ORIGINAL ARTICLES

Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks

Vacinas e desinformação: uma análise de conteúdo sobre fake news apuradas por plataformas de debunking em redes sociais

Vacunas y desinformación: un análisis de contenidos sobre fake news verificadas por las plataformas de debunking en las redes sociales

Edson Fernando D'Almonte[1,2,a]
edsondalmonte@gmail.com | https://orcid.org/0000-0002-0895-2132

Egberto Lima Siqueira[1,b]
egbertosiqueira@hotmail.com | https://orcid.org/0000-0003-0867-4600

George de Araújo e Silva[1,c]
geoaraujos@gmail.com | https://orcid.org/0009-0002-1781-170X

[1] Federal University of Bahia, Postgraduate Program in Communication and Contemporary Culture, Salvador, BA, Brazil.
[2] National Institute of Science and Technology in Disputes and Informational Sovereignties, Niterói, RJ, Brazil.

[a] Doctoral degree in Communication and Contemporary Culture from the Federal University of Bahia.
[b] Specialization in Organizational Communication from the 2 de Julho University.
[c] MBA in Marketing and Branding from Salvador University.

ABSTRACT

The impact of fake news has reached the health sector and distrust in relation to vaccines has brought back diseases that had previously been eradicated. How are these anti-vaccine discourses constructed in social medias? In this paper, 80 fake news stories focusing on vaccines were collected through Brazilian websites that perform debunking, a strategy for detecting and unmasking disinformation and fake news. Using an analytical protocol, the main characteristics present in the construction of these publications were mapped. Content analysis revealed that Facebook and WhatsApp are the preferred networks for this type of sharing. Around 59% of the content is totally false and most of the speeches highlight the possible risks of vaccines as persuasive strategies. The most referenced sources are supposedly doctors and scientists, used to create trust. The survey also points out that 60% of publications have grammatical and spelling errors in their texts.

Keywords: Fake news; Vaccine; Social media; Content analysis; Debunking.

RESUMO

O impacto das *fake news* chegou à área da saúde e a desconfiança em relação às vacinas trouxe de volta doenças até então erradicadas. Mas como os discursos antivacina são construídos nas redes sociais? Neste trabalho, 80 *fake news* com foco nas vacinas foram coletadas de *sites* brasileiros que realizam *debunking*, uma estratégia de detecção e desmascaramento de desinformação e *fake news*. A partir da aplicação de um

protocolo analítico, mapeamos as principais características presentes na elaboração dessas publicações. A análise de conteúdo revelou que o Facebook e o WhatsApp são as redes preferidas para esse tipo de compartilhamento. Cerca de 59% dos conteúdos são totalmente falsos e a maioria dos discursos destaca possíveis riscos das vacinas como estratégias de convencimento. As fontes mais referenciadas são supostamente médicos e cientistas, para criar confiabilidade. O levantamento aponta ainda que 60% das publicações apresentaram erros gramaticais e ortográficos na elaboração dos textos.

Palavras-chave: *Fake news*; Vacina; Redes sociais; Análise de conteúdo; *Debunking*.

RESUMEN

El impacto de las *fake news* llegó al área de la salud y la desconfianza en las vacunas trajo de vuelta enfermedades erradicadas. Pero, ¿cómo se construyen los discursos antivacunas en las redes sociales? En este trabajo, se recopilaron 80 noticias falsas centradas en vacunas a través de sitios web brasileños que realizan *debunking*, una estrategia para detectar y desenmascarar información errónea y noticias falsas. A partir de la aplicación de un protocolo analítico, mapeamos las principales características presentes en la elaboración de estas publicaciones. El análisis de contenido reveló que Facebook y WhatsApp son las redes preferidas para este tipo de intercambio. Alrededor del 59% del contenido es completamente falso y la mayoría destaca los posibles riesgos de las vacunas como estrategias convincentes. Las fuentes más referenciadas son supuestamente médicos y científicos para crear confiabilidad. La encuesta señala que el 60% de las publicaciones tenían errores gramaticales y ortográficos.

Palabras clave: *Fake news*; Vacuna; Redes sociales; Análisis de contenido; *Debunking*.

INTRODUCTION

One of today's major challenges is to tackle the spread of false information on social networks and the consequences of this phenomenon on society's opinions and behavior. The impact of so-called fake news gained significant prominence in the political environment during the presidential elections in the United States in 2016 (Rose, 2017) and Brazil in 2018 (Viscardi, 2020). In the health field, disinformation is already considered the main cause of vaccine hesitancy, which has threatened disease control in several countries (Aquino *et al.*, 2017; Dubé; Vivion; MacDonald, 2015). As a result, in 2019 the World Health Organization (WHO) began to consider vaccine resistance one of the ten most significant threats to global public health (WHO, 2019).

The first information on vaccines appeared in the 10th century in China, but it wasn't until 1798 that the term "vaccine" first appeared in the literature, based on a study carried out by the English doctor and scientist Edward Jenner, creator of the smallpox immunizing agent (Vaccines, 2016). Disinformation in healthcare is also not a new phenomenon, and its origins are as old as healthcare itself (Waszak; Kasprzycka-Waszak; Kubanek, 2018). Whereas the issue was previously restricted to the doctor-patient relationship and their frame of reference (Davis, 1984), the mainstream media revolution, including radio and television, brought new dimensions to the problem. However, it was the exponential increase in the use of the internet on a global scale that increased the potential for damage to an unprecedented degree (Bode; Vraga, 2017).

In recent years, several countries have faced outbreaks of vaccine-preventable diseases such as measles and diphtheria. According to a WHO report, measles cases increased by 30 percent globally in 2018. In 2019, the state of Washington in the United States even declared a state of emergency because of a measles epidemic. The situation has also affected Europe, which reported 14,732 cases of the disease between 1 February 2017 and 31 January 2018 (WHO, 2019).

In Brazil, measles had been eradicated since 2016, but outbreaks of the disease were reported again in the states of Amazonas and Roraima in 2018. With 10,326 confirmed cases that year, Brazil lost its virus-free certification in 2019. The Ministry of Health blamed low vaccination for the reappearance of cases (Mariz, 2019). The country currently has vaccines for the treatment of more than 20 diseases through the National Immunization Program (*PNI*), which was created in 1973 and is considered a global reference in vaccine coverage (Vacinas, 2016). However, in 2019 the country didn't hit its vaccination target for any of the nine mandatory immunizing agents for children aged up to one (Cambricoli, 2020).

Parents refusal to vaccinate their children may be related to reading fraudulent information about vaccines, such as posts linking the risk of vaccination to autism (Smith *et al.*, 2011). Another study showed that accessing websites with anti-vaccine content for just five to ten minutes can be enough to increase the perceived risk of vaccination, increase negative perceptions about the risk of vaccines and reduce the intention to vaccinate (Betsch *et al.*, 2010).

Fake news has affected practically every aspect of our lives (Wasserman; Madrid-Morales, 2019), and more recently, the circulation of fake content during the coronavirus pandemic has been even more worrying (Hou *et al.*, 2020; Recuero; Soares; Zago, 2021). Disinformation on social media has fueled panic among the public about the pandemic, leading governments, and authorities to urge citizens to confirm the authenticity of news before circulating it (Hou *et al.*, 2020; Huynh, 2020).

It's important to note that the definition of fake news is quite broad, and several communication researchers have endeavored to come up with a concept (Egelhofer; Lecheler, 2019; Tandoc Jr; Lim; Ling, 2018). For some, it is an umbrella term that links many types of fallacies, such as polarizing content, inaccurate reporting, persuasive comments, and information (Molina *et al.*, 2019). Others emphasize the differences between misinformation and disinformation (Southwell; Thorson; Sheble, 2017).

Original Article | Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks

595

According to Lazer *et al.* (2018), fake news is information that simulates the form of news media content but does not follow the same organizational process or intention. In turn, fake news outlets don't have the editorial standards and processes found in news media to guarantee the accuracy and credibility of their information. In addition, fake news is just one of several forms of information disorder, which include misinformation (incorrect or misleading information) and disinformation (false information spread intentionally to mislead people).

Some methods such as fact-checking and debunking have contributed to analyzing content shared on social networks. According to Mantzarlis (2018), the term fake news is currently co-opted and misused, as it describes entirely fabricated sensationalist stories that use social media algorithms to their advantage to reach huge audiences. Debunking has therefore emerged as a branch of fact-checking to focus on verifying fake news and viral rumors (Kotz; Giese; König, 2023).

Objectively speaking, a distinction between fact-checking and debunking can be structured based on the notion of the completeness of the planned action. Fact-checking is generally associated with news organizations and the verification of alleged fake news. Issues of public interest are considered, and the process can lead to a new story being published by their partner company. Debunking, on the other hand, is based on strategies for detecting and exposing disinformation and fake news and aims to help compile such content. In general, the aim is to prevent disinformation and demystify false and conspiratorial content (Lewandowsky *et al.*, 2020). By exposing narratives and/or data that are divorced from reality, the aim is to contribute to the repositioning of factual truth, explaining official sources and allowing the audience to understand the mechanisms for "debunking" disinformation (Zhu; Zhang, 2023).

For a more complete analysis, it is also essential to discuss the concept of post-truth as a theoretical basis for the current disinformation environment. According to Braga (2018), fake news is spread with the aim of disinforming and/or gaining political or economic advantage. In this sense, the individuals who share it intend to influence the recipient's thinking, leading them to a state of dissuasion. On the other hand, Dunker (2017) emphasizes that the post-truth discourse corresponds to the complete suspension of reference to objective facts, replacing them with credible opinions without confirming sources. However, it is important to emphasize that post-truth involves a calculated mixture of correct observations, plausible interpretations, and reliable sources, which as a whole are absolutely false and self-serving (Dunker, 2017).

Lyotard (2009) argues that postmodernity is characterized by disbelief in grand narratives such as science and religion, which were once seen as sources of universal and objective truths. Thus, the crisis of reason is one of the factors that led to the emergence of post-truth. When analyzing the recent growth of anti-intellectualism associated with the new extreme right, Miguel (2022) observes that the situation is fostered by the devaluation of cultural knowledge, making it possible to question the authority of traditional sources such as science, academia and journalism and preventing the reliable and universal validation of information. This lack of constant certainty, which reproduces the epistemological paradoxes about the uncertain nature of knowledge, is often referred to as post-truth.

Faced with this environment of disinformation, challenges to truth and to science itself, this article seeks to investigate the content of the major fake news stories about vaccines shared on Brazilian social media in 2020. For observation and analysis, we adopted the fact-checking framework (Lelo, 2022; Marques *et al.*, 2023) based on data organized by debunking sites (Lewandowsky *et al.*, 2020). The survey is based on extensive research into the archives of three debunking agencies: E-farsas.com, Boatos.org and the Saúde Sem Fake News channel[1], which offer explanations of facts and compile false posts disseminated on social networks. The proposed content analysis aims to trace the most common aspects present in

---

1   The page was deactivated by the Ministry of Health in December 2021 (Jornal Nacional, 2022).

vaccine fake news and provide input for new studies and strategies to combat disinformation in the areas of communication and health.

METHODOLOGY

To form the corpus of the research, we initially analyzed the explanations about vaccines produced by the websites E-farsas.com, Boatos.org and Saúde Sem Fake News, respecting the creation time for each page and the archive made available on each platform. As well as dispelling all kinds of rumors, the sites also compile them, which gave us access to the original content of the fake news and additional information about the circumstances in which this material was disseminated on social media.

Created in April 2002, E-farsas.com averages 40,000 unique visits a day and receives around 150 search requests a day from users who doubt the veracity of information posted on social networks. Their audience is comprised of 60 percent men and 40 percent women. Due to its reach, in 2011 the site was incorporated into the entertainment section of R7, Grupo Record's news portal (E-farsas, 2023).

Active since June 2013, Boatos.org had produced 1,266 posts by December 2020. The website had a record number of hits during the pandemic, reaching more than 60 million views in 2020. In March of the same year, for example, the most crucial month for Covid-19 in Brazil, there were more than 13 million views, the highest number recorded in one month in the site's history (Matsuki, 2020).

These are the two main sites in the fight against fake news in the country, due to the length of time they have been operating and the impact they have had. We chose to carry out an additional parallel survey on the Saúde Sem Fake News website. Our hypothesis was that a channel dedicated exclusively to the health sector would be able to provide a greater number of fake news stories linked to vaccines. The Saúde Sem Fake News channel was created on 27 August 2018 by the Ministry of Health. According to official data released by the ministry the site responded to 11,500 queries about health in its first year of operation,

Once the sites had been defined, we carried out searches on each page using the keyword "vacina" (vaccine). In the E-farsas.com archive, we found 26 posts on this subject between 2010 and 2020. On Boatos.org, we managed to collect 107 explanations of vaccine-related rumors in the period between 2013 and 2020. On the Saúde Sem Fake News page, 20 posts focusing on vaccines were found, all published between the date the site was created and 2020.

The next stage of the research consisted of analyzing the content of the material collected. The analysis is a type of systematic reading of texts, images and/or symbols, considered one of the most important research techniques in the social sciences (Krippendorff, 2004). This type of analysis can be either an analysis of meanings - for example, a thematic analysis - or an analysis of signifiers, i.e., a lexical analysis and an analysis of the procedures adopted. However, as Bardin (2016) points out, content analysis also depends on prior descriptive treatment which will also be adopted in this study.

Bardin (2016) points out that the techniques used in content analysis allow the inference of knowledge related to the conditions of production/reception of the messages. Using a set of partial but complementary techniques, the aim is to explain and systematize the content of messages and their expression, with the aid of indices that may or may not be quantified, to deduce logical and justified information about the origin of these messages.

To allow for a more productive and secure content analysis, we set 2020 as the cut-off period. All the sites were active in the year in question, thus ensuring consistency regarding the files made available. Furthermore, the material collected in 2020 was of a higher quality in terms of its level of detail and accuracy, as well as its volume.

Having applied this time frame, we selected 94 posts, 15 of which were produced by E-farsas.com, 74 by Boatos.org and 5 by the Saúde Sem Fake News channel. After reading the title, subtitle and full text, the

Original Article | Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks

597

news items were enumerated and labelled according to their respective websites. We added the letter "e" to each post on E-farsas.com (Table 1), the letter "b" to identify the content produced by Boatos.org (Table 2) and the letter "s" to Saúde Sem Fake News content (Table 3).

Table 1 - E-farsas.com posts about vaccines (2020)

e1	Are Covid-19 vaccines being sold in São Paulo's 25 de Março street?
e2	Are street vendors selling the Covid-19 vaccine in Rio de Janeiro?
e3	Photos show severe reaction in the first human guinea pig to test Pfizer's vaccine!
e4	The Supreme Court and PSOL prevented Venezuelan immigrants from being vaccinated 2 years ago
e5	Nurse faints because of coronavirus vaccine!
e6	Volunteers in clinical trials of the Pfizer vaccine have developed a condition called 'Bell's palsy'
e7	CNN and the BBC showed the first person being vaccinated on different days
e8	Photo shows the inventor of Pfizer's Covid-19 vaccine
e9	Vaccines can cause severe depression and induce suicide
e10	Photos show a compulsory vaccination against Covid-19 in Peru
e11	Doctor warns in video that the 'Chinese vaccine' is deadly!
e12	Three teenagers died after being vaccinated against Covid-19 in São Paulo
e13	Video proves that a volunteer didn't get a Covid-19 vaccine in São Paulo
e14	The new coronavirus vaccine is made with aborted human fetuses
e15	Cuba has created a coronavirus vaccine

Source: Prepared by the authors (2023).

Table 2 - Boatos.org posts about vaccines (2020)

(to be continued)

b1	Man died of heart attack in Israel because of Covid-19 vaccine
-b2	Covid-19 vaccine is sold by street vendors in Madureira, Rio de Janeiro
b3	Photo shows Mayor of London pretending to take Covid-19 vaccine
b4	112,800 reports of side effects from Covid-19 vaccine, says CDC (Center for Disease Control & Prevention)
b5	Covid-19 vaccine has infected people with HIV in Australia
b6	Fake syringe with retractable needle is being used in Covid-19 vaccines
-b7	Tiffany Dover, the nurse who collapsed after taking a vaccine, has died
-b8	Nurse collapsed dangerously due to effects of covid vaccine
-b9	The Supreme Court banned mandatory vaccination for Venezuelans at the request of PSOL in 2018
b10	China bought 1 billion vaccines from Australia and won't use CoronaVac
b11	Belgian doctor is right to say that vaccines are unproven, change DNA and control people through 5G
b12	26 elderly people who took the Covid-19 vaccine in the UK have died
b13	Covid-19 is H1N1 + HIV and the vaccine will have a plasma chip to reduce the population
b14	Doria to spend R$22 billion on vaccine from China to immunize São Paulo
b15	Peru suspends CoronaVac trials after vaccine causes paralysis in volunteers' legs
b16	Brazil's leading infectious disease specialist warns against rushing as well as doses and side effects of the Chinese vaccine

(continuation)

b17	Cariocas (residents of Rio de Janeiro) make pilgrimage on Presidente Dutra highway to get vaccinated in São Paulo
b18	According to the Washington Post, Sinovac paid bribes so that Doria would bring the vaccine to Brazil
b19	Boris Johnson reveals the truth when he says "virus will be injected" instead of vaccine
b20	Doctor Christiane Northrup is right to warn that the vaccine changes DNA and turns us into 5G antennas
b21	The pandemic is over and there's no need for vaccines
b22	Doctor between life and death after taking the Chinese vaccine
b23	Argentina bought crematoria for Sinovac vaccine victims
b24	China didn't have, doesn't have, won't have a vaccine and everyone is cured
b25	48 people died after taking Chinese vaccine against Covid-19 in Singapore
b26	Chinese and Oxford vaccines are made with recombinant DNA and didn't work in pigs
b27	Ken Frazier, from Merck, says the rush to vaccinate is to enable the Brazilian Carnival
b28	Chinese vaccine manufacturing date (April 2020) reveals China's evil plan
-b29	Doctor condemns Chinese vaccine being tested on Brazilians
b30	Side effects show that taking Chinese vaccine is worse than getting Covid-19
b31	Volunteer who died of Covid-19 took the Oxford vaccine
b32	It's better not to get the vaccine because it alters DNA and causes "homosexuality"
b33	China to use Oxford vaccine instead of Chinese vaccine on entire population
b34	Laboratories that produce the Covid-19 vaccine will be exempt from civil liability
b35	People in China were already vaccinated against Covid-19 and didn't need to go into lockdown
b36	Chinese vaccine causes genetic damage and serious adverse reactions in a large number of volunteers
-b37	Covid-19 vaccine killed three young people (aged 18, 16 and 13) and destroyed a family
b38	Robert F. Kennedy Jr. writes text pointing out that mRNA vaccine against Covid-19 alters DNA
b39	"Truth Outside the Media" videos tell the truth when warning against vaccines and thermometers
b40	Bill 3982/2020 establishes imprisonment for those who refuse to take the Covid-19 vaccine
b41	German doctor Walter Weber is right when he says that masks don't protect, PCR has an 85% error rate, Covid-19 doesn't exist, and vaccines alter DNA
b42	Italian doctor Roberto Petrella is right to warn about "Covid-19 vaccine" and "coronavirus hoax"
b43	Vladimir Putin's daughter dies after taking Russian Covid-19 vaccine
b44	Bill Gates says Covid-19 vaccine will alter peoples DNA
b45	Nun speaks the truth when she denounces vaccines as a plan by the Pope and Bill Gates to exterminate the population
b46	China bought vaccine from Swedish company because vaccine tested in São Paulo doesn't work
b47	Doria took the Chinese vaccine against Covid-19 and still got infected
b48	Sarah Gilbert selected three of her children to be among the first five people to test the Oxford vaccine and promised to do so by September
b49	Covid-19 mRNA vaccine alters DNA and causes irreversible genetic damage
b50	Photo shows 5G nanochip that will be included in China's vaccine and administered to people
b51	Covid-19 vaccine will modify people's DNA and turn us into genetically modified beings
b52	Medicos por la Verdad tell the truth when they report that the Covid-19 pandemic is a hoax. Flu vaccine and 5G cause the disease
b53	Covid-19 stands for Certificate of Vaccine Identification with Artificial Intelligence and the vaccine will serve to monitor the population

Original Article | Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks

599

(conclusion)

b54	Doria's guinea pig reports feeling ill after taking China's Covid-19 vaccine
b55	Chinese vaccine against Covid-19 is made from aborted babies' fetuses
b56	Chinese vaccine tested in São Paulo was not administered to volunteers and it's all a Doria hoax
b57	Doria, who was not wearing a mask, was the first to take the Chinese vaccine against Covid-19
b58	Chinese company producing Covid-19 vaccine was selling fake vaccines
b59	Fiocruz was responsible for developing the Oxford vaccine, which is now in phase 3
b60	A video shows that Australia's prime minister pretended to take the Chinese vaccine against Covid-19
b61	Doria signed agreement to produce Covid-19 vaccine in August 2019
b62	China to distribute free coronavirus vaccine to the world
b63	Scientist who discovered coronavirus vaccine was killed at home
b64	Bill Gates' INO-4800 vaccine is a stamp with a 5G chip placed in people's skin
b65	Australia approves microchip implantation in humans through vaccines
b66	Plandemic reveals truth about fake Covid-19 pandemic and vaccine mafia
b67	Vaccine for the new coronavirus (Covid-19) will come with a microchip to capture the population's identity
b68	US announces Roche Medical Company vaccine that cures coronavirus in three hours
b69	Flu vaccination for the elderly will be in alphabetical order across Brazil
b70	Government authorized citizen aid, withdrawal of FGTS, suspension of water and electricity bills and scheduling of vaccination against Covid-19 on WhatsApp
b71	Vanguard was already manufacturing a vaccine for Covid-19 (coronavirus), and this proves that the Chinese were framed
b72	Tupyara Centre is administering a spiritual vaccine against the new coronavirus
b73	Israel has discovered a cure (vaccine) for coronavirus, which will be available in May
-b74	Cuba has manufactured a vaccine against the new coronavirus

The minus sign (-) in front of the letter indicates that the news item has been excluded from the total because it is similar to another E-farsas.com post.
Source: Prepared by the authors (2023).

Table 3 - *Saúde Sem Fake News channel posts about vaccines (2020)*

-s1	Flu vaccine increases risk of coronavirus illness
-s2	Russia announces cure for coronavirus
-s3	Brazilian government announces coronavirus vaccine
-s4	China announces coronavirus vaccine
-s5	Measles vaccination campaign will pay R$1 per capita

The minus sign (-) in front of the letter indicates that the news item was excluded from the final corpus of research due to insufficient information.
Source: Prepared by the authors (2023).

After completing this stage, we excluded the material produced by the Saúde Sem Fake News website from the analysis because the site did not present original fake news content; instead, it only provided a partial cut of the texts and images, making it impossible to gather important information about the elements used in the construction of the narrative. Crucial characteristics of fake news content analysis,

such as framing, the social networks from which the news originated and the sources cited to legitimize the discourse., could not be obtained from this material. The fake news that gave rise to the post was edited in such a way as to make it unreadable to the reader. It was usually covered with the verification stamp (This is fake news!) over the disputed information. In addition, the page ceased to be updated by the Ministry of Health in July 2020, revealing a lack of commitment on the part of the federal government[2] at a critical time for the spread of fake news about vaccines.

In keeping with the methodology of the study, as far as content analysis is concerned, we also subtracted similar news items from the total and arrived at a final corpus of 80 unique posts, 66 from the site Boatos.org and 14 from the site E-farsas.com. In the case of similar news, we decided to consider only one of the posts as both reproduced the same original fake news. As a result, the characteristics used in the construction of this fake news were reflected, which could lead to a duplication of data if both posts were included in the study. This approach aims to guarantee the integrity and accuracy of the results obtained in the research from the perspective of content analysis.

However, repeated posts were considered when assessing the number of explanations about vaccines made by the websites E-farsas.com and Boatos.org in their respective time series. This approach is justified for the purposes of contextualizing the situation, making it possible to analyze the evolution of the number of posts on the subject on each page separately, regardless of their specific characteristics, which will be the subject of a more detailed content analysis later.

When the corpus was finally organized, we applied the analytical protocol developed by the Ibero-American Network for Monitoring and Training in Science Journalism (Cyted) (Massarani; Ramalho, 2012; Rede..., [2014]). The authors had previously adapted the protocol in a content analysis study of the 100 links containing the word "vaccine" that generated the most engagement on social media between 2018 and 2019.

For this study, we again adapted the protocol to an exclusive corpus of fake news stories posted on social networks and investigated by the debunking websites E-farsas.com and Boatos.org. The aim is to investigate the main characteristics of these news items, such as the most prevalent themes, the narratives outlined, the approach and the actors who appear (or do not appear) in the preparation of this content.

RESULTS AND DISCUSSION

The number of posts on the websites surveyed in this research points to a significant increase in the spread of fake news about vaccines on social media in 2020. In the year in question, the number of explanations provided by E-farsas.com surpassed the total number of posts in the site's ten-year history (Figure 1).

---

2   On 27 April 2021, the Federal Senate set up the Covid-19 parliamentary select committee, with the aim of investigating possible irregularities committed by the Ministry of Health (MoH) during the pandemic. One of the main scandals involving the ministry was the accusation that former minister Eduardo Pazuello had been warned about the lack of oxygen in Manaus but had failed to take action to resolve the situation. According to a report by Sassine (2021), Pazuello was warned about the risk of a collapse in the city's health system but ignored the warning. Another fact investigated by the committee was the accusation that the company Precisa Medicamentos had offered a bribe to encourage the purchase of the Covaxin vaccine by the Ministry of Health. According to Rezende (2021), the company's representative allegedly offered an advance payment of US$1.00 per dose, as well as an intermediary contract of R$1.00 per dose. The complaint led to the dismissal of the then director of the Ministry of Health, Roberto Ferreira Dias. In addition to these cases, the parliamentary select committee has been investigating the delay in purchasing vaccines and the lack of transparency on the part of the Ministry of Health in publicizing information related to the pandemic. According to a BBC News report (CPI..., 2021), the country could have secured more doses of the Pfizer vaccine in 2020, but it refused the pharmaceutical company's offer.

Original Article | Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks
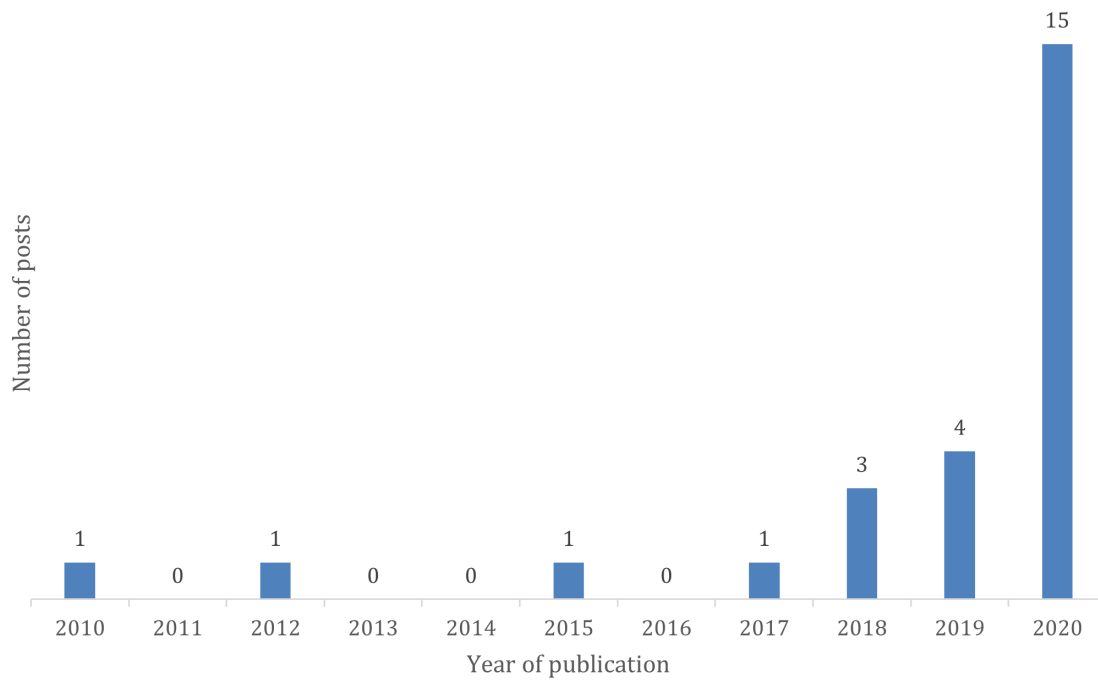
601

Figure 1 – Number of posts about vaccines, with explanations, published by E-farsas.com between 2010 and 2020
Source: Prepared by the authors.

In 2020, posts about vaccines grew by 275% compared to 2019. The increase is even greater when we analyze the Boatos.org archive (Figure 2). There were 74 posts in 2020 alone, which represents an increase of 1,133 percent compared to the previous year. These sites are recognized as important channels on the internet. They reveal a growing effort to combat fake news and reflect the disinformation environment found on social networks in recent years.
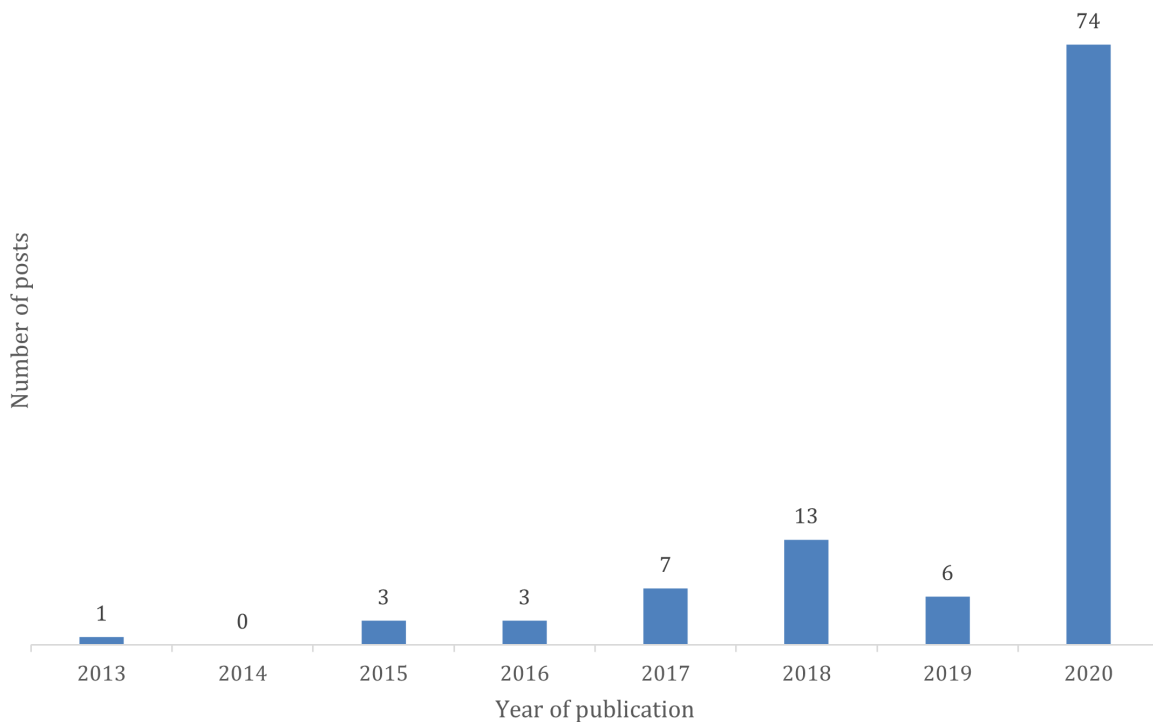

Figure 2 – Number of posts about vaccines, with explanations, published by Boatos.org between 2013 and 2020
Source: Prepared by the authors.

The figures also reinforce the relevance of our chosen time frame, having conducted content analysis of fake news about vaccines on social media in Brazil in 2020. The growth of disinformation, directly related to the health crisis caused by the covid-19 pandemic, may reveal an unprecedented enhancement in the formulation of false content and have an impact on the country's vaccination policy[3], which had been widely consolidated in previous decades.

Below we present the results of the content analysis based on the analytical protocol developed by the Ibero-American Network for Monitoring and Training in Science Journalism (Massarani; Ramalho, 2012). As suggested by the authors, we divided the news interpretation into five sections: "General characteristics", "Theme", "Narrative", "Treatment" and "Actors". We also added some specific subcategories according to the specificities of our corpus and eliminated others, respecting the concept established for each section of the protocol.

General characteristics

A study by Fox and Duggan (2013) found that most adults in the United States search for health information on the internet. The most common sources include search engines, health websites, news sites and social networks. A study by Kivits (2006) investigating trust in information found on the internet concluded that people generally trust professional sources of information, such as doctors and health professionals, more than non-professional sources.

When assessing the profile of users and trends in the search for health information on the Internet in Brazil, Moretti *et al.* (2012) identified a predominance of female users (90 percent) looking for health information online. Participants answered an electronic questionnaire made available on a widely accessible health portal. Of all those interviewed, 86 percent considered the internet to be one of their main sources of health information and spent between 5 and 35 hours on the web per week (62 percent). Respondents placed high trust in information from experts (76 percent) and low trust in television, radio, or blogs (14 percent).

Considering the increased propensity to search for health information on the internet, this study initially sought to identify the social networks with a strong impact on the dissemination of fake news about vaccines, based on the investigation of the two selected debunking sites.

Most posts (56.25 percent) don't mention a specific social network as the biggest driver of sharing, revealing a balance of engagement. When it is mentioned, Facebook comes first in 32.5 percent of the stories investigated, followed by WhatsApp (26.25 percent), YouTube (11.25 percent), Twitter (5 percent) and Instagram (1.25 percent). It's important to note that in some cases, more than one social network is cited as the main disseminator of the content in question, which explains the sum of more than 100 percent in the social networks graph (Figure 3).

---

3   The National Immunization Program (PNI) is the main instrument in Brazil's vaccination policy. It is a federal government strategy which aims to immunize the population against various diseases, including Covid-19. The National Immunization Program (PNI) was created in 1973 by the Ministry of Health and is considered one of the largest immunization programs in the world (Martins, 2022). Since its inception, the program has managed to eradicate diseases such as smallpox and polio, as well as significantly reducing the incidence of other vaccine-preventable diseases. Despite the advances made under the National Immunization Program (PNI), the current vaccination situation in Brazil is critical. Data from the Ministry of Health show that the number of people immunized in Brazil fell below 59% of the population in 2021, when the established target is 95% vaccination coverage (Fiocruz, 2022). In 2016, the World Health Organization (WHO) recognized Brazil as a measles-free country, which represented a major achievement in the fight against this infectious disease. However, three years later, the country lost this status due to the continuous incidence of confirmed cases of the virus for more than 12 consecutive months (Ministry of Health, 2022).
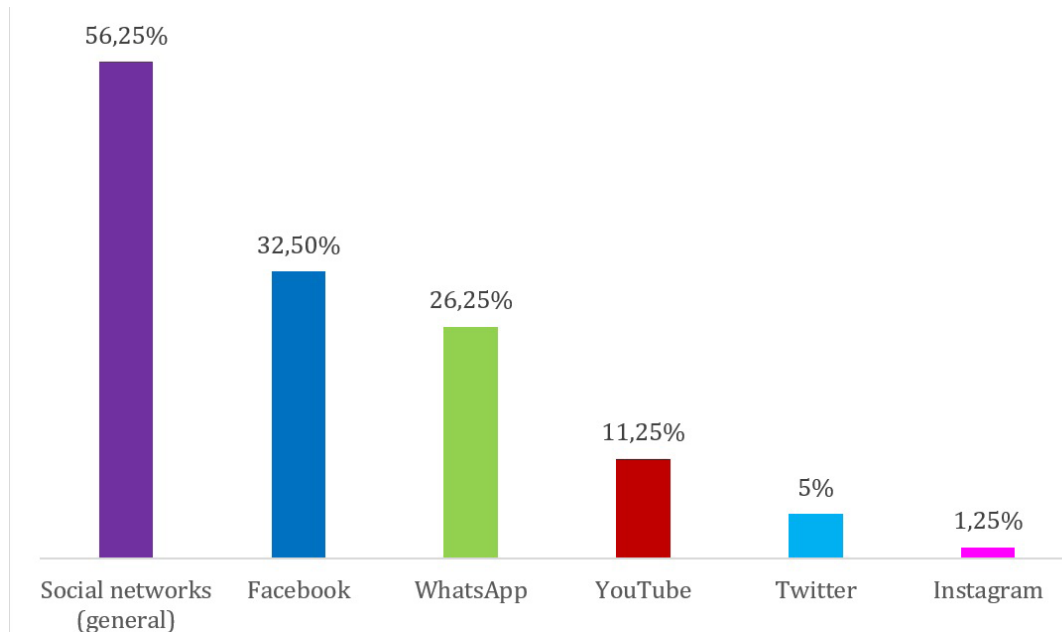
Figure 3 – Social networks most cited by E-farsas.com and Boatos.org when checking vaccine fake news.
Source: Prepared by the authors.

The result was consistent with an international survey carried out by the Reuters Institute. Considered the world's most important study on journalism and new technologies, the Digital News Report 2020 surveyed more than 80,000 people in 40 countries on all continents, including Brazil. According to the survey participants, Facebook and WhatsApp are the main platforms for spreading fake content. Among those interviewed, 29 percent expressed concern about disinformation on Facebook, six percent on YouTube and five percent on Twitter. In Brazil, 35 percent of people interviewed said they were most concerned about messaging apps such as WhatsApp (Newman *et al.*, 2020).

In the Digital News Report 2022, which extended the investigation to 46 countries, the researchers looked for new excerpts and found a link between the fear of online disinformation and the widespread use of social media. When considering all the countries investigated, just over half (54 percent) of the participants said they worry about identifying the difference between what is real and what is fake on the internet when it comes to news, but people who say they mainly use social media as a source of news are more concerned (61 percent) than people who don't use such media as a source of information (48 percent).

The document also provides updates on user consumption of social networks in 12 countries, tracked from the start of the study in 2014 until 2022. The use of Facebook for any purpose (60 percent) has fallen by five percent since its peak in 2017 and is now at a similar level to YouTube (61 percent). When compared to 2021, Instagram (40 percent), TikTok (16 percent) and Telegram (11 percent) are the only networks that grew in 2022.

When it comes specifically to news, Facebook remains the most important network, accounting for 30 percent of consumption, despite a drop of 12 percentage points since 2016. It was followed by YouTube (19 percent), WhatsApp (15 percent) and Instagram (12 percent). Twitter's user base (11 percent) has largely stagnated over the last decade, although it remains extremely influential with journalists and politicians (Newman *et al.*, 2022).

Therefore, the data provided by the Reuters Institute reports offers a more comprehensive view of the role of social networks in the spread of fake news in Brazil and around the world. The documents indicate that Facebook and WhatsApp were, until the time frame of this study, the most worrying platforms in

terms of the spread of false content, but they also signal a growing trend in the use of other platforms and, consequently, an increasing impact of these other networks on the spread of false or misleading content.

In this context, it is also important to note the significant role of the traditional media in producing and disseminating information on social networks, including news about vaccinations. However, the presence of fake news, produced by different and often unidentified sources, represents the greatest obstacle in the fight against disinformation. This study also sought to identify the authors of the content disseminated on social networks, i.e., where the disinformation originated. Among the investigations carried out by the websites E-farsas.com and Boatos.org, 91.25 percent did not find those responsible for spreading the material. The difficulty is directly linked to the absence of a signature in much of the discourse produced by the propagators of fake news: 82.5 percent of the content shared has no defined authorship. Another striking characteristic is multiple authorship, which occurs precisely when different nuances are added to stories with each new share.

The study also sought to assess the nature of the information shared. This sub-category revealed that 58.75 percent of the content was completely false, with no true facts associated with it, and 41.25 percent was distorted news, i.e., it contained some kind of correct information which was usually taken out of context to mislead people. An example of this is the post "Nurse faints because of coronavirus vaccine!" (Table 1, e5). Despite there being an associated fact, the fainting episode had nothing to do with a possible side-effect of the Covid-19 vaccine. However, the post uses an alarmist tone to discredit the immunizing agent used at the time.

Theme

The "Theme" section sought to investigate the most common approaches and themes in the posts that make up the research corpus. In terms of the type of vaccine, the immunizing agent CoronaVac, produced by the Chinese pharmaceutical company Sinovac in partnership with the Butantan Institute, was the target of 32.5% of the fake news investigated by the websites E-farsas.com and Boatos.org in 2020.

The significant presence of the immunizing agent in the fake news collected, often referred to pejoratively as the "Chinese vaccine" or "chinavac", emerges as a strong reaction by supporters of the federal government to the questionable role played by the governor of São Paulo, João Doria, in the negotiations to bring the vaccine to Brazil. The politician is mentioned in several posts, as shown by the headlines "According to the Washington Post, Sinovac paid bribes so that Doria would bring the vaccine to Brazil" (Table 2, b18), "Doria took the Chinese vaccine against Covid-19 and still got infected" (Table 2, b47), "Doria's guinea pig reports feeling ill after taking China's Covid-19 vaccine" (Table 2, b54), "Chinese vaccine tested in São Paulo was not administered to volunteers and it's all a Doria hoax" (Table 2, -b56) and "Doria, who was not wearing a mask, was the first to take the Chinese vaccine against Covid-19" (Table 2, b56).

The Pfizer vaccine appears in 12.5 percent of the fake news, followed by AstraZeneca/Oxford (7.5 percent) and Russia's Sputnik V (1.25 percent). Around 45 percent of the posts found dealt with the "covid vaccine" in general. Other vaccines, such as the influenza vaccine, accounted for 6.25 percent of the sample. It's worth noting that in some cases, more than one type of vaccine was mentioned in the same fake news story, which explains the sum of more than 100 percent in the chart of the most cited vaccines (Figure 4).

Original Article | Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks
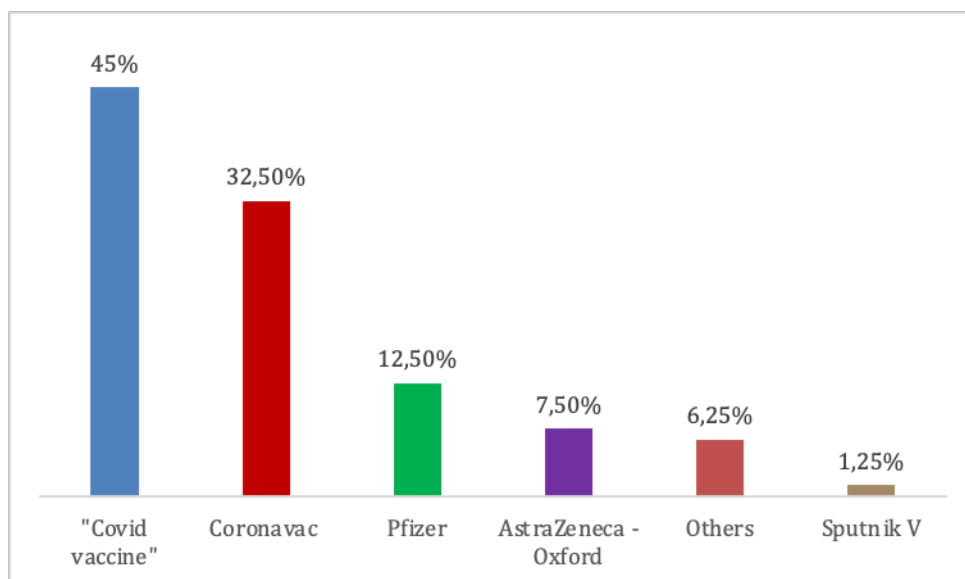
605

Figure 4 – Vaccines most cited by fake news sites E-farsas.com and Boatos.org.
Source: Prepared by the authors.

In this category, we also sought to ascertain the most frequent stance on vaccines. The fake news found, whether explicitly or not, took an anti-vaccine stance most of the time (81.25 percent). The alarmist nature of the posts was an important factor in identifying the intent of the content produced by fake news propagators. A neutral tone was perceived in 12.5 percent of posts, while a pro-vaccine stance appeared in only 6.25 percent of cases. These pro-immunization posts appeared at the beginning of the pandemic, when immunizing agents were still in the testing phase, and were intended to raise expectations about a "cure" for Covid-19.

The protocol used also suggests investigating the main biases and themes of the research corpus by identifying the areas of knowledge that are covered in posts on the study object. In this regard, 88.75 percent of the fake news about vaccines was in the area of "medicine and health". This is because most of the posts collected, focused on issues such as side effects and various health risks caused by vaccines. Subsequently, "science and technology", mostly represented by posts focusing on the scientific discovery of the vaccine, was the second most covered area within the posts (46.25 percent). Table 4 shows the complete distribution of fake news by area of expertise.

Table 4 - Distribution of vaccine fake news by area of expertise

Area of expertise	Percentage (%)
Medicine and health	88.75
Science and technology	46.25
Biological	13.75
Social sciences and humanities	5

Source: Prepared by the authors, based on the protocol described by Massarani *et al.* (2021).

Narrative

To discuss the narrative dimension, this study is based on the concept of framing, widely discussed by theorists such as Tuchman (1978), Entman (1993), Gamson (1995) and Gitlin (2003). Some of these authors consider frames to be organizers of reality (Reese, 2007) or even patterns of cognition (Gitlin, 2003). Thus, "framing" can be anything from a perceptual activity, when we emphasize parts of reality (Entman, 1993), to even a means of symbolically constructing the structure of the world (Reese, 2007). As Massarani *et al.* (2021) point out, each frame represents a central idea responsible for synthesizing the line of argument adopted by a given text, giving meaning to the subject in question. Thus, evaluating the frame offered to posts could be a plausible way of analyzing the most widespread discourses on vaccines.

After scanning the content and following the recommendations of the protocol, we established nine frames for analyzing fake news about "vaccines". The full list of frames can be found in Table 5. The order considers the frequency of use of the "frames", and each post can use more than one frame, which explains the sum of percentages above 100%.

According to the corpus analyzed, the predominant frame is that of "scientific uncertainty", present in more than half of the posts analyzed (55%). This type of 'frame' shows a significant number of pieces aimed at treating various health risks in an alarmist way. These include the side effects of the vaccine and even death, as shown by the headlines: "Photos show severe reaction in the first human guinea pig to test Pfizer's vaccine!" (Table 1, e3), "Vaccines can cause severe depression and induce suicide" (Table 1, e9), "Doctor between life and death after taking the Chinese vaccine" (Table 2, b22), "Three teenagers died after being vaccinated against Covid-19 in São Paulo" (Table 1, e12), "Covid-19 vaccine has infected people with HIV in Australia" (Table 2, b5), among others.

Table 5 - *Distribution of frames in vaccine fake news*

Main frames	Percentual (%)
Scientific uncertainties	55
Public policies	46.25
New technological developments	17.50
Personalization	17.25
Economics and marketing	12.50
Impact of science and technology	8.75
Bioethical and/or legal	7.50
Social, environmental, and cultural	3.75
Criticism of media coverage	1.25

Source: Prepared by the authors, based on the protocol described by Massarani *et al.* (2021).

The second most common frame is "public policy", which was the focus of 46.25 percent of the posts collected. In this case, there is a strong focus on the actions of public bodies, especially political figures (presidents, governors, and mayors). In this respect, the aim of a significant part of the material shared on social networks is to attack, discredit or praise one political figure over another in the fight for the dominant role in shaping public opinion.

Other frames include "new technological developments" centered on vaccine research and discoveries (17.50%); "personalization", which highlights personal stories of individuals who have taken the vaccine (17.25%); "economics and marketing", when it highlights the negotiations with pharmaceutical companies

Original Article | Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks

607

around immunizing agents (12.50%); the "impact of science and technology", which highlights the consequences of scientific progress for individuals and society (8.75%); "bioethical and/or legal", generally represented by content that discusses compulsory vaccination and individual freedoms (7.50%); "social, environmental and cultural", with content of a religious nature in particular (3.75%); and, finally, "criticism of media coverage" (1.25%).

We also added the subcategory "environment focus" to the protocol to identify the geographical setting of the fake news analyzed. In 63.75 percent of cases, the materials shared on social media were based on international issues and facts, including translations of articles, pieces, and statements by purported international authorities in the fields of health and science. Discussions focused exclusively on the Brazilian situation accounted for 31.25 percent of the sample, while five percent of the materials included international and national aspects in the same shared content.

Treatment

This section is based on the idea that the presence of certain elements may show greater or lesser concern on the part of the propagators of disinformation about the quality of the material produced for social networks.

Analysis of media resources revealed that 63.75 percent of the posts collected used photos, videos, and audio, accompanied by alarmist texts. These types of audiovisual resources are commonly used in the production of fake news, mainly because they generate more engagement on social networks. To reinforce their persuasive strategies, more than half of the content (52.5%) mentioned the risks of immunizing agents in their discourse. In addition, there were explicit recommendations to "not take the vaccine" in 31.25% of the posts analyzed.

In the explanations on the E-farsas.com and Boatos.org websites, the presence of Portuguese errors appears to be an important factor in the elucidation of false material, and for this reason we decided to add the concept of a "blunder" by fake news producers to the treatment category in this content analysis. The survey shows that 60 percent of the posts had grammatical and spelling errors in their texts.

This type of parameter is already used in various tools designed to identify fake news. In 2018, researchers from the University of São Paulo (USP) and the Federal University of São Carlos (UFSCar) developed a "fake news detector" that evaluates grammatical classes, vocabulary richness and spelling mistakes as investigation criteria (Monteiro *et al.*, 2018). The understanding is that, even unconsciously, the authors of fake news leave traces in the style of the text they produce.

Actors

The category sought to identify the main sources (the actors) that contributed to the development of the fake news narrative about vaccines on social media. The concept of a source can be understood as "data and information consulted to construct the text, and the voices, such as the individuals who are given the opportunity to speak" (Massarani *et al.*, 2021, p. 12, own translation). In this sense, we can categorize voices as a type of source and, on this basis, assess which authorities are mentioned by posts to give credibility and substance to information about vaccines.

Despite being important actors in the narrative construction process, half of the content analyzed made no reference to reliable sources. When sources are mentioned, doctors and scientists are first on the list of authorities consulted, as shown by the headlines "Doctor warns in video that the 'Chinese vaccine' is deadly!" (Box 1, e11), "Belgian doctor is right to say that vaccines are unproven, change DNA and control people through 5G" (Box 2, b11), "Brazil's leading infectious disease specialist warns against rushing as well

as doses and side effects of the Chinese vaccine" (Box 2, b16), "Doctor condemns Chinese vaccine being tested on Brazilians" (Box 2, -b29), among others.

Doctors and scientists appear in 25 percent of the posts and are most often represented by specialists whose work is questioned by the medical and scientific community in general, who are defenders of conspiracy theories or whose identity and professional performance are questionable. According to Massarani *et al.* (2021), this type of resource was also found by Costa *et al.* (2020) in a study that analyzed videos in favor of the anti-vaccine movement on YouTube, in which "people who are supposedly doctors, whose authority is bolstered by imagery such as clothing associated with the profession, legitimize vaccine hesitancy" (Massarani *et al.*, 2021, p. 14, own translation).

The next most prevalent actors were news agencies, newspapers, and journalists, mentioned in 18.75 percent of the posts. The lesser role of journalism as a source may be associated with the process of delegitimization of the press in recent years (Bellini; Santos, 2020). In several of the posts collected, phrases such as "the press won't show this" reveal the anti-vaccine movement's supporters' quest to detach themselves from journalism and reinforce the discrediting of press professionals. It's important to note that in some cases, more than one source may be mentioned, which explains the sum of more than 100 percent in the graph of the main sources cited in fake news. The full breakdown can be seen in Figure 5.
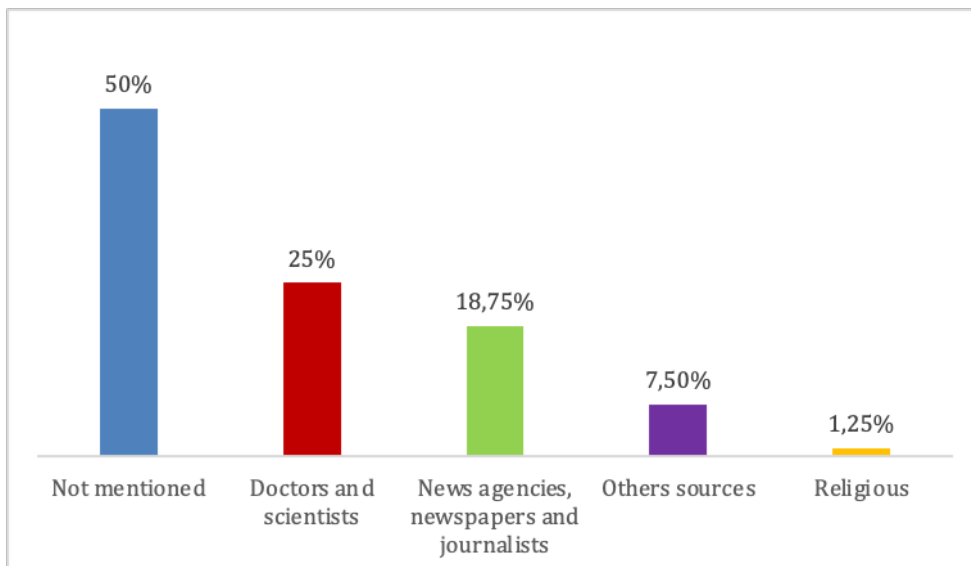

Figure 5 - Distribution of the main sources mentioned in fake news about vaccines
Source: Prepared by the authors.

CONCLUSIONS

The number of explanations produced by debunking sites E-farsas.com and Rumatos.org reveals a significant growth in fake news about vaccines shared on social media in 2020. In the year in which the Covid-19 pandemic drew the world's attention to questions of health, anti-vaccine posts took center stage and launched new challenges in the fight against disinformation.

The content analysis proposed by this study identified a series of characteristics that are common among fake news about vaccines. The posts were assessed according to five categories suggested by the protocol of the Ibero-American Network for Monitoring and Training in Science Journalism.

Regarding the dissemination of content, most of the posts on the sites analyzed (56.25%) did not identify a single social network as the main propagator of content. When networks are mentioned, Facebook (32.5 percent) and WhatsApp (26.25 percent) top the list of most shares. Most of the fake news analyzed was full

Original Article | Vaccines and disinformation: a content analysis of fake news verified by
debunking platforms on social networks

609

of Portuguese errors (60%), did not include authorship in the texts (82.5%) and the content was completely false (58.75%). Also noteworthy is the significant number of distorted posts (41.25%), i.e., with some true information and a decontextualized presentation.

The CoronaVac vaccine was the main target of fake news (32.5 percent), and this negative stance is directly related to issues that shaped the political landscape in 2020. The content opposing the vaccine makes frequent references to the governor of São Paulo, João Doria, who was both the main negotiator for the immunizing agent and President Jair Bolsonaro's biggest adversary in the political and health crisis that had engulfed the country.

When constructing the narratives, fake news sought to place particular emphasis on scientific uncertainties (55%). Alarmist posts focused on the possible health risks caused by immunizing agents. To give the information greater credibility, the propagators of fake news also favored what were supposedly doctors and scientists (25%), who featured as the most relevant sources when it came to endorsing the content.

Based on the results presented, the study corroborates the importance of more efficient strategies to combat disinformation and a more sensitive approach by public agents to health in the country. The lack of a greater commitment in this regard became even more evident in July 2020, when the Ministry of Health suspended updates to the Saúde Sem Fake News channel, the ministry's only tool for tackling fake news in the health field.

The federal government's failure to come up with more effective strategies to combat fake news is just part of the countless challenges Brazil has faced since the beginning of the pandemic. Even with the arrival of vaccinations, new scandals have emerged, mainly related to the purchase and distribution of immunizing agents.

There is also a notorious and worrying weakening of the National Immunization Program (*PNI*), especially in the context of the Covid-19 pandemic. Despite the progress made over the years, the current vaccination situation in Brazil is critical, with the return of diseases that had previously been eradicated and the failure to meet vaccination targets in the basic children's calendar.

The federal government needs to adopt more effective measures to combat the spread of fake news, with vaccine distribution strategies that guarantee easier access and greater availability of immunizing agents, as well as investing in awareness campaigns. Information about vaccines must be based on solid scientific evidence and disseminated by reliable sources.

The environment of disinformation, especially regarding vaccines, is extremely complex and has a direct impact on democratic regimes. The decentralization of information and the ease with which fake news is spread on social media is compromising the quality of the information available. This lack of commitment to the truth and the platforms' lack of regulation end up contributing to the formation of information bubbles that reinforce existing beliefs and opinions, leading to polarization and division in society.

The lack of accountability of platforms for false or misleading content deliberately contributes to the spread of fake news without blame. Social networks often present themselves as merely platforms for sharing information, without accepting any responsibility for the content posted.

The situation becomes even more serious when platforms such as Telegram, known for their leniency in relation to posted content, remain oblivious to attempts at regulation, creating an environment in which disinformation can spread more easily, without any kind of control or accountability.

In a democratic context, disinformation can have negative impacts, as people make decisions based on false or distorted information. The polarization and division of society can also be a direct consequence of the spread of fake news. It is therefore essential to adopt measures to combat disinformation and guarantee the quality and veracity of the information circulating on social networks.

By outlining the main characteristics of fake news about vaccines, this study provides elements that can help identify false content on social media, as well as fostering specific strategies and discussions around the problem of vaccine hesitancy. The mapping also brings together a significant amount of data that can support new studies aimed at combating disinformation in the areas of communication and health.

REFERENCES

AQUINO, Francesco *et al*. The web and public confidence in MMR vaccination in Italy. **Vaccine**, Amsterdam, v. 16, n. 35, p. 4494-4498, 2017. DOI: https://doi.org/10.1016/j.vaccine.2017.07.029. Available from: https://pubmed.ncbi.nlm.nih.gov/28736200/. Accessed: 15 abr. 2023.

BARDIN, Laurence. **Análise de conteúdo**. São Paulo: Edições 70, 2016.

BELLINI, Boris; SANTOS, Marli dos. Um panorama da credibilidade jornalística a partir do avanço da desinformação e das *fake news*. *In*: CONGRESSO BRASILEIRO DE CIÊNCIAS DA COMUNICAÇÃO. 43., 1-10 dez. 2020, Salvador. **Anais** [...]. São Paulo: Intercom, 2020. p. 1-15. Available from: https://www.portalintercom.org.br/anais/nacional2020/resumos/R15-1912-1.pdf. Accessed: 15 abr. 2023.

BETSCH, Cornelia *et al*. The influence of vaccine-critical websites on perceiving vaccination risks. **Journal of Health Psychology**, Thousand Oaks, v. 15, n. 3, p. 446-455, 2010. DOI: https://doi.org/10.1177/1359105309353647. Available from: https://pubmed.ncbi.nlm.nih.gov/20348365/. Accessed: 15 abr. 2023.

BODE, Leticia; VRAGA, Emily K. See something, say something: correction of global health misinformation on social media. **Health Communication**, Londres, v. 33, n. 9, p. 1131-1140, 2017. DOI: https://doi.org/10.1080/10410236.2017.1331312. Available from: https://www.tandfonline.com/doi/full/10.1080/10410236.2017.1331312. Accessed: 15 abr. 2023.

BRAGA, Renê Morais da Costa. A indústria das *fake news* e o discurso de ódio. *In*: PEREIRA, Rodolfo Viana (org.). **Direitos políticos, liberdade de expressão e discurso de ódio**. Belo Horizonte: IDDE, 2018. v. 1. p. 203-220.

CAMBRICOLI, Fabiana. País tem pior índice de cobertura da série histórica nas principais vacinas. **Viva Bem Uol**, São Paulo, 5 set. 2020. Saúde. Available from: https://www.uol.com.br/vivabem/noticias/agencia-estado/2020/09/05/pais-tem-pior-indice-de-cobertura-da-serie-historica-nas-principais-vacinas.htm. Accessed: 8 jun. 2021.

COSTA, Bianca; VIEGAS, Daiane; MOREIRA, Thamyris; ABREU, Paula. O movimento antivacina no YouTube nos tempos de pós-verdade: Educação em saúde ou desinformação?. **Revista Mídia e Cotidiano**. v. 14, n. 1, p. 220-239. DOI: https://doi.org/10.22409/rmc.v14i1.38210. Available from: https://periodicos.uff.br/midiaecotidiano/article/view/38210. Acesso em 19 ago. 2023.

CPI da covid: executivo da Pfizer confirma que governo Bolsonaro ignorou ofertas de 70 milhões de doses de vacinas. **BBC News**, [*s. l.*], 13 maio 2021. Brasil. Available from: https://www.bbc.com/portuguese/brasil-57104347. Accessed: 15 abr. 2023.

DAVIS, Dona Lee. Medical misinformation: communication between outport newfoundland women and their physicians. **Social Science & Medicine**, Londres, v. 18, n. 3, p. 273-278, 1984. DOI: https://doi.org/10.1016/0277-9536(84)90090-X. Available from: https://www.sciencedirect.com/science/article/abs/pii/027795368490090X. Accessed: 15 abr. 2023.

DUBÉ, Eve; VIVION, Maryline; MACDONALD, Noni E. Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications. **Expert Review of Vaccines**, Oxford, v. 14, n. 1, p. 99-117, 2015. DOI: https://doi.org/10.1586/14760584.2015.964212. Available from: https://pubmed.ncbi.nlm.nih.gov/25373435/. Accessed: 15 abr. 2023.

DUNKER, Christian. Subjetividade em tempos de pós-verdade. *In*: DUNKER, Christian *et al*. **Ética e pós-verdade**. Porto Alegre: Dublinense, 2017. p. 04-39.

E-FARSAS. **Sobre**. São Paulo. Available from: www.e-farsas.com/sobre. Accessed:19 ago. 2023.

Original Article | Vaccines and disinformation: a content analysis of fake news verified by debunking platforms on social networks

611

EGELHOFER, Jana Laura; LECHELER, Sophie. Fake news as a two-dimensional phenomenon: a framework and research agenda. **Annals of the International Communication Association**, Estados Unidos, v. 43, n. 2, p. 97-116, 2019. DOI: https://doi.org/10.1080/23808985.2019.1602782. Available from: https://www.tandfonline.com/doi/full/10.1080/23808985.2019.1602782. Accessed: 15 abr. 2023.

ENTMAN, Robert M. Framing: toward clarification of a fractured paradigm. **Journal of Communication**, Oxford, v. 43, n. 4, p. 51-58, 1993. DOI: https://doi.org/10.1111/j.1460-2466.1993.tb01304.x. Available from: https://is.muni.cz/el/1423/podzim2018/POL256/um/Entman_1993_FramingTowardclarificationOfAFracturedParadigm.pdf. Accessed: 15 abr. 2023.

FUNDAÇÃO OSWALDO CRUZ (FIOCRUZ) . Instituto Oswaldo Cruz. Cobertura vacinal no Brasil está em índices alarmantes. **Portal Fiocruz**, Rio de Janeiro, 29 ago. 2022. Available from: https://portal.fiocruz.br/noticia/cobertura-vacinal-no-brasil-esta-em-indices-alarmantes. Accessed: 19 ago. 2023.

FOX, Susannah; DUGGAN, Maeve. Health Online 2013. **Pew Research Center,** Washington: 15 jan. 2013. Available from: https://www.pewresearch.org/internet/2013/01/15/health-online-2013/. Accessed: 16 ago. 2023.

JORNAL NACIONAL. Canal do Ministério da Saúde que ajudava a combater notícias falsas para de funcionar. **G1**, Rio de Janeiro, 04 jul. 2022. Available from: https://g1.globo.com/jornal-nacional/noticia/2022/07/04/canal-do-ministerio-da-saude-que-ajudava-a-combater-noticias-falsas-para-de-funcionar.ghtml. Accessed: 19 ago. 2023.

GAMSON, William A. **Talking politics**. New York: Cambridge University Press, 1995.

GITLIN, Todd. **The whole world is watching**: mass media in the making and unmaking of the new left. Berkeley: University of California Press, 2003.

HOU, Zhiyuan *et al.* Assessment of public attention, risk perception, emotional and behavioural responses to the covid-19 outbreak: social media surveillance in China. **MedRxiv: The Preprint Server for Health Sciences**, Cold Spring Harbor, 17 mar. 2020. *Preprint.* DOI: https://doi.org/10.1101/2020.03.14.20035956. Available from: https://www.medrxiv.org/content/10.1101/2020.03.14.20035956v1. Accessed: 15 abr. 2023.

HUYNH, Toan Luu Duc. The covid-19 risk perception: a survey on socioeconomics and media attention. **Economics Bulletin**, Estados Unidos, v. 40, n. 1, p. 758-764, 2020. Available from: https://ideas.repec.org/a/ebl/ecbull/eb-20-00175.html. Accessed: 15 abr. 2023.

KIVITS, Joëlle. Informed patients and the internet: a mediated context for consultations with health professionals. **Journal of Health Psychology**, Thousand Oaks, v. 11, n. 2, p. 269-282, 2006. DOI: https://doi.org/10.1177/1359105306061186. Available from: https://pubmed.ncbi.nlm.nih.gov/16464924/. Accessed: 15 abr. 2023.

KOTZ, Johannes; GIESE, Helge; KÖNIG, Laura M. How to debunk misinformation? An experimental online study investigating text structures and headline formats. **British Journal of Health Psychology**, Chichester, p. 1-16, 2023. DOI: https://doi.org/10.1111/bjhp.12670. Available from: https://bpspsychub.onlinelibrary.wiley.com/doi/full/10.1111/bjhp.12670. Accessed: 15 abr. 2023.

KRIPPENDORFF, Klaus. **Content analysis**: an introduction to its methodology. 2. ed. Thousand Oaks: Sage Publications, 2004.

LAZER, David M. J. *et al.* The science of fake news: addressing fake news requires a multidisciplinary effort. **Science**, Nova York, v. 359, n. 6380, p. 1094-1096, 2018. DOI: https://doi.org/10.1126/science.aao2998. Available from: https://www.science.org/doi/10.1126/science.aao2998. Accessed: 15 abr. 2023.

LELO, Thales. The rise of the Brazilian fact-checking movement: between economic sustainability and editorial independence. **Journalism Studies**, Reino Unido, v. 23, n. 9, p. 1077-1095, 2022. DOI: https://doi.org/10.1080/1461670X.2022.2069588. Available from: https://www.tandfonline.com/doi/full/10.1080/1461670X.2022.2069588. Accessed: 15 abr. 2023.

LEWANDOWSKY, Stephan *et al.* **The debunking Handbook 2020**. [*S. l: s. n.*], 2020. DOI: http://doi.org/10.17910/b7.1182. Available from: https://skepticalscience.com/debunking-handbook-2020-downloads-translations.html. Accessed: 16 ago. 2023.

LYOTARD, Jean-François. **A condição pós-moderna**. Tradução: Ricardo Correia Barbosa. 12. ed. Rio de Janeiro: José Olympio, 2009.

D'ALMONTE, Edson Fernando; SIQUEIRA, Egberto Lima; SILVA, George de Araújo e.

612

MANTZARLIS, Alexios. Module 5: fact-checking 101. *In*: IRETON, Cherilyn; POSETTI, Julie. (Ed.).
Journalism, fake news & disinformation: handbook for journalism education and training. Paris: Unesco,
2018. p. 85-98.

MARIZ, Renata. Surtos de sarampo fazem Brasil perder certificado de país livre do vírus. **O Globo**, Rio de
Janeiro, 19 mar. 2019. Available from: https://oglobo.globo.com/sociedade/saude/surtos-de-sarampo-fazem-
brasil-perder-certificado-de-pais-livre-do-virus-23534799. Accessed: 3 jun. 2021.

MARQUES, Francisco Paulo Jamil *et al*. Who is who in fact-checked conspiracy theories? Disseminators,
sources, and the struggle for authority in polarized environments. **Journalism**, Reino Unido, 2023.
DOI: https://doi.org/10.1177/14648849231165579. Available from: https://journals.sagepub.com/doi/
abs/10.1177/14648849231165579. Accessed: 3 jun. 2021.

MARTINS, Giurla. PNI: entenda como funciona um dos maiores programas de vacinação do mundo. **Portal
do Ministério da Saúde**, Brasília, DF, 3 nov. 2022. Imunização. Available from: https://www.gov.br/saude/
pt-br/assuntos/noticias/2022/agosto/pni-entenda-como-funciona-um-dos-maiores-programas-de-vacinacao-do-
mundo. Accessed: 10 abr. 2023.

MASSARANI, Luisa; WALTZ, Igor; LEAL, Tatiane; MODESTO, Michelle. Narrativas sobre vacinação em
tempos de fake news: uma análise de conteúdo em redes sociais. **Saúde e Sociedade,** São Paulo, v. 30, n. 2,
p. 1-16, 2021. https://doi.org/10.1590/S0104-12902021200317. Available from: https://www.scielo.br/j/sausoc/a/
JwG8Jqrw8R9vWGN4MvXL7qj/abstract/?lang=pt. Accessed: 19 ago. 2023.

MASSARANI, Luisa; RAMALHO, Marina (org.). **Monitoramento e capacitação em jornalismo científico**: a
experiência de uma rede ibero-americana. Rio de Janeiro: Museu da Vida, 2012.

MATSUKI, Edgard. Os cinco textos mais lidos do Boatos.org em 2020 e outros dados. **Boatos.org**. 31 dez.
2020. Available from: https://www.boatos.org/opiniao/os-cinco-textos-mais-lidos-do-boatos-org-em-2020-e-
outros-dados.html#google_vignette. Acesso em 19 ago. 2023.

MIGUEL, Luis Felipe. A cruzada contra o capital cultural. **Mediações**, Londrina, v. 27, n. 3, p. 1-19, 2022. DOI:
https://doi.org/10.5433/2176-6665.2022v27n3e45807. Available from: https://ojs.uel.br/revistas/uel/index.php/
mediacoes/article/view/45807/47920. Accessed: 10 mar. 2023.

MINISTÉRIO DA SAÚDE. Ministério da Saúde lança plano de ação para interrupção do sarampo no Brasil.
Portal do Ministério da Saúde, Brasília, DF, 3 nov. 2022. Vigilância. Available from: https://www.gov.br/saude/
pt-br/assuntos/noticias/2022/setembro/ministerio-da-saude-lanca-plano-de-acao-para-interrupcao-do-sarampo-
no-brasil. Accessed: 14 abr. 2023.

MOLINA, Maria D. *et al*. "Fake news" is not simply false information: a concept explication and
taxonomy of online content. **American Behavioral Scientist**, Thousand Oaks, v. 65, n. 2, p. 180-2012,
2019. DOI: https://doi.org/10.1177/000276421987822. Available from: https://journals.sagepub.com/
doi/10.1177/0002764219878224. Accessed: 15 abr. 2023.

MONTEIRO, Rafael A. *et al*. Contributions to the study of fake news in portuguese: new corpus and automatic
detection results. *In*: COMPUTATIONAL PROCESSING OF THE PORTUGUESE LANGUAGE, 13., 26-28 set.
2018, Canela. **Proceedings** […]. [S. l.]: Springer, 2018. p. 324-334. DOI: https://doi.org/10.1007/978-3-319-
99722-3_33. Available from: https://link.springer.com/chapter/10.1007/978-3-319-99722-3_33. Accessed: 15
abr. 2023.

MORETTI, Felipe Azevedo; OLIVEIRA, Vanessa Elias de; SILVA, Edina Mariko Koga da. Acesso a informações
de saúde na internet: uma questão de saúde pública? **Revista da Associação Médica Brasileira**, São Paulo,
v. 58, n. 6, p. 650-658, 2012. DOI: https://doi.org/10.1590/S0104-42302012000600008. Available from: https://
www.scielo.br/j/ramb/a/SGm5WjwfG6Hj5Bf5g8s6DRs/. Accessed: 15 abr. 2023.

NEWMAN, Nic *et al*. **Digital news report 2020**. Oxford: Reuters Institute for Study of Journalism, 2020.
E-book. Available from: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2020-06/DNR_2020_FINAL.
pdf. Accessed: 7 jun. 2021.

NEWMAN, Nic *et al*. **Digital news report 2022**. Oxford: Reuters Institute for Study of Journalism, 2020.
E-book. Available from: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2022-06/Digital_News-
Report_2022.pdf. Accessed: 16 maio 2023.

Original Article | Vaccines and disinformation: a content analysis of fake news verified by
debunking platforms on social networks

613

RECUERO, Raquel; SOARES, Felipe; ZAGO, Gabriela. Polarização, hiperpartidarismo e câmaras de eco: como circula a desinformação sobre covid-19 no Twitter. **Contracampo**, Niterói, v. 40, n. 1, p. 1-17, 2021. DOI: http://doi.org/10.22409/contracampo.v40i1.45611. Available from: https://periodicos.uff.br/contracampo/article/view/45611. Accessed: 15 abr. 2023.

REDE Ibero-americana de Monitoramento e Capacitação em Jornalismo Científico – Cyted. **Museu da Vida**, Rio de Janeiro, [2014]. Available from: https://www.museudavida.fiocruz.br/index.php/noticias/53-pesquisa/791-rede-ibero-americana-de-monitoramento-e-capacitacao-em-jornalismo-cientifico-cyted. Accessed: 15 abr. 2023.

REESE, Stephen D. The framing project: a bridging model for media research revisited. **Journal of Communication**, Oxford, v. 57, p. 148-154, 2007. DOI: https://doi.org/10.1111/j.1460-2466.2006.00334.x. Available from: https://fbaum.unc.edu/teaching/articles/J-Communication-2007-9.pdf. Accessed: 15 abr. 2023.

REZENDE, Constança. Governo Bolsonaro pediu propina de US$ 1 por dose, diz vendedor de vacina. **Folha de S.Paulo**, Brasília, DF, 29 jun. 2021. Congresso Nacional. Available from: https://www1.folha.uol.com.br/poder/2021/06/exclusivo-governo-bolsonaro-pediu-propina-de-us-1-por-dose-diz-vendedor-de-vacina.shtml. Accessed: 15 abr. 2023.

ROSE, Jonathan. Brexit, Trump, and post-truth politics. **Public Integrity**, Estados Unidos, v. 19, n. 6, p. 555-558, 2017. DOI: https://doi.org/10.1080/10999922.2017.1285540. Available from: https://www.tandfonline.com/doi/full/10.1080/10999922.2017.1285540. Accessed: 15 abr. 2023.

SASSINE, Vinicius. Governo Bolsonaro ignorou alertas em série sobre falta de oxigênio em Manaus. **Folha de S.Paulo**, Brasília, DF, 16 jan. 2021. Saúde. Available from: https://www1.folha.uol.com.br/equilibrioesaude/2021/01/governo-bolsonaro-ignorou-alertas-em-serie-sobre-falta-de-oxigenio-em-manaus.shtml. Accessed: 15 abr. 2023.

SMITH, Phillip J. *et al*. Parental delay or refusal of vaccine doses, childhood vaccination coverage at 24 months of age, and the Health Belief Model. **Public Health Reports**, Washington, DC, v. 126, n. 2 supl., p. 135-146, 2011. DOI: https://doi.org/10.1177/00333549111260s215. Available from: https://journals.sagepub.com/doi/10.1177/00333549111260S215. Accessed: 15 abr. 2023.

SOUTHWELL, Brian G.; THORSON, Emily A.; SHEBLE, Laura. The persistence and peril of misinformation. **American Scientist**, Research Triangle Park, v. 105, n. 6, p. 372, 2017. DOI: https://doi.org/10.1511/2017.105.6.372. Available from: https://www.americanscientist.org/article/the-persistence-and-peril-of-misinformation. Accessed: 7 jun. 2021.

TANDOC JR., Edson C.; LIM, Zheng Wei; LING, Richard. Defining "fake news": a typology of scholarly definitions. **Digital Journalism**, Reino Unido, v. 6, n. 2, p. 137-153, 2018. DOI: https://doi.org/10.1080/21670811.2017.1360143. Available from: https://www.tandfonline.com/doi/abs/10.1080/21670811.2017.1360143. Accessed: 15 abr. 2023.

TUCHMAN, Gaye. **Making news**: a study in the construction of reality. Nova York: The Free Press, 1978.

VACINAS: as origens, a importância e os novos debates sobre seu uso. **Instituto de Tecnologia em Imunobiológicos**, Rio de Janeiro, 25 jul. 2016. Notícias e Artigos. Available from: https://www.bio.fiocruz.br/index.php/br/noticias/1263-vacinas-as-origens-a-importancia-e-os-novos-debates-sobre-seu-uso?showall=1&limitstart=. Accessed: 8 jun. 2021.

VISCARDI, Janaisa Martins. *Fake news*, verdade e mentira sob a ótica de Jair Bolsonaro no Twitter. **Trabalhos em Linguística Aplicada**, Campinas, v. 59, n. 2, p. 1134-1157, 2020. DOI: https://doi.org/10.1590/01031813715891620200520. Available from: https://www.scielo.br/j/tla/a/HWYM3LcW7yVtMY9ZbK8CWzs/. Accessed: 15 abr. 2023.

WASSERMAN, Herman; MADRID-MORALES, Dani. An exploratory study of "fake news" and media trust in Kenya, Nigeria and South Africa. **African Journalism Studies**, Reino Unido, v. 40, n. 1, p. 107-123, 2019. DOI: https://doi.org/10.1080/23743670.2019.1627230. Available from: https://www.tandfonline.com/doi/abs/10.1080/23743670.2019.1627230?journalCode=recq21. Accessed: 15 abr. 2023.

WASZAK, Przemyslaw M.; KASPRZYCKA-WASZAK, Wioleta; KUBANEK, Alicja. The spread of medical fake news in social media – the pilot quantitative study. **Health Policy and Technology**, Londres, v. 7, n. 2, p. 115-118, jun. 2018. DOI: https://doi.org/10.1016/j.hlpt.2018.03.002. Available from: https://www.sciencedirect.com/science/article/pii/S2211883718300881?via%3Dihub. Accessed: 15 abr. 2023.

WORLD HEALTH ORGANIZATION (WHO). **Ten threats to global health in 2019**. Genebra: WHO, 2019. Available from: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019. Accessed: 6 jun. 2021.

ZHU, Rui; ZHANG, Xinzhi; Public sector's misinformation debunking during the public health campaign: a case of Hong Kong. **Health Promotion International**, Oxford, v. 38, n. 3, p. daad053, 2023. DOI: https://doi.org/10.1093/heapro/daad053. Available from: https://academic.oup.com/heapro/article/38/3/daad053/7189927. Accessed: 15 abr. 2023.