The Impact of Online Misinformation on Covid-19 Vaccines: A Literature Review

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Abstract: The spread of COVID-19 misinformation has contributed to what has been labelled as a crisis of trust. This decline in trust has been reinforced by legitimate criticism of government responses to the pandemic and the exacerbation of pre-existing mistrust in governments and health services, particularly amongst marginalized groups. This study aims to analyse the COVID-19 vaccines misinformation and its impact to the life aspect of the society. This study was a literature review discussing about COVID-19 vaccines misinformation and its impact. Based on the database and keywords, 15 articles were obtained, but only 7 articles had relevant topics. COVID-19 vaccines misinformation can lead to several impacts namely the damage on the prevention and control action regarding to COVID-19. Moreover, this misinformation also can be as the stimulus undermines the COVID-19 individual responses that will affect the willingness of society's vaccines uptake. Misinformation of COVID-19 vaccines can be classified into several types such as misleading contents, manipulated content, false content and fabricated content. Those misinformation lead to the condition of society's acceptance toward COVID-19 vaccines and damage the management of COVID-19 prevention and control actions that are conducted by the Government.

Keywords: Misinformation, COVID-19, Vaccine

INTRODUCTION

The COVID-19 pandemic has produced a massive demand for information concerning, for instance, the origin of the virus, routes of transmission, prevention, disease severity, and dis- ease management. It has also generated misinformation, often grounded in conspiracy theories, which are readily believed in spite of the fact that such claims may be implausible and are not verified as accurate. The World Health Organization (WHO) has referred to the problem of large amounts of misinformation spread during the COVID-19 pandemic as an "infodemic" (Lewandowsky *et al.*, 2021). False information about vaccines is heterogeneous, spread by groups ranging from anti-vaccine libertarians protecting civil liberties to concerned parents and health conscious people (Mills and Sivelä, 2021).

The Indonesia's Ministry of Communication and Information noted that there were thousands of hoax cases as of October 2020 which were divided into 4 social media platforms, namely Facebook as many as 1,497, Twitter 482, YouTube 21, and Instagram 20 (Priastuty *et al.*, 2020). Looking at these numbers, it appears that Facebook seems to be the most widely used social media as a medium for spreading hoaxes. This is also supported by the high number of Facebook account users in Indonesia, as many as 82% of the total population, which means that almost all Indonesians have accounts and are able to access Facebook. Thus, the large number of Facebook users balanced by hoaxes that are also widely spread in the media is certainly a great opportunity for misguided content to develop and influence the community.

The spread of COVID-19 misinformation has contributed to what has been labelled as a 'crisis of trust'. This decline in trust has been reinforced by legitimate criticism of government responses to the pandemic and the exacerbation of pre-existing mistrust in governments and health services, particularly

amongst marginalized groups (Lockyer *et al.*, 2021). Therefore, this study aims to analyse the COVID-19 vaccines misinformation and its impact to the life aspect of the society.

METHODS

This study was a literature review discussing about COVID-19 vaccines misinformation and its impact. COVID-19 vaccines are still new innovation in our global world and all the health sector, thus articles that discuss about COVID-19 vaccines misinformation impacts are limited. Google Scholar, Science Direct, and PubMed were chosen as the database for being subscribed by various open access journals. This study applied a qualitative approach by elaborating results descriptively. It utilized database from articles published from 2020 until 2021 on those sites. Keywords used were "COVID-19 vaccines" and "misinformation" which are relevant to the topic of this study.

This literature review on COVID-19 vaccines misinformation analysed how the misinformation about COVID-19 vaccines happened and how the impact of those misinformation about COVID-19 vaccines. Based on the database and keywords, 18 articles were obtained, but only 7 articles had relevant topics. The results of the literature review were then explained in tables.

RESULTS AND DISCUSSION

Misinformation

Misinformation refers to claims or descriptions of inaccurate, manipulated, or partial information intended to mislead others

Misinformation is false or inaccurate information deliberately intended to deceive. In the context of the current pandemic, it can greatly affect all aspects of life, especially people's mental health, since searching for COVID-19 updates on the Internet has jumped 50% – 70% across all generations. Misinformation in a pandemic can negatively affect human health. Many false or misleading stories are fabricated and shared without any background or quality checking. Much of this misinformation is based on conspiracy theories, some introducing elements of these into seemingly mainstream discourse (PAHO & WHO, 2020).

COVID-19 Vaccines Misinformation

Misinformation about COVID-19 including COVID-19 vaccine is a global public health threat. In terms of COVID-19 vaccine misinformation, it will lead to an increasing number of vaccine rejections. Exposure to COVID-19 misinformation that continuously occurs in public can cause the negative effect, such as the emergence of doubts about the COVID-19 vaccine (Haikal, 2020).

The Impact of COVID-19 Vaccines Misinformation

Vaccines, which in fact are predicted to be the solution to this deadly disease, will eventually encounter problems because there are many people who seem to want to thwart the project. In terms of communication, which means the process in which the communicator sends a message to be received and understood by the communicant, which will be said to be effective if it is able to achieve the same purpose as the communicator, in the end there is a bias between effective and non-effective (Germani and Biller-Andorno, 2021).

For the government, with the noise in the form of fake news that spreads, it certainly becomes ineffective because the message conveyed is not able to reach what is expected. As for certain individuals, it can be said to be effective because the noise which is a message for them is actually able to be received by the communicant in accordance with existing expectations. This is a challenge for today's communication world, especially in the era of information disruption where messages can easily

be modified and disseminated from various media. Whereas the main purpose of communication is understanding (West, Richard; Turner, 2007)

Regarding the Covid-19 vaccine, if this is continuously allowed, then this could have an impact on society in general where there will be a crisis of trust in the Government and increasingly indifferent to the existence of COVID-19. This arises because in accordance with the communication process, receiving different messages with non-uniform literacy levels will affect how people think and act. The most important thing about this problem is that communication on social media, in fact, can often lead to misguided information, so to get more accurate information, it must be obtained from official channels (Priastuty *et al.*, 2020)

Willingness to accept a COVID-19 vaccine and susceptibility to misinformation is found to depend on a number of socio-economic factors (these findings are likely to be more robust since the survey ensures consistent misinformation exposure across different demographics). Females, ethnic minority groups, those without university degrees, and low-income groups were less willing to accept a vaccine (Loomba *et al.*, 2021).

Respondents who did not report even a single source of trust were significantly more susceptible to misinformation than those who did, echoing research from the UK and Ireland which found that "those who were resistant to a COVID-19 vaccine were less likely to obtain information about the pandemic from traditional and authoritative sources and had similar levels of mistrust in these sources (Murphy *et al.*, 2020). The levels of vaccine hesitancy are likely to change over time due to many other factors, including changes in COVID-19 infection and death rates, legitimate reports about vaccine safety, and other factors32. Public opinion is very sensitive to the information ecosystem and sensational posts tend to spread widely and quickly (Kerr *et al.*, 2021)

Poor communication can damage vaccine acceptance in the community. In middle and low income countries, lack of communication resources are some of the factors that limit the capacity to fight negative information about vaccines and it is difficult to get public support for vaccination programs (Goldstein *et al.*, 2015).

Furthermore, the addition of detailed information about COVID-19 vaccines misinformation will be explained in table 1.

Table 1. COVID-19 Vaccines Misinformation and Its Impact

No	Authors	Aims	Results
1.	Barua *et al.*, 2020	To test a conceptual framework considering general misinformation belief, conspiracy belief, and religious misinformation belief as the stimulus; and credibility evaluations as resilience strategy; and their effects on COVID-19 individual responses	**COVID-19 Vaccines Misinformation** 1. the relationships between general misinformation beliefs and COVID-19 individual responses (t = 4.13, β = −0.18, p < .001); conspiracy beliefs and and COVID-19 individual responses (t = 5.47, β = −0.23, p < .001); religious misinformation beliefs and COVID-19 individual responses (t = 5.57, β = −0.24, p < .001); and credibility evaluations and COVID-19 individual responses (t = 8.46, β = 0.37, p < .001) were uncovered significant. 2. Misinformation as the stimulus undermines the COVID-19 individual responses 3. Misinformation on social media has found to be more popular and is highly prevalent **The Impact of COVID-19 Vaccines Misinformation**

No	Authors	Aims	Results
			1. Misinformation can severe the condition of COVID-19. There is no vaccine and confirmed treatment, the possible best approach to counteract and slow down the spread of COVID-19 is knowing the true and accurate information about its causes and how it spreads.
			2. The dissemination of vaccines misinformation would contribute to the poor management of the current century's greatest public health disaster.
			Policy Recommendations
			1. Conducting The "Stop The Spread" campaign of WHO is trying to raise the awareness of COVID-19 misinformation, as well as the joint campaign is targeted to encourage the public to evaluate the credibility of the information by double-checking it with trusted sources like WHO and other regional and national health agencies.
			2. Encouraging the Imams or Moulanas as "expert communicator" agreed to spread the health-related news before or after the 'namaz' (praying) time on their megaphone and will help to debunk the misinformation about di- agnostic and treatment of the disease
			3. Conducting online training programs for both healthcare providers and general people with the intention to -(i) support national readiness and preparedness for COVID-19
2.	Alkaff *et al.*, 2021	Assessing exposure to COVID-19 vaccine misinformation and related factors and identifying the relationship between exposure to COVID-19 vaccine misinformation and willingness to be vaccinated.	**COVID-19 Vaccines Misinformation Exposure**
			1. One-third of the respondents (30.8%) reported having misinformation exposure of COVID-19 vaccine between Augusts to September 2020.
			2. There was a significant association between having an internet quota and misinformation exposure.
			3. no significant relationship for other assessments of self-efficacy related to misinformation of COVID-19 vaccine, such as confidence of respondents in their ability to distinguish misinformation and to verify whether the information is true or false so misinformation could be avoided.
			4. Respondents who had ignorant friends to spreading misinformation had more chance to

No	Authors	Aims	Results
			get exposure to the misinformation of the COVID-19 vaccine
			COVID-19 Vaccines Misinformation Impact
			1. The respondents who were exposed to the misinformation of COVID-19, 20% of them wished to have the vaccination, while 24.8% of respondents who did not get the misinformation had no willingness to get vaccinated.
3.	Priastuty *et al.*, 2020	Identify the COVID-19 vaccine misinformation and its impact by looking at the types of hoaxes and their intensity categories.	**The Type of COVID-19 Vaccines Misinformation**
			1. The types of hoaxes in Indonesia's channel are divided into several types, namely misleading content, manipulated content, false content, and fabricated content.
			2. Misleading content is the most familiar in Indonesia. This content itself means that the information shared is basically correct information but the details of the content are then twisted and reformulated so that it creates a different narrative and tends to be misguided.
			3. The type of misleading information can be explained by several examples, such as: vaccines microchip, the price of COVID-19 vaccine in Indonesia is 100% more expensive than in Brazil, vaccine can change the DNA of human being, and etc.
			The COVID-19 Misinformation Impacts
			1. The intensity of misinformation regarding COVID-19 vaccine is increasing between October 2020 - November 2020.
			2. The existing intensity can indicate a tendency that there are elements who deliberately want to thwart the Government's efforts in handling COVID-19 with vaccines.
			3. Erroneous conclusions contain content that tends to scare people into being afraid to do vaccines and lead opinions so that people doubt the solutions offered by the Government in solving the Covid-19 problem through vaccines.
			4. The more information and news about the Covid-19 vaccine, the higher the number of hoaxes about the vaccine being distributed.
4.	Loomba *et al.*, 2021	To quantify how online misinformation impacts COVID-19 vaccine uptake intent and identify socio-economic	**Qualitative Assessment to Appeal Scientific Misinformation**
			1. In the UK, respondents who reported that they would definitely not vaccinate to protect themselves before exposure to

No	Authors	Aims	Results
		groups that are most at-risk of non-vaccination and most susceptible to online misinformation.	misinformation were 10.6% (3.0, 18.1) more likely than those who would "definitely" get vaccinated to have seen similar misinformation. In both the UK and US, respondents in the control group who reported that they would "definitely not" vaccinate were significantly less likely to have seen similar factual information **The Impact of Misinformation on Vaccination Intent** 1. 54.0% (95% percentile interval [PI], 52.3 to 55.9) of respondents in the UK and 41.2% (39.0, 43.0) in the US report that they will "definitely" accept a COVID-19 vaccine to protect themselves 2. Exposure to misinformation induces significant decreases in the number of respondents reporting that they would "definitely" accept a vaccine: a 6.4 (3.8, 9.0) percentage point (pp) fall in the UK and a 2.4pp (0.1, 5.0) fall in the US. 3. A factor that is associated with increased chance of rejecting the vaccine, and of being more susceptible to misinformation, compared to the baseline group (same as previously stated with no social media baseline). 4. Respondents across both countries who trust television news, government briefings, health authorities, and (perhaps surprisingly) celebrities tend to have higher pre-exposure inclination to vaccinate.
5.	Pierri *et al.*, 2021	To analyze how vaccination rates and vaccine hesitancy are associated with levels of online misinformation about vaccines shared by 1.6 million Twitter users geolocated at the U.S. state and county levels.	**Association between COVID-19 Vaccine Online Misinformation and Vaccination Uptake** 1. An increase in the mean amount of online misinformation is significantly associated with a decrease in daily vaccination rates per million ($b = -3518.00$, $p < .01$) 2. As levels of misinformation increase, democratic and republican counties converge to the same level of vaccine hesitancy 3. Social media users are not representative of the general public, existing evidence suggests that vaccine hesitancy flows across online social networks33, providing a mechanism for the lateral spread of misinformation offline among those connected directly or indirectly to misinformation spreading online.

No	Authors	Aims	Results
6.	Purike and Baiti, 2021	To search the relationship between vaccine information available on social media that is accessed by the public with the attitude taken by the community towards the vaccination program and what steps can be taken by the government of the Republic of Indonesia to make it well-implemented.	COVID-19 Vaccines Belief Factors based on Misinformation 1. Refusal to get vaccinated for fear of serious side effects 2. Perception of distrust of vaccine makers or doubts about the ability of pharmaceutical companies to make and distribute safe and effective COVID-19 vaccine 3. The erosion of public trust in the consequences of its fragmented information that spread during the COVID-19 pandemic 4. Trust in policy makers (governments) can also affect public perceptions of the benefits of the COVID-19 vaccine. A global survey of the potential acceptance of the COVID-19 vaccine beginning June 2020 found that countries with high vaccine acceptance tend to be countries with strong trust in central governments, such as China and South Korea (Lazarus et al., 2020). 5. There is substantial research on COVID-19 misinformation and the role of social media in disseminating COVID-19 misinformation (Center for Informed Democracy & Social Cyber security, 2020). This is due to the lack of reliable information provided by the government so that people trust more false information (hoax) that is spread on social media. 6. Socio-demographic characteristics can also lead to significantly different perceptions or acceptance of vaccines 7. Social acceptance from peers or members of social networks also affects an individual's level of trust in the benefits of vaccines. Individual attitudes and behaviors are influenced by members of their social networks.
7.	Saling *et al.*, 2021	To investigate how these individuals, engage with misinformation and to see how this compares with the more general population.	**The Impact of COVID-19 Vaccines Misinformation on Willingness to Share Unverified Contents** 1. Of the 1397 participants, 339 (24%) indicated that they had shared unverified content. A series of independent samples t-tests were undertaken to compare the group who shared such content and the group who did not. A significantly higher belief in science was found in the group who did not share possible misinformation (M = 35.22, SD = 5.57) compared to those who did (M = 34.08, SD =

No	Authors	Aims	Results
			5.92), t(1303) = 3.14, p = .002, Mean difference = 1.14, 95% CI
			2. Lower conspiracy mentality was found in the group who did not share possible misinformation (M = 19.53, SD = 5.21) compared to those who did (M = 20.29, SD = 4.89), t(1352) = -2.31, p = .021, Mean difference = -.75, 95% CI [-1.39]
			COVID-19 Vaccines Misinformation Impacts
			1. 24% of this cohort were willing to share possible misinformation and 31% had shared information that they later discovered to be false. Participants were asked why they shared information of whose truth value they were uncertain. Approximately 37% indicated that it seemed interesting, 38.3% shared to get a second opinion about the claim's veracity and 12.4% shared information for its entertainment value
			2. Vaccine acceptance was positively predicted by belief in science and negatively predicted by conspiracy mentality.

CONCLUSION

Misinformation of COVID-19 vaccines can be classified into several types such as misleading contents, manipulated content, false content and fabricated content. Those misinformation lead to the condition of society's acceptance toward COVID-19 vaccines and damage the management of COVID-19 prevention and control actions that are conducted by the Government

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