Impact of fake news on social networks during COVID-19 pandemic in Spain

María Teresa Macarrón Máñez, Antonia Moreno Cano and Fernando Díez

Abstract

Purpose – *The pandemic has enhanced the global phenomenon of disinformation. This paper aims to study the false news concerning COVID-19, spread through social media in Spain, by using the LatamChequea database for a duration from 01/22/2020, when the first false information has been detected, up to 03/09/2021.*

Design/methodology/approach – *A quantitative analysis has been conducted with regard to the correlation between fake news stories and the pandemic state, the motive to share them, their dissemination in other countries and the effectiveness of fact checking. This study is complemented by a qualitative method: a focus group conducted with representatives of different groups within the society.*

Findings – *Fake news has been primarily disseminated through several social networks at the same time, with two peaks taking place in over a half of the said false stories. The first took place from March to April of 2020 during complete lockdown, and we were informed of prevention measures, the country's situation and the origin of the virus, whereas the second was related to news revolving around the coming vaccines, which occurred between October and November. The audience tends to neither cross-check the information received nor report fake news to competent authorities, and fact-checking methods fail to stop their spread. Further awareness and digital literacy campaigns are thus required in addition to more involvement from governments and technological platforms.*

Research limitations/implications – *The main limitation of the research is the fact that it was only possible to conduct a focus group of five individuals who do not belong to generation Z due to the restrictions imposed by the pandemic, although a clear contribution to the analysis of the impact of fake news on social networks during the COVID-19 pandemic in Spain can be seen from the privileged experiences in each of the fields of work that were identified. In this sense, the results of the study are not generalizable to a larger population. On the other hand, and with a view to future research, it would be advisable to carry out a more specific study of how fake news affects generation Z.*

Originality/value – *This research is original in nature, and the findings of this study are valuable for business practitioners and scholars, brand marketers, social media platform owners, opinion leaders and policymakers.*

Keywords *Fake news, Infodemic, Health communication, Disinformation, Fact checking, Fabricated stories*

Paper type *Research paper*

1. Introduction

By the end of 2019, the mass media reported on an epidemic outbreak of pneumonia of unknown origin, spread in Wuhan, the provincial capital of Hubei, China, with 11 million inhabitants. The term COVID-19 was used to refer to the said disease. Three months later, given the rapid and uncontrolled spread of the virus, the World Health Organization (WHO) characterized it as a global pandemic.

The WHO has coined the term "infodemic" to refer to the informational epidemic related to COVID-19 caused by several factors, including the society's urgent demand for information regarding a completely new and unknown topic, the media's priority set on immediacy over scientific rigor and the growingly rapid and less contrasted information consumption habits. This infoxication was used by Alfons Cornella to refer to the individual information epidemic

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(Cornella, 2004). The WHO made the term "infodemic" official in February 2020 in view of the increasing spread of information concerning COVID-19 primarily through the social media, thereby giving engendering an emerging scientific field: infodemiology (Springer et al., 2021). Due to infodemics, where everyone has a private opinion and alternative truth, people may become confused, irrational, anxious, fearful, suspicious, xenophobic and prone to extreme behaviours (Jakovljevic et al., 2020). As the coronavirus has spread, so has xenophobia and racism in the form of fear, suspicion and hostility towards people from China. This has occurred in many countries, especially in Europe, North America and the Asia-Pacific region. In some high schools near Paris, children of Asian descent were ostracized and their origins mocked (Jakovljevic et al., 2020).

Infodemic affects not only the society but also the scientific community, which has been discredited by incorrect or even fraudulent studies. The urge to conduct research on the new coronavirus and to publish studies has led to the preprint publication of numerous articles because specialized publishing houses were not capable of managing all the material received. An example of this is the case of Surgisphere, a currently inexistent company, which published a research article regarding a COVID-19 medication in high impact journals. Its authors ended up retracting their statements after receiving many questions about the study's reliability (Chaccour & Vilasanjuan, 2020).

Disinformation is nothing new, and its use has always involved different objectives, including health emergency situations. In the 1980s, the Infektion campaign spreads the rumour that HIV was an American biological weapon (Perez-Dasilva et al., 2020).

The proliferation of fake news is a problem for all citizens, but it particularly affects the younger public, which is the one that most uses social networks as a means of connection with current affairs (Mendiguren et al., 2020).

In a survey conducted in Andalusia, Spain, 94.1% of young people between the ages of 15 and 24 receive fake news at least once a month, and more than half receive it several times a week. The higher the level of education, the more common it is for this group to receive fake news. This is one of the reasons why this research is important. The media are identified as sources of fake news by an important sector of this youth, probably due to the lack of credibility of conventional media, as well as the political class and youtubers. For this segment of the population, the verification of unreliable news seems almost as widespread as its reception (90%). Thematic websites and generalist media are the entities most frequently approached to verify information (Gómez-Calderón et al., 2020).

The great paradox of generation Z is that, despite expressing their distrust of the media, politicians and journalists, young people do not renounce the massive consumption of social networks (Pérez-Escoda & Esteban, 2021). Moreover, this generation consumes intensively the media it trusts the least and trusts the media it consumes the least (Pérez-Escoda et al., 2021).

In the internet era, consumers' product/service information seeking and consumption behaviours have changed dramatically as a result of the omnipresence of social media and the internet's unprecedented scalability and speed of diffusion, with consumers increasingly relying on information from social media and fellow consumers, Lou and Yuan, 2019. The proliferation of social media has empowered consumers by stretching their roles as passive recipients of marketing communications to communicators who can voice their opinions pertaining to firms' products and services (Cao et al., 2021; Cheung et al., 2020).

Recent studies have reported that social media influencers' marketing is 6.9 times more effective than traditional marketing activities in reaching and persuading consumers (Martínez-López et al., 2020; Ye et al., 2021).

Online channels such as social media are increasingly affected by the spread of fake news. Fake news posts are forwarded more often by influential users. In addition, compared with truthful news, fake news is disseminated in a less centralized manner. Unlike content

disseminated through traditional channels such as newspapers and broadcasts, social media content can be created, modified and spread in a much less rigorous way. It can be published by a layperson without sufficient knowledge of a topic, modified and even distorted during dissemination, ultimately leading to serious and undesirable consequences (Ng *et al.*, 2021).

This article aims to evaluate the extent of the disinformation about COVID-19 that has been disseminated through social networks during the first year of the pandemic in Spain. To this end, we have analysed, using the LatamChequea database, the most popular topics and the characteristics of these fake news stories. The evolution of this phenomenon has been compared in relation to the development of the pandemic. Virality, the motivation for sharing this news and its dissemination to other countries have been studied. We have also evaluated the effectiveness of fact checking tools on social networks to identify and denounce this information. In short, we have tried to expose and understand the media impact generated by the pandemic.

2. Theoretical background

2.1 Disinformation. A problem hard to tackle

Digitalization has entailed a complete metamorphosis for communication at all levels. Professional journalism has been directly affected by content democratization, with conventional media consumption becoming increasingly uncommon, the decline in advertising from conventional media and the virtual monopolization of online advertising (Pew Research Center, 2021).

One of the most crucial changes is related to the social media use. In Spain, 85% of the people aged 17–70 years are social media users, which include WhatsApp (85%), Facebook (75%), Youtube (70%) and Instagram (64%), i.e. the most frequently used networks (IAB, 2021). Internet users account for approximately 95% population in Spain, showing an increase in the search of digital content related to COVID-19 during the pandemic; 58% users have searched for pandemic-related information (ONTSI, 2021).

The conventional media (i.e. press, radio and television) are still perceived as the most reliable (Tandoc *et al.*, 2018). Consumption habits have changed during the pandemic. In the first months of 2020, individuals aged 18–34 increasingly preferred television to social networks, which turned out to be far less reliable [9–10]. The use of inaccurate information became popular during the 2016 presidential elections in the United States (Alcott and Gentzkow, 2017). Trump even created the Fake News Awards and gave it to CNN, The New York Times or the Economy Nobel prize-holder Paul Krugman, thereby branding them corrupt and dishonest (McMillan, 2018).

Ryan *et al.* (2020) differentiate the terms disinformation and misinformation (whose Spanish equivalents would be falsas informaciones and informaciones falsas, respectively). Misinformation refers to pieces of news with some type of problem, such as a lack of context and excessive leads, although neither aiming to be misleading nor responding to a certain strategy. Disinformation refers to fake news.

Innerarity (2021) points out the existent difference between both types of news, thereby highlighting the distinction between false and fabricated. False information has been fabricated and is thus dangerous for democracy, whereas fake news stories are not so harmful. Here, we have to evaluate what is true and what is not, which is an extremely difficult task.

The European Union's website refers to fake news as "disinformation or false or misleading information, published with the intention of obtaining any economic benefit or with the purposes of deceiving the population to take advantage." Similarly, the influence of fake news in European citizens' lives and decisions stands out, and they may affect the democratic processes by creating "a public opinion based on lies and incorrect data,

perceived as true by many individuals" (European Union, 2019). Therefore, it warns against the emergence of mass media whose sole purpose is to disseminate false information.

Several authors have highlighted that disinformation has become normal, and fake news stories, being of scientific nature, are the most likely to be disseminated in social media because they are difficult to cross-check or because individuals may not be inclined to cross-check them (Sánchez-Duartea and Magallón Rosa, 2020).

Digital media have led to heightened visibility of audience reaction. They pick up on news coverage and elite communication or actively point out stories that, in their view, have been underreported. Digital media makes the topics, content and perhaps even the sentiment of the audience reactions broadly visible and countable. Audience reactions manifest in clicks, shares, likes or comments become measurable and start to influence the flow of political information (Jungherr et al., 2020).

The new language used by social media combines text, pictures and emotions (likes); said emotions make virality possible because users may forward the message without reading (Ramón Reyero and Gil Martín, 2021). The reach of viral fake news sometimes cannot be anticipated, and an example of this is the so-called Pizzagate (López, 2016). In 2018, the scandal of Cambridge Analytica (BBC, 2018), an English company engaged in the data analysis for advertising and political campaigns, recognized that electoral battles are not fought based on facts but emotions: fear and hope. Furthermore, the company's founder, Alexander Nix, alleged that truth is not necessary when it comes to spreading information and influencing elections; it must only be believed (Channel 4, 2018). Therefore, an unquestionable intent is behind all these facts, i.e. to deceive the audience out of political ideals or money, thereby making the fake news phenomenon a political and economic concern (Alcott and Gentzkow, 2017).

Fake news are not always ideologically or politically driven but essentially motivated by economic grounds instead. An example of this is when several teenagers disseminated false news stories during the 2016 North American election period (NBC, 2016). A study conducted in five countries (i.e. Bosnia and Herzegovina, Romania, Hungary, Moldova and Slovenia) shows that the primary websites dedicated to disinformation earned significant revenue from advertising. For example, zemaveck.sk received approximately €410,000 as advertising revenue. This research also highlights that social media, Facebook in particular, may generate up to 80% of the inbound traffic for fake news sites (Szakács, 2020).

The most controversial fake news stories are highly profitable because they generate clicks and traffic, thereby boosting the value of the advertising spaces on said websites (Amorós, 2018a). Advertisers are concerned because they are not happy with their ads being published on websites characterized for being sources of disinformation. To this end, sites, such as NewsGuard, have been created, which rate and give reliability scores to websites depending on several criteria.

The camouflage of many contents disguised as news is undermining the Internet with fake news, propaganda, misleading contents, lies and manipulated information. The consequences are felt in polarized discourses and in the radicalization of opinions, in the disinformation of the population and indirectly in the lower trust towards journalistic activity and the media produced by a double dynamic: attacks on the media and journalists by political leaders and the spiral of skepticism that generates so much disinformation towards the credit of the journalistic profession (Pérez, 2019).

There is no easy solution to the disinformation problem because this takes place in the context of information overload and because the widespread use of social media makes monitoring each message impossible. Although social media companies claim that they will fight against fake news (Gayo-Avello, 2017), in addition to the institutional level (laws and regulations) and the filters made by social networks, using fact-checkers and training users are of paramount importance.

In this sense, the more traditional press, which prides itself on credibility as its main asset, even when exposed to errors or unethical and malicious attitudes of its own reporters, has always been forced to admit or deny its own publications. And in many cases, they have applied or apply "fact checking" standards even internally. This, in fact, has been the antecedent of these widespread practices of "fact checking", so necessary nowadays, by international organizations, civil society or groups of professional journalists that initially emerged in Europe (Costa, 2020).

On the other hand, to deal with false information, bet on a coordinated educational effort from institutions. Other authors lean towards an encouragement of debate or discussion through virtual environments and the re-enactment of collaborative projects at a distance (Durán Becerra and Machuca, 2018). Although media literacy cannot be considered a tool that works by itself, it needs coordinated strategies that enable media reform (Mcdougall *et al.*, 2019). Thus, it should be expected that a heightened awareness on the part of the public may eventually act as an antidote to the politics of untruth that fake news has come to embody (Arias, 2019).

The solutions proposed thus far raise important questions. The social media's censorship to avoid the propagation of fake news has opened a wide debate on fundamental rights and freedom of speech (Miguel de Bustos, 2017), and in some way, social media platforms sometimes benefit from the false story, and thus, they obviously act in light of their own interests (Levi, 2019). In short, today's information consumer is globally unprepared to deal with disinformation (Romero-Rodríguez *et al.*, 2018).

2.2 Who are the influencers?

Generally, influencers are viewed as subjects who can interact with a target audience, stimulate engagement, drive communication and/or sell a product or service (Childers *et al.*, 2019). Since influencer-generated content enables their audiences to grow recognition of brand congruence and brand attitude, this can subsequently stimulate purchasing intent (Torres *et al.*, 2019).

Homophily is the degree of similarity between people who interact based on belief, education and social status (Eyal and Rubin, 2003). Homophily used primarily in communication research has recently been introduced into marketing research on social and virtual environments (Ladhari *et al.*, 2020). Homophily can positively promote customer participation behaviour through encouraging audiences' seeking and sharing information, eliciting their responsible behaviour and personal interaction. Under the influence of such homophily, the target audience will produce active and voluntary citizenship behaviours, such as advocating for, encouraging and recommending positive actions; providing help to those in need; tolerating certain circumstances; and providing timely feedback regarding their thoughts (Bu, Parkinson and Thaichon, 2022). This could lead to more responsible behaviour in sharing COVID-19-related fake news, especially among young consumers.

As social media has changed the way news is created and consumed, people typically only read headlines or watch short videos. Several studies have posited the existence of confirmation bias, arguing that users tend to believe news that confirms their prior beliefs, regardless of the authenticity of its content (Kim and Dennis, 2019; Kim, Moravec and Dennis, 2019). When encountering information that does not align with their prior beliefs, individuals experience cognitive dissonance (Harmon-Jones and Mills, 2004) and tend to resolve such dissonance by rejecting new information, as this often requires less effort than changing one's beliefs. Other mechanisms, such as fluency via prior exposure (Pennycook, Cannon and Rand, 2018), laziness or lack of reasoning (Pennycook and Rand, 2019) and cognitive and affective engagement (Maasberg *et al.*, 2018), have also been proposed to explain why people are susceptible to fake news.

Opinion leaders can be defined as individuals who have a great amount of influence on the decision-making of other people and on their attitudes and behaviours (Godey *et al.*, 2016). For their part, consumers are increasingly using social media to gather information on which to base their decisions, influenced by these opinion leaders. The higher the congruence between the contents of the account and the consumer's thoughts and personality, the greater will be the psychological closeness between the consumer and the opinion leader, which may result in a higher influence of the latter on the former (Casaló *et al.*, 2020). In this sense, the characteristics of the opinion leaders closest to young consumers should be determined.

This is similar to the literature on advertising that suggests that when a consumer perceives that there is a great match-up between his/her self-image and that of the endorser (for example, a celebrity), the assessment of the advertisement and the intention to purchase a product are higher (Choi and Rifon, 2012)

3. Materials and methods

An analysis of the main fake news stories related to COVID-19 spread through social media has been conducted for this study; the analysis entails a descriptive quantitative research that measures the variable features of this phenomenon and provides a statement of the facts and a description of the characteristics. It aims at explaining the definition of disinformation and how it operates (Sampieri Hernández, 2016).

The methodology became mixed through the incorporation of a focus group, a qualitative method of a phenomenological design. This methodology supplements the descriptive analysis and understanding of the disinformation phenomenon based on the subjective experience and different perspectives of each participant (Sampieri Hernández, 2016).

Many pieces of fake news have been censored at this point of the pandemic, and thus, given their unavailability, our work has not focused on the analysis of original stories. By contrast, we rely on the publications made by the renowned organization Chequea to refute them. Chequea is a digital organization established in 2010 and engaged in the verification of public discourse and the fight against disinformation. Certified by the International Fact Checking Network, it gathers information from different countries worldwide. Some of the 35 organizations participating in the project include the Spanish institutions AFP Factual, EFE Verifica, Maldita and Newtral.
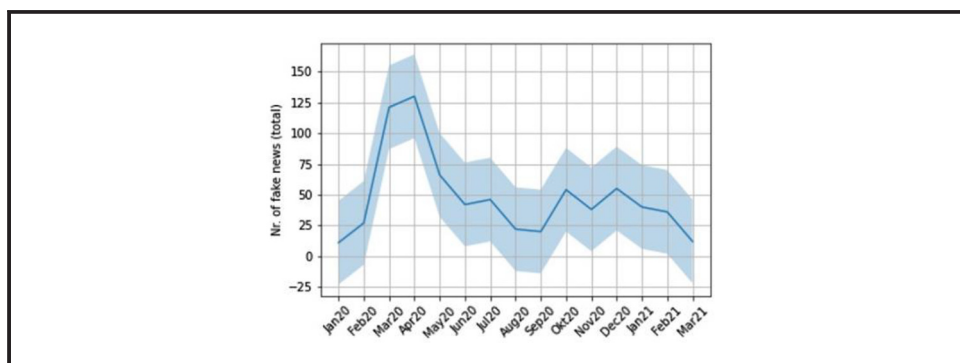
The analysis period ranges from January 2020, when the first pandemic-related false story was detected, to the month when this study was conducted, March 2021. All records from Spain have been selected as the false story's place of origin, regardless of their dissemination in other countries, which is also specified in the database, and we obtained 1.056 records. Further, we proceeded to delete each content spread through other different social means, such as e-mail, media or SMS.

This database classifies fake news into "true", "false" or "impossible to prove its authenticity." For our study, only those exclusively considered false, partially or fully, were selected because they misled readers in all cases.

After said selection, 720 records have been included in the quantitative analysis performed on the type of fake story, social media where the story has been spread, dates of creation, the association between their creation and the evolution of the pandemic, and its reach to other countries. Furthermore, we address the issue of fact checking as a resource for stopping the sharing of false data.

The confidence intervals of the results calculated from the data obtained in LatamChequea are shown below:

Tables 2 and 3, as well as Figures 2 and 4, can be considered statistically significant at a 99% confidence level (Haldun, 2018) and a margin of error of less than 5% (exact Figure 1: 4.81%). Consequently, the distribution of topics, message formats and where they were

Figure 1 Fake news margin error

shared is representative of fake news originating in Spain and not shared by email, SMS or media

For Figure 5, we have estimated an error of less than 10% with a confidence level of 95%. The specific figures are as follows, all at 95% confidence level:

- Period 1: margin of error 3.3%.

- Period 2: margin of error 9.79%.

- Period 3: margin of error 5.25%.

Figures 6 and 7 are statistically significant, as they contain all the infections and deaths recorded by Covid (fake news disseminated) and Figure 4 (which is fine by the above argument).

Therefore, we have calculated the Pearson correlation coefficient [42] of the different factors (Table 1):

- for Figure 6 and period 1 (corresponding to an almost perfect correlation);

- for Figure 6 and period 2 (corresponding to an almost perfect inversely proportional relationship between the no. of cases and the no. of fake news, and a strong, but not perfect, inversely proportional relationship between the no. of cases and the no. of deaths);

- for Figure 6 and period 3 (corresponding to a weak relationship); and

- for Figure 7, the Pearson correlation between the no. of fake news and the spread to other countries is 0.907, which is again an almost perfect correlation.

In addition to this analysis, we have included five individuals to be a part of the focus group considering the representation of the current social context. They are social media users aged 30–45 years, with different occupations of interest for the study: a front-line hospital health worker, a member of the state forces specializing in collaborative fact-checking projects, a computer scientist for technical insights, a regular social media user sharing

Table 1 Pearson correlation coefficient for Figure 6

Nr. fake news	Period 1	Period 2	Period 3
Nr. deaths	0.969619	−0.774538	0.382387
Nr. cases	0.989384	−0.928420	0.453170

their personal experience and a primary education teacher highly knowledgeable in the influence of fake news among youngsters.

The main limitation of the research is that it was only possible to carry out a focus group of only five individuals who do not belong to generation Z due to the restrictions imposed by the pandemic. However, a clear contribution to the analysis of the impact of fake news on social networks during the COVID-19 pandemic in Spain can be seen based on the experiences that each of these five individuals contribute from their fields of work, which we consider to be of vital importance. In this sense, the results of the study are not generalizable to a larger population.

We believe that each of these perspectives may provide a highly enriching approach. In view of the pandemic-related restrictions, the meeting was held online, and we will consider it only as an approximation of the actors involved and not as general recommendations.

4. Results

This section presents the results obtained after assessing the 720 records entered in the LatamChequea database corresponding to Spain originating on social media. Subsequently, this is supplemented by the results based on the answers from the focus group's participants. This analysis is outlined in a set of paragraphs that answer questions regarding the spread of fake news stories, their content, their primary dissemination media, their date of origin and their purpose.

4.1 Characteristics of the disseminated fake news

As for the content of said false stories, the database classifies them into 10 categories listed in Table 2. Pieces of news that cannot fit in other categories have been grouped in the "Other" category (27.44%), such as the message of hatred posted on a picture of one Asian woman and three men cutting off the corpse of a baby on Instagram in April of 2020, accompanied by the text: "they are also eating babies in Asia now".

This was specifically refuted by Maldita (an organization fighting disinformation), which observes public discourse and promotes media literacy through data journalism and fact-checking techniques in collaboration with other media. Maldita explained that this picture corresponds to an autopsy performed by a forensic surgeon in Bangkok. What is most striking is that the same picture has been also used in a false article published in 2014,

Table 2	Themes of fake stories	
Theme	*Description*	*%*
Others	Messages of widely diverse themes	27.44
Prevention measures	Preventive cures through the consumption of specific products or the implementation of different practices	25.63
Vaccines and other treatments	Ways to cure the disease and its effects. Vaccines: research, adverse effects, concealed economic interests	20.33
A country's situation	Number of infected and dead people around the world. Official communications on the pandemic and the governmental control measures. Disease development	7.52
The origin of the virus	Claims about the origin of the virus, its use as a biological weapon or as a tool to reduce the global population	6.13
Contagions	Disease spread by asymptomatic individuals, children and public figures	6.13
Diagnostic tests	Uselessness or manipulation of antigen tests	3.62
Characteristics of the virus	The persistence of the virus on different surfaces. Questions regarding its nature and features	1.25
Symptoms	Self-assessment questionnaires. Signs of the disease	0.97
Prediction	Movies, literary works and paintings that predicted the pandemic	0.97
Source: Prepared by the authors based on LatamChequea		

which stated that the Chinese people in the picture were killing the baby to eat him, which was completely untrue, including the people's nationality.

Another similar feature of fake news stories in the digital era is timelessness. Once posted on a website or social network, they may remain there for a long time or be deleted after being fact-checked or for any other reason. However, when the fake news article is disseminated via WhatsApp, it remains in the memory of our smartphones, ready to be re-used whenever we want.

The second category (prevention measures) is also recurrent (25.63%), accounting for 25% of fake news stories and dealing with prevention measures against coronavirus. For example, a chain letter shared via WhatsApp that reads: "An otolaryngologist has recommended taking vitamin C tablets and GNC omega capsules to strengthen our immune system and cope with the new coronavirus outbreak."

A 20.33% of fake news stories are regarding vaccines; immunity is the only safe protection against this virus. Furthermore, the so-called herd immunity has been the focus of public debate from the beginning of the pandemic. This topic has engendered all types of misleading theories and statements: their production and research methods, their preexistence, the possible adverse effects, or the alleged statements made by Bill Gates, who supposedly claimed that the COVID-19 vaccines would permanently change the human DNA.

The remaining types are less frequently observed, although not less harmful, and comprise all types of fake and negationist pieces of news: videos of empty ICU rooms; pictures of corpses in morgues or coffins in the Gran Vía street (Madrid); health workers and police officers protesting in the light of the new world order; and an extensive list of forged, distorted and manipulated messages aimed at misleading and encouraging panic.

As for the format of these messages (Table 3), 49% were sent as text, whereas 51% relied on visual supports of videos or pictures only or in combination with text to improve their credibility. Similar to written text, pictures are frequently manipulated or decontextualized.

In the focus group, every participant recalled having received many messages in different formats. In this respect, the teacher explains, "Picture messages are easier to remember and have a greater impact. Photographs reinforce the content of the message." The social network user answers that pictures demand less time and attention: "These are more agile and dynamic, and you can get the message as soon as you see the pictures. And these are the most frequently forwarded messages, as they somehow encourage you to do so".

This may suggest that the act of sharing fake news stories is impulsive. For a false article to disseminate, it must cause an emotional impact on the audience, which must be greater than their reasoning skills at the moment of reading or seeing it.

4.2 Dissemination media

The most frequent fake news stories in Spain are those which have been spread through different social networks at the same time, followed by those exclusively shared on WhatsApp, Facebook and Twitter, among others, in this order (Figure 2).

Table 3 Format of messages	
Format	*Proportion of messages (%)*
Text	49
Video	21
Picture	19
Combination	7
Audio	4
Source: Prepared by the authors based on LatamChequea	

Figure 2 Number of fake news stories shared per social network
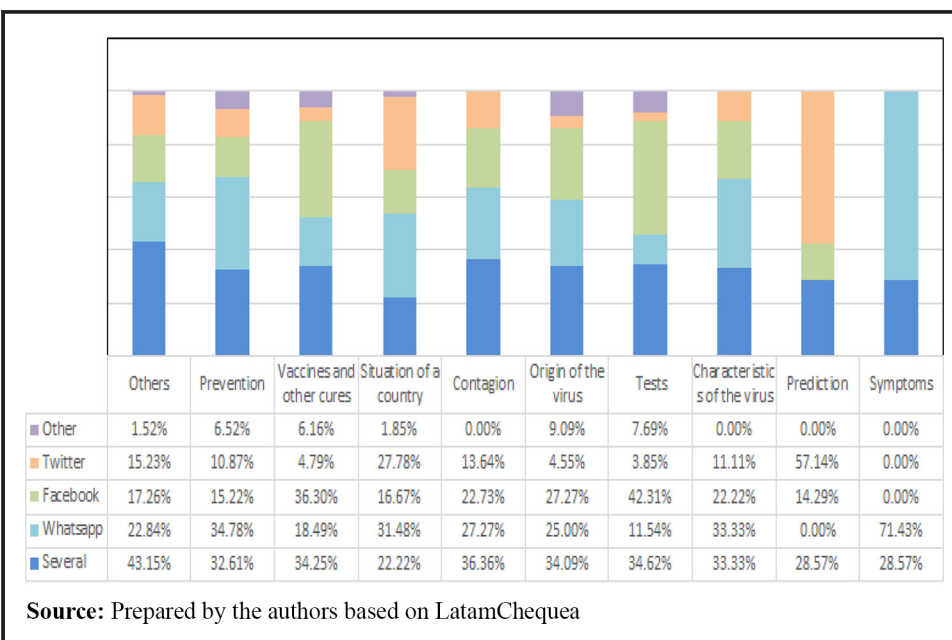
Source: Prepared by the authors based on LatamChequea

The focus group's participants use different social networks: Instagram, Facebook, Tik Tok, Twitter, Twix and WhatsApp. All of them confirm that during the first year of the pandemic, they have received identical fake news stories through different platforms, particularly Facebook or Twitter screenshots forwarded via WhatsApp. In this respect, the State security forces member remembers a false story that went viral during the first lockdown through several social networks, which warned against an alleged police action against individuals who were banging pots in their balconies to protest against the government management of the health crisis.

This participant considers that social media substantially contribute to the dissemination of false stories. They affirm that they just use social media for recreation purposes and to keep in touch with their contact network rather than to get information. All participants in the discussion group use conventional means to obtain reliable information: press, radio and television, and not social media. All of them agree that during the pandemic, this has been an increasing trend with regard to their information consumption habits. Although these opinions are part of a small sample, this finding is in contrast to the data corresponding to North America, where 23% of its residents regularly acquire information from social networks, whereas 30% of them do so occasionally, thereby totalling 53% of people who get information from social media at least from time to time (Shearer and Mitchell, 2020).

A difference has been observed between the themes disseminated in each social network, particularly Facebook and WhatsApp. Figure 3 shows the percentage of themes spread per social network in relation to the total number of them.

WhatsApp is the most widely used platform concerning different themes: prevention, country's situation, contagion, characteristics of the virus and symptoms, whereas the same happens with Facebook and vaccines, origin of the virus, and tests. Only fake news related to prevention is shared via Twitter, although its percentage is high (57.14%). The 36.3% of fake news stories regarding vaccines (i.e. research, adverse effects and concealed economic interests) have been posted on Facebook. This finding brings the anti-vaccine movements to our mind because, although they are smaller than pro-vaccine groups, the former are substantially involved in this activity and have developed said articles via dissemination platforms, such as Facebook, at least until they are censored. Topics regarding the uselessness or manipulation of antigen tests have also been mostly shared via Facebook (42.41%).

Figure 3   Themes per social network

	Others	Prevention	Vaccines and other cures	Situation of a country	Contagion	Origin of the virus	Tests	Characteristics of the virus	Prediction	Symptoms
■ Other	1.52%	6.52%	6.16%	1.85%	0.00%	9.09%	7.69%	0.00%	0.00%	0.00%
■ Twitter	15.23%	10.87%	4.79%	27.78%	13.64%	4.55%	3.85%	11.11%	57.14%	0.00%
■ Facebook	17.26%	15.22%	36.30%	16.67%	22.73%	27.27%	42.31%	22.22%	14.29%	0.00%
■ Whatsapp	22.84%	34.78%	18.49%	31.48%	27.27%	25.00%	11.54%	33.33%	0.00%	71.43%
■ Several	43.15%	32.61%	34.25%	22.22%	36.36%	34.09%	34.62%	33.33%	28.57%	28.57%

Source: Prepared by the authors based on LatamChequea

By contrast, false stories regarding prevention and treatments through the consumption of specific products or the implementation of different practices have been mostly disseminated via WhatsApp (34.78%). Other studies have consistently shown that prevention has been the primary topic of WhatsApp messages during the pandemic, followed by treatment (Moreno-Castro *et al.*, 2021).

In the case of messages regarding the numbers of infected and dead people around the world, which have focused on the official communications on the pandemic and the Spanish governmental control measures, along with the disease development, WhatsApp has been the most widely used platform (31.48%). This was also the case for those dealing with the symptoms and signs of the disease (71.43%).

The characteristics of the virus and its persistence on different surfaces, or the questions regarding its nature and features, have equally gone viral via WhatsApp and other media (33.33%).

For their part, messages regarding the disease spread by asymptomatic individuals, children and public figures (36.36%), similar to claims about the origin of the virus and its use as a biological weapon or as a tool to reduce the global population (34.09%), were mostly shared through various social media platforms.

4.3 Development of the dissemination

Three periods have been identified after the creation of false stories: before the state of alert was declared and during lockdown; after the initial quarantine; and the third period, from October 2020 up to present time and the beginning of this research.

1. First period: from January 22, 2020, when the first pandemic-related false story was detected, until June 21, 2020, when the lockdown ended.

2. Second period: from June 22, when we began living under "the new normal", until the end of the holiday season on September 29, 2020.

3. Third period: from October 1, 2020, up to the last record entered in the database on the start date of this study, March 9, 2021.

As can be seen in Figure 4, the first period was the most productive one in terms of fake news development in view of the great uncertainty caused by the pandemic. In the second stage, the summer months, fake stories regarding coronavirus declined significantly, although they were always more than the data recorded in only January. As from October, when the development of the COVID-19 vaccine was announced by the Spanish Ministry of Health and the public debate held the days before on this issue, the number of false stories began increasing again, although it never reached the high level observed at the beginning of the first period.

Consistent with the aforementioned data, all the focus group's participants state that the peak of fake news stories took place at the beginning of the pandemic during lockdown. They further acknowledged a second peak by the end of the year, concurrently with the coming vaccine.

The computer scientist says that "at the beginning, false stories were critical of the government and focused on causing unrest in the political party in power, whereas the second peak dealt with vaccines, in addition to the statements made by the president of the Universidad Católica de Murcia." They are making reference to a speech that went viral, by José Luis Mendoza, the president of the Universidad Católica de San Antonio, in June 2020, during which he claimed that Bill Gates predicted the outbreak of the coronavirus and that vaccines will contain a chip to be inserted into us for controlling purposes (Periférica, 2020).

If we compare these different types of information per period, we will note that some topics are recurrent throughout the pandemic, whereas others are really diverse in function of the time of publication instead. After differentiating the three aforementioned periods, we can cover the moments of greater and lower dissemination of messages and compare their development alongside the evolution of the pandemic in Spain.

Figure 5 shows that prevention measures were the subject of fake news story, particularly at the beginning of the pandemic and to a lesser extent during the two subsequent stages. The country's situation was also a relevant topic at first, although it was neglected after lockdown, similar to the topics related to the virus' symptoms and origin.

The opposite is observed with vaccines and other treatments. Although it has been a major topic during the first stage, it is not so relevant in the second one. However, in the third

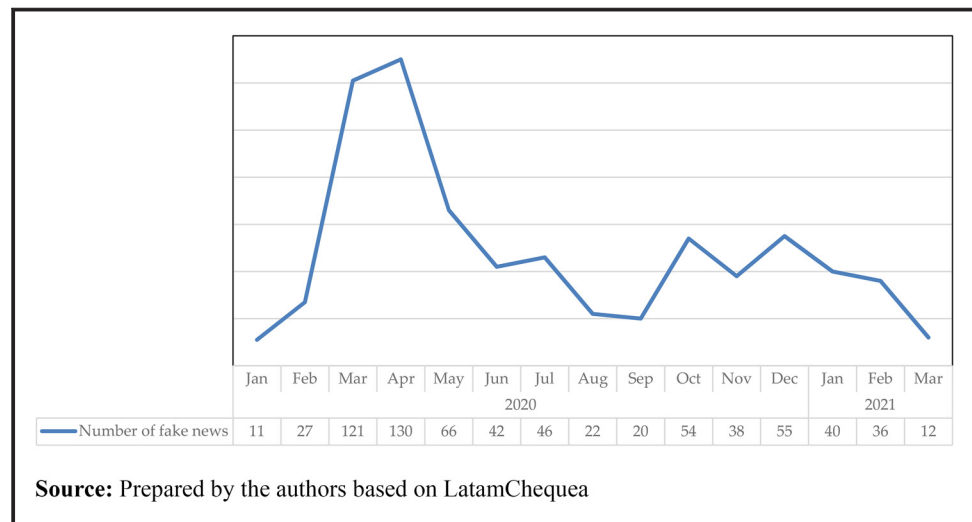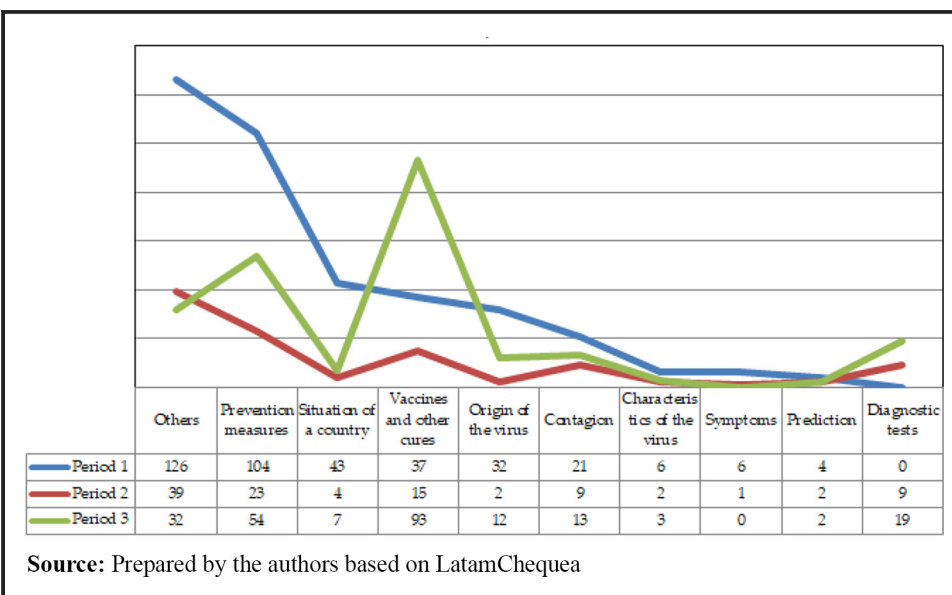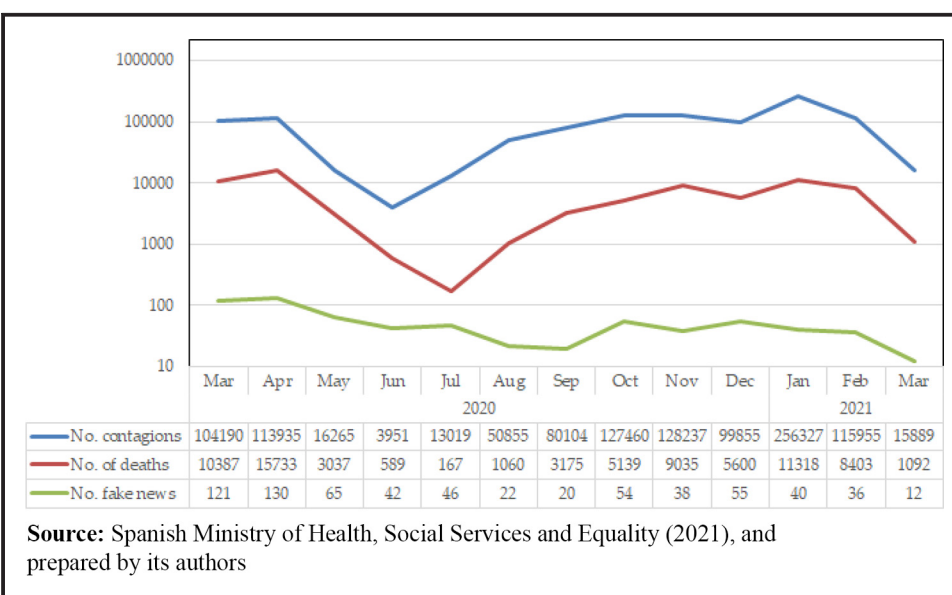**Figure 4** Number of fake news-stories per month

Number of fake news	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
	11	27	121	130	66	42	46	22	20	54	38	55	40	36	12
						2020								2021	

Source: Prepared by the authors based on LatamChequea

Figure 5   Message type per period

	Others	Prevention measures	Situation of a country	Vaccines and other cures	Origin of the virus	Contagion	Characteristics of the virus	Symptoms	Prediction	Diagnostic tests
Period 1	126	104	43	37	32	21	6	6	4	0
Period 2	39	23	4	15	2	9	2	1	2	9
Period 3	32	54	7	93	12	13	3	0	2	19

Source: Prepared by the authors based on LatamChequea

stage and consistent with the official announcement of the vaccination campaigns by the government, this theme reaches its peak. As for the pandemic development and its relationship with fake stories, it can be observed that they are fairly consistent, which may account for a large amount of data.

Figure 6 shows the number of COVID-19 infections and deaths, together with the comparison chart regarding fake news published during said months in Spain. The high number of false stories created at the beginning of the pandemic is not consistent with a similar number of infected individuals in Spain because the highest peak (256,327) was observed in January 2021, i.e. the third wave. However, the greatest number of false stories

Figure 6   Number of infections, deaths and fake news-stories

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
					2020							2021	
No. contagions	104190	113935	16265	3951	13019	50855	80104	127460	128237	99855	256327	115955	15889
No. of deaths	10387	15733	3037	589	167	1060	3175	5139	9035	5600	11318	8403	1092
No. fake news	121	130	65	42	46	22	20	54	38	55	40	36	12

Source: Spanish Ministry of Health, Social Services and Equality (2021), and prepared by its authors

was observed in April 2020 (130), which coincided with the largest number of deaths registered (15,733). At the beginning of the pandemic, the massive amount of fake news stories was mostly the result of the WHO pandemic declaration on March 11, 2020 (World Health Organization, 2020), which indicated substantial uncertainty regarding the disease and the surrounding circumstance.

The second period (July to September) shows an inversely proportional relationship; the higher the number of infections, the lower the number of fake news stories created. In the case of the number of deaths in this period, the lowest figure was registered in July, with 167 deaths. In other words, there were more infected people but fewer deaths under the "new normal", and thus fewer fake news stories. Deaths seem to be a relevant factor in the creation of false articles.

After the holiday season, another peak of infections, deaths and fake stories was recorded in October, which corresponds to the second wave of the pandemic in Spain and the coming vaccine development.

Finally, a third wave of the COVID-19 infection was observed in January, right after Christmas, with no correlation to the generation of false stories. This finding may be due to the fact that health authorities have set up official and easy-to-access channels to report on the virus, and thus, we are not ignorant regarding the disease. However, this is also the consequence of the censorship conducted by social media, which prevents the publication and dissemination of harmful news.

4.4 Identifying senders

With regard to the dissemination of fake news, the database identifies the primary senders for 8% of them, including public figures, supposed doctors or scientists, influencers, politicians, Twitter users and various Internet portals. The messages, which were originally humorous and were later misunderstood and went viral as true information, stand out. This is the case of the news regarding the Secretary General of the political party Vox, Ortega Smith, who stated: "I would rather be infected with coronavirus than homosexualism." In fact, the article was originally posted on the website "*La realidad a diario*", characterized by its satirical publications and subjective rigor.

Similarly, on February 2, 2020, the portal Cannabisn24.com posted a self-serving message, in which several alleged scientists working at a nonexistent laboratory asserted that cannabis was found to be a good treatment for coronavirus, followed by its dissemination over the social media. Most notably, this false story was first published on the satirical website Cerebrother.

As for humorous or satirical fake news, the participants of the focus group receive many political memes, and they believe that despite their humorous nature, these criticize and throw doubt on the characters involved in them. The fake news stories directly disseminated by internationally recognized figures and performers in general deserve special attention given the high level of interest received. A public discussion has recently been opened in this regard, questioning the power given to these celebrities in the media due to their great influence.

All participants declared having received fake news stories represented by public figures. The database includes a video of the actress and denier Victoria Abril, in which she ensures that the pandemic is an invention to restrict human freedom and that vaccines cause a greater number of infections.

The database also listed false information from a negationist website called *Médicos por la verdad*, which holds an openly critical position towards the official story and spreads fake news through messages and videos. In this case, these are real doctors, although their professionalism has already been questioned by the corresponding authorities.

Finally, we would like to mention the case of Antonio Cañizares, the Archbishop of Valencia, who states that one of the COVID-19 vaccines has been manufactured using cells from aborted human foetuses (Cadena Ser, 2020). This false information originated in 1963, when microbiologist Leonard Hayflick started cultivating cells from foetal tissues deriving from abortions, miscarriages or carried out for medical reasons to develop vaccines (Redondo Calderón, 2008). This fake news gives rise to others that use experimentation with human foetuses, although by a different sender.

4.5 Credibility and purpose of fake news

With respect to the credibility of fake news, this article has dealt with the primary features of false messages that use sensational headlines, errors, spelling mistakes and manipulated images, among others. In this connection, the focus group's health worker highlights emotions again and says: "Our moods and the moment in which we receive them also influences how we feel about the piece of news and affects our decision to resend it or not".

The remainder of the participants of the focus group think that many of them are easily detectable and that they only share those they believe or may still cast doubt on but consider harmless. Therefore, they trust their own judgement to distinguish truth from falseness. However, all of us are actually misled; we receive one false article at least once a day. A study shows that 60% of individuals believe they can detect a fake news story; however, in fact, only 15% can successfully do so (Amorós, 2018a).

None of them have reported fake news stories through the fact-checking methods offered by the social networks or other organisms. When they receive a piece of news that seems to be false, they just ignore it. The computer scientist explains that he tries not to forward any of them because he had shared and commented on an article about a person who had been banned by his country's political regime a few years ago on Facebook, and his post was blocked.
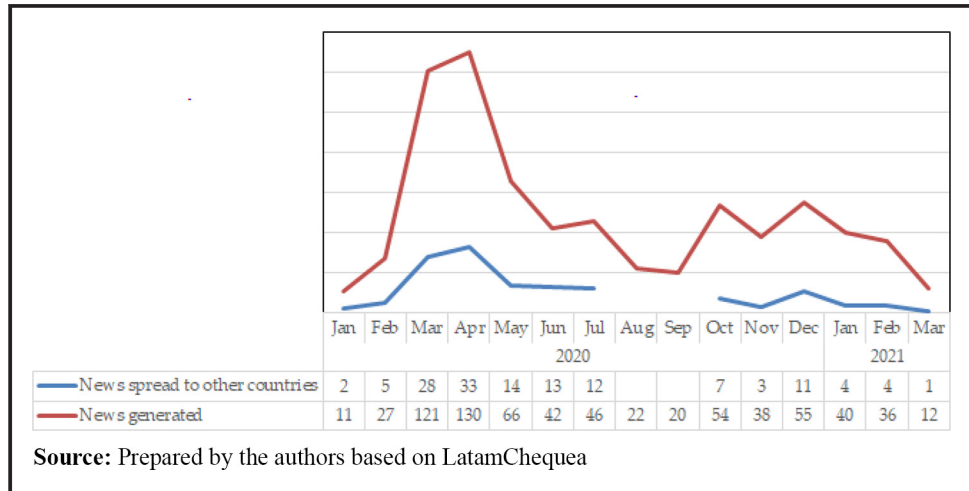
We contribute to the spread of fake news stories by not reporting the information that seems false and by sharing others we believe to be true without checking their veracity first, only because, in many cases, they were sent by our contacts. This is how fake news stories are disseminated, go viral, and cross boundaries, thereby making it harder to identify their original senders; 20% of false articles from the database we are using have been spread to other countries, with the USA being one of the countries where they have been replicated the most and thus reflecting their large influence at the global level.

Figure 7 shows that the replication of fake news in other countries has developed in parallel with their generation.

As fake articles are disseminated, their irreversible negative effects become intensified because "denial is not efficient when it comes to reducing the impact of a false story" (Amorós, 2018b). This is striking for the member of the State Forces who is a part of the focus group because several fake news stories "are later disproved, with neither a guilty person nor consequences for anyone".

The information included in false articles is a key aspect to assess their intentionality. This is how we could see, as shown in Table 4, that checkers have classified most fake news stories as viral disinformation" (95%). These are redrafted messages based on previous pieces of news, which is an important factor because this suggests a clear manipulative aim.

Explanatory articles are records that clarify the characteristics and circumstances of the pandemic, all of them being corroborated by Maldita and clearing up data regarding evidence from the science field or official bodies. As an example, several messages warn against thieves impersonating health workers who conduct coronavirus tests to steal from homes in Madrid, Palma de Mallorca, and Vitoria. All of these have been verified by

Figure 7 Articles spread to other countries vs total news stories created

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
					2020									2021	
News spread to other countries	2	5	28	33	14	13	12			7	3	11	4	4	1
News generated	11	27	121	130	66	42	46	22	20	54	38	55	40	36	12

Source: Prepared by the authors based on LatamChequea

Table 4 Type of article

Intention	%
Viral disinformation	95
Explanatory	3
Fact-checking on public figure	2
Fact-checking on media	1

checkers, including the response from the state bodies and security forces, thereby confirming the false nature of the article.

Finally, checking articles are verifications of messages spread by public figures or some mass media. For example, the website alertageo.org posted a world map showing how the coronavirus spread after inhabitants of Wuhan had left the city by using indicative lines and endorsing the picture, according to the University of Southampton. The picture went viral through Twitter shortly afterwards (the tweet is no longer available). The checker confirms that these are global flight routes that bear no relation to the COVID-19 disease.

4.6 Fact checking

Disinformation in the social media poses a serious problem affecting its more than 4 billion users worldwide, i.e. over 50% of the total global population (Hootsuite, 2021). Such figures present an actual challenge for humanity. Governments, companies and the overall population have been concerned regarding the consequences of this phenomenon for years in an attempt to fight disinformation through research and collaborative projects. In this regard, some experts believe that the best way to combat misinformation is to flood the landscape with accurate information that is easy to digest, engaging and easy to share on mobile devices. It must also answer people's questions and, ultimately, their fears (Clemente, 2021).

This is how fact-checking news platforms have emerged worldwide with the objective of verifying the authenticity of the information, including AFP Actual, EFE Verifica, Newtral, Maldita, and Verificat in Spain. These implement a strict code of conduct promoting transparency and good practices in journalism. There are many fact-checking sites and

projects available, such as the WHO's COVID-19 observatory and the UN's Verified initiative.

The pandemic has led Facebook, which subsequently owns Instagram and WhatsApp, to start checking posts by using verification organizations and banning COVID-19-related false stories. In this way, it deletes every article disproved by health authorities.

For its part, Twitter also has agreements with fact-checking organizations that review tweets and delete those that may be detrimental to health and contrary to the recommendations made by health authorities as explained by the Twitter Spain account.

However, this step is harder to take in WhatsApp because messages are coded and checkers may only access them if users agree to provide them. The most effective task implemented has involved restricting message forwarding to five recipients, particularly to prevent the uncontrolled dissemination of false stories.

To check for the effectiveness of said measures, we have searched for a fake news story listed in the database on Twitter, and verifying that all comments have been deleted is difficult. We selected the article "An Argentinean doctor discovered and began giving a coronavirus vaccine in Spain" from the database LatamChequea, only to find that many profiles have labelled it as fake or false and linked to the disproval information included in Newtral's website. By contrast, it remains on other sites as a true article. In other words, these mechanisms are not always effective, and thus, extreme caution should be exercised.

5. Conclusions

The information consumption habits of the new generations are advancing in parallel with the development of social and messaging networks – WhatsApp, Facebook and Twitter. This has become a crucial problem due to the alarming lack of judgement of adolescents about the veracity or falsity of fake news circulating on the network, which in many cases serves manipulative interests (Sánchez García, 2021).

Social networks have been the perfect place to disseminate and viralize all types of fake news related to the COVID-19 pandemic and particularly those concerning prevention measures, vaccines, and other treatments for this virus. WhatsApp has been the most widely used social platform. In fact, WhatsApp is one of the main channels for spreading fake content because it is the ideal terrain for doing so. It has no external verifiers and works on trust bubbles. People share what they get from people in their environment, and many of the stories they share are not true, leading to wrong decisions (Cifuentes-Faura, 2020). Although the most striking fact has been found to be the highest figure corresponding to false stories that have been disseminated through different social media at the same time. This suggests the strong virality and diversity of media selected by users in these cases, in addition to the fact that a fake news story spread through various means at the same time may be considered a repetition, and therefore, it becomes even more popular.

Said pieces of news originated during the first year of the pandemic, with two peaks standing out and accounting for over half of false stories. The first peak, which was the highest, took place between March and April of 2020, in full lockdown, whereas the second peak occurred between October and December, coinciding with the arrival of the vaccine, in addition to the second wave. The news stories that went viral the most at the beginning of the pandemic are related to prevention measures, the country's situation, and the origin of the virus, whereas articles disseminated during the second wave focused on the vaccines and other treatments; themes that were of major concern when they were created.

The creation of new fake news was quite simultaneous with the number of deaths as the pandemic evolved. This data is disclosed as a driving factor for the creation of fake news, rather than the number of infected people. The information regarding the number of deaths was largely available at all times in every mass media.

Facebook and Twitter are increasingly strict with government-run media in their policy of avoiding the transmission of hoaxes, such as the information on pandemics coming from the Chinese public media. The rise of social networks has only changed one circumstance: now it is not only the power of governments with their media and broadcasting agencies that can spread hoaxes (Elías, 2020).

This research identifies only 8% of the issuers of all these fake news, some of them being influencers, internet portals or renowned artists. To this, we must add that it seems that the audience largely believes that they recognize fake news by their own criteria; 53% of Spaniards recognize that they encounter fake news every day or almost every day (Rodríguez, 2019), so it is not very common for them to contrast them. Nor is there much of a habit of reporting fake news to the relevant agencies.

Only 8% of senders of said fake news stories can be identified, some of them being influencers, Internet portals or renowned performers. Furthermore, it seems that the audience largely considers that they are capable of recognizing false articles on their own, and thus, they are not used for cross-checking. They are not in the habit of reporting said fake news stories to the relevant bodies. The anonymity of people disseminating these fake news stories is striking; however, everything adds up for them to rapidly spread, in addition to the fact that one fifth of them have become known in other countries, with the USA being most prominent in this regard. The larger the number of fake news stories, the more likely they are to spread to other territories. This leads us to believe that the reality of fake news far exceeds the database we have used as a sample.

The manipulation and intentionality of fake news are also proven based on its classification as viral disinformation, applicable to 95% of the articles under study, and corresponding to pieces of news that have been rewritten based on other pre-existent articles.

In this context, for young Spanish journalists belonging to generation Z, social representations and perceptions of misinformation are one of the biggest challenges they will have to face during their professional careers. For these young professionals, the solution to this phenomenon of disinformation in social networks would be based on increasing the rigor, ethics and quality of journalistic work. And also the adoption of new models of communication with audiences that are more bidirectional to recover lost credibility (García-Marín, 2021).

Young people are not interested in being informed through conventional media, as they prioritize audiovisual media for immediate consumption. This preference, based on immediacy, also generates a problem of misinformation (Mendiguren *et al.*, 2020).

An example of an immediate consumption application that is the most used by generation Z, along with YouTube (Annual Social Media Study, 2020), is the instant messaging application WhatsApp. This application joins the other social networks as one of the most preferred by young people for information (Newman *et al.*, 2017). In this hyperconnected context, news is spread at great speed, being taken for true, without even being contrasted, and, as concluded by the study conducted by Mendiguren *et al.* (2020), 87% of young people recognize having taken as true information that was not.

In this context, it is of vital importance to provide young people with the mechanisms to be able to identify these false news and thus limit their dissemination.

Finally, social networks have been implementing measures to counteract disinformation for a long time. With the pandemic, the fact-checking protocols have been made stricter, thereby censoring information against official sources for the purposes of protecting the audience from the fatal consequences of this phenomenon. However, to verify that these mechanisms are not always effective, we must remain vigilant.

In conclusion, eradicating disinformation proved to be a challenging task, although we may reduce its impact through interventions at different levels: first, governments and international

institutions must promote rules that force social media to use all means – both human and algorithmic – to reduce the impact of fake news; second, social media in particular must implement human and algorithmic resources to detect false news supplemented by the resource of implementing fact-checkers and other mechanisms; and third, the users, especially young people, must learn to distinguish fake news in order to reduce their virality and thus lessen their potential damage. In this sense, it is essential to educate children and young people about the risks that may exist on the Internet, and help them to make responsible use of the devices and their presence on the Internet, in order to avoid negative physical and/or psychological consequences for them (Teba Fernández, 2021).

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