

Review

The Misinfodemic and Its Effects on COVID-19 Preventive Strategies in Socially Vulnerable Populations

Robin Ashley, MS, PA-C^{1*}; Denise Rizzolo, PhD, MPH, PA-C^{2*}¹Nuvance Health, Hospitals and Health Care Danbury, CT 13022, USA²Physician Assistant Education Association, Washington, DC, USA***Corresponding authors****Robin Ashley, MS, PA-C**Lead PA, Employee Health Services, Nuvance Health, Hospitals and Health Care Danbury, CT 13022, USA; E-mail: Robin.Ashley@nuvancehealth.org**Denise Rizzolo, PhD, MPH, PA-C**Director of Research and Data Operations, Physician Assistant Education Association, Washington, DC, USA; E-mail: rizzolde@gmail.com**Article information****Received:** December 15th, 2022; **Revised:** April 22nd, 2023; **Accepted:** May 2nd, 2023; **Published:** May 10th, 2023**Cite this article**Ashley R, Rizzolo D. The misinfodemic and its effects on COVID-19 preventive strategies in socially vulnerable populations. *Public Health Open J.* 2023; 8(1): 13-17. doi: [10.17140/PHOJ-8-164](https://doi.org/10.17140/PHOJ-8-164)**ABSTRACT**

Throughout the coronavirus disease-2019 (COVID-19) pandemic, there has been disparate misinformation on those already experiencing health and social inequities. Misinformation from online communities, friends/family interpretation bias, and inconsistent information from content experts exacerbate an already weakened trust in the medical system among socially vulnerable populations. When trust in scientific evidence is low, susceptibility to misinformation is high. Although trust is an essential factor in susceptibility to misinformation, it cannot be the only lens through which the impact of misinformation on socially vulnerable populations is examined. Patients need scientifically valid information in the face of a flood of misinformation and conspiracy theories. This can be provided through public health campaigns, community workers, and all healthcare providers. Vigilance needs to be maintained to dispute any unwarranted information to keep the population healthy.

Keywords

Misinfodemic; COVID-19; Social media; Social determinants of health.

INTRODUCTION

The Department of Social Determinants of Health (SDOH) was established in response to a call to action from the World Health Organization (WHO) Commission on Social Determinants of Health (CSDH) to address the avoidable social, physical, and economic inequities that affect health and health outcomes, particularly among the world's most vulnerable populations.¹ The five key areas of SDOH include health and healthcare, education, neighborhood and work environment, financial stability, and social and community interconnection.¹ The Centers for Disease Control (CDC) divides the risk factors that affect SDOH into four groups that define socially vulnerable populations: housing type and transportation, socioeconomic status, household composition, and disability, minority status, and language.² Coronavirus disease-2019 (COVID-19) was initially assumed to be the great equalizer, as everyone was regarded similarly vulnerable.³ However, age, concomitant medical disorders (hypertension, obesity, cardiovascular disease, and diabetes), and populations with non-medical social vulnerabilities were found to have the worst outcomes from

COVID-19 infection,⁴ excessively impacting minorities.⁵ As United States (U.S.) businesses shuttered, the socioeconomic divide further widened, as populations already suffering from pre-pandemic health and social inequities were disproportionately exposed due to their living and working environments, limited access to medical care, and inability to effectively implement self-protective strategies.⁶ At the start of the COVID-19 pandemic the most common sources of COVID-19 information were online news platforms and social media.⁷ To improve COVID-19 preventive measures among socially vulnerable populations, it is critical to understand the risk of social media misinformation and its intersection with eHealth literacy, education, and social context.⁸

MISINFORMATION AND SOCIAL MEDIA

Misinformation from online communities, friends/family interpretation bias, and inconsistent information from content experts⁹ exacerbate an already weakened trust in the medical system among¹⁰ socially vulnerable populations. When trust in scientific evidence is low, susceptibility to misinformation is high.¹¹ Although trust is an essential factor in susceptibility to misinformation, it cannot be the

only lens through which the impact of misinformation on socially vulnerable populations is examined.¹² Misinformation and conspiracy theories also proliferate in the absence of scientific evidence, and those who believe in misinformation likely use social media as a resource for information.⁹

The appeal of social media stems from the ease of connection to others and is a widely used resource, but there are disadvantages. Misinformation spreads quickly without validation, especially laced with the biases of trusted family, friends, and internet “experts”. During the early stages of the COVID-19 pandemic, global social media use soared by 65-75%.¹³ Researchers began to investigate the effects of political ideology, motivated reasoning, and belief correlation of misinformation on COVID-19 preventive strategies as the popularity of social media increased. According to Pennycook et al,¹⁴ contrary to popular assumption, political ideology is less of an influence in the belief of misinformation than the inability to analytically evaluate information.¹⁴ When confronted with extremely complex scientific issues where analytic thinking may fail, people resort to motivated reasoning and intuition,¹⁴ increasing the probability of accepting false information to maintain pre-existing beliefs.³

The degree to which the information corresponds with a person’s own beliefs, the perceptual consensus, and the perceived source trustworthiness rather than the veracity of the information, are factors driving its dissemination.¹⁵ Misinformation spreads *via* digital algorithms to those whose social media streams are relevant to the message, creating an ecosystem inside the wider network,¹⁵ resulting in misleading information reaching people six times faster than factual information.¹⁶ Familiarity with the subject content increases perceived accuracy, regardless of the credibility of the source.^{9,15} To gain social consensus, the user proliferates the misinformation in social media echo chambers,¹¹ forming a “homogenous cluster”, which results in the assimilation, reinforcement, and propagation of those beliefs.¹⁷ Obiala et al¹⁸ investigated the rate at which accurate *versus* false COVID-19 information was disseminated. According to the researchers, 80% of articles, concerning COVID-19, published on Facebook during the study period were accurate; of which only 6.7% were scientifically valid or peer-reviewed.⁸

COVID-19 RISK PERCEPTION

Most of the public acknowledges that misinformation is a threat, but what constitutes risk varies according to a person’s political ideology, culture, values, and socioeconomic conditions.¹⁸ According to the Health Belief Model, if a person believes they are susceptible to COVID-19 and that it is a serious risk, they will take measures to protect themselves after considering the perceived benefits and barriers to adopting a particular preventive strategy.¹⁹ People perceive risk through cognitive and emotional domains which are not always congruent, but influence risk perception and risk avoidance behaviors.²⁰ The use of preventive strategies is influenced further by the perception of danger than by actual risk. Through social media analysis, Qiao et al²⁰ examined which social determinant factors impact risk perception: perceived susceptibility, severity, and/or emotion.²⁰ According to research, participants who live in poverty, have a lower socioeconomic status, are uninsured, have less than a high school education, and score low in terms of the perceived risk of COVID-19 infection.²⁰ Research

has shown the older minority,²¹ the less educated,¹⁶ and those with a lower cognitive function²² are the most vulnerable to misinformation.^{16,21,22} This provides an important corollary between vulnerable populations and COVID-19 risk perception.²⁰ The use of preventive strategies positively correlates trust with scientific evidence, numeracy, and health and scientific literacy.^{22,23} Susceptibility to misinformation and inadequate COVID-19 preventive measures can have disastrous consequences (Table 1).^{13,24-26}

Table 1. Examples of Misinformation^{13,24-26}

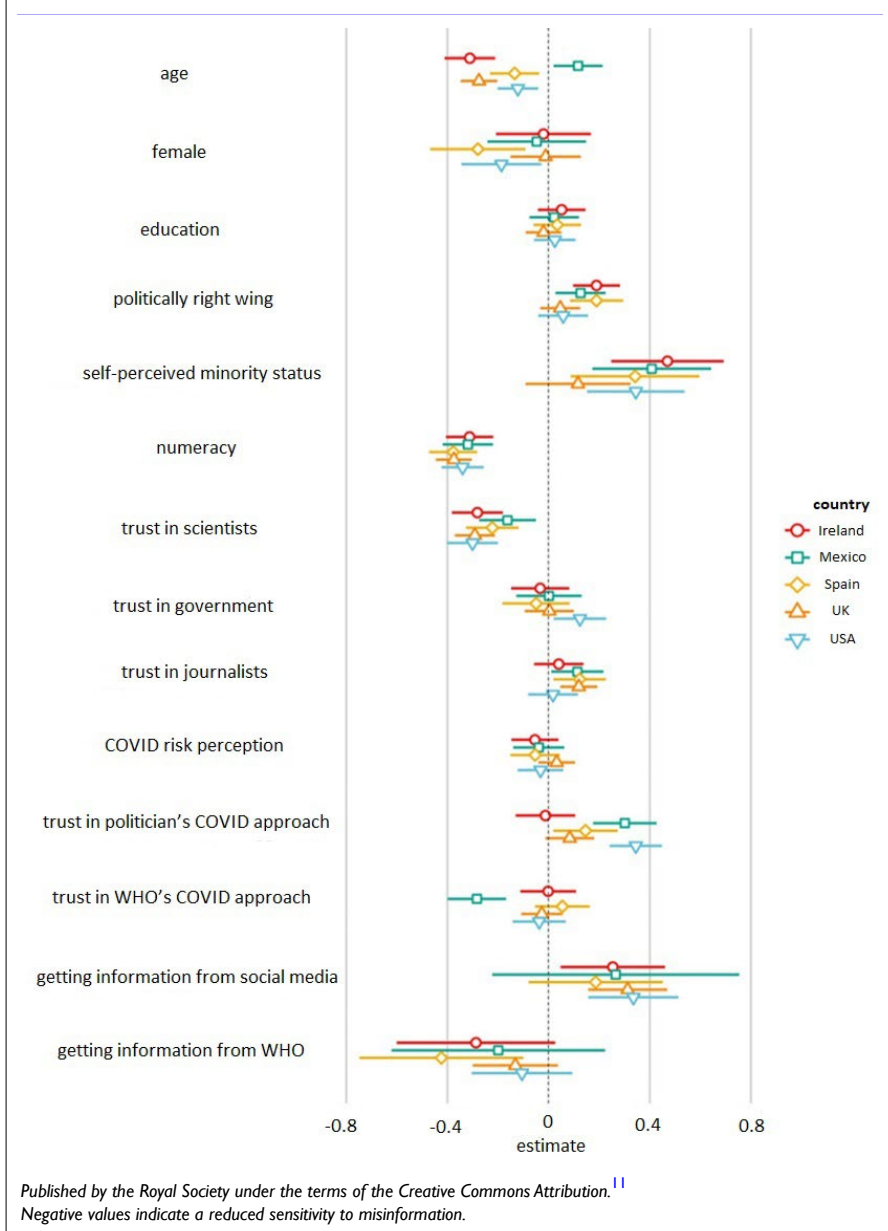
1. The threat of Coronavirus has been exaggerated by political groups who want to damage President Trump.
2. The Coronavirus is being used to force a dangerous and unnecessary vaccine on Americans.
3. Ultra-violet (UV) light can cure COVID-19.
4. The Coronavirus is being used to install tracking devices inside our bodies.
5. Hydroxychloroquine can prevent or cure COVID-19.
6. COVID-19 cannot be transmitted in areas with hot and humid climates.
7. Bill Gates is behind the Coronavirus pandemic.
8. Putting disinfectant into your body can prevent or cure COVID-19.
9. African Americans are not susceptible to COVID-19 due to the melanin in their skin.
10. Consumption of garlic and cow’s urine (Gou Muta) can cure COVID-19.
11. Consumption of highly concentrated alcohol disinfects the body from COVID-19, resulting in 800 deaths
12. Drinking methanol cures COVID-19, blinding 60 and hospitalizing 5,876 people

Research suggests skepticism is one of the best forms of defense against misinformation.²⁷ Skepticism acknowledges that there is a perceived knowledge gap on a given topic.²⁷ This identified knowledge gap influences whether or not a subject will research a given topic.³ Unfortunately, information-gathering does not always correspond with accuracy.³ Roozenbeek et al¹¹ studied the correlation of susceptibility to misinformation as a predictor of compliance with COVID-19 preventive strategies (Figure 1). According to previous research, minority status, acquiring information from social media,¹¹ and low eHealth literacy²³ are associated with the highest susceptibility to misinformation.

THE RELATIONSHIP BETWEEN HEALTH LITERACY AND SOCIAL MEDIA

eHealth literacy combines general health literacy and digital media self-efficacy,^{23,28} which supports the assessment of content accuracy and recognition of personal knowledge gaps, in order to assume healthy behaviors.²³ The term eHealth literacy, originally coined by Norman et al²⁹ refers to “*the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem*”.²⁹ Research by Guo et al³⁰ concludes that eHealth literacy rather than income is a greater determinant of knowledge and adherence to COVID-19 preventive behaviors: higher socioeconomic class³¹ and education level positively correlate to greater eHealth literacy and the ability to effectively research,³⁰ while rurality and poor numeracy skills are associated with low eHealth literacy.^{23,32} A person’s eHealth literacy correlates to less belief in conspiracy theories and better comprehension of COVID-19 and preventive health strategies.²⁸ However, the challenge of the eHealth literacy instrument is the subjective assessment of one’s gap between perceived and actual knowledge.^{23,32} The COVID-19 pandemic exposes a reciprocal relationship between social and digital inequities, impacting eHealth literacy and the knowledge gap.²⁸

Figure 1. Susceptibility to COVID-19 Misinformation Model, Sorted by Country¹¹



Individuals who are elderly, homeless, or live in rural areas, along with those who previously relied on internet connectivity at work, have limited access to dependable online government and public health resources,³³ which contribute to the digital divide. To strengthen preventive methods, bridging the knowledge gap to reach socially vulnerable groups and those who are more likely to have a lower perceived risk of COVID-19 illness must be tailored to the community's resources.³⁴ Access to information resources, perceived reliability of the messenger and message, willingness to seek to clarify information and perceived risk all play a role in improving adherence to preventive behaviors among persons with communication inequities.³⁴

STRATEGIES FOR CORRECTING PATIENT MISPERCEPTIONS

Direct messaging on social media platforms by healthcare professionals, is effective to foster confidence in public health messaging, improve health literacy, and inoculate the public against misinformation.²⁴ The social and economic costs of the pandemic

can be reduced by focusing communication and strategies on the SDOH.³⁵ Communication of accurate COVID-19 information may reach the widest audience, including vulnerable populations by leveraging social media platforms. Healthcare professionals who want to employ this strategy must ensure that communication is non-judgmental, evidence-based but medical-jargon-free, and structured to educate people on the benefits gained by using preventive strategies *versus* losses of not doing so.⁸ It is recommended that healthcare professionals seek risk management advice and become familiar with anti-vaccine and COVID-19 denialist rhetorical strategies before attempting social media outreach to pre-develop messaging that effectively debunks those narratives.^{36,37}

During office well-visits, healthcare professionals should take the opportunity to re-educate patients, noting to deliver information based on the patient's education level while respecting cultural beliefs. Using a patient-centered approach, explore the rea-

sons and attitudes that lead to vaccine hesitancy and inadequate preventive illness behaviors.³⁸ Cultivate a behavior change partnership that incorporates active decision-making and patient engagement, with the goal of addressing the patient's perspective.³⁸ Refer patients to government websites such as CDC and WHO's Myth-buster,³⁹ for scientifically valid COVID-19 information.

When confronted with misinformation or conspiracy theories, ineffective messages that contradict pre-existing beliefs can sometimes reinforce those beliefs. According to the Debunking Handbook, rather than simply refuting the myth, begin with the fact, in a clear, direct manner appropriate to the context in which the misinformation was originally presented. Do not repeat the myth more than once. Explain the fallacy and the underpinning of the misinformation.²⁷

Public health outreach and community collaboration are ongoing. Patients need scientifically valid information in the face of a flood of misinformation and conspiracy theories. Acceptance of a vaccine or adoption of a disease-preventive behavior is the result of complex decision-making that involves trust, risk perception, and health literacy,⁴⁰ which underscores the importance of patient education. A comprehensive health history must include conversations about social media use. Social media is a widely used resource, and patient misperceptions derived from its use must be regarded as a risk to a patient's health and safety.¹⁸ Education is our most powerful tool for reversing the misinfodemic and improving preventive strategies for our vulnerable populations.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

- Centers for Disease Control and Prevention (CDC). Social Determinants of Health at CDC. Website. <https://www.cdc.gov/socialdeterminants/about.html>. Published March 10, 2021. Accessed August 28, 2021.
- Agency for Toxic Substances and Disease Registry (ATSDR). CDC/ATSDR's Social Vulnerability Index. Website. <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>. Updated April 28, 2021. Accessed September 6, 2021.
- Kim HK, Ahn J, Atkinson L, Kahlor LA. Effects of Covid-19 misinformation on information seeking, avoidance, and Processing: A multicountry comparative study. *Sci Commun*. 2020; 42(5): 586-615. doi: 10.1177/1075547020959670
- Centers for Disease Control and Prevention (CDC). Understanding Risk. Website. <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/assessing-risk-factors.html>. Published August 5, 2021. Accessed September 4, 2021.
- Centers for Disease Control and Prevention (CDC). Advancing Health Equity in Chronic Disease Prevention and Management. Website. <http://www.cdc.gov/chronicdisease/healthequity/index.htm>. Updated March 11, 2020. Accessed August 21, 2021.
- Papageorge NW, Zahn MV, Belot M, et al. Socio-demographic factors associated with self-protecting behavior during the Covid-19 pandemic. *J Popul Econ*. 2021; 34(2): 691-738. doi: 10.1007/s00148-020-00818-x
- Geçer E, Yıldırım M, Akgül Ö. Sources of information in times of health crisis: Evidence from Turkey during COVID-19. *J Public Health (Berl.)*. 2020; 30: 1113-1119. doi: 10.1007/s10389-020-01393-x
- Obiała J, Obiała K, Mańczak M, Owoc J, Olszewski R. COVID-19 misinformation: Accuracy of articles about CORONAVIRUS prevention mostly shared on social media. *Health Policy Technol*. 2021; 10(1): 182-186. doi: 10.1016/j.hlpt.2020.10.007
- Gerts D, Shelley CD, Parikh N, et al. "Thought I'd Share First": an analysis of COVID-19 conspiracy theories and misinformation spread on twitter. *JMIR Public Health Surveill*. 2021; 7(4): e26527. doi: 10.2196/26527
- Hall WJ, Chapman MV, Lee KM, et al. Implicit racial/ethnic bias among healthcare professionals and its influence on healthcare outcomes: A systematic review. *Am J Public Health*. 2015; 105(12): 2588-2588. doi: 10.2105/ajph.2015.302903a
- Roozenbeek J, Schneider CR, Dryhurst S, et al. Susceptibility to misinformation about COVID-19 around the world. *R. Soc. Open Sci*. 2020; 7(10): 201199. doi: 10.1098/rsos.201199
- Viswanath K, Lee EW, Pinnamaneni R. We need the lens of equity in COVID-19 Communication. *Health Commun*. 2020; 35(14): 1743-1746. doi: 10.1080/10410236.2020.1837445
- Al-Zaman MS. Social media and COVID-19 misinformation: How ignorant Facebook users are? *Heliyon*. 2021; 7(5): e07144. doi: 10.1016/j.heliyon.2021.e07144
- Pennycook G, Rand DG. Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. *Cognition*. 2019; 188: 39-50. doi: 10.1016/j.cognition.2018.06.011
- Buchanan T. Why do people spread false information online? The effects of message and viewer characteristics on self-reported likelihood of sharing social media disinformation. *PLoS One*. 2020; 15(10): e0239666. doi: 10.1371/journal.pone.0239666
- Kumar S, Shah N. False information on web and social media: A survey. arXiv.org. Website. <https://arxiv.org/abs/1804.08559>. Published April 23, 2018. Accessed September 7, 2021.
- Choi D, Chun S, Oh H, Han J, Kwon TT. Rumor Propaga-

- tion is amplified by echo chambers in social media. *Sci Rep.* 2020; 10(1): 310. doi: [10.1038/s41598-019-57272-3](https://doi.org/10.1038/s41598-019-57272-3)
18. Krause NM, Freiling I, Beets B. Fact-checking as RISK communication: The MULTI-LAYERED risk of misinformation in times of COVID-19. *J Risk Res.* 2020; 23(7-8): 1052-1059. doi: [10.1080/13669877.2020.1756385](https://doi.org/10.1080/13669877.2020.1756385)
19. Ruiz JB, Bell RA. Predictors of intention to vaccinate against COVID-19: Results of a nationwide survey. *Vaccine.* 2021; 39(7): 1080-1086. doi: [10.1016/j.vaccine.2021.01.010](https://doi.org/10.1016/j.vaccine.2021.01.010)
20. Qiao S, Li Z, Liang C, Li X, Rudisill CA. Risk perception of COVID-19 and its socioeconomic correlates in the United States: A social media analysis. *medRxiv.* 2021; 2021.01.27.21250654. doi: [10.1101/2021.01.27.21250654](https://doi.org/10.1101/2021.01.27.21250654)
21. Seo H, Blomberg M, Altschwager D, Vu HT. Vulnerable populations, and misinformation: A mixed-methods approach to underserved older adults' online information assessment. *New Media Soc.* 2021; 23(7): 2012-2033. doi: [10.1177/1461444820925041](https://doi.org/10.1177/1461444820925041)
22. De keersmaecker J, Roets A. 'Fake news': Incorrect, but hard to correct. the role of cognitive ability on the impact of false information on social impressions. *Intelligence.* 2017; 65: 107-110. doi: [10.1016/j.intell.2017.10.005](https://doi.org/10.1016/j.intell.2017.10.005)
23. Christy SM, Gwede CK, Sutton SK, et al. Health literacy among medically Underserved: The role of demographic factors, social influence, and religious beliefs. *J Health Commun.* 2017; 22(11): 923-931. doi: [10.1080/10810730.2017.1377322](https://doi.org/10.1080/10810730.2017.1377322)
24. Enders AM, Uscinski JE, Klofstad C, Stoler J. The different forms of COVID-19 misinformation and their consequences. *Har Kennedy Sch Misinformation Rev.* 2020; 1(8). doi: [10.37016/mr-2020-48](https://doi.org/10.37016/mr-2020-48)
25. Hildreth JEK, Alcendor DJ. Targeting COVID-19 vaccine hesitancy in minority populations in the US: Implications for herd immunity. *Vaccines (Basel).* 2021; 9(5): 489. doi: [10.3390/vaccines9050489](https://doi.org/10.3390/vaccines9050489)
26. Kulkarni P, Prabhu S, Kumar S, Ramraj B. COVID-19- Infodemic OVERTAKING Pandemic? Time to DISSEMINATE facts over fear. *Indian J Community Health.* 2020; 32(2 (Supp)): 264-268. doi: [10.47203/ijch.2020.v32i02supp.018](https://doi.org/10.47203/ijch.2020.v32i02supp.018)
27. Lewandowsky S, Cook J, Ecker et al. *Debunking Handbook 2020.* NY, USA: New York University Library; 2020. doi: [10.17910/b7.1182](https://doi.org/10.17910/b7.1182)
28. An L, Bacon E, Hawley S, et al. Relationship between coronavirus-related eHealth literacy and COVID-19 knowledge, attitudes, and practices among US adults: Web-based survey study. *J Med Internet Res.* 2021; 23(3): e25042. doi: [10.2196/25042](https://doi.org/10.2196/25042)
29. Norman CD, Skinner HA. eHealth literacy: Essential skills for consumer health in a networked world. *J Med Internet Res.* 2006; 8(2): e9. doi: [10.2196/jmir.8.2.e9](https://doi.org/10.2196/jmir.8.2.e9)
30. Guo Z, Zhao SZ, Guo N, et al. Socioeconomic disparities in eHealth literacy and preventive behaviors during the COVID-19 pandemic in Hong Kong: Cross-sectional study. *J Med Internet Res.* 2021; 23(4): e24577. doi: [10.2196/24577](https://doi.org/10.2196/24577)
31. Tichenor PJ, Donohue GA, Olien CN. Mass media flow and differential growth in knowledge. *Public Opin Q.* 1970; 34(2): 159-170. doi: [10.1086/267786](https://doi.org/10.1086/267786)
32. Chesser A, Burke A, Reyes J, Rohrberg T. Navigating the digital divide: A systematic review of eHealth literacy in underserved populations in the United States. *Inform Health Soc Care.* 2015; 41(1): 1-19. doi: [10.3109/17538157.2014.948171](https://doi.org/10.3109/17538157.2014.948171)
33. Beaunoyer E, Dupéré S, Guitton MJ. COVID-19 and DIGITAL inequalities: Reciprocal impacts and mitigation strategies. *Comput Human Behav.* 2020; 111: 106424. doi: [10.1016/j.chb.2020.106424](https://doi.org/10.1016/j.chb.2020.106424)
34. Lin L, Savoia E, Agboola F, Viswanath K. What have we learned about communication inequalities during the H1N1 pandemic: A systematic review of the literature. *BMC Public Health.* 2014; 14: 484. doi: [10.1186/1471-2458-14-484](https://doi.org/10.1186/1471-2458-14-484)
35. Ataguba OA, Ataguba JE. Social determinants of health: The role of effective communication in the COVID-19 pandemic in developing countries. *Glob Health Action.* 2020; 13(1): 1788263. doi: [10.1080/16549716.2020.1788263](https://doi.org/10.1080/16549716.2020.1788263)
36. Hughes B, Miller-Idriss C, Piltch-Loeb R, et al. Development of a codebook of online anti-vaccination rhetoric to manage COVID-19 vaccine misinformation. *Int J Environ Res Public Health.* 2021; 18(14): 7556. doi: [10.3390/ijerph18147556](https://doi.org/10.3390/ijerph18147556)
37. Hoffman BL, Colditz JB, Shensa A, et al. #DoctorsSpeakUp: Lessons learned from a pro-vaccine Twitter event. *Vaccine.* 2021; 39(19): 2684-2691. doi: [10.1016/j.vaccine.2021.03.061](https://doi.org/10.1016/j.vaccine.2021.03.061)
38. Gagneur A. Motivational interviewing: A powerful tool to address vaccine hesitancy. *Can Commun Dis Rep.* 2020; 46(4): 93-97. doi: [10.14745/ccdr.v46i04a06](https://doi.org/10.14745/ccdr.v46i04a06)
39. World Health Organization (WHO). Coronavirus disease (COVID-19) advice for the public: Mythbusters. Website. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters>. Updated May 5, 2021. Accessed September 7, 2021.
40. MacDonald NE; SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope and determinants. *Vaccine.* 2015; 33(34): 4161-4164. doi: [10.1016/j.vaccine.2015.04.036](https://doi.org/10.1016/j.vaccine.2015.04.036)