Public health communication and the Covid-19: A review of the literature during the first wave

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Abstract

The expansion of the Covid-19 virus in early 2020 grew in parallel with the spread of rumours, false or unverified news and even contradictions between information sources and health sources. It has been the first pandemic to be broadcast live on social media and has generated disinformation which was described by the *WHO* as an "infodemic", a pandemic as serious as the virus itself. The aim was to identify and analyse the impact generated by the first wave of Covid-19 (January-June 2020) on public health communication. The review was carried out under the *Prisma* guidelines. A systematic search was performed in *PubMed*, *Scopus* and *Web of Science* databases, which yielded a figure of 1.157 papers. Using seven keywords as a filter a corpus of 193 articles was reached. Four main themes were identified: 1) Need for massive public health literacy; 2) Social networks as an information and disinformation during pandemic; (3) The uncertain response of institutional communication; and (4) Media coverage of the pandemic. The authors propose large-scale health literacy and point out the need to work on health information together -governments, health institutions and the media-.

Keywords

Systematic review; Covid-19; Coronavirus; Infodemics; Health communication; Public health; Ehealth literacy; Social media; Social networks; Disinformation; Health information; Pandemics.

1. Introduction

The Covid-19 pandemic is a Public Health Emergency of International Concern (PHEIC). Worldwide, 634.5 million infections and more than 6.5 million deaths were counted as of November 21, 2022 (*World Health Organization*, 2022). This is the fifth PHEIC declared by the *WHO*, the four previous ones being

- the severe acute syndrome (SARS) pandemic in 2002-2004 in China and Southeast Asia;
- H1N1 swine influenza in 2009;
- the Middle Eastern respiratory syndrome (MERS) in 2013 in Saudi Arabia; and
- Ebola in 2014 in Africa.

Covid-19 was a true health crisis situation on a global scale, affecting the whole population of the world. This pandemic can be described as an unexpected crisis in which critical elements coincided such as:

> "the surprise factor, destabilization, stress and the reduction of time that determine decision-making, the emotion of the affected public, media pressure, the challenge for the image of the authorities and the danger to the position of power the governing officials" (**Crespo-Martínez**; **Garrido**, 2020).

The different communication models were disrupted the pandemic. There was no clear responsible beyond those pointed out by the political *framing*. Moreover, this crisis has generated infinite economic and social crises that have led to a very alarming situation in all countries (**Xifra**, 2020). From a strategic point of view, it has affected different sectors and publics –governments, institutions, media, citizens, companies, among others– (**De-la-Hoz**, 2014), and has required global health coordination between many countries to solve it.

During the Covid-19 pandemic, digital channels and, above all, social networks have had a clear preeminence as tools at the service of institutional communication to inform the population in a fast and accessible way, and to establish effective relationships with the public (**Castro-Martínez**; **Morán-Urdiales**; **Díaz-Morilla**, 2021). In previous pandemics, the value of social networks as a tool to quickly inform the population was already highlighted (**Vijaykumar**; **Nowak**; **Himelboim**; **Jin**, 2018). However, in this pandemic they have gained a special role, generating such an incredible volume of news which made impossible to discern between reliable and non-reliable information. The speed with which information circulated, and the mixture of erroneous and contradictory news has made containment measures difficult and has become an additional threat. The *WHO* has denounced this situation, which constitutes a great challenge for public health communication, and has pointed out that this deluge of inaccurate and contradictory information is the main obstacle to public health policies and, consequently, to preventive actions and interventions (**Venegas-Vera**; **Colbert**; **Lerma**, 2020).

All this has highlighted the need for digital literacy to be able to search, understand and evaluate the health information conveyed in digital channels in relation to pandemic prevention and control measures, since low literacy is directly related to misuse of information (**Choukou** *et al.*, 2022). Health literacy encompasses people's knowledge, motivation and skills to find, understand, value and apply health information, as well as to make informed judgments and decisions about health care, disease prevention and health promotion to act accordingly (**Juvinyà-Canal**; **Bertran-Noguer**; **Suñer-Soler**, 2020). The proper use of communication channels contributes powerfully to the promotion of health and public awareness of the causes and remedies in the face of a pandemic, which generates a positive impact on the behavior of the population in relation to their health (**Mheidly**; **Fares**, 2020).

One of the key elements in dealing with the so-called PHEIC is how communication is managed in public health (**Mirbabaie** *et al.*, 2020). **Bernhardt** (2004) defines it as

> "the scientific development, strategic dissemination and critical evaluation of relevant and accurate information, in an accessible and understandable way, in order to improve population health."

Its main objective is to generate behavioral changes in the population which must be done with a strategy that puts health objectives before the satisfaction of mere informational curiosity. As **Glick** (2007) states, communication management is crucial in the administration of a public health crisis, which is why the *Centers for Disease Control and Prevention* (*CDC*) consider it one of the 15 key points in preparing for a health emergency (*Centers for Disease Control and Prevention*, 2018).

Public health communication aims to instruct the population in their personal health management (**Paakkari**; **Okan**, 2020), helping to mitigate the risks of contagion, supporting official protection measures and reducing the negative impact on citizens' mental health as a result of a pandemic. Since the beginning of Covid-19, local and international public health agencies have used the media to inform the population immediately about the evolution of the pandemic, with the aim of raising awareness and reducing the impact of the spread of the virus on the population (**Mheidly**; **Fares**, 2020).

All stakeholders (Ministries of Health, Public Health Agencies, etc.) should join efforts to conduct health education campaigns on the pandemic and preventive behaviors, ensuring that information is clear, truthful and credible (**Frieden**, 2014). The use of the media as channels of health information has highlighted the importance of health literacy and, in particular, the importance of digital literacy. The *WHO* defines health literacy as

"the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use information and services to make decisions about health" (*World Health Organization*, 2015).

As **Naeem** and **Boulos** (2021) point out, such literacy is essential to deal with a global health crisis, as it exponentially increases the resilience of the population.

A retrospective analysis of the first PHEIC has shown the importance of media campaigns to inform the population and educate them about preventive measures (**Savoia**; **Lin**; **Viswanath**, 2013; **Basch** *et al.*, 2020; **Liu, Q.** *et al.*, 2020). Likewise, a systematic review on the use of social networks during the Ebola epidemic showed a strong breakdown in health communication that led to widespread panic among the population due to the misuse of new technologies (**Roberts** *et al.*, 2017; **Wong** *et al.*, 2017).

The Covid-19 pandemic, and specifically this first wave, introduced important challenges for health communication for governments and authorities. The analysis of this communication during this phase of the health crisis has generated not only valuable knowledge, but also relevant conclusions to improve communication strategies for future health emergencies.

2.1. Search

The first step was to implement an adequate search strategy in the main databases. Due to the theme of our study, we used *PubMed*, and for the scientific relevance of the databases, *Web of Science* (core collection) and *Scopus*. The literature review was carried out in these databases as the outcome of our study was communication in public health. The dates indicated by the *WHO* were established as a time frame: January to June 2020. Table 1 shows the search strategy implemented in *PubMed*. This same strategy has been implemented in *Web of Science* and *Scopus*, adapting the terms to the specific language of each of these bases. The results obtained were imported into the *Rayyan* screening tool, to extract duplicates and select the articles.

2.2. Eligibility criteria

The second step was to rigorously determine the criteria for inclusion and exclusion of the articles. Articles that analyzed public health communication during the first wave of the Covid-19 pandemic in any communicative context (media, social networks, advertising campaigns, institutional communications, etc.), with any type of format and design, and published in English or Spanish, were included.

The search strategy in the three databases yielded 2,206 references (*PubMed*: 720, *Web of Science*: 316, *Scopus*: 1170; search date: July 2020). A total of 1,049 duplicates were removed and further 954 that did not specifically address the issue raised were discarded. Finally, a total of 193 articles were selected (Figure 1).

Table 1. Search strategy in the *PubMed* database

Terms used in *PubMed* (10/07/2020)		Nº of references
#1	covid-19	30,423
#2	coronavirus	35,044
#3	#1 OR #2	47,134
#4	public health campaign*	1,036
#5	media	497,391
#6	health communication	7,182
#7	health information	33,186
#8	health literacy	10,636
#9	#4 OR #5 OR #6 OR #7 OR #8	542,503
#10	#3 AND #9	720

2.3. Synthesis

The study review process was carried out by all four researchers. It was done independently and in three sub-phases following the *Prisma* guidelines (**Moher** *et al.*, 2009): 1) Review by title, 2) Review by abstract, and 3) Review by full text based on the inclusion criteria. The reasons for exclusion of full text were recorded (Figure 1). Any discrepancies in the selection process were resolved by discussion among the members of the research team. An ad hoc data extraction matrix was designed with the following list: first author, year of publication, country of the PI, country under study, study design, aim, main results and conclusions.

2.4. Analysis

The data in the extraction table, as well as the main objectives and results, were analysed by means of a thematic analysis

Figure 1. PRISMA Flow Diagram studies selection

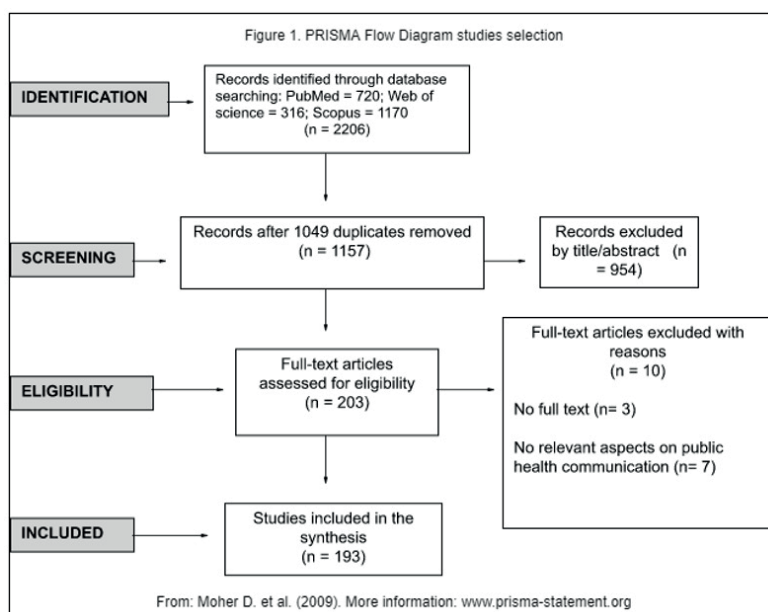From: Moher D. et al. (2009). More information: www.prisma-statement.org

Figure 1. Scheme of the bibliographic search

that took into account the key concepts alluded to in the title, abstract and body of the article. Because of the nature of this study, approval by an ethics committee was not required.

3. Analysis and results

The analysis of the articles shows that most of the published works have studied the pandemic as a global issue, with reference to its incidence in the general population (n=91). In terms of geographical overview, the countries that were the subject of a more specific study were: China (n=19); United States (n=17) and United Kingdom (n=12), in first place; followed by India (n=4), Pakistan (n=3) and South Korea (n=3). The other countries have had a residual frequency.

Regarding the type of article, the following articles fall from highest to lowest in: original studies (119), commentaries (32), reviews (17), letter to the editor (14), editorial (7) and gray literature (4). Regarding the design of the original studies, 91 of them were cross-sectional quantitative studies and 28 qualitative studies. Of these, 13 were descriptive and 15 case studies.

The literature review allowed us to identify four main themes:

(1) The need for mass public health literacy (n=63);

(2) Social networks as a source of information and misinformation (n=105);

(3) The uncertain response of institutional communication (n=27); and

(4) Media coverage of the pandemic (n=31).

The total of the 4 themes adds up to 226 articles because several of them address more than one storyline. We describe each of the themes below.

3.1. The need for mass public health literacy

Some authors point to the importance of an urgent improvement in public health literacy (**Abdel-Latif**, 2020; **Abel** and **McQueen**, 2020; **Finset** *et al.*, 2020; **Gray Back**, 2020; **Liao** *et al.*, 2020; **Lin, Y. H.** *et al.*, 2020). A total of 63 works affirm this exhaustively and an editorial by **Van-den-Broucke** (2020) highlights the desire and determined will of the population to be well informed. For the authors, responding to this social need is unavoidable in the face of upcoming health emergencies (**Li, S.** *et al.*, 2020; **Liu, P.** *et al.*, 2020; **Paakkari** and **Okan**, 2020).

Quite a few authors also see the need to involve the population in the adoption of preventive measures, changing the common tendency to leave all responsibility in government hands. Awareness needs to be raised so that they have greater control over their health (**Habersaat** *et al.*, 2020; **Lazcano-Ponce** and **Alpuche-Aranda**, 2020). **Hashemi-Shahri** *et al.*, (2020) demonstrate with data how poor literacy leads to a greater spread of the pandemic. **Chan** *et al.* (2020) also point out that the lack of information has endangered health professionals, increasing their chances of contagion. Other authors have highlighted that, although internet searches have sometimes facilitated the adoption of preventive behaviors (**De Coninck** *et al.*, 2020; **Kamenidou**; **D'Haenens**; **Matthijs**, 2020; **Liu, Q.**, 2020; **Yusof** *et al.*, 2020), citizens have often failed to interpret or transmit information with due prudence (**Harnett**, 2020). Also the saturation of content has made it difficult to decide which sources deserved confidence and which did not (**Lima**; **Albanez**; **Brito**, 2020).

The importance of informing in a language accessible to all is also noted (**Airhihenbuwa** *et al.*, 2020; **Karamouzian**; **Johnson**; **Kerr**, 2020), especially for those most vulnerable (**Rudd**; **Baur**, 2020). **Kluger** and **Scrivener** (2020) highlight that people use more informal language when searching the internet; therefore, others advice offering visual and educational content (**Adam**; **Bärnighausen**; **McMahon**, 2020; **Ali**; **Bhatti**, 2020; **Chiodini**, 2020) or manifest the need to improve digital literacy (**Katapally**, 2020; **López**, 2020; **Sharma** *et al.*, 2020; **Szmuda** *et al.*, 2020). Some authors highlight the need to achieve an emotional connection with the public, giving prominence to the population (**Martínez-Estrella**, 2020).

To build trust, it is key that the information is transmitted by doctors publicly recognized as experts in the field. Messages should not be based on fear, nor should they use a paternalistic tone; rather, they must build trust in the community, relying on standards recommended by health workers and adopted by all (**Bilal** *et al.*, 2020; **St. Amant**, 2020; **Wang** *et al.*, 2020). Finally, health workers should not be portrayed as 'heroes', as this puts on them

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the psychological pressure to feel obliged to work beyond their duty, while reducing the population's awareness of their responsibility for their own health and the obligation to comply with health measures (**Cox**, 2020).

3.2. Social networks as a source of information and misinformation about the pandemic

Covid-19 has been the first pandemic broadcast live through social networks, which have been hyper-consulted before each turn of the health crisis (**Bento** *et al.*, 2020). Unlike what happened in other crises –such as Ebola or avian flu– the governments and health workers found themselves unable to control the flow of information, outpaced in time and credibility by social networks and overwhelmed by the saturation of unverified information. A total of 105 articles analyze this phenomenon.

3.2.1. Widespread disinformation

The authors harshly criticize the role of social media in the early days of the pandemic. They are accused of having massively disseminated fake news and unverified news (**Ahmed-Siddiqui** *et al.*, 2020; **Armitage** *et al.*, 2020; **Romanò**; **Majerova**; **Machová**, 2020) with extraordinary ease to replicate rumors (**Bastani**; **Bahrami**, 2020). This has generated a new concept in public health: "infodemic" (information epidemic). This term, created in the networks themselves and officially adopted by the *WHO*, refers to the high and uncontrolled flow of news about the pandemic (**Kulkarni** *et al.*, 2020; **Lu, Y.**; **Zhang**, 2020), which has caused overexposure to the media, making it impossible to discern false information from true information (**Sasaki** *et al.*, 2020; **Sharov**, 2020). Within this concept, some authors (**Looi** *et al.*, 2020; **Mirbabaie** *et al.*, 2020) point out that continued over-information has also generated a negative and fatalistic impression of public health. In fact, the large amount of fake or exaggerated news has given rise to a climate of skepticism, along with complete disorientation (**Ippolito** *et al.*, 2020).

> ' Many authors see the need to involve the population in the adoption of preventive measures, changing the common trend of leaving all responsibility in government hands. '

This disorientation and misinformation has generated great concern among citizens (**Chong** *et al.*, 2020; **Ratzan**; **Sommariva**; **Rauh**, 2020). Hence, "the first measure to control the pandemic" is the need to verify any information before sharing it; instead, it is strongly advised to refer to official websites.

3.2.2. Beneficial effects of social networks

On the other hand, several authors highlight the effectiveness of social networks in the rapid transmission of protocols between medical staff and health authorities (**González-Padilla**; **Tortolero-Blanco**, 2020; **Gottlieb**; **Dyer**, 2020). They have also been shown to be effective in training and informing doctors and health workers (**Chan** *et al.*, 2020), emergency responders in health centers (**Merchant**; **Lurie**, 2020) and those who should manage public health information (**Amin**, 2020; **O'Brien**; **Moore**; **McNicholas**, 2020). Their potential use for rapid and effective communication with citizens is noted (**Bao** *et al.*, 2020; **Leng**; **Phua**, 2020; **Nazir** *et al.*, 2020), as they positively increase risk awareness (**Luu**, 2020; **Malecki**; **Keating**; **Safdar**, 2020;), contribute to the adoption of preventive measures (**Abd-Alrazaq** *et al.*, 2020; **Su** *et al.*, 2020) and are useful for soliciting volunteer collaboration (**Ekzayez** *et al.*, 2020; **Chen**; **Lerman**; **Ferrara**, 2020). Their systematic and protocoled use by public health officials is proposed (**Balhara**; **Chandiok**, 2020), as there is evidence that medical personnel are, in general, a reliable source for citizens (**Hunter**, 2020; **Lohiniva** *et al.*, 2020; **Topf**, 2020). Some articles appeal to health organizations, media and all stakeholders to create common platforms to disseminate quality information on the Covid-19 (**Jain**; **Sinha**, 2020; **Tasnim**; **Hossain**; **Mazumder**, 2020).

Other authors highlight the help that social networks have provided to medical students to act as health agents (**Huddart** *et al.*, 2020), as well as the intensive and beneficial participation of young people in digital channels (**Hashim** *et al.*, 2020; **Mohamad**, 2020; **Olaimat** *et al.*, 2020). In healthcare, social networks have contributed to the rediscovery of telehealth, which includes medical care via the internet and social networks (**Massaad**; **Cherfan**, 2020; **Mulrennan**; **Colt**, 2020).

3.2.3. Medical use of specific social networks

Several studies have focused on the analysis of a particular social network. Regarding *YouTube*, studies show that videos produced by health professionals or university professors have been more efficient than those disseminated by citizens or other information channels (**Fitz-Maurice**; **Di-Tommaso**; **Baranchuk**, 2020; **Kocyigit**; **Akaltun**; **Sahin**, 2020; **D'Souza** *et al.*, 2020; **Vervoort** *et al.*, 2020). This is why one author laments the fact that the US health authorities have hardly used this medium, a missed opportunity (**Basch** *et al.*, 2020).

Regarding *Twitter*, some authors point out that the information disseminated here by health professionals is, with exceptions, mostly adequate (**Shah**; **Kim**; **Mian**, 2020). Some good practices have been analysed (**Park**; **Park**; **Chong**, 2020), such as the creation of an account for physicians' communication with patients with diabetes (**Iacobucci**, 2020), the #GetMePPE movement to raise awareness of protective measures (**He** *et al.*, 2020) and its use for monitoring people with sclerosis (**Nesbitt** *et al.*, 2020). In contrast, it is clearly noted that the G7 world leaders made controversial use of this network during the pandemic (**Rufai**; **Bunce**, 2020).

Some authors have tested the effectiveness of specific networks in providing information to specific groups of patients: *Facebook* for communication with patients with diabetes (**Isip-Tan** *et al.*, 2020); *WhatsApp* as an alerting network and medical surveillance system (**Ekzayez** *et al.*, 2020); *Weibo* as a source of information for patients with coronavirus (**Huang** *et al.*, 2020); and in some cases the use of *Facebook* live to disseminate medical information in real time has also been proposed (**Kauffman** *et al.*, 2020).

3.3. The uncertain response of institutional communication

Institutional communication has proved uncertain for many authors and a lack of coordination between the various institutions at national and international level has been observed, which has increased the existing disinformation. A total of 27 papers refer to this topic, which we have divided into two thematic areas.

3.3.1. Criticisms of government and institutional communication

The Covid-19 crisis has also been a political and health communication crisis. Several factors have contributed to this: partisan use, disparity of health criteria, minimisation of risk by governments and lack of accountability in some media (**Gollust**; **Nagler**; **Fowler**, 2020). The inaction of authorities to combat fake news (**Pennycook** *et al.*, 2020), especially concerning magical cures or racist information (**Rathore**; **Farooq**, 2020), has been criticized in general, leading to many people ignoring health recommendations (**Brivio**; **Oliveri**; **Pravettoni**, 2020).

Several authors point out that governments have not adequately coordinated the dissemination of information, which explains why they have generated so little trust in society. Some criticize the scant information on protective measures (**Hu** *et al.*, 2020; **Ruiu**, 2020), or the self-sufficient way in which some leaders have managed the transmission of this information, prioritizing economic development over pandemic containment (**Singer**, 2020). Two striking examples were Trump's promotion of hydroxychloroquine without *Health Department* approval (**Samy**; **Ahmed**; **Kelada**, 2020) and the British government's changing attitude towards the virus: first it spoke of "containing it", then of "delaying it" and finally it proposed "herd immunity" (**Cowper**, 2020).

3.3.2. The need to rethink institutional public health communication

Several articles propose strengthening and improving the response of governments and health institutions towards public opinion: to prevent epidemics or to cope with them and to foster government-society-citizen collaboration to jointly combat them (**Han** *et al.*, 2020; **Harnett**, 2020; **Zhao** *et al.*, 2020; **Zhu** *et al.*, 2020).

A study has been conducted on how various institutional groups (government leaders, social media companies and healthcare providers) could jointly respond to the communication challenges of Covid-19 and their role in preventing relevant but uninformed voices from generating mistrust or endangering public health (**Limaye** *et al.*, 2020; **Yin** *et al.*, 2020). Some outline digital initiatives that can help institutions respond more proactively (**Dheeraj**, 2020; **El-Jardali**; **Bou-Karroum**; **Fadlallah**, 2020; **Huang** *et al.*, 2020; **Jayawardena** *et al.*, 2020; **Raamkumar**; **Tan**; **Wee**, 2020; **Rashid**; **Wang**, 2020; **Schillinger**; **Chittamuru**; **Ramírez**, 2020). **Bilbatua** *et al.* (2020) point out that the strategic public health communication response should have three objectives: to address citizens' need for information; to pre-empt misinformation; and to build trust in health institutions. **Eysenbach** (2020) identifies four pillars for infodemic management: 1) information monitoring (info-surveillance); 2) fostering health literacy; 3) better data verification and peer review; and 4) knowledge sharing, minimizing political or commercial interference.

Finally, **Guest**, **Del-Río** and **Sánchez** (2020) indicates three key steps to end Covid-19: health leadership, rapid innovation and political will. A key element on which several authors agree is that there should be a strategy of international, national and EU coordination, through the creation of partnerships and common platforms to disseminate quality information (**Sahoo**; **Sahu**; **Kankaria**, 2020; **Tasnim**; **Hossain**; **Mazumder**, 2020).

3.4. Media coverage of the pandemic

In contrast to the negative view of social media, the 31 articles that analyse media coverage offer a generally positive view; perhaps this is why they have experienced an increase in readership during the pandemic (**Casero-Ripollés**, 2020; **La** *et al.*, 2020; **Mahima** *et al.*, 2020). Some attribute this increase to their empathy with people's suffering (**Barile**; **Bovalino**, 2020); others to their ability to mitigate the tendency to scaremongering (**Bilal** *et al.*, 2020); and others to their ability to raise awareness about preventive measures (**Chang** *et al.*, 2020; **Segura**, 2020; **Sezgin**; **Karaaslam**; **Ersoy**, 2020), key factor in mitigating the spread of the disease (**Bilal** *et al.*, 2020; **Yan** *et al.*, 2020).

For health professionals the media has generally been seen as a reliable source (**Ko** *et al.*, 2020; **Walker**; **Sulyok**, 2020; **Wang** *et al.*, 2020), providing them with the means to assess the evolution of the pandemic (**Dkhar** *et al.*, 2020; **Karasneh** *et al.*, 2021; **Liu**, 2020). Hence, some have encouraged the presence of health professionals and academics in the media, to support the measures taken by health authorities (**Laufer**, 2020).

To a much lesser extent, other authors have criticised the "infodemics" that the media itself has generated (**Oh** *et al.*, 2020), by continuously and falsely disseminating negative news (**Cuan-Baltazar** *et al.*, 2020; **Ippolito**, 2020; **Rommer**; **Majerova**; **Machová**, 2020) and allowing a wave of fake news that has fostered racism (**Rovetta**; **Bhagavathula**, 2020), increased public anxiety (**Arora**; **Grey**, 2020; **Wen** *et al.*, 2020) or generated unease in financial markets (**Haroon**; **Rizvi**, 2020).

However, the main complaint has been in the reverse direction: government pressure on the media to control information on Covid-19 has been criticized. This has been particularly notable in India (**Singh**, 2020), where the authorities refused to listen to voices critical of their management; and in China, where official media reports were highly inconsistent with those issued in the rest of the world (**Bento** *et al.*, 2020; **Fu**; **Zhu**, 2020).

> The role of social networks at the beginning of the pandemic is harshly criticized; they are accused of having massively disseminated hoaxes and unverified news, with extraordinary ease in replicating rumors

4. Discussion and conclusions

Below we point out the main conclusions of the results obtained from the general review of the literature.

1) The need for broad public health literacy is confirmed. It has also been noted that the current lack of public health literacy education severely limits the adoption of preventive behaviours (**Hashemi-Shahri** *et al.*, 2020). A cross-sectional study conducted in Vietnam at the beginning of the pandemic with 3,947 participants concludes that literacy has a protective effect against depression and improves quality of life (**Nguyen** *et al.*, 2020). Along these lines, there has been discussion in the health system in recent years on how to empower the population in public health decisions, as research shows how literacy and community participation in health are clearly interconnected (**McCormack** *et al.*, 2017). It is also recommended to involve expert health professionals to lead public literacy in the communication channels to which they should be given access.

There is also a need to inform by adapting the language to the general public. Some health organizations recommend writing information at a reading level equivalent to 2nd grade secondary education (13-14 years old) (**Badarudeen**; **Sabharwal**, 2010). Several studies highlight the usefulness of visual material for health education. The results of this review also suggest the importance of providing culturally segmented messages for each group of individuals, a strategy previously used in poor literacy contexts (**Luque**, 2018). **Airhihenbuwa** *et al.* (2020) propose tailoring information to a culturally appropriate framework to engage the community.

2) It highlights the relevance of social networks in the transmission of information and as potentially effective tools for communicating health emergencies, something already pointed out in previous epidemics (**Tang** *et al.*, 2018). On the other hand, the articles also point out the enormous proliferation of fake news in social networks, and the confusion and misinformation generated during the first wave; This confirms the need to take measures at the highest level to control the "infodemic" –the rapid spread of false or unverified news– and to incentivise the use of reliable sources of expert professionals. Previous studies had already shown this high prevalence of disinformation on social networks, as well as its capacity to induce fear, anxiety and distrust in institutions (**McDougall** *et al.*, 2019).

It underlines the desirability of health professionals and health and government institutions to better use their own social networks to carry out this task, giving voice to experts and using social networks as allies to disseminate immediate and truthful information.

3) It is also clear the need to strengthen institutional communication (health and government), leaving aside political and / or partisan interests in the search for culprits, as many analysts have criticized the biased use of information by some politicians and rulers, the excess of non-relevant information in official communications and the lack of measures to combat fake news. Similarly, it has been denounced that the authorities would not have been able to take advantage of a digitalized society, informing through traditional channels, which have often been of little relevance to the population.

It appears as a fundamental need to achieve adequate coordination in the management of communication in public health. This coordination should involve governments and health institutions -both internationally and at the national and local levels-, without leaving in government hands all the responsibility for the management of health communication. Prior to Covid-19, a study on social media information during the Zika epidemic (**Gui** *et al.*, 2018) revealed notable discrepancies between what the population is interested in or concerned about and the information provided by health authorities.

4) In the articles analyzed, there is a generally positive view of the coverage of the journalistic media during Covid-19, since they were empathetic with the suffering of the population, knew how to attenuate the tendency to alarmism and favored awareness of preventive measures. In addition, in the face of a health catastrophe such as the one that occurred, the need to raise morale and encourage the population to counteract the panic and anxiety generated by the pandemic became clear.

The authors point out the need for joint work between health authorities and the media to share reliable information and use social networks in a coordinated way, as well as to actively counter misinformation (**Harnett**, 2020).

The present systematic review highlights as a strength the use of a comprehensive search strategy (*PubMed*, *Scopus* and *Web of Science*) that allowed the exhaustive review of the articles published during the first wave of Covid-19. The study selection process was conducted considering *Prisma* guidelines. It also highlights the high number of articles included in the review, which has allowed us to understand the practical consequences in relation to public health communication for future pandemics. As limitations of the research, we must point out the inclusion of articles of different nature, and even of very different quality. However, our objective was to review all publications of scientific journals that examined communication in public health, so no type of articles was excluded. Another limitation of this review has been the time frame in which it was carried out, taking into account that some publications referring to the first wave had to be published later. Finally, we must note the limited methodological design, which had to be simpli-

> ' The climate of social alarm was increased by the appearance of conspiracy theories, which led to distrust of sanitary measures '

fied due to the exceptional production analyzed. In this sense, the large volume of articles included in this review has not allowed an integrative analysis, leaving the results obtained at a more descriptive level.

As a summary, we can conclude that the analysis of the articles on the first wave of Covid-19 has provided interesting proposals that could serve to improve public health communication in the face of future health crises. These include the presence and leadership of health professionals in the media in the face of a pandemic, and

> ' The extraordinary facility of social networks to replicate rumors and unverified news generated a new concept in public health: the "infodemic" (information epidemic). The WHO adopted this term to refer to the confusing, contradictory and uncontrolled flow of news about the pandemic. '

the need for adequate public health literacy among the population. It also shows the need for coordination between governments, health authorities and mass media to, from the beginning and unanimously, counteract possible social alarm and misinformation. Likewise, it is committed to the use of social networks as a habitual channel for general and frequent information about the state of the pandemic and for communication between doctors and health authorities. The networks, which in inexperienced hands caused confusion and anxiety during the first wave, must transmit clarity and serenity in authorized and reliable hands, taking the lead in communicating any incident and clearly explaining the ways to prevent contagion. For this, it will be essential to segment the audiences to which to direct the communication, and adapt the messages to an informative level, prioritizing visual communication over verbal communication. We believe that the findings reported in this review can contribute to improving the design and coordination of communication strategies in the face of future pandemics.

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