Disinformation in Social Networks: A Systematic Review on Fake News in Times of Pandemic.

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Abstract

The use of social media, low literacy, fast information sharing and preprint services are identified as the main causes of the infodemic [4] and among its consequences we find that it can promote public health risk behaviors globally. The results of
Fake news represents a threat to societies in the context of the pandemic. The aim of this article is to review existing research on fake news in the last 2 years, discussing the characteristics of infodemics, media/digital literacy and its impact on society, as well as highlighting mechanisms to detect and curb fake news on covid-19 in social networks. Thirty articles were analyzed and selected from 1354 open access articles on this subject. The conclusion was that knowledge of fake news should be taken note of due to the harmful effects on society, considering the informational contexts (epistemic, normative and emotional), together with media literacy to increase trust and emphasize public health messages with emotionally relevant and scientifically based content, in order to continue conducting research that allows a 100% effective recognition and elimination of untruthful information on social networks.

Keywords

Covid-19, disinformation, fake news, rumors, social networks, digital literacy, infodemics, deep network detection.

1. Introduction

The development of the internet as we know it resulted in multiple benefits for society, opportunities to share convictions and opinions. Unfortunately, it represents a place for conspiracy theories, disinformation and dissemination of untruthful information. In the first weeks of 2020, when the coronavirus outbreak was centered in China, few people had been diagnosedin other countries. At this time, the coverage of the epidemic in international media was small.

However, once it became clear that the virus was expanding, media coverage increased and with it the spread of panic.

The dissemination and creation of fake news through social networks represents a danger to society, the economic system and democracy [1]. The circulation of fake news during a health crisis is often motivated by the desire to suppress or distort key official messages for recovery. Almost half of the health content posted on social networks contains misinformation since, one of the most salient characteristics of fake news is that it has a narrative that has a detrimental impact [2] with fear or mistrust, which can generate serious problems in the short, medium and long terms [3].

Kabha's research [11] include several impacts from the dissemination of misinformation to the misuse of drugs to cure the disease. Health misinformation about vaccines were also verycommon (43%) [5]. According to the review of Gabarron y Win [6], of the 22 investigations, 11 did not categorize the type of COVID-19- related misinformation, 9 described specific misinformation myths, and 2 reported sarcasm or humor related to COVID-19. But, susceptibility to interact with fake news is independent of the individual educational level of each study subject.

Major media platforms contain mainly fake news and during the current pandemic generated many concerns regarding public health and communication. According to studies by Alí [1], Córdova [3] and Rocha [7], there is a strong significant correlation between social media platforms (Facebook, YouTube and Twitter) and fake news.

The spread of rumors, especially about government performance, on social media is clearly of concern [8], and artificial intelligence, natural language processing (NLP) and deep learning techniques are currently being applied to detect fake news before its spread via social networks on covid-19.

However, in reviews done so far, the benefits of media and digital literacy, related to automated fake news detection practices, are not explained in detail. Therefore, the objective of this review is to conduct a review in relation to fake news, discussing the characteristics of the infodemic, media/digital literacy and the impact of this for society, as well as mechanisms to detect and stop fake news about covid-19 in social networks.

2. Methodology

For the reporting of this systematic review, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta- Analyses) 2020 standards are applied to identify eligibility criteria, sources of information, search strategy, selection process, data collection process, and data list.

3. Search Equation Databases Consulted:

For the present case, 3 relevant databases were chosen for the study of the identification of fake news. One digital library (IEEE Xplore) and two documentary databases (Scopus and Web of Science) were selected. All index impact articles. And while all of them show relevant results in the field of Computer Science, important for the detection of fake news; Scopus and WoS also show relevant information for social sciences.

SEARCH STRING
(("Fake News" OR "Media misinformation" OR Misinformation OR Rumors OR Disinformation) AND ("Social Media" OR "Social Network" OR "Online News" OR Twitter OR Facebook OR Whatsapp) AND ("COVID-19" OR covid OR coronavirus OR quarantine OR pandemic)))

INCLUSION AND EXCLUSION CRITERIA

INCLUSION CRITERIA	EXCLUSION CRITERIA
Articles published in scientific journals between January 2020 and January2022.	The text of the article is not availablefor reading.
Publications indexed in the databases wehave established.	The article is written in a languageother than English or Spanish.
The text of the article must be availablefor reading.	Articles that do not develop educational research related to information literacy, media literacy,digital literacy, data literacy or newsrelated to COVID-19 in social networks.
The article is written in Spanish orEnglish.	Articles whose purpose is thepresentation of monographs.
Articles with the keywords "fake news", "disinformation" or "misinformation" or"COVID-19".	Reviews, theses, conferences, andeditorials

Proposals that will analyze and employmechanisms to detect and/or stop fake news in social networks.	Repeated documents, documents written in a language other than English or Spanish, inaccessible documents, and documents publishedbefore 2020.

4. Prism Diagram
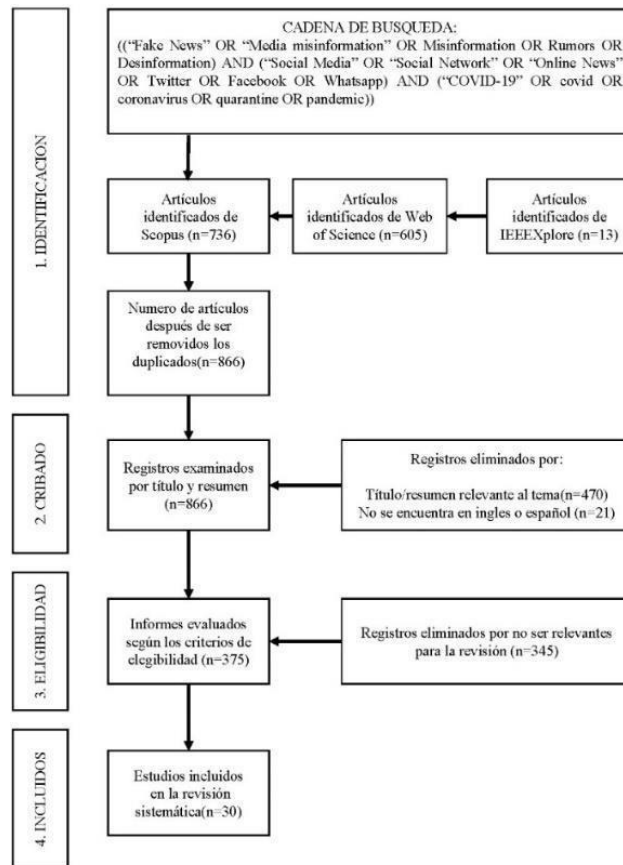
Figure 1: Prism Diagram

Table 1

Socio-demographic profile of residents

SOCIODEMOGRAPHIC VARIABLES		N°	%
Age	20–30 years	4	13.3
	31–40 years old	5	16.7
	41–50 years	6	20.0
	51 and over	15	50.0
Marital Status	Single	8	26.7
	Married	9	30.0
	Cohabiting	9	30.0
	Divorced	3	10.0

	Widowed	1	3.3
Grade of Education	No education	2	6.7
	Completed elementary school	4	13.3
	Incomplete Elementary	8	26.7
	High school completed	8	26.7
	Incomplete High school	4	13.3
	Superior - Technical	4	13.3
Number of family members	2–3 members	13	43.3
	4–5 members	11	36.7
	6 or more members	6	20.0
Income from Crafts	< SMV	27	90.0
	= SMV	2	6.7
	> SMV	1	3.3

It was evaluated whether the artisan women are complying with the general pre-ven-tive measures imposed by the Peruvian state, which are as follows: carrying out clean-ing and disinfecting process on surroundings, furniture, tools, and equipment among other inert surfaces to ensure they are free of COVID-19; ensuring the quanti-ty and lo-cation of hand washing points (water, liquid soap or gel) and alcohol for the artisan's use; implementing the correct use of double surgical masks or a KN 95 and respecting the social distance of at least 1 meter.

The results obtained show that 93.3% of artisan women have been vaccinated against COVID-19, which is the most effective prevention measure worldwide (see Table 2).

In terms of compliance with the general preventive measures, 70% of the artisan women do not comply or are at a beginner level with the health protocols and 30% of the artisan women are in the process, meaning that in some cases they use alcohol when in contact with another person, they clean and disinfect their work tools and use a surgical mask.

Table 2
General preventive measures

HEALTH SITUATION-COVID 19		N°	%
COVID 19 Vaccine	Yes	28	93.3
	No	2	6.7
Level of Compliance with General Preventive Measures	Non-compliant/ Beginning	21	70.0
	In Process	9	30.0
	Total	30	100.0

Concerning compliance with COVID-19 preventive measures in the production pro-cess and the sale of artisan work, three stages have been identified: Before the activity–artisan work production process (stage 1); at the sale of artisan work in workshops, stalls, or artisan stores (stage 2) and after the artisan activity (stage 3), as shown in Table 3.

In compliance with stage 1, 70% of the artisan women do not comply or are in the pro-cess of beginning to comply with the preventive measures, with the lowest indicators being when more than two artisans meet to produce their work, they do not keep social distance and do not use double surgical masks or a KN 95 with 80% and 83.3%, respectively.

Concerning compliance with stage 2—regarding the sale of artisan work in the work-shop, stall, or store—100% of the artisan women do not comply with the prevention measures, for tourism revival and are not prepared to serve the public. Only 16.7% of the artisan women have installed or use a hand sanitizing point at the entrance of the workshop, stall, or store. A hand disinfection point has been installed or used at the entrance of the workshop, stall, or craft store by 7% of artisan women; only 3.3% use electronic payment methods or digital wallets as most of them are afraid of electronic transactions and 100% have not placed signs that promote care and measures to pre-vent COVID 19.

In compliance with stage 3, 76.7% of the artisan women do not comply or are in the process of beginning to comply with the preventive measures after carrying out their activities; only 23.3% store

raw materials and consumables in the storage area, discard the containers (bags, paper, etc.) and disinfect the area; 83.3% of the artisan women wash and disinfect their hands at the end of the operation.

Table 3
Preventive measures in the production and sales process.

PREVENTIVE MEASURES IN THE PRODUCTION AND SALES PROCESS				COMPLIANCE					
	QUESTIONS	Frequency	Percentage	Non-Compliant / Beginning		In Process		Compliance / Achieved	
				N°	%	N°	%	N°	%
Stage 1	Cleaning and disinfection of raw materials, supplies, tools, and equipment at the beginning of the workday. Yes	10	33.3	21	70	4	13.3	5	16.7
	No	20	66.7						
	Total	30	100						
	Washing and disinfection of hands when starting the production of their work. Yes	12	40						
	No	18	60						
	Total	30	100						
	When more than two craftswomen come together to produce their work, they ensure social distancing (1 meter). Yes	6	20						
	No	24	80						
	Total	30	100						
	When more than two craftswomen come together to produce their products, they use double surgical masks or a KN 95. Yes	5	16.7						
	No	25	83.3						
	Total	30	100						
Stage 2	Install and use a hand sanitizing station at the entrance of the workshop, booth, or artisan store. Yes	5	16.7	30	100	0	0	0	0
	No	25	83.3						
	Total	30	100						
	Places signage to promote social distancing at the point of sale No	30	100						
	Use electronic means of payment or a digital wallet for transactions. Yes	1	3.3						
	No	29	96.7						
	Total	30	100						
Stage 3	Store raw materials and supplies in the storage area, discard packaging (bags, paper, etc.), and disinfect. Yes	7	23.3	23	76.7	2	6.7	5	16.7
	No	23	76.7						
	Total	30	100						
	At the end of the operation, hands are washed and disinfected. Yes	5	16.7						
	No	25	83.3						
	Total	30	100						

5. Results

This pandemic generated by covid-19 is an important event that brings disinformation generating two basic problems for public safety: Propagation of misinformation and also the so-called infodemic. Disinformation is false or incorrect information in overabundance that makes it difficult for people to find reliable sources when they need them according to WHO [9]. Covid-19 was declared a pandemic by WHO on March 11, 2020 and before that the disinformation in social networks about it was already causing damage worldwide, so the threat of the infodemic was announced in February 2020 at the Munich security conference.

Marín (2021) [10], explains that there are three types of informative context: weak epistemic (information is not always shared to inform), strong normative (prescriptive or evaluative statements) and strong emotional (emotional manipulation in the news), in each one, but especially the strong emotional context, social networks play a fundamental role in exploring people's behaviors. In a crisis context the amount of information overwhelms the public generating attention fatigue that affects health-related behaviors and emotional responses such as fear, sadness, nervousness, confusion, amusement, anxiety that surface distrust and competition between information sources reducing the dissemination of useful health information generating stress and discouragement, affecting the emotional health of the recipients, there being a significant positive statistical correlation between social networks and the spread of panic about COVID-19. This could be influenced by demographic and generational characteristics such as age and the context in which the people receiving the information analyze it. For example, the study by Soleymani, et al (2021) [12] (n=24), explained that everyone had a specific attitude towards the crisis, among these, many people developed the illusion of being infected by the coronavirus when hearing news about patients and, especially, their deaths. In addition, emotional language can help the success of, for example: (vaccination campaigns, distribution of information, and decrease in the spread of fake news). Therefore, the researchers agree that education could increase trust and emphasize public health messages with emotionally relevant and science-based content. It was possible to identify that the social network Twitter predominated among the chosen documents appearing in 6 articles [13]; [14]; [15]; [16]; [17], followed by Facebook with

participation in 2 articles [18]; [19]; while WhatsApp, Youtube, Instagram, Weibo and Tiktok appeared in only one article [20]; [21]; [22]; [23]; [24].

The discussion on social networks has been affected, dramatically increasing topics about COVID or related topics. The most recurrent topic concerning coronavirus on YouTube and Tiktok was prevention. Due to the crisis, economy was also another quite searched topic as is the case in India [13], and that of Twitter where: "company", "stocks", "economy/economic", "Nasdaq", "wall street" were the most searched terms; but not that of Tiktok where it was unpopular[17]. Disinformation about coronavirus was also quite widespread. In Tiktok it was identified that 27% of the videos had incorrect information about COVID-19 [22]. On twitter, the following were used: 'fake news', 'circulating on social', 'socialnetwork', 'social media' and 'circulating' for misinformation; 'world health organization' 'ministry of health' 'media briefing' for fabricated information; and 'latest information' and 'situation report' for partially false information [22]. In Northern, Western and Southern Europe, words associated with disinformation such as the effects of technological advances were used (5G) In Spanish words like 'plandemic' or 'coronatimo' were widely used to discredit the coronavirus [15]. And on twitter in English words like #vaccineskill and #vaccinesharm to discredit vaccines. [25] On the other hand, the sources most used by people to get information about the pandemic were social networks, both in studies done in Spain, Palestine and Iran. Within them it was found that both YouTube and Twitter the most prevalent sources of information about COVID were official news media [21], [26]. In comparison on both Instagram and Tiktok where the highest amount were produced by public accounts; 67.1% [23] and 96% [22] of total posts respectively. These accounts are likely to use scientific expertise strategically to reinforce one's own pre- existing evaluative opinions [10] and contrary to network consumption, trustworthiness in news shared on these media is quite reduced in generation Z. In Iran likewise individuals stated that pieces of information are disseminated anonymously and cannot be easily trusted, thus stating that it is necessary to validate such information [12], and traditional, alternative media and social networks themselves are the sources of authority attributed in 84.3% of cases. [15]

(Soleymani et al., 2021) [12], describes that media literacy of people decreases the counterproductive impact of disinformation and the spread of false news, a tool that improves its effectiveness when coordinated with the media, educators and governmental institutions [27]. Moore & Hancock [28] present media literacy as an instrument of well-being for older adults, since decreasing their relationship with fake news favors their media learning, allowing them to avoid possible attacks on their emotional stability and interaction in social networks. Media literacy maintains the same objective, to be seen as a tool to fight against fake news and the resilient role of education, as it seeks to enable people to make correct use of information resources and avoid disinformation [12].

Currently, studies are applying artificial intelligence and natural language processing (NLP) techniques to detect fake news before it spreads via social networks and in April 2020, the Facebook platform managed to eliminate approximately fifty million publications related to COVID-19, as these were classified as fake news through the application of NLP methods based on automated learning. As well as conducting surveys to collect responses, give criteria for credibility, conformability, reliability and transferability of information. However, one thing that stands out is the fine line between the task of deleting accounts, suspending users or removing messages, and maintaining freedom of expression, which means that the design of the rules of use is always one step behind the conversation on social networks. Therefore, interventions by the relevant authorities can exploit the positive power of social networks to distribute accurate information from primary and reliable sources.

The findings indicate that most of the users of social networks accept false information as they feel insufficient knowledge and irrelevant experience in the subjects proposed in the networks. The most effective methods and materials with respect to differentiating fake news from real news [29], the optimal deep learning performance classifiers are, GRU (Closed Recurrent Units), LSTM (Long Short-Term Memory), RNN (Recurrent Neural Network, and offer results of discarding fake news in 86.12%. on the other hand, methods used by a large part of researchers in this regard is verification by PLS-SEM analysis technique, rumor refutation and through a crawler.

6. Discussion

This pandemic generated by covid-19 is an important event that brings disinformation generating basic problems for public safety. The dissemination and creation of false news through social networks represents a danger to society, the economic system and democracy [1] because it fuels panic among people and discredits the scientific community in the eyes of public opinion [7] a point that is reinforced by our study, since, for most of the articles analyzed it was considered that in times of crisis the amount of information affects health-related behaviors and emotional responses such as fear, sadness, nervousness, confusion, anxiety that bring out mistrust reducing the dissemination of useful health information generating stress and discouragement, affecting the emotional health of the recipients, there being a positive statistical correlation between social networks and the spread of panic about COVID-19.

Within the three types of informational context: weak epistemic, strong normative and strong emotional, in each, but especially the strong emotional context, social networks play a fundamental role in exploring user behaviors, as they are generally used to manipulate people, being the main media platforms disseminators of fake news generating many concerns regarding public health and communication.

According to studies by Alí [1], Córdova [3] and Rocha [7], there is a strong significant correlation between social network platforms (Facebook, YouTube and Twitter) and fake news. However, in this study, although the correlation between these platforms and NFs is proven, it should be noted that the proportions according to the analyzed articles are as follows: the social network Twitter predominated among the chosen papers appearing in 6 articles, followed by Facebook with participation in 2 articles; while WhatsApp, YouTube, Instagram, Weibo and Tik-Tok appeared in only one article respectively.

According to the analysis of Pian et al, (2021) [4] the use of social media, the low level of eHealth literacy and the fast publication process and preprint service are identified as the main causes of the infodemic. Hypothesis that is reinforced, but complemented in an explanatory way in the analysis of this study, which highlights that media literacy maintains the objective of being seen as a tool to fight

against fake news and the resilient role of education, as it generates a significant change seeking that people can make a correct use of information resources validating and through praxis avoid disinformation [12].

The results of this research include various impacts from small repercussions, such as the spread or viralization of misinformation to the misuse of drugs to cure the disease. Health misinformation about vaccines was also very common. But, the susceptibility to interact with FN is independent of the individual educational level of each study subject as they explained [6]. However, it is stated according to the results of the

30 articles analyzed that demographic and generational characteristic such as age and the context where the persons receiving the information analyze it could also influence. For example, the study of Soleymani (2021) [12] (n=24), explains that each one had a specific attitude towards the crisis, especially about conspiracy theories.

Currently, artificial intelligence and natural language processing (NLP) and deep learning techniques are being applied to be able to detect fake news before its propagation via social networks on covid-19 [3] and [8]. However, for the results of our study not only natural language processing (NLP) was considered, but in much of the research they use and recommend the improvement of GRU, LSTM, RNN and PLS-SEM analysis strategies. As well as conducting surveys to collect responses, give criteria of credibility, conformability, reliability and transferability of information, highlighting the fine line between the verification of information and maintaining freedom of expression.

7. Conclusion

This analysis has again highlighted the dangers and consequences that fake news presents to humanity. Infodemic is false or incorrect information in overabundance that makes it difficult for people to find reliable sources when they need them (WHO, 2020) in such a massive way that it is categorized as an endemic evil. The causes of misinformation are usually associated with low rates of media and digital literacy, which in turn makes it difficult for people to distinguish between real or fictitious health information, being manipulated. Therefore, we conclude by highlighting the need for critical attention on the part of governments and corresponding authorities in crisis communication and misinformation, especially for studies focused on public health crises, because as the infodemic of contradictory news continues to massify, real and timely information cannot be clearly communicated. The three informational contexts (epistemic, normative and emotional) should be considered, together with media education to increase trust and emphasize public health messages with emotionally relevant and scientifically based content on the part of the population. Finally, although the knowledge of NF is well studied, it is recommended to continue paying attention to the subject matter that harms public health and safety and to continue conducting research that will allow 100% effective recognition and elimination of untruthful information in social networks.

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