

Categories of fake news about COVID-19 disseminated in the first year of the pandemic in Brazil

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Abstract

The objective of this study was to analyze the false news about COVID-19 disseminated in Brazil during the first year of the pandemic in the country. This was a documentary type study, which investigated the fake news inserted in the Coronaverificado.news platform until February 27, 2021, totaling 938 news items, which were submitted to the IRaMuTeQ software, resulting in the Descending Hierarchical Classification. This enabled the clarification of four thematic categories analyzed with theoretical and methodological support from Hermeneutics-dialectics. The results revealed social networks as the most used vehicles for sending fake news (n=625; 66.6%), whose contents were predominantly texts (n=488; 52%). In the categorization of subjects, "Government and authorities" was the category that concentrated the most widespread subjects (56.6%), followed by "Development and application of vaccines" (14.8%), revealing the multifaceted scope and intention of the fake news items, which confuse the population and encourage adherence to unsafe practices. It is essential that the mass media function as a vehicle for reliable scientific and technical content about COVID-19's coping actions, since true communication associated with the ethical commitment of government officials will help to reduce the risk of people's inappropriate behavior, aiding the conscious adoption of measures that promote overall health in the pandemic and post-pandemic context.

Keywords: COVID-19. False Information. Social Media.

INTRODUCTION

The COVID-19 pandemic, which started at the end of 2019, has been a recurring issue in the world population, as epidemiological and operational indicators are alarming¹. In Brazil, measures to fight the disease started through a ministerial order² signed after the World Health Organization (WHO) declared COVID-19 a Public Health Emergency of International Importance (ESPI)³ and

continued by regulations issued by state and municipal governments⁴.

On February 25, 2021, a year after the first case of COVID-19 was registered in Brazil, more than 250 thousand deaths from the disease were registered in the country, 1,582 in a single day, configuring one death per minute. In this second wave, the press reported maximum occupation in hospital

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structures and the vaccination of priority groups was still in the first stage, occurring discontinuously and without a guaranteed dose for all. This slows the expected impact, which is on the control of the pandemic with non-pharmacological measures⁵.

In this context, valid information based on scientific evidence is a necessary tool for raising the population's awareness, which is one of the strategies to combat the pandemic⁶. However, it is clear that despite the existing guidelines and the dissemination of recurring information by journalistic communication vehicles and government virtual channels, the population continues to search for news related to COVID-19. Thus, it uses mechanisms that enable the quick dissemination of information⁷, such as social networks; however, without worrying about making sure that what they read, see, or hear is true.

In the context of COVID-19, a risk of this type of vehicle is the dissemination of false news (fake news), which can contribute to the worsening of the situation, since there are people assimilating such information and predisposing themselves to choose inappropriate behaviors for protection⁸, which can result in serious health events⁹. In addition, they collaborate so that other people propagate the message of dubious content, transforming them into disseminators of their

profiles and false news, which is a crime against honor of and damages the virtual environment¹⁰.

It is important to highlight that fake news on health issues predates the emergence of COVID-19. Since in 2018, the Ministry of Health issued clarifications on false news that hampered the fight against yellow fever, flu, and measles¹¹. A similar fact has been occurring with the news about COVID-19 disseminated to induce error by appealing, exaggerated or clearly false cries¹², carried on social networks and messaging applications, the latter being the most difficult dissemination medium to be monitored by official health entities¹³.

In view of the multifaceted nature of the false messages transmitted and the subjectivity of the human act of understanding when receiving them, the subject who disseminates these messages can gain followers and become a reliable reference, since all the symbolic production found in these media provides for the apprehension of the social discourse that carries them¹⁴. Given this, and considering that false news, if not effectively combated, may negatively influence the population and compromise collective health, the objective of this study was to analyze the fake news about COVID-19 disseminated in Brazil during the first year of the pandemic in the country.

MATERIALS AND METHODS

This is documentary study, whose design was based on the process of searching for data in the Knowledge Discovery in Databases (KDD)¹⁵. It is composed of five consecutive steps capable of generating concise and useful results for the purposes investigated in the scope of information generated and

knowledge discovery. The steps that make up the KDD are: extraction, treatment, standardization, and data mining, followed by information evaluation. This model has the versatility to be used in different research areas, providing mechanisms for generating analyses on large data sets in an assertive

and innovative way.

The documentary material consisted of news whose content was identified as false after checking data. It is noteworthy that, in order to check and prove that a news item is false, journalists linked to agencies specialized in journalistic investigation use several strategies, making comparisons between sources, using official references, and consulting specialists on the subject. However, it is not always possible to identify the source or origin of the news, due to the uncertainty as to whether the means of communication that shares the false information is the source itself¹⁶, thus making it difficult to identify the author of the disseminated content.

For data extraction, the spreadsheet available for free was downloaded from the Coronaverificado.news Platform (<https://chequeado.com/latamcoronavirusportugues/>), created by the union of fact, data and statement agencies (fact-checking) from Latin America, which provide checked news to readers in all Spanish or Portuguese speaking countries. Three Brazilian agencies recognized by the International Fact-Checking Network (IFCN) host their checks on the Platform, thus providing relevant work to deny the related fake news¹⁷.

News published in Brazil up to February 27, 2021 were selected and inserted in the Platform totaling 938 items, whose publications took place from January 2020 to February 2021. The data analyzed were: title and description of the news, news checking agency, type of content, classification, vehicle, and visual format of dissemination. The news items were organized in numerical sequence according

to the date of publication and transcribed to a text file in the program Libre Office Writer version 5.4, in which there was the removal of special characters and standardization of terms (data), generating the textual *corpus* for analysis.

The textual corpus was analyzed with the aid of the free software IRaMuTeQ, version 0.7 alpha 2, linked to R Package, which implements some types of analysis based on statistical and text mining methods, such as the Descending Hierarchical Classification (DHC). In this program, it is possible to visualize the words that have more frequency among themselves and that are grouped into classes, defined by means of the chi-squared tests (χ^2) and represented by the p-value (<0.05)¹⁸.

In the light of the theoretical-methodological framework of Hermeneutics-dialectics, it was possible to clarify the categories of analysis pointed out in the DHC dendrogram. This technique preserves the hermeneutics from the possibility of interpreting the meanings that the subjects elaborate in their statements and preserves the dialectics from the understanding of such meanings in their social and historical context¹⁹. In this perspective, it was possible to analyze the content contained in the main fake news disseminated and checked in Brazil during the COVID-19 pandemic.

As this is a documentary search of texts available on the internet, of a public nature, and freely accessible to the population, this study followed what is recommended by Resolution No. 466/2012 and No. 510/2016 of the National Health Council, dispensing the need to need for appreciation by a Research Ethics Committee.

RESULTS

938 news stories that were proven to be false were analyzed. The first news item was dated January 2, 2020 and the last was February 8, 2021, and Agência Lupa was responsible for 46.3% of the checks. Of the news, 66.6% were broadcasted on social media in text (52%) and video (23.8%) formats, with some being published in more than one format simultaneously. All received a rating on the Coronaverificado.news Platform, with emphasis on matters involving authorities (24.8%) and the cure of COVID-19 (19%). As for the type, the contents were characterized as false (90.6%) or misleading (9.4%) (Chart 1).

The textual corpus from these news items were divided by IRaMuTeQ into 940 text segments (TS), listing 3,267 words that occurred 16,832 times. DHC retained 85.6% of the total TS (805 TS), generating a dendrogram with five classes, illustrating that the first division of the corpus established class 5 as opposed to the other classes; then class 4 was separated from the other classes; in the third moment, class 3 was separated from classes 1 and 2, which differed in the last division, ending the process.

All the words listed in the dendrogram (Figure 1) showed high significance according to the class ($p < 0.0001$) and the sequence of the divisions defined the description order of the classes that, with the support of the hermeneutic referential, originated four categories of fake news about COVID-19 disseminated in Brazil.

Class 5, constituting 14.8% of the analyzed news items, brought the interface of “development and application of vaccines” against COVID-19 in the context of fake news. Immunobiological agents still undergoing clinical tests to verify safety and efficacy, vaccines approved for emergency use and in use in the country, and aspects related to the

production of these immunizing agents were among the false news items in this category.

Class 4, which represented 14.7% of the total TS, highlighted the category “contagion statistics”, aggregating the false contents related to the statistical data on the number of confirmed cases and deaths by COVID-19 registered by the state health departments and civil registry offices.

Class 3, with a 14% representation of the corpus, called “treatment and cure”, presented aspects related to pharmacological therapies against COVID-19, including false news about treatments and cures involving health authorities and health professionals. Fake news involving antibiotics, worms, antimalarial agents, or natural compounds are among the most widespread preventive and therapeutic measures.

Class 2 obtained the highest percentage of TS retention (43.4%) and, together with Class 1, which represented 13.2% of the *corpus*, generated the category “government and authorities”, as they added false news items involving politics of confronting the pandemic by the federal government, especially on emergency aid for people in situations of socioeconomic vulnerability. Moreover, they include false content citing the non-use of masks, receipt of the vaccine, and other situations involving state, municipal, and other politicians. In this category, citing the existence of unoccupied hospital beds and burials of empty coffins are also grouped as fake news items.

A summary table, positioning the thematic categories according to the percentage of representation, in order to facilitate the discussion of the findings of this study, presents some statements of false or misleading content and their respective explanations, illustrating the typology of the disseminated fake news (Figure 2).

Table 1- Characterization of fake news analyzed.

Checking Agency	Agência Lupa	434 (46.3%)
	Estadão Verifica	271 (28.9%)
	Aos Fatos	233 (24.8%)
	Total	938 (100%)
Type of Content	False	850 (90.6%)
	Misleading	88 (9.4%)
	Total	938 (100%)
Dissemination format	Text	488 (52.0%)
	Video	223 (23.8%)
	Image	175 (18.7%)
	Audio	52 (5.5%)
	Total	938 (100%)
Dissemination vehicle	Social Media	625 (66.6%)
	Communication outlets	204 (21.7%)
	WhatsApp	85 (9.1%)
	YouTube	24 (2.6%)
	Total	938 (100%)
Classification	Others (no specification)	236 (25.2%)
	Authorities	233 (24.8%)
	Cure	178 (19.0%)
	Conspiracy theory	142 (15.1%)
	Contagion	87 (9.3%)
	Vaccine	62 (6.6%)
	Total	938 (100%)

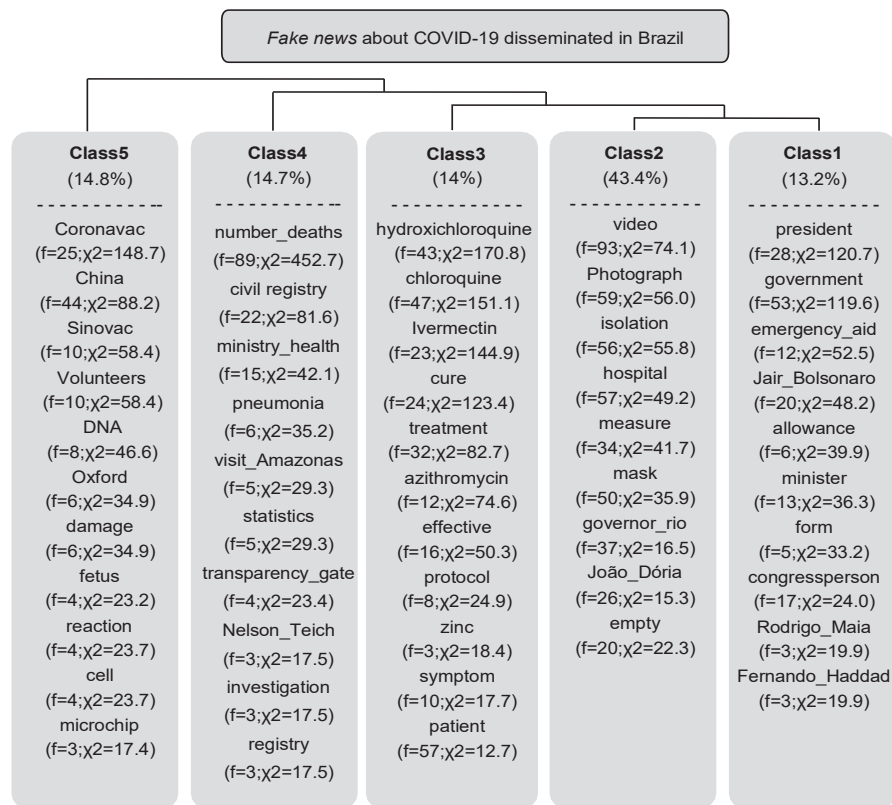


Figure 1- DHC dendrogram of the fake news corpus concerning COVID-19 disseminated in Brazil

FAKE NEWS	CONTENT	EXPLANATION
Category 1 - Government and authorities		
The government of Jair Bolsonaro transformed the textile pole of Pernambuco into the largest producer of masks and PPE during the new coronavirus pandemic.	False	The production of masks and PPE was in fact financed by the government of Pernambuco, but the mayor of Santa Cruz do Capibaribe, one of the municipalities that make up the hub, said he never spoke or negotiated with President Jair Bolsonaro.
Brazilian government grants aid of R\$470.00 for people from the Family Allowance, a program to fight poverty, to buy masks and hygiene products.	False	The Ministry of Citizenship, responsible for the program, denied on its social networks the disclosure and stated that it announced only the inclusion of 1.2 million families in the Program.
Former presidential candidate Fernando Haddad threw a birthday party with guests during the pandemic.	False	Fernando Haddad was born in January, but the photo is from the year 2019.
João Doria stopped sending vaccines to Bauru, due to a political fight with the mayor. She visited Bolsonaro, who decided to send vaccines directly to the municipality.	False	Until the publication of the article, three batches of vaccines had been sent to Bauru by the São Paulo government, the 1st. on the 20th of January. The mayor's meeting with Bolsonaro was on the 27th, with other issues on the agenda.
Category 2 - Development and application of vaccines		
Video shows that the first volunteer vaccinated with coronavac did not have his arm pierced, proving it is a scam.	False	The images are from a video demonstration of the immunization process; however, there are images of the vaccination occurring normally.
181 people were killed by vaccines in the United States.	False	197 people died after getting the vaccine, but there is no evidence that any of these deaths were caused by any immunizing agent.
Photo of an alleged dose of Pfizer vaccine, with the words: "made in China".	False	The photo is a meme. The product in the packaging is a supposed vaccine in vaporizer format.
Bill Gates admits on video that the Covid-19 vaccine changes people's DNA forever.	False	The post edited a video from the Youtube channel Gates Notes. Bill Gates does not make this statement in the original content.
A study shows that Covid-19 vaccines cause male infertility.	False	The cited study, in fact, says that Covid-19, not the vaccine, affects testicular cells and can cause damage to reproductive health.
Bill Gates is funding a vaccine in the form of a patch. The vaccine contains a microchip that will be used to monitor people via the 5G network.	False	The vaccine funded by the Bill and Melinda Gates Foundation is not adhesive, it is liquid for injection, and there is no evidence that it contains a microchip that allows screening in 5G networks.
Category 3 - Contagion statistics		
H1N1 caused more deaths during the 2009 pandemic than the new coronavirus. However, nobody talked about it.	False	Officially, 18,000 deaths were confirmed during the H1N1 pandemic. Currently (06/2020), more than 400 thousand deaths were confirmed by Covid-19.
Despite the Covid-19 pandemic, the total number of deaths in Brazil has decreased when compared to April 2019 and April 2020.	False	By the time this fact check was published, the number of deaths in April 2020 was already higher than 2019.
Deaths from pneumonia and respiratory failure are now registered as Covid-19 on the civil registry transparency portal.	Misleading	The database used as a source is constantly updated and, this year, the number of deaths from non-specific causes and from Respiratory Syndrome increased.
The number of deaths from Covid-19 dropped suddenly in Amazonas as soon as Minister Eduardo Pazuello visited Manaus.	False	The number of deaths increased during the visit of Pazuello, between 23 and 29 January 2021.
Photo shows empty hospital room; the caption says that it used to be an isolation room for patients with Covid-19 at HCPM, and that there was only 1 case of Covid at HC.	False	According to the Rio Military Police, which manages the HCPM, the room is just a regular waiting room and there were still 42 patients with Covid-19 in the hospital on May 18, 2020.
Coffins were buried containing stones and wood in Belo Horizonte.	False	The BH City Hall denied the information and the author of the recording also acknowledged that his statement was false.

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FAKE NEWS	CONTENT	EXPLANATION
Category 4 - Treatment and cure		
A prescription for hydroxychloroquine, azithromycin and zinc guarantees the cure of 99.9% of any patient with Covid-19.	False	There is no scientific evidence that this prescription cures 99.9% of patients with Covid-19. All double-blind randomized studies show the opposite.
Azithromycin, nitazoxanide and ivermectin cure Covid-19 if taken when the first symptoms are observed.	False	Health officials say there is still no known cure for Covid-19.
Doctor says chloroquine cures Covid-19 and wearing a mask can turn your blood into acid, which can help the proliferation of the new coronavirus.	Misleading	There is no evidence that the use of masks can cause any harm and WHO recommends their use.
Exposure to sun, eggs and alkaline foods help prevent Covid-19.	False	None of these items have any effect against Covid-19.
Drinking water every 15 minutes prevents the virus from lodging in your mouth, as it carries viral load to your stomach.	False	Water does not carry the virus, and its main concentration is in the respiratory tract, not in the mouth.

Source: Plataforma Coronaverificado.news (2021).

Figure 2- Summary table of the main fake news items concerning COVID-19 disseminated in Brazil.

DISCUSSION

The world faces an unprecedented challenge with the COVID-19 pandemic. By the end of February 2021, 10 million people had contracted the virus, negatively impacting people's health, and the countries' economies. In this context, the spread of false news and misinformation about the pandemic continues to occur, severely hampering the actions to control the transmission of the virus.

Because of this, Brazilian fact-checking agencies started to dedicate time in investigating news related to COVID-19 in Brazil, whose data made it possible to carry out this study, after analyzing 938 fake news items. These news items were replicated by several mass media outlets, predominantly social networks, as they are easy to access and quick to share using mobile devices.

Another strategy consisted in the elaboration of the contents in text or video format that made it possible to create untrue

news or the decontextualization of true stories, characterizing them as false or misleading because their visual contents affect people's emotions, exacerbating their feelings such as fear, anger, indignation, and instigating them to give credibility to the content conveyed²⁰, as well as sharing it.

The categorization of fake news analyzed in this study demonstrated the multifaceted approach of this type of news, with an emphasis on the role of government officials in facing the pandemic. However, it also involved the names of ex-government officials and other public figures, as well as exposing aspects that involved science and research related to the prevention, treatment, and cure of COVID-19.

The current Brazilian President and the Ministers of Economy and Health were included in the "Government and authorities" category, with texts that cited the adoption of

positive measures to combat the pandemic, such as emergency aid and the production of masks and large-scale supplies in the country. Governors were also cited in false content, however, accusing them of manipulating statistical data from COVID-19. These contents led them to adopt strategies aimed at curbing them, such as the Antifake CE online platform, launched by the Government of Ceará²¹. Decrees establishing fines for propagating fake news were also issued by the governors^{22,23}.

It is noteworthy that, for those who send or replicate fake news, the consequences are in the areas of Civil and Criminal Law. On the other hand, although the Marco Civil Internet Law²⁴ exists in Brazil, it is insufficient against fake news, because as stated in its article 19, the internet provider that has false content posted by people registered on its network will only be liable if they fail to comply with a court order determining its withdrawal. This situation, subject to judicial determination, reflects that the removal of the false news items can take time, and, thus, cause damages of different orders.

In the health field, the understanding that false news constitutes a potential threat was already verified in studies prior to the COVID-19 pandemic²⁵. In this study, the development and application of vaccines against COVID-19 brought together fake news items with photos, texts, and videos involving everything from the testing phase to the use of immunobiological agents, and incited distrust as to the origin, composition, and mechanisms of action of the immunizing agent; which include false claims that vaccines were manufactured with the intention of harming health or causing death, that they have components capable of altering people's genetic material, or that they implanted technological monitoring devices.

Concurrent with the advance of the pandemic, the production and testing of more than 200 vaccines against COVID-19 began in several countries²⁶. In Brazil, on January 17, 2021, the vaccines Coronavac (Sinovac - China and Instituto Butantan - São Paulo) and Covishield (University of Oxford and AstraZeneca - United Kingdom and Oswaldo Cruz Foundation - Rio de Janeiro) were authorized by ANVISA for use on an emergency basis²⁷, which favored the significant increase in fake news items about vaccines as of this date.

Since vaccination is one of the measures capable of producing positive results in the prevention of diseases, its manufacture has been one of the promising hopes of fighting SARS-CoV-2 worldwide. However, the spread of news about immunobiological agents as being without scientific validation, especially regarding safety and efficacy, or that they are a scam and therefore would not, in fact, be applied, can undermine the population's willingness to follow legitimate health advice and to take proven precautionary measures²⁸, such as when an elderly population refused to be vaccinated against Influenza that occurred in 2009²⁹.

The fake news of the "contagion statistics" category gathered data on confirmed cases and deaths registered by government agencies and civil registry offices, denouncing irregularities involving Brazilian states regarding the installed capacity of hospital beds, presented especially in the form of images and videos, with predominance of posts disseminated in the first half of 2020.

News that highlighted divergences between the numbers of deaths by COVID-19 informed by the ministries of health and civil registry offices, hinted that there was over-notification by the state governments, denouncing that there was political intention on the part of

the managers in the disclosure of these data. However, due to the delay in the delivery of some laboratory results confirming the disease, these death certificates are issued without previous confirmation of the viral diagnosis for COVID-19, which may be one of the reasons for the divergence in the data, opening the possibility for the distortion reported³⁰.

It is noteworthy that, according to the Clinical Management Protocol for the New Coronavirus³¹, cases of COVID-19 constitute a public health event with immediate compulsory notification, but suspicions or deaths due to Influenza-like Syndrome and Severe Acute Respiratory Syndrome must also be notified by health professionals and institutions within 24 hours, whether in the public or private sector. Such conducts may also be indirectly contributing to data divergences between platforms, thus favoring the spread of fake news.

The category “contagion statistics” also brought a set of false news citing the existence of exclusive beds for COVID-19 unoccupied in hospital care equipment in the country. It so happens that, with the daily increase in cases and the need for hospitalization, the necessary expansion of the supply of SUS beds and the construction of field hospitals³² were recurrent measures by state governments. In this context, fake news started to disseminate photographs and footage of the installations in the assembly and pre-inauguration phase, decontextualizing them, confusing the population and providing a political nature to the management of health care in the pandemic context.

The “treatments and cure” category compiled content that covered the use of drugs of various pharmaceutical classes and the combination of natural products, all, so far, without any scientific evidence against

COVID-19. Also included in this category are false news items that health authorities, for example the World Health Organization, are recognizing that wearing masks does not provide protection against COVID-19, in an attempt to weaken credibility in these instances.

Fake news about prevention, disseminated more frequently at the beginning of the pandemic, may have continued to exist due to the unavailability of vaccines for the entire population³³. In this study, consumption of food, teas, and infusions to eliminate the virus before it sets in and triggers symptoms, were some of the false indications. These contents may initially be shared with the intention of cooperating with the health of the closest people, as they are disseminated predominantly by social groups; however, the appeal that COVID-19 can be fought with natural products favors the spread (viralization) of this news.

As for effective pharmacological treatments against COVID-19, the literature mentions many possibilities that are being investigated, such as antiviral drugs, drugs that block the entry of the virus into the target cell, monoclonal antibodies, plasma from convalescent patients, antiparasitic drugs, vermifuge drugs, corticoids, anticoagulants, in addition to two drugs widely used by rheumatologists and dermatologists in the treatment of autoimmune diseases³⁴.

The hydroxychloroquine and chloroquine antimalarials were responsible for a high number of fake news items, disseminated in text and video formats, with the participation of government authorities, politicians, and doctors. In fact, these drugs have demonstrated antiviral activity against SARS-CoV-2 in *in vitro* research and in some clinical studies; however, because they were considered limited and inconclusive³⁵, they instilled

dissent among the medical³⁶, scientific³⁷ and Government³⁸ communities regarding their use in the context of COVID-19. With the conclusion of new studies by WHO³⁹, it was possible to prove the ineffectiveness of these drugs; however, the press continued to report its consumption as a preventive measure by a portion of the population.

False news attributing ineffectiveness to masks as a measure to combat transmission and contamination by SARS-CoV-2 also appeared in the “treatment and cure” category, whose contents confront the recommendations of scientists and health authorities around the world, regarding the use of this facial protection equipment in conjunction with other measures to mitigate the epidemic, such as physical distance, respiratory etiquette, and hand washing.

Reflectively, although it is still uncertain

to accurately quantify how many contacts are affected by COVID-19 from an infected person, the estimates found so far⁴⁰ help to understand the need for adopting these measures, even among asymptomatic people, as reducing contact rates means slowing down the growing trend of transmission⁴¹, while the population is still not vaccinated.

With such considerations, it is understood that the fake news items related to the prevention, treatment or cure of COVID-19 appear ambiguously in the media, sometimes scaring the reader by exposing gaps or limitations in an exaggerated way, other times providing material that is purposely distorted to encourage the adoption of dangerous practices, such as self-medication, the use of mixtures falsely identified as effective in combating the disease, or even the non-use of masks.

CONCLUSION

The daily disclosure of COVID-19 indicators by state, municipal, and federal government managers shows that, in the last week of April 2021, Brazil registered more than 14 million infected people, with 384 thousand deaths. The high number of new daily cases characterizes an alarming epidemiology, reaffirming that the pandemic is not yet under control, and that governments need to plan and act.

In the present study, despite the limitation of having analyzed only news published in Brazil, 938 fake news items were checked and identified over a period of one year, which dealt with COVID-19 which interfaced with governments and science. These appealing content demonstrated a potential influence of what is replicated, its

multifaceted scope and intention, as well as whose meanings were understood through the lens of hermeneutics-dialectics, and which can assist in curbing fake news items about the pandemic disseminated in other countries.

With this understanding, it is essential that mass media functions as a vehicle for reliable scientific and technical information about COVID-19's coping actions, providing a valuable public health service. Television, spoken, and written press play an important role in effective communication in health and in the fight against fake news. Health professionals, equipped with Evidence-Based Health Practices, have the mission of adding to the ethical actions of the national and international press to guide the

general population about true information of scientific quality.

In addition, scientists are responsible for conducting research within international ethics involving human beings, and publishing texts with academic and social relevance, in a timely, convergent, and broad way in dissemination vehicles, instigating the critical view of readers. True communication,

coupled with the government's ethical commitment to health management and the implementation of safe and effective pandemic mitigation technologies, will help to reduce people's inappropriate behavior and collective insecurity, thus, helping to consciously adopt measures that promote overall health in the pandemic and post-pandemic context.

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