

Advancing Healthcare Innovation: Multidisciplinary Collaboration and Translational Research

Crisis of credibility: A systematic review on the influence of rumors spread through multimedia on public health during the SARS-CoV-2 epidemic

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Abstract The SARS-CoV-2 pandemic, which started in late 2019, presented a serious public health threat as well as a crisis of confidence due to the speed at which rumors propagated across several communication platforms. As a consequence of this rumors, individuals are more likely to take steps that accelerate the spread of the virus and have negative effects on their physical and mental health. It has been suggested that these beliefs are to blame for a number of tragedies that have occurred across the globe. This systematic review looks at the manner in which the SARS-CoV-2 pandemic affected public health as a result of rumors spread over the internet and other media. The study incorporates qualitative as well as statistical results into its analysis of the current literature to present a complete data of the topic. The greatest way to tackle this difficulty is to provide primary care providers with the most current results from relevant studies and reliable data. Strategic alliances should be formed between the media, healthcare facilities, community-based organizations along with other key players and shared platforms should be established to disseminate genuine public health messaging. This research highlights the devastating effects of rumor dissemination on population health. The crisis of credibility has to be addressed during public health crises for accurate and evidence-based information to be disseminated.

Keywords: Covid-19, Social Media, pandemic, fake news

1. Introduction

The development of the SARS-CoV-2 virus has led to difficulties for governments, society, people and public health professionals. As the virus spreads, information becomes an essential tool for crisis management. Timely and precise information was crucial in managing the spread of the virus, reducing its effects, and guaranteeing the security and welfare of the world population. However, in the midst of information and press coverage, a darker side of the pandemic is the dissemination of rumors and incorrect information derived from light (Usman and Moosa 2020). These included the promise of miraculous treatments, wild speculation on the virus origins, inaccurate data regarding virus spread and deceptive guidance on how to avoid infection. These rumors proliferated over a wide range of channels, including messaging applications, social networking sites, news websites and even conventional media agencies. These rumors have far-reaching effects on public attitudes, behavior and the capacity of healthcare institutions to handle crises efficiently (Woo 2021). The spread of incorrect information that can cause people to take dangerous action was the first and perhaps most obvious effect of rumors during the COVID-19 outbreak (Balarabe and Kumar 2020). Numerous rumor stories promoted unverified remedies or cures for the infection. People have sometimes resorted to unproven, harmful treatments in the hopes of defending themselves. These false strategies not only threaten public health but also divert attention and resources from supported approaches to managing the pandemic (Huu 2023). The capacity of rumors to sway public opinion is one of their most pernicious effects. People's perceptions of the virus and proper ways to respond to it were influenced by the spread of misleading information about COVID-19. For example, false information on virus transmission might cause people to overestimate the danger of close contact, which could aid in virus spread. The public can become unnecessarily anxious and scared as a result of rumors about the virus's mortality, which could lead to an excessive hoarding of essential supplies and detrimental effects on mental health (Srivastava 2021). Compliance with common residents was essential for ensuring that people were able to complete health measures, including social isolation, wearing protective masks and wearing vaccination drives. Concern and uncertainty were expressed about these preventative steps, which were successful at halting the progression of the virus despite the widespread circulation of rumors. As a direct result of this uncertainty, a number of people decided to disobey these regulations, which led to an



increase in the rate of transmission and prolonged the effects of the epidemic (Wechsler 2023). The public's confidence in government institutions and public health experts was damaged by rumors, false information and deception. For public health communication and crisis management to be successful, trust is essential. The reliability of health professionals and the advice they provide when they encounter contradictory or erroneous information. There can be a decrease in the probability that people follow public health recommendations and accept experts. An attempt to provide accurate and useful public health information can be hampered by this breakdown of confidence (Ineji and Ineji 2020). The effect that rumors had on healthcare systems during the COVID-19 epidemic was another aspect of their significance. False information circulated quickly, creating a demand for hospital care, testing and medical procedures that lacked a scientific support system (Bernardino and BacelarNicolau 2020). Healthcare institutions were finding it difficult to handle the pandemic's effects through this wave of patients. It overtaxed the ability of healthcare systems and took resources away from those who were in need of medical treatment (Okeya-Olayinka and Ogundele 2022). During the COVID-19 epidemic, rumors had an impact on people in more than one country or area. Because media and communication are intertwined, rumors and incorrect information can travel across national boundaries. A small amount of false information could have enormous effects on public opinion and behavior in other areas. This interdependence prevented rumors and false information, a global challenge that required international collaboration in addition to rapid efforts to stop the spread of fake news (Debnath and Bardhan 2020). During the COVID-19 epidemic, several diverse measures have been taken to counteract the impact of rumors. Governments, fact-checking groups and public health organizations have worked to combat disinformation by disseminating factual and supported information. Public health campaigns have aimed to teach people about the value of adhering to evidence-based recommendations and obtaining information from trustworthy sources (Kathiravan 2023). Social media networks and IT firms took action to stop the dissemination of false information. Many network tools are used to predict rumors; these tools include fact-checking labels, alerts against misleading material and even take down or limit the availability of misleading information. These channels are crucial for tackling the issue of rumors and disinformation because of their significance in spreading information during epidemics (Omowale and Oyedeki 2020). The SARS-CoV-2 pandemic has had a significant impact on public health and society due to the widespread dissemination of rumors via multimedia. As the epidemic worsens, it becomes more important than ever to take preventative action against false information, ensure that public health information is true and easily available, and encourage media literacy to lessen the negative effects of misinformation on people's health and wellbeing. Trustworthy and factual communication is vital, as shown by the complicated problems created by rumors and false information during epidemics (Badawy et al 2020). In addition, IT corporations and social media platforms implemented countermeasures to combat the dissemination of false information. Many organizations have implemented fact-checking labels and warning signs on materials that contain misleading information, and some have even eliminated or limited the reach of erroneous information. Because of the role that they played in distributing information during the epidemic, these platforms are essential players in the fight against the issue of rumors and false information (Wang et al. 2022). A greater effort to resist the power of rumors involves a number of different components, but one of the most important has been the promotion of media literacy. In today's hyperconnected world, when information travels at the speed of light and is consumed without proper scrutiny, it is more important than ever to educate the general people in the skills necessary to evaluate information sources critically that distinguish between reputable and questionable sources (Alam et al 2021). To address vaccine hesitation, which was a significant concern during the COVID-19 pandemic, it was necessary to address the role that rumors and false information play in causing reluctance to provide correct information about vaccinations. Campaigns to promote vaccinations aimed to debunk myths and misinformation about the effectiveness and safety of vaccines (Pham et al 2022). Rapid dissemination of misleading information via multimedia platforms has impacted public health by changing public opinion, weakening initiatives to promote public health, eroding faith in authorities and putting a burden on healthcare systems. Public health campaigns, fact-checking, promoting media literacy and working with tech businesses and social media platforms are some of the strategies used to counteract this impact (Oude Munnink et al. 2022). Rumors have the potential to erode public confidence in medical authority, which makes handling a worldwide health emergency more challenging. Responding to this influence requires a focused effort that combines open communication, media literacy education and fact-checking to ensure that accurate, fact-based information prevails in the fight against the pandemic's consequences.

2. Tumor recognition information

The prevalence of erroneous or fraudulent information spread across a variety of media outlets is necessary to conceptualize fake news. Information is purposefully falsified or twisted to mislead fool readers, viewers, or listeners and is referred to as fake news. This material is not supported by credible sources or factual accuracy. Usually, with the intention of reaching a large audience, fake news is disseminated through different types of media channels, including social media, messaging apps, websites, conventional media (such as news sources and television) and social media (Wang et al 2023). Fake news is acknowledged as inaccurate information, although politicians use it to undermine in-depth journalistic investigations.

3. Understanding the role of media in information dissemination in SARS-CoV-2

The term "multimedia" refers to a range of media methods used to reach many people through dissemination. The public obtains information more effectively from a variety of media sources. Raising knowledge of pandemic risk factors and responses is an essential first step in controlling any epidemic (Anwar et al 2020). The media has done a good job of covering the pandemic's impact and containment methods in the past. The media has disseminated information about COVID-19 and assisted the general public in comprehending the disease's pattern and severity. The media has developed into a vital resource for health-related information as well as a forum for sharing thoughts, concerns and experiences related to illness, health and treatment. The public has been made aware of the spread of sickness and the use of isolation and quarantine as preventative measures against viral infections by the media (Cowley et al 2021).

Figure 1 shows the use of social media during the COVID-19 pandemic. News reporting can confuse the public and utilize instant messaging tools to spread false information that is not verified by science, which can make people fearful. Social media has an enormous effect since it impacts the younger generation and is a quick way to spread knowledge. The younger generation worldwide comprises the bulk of social media users. Selecting the appropriate media channel to reach the people who are most likely to have this fatal illness is the most challenging part of information delivery. The spread of information might come from the responsible and suitable usage of media (Bisanzio et al 2020). While reporting COVID-19 risk factors in the media, precise, accurate and polished language is needed. An information system that is appropriate, accountable and well managed can be used to prevent the spread of disease to save people's lives.

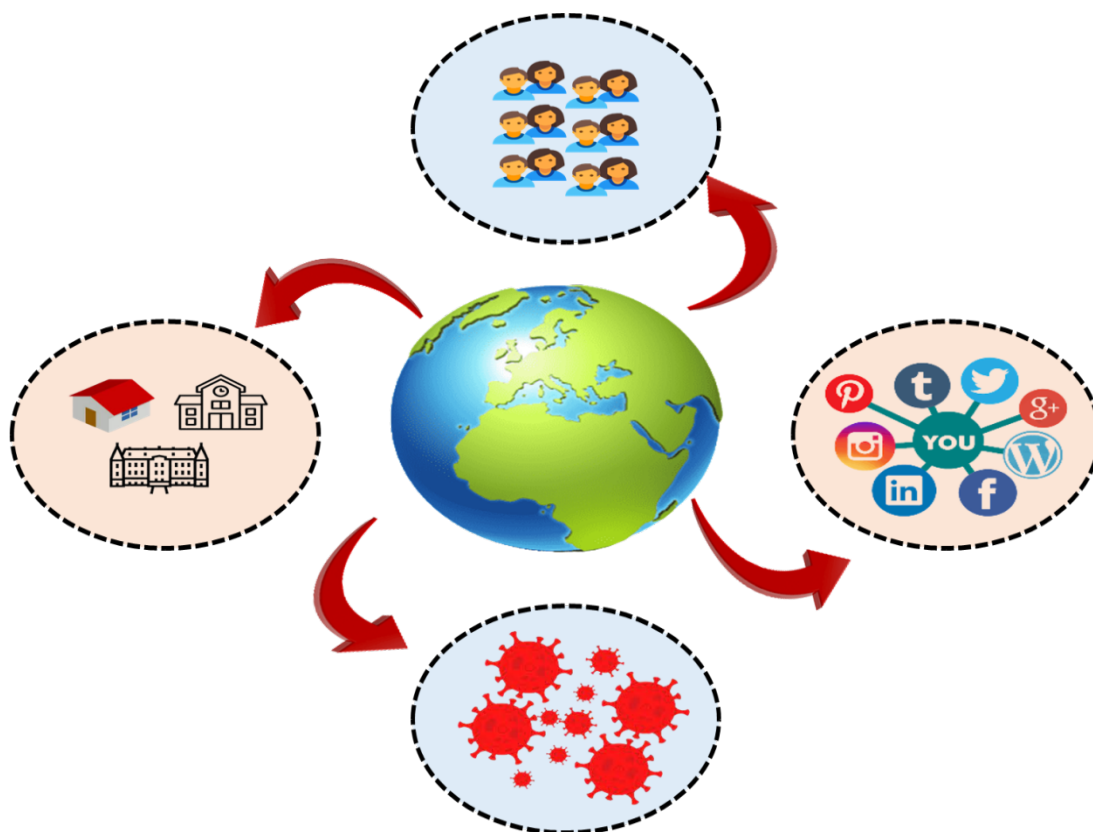


Figure 1 Adoption of social media during the COVID-19 pandemic.

4. Rumors’ cause on public health

Respiratory system disease known as COVID-19, which is caused by the SARS-CoV-2 virus, is a major public health risk that impacts health systems worldwide. A great deal of false material, misinformation and hoaxes about the cause, course, prevention and treatment of this illness on various social media platforms are shown in Figure 2 (Bass et al 2021). The urgent problem is that incorrect data spread on social media more quickly than did content from reputable sources, upsetting the delicate balance of authenticity within the ecosystem. According to a recent investigation, news from 19 reliable sources combined was not as disseminated during the 2016 presidential election as was news that was unfair and fake. Moreover, excessive information exposure can cause media fatigue, which makes it easier to relax the protective habits that are necessary for good health (Butler et al 2021). Fake information and rumors about COVID-19 are related to disguising positive behaviors (such as hand washing and social distancing) and endorsing incorrect actions that spread the virus widely and worsen people’s physical and mental health. For instance, it was reported in India that a father of three people killed himself after learning that he had COVID-19.



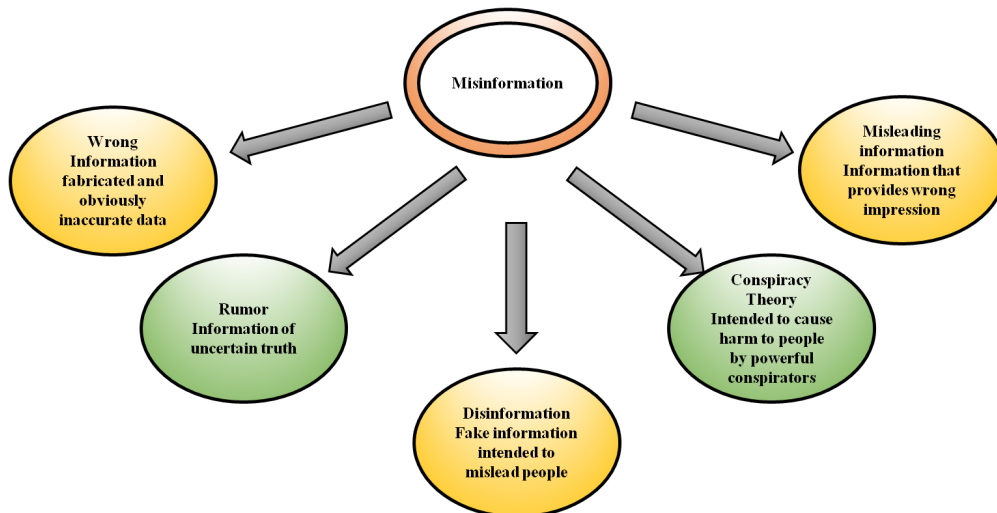


Figure 2 Categories of COVID-19 misinformation.

Source: <https://link.springer.com/article/10.1007/s13278-022-00921-9>

The general public and medical professionals, who are dealing with a condition that has been studied in small numbers, are informed by the abundance of false information about the identification and treatment of COVID-19. This weakens the credibility of fresh scientific findings on treatment or vaccination for this illness (Pinkas et al 2020). In addition to spreading social stigma surrounding the virus, these fraudulent attacks and rumors have decreased adherence to social isolation and home quarantines. Hundreds of people have been infected in many nations by a single person who went mosque or church against the recommendation of their doctor to stay at home and be isolated. These issues are making it more difficult to contain the COVID-19 pandemic in groups (Mulugeta et al 2021).

4.1. Possible methods to assure COVID-19 health communication

People who are under quarantine, are isolated, or who face the possibility of infectious disease epidemics are exposed to psychological stress and detrimental health repercussions. This situation has attracted people's interest and has led them to learn more about the disease (Anwar et al 2020). The WHO (World Health Organization) has recognized this need, and in partnership with seven major tech companies, several social media platforms, including Facebook, Google, LinkedIn, Microsoft, Reddit, Twitter and YouTube, have committed to rooting out misinformation and fraud in addition to promoting important updates from healthcare agencies. Numerous multifaceted measures are required to counteract the widespread misinformation on the platforms, notwithstanding the agreements.

Correct information that can be shared with patients or populations at risk and used in direct caregiving should be provided to frontline healthcare personnel. This might contribute to better health outcomes, which would be made possible by improved patient-provider communication (Choi et al 2020). The integration of information technology to control mass casualty events has improved patient care. There are numerous benefits, including improved patient outcomes, increased care and resource management.

The dissemination of reliable information can be aided by the media, civic society, neighborhood associations and support groups. It is necessary to create strategic alliances on a local and international scale, coordinating the linking of physical and online resources to ensure that verified information is shared across platforms (Okan et al 2023).

To increase public awareness, accurate material should be permitted on digital platforms, eliminating rumors and hoaxes altogether (Dang 2021). Modern data-mining algorithms identify the distinctive qualities of various types of false news and eliminate them from platforms. Amazon, Reddit and Twitter have started using these techniques to eliminate phony user identities and reviews. It is possible to use the same principles to dispel any myths and hoaxes about this epidemic, even given its particular problems. As a result, social media and other internet service providers implement similar procedures to recognize and eliminate dangerous rumors and falsehoods.

Anyone responsible for creating and disseminating such false material, including internet portal operators, needs to face legal consequences (Daud and Zulhuda 2020). To address these issues in their particular settings, law enforcement and regulatory bodies at the local, state and federal levels should be made aware of them. In this sense, the governments of several nations have retained those responsible for spreading these kinds of misinformation.

The distribution of preventative information in offline and online media should be facilitated by the development of shared platforms (Liu 2020). It is necessary to identify and put into practice effective mass media campaign methods for the last several outbreaks. To enhance reach, these messages must be translated into other languages and adapted for different cultural contexts. Recent outbreaks of SARS, H1N1, MERS-CoV, Ebola and H7N9 were covered by the media, which contributed

to the reduction in the overall spread of these infections by encouraging healthy practices (Yuan et al 2022). Similar outcomes are anticipated based on factual knowledge of COVID-19.

Evidence-based care and information services should be made accessible via telemedicine to those who have restricted access to care, such as those who are old and live in remote regions, and who are confined to their homes during lockdowns (Zimmerling and Chen 2021). The probability of a hospital-acquired infection will decrease as more resources such as ventilators and doctor personal protective equipment will be used.

The benefit of the general public enduring the physical and emotional effects of this pandemic, openness, sound information governance and leadership in communities as well as institutions should be fostered to eliminate false information pertaining to COVID-19 (Narayan et al 2021).

4.2. Rumors' psychological impact

During the SARS-CoV-2 epidemic, rumors have had an enormous influence on how people think and act. They can have a significant and wide-ranging psychological influence on people, groups and even entire societies. Rumors are unproven or circulate through social media or different channels. During the COVID-19 pandemic, gossip has proliferated via social media, oral communication and internet news outlets. Issues such as the virus's origin, mode of transmission, cure and strength have been discussed (Musa et al 2020). Rumors have the power to incite dread and anxiety when they make dramatic or frightening assertions. False information on the virus's lethality or modes of transmission can cause people to become more anxious. The "fight or flight" reaction that fear might set off can have negative psychological and physiological effects. Uncertainty is a perfect environment for rumors to flourish. People looked for knowledge to ease their concerns since the SARS-CoV-2 disease was new and the epidemic was developing (Banko 2020). There was panic in the early stages of the epidemic due to fears of shortages and lockdowns. People hurried to stock up on necessities such as toilet paper, hand sanitizers and nonperishable food out of fear of shortage. This rumor-driven conduct puts stress on supply systems and increases anxiety levels.

Discrimination and humiliation are exacerbated by certain rumors. For instance, incorrect allegations about the virus's origin contributed to xenophobia and prejudice toward Asian Americans. Having a rumor such as this can have a negative psychological impact on people and groups, making them feel excluded and alone. Rumors can cause people to lose faith in health authorities when they contradict the facts they have been given. The legitimacy of government authorities and health groups can be questioned, which might impede public health initiatives and the following of advised protocols. Rumors and fake information might make it harder to make decisions. People can make decisions based on misleading information, which might be harmful to their own or other people's health (De Gennaro et al 2020). For example, depending on untested therapies because of hearing, for example, might have negative effects on health. Rumors during the SARS-CoV-2 epidemic had complex and significant psychological effects. To address the difficulties caused by rumors and false information during times of crisis, comprehending this influence is important. In addition to providing correct information, efforts to stop rumors must include methods for reducing the psychological effects that misinformation can have on a community during a global health emergency (Islam et al 2020). Media sources and public health organizations are essential for dispelling rumors and lessening their psychological effects.

5. Results and Discussion

5.1. Modifications in misinformation throughout time

A timeline or debate centered on the evolution of and changes in disinformation across various historical eras might involve well-titled modifications of disinformation throughout time (Cortada and Aspray 2019). This topic suggests an investigation of the ways in which inaccurate or misleading information has changed and evolved over time, offering perceptions of the dynamic nature of dishonesty and its effects on the community. Figure 3 illustrates whether COVID-19 fake news varied over time.

Fake news developed more after September 30 but decreased after October 11. It increased again after October 16 and fluctuated until it reached its peak on October 29 ($n = 9$; 7.9%). On October 30, the next day, the number of colonies fell once again ($n = 1$; 0.5%). The number peaked on November 7 ($n = 6$; 5.8%), before another significant variation. The curve does indicate a decrease in daily instances starting on November 3.

5.2. Distinguishing fake news from real news

The initial layer of a false news network is smaller than the subsequent layers, which are greater in comparison. Thus, the ratio of the first to the second layer's size can be defined as the layer size ratio. The share of fake news is greater than that of actual news, as shown by the ratio distribution (Monti et al 2019). Fake and authentic news items are separated by the distribution of the layer size ratio, with very little overlap.

According to Figure 4 and Table 1, the possibility that fake news will differ from actual news based on layer ratio distributions starts at the initial reposting time. The layer size distribution on Twitter has a peak at layer four as a result of secondary breakouts.

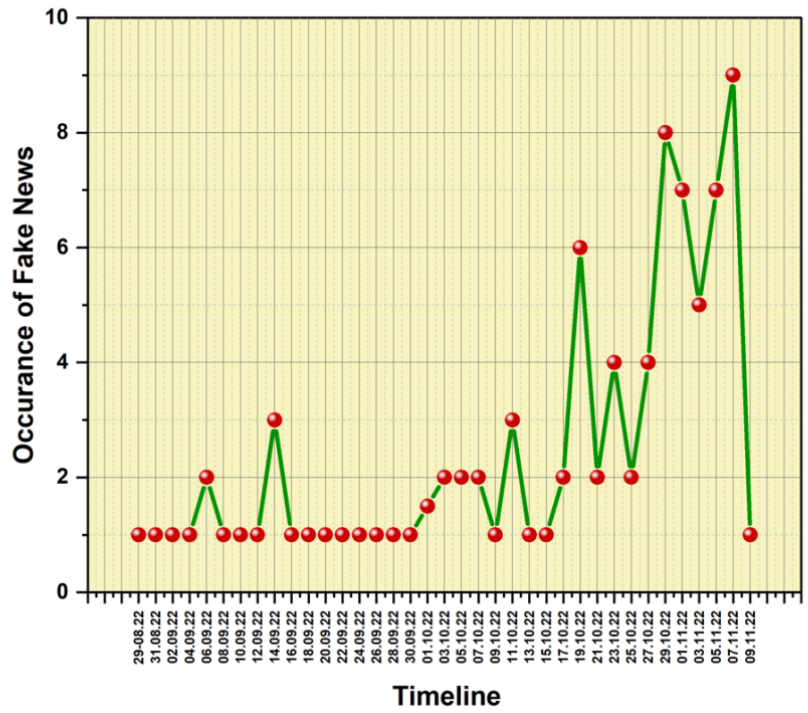


Figure 3 A timeline of fake news.

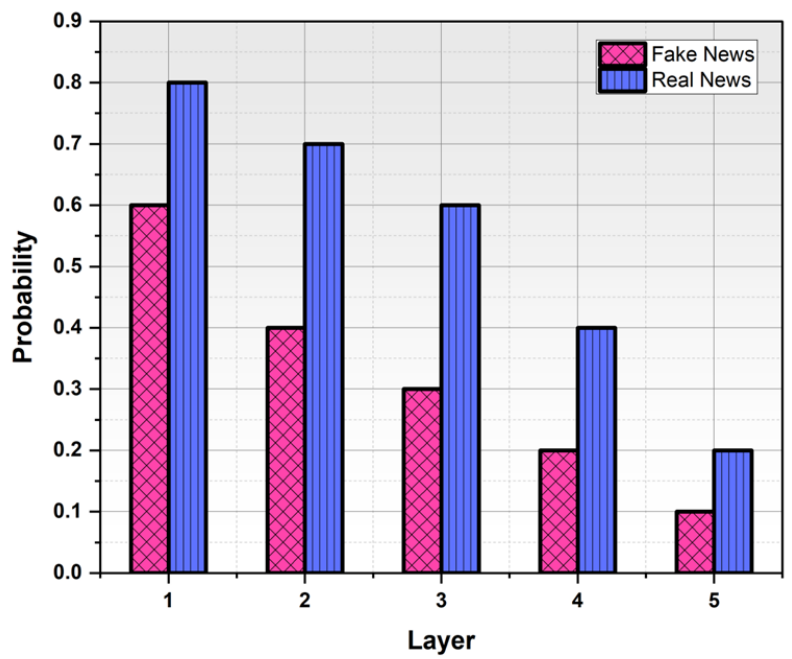


Figure 4 News Source Evaluation. Real vs. Fake.

Table 1 Numerical values of Fake and real news.

Layer	Probability	
	Fake News	Real News
1	0.6	0.8
2	0.4	0.7
3	0.3	0.6
4	0.2	0.4
5	0.1	0.2



5.3. Preliminary pandemic crisis indications

The number of SARS-CoV-2 illnesses recorded has increased worldwide. Figure 5 illustrates the H1N1 pandemic in 2021, and the previous SARS-CoV epidemic in 2019 contrasted with the rapid buildup of cases; however, it should be noted that there was a misdiagnosis of H1N1 illness.

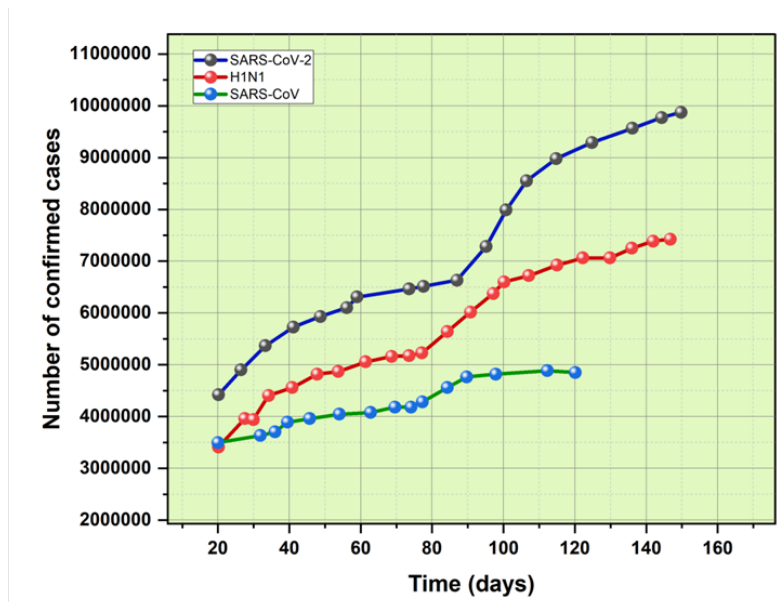


Figure 5 Number of verified cases.

It is essential to contemplate the potential new balance that can exist between humans and this virus, as well as its evolutionary offspring. This Perspective aims to concentrate on the expected shift of COVID-19 infection in humans to another stage as an endemic virus with sporadic pandemic peaks. The evaluation is based on findings from prior epidemics as well as continuing data from the COVID-19 pandemic (Cavicholi et al 2021).

5.4. Importance of mask wearing

One of the most well-known COVID-19 treatments is the use of face masks, which are adopted throughout most nations (Abbasi et al 2020). The government ruled that wearing a mask during a pandemic was necessary, but some individuals refused to cooperate since they had respiratory problems. However, as shown in Figure 6, mask wearing decreased globally in 2021, even in nations with low immunization rates.

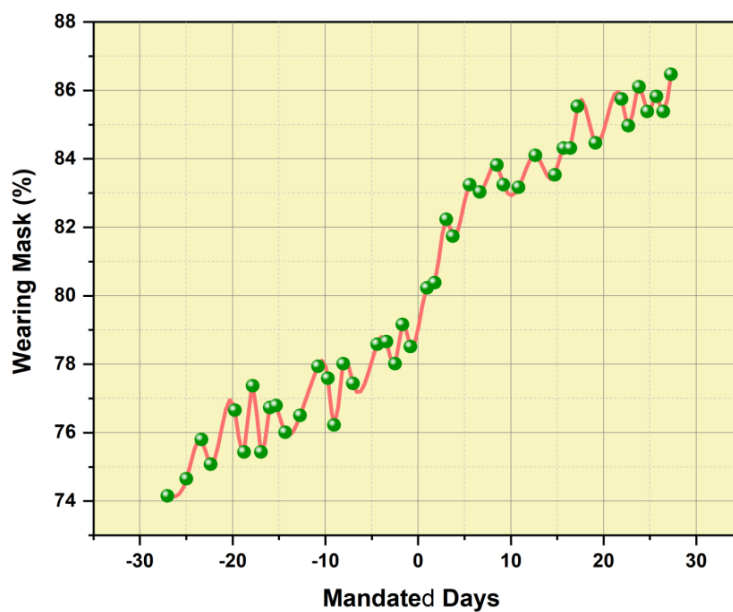


Figure 6 Significance of mask wearing.



The efficacy of mask use in public places is vital. The efficiency of mask use in various contexts and on various scales. N95 masks are effective in the healthcare setting when worn by skilled users, cutting the transmission of coronaviruses, such as severe acute respiratory coronavirus syndrome 2 (SARS-CoV-2), in half (Liu 2020). The optimal surgical masking method for noninfected individuals reduces their chance of contracting COVID-19 by 65 to 75%.

6. Final considerations

The spread of SARS-CoV-2 has been a contributing factor to the increase in the dissemination of misinformation, which has contributed to persisting misconceptions about the virus. Effective preventative efforts are impeded by this disinformation, which increases the virus's ability to spread and worsen its effects on mental and physical health. Globally, incidents linked to these misleading narratives have disastrous results. Frontline healthcare professionals' accurate and current information is essential for addressing this pressing problem. Joint ventures and centralized channels between the media, healthcare institutions and community groups are essential to the dissemination of true public health recommendations. Primary content and COVID-19-related false news content types seem to be less prevalent than are their combined categories, indicating that more fake news uses many kinds of content at one time. Some individuals refused to use masks during the epidemic due to respiratory concerns. Mask wearing is linked to a significant decrease in transmission. Our data indicate that the global adoption of mask wearing must have been influenced by factors other than rules and regulations. Due to the many factors that might distort the results of an investigation, determining the specific influence that rumors have on public health can be difficult.

Ethical Considerations

Not Applicable.

Conflict of Interest

The authors declare no conflicts of interest.

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