

## **“Plenty of Vaccines, But Not Enough Arms”: A Social-Ecological Approach to COVID-19 Vaccine Hesitancy in Rural US Communities**

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### **Abstract**

This article leads off the special issue’s first section on *Health, Mental Health, and Well-Being Today Among Marginalized Populations*. It draws from multiple disciplines to address COVID-19 vaccine hesitancy in rural areas of the United States. Presenting a synthesis of literature on rural vaccine hesitancy and emerging research and scientific opinion on COVID-19, we identify likely factors in rural decision-making about COVID-19 vaccination. Vaccination is underway, with plans to provide access to every U.S. resident. However, polls suggest vaccine hesitancy may compromise our ability to reach the goal of herd immunity, and rural residents express more hesitancy than their urban and suburban counterparts. Drawing on Thomson et al.’s (2016) identification of five dimensions of vaccine uptake, we use a social-ecological approach to propose actions to increase vaccine acceptance on individual, interpersonal, organizational, community, and cultural levels. This conceptual paper is a starting point for rural health and human services administrators and practitioners seeking to reduce COVID-19 vaccine hesitancy in their communities in this early stage of COVID-19 vaccination.

**Keywords:** COVID-19, vaccine hesitancy, rural health, health equity, social determinants of health

### **Introduction**

As of March 10, 2021, the Centers for Disease Control and Prevention (CDC, 2021) had attributed 527,726 reported deaths to the COVID-19 pandemic in the United States. One priority in the quest to end the pandemic is vaccination, and in December 2020, the U.S. Food and Drug Administration (FDA) granted emergency use authorization for the first COVID-19 vaccine. In conjunction with effective public health measures, widespread vaccination is considered an essential aspect of mitigating disease and death on both a national and global scale.

But what happens when there are “plenty of vaccines, but not enough arms”? In a recent U.S. survey, more than one-third of respondents were either unsure or did not intend to access the COVID-19 vaccine (Fisher et al., 2020). This expression of uncertainty is reflective of what we refer to in this article as “vaccine hesitancy”: individuals who have significant concerns, reluctance, or uncertainty about the decision to accept a COVID-19 vaccination—independent of their ultimate decision about whether to accept the vaccine. This classification is distinct from, but might include, people who are commonly referred to as an “anti-vaxxers”: those completely opposed to vaccination, typically discussed in the context of a parent who does not want to vaccinate their child. (For discussion of factors that complicate settling on a universal definition of vaccine hesitancy, see Dubé et al. [2013].) Vaccine



hesitancy and the possibility of non-acceptance of the COVID-19 vaccine are problematic, as one goal of vaccination is to reach herd immunity, which provides indirect protection against COVID-19 for susceptible individuals by minimizing the possibility of disease transfer; when herd immunity is reached, sustained spread cannot occur, and the outbreak will decline (World Health Organization [WHO], 2020). The percentage of the U.S. population that needs to be vaccinated to reach this point cannot yet be determined, but one estimate places it around 70% (Fisher et al., 2020). Without laws requiring vaccination, it is possible that vaccine hesitancy could result in a failure to reach herd immunity in the U.S. Rural communities appear to be especially vulnerable in this regard, as rural U.S. residents exhibit higher rates of hesitancy compared to urban and suburban counterparts (Kaiser Family Foundation (KFF), 2021; Khubchandani et al., 2021).

This paper identifies challenges and proposes strategies to combat vaccine hesitancy, situating this problem in the greater context of social determinants of rural health and the COVID-19 pandemic. Social determinants of health (SDOH) are the social, economic, environmental, educational, and health-related conditions that affect health disparities (WHO, 2013). The aim is to provide a starting point for health and human services administrators and professionals in a position to contribute to efforts to reduce rural vaccine hesitancy in these critical first months of the COVID-19 vaccine roll-out. Drawing on insights from literature on rural vaccine hesitancy, as well as emerging research and scientific opinion related to COVID-19, we use a social-ecological approach to identify interventions to promote rural COVID-19 vaccine acceptance on a range of micro (individual) to macro (societal) levels.

## **Literature Review**

Global responses to the COVID-19 pandemic have varied greatly, contributing to the weakening of public trust in health care, the government, and scientific research more broadly (Chou & Budenz, 2020; Verger & Dubé, 2020). When the current article was written in March 2021, the COVID-19 pandemic had been ongoing for 1 year, according to the WHO. Mirroring existing disparities in rural health research and outcomes in the U.S., understanding of COVID-19 has largely focused on urban areas, despite recognition that rural communities might be uniquely vulnerable to the pandemic's physical and economic impact (Mueller et al., 2021).

Rural areas are marked by higher levels of poverty; less robust job markets; and economic realities that amplify existing health-related challenges for rural populations, which tend to be older, in poorer health, and lack access to comprehensive health care facilities (Lakhani et al., 2020; Mueller et al., 2021). Thus, rural communities in the U.S. pose a unique challenge to the pandemic recovery process. Our conceptual article synthesizes literature in three topic areas: rural health disparities/SDOH, (1) rurality, (2) COVID-19; and (3) COVID-19 vaccine hesitancy, drawing on this knowledge to offer interventions aimed at increasing rural COVID-19 vaccine acceptance.

## ***Rural Health Disparities and SDOH***

Persistent health disparities exist in rural areas across the U.S. (Singh et al., 2017). These disparities can be understood in the larger context of SDOH, defined by the WHO (2013) as circumstances into which people are born; the circumstances in which they grow up, live, work and advance across the lifespan; and the responses systems available to them in order to deal with illness. Naturally, a wide set of economic, social policy, and political forces affect these circumstances (WHO, 2013). For example, in the U.S., individuals who live in mostly rural areas are disproportionately less likely to engage in preventive health



behaviors, including vaccination (Vanderpool et al., 2019). The impact of privilege associated with certain sociodemographic factors cannot be underestimated (Aljassim & Ostini, 2020; Singh et al., 2017). Scholarship has established that rural communities in the U.S. have lower levels of health literacy, and that socioeconomic status, education, age, gender, and race/ethnicity are critical pieces in understanding factors that shape rural-urban differences (Aljassim & Ostini, 2020). In terms of health outcomes, infant and child mortality are higher in rural and poor communities, with mortality rates for Black infants and children in rural, poor areas almost 3 times higher than rates in affluent rural areas (Singh et al., 2017). Identifying social factors that influence health allows for a more nuanced understanding of how the COVID-19 pandemic has impacted rural communities more broadly, and vaccine hesitancy specifically (Olusanya et al., 2021).

### ***COVID-19 in Rural U.S. Communities***

In March 2020, as the highly communicable nature of COVID-19 was recognized, the virus spread rapidly in densely populated urban areas, with most of the earliest confirmed cases located in metropolitan areas with populations of at least 1 million. According to the U.S. Department of Agriculture (USDA, 2021a), the per capita prevalence of cumulative COVID-19 cases remained greater in metro areas than in non-metro areas until late October 2020. However, this trend was reversed in Fall 2020 as the per capita prevalence of cumulative COVID-19 cases in non-metro areas surpassed that of metro areas. This higher prevalence also translated into higher per capita mortality rates for rural areas, with death rates in non-metro areas exceeding urban death rates throughout the fall and winter of 2020 (USDA, 2021b). Rural communities have experienced higher death rates due, in part, to an aging population and the presence of underlying health conditions (USDA, 2021b). Notably, these prevalence rates vary from county to county, with rural Black and Latinx populations experiencing both higher infection rates and higher mortality rates compared to their rural White counterparts (Cheng et al., 2020).

The higher per capita prevalence and mortality that emerged in rural areas in late 2020 could be linked, in part, to lower levels of engagement in health prevention efforts. Important differences in COVID-19 health prevention behaviors were found between urban and rural areas; for example, rural residents were 50% less likely to wear a mask and conservative political ideologies were associated with fewer preventative health strategies (Callaghan et al., 2021). Previous scholarship has established the urban-rural political divide, with rurality playing a role in Republican party identification (Gimpel et al., 2020). Thus, given the lack of support that many Republican government officials showed for mask wearing and social distancing, conservative political elites had a significant impact on both the seriousness with which their supporters reacted to COVID-19, and the extent to which those supporters adopted social distancing and mask-wearing as preventative behaviors (deBruin et al., 2020; Gatwood et al., 2021).

Amplifying the effects of higher proportionate rates of COVID-19 morbidity and mortality in rural areas is the reality of an economic recession which has hit rural communities particularly hard. For example, Mueller et al. (2021) reported a larger increase in reliance upon unemployment. This suggests the challenges rural communities face in recovering from the pandemic are multi-faceted and context specific.

### ***COVID-19 Vaccine Hesitancy in the U.S.***

COVID-19 vaccine hesitancy is a documented issue nationwide. Szilagyi et al. (2020) indicated the national self-reported likelihood of getting a COVID-19 vaccine declined from



a high of 74% to 56% from April to December 2020, with lower reported levels of vaccine acceptance among women (compared to men), Black individuals (compared to White), and for those with lower educational levels (compared to those with college degrees). These same demographic predictors of vaccine acceptance held up in other recent studies (Khumbchandani et al., 2021; Reiter et al., 2020), though some reported even higher rates of vaccine hesitancy (Ruiz & Bell, 2021). Vaccine hesitancy is disproportionately reported in rural areas in the U.S.: a recent poll found 24% of people from rural areas reported *definitely not* wanting to be vaccinated, compared to 13% and 14% of people residing in urban and suburban areas (KFF, 2021).

Relevant predictors of COVID-19 vaccine acceptance include being a Democrat, being married or partnered, having a pre-existing medical condition, and having had an influenza vaccine in 2019–2020 (Ruiz & Bell, 2021). Overall, this suggests that demographic factors such as age, race/ethnicity, gender, and economic status; access to accurate vaccine knowledge; viewing the virus as serious or as being likely to directly affect you; and Democratic versus Republican party affiliations are relevant factors in understanding COVID-19 vaccine hesitancy. Even rural healthcare workers reported less willingness to take the COVID-19 vaccine as soon as it became available, compared to the overall study population, with the most noted concerns including safety, effectiveness, and speed of development and approval (Shekhar et al., 2021).

Aside from the demographic and social factors relating to COVID-19-related vaccine hesitancy, community-level dynamics, such as misinformation and trust in science and healthcare, are significant. In a study conducted in Fall 2020, researchers found that recent exposure to misinformation about the COVID-19 vaccine resulted in a 6.5% decline in willingness to be vaccinated (Loomba et al., 2021). Along with this misinformation is the ongoing spread of conspiracy theories on social media by anti-vaccine groups that predate the pandemic and that erode public trust (Vergara et al., 2021). Organizations responsible for the spread of misinformation have played a large role in creating confusion, fear, and mistrust of health care professionals and vaccination practices. Intent to vaccinate was lower for those who got their news from social media or conservative leaning cable news channels and those who believed in vaccine conspiracy theories (Ruiz & Bell, 2021). The misinformation messaging that occurs on social media is tied to decreased levels of trust in science and technology—trust that has been hard to build as the information regarding COVID-19 has been rapidly changing and evolving over the past year and a half (Verger & Dubé, 2020). The sources of mistrust and the effects vary based on population. For example, ongoing systemic abuse and neglect of Black, Puerto Rican, and Indigenous populations in the U.S. results in enduring health disparities for non-White residents; thus, it is conceivable that rates of vaccine hesitancy due to distrust of the medical establishment and/or the government (i.e., not necessarily vaccine specific) might also be a factor in racial and ethnic minority communities (Gatwood et al., 2021; Latkin et al., 2021).

### ***Vaccine Hesitancy in Rural Areas***

Although there is no existing research on the specific factors that lead to the reduction of COVID-19 vaccine hesitancy in rural areas (to the authors' knowledge), research focusing on rural responses to H1N1 and HPV vaccinations find vaccine refusal is the result of coordinated and complex decision-making processes for families (Hausman et al., 2020). Hausman et al. (2020) investigated parental decisions about H1N1 vaccination at free, in-school clinics, finding that—contrary to the expectations of the health department—parents made purposeful decisions about flu vaccination for their children.



Parental decisions were related to safety, efficacy, and risk, and emphasized beliefs about personal and familial circumstances (e.g., individual or familial susceptibility to illness). For many, concerns about vaccine risk were heightened for the new vaccine, suggesting “even a pandemic influenza like H1N1...does not necessarily motivate families to accept a new vaccine” (p. 249).

Regarding the HPV vaccine, despite higher rates of HPV-related cancer in rural areas, there are lower rates of HPV vaccine coverage. These lower rates are linked to concerns about social stigma due to the link to cervical cancer and sexual transmission of HPV; level of comfort in discussing sexual health matters with health care providers; and a complex array of social and cultural factors, including social and political background (Peterson et al., 2020; Thomas et al., 2019). For example, in an exploratory study of parental knowledge of HPV vaccination in rural South Florida, hesitancy-focused results indicated 26% of parents reported concern about stigma while maintaining a low level of knowledge about the vaccine, with 80% reporting reluctance due to beliefs rooted in misinformation (Thomas et al., 2019). Peterson et al. (2020) found that individual level knowledge of cervical cancer, sexual behavior, STD diagnosis, and contraceptive use (among other sexual health measures) were significant factors in vaccine acceptance, while health insurance, provider influence and communication, and school-based interventions also played a role in whether individuals and families engaged in HPV vaccination (Peterson et al., 2020).

### ***Addressing Vaccine Hesitancy***

Existing vaccine hesitancy research has demonstrated that rural families have relied heavily on local healthcare providers and schools for information about both H1N1 and HPV. Thomson et al. (2016) refer to the dynamics related to vaccine acceptance as “the 5As”: access, affordability, awareness, acceptance, and activation. Addressing challenges on each of these levels is important. One strategy that relates to several of these dynamics centralizes health education and outreach. Thomas et al. (2019) found that reducing vaccine hesitancy requires increasing vaccine-specific knowledge in rural communities, suggesting that public health education campaigns must be designed with input from parents and community leaders. In addition, provider recognition of the specific cultural norms of the community is an important aspect of patient-provider communication and might require specific education for different demographic groups (Fazekas et al., 2008; Katz et al., 2009; Thomas et al., 2019). Health literacy could be further affected by language barriers. It is also important to address general misunderstandings of vaccine-related issues as well as vaccine-specific misinformation (Fazekas et al., 2008; Hausman et al., 2020; Katz et al., 2009). In addition to education, other general strategies seek to increase community demand for vaccination, boost access, and use the relationship between patients and provider (Dubé et al., 2015).

This section reviewed literature on rural health disparities, COVID-19, and vaccine hesitancy. Next, we use a social-ecological model to identify potential approaches for health and human services organizations and providers working to combat COVID-19 vaccine hesitancy in rural areas. This model is informed by evidence-based practice from prior efforts to reduce non-COVID-19 vaccine hesitancy and scientific research and opinion on COVID-19.

### **A Social-Ecological Approach to Rural COVID-19 Vaccine Hesitancy**

This conceptual model draws from rural vaccine hesitancy literature and broad-based research and projections about COVID-19 vaccine hesitancy. The aim is to identify factors that might be particularly salient to COVID-19 vaccine acceptance in rural areas. Thomson et al.’s (2016) five dimensions of vaccine uptake were used as a guide: access,





affordability, awareness, acceptance, and activation. A social-ecological approach to organizing health intervention strategies is useful because it allows for interventions that take place on varying levels of society to be mapped out. However, this model is not intended to represent interventions that would be appropriate for all rural communities due to differences among rural populations in the U.S. (Cohen et al., 2013). Further, these interventions were generated from a synthesis of two under-developed bodies of literature and should not be viewed as a comprehensive plan for addressing rural vaccine hesitancy. Instead, the aim of this model is to provide a foundation for how rural health and human services administrators and professionals might organize or contribute to efforts to reduce COVID-19 vaccine hesitancy. Macro-to-micro-level interventions are organized according to a social ecological model with five levels, described below:

- **Macro-level interventions: Public policy and social narratives:** consider regulatory or policy actions, federal legislature, cultural values, and social narratives.
- **Community-level interventions:** consider issues such as access, availability, barriers, and opportunities; emphasize relationships between organizations, the physical and built environment (e.g., the urban planning and architectural design of neighborhoods), and geographic features.
- **Organizational-level interventions:** also consider access, availability, barriers, and opportunities, with a focus on the strategies that organizations can employ (e.g., hospitals, medical offices, community health organizations, schools, childcare entities, supermarkets, convenience stores, libraries, religious institutions, etc.).
- **Interpersonal-level interventions:** consider approaches related to role modeling, social support, social values, beliefs, and norms; emphasize the role of family, peers, and social networks.
- **Individual-level interventions:** consider outcome expectations, motivations, behavioral capability; emphasize factors such as knowledge, attitudes, self-concept, and skills.

Table 1

*Interventions to Reduce Rural COVID-19 Vaccine Hesitancy*

<i>Level</i>	<i>Description</i>	<i>Strategies to Reduce Hesitancy</i>
Macro Level: Public Policy Social Narrative	Regulatory or policy actions, federal legislation, cultural values, social narratives	<ul style="list-style-type: none"> <li>• Shift social narratives to prioritize public health</li> <li>• Call for social media platforms to combat misinformation and conspiracy theories</li> <li>• Enact pro-vaccination health policy</li> <li>• Strengthen public health infrastructure</li> </ul>
Community	Access, availability, barriers, opportunities; emphasize relationships between organizations, the environment and geography	<ul style="list-style-type: none"> <li>• Expand the public health workforce through collaborative relationships</li> <li>• Address the needs of vulnerable populations</li> <li>• Educate providers and healthcare workers</li> <li>• Use tailored, culturally responsive education materials</li> <li>• Use effective health communication strategies</li> </ul>



Organizational	Access, availability, barriers, and opportunities; focus on strategies for organizations	<ul style="list-style-type: none"> <li>• Ensure privacy</li> <li>• Promote workplace vaccination opportunities</li> <li>• Leverage existing resources (e.g., libraries)</li> </ul>
Interpersonal	Role modeling, social support, values, and norms; emphasize role of family, peers, social networks	<ul style="list-style-type: none"> <li>• Build on patient-provider relationships</li> <li>• Promote pro-vaccination community norms</li> <li>• Create a community mutual aid program</li> </ul>
Individual	Expectations, motivations, capability; emphasize knowledge, attitudes, skills	<ul style="list-style-type: none"> <li>• Tailor interventions to the individual</li> <li>• Recognize historical trauma</li> <li>• Account for linguistic diversity</li> </ul>

### ***Macro-Level Interventions: Public Policy and Social Narratives***

- ***Shift social narratives to prioritize public health.*** Views on COVID-19 vaccination exist in a broader context of social and political tensions relating to autonomy and state power (Harrison & Wu, 2020). Expanding COVID-19 discourse to prioritize values and behaviors supportive of healthy communities and society, and away from false dichotomies (e.g., individual freedom versus public good), might have positive short and long-term effects (Harrison & Wu, 2020). Emphasis on the value of social solidarity could increase pro-social views of COVID-19 vaccination, positioning the health of the larger community as a motivational factor in vaccination decisions. This might also have implications for the way society views and addresses future public health issues.
- ***Call for social media platforms to combat misinformation and conspiracy theories.*** Although some social media platforms flag or otherwise seek to limit COVID-19-related misinformation, the industry must do more to disrupt the spread of COVID-19 conspiracy theories. Exposure to misinformation about vaccination has a direct effect on vaccine acceptance (Ruiz & Bell, 2021). Misinformation and conspiracy theories that spread quickly over social media are tied to decreased levels of trust in science and technology, exacerbating public concerns about the accuracy of COVID-19 information and knowledge of how to stay safe (Verger & Dubé, 2020).
- ***Enact pro-vaccination health policy.*** COVID-19 vaccination policies must be scientifically based and follow expert recommendations. Examples of health policy and recommendations situated to promote vaccine acceptance in rural communities include provider inquiry and recommendation at each health visit; COVID-19 vaccination programs in schools, pharmacies, mobile clinics, dental practices, and other community-based, non-medical settings; school entry requirements; and increased federal funding for research on COVID-19 vaccination in rural communities (Vanderpool et al., 2019).
- ***Strengthen public health infrastructure.*** Federal, state, and local public health organizations need the infrastructure and funding to provide key public health services equitably across the U.S. Geography, distance, and lack of resources are a few factors affecting community organizations' ability to identify and address the specific public health needs of rural populations. This is a barrier to lessening rural health disparities.

### ***Community-Level Interventions***



- ***Expand the public health workforce through strategic collaborations.*** Health education and outreach workers might visit other community and religious organizations in-person to promote vaccination and answer questions. In some rural communities, local police departments, volunteer EMS/firefighters, or other organizations might volunteer to provide transportation or engage in health outreach to targeted populations. Finally, consider the role of other trusted health professionals; see Gatwood et al. (2021) for a discussion of the contributions rural pharmacists stand to make in the vaccination process.
- ***Identify and address the needs of under-resourced/vulnerable populations.*** Older adults in rural areas are uniquely vulnerable to COVID-19, as they tend to have more underlying health conditions, fewer economic resources, and more limited access to healthcare and technology (Henning-Smith, 2020). Community health organizations may provide or connect under-resourced individuals to technical support for vaccination scheduling, transportation, and education about the vaccine. For communities that are especially distrustful of the government or medicine due to mistreatment (e.g., Black, Indigenous, and other people of color; undocumented residents), collaboration with trusted community- and faith-based organizations—which could necessitate educating community leaders—is necessary (Thomas et al., 2019).
- ***Educate medical providers and healthcare workers.*** Interventions and training should empower healthcare providers to disseminate evidence-based advice on vaccines (Olusanya et al., 2021). However, like the broader communities within which they work, rural health professionals face augmented barriers to accessing current, medically accurate information (Dilley et al., 2018; Dorsh, 2000). This might be especially significant at this stage of the COVID-19 vaccine rollout, because many personal physicians are not directly responsible for administering the vaccine. Nurses, pharmacists, administrative staff, and others in the healthcare workforce should be provided the same education and resources (Dilley et al., 2018); rural residents might be especially likely to rely on the advice of trusted medical- and medical-adjacent community members compared to what they perceive as “outsider” views of the government or pharmaceutical-sponsored messaging.
- ***Create tailored and culturally responsive health education materials.*** There is a consensus that personal and community beliefs play a role in the acceptance of medical and public health recommendations and subsequent health behaviors (Gatwood et al., 2021; Thomas et al., 2019; Williams 2014). Education must be tailored, and for rural communities, it is often helpful to develop materials in consultation with local and religious leaders to be culturally responsive and address the specific concerns of vaccine-hesitant community-members and groups (Olusanya et al., 2021; Thomas et al., 2019). Education and outreach materials should provide vaccine-specific information as well as general education about how the vaccine works and whether having, or having been exposed, to COVID-19 affects immunity (Fazekas et al., 2008; Hausman et al., 2020; Katz et al., 2009). Finally, social marketing campaigns have proven to be effective in at least one rural vaccination effort (Cates et al., 2011).
- ***Use effective health education communication strategies.*** Chou and Budenz (2020) highlight another dynamic specific to health communication, suggesting that recognizing, and then addressing and/or leveraging both negative and positive emotions associated with the COVID-19 pandemic are important aspects of vaccine





communication efforts. For example, it might be more effective to frame vaccination as a positive decision that could support the health of the community, as opposed to using negative appeals that could exacerbate virus-related fears (Chou & Bunde, 2020). Perhaps equally important to the content is how information is communicated. Mical et al. (2021) stressed the importance of avoiding models that assume misconceptions or a lack of knowledge, since these have been disproven to be effective and have even resulted in increases in vaccine hesitancy. Instead, they highlighted three communications strategies: presumptive language models, motivational interviewing, and educational dialogue-based interventions—with presumptive language models identified as foundational for recommendations and the latter two suggested as useful for advocating for caregiver acceptance.

### ***Organizational-Level Interventions***

- ***Ensure Privacy.*** Research on vaccine hesitancy in rural areas indicates that stigma and a perceived lack of privacy might be barriers to vaccine acceptance (Katz et al., 2009; Thomas et al., 2019). In addition to stigma, ideas associated with good health and having a strong immune system might be moral as well as descriptive in terms of making decisions about vaccines (Hausman et al., 2020). Therefore, supporting community needs for privacy is important (e.g., provide more private places to be vaccinated versus commercial locations or mass vaccination sites).
- ***Promote vaccination opportunities in workplaces.*** Workplaces can support vaccination efforts by providing information about the COVID-19 vaccine, encouraging staff to be vaccinated, providing accommodations (e.g., paid time off) to travel to vaccination appointments, or hosting a vaccination clinic.
- ***Leverage existing community resources: Libraries and community centers.*** Libraries and community centers are hubs of information in rural areas and could display information about COVID-19 and vaccination, provide opportunities for community-members to access the technology and assistance needed to book vaccination appointments, and connect individuals in need with other community members or organizations.

### ***Interpersonal-Level Interventions***

- ***Build on patient-provider relationships.*** Medical professionals play a significant role in patients' education and decision-making. Patients trust their physician's advice and are more likely to choose vaccination if their doctor recommends it (Dorell et al., 2011; Dubé & MacDonald, 2020; Reiter et al., 2020). Providers can be more effective in communications with patients by demonstrating an awareness of specific cultural norms and beliefs pertaining to vaccination (Thomas et al., 2019).
- ***Promote pro-vaccination community norms.*** Norm-based intervention strategies (e.g., promotion of pro-vaccination social norms) could increase COVID-vaccine uptake, especially among young adults (Graupensperger et al., 2021). Another group that might benefit from exposure to vaccine acceptance are those affiliated with the Republican political party, as COVID-19 vaccine hesitancy is disproportionately higher for Republican respondents compared to Democrats (Ruiz & Bell, 2021). Finally, the establishment of pro-COVID-19 vaccination norms might be especially important in rural communities, where distrust of outsiders, a lack of privacy, and social stigma are factors that relate to vaccine hesitancy.



- **Create a community mutual aid program.** Community members can help each other by addressing specific challenges that might deter individuals from seeking vaccination. A few examples include navigating web-based resources, making appointments, transportation to appointments, and sharing information about vaccine administration and the vaccine itself.

### **Individual-Level Interventions**

- **Tailor interventions to the individual.** Consider socio-demographic factors such as age, race/ethnicity, class, gender, sexuality, religion, and citizenship status. Strategically tailored, innovative strategies are needed to reach under-resourced and marginalized sub-populations within rural communities. Williams (2014) notes the importance of assessing why individuals are choosing to refuse vaccination; being able to assess causes of vaccine hesitancy on a local level provides a stronger foundation for identifying effective interventions.
- **Be sensitive to historical/ medical trauma.** Some communities (e.g., Indigenous, Black, Puerto Rican) have experienced historical trauma specific to medical abuse, in some cases sanctioned by the U.S. government; this requires specifically targeted intervention and trust-building (Gatwood et al., 2021).
- **Recognize linguistic diversity.** Increase access to medically accurate, multilingual information and plan to disseminate information in written, audio, and visual forms.

### **Conclusion**

In conjunction with the continuing efforts to keep rates of transmission low through behavioral interventions (e.g., masks, hand washing, social distancing), public and community health agencies are now tasked with the challenge of facilitating the vaccination of most U.S. residents. One challenge in the quest to vaccinate is vaccine hesitancy. Lacking evidence-based strategies to combat vaccine hesitancy specific to COVID-19, let alone COVID-19 in rural communities, we have identified challenges and strategies gleaned from (a) efforts to reduce non-COVID-19 vaccine hesitancy in rural areas and (b) recent studies and opinions about COVID-19-specific vaccine hesitancy, with the goal of better equipping rural health and human services workers to promote COVID-19 vaccination. The factors identified here do not represent a full, comprehensive plan; instead, they highlight considerations and ideas that might be particularly salient for rural community efforts to promote COVID-19 vaccine acceptance during a global pandemic and in early stages of vaccine availability. Limitations of this paper include a lack of information about COVID-19 vaccine hesitancy and vaccine acceptance (thus heavy reliance on essays and conceptual suggestions about how to address COVID-19 vaccine hesitancy) combined with a relatively limited body of literature related to vaccine hesitancy in rural areas of the U.S., most of which focuses on parental decision-making about vaccines administered during childhood/adolescence. More research is needed on concerns specific to COVID-19 vaccination, with attention to the specific needs of rural populations and communities in the U.S., and under-resourced and racial and ethnic minority populations living in rural areas.

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