. *Adapt Messaging as Circumstances Change*

Adaptive messaging is a core tenet of communication during the response to an infectious disease outbreak (Tumpey et al., 2018). Accordingly, what influences people's decisions is likely to shift as vaccine distribution goes forward, reflecting both individual experiences and months of media coverage. Ultimately, communication themes being emphasized today may be inappropriate or incomplete in several months as circumstances change, and campaigns will be forced to adapt accordingly. Recognition of the dynamism of COVID-19 vaccine hesitancy is key to the construction of effective communication strategies, which must mirror the dynamism of beliefs. Therefore, constant research to monitor and understand the addressable influences on vaccine confidence over time will be essential, as will feedback mechanisms to ensure that this information is used to inform planning processes. Rapid research methods will be needed to identify relevant priorities, appropriate message formats, trusted messengers, and appropriate message frequency, along with funding to support this research (Schoch-Spana et al., 2020).

5. *Respond to Adverse Events in a Transparent, Timely Manner*

As vaccination becomes more common, people's experiences with the COVID-19 vaccines will become known. While the vaccines often cause mild and transitory side effects, serious adverse reactions are exceedingly rare (CDC, 2021; n.d.). The rarity of adverse events is not always appreciated, however, as such events are often disproportionately reported in the news media and spread widely on social media. Moreover, serious medical events may occur coincidentally soon after vaccination and be perceived as related to the vaccine (Salmon, 2020). It is important to communicate information about adverse events in a timely and transparent manner and to help people understand what is known, what is unknown, and what should be done. In addition, postvaccination surveillance is essential to identify rare adverse outcomes that may be vaccine related. Taking this approach will help mitigate concerns about safety, side effects, and adverse events moving forward.

6. *Identify Trusted Messengers to Deliver Messages*

Messages about a new COVID-19 vaccine will be novel to all target audiences. Trust in the person or institution that delivers a message, built over previous years, will boost its credibility. Different groups may have different trusted messengers and preferred mediums and channels. Decision makers can identify groups that represent trust gaps in their community and trusted sources within and outside their organization who can convey public health messages to those groups.

7. *Emphasize Support for Vaccination Instead of Focusing on Naysayers*

Research shows that people look to their peers for cues about how to behave in a wide range of areas, from voting to savings (Brunson, 2013; Schultz et al., 2007). Accordingly, making vaccine uptake visible will encourage a social norming of COVID-19 vaccine acceptance. Early on, one approach is to emphasize *increasing* support for vaccination as uptake increases, thus initiating a virtuous cycle. Just as voters receive "I voted" stickers after casting

their ballots, vaccine distribution sites could provide “I got vaccinated” stickers, or encourage people to text their friends and family or post on social media that they received the vaccine (Milkman, 2020). Likewise, state and local jurisdictions could create publicly available dashboards with real-time data about the doses of vaccine administered in their communities or highlight evidence of community demand for vaccination (e.g., through news stories about people seeking vaccination).

8. *Leverage Trusted Vaccine Endorsers*

The immunization of thought leaders, community champions, and celebrities could help encourage members of the public to be vaccinated (Freed et al., 2011; Hoffman et al., 2017; Najera, 2019). Such vaccine promotion messengers should be relatable, trusted, and credible, and their messages should be consistent (Tumpey et al., 2018). This strategy could be paired with strategy 1 above.

A particularly effective way to implement this strategy could be to partner with people who have strong existing popular or community relationships with experts, adapting messages as needed. Examples of this approach include NBA star Stephen Curry’s hosting Dr. Anthony Fauci on his video series and national vaccine experts participating in local town hall meetings. Likewise, in Baltimore, public health experts and researchers have partnered with faith leaders in the Black community to reach out to and educate community members about both COVID-19 and influenza (Sokolow, 2020), an approach that could be adapted elsewhere. And in Prince George’s County, Maryland, a long-time partnership involving the Maryland Center for Health Equity has focused on having local health care providers talk about the vaccine with barbers and stylists to shift them toward vaccine acceptance, the idea being that these individuals can help clarify misinformation and set social norms in their community.

9. *Pay Attention to Delivery Details That Also Convey Information*

Trust in a vaccination program may be undermined if the user experience with enrolling and getting vaccinated is poor. If exposed to reports of online sign-up portals crashing, dirty clinic sites, or long wait times, for example, people may infer that the vaccine itself is also faulty.

CONCLUSION

Public engagement and messaging are critical to addressing the issues discussed herein to promote public confidence and trust in the COVID-19 vaccines. Given the prevalence of local concerns and information needs, it is important to support local communities by providing the resources they need to engage community members and reinforce accurate, clear information. Accessible, consistent, and transparent communication is crucial to converting hesitancy about vaccination to acceptance. Strong community engagement to identify and understand concerns will help in determining what messaging, delivered by whom, will be most effective.

Everyone—employers, health care providers, faith leaders, elected leaders, and public health officials—has a role to play. All strategies for increasing vaccine confidence need to take into account that vaccine decision making is part of a nuanced ecological model in which individual beliefs and behaviors are influenced by experiences at the community, organizational, and policy levels. As the COVID-19 vaccination campaign continues, it will be important to employ a coordinated approach that is supported at the federal and state levels and invests in

local resources, expertise, and involvement. A variety of strategies at the national, state, and local levels will be required to change the pattern of interactions with the public, address vaccine hesitancy, build trust, and ultimately ensure a successful COVID-19 vaccination campaign.

SEAN is interested in your feedback. Was this rapid expert consultation useful? Send comments to sean@nas.edu or (202) 334-3440.

REFERENCES

- Amin, A. B., R. A. Bednarczyk, C. E. Ray, K. J. Melchiori, J. Graham, J. R. Huntsinger, and S. B. Omer. 2017. Association of moral values with vaccine hesitancy. *Nature Human Behaviour*, 1(12), 873–880.
- Bay Area Regional Health Inequities Initiative. 2020. *About*. <https://www.barhii.org> (accessed January 10, 2021).
- Berkowitz, S. A., C. W. Cené, and A. Chatterjee. 2020. COVID-19 and health equity: Time to think big. *New England Journal of Medicine*, 383(12), e76. doi: 10.1056/NEJMp2021209.
- Brewer, N. T., G. B. Chapman, A. J. Rothman, J. Leask, and A. Kempe. 2017. Increasing vaccination: Putting psychological science into action. *Psychological Science in the Public Interest*, 18(3), 149–207. doi: 10.1177/1529100618760521.
- Bruine de Bruin, W., A. M. Parker, M. Galesic, and R. Vardavas. 2019. Reports of social circles' and own vaccination behavior: A national longitudinal survey. *Health Psychology*, 38, 975–983.
- Brunson, E. K. 2013. How parents make decisions about their children's vaccinations. *Vaccine*, 31(46), 5466–5470.
- Carpio, M. V. 2004. The lost generation: American Indian women and sterilization abuse. *Social Justice*, 31, No. 4 (98), 40–53. <http://www.jstor.org/stable/29768273> (accessed December 30, 2020).
- CDC (Centers for Disease Control and Prevention). 2020a. *COVID-19 hospitalization and death by race/ethnicity*. <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html> (accessed January 15, 2020).
- CDC. 2020b. *COVID-19 racial and ethnic health disparities*. <https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/racial-ethnic-disparities/disparities-deaths.html#:~:text=Data%20on%20race%20and%20ethnicity,ethnic%20groups%20among%20the%20total> (accessed January 15, 2021).
- CDC. 2021. *Frequently asked questions about COVID-19: Vaccination*. <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/faq.html> (accessed December 30, 2020).
- CDC. n.d. *Infant Immunizations FAQs*. https://www.cdc.gov/vaccines/events/niiw/ed-resources/downloads/f_provider-qa-color.pdf (accessed December 30, 2020).
- Cook, J., and S. Lewandowsky. 2011. *The debunking handbook*. https://skepticalscience.com/docs/Debunking_Handbook_2011.pdf (accessed January 19, 2021).
- Dixon, G. N., B. W. McKeever, A. E. Holton, C. Clarke, and G. Eosco. 2015. The power of a picture: Overcoming scientific misinformation by communicating weight-of-evidence information with visual exemplars. *Journal of Communication*, 65(4), 639–659. doi: 10.1111/jcom.12159.
- Dubé, E., D. Gagnon, and N. E. MacDonald. 2015. Strategies intended to address vaccine hesitancy: Review of published reviews. *Vaccine*, 33(34), 4191–4203. doi: 10.1016/j.vaccine.2015.04.041.
- Ecker, U. K., S. Lewandowsky, and D. T. Tang. 2010. Explicit warnings reduce but do not eliminate the continued influence of misinformation. *Memory and Cognition*, 38(8), 1087–1100. doi: 10.3758/MC.38.8.1087.
- Ecker, U. K. H., J. L. Hogan, and S. Lewandowsky. 2017. Reminders and repetition of misinformation: Helping or hindering its retraction? *Journal of Applied Research in Memory and Cognition*, 6, 185–192. <https://www.sciencedirect.com/science/article/abs/pii/S2211368116301838?via%3Dihub> (accessed January 19, 2021).
- Ferreri, E. 2020. Duke experts: Meet vaccine skeptics with empathy, information: A restart could help public confidence in COVID-19 vaccines, panelists say. *Duke Global Health Institute Commentary*. <https://globalhealth.duke.edu/news/duke-experts-meet-vaccine-skeptics-empathy-information> (accessed January 19, 2021).
- Frakt, A. 2020. Bad medicine: The harm that comes from racism. *New York Times*, July 8.

- <https://www.nytimes.com/2020/01/13/upshot/bad-medicine-the-harm-that-comes-from-racism.html> (accessed December 30, 2020).
- Freed, G. L., S. J. Clark, A. T. Butchart, D. C. Singer, and M. M. Davis. 2011. Sources and perceived credibility of vaccine-safety information for parents. *Pediatrics*, 127(Suppl 1), S107–S112. doi: 10.1542/peds.2010-1722P.
- Gagneur, A. 2020. Motivational interviewing: A powerful tool to address vaccine hesitancy. *Canada Communicable Disease Report*, 46(4), 93–97.
- Gamble, V. N. 1997. Under the shadow of Tuskegee: African Americans and health care. *American Journal of Public Health*, 87(11), 1773–1778. doi: 10.2105/AJPH.87.11.1773.
- Garcia-Retamero, R., and M. K. Dhimi. 2011. Pictures speak louder than numbers: On communicating medical risks to immigrants with limited non-native language proficiency. *Health Expectations*, 14, 46–57.
- Gust, D. A., A. Kennedy, S. Wolfe, K. Sheedy, C. Nguyen, and S. Campbell. 2008a. Developing tailored immunization materials for concerned mothers. *Health Education Research*, 23(3), 499–511. doi: 10.1093/her/cym065.
- Gust, D. A., N. Darling, A. Kennedy, and B. Schwartz. 2008b. Parents with doubts about vaccines: Which vaccines and reasons why. *Pediatrics*, 122(4), 718–725. doi: 10.1542/peds.2007-0538.
- Hamel, L., Kirzinger, A., Munana, C., and M. Brodie. 2020. *KFF COVID-19 Vaccine Monitor: January 2021: Vaccine Hesitancy*. <https://www.kff.org/report-section/kff-covid-19-vaccine-monitor-january-2021-vaccine-hesitancy/> (accessed January 27, 2021).
- Hausman, B. L. 2020. Against misinformation. *On Education*. <https://www.oneducation.net/no-08-september-2020/against-misi> (accessed January 19, 2021).
- Hausman, B. L., Lawrence, H. Y., West Marmagas, S., Fortenberry, L., and Dannenberg, C. J. 2020. H1N1 vaccination and health beliefs in a rural community in the Southeastern United States: Lessons learned. *Critical Public Health*, 30(2), 245–251.
- Hoffman, J. 2020. Mistrust of a coronavirus vaccine could imperil widespread immunity. *New York Times*, July 18. <https://www.nytimes.com/2020/07/18/health/coronavirus-anti-vaccine.html> (accessed December 30, 2020).
- Hoffman, S. J., Y. Mansoor, N. Natt, L. Sritharan, J. Belluz, T. Caulfield, Y. Freedhoff, J. N. Lavis, and A. M. Sharma. 2017. Celebrities’ impact on health-related knowledge, attitudes, behaviors, and status outcomes: Protocol for a systematic review, meta-analysis, and meta-regression analysis. *Systematic Reviews*, 6(1), 13. doi: 10.1186/s13643-016-0395-1.
- Jarrett, C., R. Wilson, M. O’Leary, E. Eckersberger, and H. J. Larson. 2015. Strategies for addressing vaccine hesitancy—A systematic review. *Vaccine*, 33(34), 4180–4190. doi: 10.1016/j.vaccine.2015.04.040.
- Kritz, F. 2020. “Trusted messengers, trusted messages”: How to overcome vaccine hesitancy. NPR, December 24. <https://www.npr.org/sections/health-shots/2020/12/24/948776228/trusted-messengers-trusted-messages-how-to-overcome-vaccine-hesitancy> (accessed January 10, 2021).
- Lewandowsky, S., U. K. H. Ecker, C. M. Seifert, N. Schwarz, and J. Cook. 2012. Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest*, 13(3), 106–131. doi: <https://doi.org/10.1177/1529100612451018>.
- MacFarlane, D., and R. Rocha. 2020. Guidelines for communicating about bats to prevent persecution in the time of COVID-19. *Biological Conservation*, 248, 108650. doi: 10.1016/j.biocon.2020.108650.
- Martin, M. 2021. Talking with people in your life hesitant about the coronavirus vaccine. NPR, January 12. <https://www.npr.org/2021/01/11/955691117/talking-with-people-in-your-life-hesitant-about-the-coronavirus-vaccine> (accessed January 15, 2021).
- Maurici, M., M. Arigliani, V. Dugo, C. Leo, V. Pettinicchio, R. Arigliani, and E. Franco. 2019. Empathy in vaccination counselling: A survey on the impact of a three-day residential course. *Human Vaccines & Immunotherapeutics*, 15(3), 631–636.
- McNeil, D. G. 2020. How much herd immunity is enough? *New York Times*, December 24.

- <https://www.nytimes.com/2020/12/24/health/herd-immunity-covid-coronavirus.html> (accessed December 30, 2020).
- Milkman, K. 2020. Katy Milkman on how to nudge people to accept a COVID-19 vaccine. *Economist*, November 30. <https://www.economist.com/by-invitation/2020/11/30/katy-milkman-on-how-to-nudge-people-to-accept-a-covid-19-vaccine> (accessed January 18, 2020).
- Najera, R. F. 2019. *Celebrities have influence on vaccination*. <https://www.historyofvaccines.org/content/blog/vaccine-celebrities> (accessed December 30, 2020).
- NASEM (National Academies of Sciences, Engineering, and Medicine). 2017. *Communicating science effectively: A research agenda*. Washington, DC: National Academies Press. doi: 10.17226/23674.
- NASEM. 2020a. *Framework for equitable allocation of COVID-19 vaccine*. Washington, DC: National Academies Press. doi: 10.17226/25917.
- NASEM. 2020b. *Vaccine access and hesitancy: Part one of a workshop series: Proceedings of a workshop—In brief*. Washington, DC: National Academies Press. doi: 10.17226/25895.
- Omer, S. B., A. B. Amin, and R. J. Limaye. 2017. Communicating about vaccines in a fact-resistant world. *JAMA Pediatrics*, 171(10), 929–930.
- Omer, S. B., Yildirim, I., and Forman, H. P. 2020. Herd immunity and implications for SARS-CoV-2 control. *Journal of the American Medical Association*, 324(20), 2095–2096. doi:10.1001/jama.2020.20892.
- Parvanta, S., L. Gibson, H. Forquer, D. Shapiro-Luft, L. Dean, D. Freres, C. Lerman, G. Mallya, M. Moldovan-Johnson, A. Tan, J. Cappella, and R. Hornik. 2013. Applying quantitative approaches to the formative evaluation of antismoking campaign messages. *Social Marketing Quarterly*, 19(4), 242–264. doi: 10.1177/1524500413506004.
- Pflugh, K. K., J. A. Shaw, and B. B. Johnson. 1992. *Establishing dialogue: Planning for success: A guide to effective communication planning*. Trenton: New Jersey Department of Environmental Protection and Energy.
- Policy Lab, Brown University, and Rhode Island Department of Public Health. 2020. *Learnings on the COVID-19 testing experience*.
- Public Health Institute. 2020. *Communicating about the COVID-19 vaccines: Guidance and sample messages for public health practitioners*. <https://www.phi.org/thought-leadership/communicating-about-the-covid-19-vaccines-guidance-and-sample-messages-for-public-health-practitioners> (accessed December 30, 2020).
- Quinn, S. C., J. Parmer, V. S. Freimuth, K. M. Hilyard, D. Musa, and K. H. Kim. 2013. Exploring communication, trust in government, and vaccination intention later in the 2009 H1N1 pandemic: Results of a national survey. *Biosecurity and Bioterrorism*, 11(2). doi: 10.1089/bsp.2012.0048.
- Quinn, S. C., A. M. Jamison, and V. Freimuth. 2020. Communicating effectively about emergency use authorization and vaccines in the COVID-19 pandemic. *American Journal of Public Health*. doi: 10.2105/AJPH.2020.306036.
- Quinn, S., Kumar, S., Freimuth, V., Kidwell, K., and Musa, D. 2009. Public willingness to take a vaccine or drug under emergency use authorization during the 2009 H1N1 pandemic. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*. 7(3), 1–16.
- Rutjens, B. T., R. M. Sutton, and R. van der Lee. 2018. Not all skepticism is equal: Exploring the ideological antecedents of science acceptance and rejection. *Personality and Social Psychology Bulletin*, 44(3), 384–405.
- Salmon, D. 2020. *Vaccine safety communication in a pandemic*. Presentation for the National Academies of Sciences, Engineering, and Medicine, December 18.
- Schoch-Spana, M., E. Brunson, R. Long, S. Ravi, A. Ruth, and M. Trotochaud. 2020. *The public's role in COVID-19 vaccination: Planning recommendations informed by design thinking and the social, behavioral, and communication sciences*. Baltimore, MD: Johns Hopkins Bloomberg School of Public Health Center for Health Security.

- Schultz, P. W., J. M. Nolan, R. B. Cialdini, N. J. Goldstein, and V. Griskevicius. 2007. The constructive, destructive, and reconstructive power of social norms. *Psychological Science*, 18(5), 429–434. doi: 10.1111/j.1467-9280.2007.01917.x.
- Sokolow, A. 2020. With science and scripture, a Baltimore pastor is fighting COVID-19 vaccine skepticism. STAT News, August 31. <https://www.statnews.com/2020/08/31/with-science-and-scripture-a-baltimore-pastor-is-fighting-covid-19-vaccine-skepticism/> (accessed December 30, 2020).
- Trevena L. J., H. M. Davey, A. Barratt, P. Butow, and P. Caldwell. 2006. A systematic review on communicating with patients about evidence. *Journal of Evaluation in Clinical Practice*, 12(1), 13–23. doi: 10.1111/j.1365-2753.2005.00596.x.
- Trevena, L. J., B. J. Zikmund-Fisher, and A. Edwards. 2013. Presenting quantitative information about decision outcomes: A risk communication primer for patient decision aid developers. *BMC Medical Information Decision Making* 13, S7.
- Tumpey, A. J., D. Daigle, and G. Nowak. 2018. *The CDC field epidemiology manual: Communicating during an outbreak or public health investigation*. Atlanta, GA: CDC. <https://www.cdc.gov/eis/field-epi-manual/chapters/Communicating-Investigation.html> (accessed January 19, 2021).
- University of Wisconsin. 2018. *Sterilization of Puerto Rican women: A selected, partially annotated bibliography (Louis de Malave, 1999)*. <https://www.library.wisc.edu/gwslibrarian/bibliographies/sterilization> (accessed December 30, 2020).
- Weber, E. U., and E. J. Johnson. 2006. Constructing preferences from memory. In *The construction of preference*, edited by S. Lichtenstein, and P. Slovic. New York: Cambridge University Press. Pp. 397–410.

ACKNOWLEDGMENTS

We thank the sponsors of SEAN—the National Science Foundation and the Alfred P. Sloan Foundation—and of the Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats—the U.S. Department of Health and Human Services, Assistant Secretary for Preparedness and Response.

Special thanks go to colleagues on the SEAN executive committee: Mary T. Bassett (co-chair), Harvard University; Robert M. Groves (co-chair), Georgetown University; Dominique Brossard, University of Wisconsin-Madison; Janet Currie, Princeton University; Michael Hout, New York University; Arati Prabhakar, Actuate; Adrian Raftery, University of Washington; and Jennifer Richeson, Yale University. We thank as well the Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats, particularly Harvey Fineberg (Gordon and Betty Moore Foundation).

We extend gratitude to the staff of the National Academies of Sciences, Engineering, and Medicine, in particular to Emily Backes and Benjamin Kahn, who contributed research, editing, and writing assistance. Bridget Kelly was also invaluable in the planning and execution of the public-information session that informed the development of this rapid expert consultation. Thanks are due as well to Mike Stebbins (Science Advisors, LLC, and Federation of American Scientists) and Kerry Duggan (SustainabiliD, LLC, and Federation of American Scientists), consultants to SEAN, who provided additional editorial and writing assistance. We also thank Rona Briere for her skillful editing.

To supplement their own expertise, the authors received input from several external sources, whose willingness to share their perspectives and expertise was essential to this work. We thank Noel Brewer (University of North Carolina), Mollyann Brodie (Kaiser Family Foundation), Ron Carlee (Old Dominion University), Mirta Galesic (Sante Fe Institute), Branden Johnson (Decision Research), Rupali Limaye (The Johns Hopkins University), Brendan Nyhan (Dartmouth College), Erina MacGeorge (Pennsylvania State University), Scott Ratzan (CUNY School of Public Health), Itzhak Yanovitzky (Rutgers University, and David Yokum (Brown University Policy Lab).

We also thank the following individuals for their review of this rapid expert consultation: Helene D. Gayle, President and Chief Executive Officer, The Chicago Community Trust and Affiliates; Bernice L. Hausman, Chair, Department of Humanities, Penn State College of Medicine, Hershey, PA; Robert Hornik, Wilbur Schramm Professor of Communication and Health Policy, Annenberg School for Communication, University of Pennsylvania; Joneigh S. Khaldun, Chief Medical Executive and Chief Deputy Director for Health, Michigan Department of Health and Human Services; Daniel Salmon, Division: Global Disease Epidemiology and Control and Institute for Vaccine Safety, Johns Hopkins Bloomberg School of Public Health.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the conclusions of this document, nor did they see the final draft before its release. The review of this document was overseen by Alicia L. Carriquiry, Department of Statistics, Iowa State University, and Robert A. Moffitt, Department of Economics, Johns Hopkins University. They were responsible for making certain that an independent examination of this rapid expert consultation was carried out in accordance with the standards of the National Academies and that all review comments were carefully considered. Responsibility for the final content rests entirely with the authors and the National Academies.

**SOCIETAL EXPERTS ACTION NETWORK (SEAN)
EXECUTIVE COMMITTEE**

MARY T. BASSETT (*Co-chair*), Harvard University
ROBERT M. GROVES (*Co-chair*), Georgetown University
DOMINIQUE BROSSARD, University of Wisconsin-Madison
JANET CURRIE, Princeton, University
MICHAEL HOUT, New York University
ARATI PRABHAKAR, Actuate
ADRIAN E. RAFTERY, University of Washington
JENNIFER RICHESON, Yale University

Staff

MONICA N. FEIT, *Deputy Executive Director, Division of Behavioral and Social Science and Education*
ADRIENNE STITH BUTLER, *Director, Board on Behavioral, Cognitive, and Sensory Sciences*
EMILY P. BACKES, *Senior Program Officer*
NATALIE NIELSEN, *Senior Program Officer*
DARA SHEFSKA, *Associate Program Officer*
PAMELLA ATAYI, *Program Coordinator*

STANDING COMMITTEE ON EMERGING INFECTIOUS DISEASES AND 21ST CENTURY HEALTH THREATS

HARVEY FINEBERG (*Chair*), Gordon and Betty Moore Foundation
KRISTIAN ANDERSEN, The Scripps Research Institute
RALPH STEVEN BARIC, The University of North Carolina at Chapel Hill
MARY T. BASSETT, Harvard School of Public Health
TREVOR BEDFORD, Fred Hutchinson Cancer Research Center
GEORGES BENJAMIN, American Public Health Association
DONALD BERWICK, Harvard Medical School
RICHARD BESSER, Robert Wood Johnson Foundation
R. ALTA CHARO, University of Wisconsin-Madison
PETER DASZAK, EcoHealth Alliance
JEFFREY S. DUCHIN, University of Washington
ELLEN EMBREY, Stratitia, Inc
BARUCH FISCHHOFF, Carnegie Mellon University
DIANE GRIFFIN, Johns Hopkins Bloomberg School of Public Health
ROBERT GROVES, Georgetown University
MARGARET HAMBURG, Foreign Associate, National Academy of Medicine
DAN HANFLING, In-Q-Tel
JOHN HICK, Hennepin County Medical Center
KENT E. KESTER, Sanofi Pasteur
PATRICIA KING, Georgetown University Law Center
JONNA MAZET, University of California, Davis School of Veterinary Medicine
PHYLLIS MEADOWS, The Kresge Foundation
TARA O'TOOLE, In-Q-Tel
ALEXANDRA PHELAN, Georgetown University
DAVID RELMAN, Stanford University
MARK SMOLINSKI, Ending Pandemics
DAVID WALT, Harvard Medical School

Project Staff

LISA BROWN, *Senior Program Officer*
AUTUMN DOWNEY, *Senior Program Officer*
CAROLYN SHORE, *Senior Program Officer*
SCOTT WOLLEK, *Senior Program Officer*
AURELIA ATTAL-JUNCQUA, *Associate Program Officer*
EMMA FINE, *Associate Program Officer*
BENJAMIN KAHN, *Associate Program Officer*
MICHAEL BERRIOS, *Research Associate*
BRIDGET BOREL, *Administrative Assistant*
JULIE PAVLIN, *Director, Board on Global Health*
ANDREW M. POPE, *Director, Board on Health Sciences Policy*