

Review

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Review

Addressing Vaccine Hesitancy: A Review of Factors Contributing to Vaccine Refusal and Effective Communication Strategies for Promoting Vaccine Acceptance

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Abstract: Vaccine hesitancy has emerged as a significant barrier to achieving herd immunity and protecting populations from preventable diseases. Despite the proven effectiveness and safety of vaccines, many individuals remain hesitant or refuse to vaccinate themselves or their children. This review aims to identify the factors contributing to vaccine hesitancy, including misinformation, lack of trust in authorities, cultural beliefs, and access barriers. We also discuss the impact of vaccine hesitancy on public health, including outbreaks of vaccine-preventable diseases and erosion of trust in public health authorities. Furthermore, we present evidence-based communication strategies for addressing vaccine hesitancy, including building trust, providing accurate information, addressing myths and misconceptions, engaging with local influencers, and utilizing social media and digital platforms. By understanding the factors contributing to vaccine hesitancy and implementing effective communication strategies, healthcare providers, public health officials, and community leaders can work towards promoting widespread vaccine acceptance and protecting public health.

Keywords: vaccine hesitancy; public health; communication strategies; misinformation; herd immunity

1. Introduction

Vaccines have long been hailed as one of the most successful public health interventions in history, significantly reducing the burden of infectious diseases and saving countless lives [1]. However, despite their proven effectiveness and safety, vaccine hesitancy remains a significant barrier to achieving herd immunity and protecting populations from preventable diseases.

Vaccine hesitancy is a complex phenomenon influenced by a myriad of factors, including misinformation, lack of trust in authorities, and cultural beliefs [2,3]. In order to address this issue and increase vaccine acceptance, it is crucial to understand the underlying drivers of hesitancy and develop effective communication strategies that resonate with hesitant individuals. Addressing vaccine hesitancy is crucial in the context of public health as it directly impacts the effectiveness of immunization programs and the control of infectious diseases. Widespread vaccine hesitancy can lead to decreased vaccination rates, resulting in outbreaks of preventable diseases. Understanding the factors contributing to vaccine hesitancy and implementing effective communication strategies is essential to promote vaccine acceptance, protect vulnerable populations, and maintain herd

immunity in communities. By addressing vaccine hesitancy, public health officials can work towards achieving global health goals and preventing the spread of infectious diseases.

In order to address this issue effectively, it is crucial to understand the various factors that contribute to individuals' reluctance or refusal to vaccinate. By studying and identifying these factors, healthcare professionals, policymakers, and public health experts can develop targeted strategies to combat vaccine hesitancy and increase vaccination rates. Factors that contribute to vaccine hesitancy may include concerns about vaccine safety, lack of trust in healthcare providers or the pharmaceutical industry, misinformation spread through social media and other sources, religious or philosophical beliefs, and access barriers. By understanding these factors, stakeholders can tailor communication efforts to address specific concerns and misconceptions, ultimately leading to increased vaccine acceptance. Furthermore, identifying the underlying reasons for vaccine hesitancy can help inform the design of interventions and educational campaigns that are most likely to be effective in changing attitudes and behaviors towards vaccination. As such, research on the factors that contribute to vaccine hesitancy is essential for developing evidence-based strategies to communicate the importance of vaccination and promote public health.

Misinformation, myths, fear, and mistrust surrounding vaccines have contributed to a growing number of individuals questioning the safety and efficacy of vaccines [4]. This hesitancy not only undermines the herd immunity necessary to protect vulnerable populations but also poses risks to individual health and well-being. Effective communication strategies are essential to address vaccine hesitancy and promote vaccine acceptance [5]. By understanding the factors that contribute to hesitancy, such as lack of knowledge, mistrust of healthcare providers, concerns about vaccine safety, and cultural beliefs, targeted communication efforts can be tailored to address these specific barriers [6]. Additionally, clear, accurate, and culturally sensitive messaging can help counter misinformation and myths, build trust in vaccines and healthcare providers, and empower individuals to make informed decisions about vaccination [7]. Therefore, it is imperative to develop and implement effective communication strategies that address the diverse perspectives and concerns of individuals who are hesitant about vaccines. By fostering open dialogue, providing evidence-based information, and promoting trust in vaccines and healthcare systems, effective communication can play a critical role in increasing vaccine acceptance and ultimately protecting public health.

2. Overview of Vaccine Hesitancy:

- Factors affecting Vaccine Hesitancy

Vaccine hesitancy is a complex issue that can be influenced by a multitude of factors across different contexts and time periods. A thorough review of existing literature reveals several key factors that have contributed to vaccine hesitancy in the past, present, and potentially in the future.

One of the primary factors contributing to vaccine hesitancy is misinformation and lack of trust in the healthcare system and vaccine manufacturers [6]. Misinformation spread through social media and other channels has led to confusion and skepticism about the safety and efficacy of vaccines [7]. Additionally, past incidents such as the fraudulent MMR-autism study have eroded trust in vaccines and public health authorities, leading to hesitancy among some individuals [8].

Another important factor that has contributed to vaccine hesitancy is fear of adverse reactions [9]. While serious adverse events are rare, they can have a significant impact on public perception of vaccines. Media coverage of rare adverse events can amplify fears and lead to a decrease in vaccine uptake.

Cultural and religious beliefs also play a role in vaccine hesitancy. Some communities may have beliefs that conflict with vaccination or may have concerns about the ingredients in vaccines [10]. Understanding and addressing these beliefs is crucial in effectively communicating the importance of vaccination.

Socioeconomic factors such as access to healthcare and education can also contribute to vaccine hesitancy [11]. Individuals from marginalized communities may face barriers to accessing vaccines or may have lower levels of health literacy, leading to increased hesitancy.

Looking to the future, emerging technologies such as social media and artificial intelligence have the potential to both exacerbate and mitigate vaccine hesitancy [12,13]. While social media can spread

misinformation, it can also be used as a tool for targeted and tailored communication strategies to address vaccine hesitancy [13]. A comprehensive understanding of the multifaceted factors that contribute to vaccine hesitancy is essential in developing effective communication strategies to address this ongoing public health challenge.

- Existing Communication Strategies:

Vaccine hesitancy continues to be a significant public health concern, as it can lead to lower vaccination rates and increased outbreaks of vaccine-preventable diseases. In order to address this issue, researchers have explored various communication strategies and interventions aimed at increasing vaccine acceptance.

One communication strategy that has been shown to be effective in increasing vaccine acceptance is the use of persuasive messaging [14]. Research has found that messages that emphasize the benefits of vaccination, such as protecting oneself and others from disease, are more likely to sway vaccine-hesitant individuals. In addition, using empathetic language and personal stories can also help to make the message more relatable and convincing.

Another communication strategy that has shown promise is the use of social norms. Research has found that individuals are more likely to accept vaccines if they believe that others in their community are also getting vaccinated [15,16]. By highlighting the norm of vaccination within a community, public health campaigns can help to create a positive social environment that promotes vaccine acceptance.

Furthermore, research has also explored the use of educational interventions to increase vaccine acceptance [17,18]. Providing accurate information about vaccines, their safety and efficacy, and the importance of herd immunity can help to dispel myths and misinformation that may contribute to hesitancy. Educational campaigns that are tailored to specific populations, such as parents of young children or healthcare workers, can also be effective in increasing vaccine acceptance.

In addition to communication strategies, researchers have also investigated the role of healthcare providers in promoting vaccine acceptance. Studies have found that individuals are more likely to accept vaccines if they receive a recommendation from a trusted healthcare provider [19]. Therefore, efforts to train healthcare providers on effective communication strategies and the importance of vaccination can help to increase vaccine acceptance rates.

Thus, we understand that research on communication strategies and other interventions to increase vaccine acceptance has yielded valuable insights that can help to address vaccine hesitancy. By using persuasive messaging, highlighting social norms, providing education, and engaging healthcare providers, public health campaigns can effectively promote vaccine acceptance and ultimately improve public health outcomes.

3. Understanding Vaccine Hesitancy:

-Factors that contribute to vaccine hesitancy:

At the individual level, factors such as lack of knowledge about vaccines, mistrust in the healthcare system, and fear of side effects play a significant role in contributing to vaccine hesitancy [20]. Numerous qualitative studies have highlighted the importance of individual beliefs, attitudes, and experiences in shaping vaccine decision-making [20–23]. For example, misinformation spread through social media and personal experiences of adverse reactions can greatly impact an individual's willingness to vaccinate themselves or their children.

On a social level, peer influence, family dynamics, and cultural beliefs can also impact vaccine hesitancy. For instance, research has shown that social networks and community norms play a crucial role in shaping vaccine acceptance, with individuals often being influenced by the opinions of those around them [24–26]. Furthermore, various studies have emphasized the importance of trust in healthcare providers and the influence of media coverage on vaccination decisions.

Additionally, contextual factors such as access to healthcare services, government policies, and socio-economic status can also contribute to vaccine hesitancy [3,11]. Research has demonstrated that individuals facing barriers to healthcare access, such as cost or distance, are more likely to be hesitant

about vaccines [6,27,28]. Moreover, cultural and political contexts can influence public perceptions of vaccines, with differing levels of vaccine hesitancy observed across different regions and countries. [3,29].

By identifying and addressing these factors, public health efforts can work towards improving vaccine acceptance and uptake rates.

- Impact of Vaccine Hesitancy:

When individuals choose not to vaccinate themselves or their children, it can lead to outbreaks of vaccine-preventable diseases such as measles, mumps, and whooping cough [30,31]. These outbreaks not only result in increased morbidity and mortality rates but also place a significant strain on healthcare systems and resources.

Furthermore, vaccine hesitancy can erode trust in public health authorities and scientific expertise, leading to a decrease in vaccination rates overall. This loss of trust can have long-lasting consequences, as it undermines efforts to control infectious diseases and protect vulnerable populations, such as infants, the elderly, and those with weakened immune systems.

In addition, vaccine hesitancy can contribute to the spread of misinformation and conspiracy theories, fueling fear and confusion among the public. This misinformation can perpetuate harmful myths about vaccines, such as the unfounded link between vaccines and autism, furthering the hesitancy towards immunization.

The impact of vaccine hesitancy is not limited to individual health outcomes but extends to society as a whole. By compromising herd immunity and increasing the risk of disease outbreaks, vaccine hesitancy threatens the well-being of communities and the overall social fabric. It is essential for public health authorities, healthcare providers, and policymakers to address the root causes of vaccine hesitancy and implement effective communication strategies to combat misinformation and build trust in vaccines. Failure to do so can have detrimental effects on public health and society at large.

4. Effective Communication Strategies

- Present evidence-based communication strategies for addressing vaccine hesitancy:
 1. Building Trust: Establishing trust is essential in communicating with individuals who are hesitant about vaccines. Healthcare providers, public health officials, and community leaders should engage with the community, listen to their concerns, and empathize with their perspectives. This can help build rapport and credibility, making individuals more receptive to receiving accurate information about vaccines [32].
 2. Providing Accurate Information: Providing evidence-based, accurate information about vaccines is crucial in dispelling myths and misconceptions. Tailoring information to the specific concerns of individuals or communities can help increase understanding and address any doubts they may have. Utilizing plain language, visuals, and multimedia tools can also enhance comprehension and engagement [33,34].
 3. Addressing Myths and Misconceptions: Vaccine hesitancy is often fueled by misinformation and myths circulating in communities. Addressing these myths proactively and transparently can help in countering false narratives. Communicating the safety and effectiveness of vaccines, highlighting the rigorous testing and regulatory processes vaccines undergo, and debunking common misconceptions can help alleviate concerns and increase confidence in vaccination [35].
 4. Engaging with Local Influencers: Engaging with trusted local influencers, such as community leaders, religious figures, and healthcare professionals, can help in disseminating accurate information and promoting vaccine acceptance. Collaborating

with these influencers to address concerns, answer questions, and endorse vaccination can leverage their credibility and reach within the community [36].

5. Utilizing social media and Digital Platforms: Leveraging social media and digital platforms to disseminate accurate information, counter misinformation, and engage with individuals hesitant about vaccines can be effective. Developing targeted campaigns, utilizing data-driven strategies, and actively monitoring and addressing misinformation online can help in reaching a wider audience and fostering open dialogue [24].

By implementing these evidence-based communication strategies, healthcare providers, public health officials, and policymakers can work towards addressing vaccine hesitancy effectively and promoting widespread acceptance of vaccination.

-Discuss the role of healthcare providers, public health officials, and community leaders in promoting vaccination

When it comes to promoting vaccination and addressing vaccine hesitancy, healthcare providers, public health officials, and community leaders all play crucial roles in effectively communicating the importance of vaccines. Healthcare providers are often the first point of contact for individuals seeking information about vaccines. They have a unique opportunity to educate patients about the benefits of vaccination, address any concerns or misinformation, and emphasize the importance of getting vaccinated to protect not only themselves but also the broader community. By providing accurate information and guidance, healthcare providers can help build trust and confidence in vaccines among their patients. Public health officials play a key role in promoting vaccination at a population level. They are responsible for developing and implementing vaccination programs, monitoring vaccine coverage rates, and responding to outbreaks or vaccine-preventable diseases. Public health officials also work to dispel myths and misinformation about vaccines through public education campaigns and outreach efforts. By engaging with the community and providing transparent and evidence-based information, public health officials can help build support for vaccination and increase uptake rates.

Community leaders, including religious, political, and cultural figures, can also play a significant role in promoting vaccination within their communities. They have the ability to influence public opinion and behavior, so their support and endorsement of vaccination can help shape attitudes towards vaccines and encourage uptake. By working with community leaders to tailor messaging and outreach efforts to specific cultural and social contexts, public health officials can effectively reach populations that may be hesitant or resistant to vaccination.

5. Case Studies

These are real-world examples of successful communication strategies that have been used to address vaccine hesitancy in different populations or settings:

- a. Public Health Messaging in Great Britain (England, Scotland and Wales): In Great Britain (England, Scotland and Wales), public health authorities successfully used a combination of traditional media, social media, and community outreach to address vaccine hesitancy during the COVID-19 pandemic. Messages focused on the safety and efficacy of vaccines, as well as the importance of vaccination in protecting individuals and communities [37].
- b. Personal Stories in the United States: In the United States, organizations such as the Vaccinate Your Family campaign have effectively used personal stories and testimonials to combat vaccine hesitancy. By sharing the experiences of individuals who have been personally affected by vaccine-preventable diseases, these campaigns have helped to humanize the issue and emphasize the importance of vaccination [38].

- c. **Community Engagement in Nigeria:** In Nigeria, community engagement strategies have been used to address vaccine hesitancy in remote and marginalized populations. By working closely with community leaders, healthcare providers, and local organizations, public health authorities have been able to build trust and rapport with communities, leading to increased vaccine acceptance [39].
- d. **Vaccine Clinics in the United States:** In the USA, mobile vaccine clinics have been established in underserved communities to improve access to vaccines and address vaccine hesitancy. By bringing vaccines directly to communities, public health authorities have been able to reach individuals who may not have otherwise had access to vaccination services, leading to higher vaccination rates [40].

One example of a successful communication strategy used in Africa to address vaccine hesitancy is the "mama-to-mama" approach. In Nigeria, Mallawa Sarkin Garbas community in Bauchi state community health workers known as "mama mentors" were trained to educate and engage mothers in conversations about the importance of vaccination and cervical cancer. These mentors, who were often mothers themselves, were able to establish trust and credibility within the community, leading to increased vaccine acceptance among hesitant individuals [41].

Another example comes from India, where religious leaders played a key role in dispelling myths and misinformation about vaccines. By partnering with local mosques and churches, health authorities were able to reach a wider audience and address concerns about vaccine safety and efficacy. Religious leaders were able to leverage their influence and credibility to promote vaccination as a means of protecting the community's health.

Additionally, in South Africa, the government implemented a multimedia campaign to promote vaccination and counter misinformation spread through social media [44,45]. Public service announcements, radio broadcasts, and community events were used to educate the public about the benefits of vaccination and address common concerns. By using multiple communication channels, health authorities were able to reach a diverse audience and increase vaccine acceptance rates.

These examples highlight the importance of culturally sensitive and community-led communication strategies in addressing vaccine hesitancy in African populations. By engaging with local leaders, leveraging existing social networks, and utilizing various communication channels, health authorities can effectively combat misinformation and improve vaccine acceptance rates.

6. Recommendations

- i. **Healthcare providers:**
 - Take the time to listen to the concerns and questions of vaccine-hesitant individuals, and provide accurate and evidence-based information to address their specific concerns.
 - Use clear and accessible language when discussing vaccines, avoiding jargon or overly technical explanations.
 - Incorporate shared decision-making approaches to involve vaccine-hesitant individuals in the decision-making process and tailor recommendations to their individual values and preferences.
 - Emphasize the importance of vaccines in protecting not only the individual but also the community from preventable diseases.
- ii. **Public health officials:**
 - Develop targeted communication campaigns that address common misconceptions and concerns about vaccines, using diverse platforms to reach different populations.

- Collaborate with community leaders and trusted influencers to disseminate accurate information and address misinformation.
 - Provide transparent and timely updates on vaccine safety and effectiveness, addressing any emerging issues or concerns.
 - Highlight the benefits of vaccination in preventing outbreaks and protecting vulnerable populations, framing vaccines as a public good.
- iii. Policymakers:
- Support policies that promote vaccination uptake, such as mandating vaccines for certain populations or providing incentives for vaccination.
 - Allocate resources for education and outreach programs aimed at addressing vaccine hesitancy and improving vaccine confidence.
 - Invest in research to better understand the underlying factors contributing to vaccine hesitancy and develop tailored communication strategies.
 - Engage with stakeholders, including healthcare providers, public health officials, and community groups, to develop collaborative approaches to address vaccine hesitancy at the local and national levels.

7. Conclusions

Effective communication with vaccine-hesitant individuals requires empathy, patience, and a commitment to providing accurate information in a culturally sensitive and respectful manner. By implementing these recommendations, healthcare providers, public health officials, and policymakers can work towards building trust and confidence in vaccines and ultimately improving vaccination rates to protect public health.

In our review article on vaccine hesitancy, we found that there are various factors contributing to individuals' reluctance to receive vaccines, including misinformation, distrust in healthcare systems, and fear of side effects. To address this issue effectively, it is crucial to implement targeted communication strategies that aim to build trust, provide accurate information, and emphasize the importance of vaccination in protecting individual and community health. Our review highlights the importance of tailoring communication efforts to specific populations and addressing their unique concerns and beliefs. By engaging with communities, healthcare providers, and public health officials, we can create messaging that resonates with individuals and encourages vaccine uptake. Additionally, leveraging trusted sources, such as healthcare professionals and community leaders, can help to counter misinformation and build confidence in vaccination. It is essential for promoting vaccine acceptance and addressing vaccine hesitancy to be a priority in public health efforts. By implementing evidence-based communication strategies, we can effectively combat misinformation and improve vaccine coverage rates to protect individuals and communities from preventable diseases. Addressing vaccine hesitancy through targeted communication strategies is key to achieving successful immunization programs and promoting overall public health.

References

1. New data shows vaccines have saved 154 million lives in the past 50 years. (2024, May 27). <https://www.gavi.org/vaccineswork/new-data-shows-vaccines-have-saved-154-million-lives-past-50-years>
2. Vaccine Hesitancy - University of Pittsburgh Press. (2024, June 18). University of Pittsburgh Press. <https://upittpress.org/books/9780822966906/>
3. Nuwarda, R. F., Ramzan, I., Weekes, L., & Kayser, V. (2022). Vaccine Hesitancy: Contemporary Issues and Historical Background. *Vaccines*, 10(10), 1595. <https://doi.org/10.3390/vaccines10101595>

4. Zimmerman, T., Shiroma, K., Fleischmann, K. R., Xie, B., Jia, C., Verma, N., & Lee, M. K. (2023). Misinformation and COVID-19 vaccine hesitancy. *Vaccine*, 41(1), 136–144. <https://doi.org/10.1016/j.vaccine.2022.11.014>
5. Avelino-Silva, V. I., Ferreira-Silva, S. N., Soares, M. E. M., Vasconcelos, R., Fujita, L., Medeiros, T., Barbieri, C. L. A., & Couto, M. T. (2023). Say it right: measuring the impact of different communication strategies on the decision to get vaccinated. *BMC Public Health*, 23(1). <https://doi.org/10.1186/s12889-023-16047-2>
6. McCready, J. L., Nichol, B., Steen, M., Unsworth, J., Comparcini, D., & Tomietto, M. (2023). Understanding the barriers and facilitators of vaccine hesitancy towards the COVID-19 vaccine in healthcare workers and healthcare students worldwide: An Umbrella Review. *PloS One*, 18(4), e0280439. <https://doi.org/10.1371/journal.pone.0280439>
7. Cascini, F., Pantovic, A., Al-Ajlouni, Y. A., Failla, G., Puleo, V., Melnyk, A., Lontano, A., & Ricciardi, W. (2022). Social media and attitudes towards a COVID-19 vaccination: A systematic review of the literature. *EClinicalMedicine*, 48, 101454. <https://doi.org/10.1016/j.eclinm.2022.101454>
8. Sinuraya, R. K., Nuwarda, R. F., Postma, M. J., & Suwantika, A. A. (2024). Vaccine hesitancy and equity: lessons learned from the past and how they affect the COVID-19 countermeasure in Indonesia. *Globalization and Health*, 20(1). <https://doi.org/10.1186/s12992-023-00987-w>
9. Nazlı, E. B., Yiğman, F., Sevindik, M., & Özturan, D. D. (2021). Psychological factors affecting COVID-19 vaccine hesitancy. *Irish Journal of Medical Science*, 191(1), 71–80. <https://doi.org/10.1007/s11845-021-02640-0>
10. Volet, A. K., Scavone, C., Catalán-Matamoros, D., & Capuano, A. (2022). Vaccine Hesitancy Among Religious Groups: Reasons Underlying This Phenomenon and Communication Strategies to Rebuild Trust. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.824560>
11. Lee, J., & Huang, Y. (2022). COVID-19 Vaccine Hesitancy: The Role of Socioeconomic Factors and Spatial Effects. *Vaccines*, 10(3), 352. <https://doi.org/10.3390/vaccines10030352>
12. Larson, H. J., & Lin, L. (2024). Generative artificial intelligence can have a role in combating vaccine hesitancy. *BMJ*, q69. <https://doi.org/10.1136/bmj.q69>
13. Ruggeri, K., Vanderslott, S., Yamada, Y., Argyris, Y. A., Večkalov, B., Boggio, P. S., Fallah, M. P., Stock, F., & Hertwig, R. (2024). Behavioural interventions to reduce vaccine hesitancy driven by misinformation on social media. *BMJ*, e076542. <https://doi.org/10.1136/bmj-2023-076542>
14. Leonardelli, M., Mele, F., Marrone, M., Germinario, C. A., Tafuri, S., Moscara, L., Bianchi, F. P., & Stefanizzi, P. (2023). The Effects of the COVID-19 Pandemic on Vaccination Hesitancy: A Viewpoint. *Vaccines*, 11(7), 1191. <https://doi.org/10.3390/vaccines11071191>
15. Tang, M. Y., Rhodes, S., Powell, R., McGowan, L., Howarth, E., Brown, B., & Cotterill, S. (2021). How effective are social norms interventions in changing the clinical behaviours of healthcare workers? A systematic review and meta-analysis. *Implementation Science*, 16(1). <https://doi.org/10.1186/s13012-020-01072-1>
16. Christakis, N. A., & Fowler, J. H. (2012). Social contagion theory: examining dynamic social networks and human behavior. *Statistics in Medicine*, 32(4), 556–577. <https://doi.org/10.1002/sim.5408>
17. Misra, R., Kirk, B., Shawley-Brzoska, S., Totzkay, D., Morton, C., Kuhn, S., Harris, M., McMillion, M., & Darling, E. (2024). Educational Intervention to Increase COVID-19 Vaccine Uptake in Rural Patients with Chronic Diseases: Lessons Learned from An Innovative Academic–Community Partnership. *International Journal of Environmental Research and Public Health/International Journal of Environmental Research and Public Health*, 21(1), 71. <https://doi.org/10.3390/ijerph21010071>
18. Takagi, M. A., Hess, S., Smith, Z., Gawronski, K., Kumar, A., Horsley, J., Haddad, N., Noveloso, B., Zyzanski, S., & Ragina, N. (2023). The impact of educational interventions on COVID-19 and vaccination attitudes among patients in Michigan: A prospective study. *Frontiers in Public Health*, 11. <https://doi.org/10.3389/fpubh.2023.1144659>
19. Pierz, A. J., Rauh, L., Masoud, D., Cruz, A. K., Palmedo, P. C., Ratzan, S. C., & Parker, R. (2023). Supporting US healthcare providers for successful vaccine communication. *BMC Health Services Research*, 23(1). <https://doi.org/10.1186/s12913-023-09348-0>
20. Ndasauka, Y., Twabi, H. S., Kainja, J., Gunde, A. M., & Makhumula-Mtimuni, C. (2024). Knowledge, attitudes and demographic drivers for COVID-19 vaccine hesitancy in Malawi. *Scientific Reports*, 14(1). <https://doi.org/10.1038/s41598-024-60042-5>
21. Chen, Y., Tower, M., Zimmerman, P. A., Layh, J., Sparke, V., Prichard, R., Mason, M., & Lin, F. F. (2024). Perceptions and attitudes toward COVID-19 vaccination among health professional students in Australia: a qualitative study. *Journal of Public Health Policy*. <https://doi.org/10.1057/s41271-024-00483-4>

22. Karashiali, C., Konstantinou, P., Christodoulou, A., Kyprianidou, M., Nicolaou, C., Karekla, M., Middleton, N., & Kassianos, A. P. (2023). A qualitative study exploring the social contagion of attitudes and uptake of COVID-19 vaccinations. *Human Vaccines & Immunotherapeutics*, 19(2). <https://doi.org/10.1080/21645515.2023.2260038>
23. Wróblewski, M., Meler, A., Stankowska, J., & Kawiak-Jawor, E. (2022). An Analysis of Factors Shaping Vaccine Attitudes and Behaviours in a Low-Trust Society Based on Structural Equation Modelling—The Case of Poland's Vaccination Programme against COVID-19. *International Journal of Environmental Research and Public Health/International Journal of Environmental Research and Public Health*, 19(22), 14655. <https://doi.org/10.3390/ijerph192214655>
24. Rodrigues, F., Ziade, N., Jatuworapruk, K., Caballero-Urbe, C. V., Khursheed, T., & Gupta, L. (2023). The Impact of Social Media on Vaccination: A Narrative Review. *Journal of Korean Medical Science/Journal of Korean Medical Science*, 38(40). <https://doi.org/10.3346/jkms.2023.38.e326>
25. Keselman, A., Smith, C. A., Wilson, A. J., Leroy, G., & Kaufman, D. R. (2022). Cognitive and Cultural Factors That Affect General Vaccination and COVID-19 Vaccination Attitudes. *Vaccines*, 11(1), 94. <https://doi.org/10.3390/vaccines11010094>
26. Rogers, A. A., Cook, R. E., & Button, J. A. (2021). Parent and Peer Norms are Unique Correlates of COVID-19 Vaccine Intentions in a Diverse Sample of U.S. Adolescents. *Journal of Adolescent Health*, 69(6), 910–916. <https://doi.org/10.1016/j.jadohealth.2021.09.012>
27. Wollburg, P., Markhof, Y., Kanyanda, S., & Zezza, A. (2023). Assessing COVID-19 vaccine hesitancy and barriers to uptake in Sub-Saharan Africa. *Communications Medicine*, 3(1). <https://doi.org/10.1038/s43856-023-00330-9>
28. Galagali, P. M., Kinikar, A. A., & Kumar, V. S. (2022). Vaccine Hesitancy: Obstacles and Challenges. *Current Pediatrics Reports*, 10(4), 241–248. <https://doi.org/10.1007/s40124-022-00278-9>
29. Ali, G. G. M. N., Rahman, M. M., Hossain, M. A., Rahman, M. S., Paul, K. C., Thill, J. C., & Samuel, J. (2021). Public Perceptions of COVID-19 Vaccines: Policy Implications from US Spatiotemporal Sentiment Analytics. *Healthcare*, 9(9), 1110. <https://doi.org/10.3390/healthcare9091110>
30. Phadke, V. K., Bednarczyk, R. A., Salmon, D. A., & Omer, S. B. (2016). Association Between Vaccine Refusal and Vaccine-Preventable Diseases in the United States. *JAMA*, 315(11), 1149. <https://doi.org/10.1001/jama.2016.1353>
31. McKee, C., & Bohannon, K. (2016). Exploring the Reasons Behind Parental Refusal of Vaccines. *the Journal of Pediatric Pharmacology and Therapeutics*, 21(2), 104–109. <https://doi.org/10.5863/1551-6776-21.2.104>
32. Shen, A. K., Browne, S., Srivastava, T., Kornides, M. L., & Tan, A. S. (2023). Trusted messengers and trusted messages: The role for community-based organizations in promoting COVID-19 and routine immunizations. *Vaccine*, 41(12), 1994–2002. <https://doi.org/10.1016/j.vaccine.2023.02.045>
33. How to talk about vaccines. (2021, May 19). <https://www.who.int/news-room/feature-stories/detail/how-to-talk-about-vaccines>
34. Kaufman, J., Ryan, R., Walsh, L., Horey, D., Leask, J., Robinson, P., & Hill, S. (2018). Face-to-face interventions for informing or educating parents about early childhood vaccination. *Cochrane Library*, 2018(5). <https://doi.org/10.1002/14651858.cd010038.pub3>
35. Geoghegan, S., O'Callaghan, K. P., & Offit, P. A. (2020). Vaccine Safety: Myths and Misinformation. *Frontiers in Microbiology*, 11. <https://doi.org/10.3389/fmicb.2020.00372>
36. Sinuraya, R. K., Nuwarda, R. F., Postma, M. J., & Suwantika, A. A. (2024b). Vaccine hesitancy and equity: lessons learned from the past and how they affect the COVID-19 countermeasure in Indonesia. *Globalization and Health*, 20(1). <https://doi.org/10.1186/s12992-023-00987-w>
37. Vilar-Lluch, S., McClaughlin, E., Knight, D., Adolphs, S., & Nichele, E. (2023). The language of vaccination campaigns during COVID-19. *Medical Humanities*, 49(3), 487–496. <https://doi.org/10.1136/medhum-2022-012583>
38. Personal Stories - Vaccinate Your Family. (2023, November 15). <https://vaccinateyourfamily.org/why-vaccinate/personal-stories/>
39. Eguavoen, A., Larson, H., Chinye-Nwoko, F., & Ojeniyi, T. (2023). Reducing COVID-19 vaccine hesitancy and improving vaccine uptake in Nigeria. *J. Public Health Africa (Online)*;14(5): 1-12, 2023. | AIM. <https://search.bvsalud.org/gim/resource/es/biblio-1435811>

40. Leibowitz, A., Livaditis, L., Daftary, G., Pelton-Cairns, L., Regis, C., & Taveras, E. (2021). Using mobile clinics to deliver care to difficult-to-reach populations: A COVID-19 practice we should keep. *Preventive Medicine Reports*, 24, 101551. <https://doi.org/10.1016/j.pmedr.2021.101551>
41. Relentless for an assured future for girls. (n.d.). UNICEF Nigeria. <https://www.unicef.org/nigeria/stories/relentless-assured-future-girls/>
42. Soni, G. K., Bhatnagar, A., Gupta, A., Kumari, A., Arora, S., Seth, S., Rastogi, A., Kanagat, N., & Fields, R. (2023). Engaging Faith-Based Organizations for Promoting the Uptake of COVID-19 Vaccine in India: A Case Study of a Multi-Faith Society. *Vaccines*, 11(4), 837. <https://doi.org/10.3390/vaccines11040837>
43. Marcell, L., Dokania, E., Navia, I., Baxter, C., Crary, I., Rutz, S., Monteverde, M. J. S., Simlai, S., Hernandez, C., Huebner, E. M., Sanchez, M., Cox, E., Stonehill, A., Koltai, K., & Waldorf, K. M. A. (2022b). One Vax Two Lives: a social media campaign and research program to address COVID-19 vaccine hesitancy in pregnancy. *American Journal of Obstetrics and Gynecology*, 227(5), 685-695.e2. <https://doi.org/10.1016/j.ajog.2022.06.022>
44. Steffens, M. S., Dunn, A. G., Leask, J., & Wiley, K. E. (2020). Using social media for vaccination promotion: Practices and challenges. *Digital Health*, 6, 205520762097078. <https://doi.org/10.1177/2055207620970785>

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