Sourcing pandemic news: A cross-national computational analysis of mainstream media coverage of COVID-19 on Facebook, Twitter, and Instagram

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Abstract

This article explores the uses of sources in coverage of the COVID-19 pandemic in social media posts of mainstream news organizations in Brazil, Chile, Germany, Mexico, Spain, the U.K., and the U.S. Based on computational content analysis, our study analyzes the sources and actors present in more than 940,000 posts on COVID-19 published in the 227 Facebook, Instagram, and Twitter accounts of 78 sampled news outlets between January 1 and December 31 of 2020, comparing their relative importance across countries, across media platforms, and across time as the pandemic evolved in each country. The analysis shows the dominance of political sources across countries and platforms, particularly in Latin America, demonstrating a strong role of the state in constructing pandemic news and suggesting that mainstream news organizations' social media posts maintain a strong elite orientation. Health sources were also prominent — consistent with the defining role of biomedical authority in health coverage—, while significant diversity of sources, including citizen sources, emerged as the pandemic went on. Our results also revealed that the use of specific sources significantly varied over time. These variations tend to go hand in hand with specific global milestones of the pandemic.

Keywords: *COVID-19, sources, journalism, news, social media, computational analysis, comparative research, Facebook, Instagram, Twitter.*

Since the beginning of the COVID-19 pandemic, journalists have shifted from an everyday reporting mode to a full health crisis mode of news coverage. Journalism and the media have addressed the pandemic from every conceivable angle: health, politics, economic measures, science, lifestyle, sports, and celebrity, among many others, while the digital platforms used by

mainstream media to communicate with their audience have played a key role in the dissemination and discussion of the disease and its consequences on various levels (e.g., Boberg et al., 2020; Garfin et al. 2020; Quandt et al., 2020).

In the context of this public health crisis, journalists and the media have been criticized for a number of often contradictory failings. These include causing unnecessary panic, promoting risky behavior, displaying negative sentiments, spreading misinformation, and generating a lack of trust among different groups in society (Brenner et al., 2020; Boberg et al., 2020; Phillips, 2020). Journalists also have been accused of focusing on a very small number of actors, generating a lack of plurality in the news. Furthermore, they have been criticized for relying too much on official sources –including decision-makers, economic leaders, experts, and political figures–, and for providing uncritical coverage of the crisis (Boberg et al., 2020). Other voices have judged them for over-politicizing the coverage of the pandemic, leaving aside the expert and more technical voices of health sources that are better qualified to address the public during this sort of event (Hart et al., 2020).

Such criticisms take us to one of the defining features of news production: the entities that journalists allow to "narrate" their stories. One key indicator of authority in public discourse is the sources that news professionals include in their reports as "primary definers" (Hall, et al., 1978) and "authorized knowers" (Hallin, Manoff and Weddle, 1993; Schudson, 2003). While news sourcing research has a long tradition and has contributed to our understanding of the voices that dominate both everyday news (Reich, 2009; Fisher, 2018) and health crises (e.g., Hallin et al, 2020; Briggs and Hallin, 2016), it also presents important limitations. First, studies on news sourcing have not systematically considered the extent to which the expansion of social media has changed the way journalists and the media source the news, and comparative efforts have focused

on traditional media platforms (Nwakpu, Ezema and Ogbodo, 2020) or specific digital platforms (Quandt et al., 2020), more than across the social platforms that the media use to inform the public.

Most studies specifically focused on sources and health news dealing with regular coverage rather than health crises and pandemics (e.g., De Dobbelaer et al., 2018; Hallin et al., 2013; Stroobant et al., 2018). Furthermore, research on news sources has mostly focused on individual national systems, or has used a limited sample of countries (e.g., Holland et al., 2014; Wallis and Nerlich, 2005; Brossard et al., 2004; Da Silva Medeiros and Massarani, 2010; Shih et al., 2008). Finally, they have also been bounded in time mostly because previous health crises lasted for a shorter period of time than the COVID-19 pandemic. In view of this, the investigation of how the media in different parts of the world source the news during a health crisis across social media platforms over time remains largely absent.

Against this backdrop, the aims of this study are twofold. In the first place, given that studies have consistently shown that media coverage varies across cultures, we compare the presence of different types of sources in COVID-19 coverage by mainstream news organizations on social media across countries. Secondly, the paper also unpacks the relationship between the use of different sources in the public representation of the crisis across different social media platforms, and the evolution of the pandemic.

Based on computational content analysis, our study analyzes the sources that 78 mainstream news media from Chile, Mexico, Brazil, the United States, the United Kingdom, Spain, and Germany used when covering the pandemic in their social platforms. Specifically, we analyzed more than 940,000 posts on COVID-19 published in the 227 Facebook, Instagram, and Twitter accounts of the sampled outlets between January 1 and December 31 of 2020.

Investigating news sourcing of a single pandemic across the digital platforms used by the media in different parts of the world provides valuable information about the dynamic that surrounds the role of the media in the construction of health as an object of public discussion (Hallin et al., 2020). This approach also elucidates its potential impact on society, especially given the extensive debates about the plurality of voices in the news. This is particularly important given that dominant voices may be aligned with the dominant political culture of each society (Hallin and Mancini, 2017), the organizational structures in which they are built (Mothes et al., 2020), or specific newsrooms' cultures (Reich, 2011). Also, focusing on social media coverage in various countries allows us to observe the adaptive capacities of traditional media on different digital platforms and their unique characteristics (van Dijk and Poell, 2013). Fisher (2018), for example, argues that the reporter-source relationship is not static and changes in response to the cultural, social, political and economic environment, as well as in response to developments in communication technology.

Sourcing Health News

News sources are one of the most important elements that news professionals use to support the claims made in their stories (Reich, 2009). In order to create the news, journalists must develop relationships with sources while defending their independence and authority as professionals. The relationship between journalists and their sources tends to swing back and forth between cooperation and conflict (Sigal, 1973; Strömbäck and Nord, 2006; Gans, 1979), and between a straightforward exchange of information and a heated battle (Fisher, 2018).

Research in journalism has traditionally analyzed the presence of entities who are cited as sources in the news in order to evaluate which sector of society dominates the media agenda. The variety and "authoritativeness" of the sources chosen by journalists are key indicators of the

pluralism of information within media ecosystems (Maldonado and Balbontín, 2019). These practices may shift depending on the political, technological, social, and cultural context and in response to specific events such as electoral processes (López, 2020), climate change (Schäfer, Ivanova and Schmidt, 2014; Leas et al., 2016), gender biases (Leavy, 2019), natural disasters (Sood, Stockdale and Rogers 1987; Takahashi, Zhang and Chavez, 2019), and health and pandemic crises like COVID-19.

Health news coverage is a specialized news beat (Briggs and Hallin, 2016), and is distinctive in important ways. A key factor distinguishing health news is the strong cultural authority of biomedical science, and the fact that health knowledge is widely seen as a kind of knowledge properly produced by experts, with journalists playing the role of translating it for lay persons and educating them in health literacy (Forsyth et al., 2010, Logan, 1991). Health sourcing has been analyzed from the perspective of credibility, expertise, and trustworthiness in that sources must show competence, report accurate information, and make valid assertions (McCroskey and Young, 1981; Metzger and Flanagin, 2015). Health communication and journalism research has shown that there is a tendency among journalists to perceive scientists and biomedical researchers as authoritative experts and neutral sources, and to seek "white coats" to give credibility to the news (Forsyth et al., 2012; Hinnant et al., 2012; Len-Ríos et al., 2009, p. 318; Hallin et al., 2020).

While health news is strongly shaped by the authority of biomedicine as a producer of knowledge, authors such as Briggs and Hallin (2016) argue that health is at the same time a complex social field, also strongly affected by commercial and political logics, highly mediatized, and increasingly popularized over the years. There is also public relations content, especially from pharmaceutical companies (Stroobant, et al., 2018) which provide media with

"editorial subsidies" such as contact with experts and patients (Jackson and Moloney, 2016). While studies suggest that journalists are skeptical towards business sources (De Dobblelaer et al., 2018), they also show that journalists are less suspicious of PR content from universities and non-profit organizations because these seem to serve the public rather than the interests of corporations (Hinnant and Len-Ríos, 2009). These factors produce complex patterns in the use of sources in health news.

The literature tends to show that overall, medical professionals and health specialists, academics, and government authorities and politicians continue to be the most important voices in news coverage by traditional media (Atkin et al., 2008; De Dobblelaer et al. 2018; Oh et al., 2010; Stroobant et al. 2018; Wu, 2006; Hallin et al., 2013 Hallin et al. 2020). Some studies have found that the presence of citizens as sources in health news is comparatively low (Rowe et al., 2003) and is actually completely absent in the coverage of some diseases (Clarke, 2016). But much recent research has documented a diversification of in health news coverage over time (Hallin et al., 2013) and an increasing trend towards citizen participation as sources (Atkin et al., 2008; De Dobblelaer et al., 2018; Husemann and Fisher, 2015; Stroobant et al., 2018; Hallin et al., 2013), especially because of the human and testimonial dimension that people bring to news coverage, often manifested in stories built around particular patients who serve as exemplars (Hinnant, LenRios and Young, 2013).

Meanwhile, studies on health coverage in traditional media have shown that the use of sources in the news varies depending on the platform. While citizen sources are used more frequently in television (da Silva Medeiros and Massarani, 2010), academics dominate as a source in magazines (De Dobbelaer et al., 2018) and online media (Stroobant et al., 2018). Other authors have suggested that the understanding of source credibility has changed as a result of the

importance of social media's role in informing on health issues, as well as the changes in the

audience (Hocevar, Flanaging, & Metzger, 2014).

Given that digital platforms have different media logics including a culture of citizen

participation, some authors have argued that they may cultivate journalistic cultures that are less

elite-centric in their sourcing practices and more open to the use of diverse and alternative

sources (Hermida, 2013; Poell and Borra, 2012). While according to some scholars this is

thought to increases journalists' focus on the expertise held by laypeople who have experienced

health issues in their everyday life (Hocevar et al. 2017), several empirical studies within and

beyond the health context suggest that journalists may not (yet) fully exploit the potentials of

social media for broadening their spectrum of sources and, instead, continue focusing on elite,

expert, and media sources, while still neglecting ordinary citizens as potential news sources

(Brands, Graham and Broersma, 2018; Deprez and Van Leuven, 2018; Hladík and Štětka, 2017;

Knight 2012). One exception is very recent work on Covid-19 coverage. Boberg et al. (2020) and

Quandt et al. (2020) studied the coverage of the pandemic during the first trimester of 2020 by

the German alternative and mainstream media on Facebook, and found that while state and

political actors play a central role, their coverage features a wider range of actors.

Pandemic news coverage

Pandemics represent a crisis context in which standard news routines may be

significantly modified. In popular discussion, media are often seen as sensationalizing

pandemics, with media logics distorting the flow of scientifically grounded information. Some

scholarly research has supported this perspective (Harding, 2009; Krishnatray and Gadekar,

2014; Da Silva Medeiros and Massarani, 2010), but most of the literature suggests that in fact,

during health crises journalists tend to defer to public health authorities and to follow their lead

in sounding the alarm to the mass public (Forsyth et al., 2002; Klemm, Hartmann, and Das, 2019; Vasterman and Ruigrok, 2013; Staniland and Smith, 2013; Briggs and Hallin 2016). Health crises, like security crises or natural disasters, are in this sense "sphere of consensus" events in the terms of Hallin (1986), and tend to generate cooperation between media and public authorities, suspension of watchdog roles and bracketing of partisan divisions (Hallin et al. 2020).

Pandemics might in this sense be seen as a case in which what Briggs and Hallin (2016) call the biomedical authority model of health communication applies, and media primarily play the role of communicating established science downward to lay publics. Certain characteristics of pandemics, and of COVID-19 in particular, however, complicate this picture. In the first place, modern pandemics generally involve emerging diseases. At the beginning, scientific knowledge of the pathogen is limited, and public health officials—as well as journalists—must communicate under conditions of uncertainty, constructing the disease as an object of public knowledge before it can become an object of fully developed scientific knowledge. Public health recommendations frequently shift, scientists disagree, errors are made, and the credibility of health officials is strained. Thus, journalists are often compelled to report in a context where the science of public health does not speak with one voice.

Second, a pandemic of the scope and scale of the COVID-19 has profound effects that touch every segment of society, making it impossible for public health officials to control the flow of information in the way they might in a crisis of short duration and more contained impact. All of these processes are further complicated by the role of social media, where the flow of information may follow a very different logic from the one that prevails in legacy media. A pandemic of this magnitude may enhance the authority of biomedical experts and their relevance

as news sources in important ways, but this tendency may also coexist with a strong tendency for other actors affected by the pandemic to become mobilized and to be considered newsworthy.

Pandemic News and Sourcing in Comparative Perspective

It is possible that the balance of different forces shaping pandemic coverage will vary significantly between countries depending on the nature of the political and media systems and the particular political conjuncture in which the pandemic took place. Comparative research on health news is not extensive. The research that does exist suggests certain common patterns, including a predominance of political authorities and biomedical experts as sources, but also specific differences. Hallin et al., (2020) examines health news in Norwegian, Spanish, British, and U.S. newspapers. While they found common patterns across countries, with biomedical researchers, political figures, public health officials, and citizens as the most common sources, they also found some important differences, with citizens more prominent in the Norwegian and UK press, for example; business sources more prominent in the US, and politicians also more prominent in the US, where health policy was a polarizing issue.

In relation to pandemic coverage, Oh et al., (2010) examined cross-cultural variation between the U.S. and South Korean press in regard to the use of sources in coverage of the H1N1 pandemic, finding that U.S. news stories used more diverse sources than those published in South Korean newspapers, which relied more on government sources. Wu (2006, p. 270) compared news coverage of HIV/AIDS in China by China's Xinhua News Agency and the U.S. Associated Press. The results showed that while political sources were "the dominant newsmakers" in Xinhua's coverage and provided a pro-government frame for the news, the U.S. Associated Press coverage included significantly more activists, experts, and former health officials as news sources, addressing the issue from a negative and anti-government perspective.

Cornia et al. (2015) compared coverage of the H1N1 pandemic in Sweden, Italy and the UK, finding that media were more deferential to health authorities in Sweden, followed partisan lines in Italy, and played a watchdog role in Britain. Hallin et. al (2020) found that media in Argentina, Venezuela and the U.S. tended to defer to biomedical authorities in covering H1N1, but with a higher level of partisan criticism of the Health Minister in Argentina.

Research Questions

As important as these studies are in developing an understanding of news sourcing of pandemics, they, on the whole, represent analyses of the practices of health reporters. The sheer scale, impact and duration of the COVID-19 pandemic means that for news organizations, this was not just a health story, but was covered by journalists from beats ranging from education to economy, to sport, politics, business and entertainment. This limits the applicability of previous research to the COVID-19 pandemic, and offers an important impetus for further research on how the pandemic was reported.

Understanding how journalists and the media have given voice to different sources during the pandemic can help us to analyze the extent to which certain sources dominate specific phases of the pandemic and on certain political and social contexts, or whether their dominance transcends cultures and time.

Given that previous literature has not been conclusive about the preponderance of specific sources when journalists cover health crises around the world, and the lack of evidence about the evolution of news sourcing across time on social media platforms, we have transformed our goals into the following research questions:

RQ1: Which types of sources dominate COVID-19 coverage by mainstream news organizations on Facebook, Twitter, and Instagram in different parts of the world?

RQ2: How do news sourcing practices on covering COVID-19 pandemic differ between countries representing different media systems, political cultures and pandemic response strategies?

RQ3: What is the relationship between the predominance of different sources in the public representation of the COVID-19, and the evolution of the pandemic across digital platforms and countries?

Method

Sampling

This study analyzes the practice of 78 media outlets in Chile, Brazil, Germany, Mexico, the U.S., Spain, and the UK. The news organizations included in this study represent different media platforms – television, radio, newspapers, and online news websites – and are among the most popular in their class in their respective nations. Given that media systems differ in many respects across countries, our sample meant to represent the diversity of the country's media structure to the greatest possible extent.

We selected countries from two continents –Europe, and America– which show differentiated temporal phases and milestones in the development of the pandemic, and have different political, economic, and social structures. Further, our sample includes countries with different pandemic response strategies and related success in managing the outbreak), with three of them - the U.S., Brazil and Mexico - having male populist leaders who expressed skepticism of either public health authorities, of protective measures, and, to varying degrees, of the danger of the virus. These three countries also had the highest Covid-19 death toll at the time of data collection. Spain and the UK are examples of either widespread virus outbreaks and or/ hospital

bed shortages. Germany and Chile stood out in their regions for their quick response and early containment during the first wave of the pandemic.

Social media platforms use different media logics and rules, which means that they may require the use of different rhetorical practices (Hermida and Mellado, 2020). Because of that, and for each news outlet, the posts published in their Facebook pages, and Twitter and Instagram accounts were analyzed over the course of 12 months to cover the evolution of the pandemic and its relationship with specific news sources.

The dataset begins on January 1, 2020 –when some were already infected in China, while the media published the first news piece about the virus in the UK– and ends on December 31, 2020 after many countries had experienced a second peak of the virus, and vaccines were beginning to be approved.

To access the posts of each media outlet on their Facebook pages and Instagram accounts we used CrowdTangle, a platform that tracks public content from verified Facebook pages and public Instagram accounts, including headlines and teaser texts of linked sites, pictures or articles. For Twitter, we used crawling and scraping strategies along with complementary accesses through the API premium for developers of this social media platform. All media outlets included in this study had a Twitter and Facebook presence at the time of data collection, and 71 out of 80 had active Instagram accounts.

While both CrowdTangle and the API premium for Twitter allowed us to access the entire posts published by each media outlet in their social media accounts, we did not get access to the entire news pieces behind their social media publications.

Measures

To measure the presence of sources in COVID-19 social media coverage, we first looked at the actors/entities included in each post. We focused on individuals, organizations, and institutions. Entities can be analyzed as actors and/or sources. Some individuals, institutions or organizations are considered "objects of information" (the subject of the report or comment in the story) while others are considered sources of information (entities that speak/provide information) (Hughes and Mellado, 2016). In order for someone or something to be considered a source, sentences, phrases, facts or quotes must be attributed to them directly or indirectly (paraphrasing). If the news story says something about an entity, but such entity does not actually provide information within the news, it is considered an actor. After recognizing the presence or absence of actors and entities in each post, we measured the actors/entities used as sources.

Preprocessing

The crawled *CrowdTangle* data included a total of 1,116,440 Facebook posts and 98,883 Instagram posts. The crawled and scraped data from Twitter includes 1,684,141 tweets (see full list of Facebook, Twitter, and Instagram accounts per media outlet in the Supplementary Information file).

COVID-19-related posts were filtered based on the expressions most commonly used to refer to the virus: "COVID," "COVID-19," "Coronavirus," "Corona," "pandemic," "epidemic," "SARS-CoV-2," and "Corona crisis." This yielded a total sample of 940, 271 posts (see Table 1). These messages were preprocessed to facilitate the analyses (Günther and Quandt, 2016). Specifically, scores, URLs, and stop words were removed from the posts.

Table 1. Number of COVID-related Publications per Social Media Platform by Country

	Social Media Platform		
	Facebook	**Instagram**	**Twitter**
Country/Number of media outlets	78	71	78
Spain	92,632	6,601	104,655
UK	60,115	3,507	76,681
Germany	23,362	3,861	25,148
US	69,095	9,921	68,172
México	77,124	3,858	73,918
Brazil	30,676	8,211	31,099
Chile	86,638	14,270	70,727
Total	**439,642**	**50,229**	**450,400**

Analytical Strategy

Two parallel analytical strategies were used to search for sources in the media posts. First, we categorized the material according to a deductive method that allowed us to search for the presence of widely known categories of sources in the news. Specifically, eleven categories were used to classify news sources: political, business, health, scientific and academic sources, police/security, legal, civil society, citizen, media, sports, and celebrity sources. One important decision that had to be made to define these categories had to do with the boundary between health and political sources, since health institutions at many levels are often part of governmental structures. Here we tried to distinguish between health ministers and other top political officials responsible for health policy, whom we included among political sources, and biomedical professionals working within government whose functions are not normally considered political, whom we included as health sources. At the international level, we also categorized the WHO and its President as health sources, as they are normally quoted for expert information rather than as political decision-makers.

We broke down those eleven categories into sub-categories that represent formal positions, names of individuals, institutions, organizations and groups, as well as each of their nicknames and acronyms (if any). Each national team was responsible for translating the sub-

categories into their own language. Later, a manual dictionary was created for the seven countries included in the study, which contains over (10,102) entities that belonged to each sub-category at the time of data collection.

We use *Anaconda*, a free and open-source distribution software of the Python and R programming languages for data science and machine learning related applications, to process the data [1]. We identified entities as terms according to their grammatical use. In this study, we were interested in identifying singular nouns (called NNP by Proper Noun Singular Form) and plural nouns (called NNPS by Proper Noun Plural Form).

We consulted a list of language patterns and signs in order to distinguish between actors and sources. Specifically, we used 1,659 declarative verbs or common expressions used by the media when cite a source in their respective languages (Spanish, English, Portuguese, and German), as well as the presence of colons or quotation marks. For the purposes of localizing a source, one of these verbs/declarative expressions or a colon or a quotation mark had to be present before or after the name of the entity, while both the verb/declarative expression and the entity must be outside the quote. The number of sources was then automatically calculated for the entire sample and further filtered by the five most frequent types of sources[2].

The implemented classification method went through different rounds of manual pretests on smaller subsamples of the data, until accuracy exceeded 85% per country.

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[1] The following libraries were imported into this software and used to process natural language: Pandas, Numpy, and NLTK. The first is a library used for the manipulation and analysis of data for programming language. The second is a library that provides inputs for creating large, multidimensional vectors and matrixes along with a large collection of high-level mathematical functions to use with them. Finally, NLTK (Natural Language ToolKit) is a set of neutral language tools for processing natural symbolic and statistical language.

[2] In an effort to locate recurrent entities and actors not included in our manual dictionary, we added a complementary step, categorizing the corpus using the *Part-of-Speech* (POS) tagging technique, which allowed us to mark up a word in a text based on both its definition and its context.

Results

Sources and actors in COVID-19 news coverage

Regarding the predominance of specific sources in COVID -19 news coverage, the data reveals that media in different countries rely primarily on elite sources, especially political figures, health authorities, and health experts as authorized voices in the news.

In global terms, political sources represent 51.2% of all news sources, while health sources reach 17.5%. This means that more than half of the news portrays political voices prominently, making the pandemics a predominantly political issue. This result is consistent with previous studies on the COVID-19 crisis (Hart, Chinn and Soroka, 2020; Quandt et al., 2020), showing that the way mainstream media around the world covered the pandemic on Facebook, Instagram, and Twitter does not really differ from the way they cover health emergencies in their traditional platforms.

However, there are other voices that while lagging considerably behind, also had presence globally. Our study found an important diversification in COVID-19 coverage with a trend towards a growing presence of citizen voice as sources of the news. Indeed, citizen sources appear as the third most important type of source in the pandemic news coverage (8.1%), followed by educational/scientific sources (6.8%) and business sources (4.4%). The other types of sources analyzed in our study received significantly less attention at a global level in social media news posts, especially legal (1.1%), sport (1.26%), and civil society sources (1.60%).

Considering the five most important types of sources that had a voice during the COVID-19 pandemic news coverage in all countries analyzed, the data reveal that political and health sources always scored the first and second position, respectively, as the most common types of sources although with a wide gap between them: politics drove COVID-19 coverage more that

health in terms of the voices being heard. The other three types of sources, instead, vary more powerfully in their relative importance across countries (see Table 2). The country distribution shows that political sources were proportionally more important in Latin American media coverage (X^2= 13963.99; df= 6; p< .001). This is not surprising given the preference for political frames in the coverage of pandemic news in the region (Waisbord, 2010). Chilean media, for example, use political voices in nearly two thirds of its social media output (58%), followed by Mexico and Brazil. German coverage, by contrast, was slightly less politicized in the sources being used (46.9%), while peaking in the inclusion of business sources (X^2= 1414.82; df= 6; p= <.001).

Table 2. Sources in social media COVID-19 pandemic news coverage by country

Sources	Global	Brazil	Chile	Germany	Mexico	Spain	UK	US
Celebrity	2.86%	4.36%	2.91%	3.48%	2.54%	2.89%	2.58%	2.58%
Sport	1.26%	0.81%	1.76%	0.42%	0.65%	1.39%	0.81%	1.47%
Media	3.33%	4.36%	1.86%	6.36%	2.65%	3.63%	4.03%	4.19%
Political	51.17%	51.62%	57.98%	46.93%	50.61%	50.52%	48.40%	45.54%
Police/Security	1.94%	0.39%	2.08%	2.15%	1.09%	2.18%	2.26%	2.40%
Scientific/ Educational	6.81%	7.14%	5.61%	8.65%	6.54%	5.55%	10.75%	6.90%
Health	17.53%	18.19%	12.79%	10.91%	21.35%	20.13%	20.30%	17.45%
Business	4.42%	3.42%	5.20%	8.10%	5.50%	3.33%	3.41%	4.23%
Legal	1.01%	2.15%	1.25%	0.86%	0.82%	0.90%	0.14%	1.21%
Citizen	8.05%	5.69%	5.97%	10.64%	6.98%	8.04%	5.82%	13.36%
Civil Society	1.62%	1.88%	2.59%	1.50%	1.27%	1.43%	1.51%	0.67%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Doctors, medical experts, and health care professionals (X^2= 1718.07; df= 6; p= <.001) played a more important role in the U.S., and especially in the UK media coverage, as they appeared in one out of five stories (20.3%). With half as much, German social media coverage used health sources the least (10.91%). Meanwhile, the UK stood out in the inclusion of scientific and educational sources (X^2= 1126.62; df= 6; p= <.001).

While the presence of citizen sources in the countries' social media posts was proportionally higher in the U.S. media, they were clearly less important in the coverage of the COVID-19 pandemic in Latin American, Spanish, and UK media coverage (X^2= 4856.93; df= 6; p= <.001).

Interestingly, the use of civil society (X^2= 1412.78; df= 6; p= <.001) was proportionally more pronounced in the Chilean media; media sources tend to be more important for the media in Germany, the UK and the U.S. (X^2= 717.93; df= 6; p= <.001); sport news sources (X^2= 1015.61; df= 6; p= <.001) and police sources (X^2= 956.13; df= 6; p= <.001) also tend to be more frequent in the United States, while celebrity (X^2= 576.32; df= 6; p= <.001) and legal sources (X^2= 930.53; df= 6; p= <.001) were proportionally higher in Brazil.

The scenario is slightly different when speaking of actors rather than sources. The inclusion of these entities as *actors* in COVID-19 news coverage –that is, entities that feature or are *talked about* in social media news without necessarily having an active voice– is a little more diverse, and actors beyond political ones have a more central place. Put together, health, citizen and scientific/educational actors feature nearly as much in stories as political actors. Still, the data show that while social media in different countries target a significantly more plural group of actors in their stories –legal, sports, police actors, for instance –, it does not provide the same space to those actors to have a voice in stories about the pandemic, as they do with political elites, officials, authorities, and to some extent, health entities.

When comparing actors *within* rather than *across* countries, we found that citizen actors are the second most important entities mentioned in news stories for the U.S. and Chilean media, while scientific/educational actors occupy that place in Germany. Health actors were in third place in Chilean and the U.S. media coverage of the pandemic, and fifth place in German media,

while media actors rank at the third place in the UK news coverage of the pandemic, a country certainly known for its celebrity-oriented news media (see Table 3).

Table 3. Actors in social media COVID-19 pandemic news coverage by country

Actors	Global	Brazil	Chile	Germany	Mexico	Spain	UK	US
Celebrity	2.79%	4.42%	2.96%	2.81%	2.33%	2.77%	2.62%	2.52%
Sport	1.63%	0.82%	2.66%	0.73%	0.85%	1.61%	1.23%	1.83%
Media	7.02%	8.33%	3.85%	5.71%	5.99%	6.77%	13.67%	6.93%
Political	41.97%	43.84%	42.97%	36.0%	46.74%	43.85%	36.35%	39.16%
Police/Security	2.40%	0.61%	2.61%	3.09%	1.35%	2.92%	2.64%	2.80%
Scientific/Educational	8.20%	8.07%	7.43%	12.94%	7.80%	7.24%	9.74%	8.54%
Health	14.06%	16.34%	12.20%	11.18%	14.77%	12.94%	18.63%	13.34%
Business	6.60%	4.18%	8.77%	11.25%	7.51%	6.82%	4.03%	4.72%
Legal	1.19%	3.19%	1.35%	1.11%	0.99%	0.94%	0.22%	1.45%
Citizen	12.45%	8.35%	12.43%	12.29%	10.31%	12.76%	9.33%	17.93%
Civil Society	1.69%	1.85%	2.77%	2.89%	1.36%	1.38%	1.54%	0.78%
Total	100%	100%	100%	100%	100%	100%	100%	100%

Sources across media platforms

Most of the sources that the mainstream media used in their social media coverage on COVID-19 appeared on Facebook (57.9%), followed by Twitter (30.4%), and Instagram (11.6%), respectively. This hierarchy seems to go hand in hand with the traffic and the number of posts by media outlets on each social media platform. On the other hand, Instagram posts were more likely to cite sources for all countries (54.1% cited at least one) especially in comparison to Twitter (15.9%) (X^2= 51384.78; df= 2; p< .001). This result goes in line with Laferrara and Justel-Vázquez' (2020) findings on the pandemic in Spain, suggesting that despite a large quantity of soft content and human-interest stories, Instagram has also been used as a platform to distribute information of public interest about the crisis (see Table 4).

Table 4. Sources in COVID-19 news coverage by social media platform and media origin

Sources	Global	Social Media Platform			Media Origin			
		Facebook	Twitter	Instagram	Print	TV	Online	Radio
Celebrity	2.86%	3.08%	2.05%	3.92%	2.85%	2.36%	3.23%	3.90%
Sport	1.26%	1.39%	1.06%	1.14%	0.92%	1.26%	0.95%	2.30%
Media	3.33%	3.21%	3.11%	4.50%	3.57%	2.96%	3.24%	3.92%
Political	51.17%	49.62%	55.04%	48.83%	49.34%	52.64%	53.34%	48.84%
Police	1.94%	2.01%	1.75%	2.04%	1.93%	2.11%	1.64%	1.75%
Scientific/Educational	6.81%	6.95%	6.54%	6.83%	7.74%	6.31%	6.92%	6.12%
Health	17.53%	17.87%	17.98%	14.64%	18.33%	17.39%	16.75%	17.01%
Business	4.42%	4.57%	4.05%	4.59%	4.52%	4.45%	3.98%	4.54%
Legal	1.01%	1.06%	0.82%	1.31%	0.98%	0.91%	1.13%	1.33%
Citizen	8.05%	8.60%	6.19%	10.13%	8.44%	7.94%	7.05%	8.53%
Civil Society	1.62%	1.64%	1.41%	2.07%	1.38%	1.67%	1.77%	1.76%
Total	100%	100%	100%	100%	100%	100%	100%	100%

On Twitter the media in all countries included significantly fewer voices, and the situation remains similar when considering only the five types of sources most used in COVID-19 news coverage. All in all, differences across platforms show a greater presence of political sources on Facebook and Twitter, of citizen and media sources on Instagram, and of scientific and educational sources on Facebook in most countries.

Regarding the distribution of sources by media origin, the data reveal that overall, TV news outlets (31.2%) include significantly more voices in their social media coverage than radio (24.8%), online websites (24.1%), and especially print media outlets (20.2%; X^2=10548.86; df=3; p= <.001), suggesting that tendencies found in traditional media may actually be enhanced in these short-form platforms.

The most important differences across media outlets reveal that health sources were more common in social media posts originated by TV outlets in Chile, Mexico, and the U.S.; by print

outlets in Spain, Brazil, and the UK; and by both TV and radio outlets in Germany (F= 9.747; df= 17; p= <.001).

Sourcing pandemic news over time

Figures 1 to 8 illustrate the trends in sources used by the news media included in the sample over time, globally and for each country. Each bar corresponds to two weeks and represents the five most frequent types of sources in COVID-19 news coverage. The black line plots the evolution of cumulative deaths from the virus, while the light blue line represents new cases over time. The relative presence of the major source types over time can be found for each country in Tables 5-11 in the Supplementary Information File.

Figure 1. Use of news sources on COVID-19 social media coverage over time (Global)
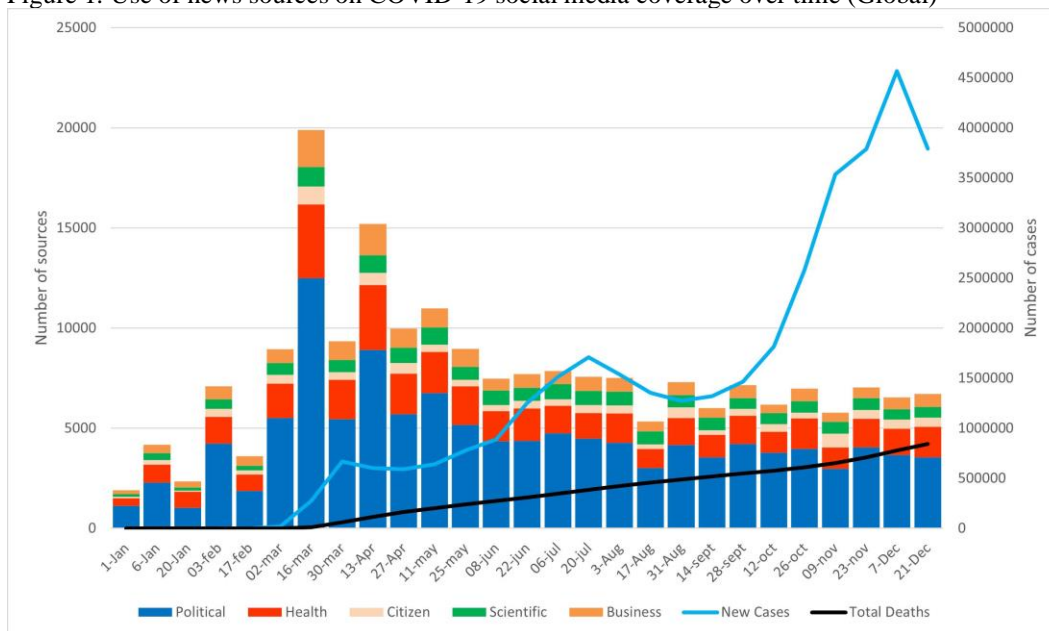
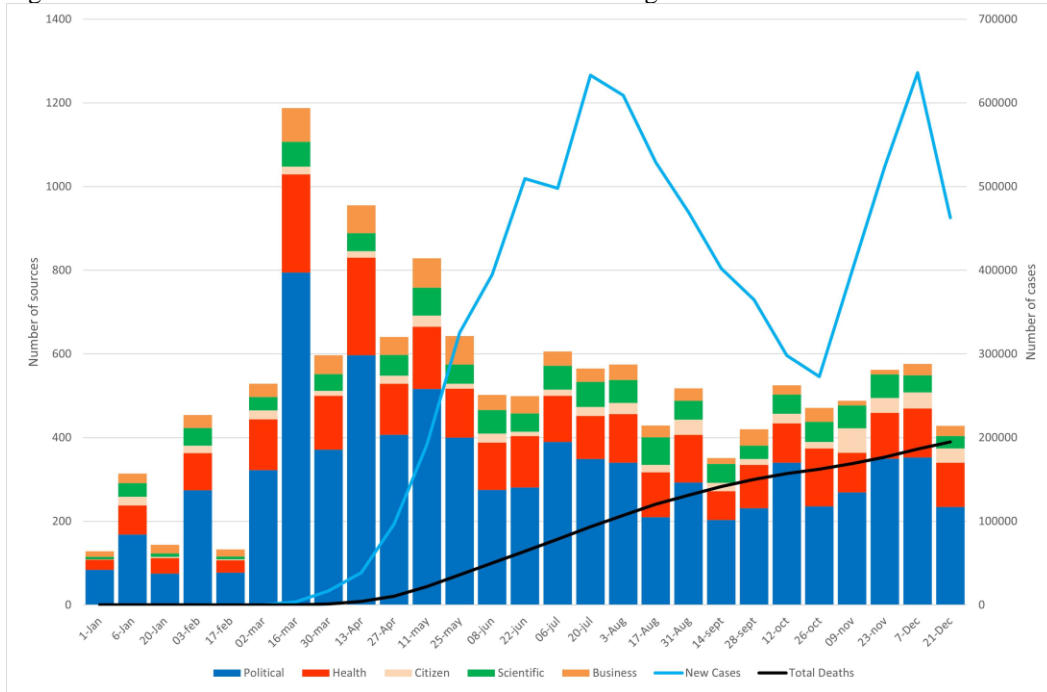Figure 2. Use of sources on COVID-19 social media coverage over time in Brazil

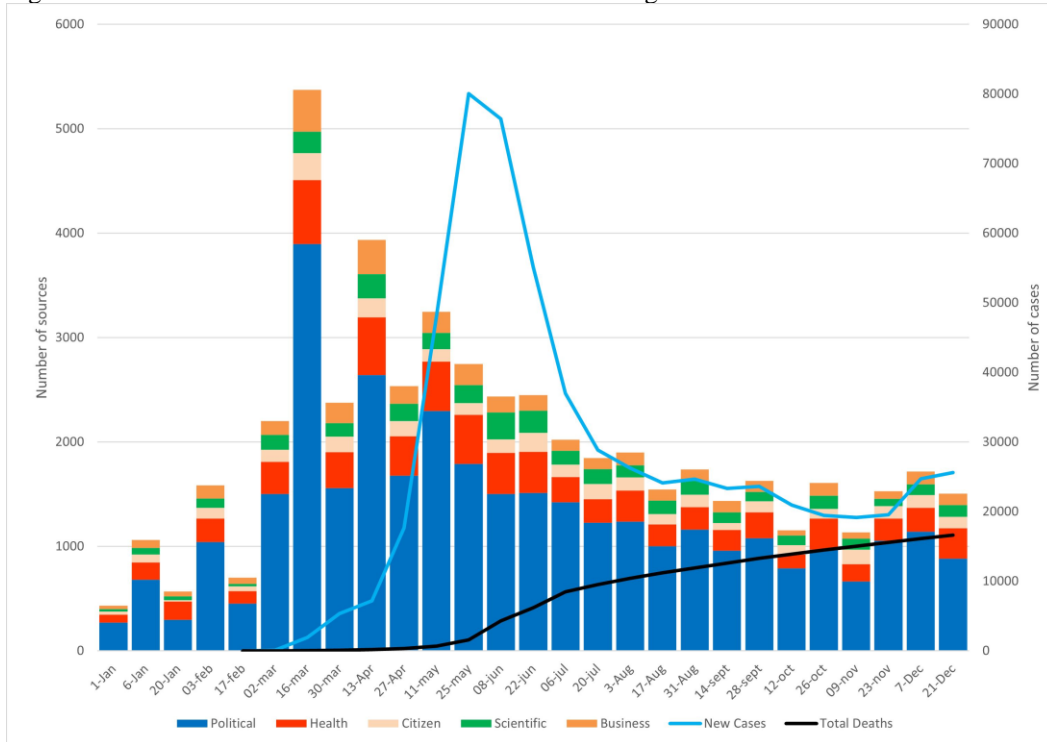Figure 3. Use of sources on COVID-19 social media coverage over time in Chile

Figure 4. Use of sources on COVID-19 social media coverage over time in Germany
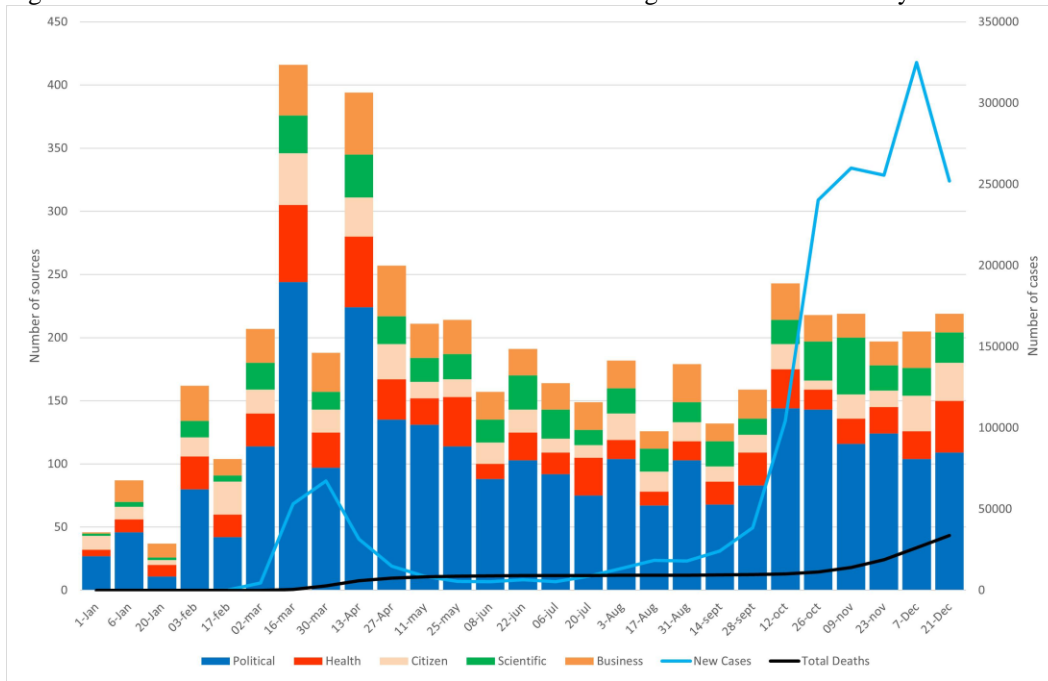

Figure 5. Use of sources on COVID-19 social media coverage over time in Mexico
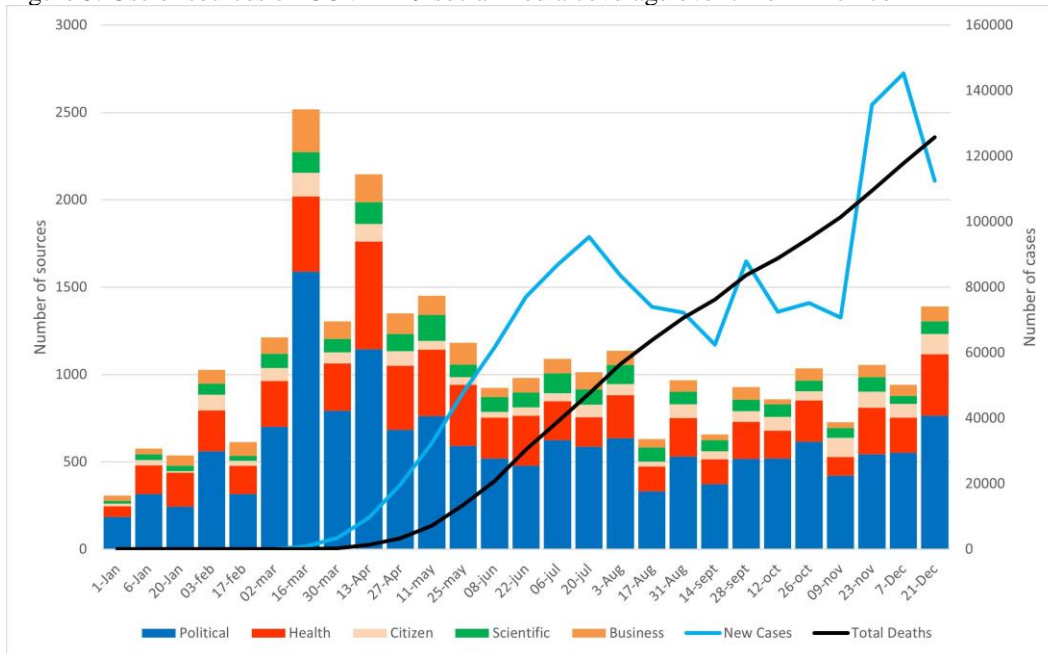
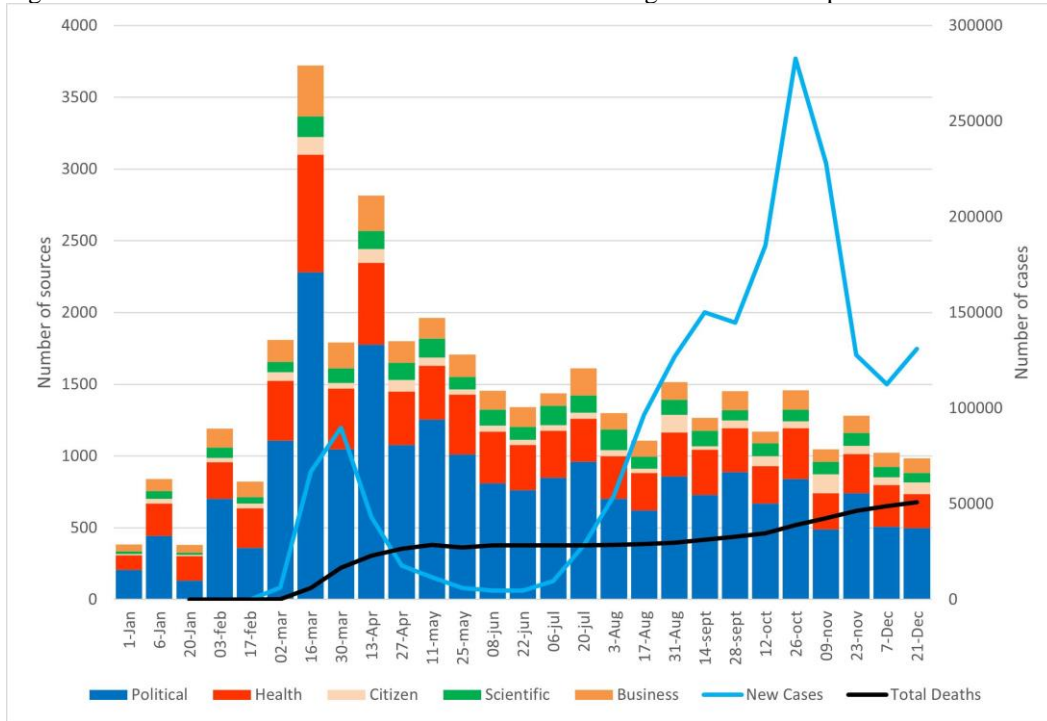Figure 6. Use of sources on COVID-19 social media coverage over time in Spain

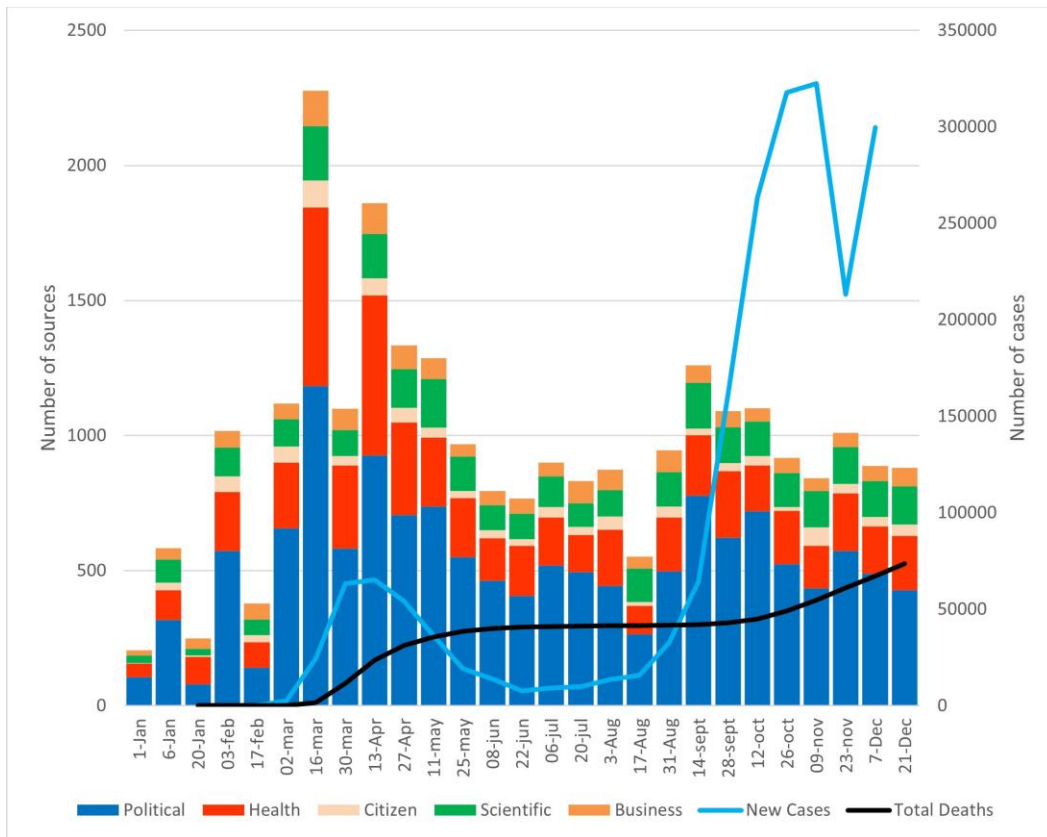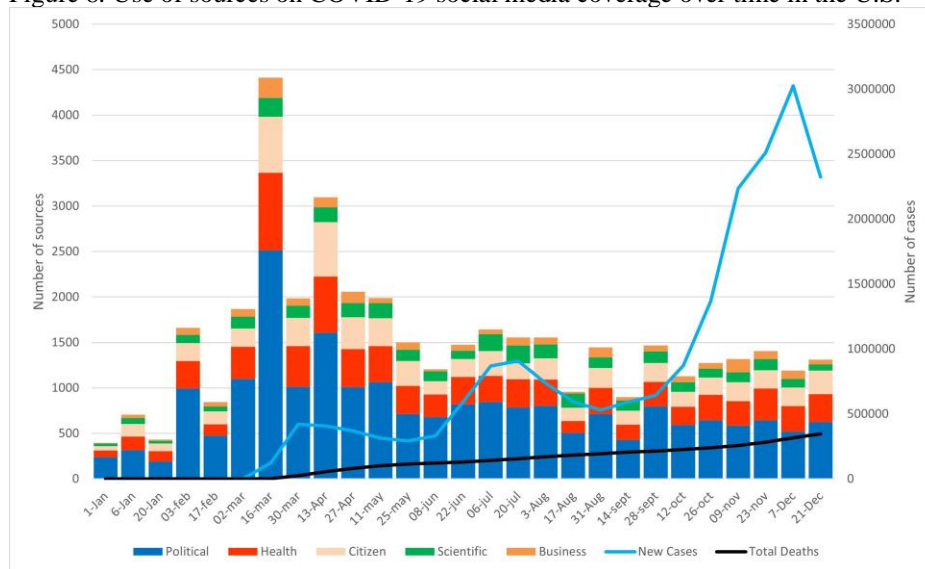Figure 7. Use of sources on COVID-19 social media coverage over time in UK

Figure 8. Use of sources on COVID-19 social media coverage over time in the U.S.

Overall, the volume of media coverage was at its highest in March and April of 2020, as the first wave of infections spread around the globe, and as societies first faced the need to take restrictive measures and the consequent impacts on social life. Subsequent peaks in coverage were often related to surges in cases, though consistent with the argument of Briggs and Hallin (2016) and Hallin et al. (2020) that news coverage of a pandemic does not mirror epidemiology, the early peak is never matched even when cases rise to far higher levels. The peak in coverage prior to the rise in cases reflects the effort of public health officials to sound the alarm, the tendency of media to focus on a novel story, and also the global character of the story, as media in many countries report heavily on the outbreak before it has become an issue locally.

In general, similar patterns of source use prevail throughout the year, but there were some significant variations as the pandemic evolved.

Political and Health sources

Political sources were the most prominent everywhere throughout the pandemic. For all countries, the peak of political and also of health sources appeared to go hand in hand with the

rise of new positive cases and deaths during the pandemic's first wave, coinciding with the harshest confinement and, in several countries, with health ministers and the President of the Government holding daily live press conferences, as in Mexico, Chile, and Spain. Health sources were generally highest in the very first months, when the pandemic was still distant for most countries and media relied on global health authorities to interpret the threat of a novel disease. Often then they would rise with new waves, as in Germany where they tended to rise just before the main curve of infections. Political sources rose as governments confronted the reality of the global spread of the virus. In the U.S., U.K. Spain and Germany, political sources reached their absolute peaks sometime in the period between March and May, as authorities first confronted the pandemic, and tended to decline somewhat later on, though in percentage terms there are ups and downs in many countries.

Comparatively, health sources occupied a prominent role in UK news coverage, especially relative to political sources and especially in the first part of the year, reflecting how the UK was hit hard by the pandemic in March - probably the worst hit of the sampled countries in that period, but probably also reflecting the strong focus of British media on the National Health Service. Several kinds of stories drove this coverage: the lack of preparedness of the health service, the volume of people going into hospital, lack of PPE for health workers, and the need to build emergency hospitals to cope with the demand for hospital beds. These stories also had innate news value, given they were based on conflict and often contained criticism of the government. Health sources, it should be noted, vary from elite sources like the Director of the WHO or top public health professionals, to rank-and-file medical professionals treating COVID patients on the ground.

Although the presence of political and health sources in Chilean, Mexican, and Brazilian coverage of the pandemic tends to be stable over time, they saw a peak in political sources around mid-March, when the number of cases rose and the restrictive measures were installed in Chile, and even before the main explosion of contagion in Brazil, while President Bolsonaro gave public statements denying the relevance of the pandemic and changed the Minister of Health twice. In Mexico, while official and political sources decreased after June, they once again gained a new peak by mid-December in coincidence with the announcement of new confinement and closure measures right before Christmas.

Health sources show a different evolution to that of political sources among Latin American countries. In Chile and Mexico, their highest presence occurred between March and June. This growth decelerated significantly in the following months and reappeared at the beginning of December, hand in hand with the new wave's start. In Brazil, its main increment coincides with the start of the pandemic's first wave, between March and April.

Scientific and Academic Sources

Scientific and educational sources were much more stable in their presence and proportionally more important for the UK media than for the media in other countries. UK data reveals that more scientific and educational voices were cited at the beginning of each wave of the virus in consonance with the new waves of contagion, the discussion of upcoming vaccines and their effectiveness, and also a new school year once again began virtually, with no signs of returning to normality.

While in the U.S., Spain, and Germany, the major peaks in scientific sources occurred at the heart of each pandemic's cycle, scientific sources in Latin America showed different trends. In Brazil, the presence of scientific/educational sources was significant during the second

half of the year, something perhaps driven by political disputes over the minimization of the pandemic by the ruling political power. In Mexico, instead, the participation of the scientific and educational community in the narration of the pandemic has an earlier incremental growth and then progressively decreased, while in Chile, scientific and educational sources had their biggest impact over a more extended period of time – between March and June –, months in which the academic and educational system suffered important changes. In a matter of weeks, they had to change their teaching method to virtual models, while the social differences in access and connectivity to technologies became evident. Parallel to this, conflicts between the Health Minister and members of the scientific community were growing after researchers questioned the Ministry of Health figures regarding the real dimension of the pandemic.

Citizen voices

Though political and health sources played the most prominent role in the pandemic, citizen sources played an important role throughout, rising in importance in certain kinds of conjunctures. In absolute terms, their presence grew in the first wave as the impact of the virus was felt in everyday life and coverage tended grow in volume and complexity. They were most significant for narrating the pandemic in Germany – surpassing health and educational sources in several months of the year. Their biggest increments occurred during the pandemic's first wave, and they became especially important when protests against the lockdown began to manifest themselves in organized movements. The largest of these movements ('Querdenken,' or 'lateral thinking') sparked numerous discussions about their real motivations, as it was increasingly held responsible for spreading anti-democratic ideas and for instigating agitation against journalistic media as 'state media.' The pattern in the U.S., which was second in terms of the presence of

citizen sources, was broadly similar, with citizen sources often appearing in the contexts of debates over restrictions and reopening.

In Mexico, to take an example of another pattern, citizen sources had a more significant presence in the first half of the year, especially between March and May. Critics' general annoyance at the federal government's low testing rate and perceived failed strategy to contain the pandemic saw citizens and oppositional politicians voicing their anger, especially at the government's implementation of the sentinel model of epidemiological surveillance to track and calculate infection cases, which vastly underestimates 'actual' cases. In this controversial period of 'war of figures,' reporters relied on citizen testimonies to counter the official narrative of 'everything is under control.'

Business sources also had a significant presence in the sample, and tended to jump in periods when restrictions and measures to address economic consequences of the pandemic were under discussion. In Chile, for example, while business sources were prominent and sometimes eclipsed citizen and scientific sources, their highest growth occurred at the beginning and the end of the first wave and during the second explosion of infections in the country, when the need of resorting to individual pension capitalization funds of Chileans was discussed as an option for dealing with the economic crisis.

Discussion

In this article we have examined the use of sources in health crisis reporting on social media across nations and platforms and over the course of the first year of the COVID-19 Pandemic. Chew and Eisenbach (2010) found in a study of the 2009 H1N1 pandemic that citizens relied heavily on information posted on social media by major news organization, and that one of the defining elements of the character of that information was the use of sources.

One key question raised in this study has to do with the debate about whether news organizations might pivot toward greater pluralism in the kind of voices represented in their posts in social media, adapting to a more popular, participatory logic commonly assumed to characterize social as opposed to traditional media. Our data are more consistent with the findings of scholars such as Deprez and Van Leuven (2018), who found in a study on the use of social media in news-gathering that Belgian health journalists reproduced standard, elite-oriented sourcing practices. Since it is possible that news organizations actually concentrate more narrowly on traditional criteria of newsworthiness in posts on the short-form platforms of social media, assuming short attention spans, we intend to compare directly the social media posts of news organizations with their content on their traditional platforms in subsequent work.

In terms of the kinds of sources used during COVID-19 pandemic news coverage in 2020, one finding stands out as particularly striking: the dominance of political sources across countries and platforms. This finding contrasts sharply with what previous research has found about health news generally. Hallin, Figenshou and Thjorbjørnsrud (2020), whose study covered three of the countries included in our study, found non-health political sources to make up 28 percent of source citations in the U.S. and 19% in Spain and the U.K., which is dramatically lower than the figures reported here. Even research on previous pandemics (Briggs and Hallin 2016; Hallin et al. 2020) show a limited role of political sources, and a focus instead on health professionals. This presumably reflects the character of the COVID-19 pandemic as an extraordinarily broad and grave societal emergency requiring dramatic intervention into patterns of social life and affecting all aspects of society, a kind of crisis for which political authorities cannot help but take responsibility. Given the overall relevance of policy decisions related to the Covid-19 pandemic on both the economic system and the health care system, it is unsurprising

that political sources also gained additional importance during periods of rising infection levels. A pandemic of this magnitude is in this sense similar to a war; it is a kind of social context in which the role of the state in society is strongly enhanced. And it indicates that in addition to a medical and health emergency, the pandemic is an important political phenomenon.

Still, there were important variations in the role of the political sources across the countries in our sample. It was highest, in the three Latin American countries, lower in the U.S., U.K. and Germany, and in between in Spain. The strong focus on political sources in Latin America, and perhaps to some extent also Spain could be interpreted as a common characteristic of journalistic cultures in which the media privilege official political events and actors (Márquez-Ramírez 2012; Díaz and Mellado 2017), where official sources and their political opponents' reactions tend to set the agenda. It also sheds light on differences in governmental structures, with neutral experts within public agencies playing a smaller role in Latin America relative to partisan political figures.

Even if a strong role of political authorities in no doubt inevitable during a health crisis of this magnitude, the figures revealed by our study certainly suggest questions about whether these societies found the right balance between political voices and others, including those of biomedical scientists and health professionals. The numbers and trends shown by our results reflect a joint product of communication practices of government agencies—who took the lead in communicating with the public—and the choices of news organizations. Three of the countries in our sample, (Brazil, Mexico, and the U.S.) had populist political leaders who, to varying extents, were skeptical of expert knowledge and had personalist leadership styles that put themselves at the center of attention, and strong concerns were expressed in many of these countries about over-politicization of the crisis.

In the U.S., for example, while in earlier crisis the Centers for Disease control took the leading role in public communication, during the current crisis CDC briefings were displaced by White House press conferences in which Trump played the central role and public health officials were often marginalized. Addressing these issues fully would require more detailed data on what official sources actually said, whether they were engaging in partisan conflict, for example, or passing on to the public conclusions and recommendations of health experts.

The media outlets in our sample, did, at the same time, incorporate a wide range of other sources and actors. Health sources were the second most prominent—and taken together with scientific and educational sources, the data suggest that if the state became more central during the pandemic, so too did the defining role of biomedical science, strengthening the trend toward "biomedicalization" of society and culture discussed by Briggs and Hallin (2016). Citizen sources were third in prominence, typically spiking with new waves and restrictive measures. They were particularly high in the U.S. and Germany, and both had fairly high diversity of sources, which could be interpreted in terms of the more "civic" and pluralistic character of the liberal and democratic corporatist media systems (Hallin and Mancini 2004).

If we shift to the comparison across platforms, our data show relative consistency across Facebook, Twitter and Instagram, although Twitter posts tended to have a higher level of political sources over time, and Instagram posts to have a higher level of Citizen sources at the global level. Posts by print media tended to be highest in health and scientific/educational sources, and lowest in citizen sources, perhaps reflecting their generally more educated audiences and role as leaders of elite discussion.

This study is an exploratory one, carried out with the pandemic still unfolding and looking at broad patterns in the use of sources, and there are many questions that need to be

addressed by subsequent research. The source categories used here are broad, with the health category, for example, encompassing sources ranging from top public health authorities to rank-and-file doctors and nurses, and a more fine-grained analysis could give deeper insight into the range of voices represented. For example, does a bigger diversity of types of news sources necessarily contributes to a more plural debate on the pandemic and its consequences? Similarly, the news outlets sampled by this study does not consider alternative nor local media. At the same time, there is a need for more fine-grained analysis of what roles different kinds of sources actually played: did political sources, for example, support public health authorities or undermine them and did they promote social solidarity or partisan conflict? In what contexts did citizens enter the conversations, and what kinds of citizens were included in which ways? It would also be important, as noted above, to compare directly media posts on social media with their traditional content, and to consider other kinds of content on social media. Finally, our study suggests possible causal mechanisms that may account for some of the patterns reported here, like the dominance of elite sourcing in Latin American media or the role of protests in driving use of citizen sources. Establishing these with greater confidence, however, would require both further conceptual work on the patterns and their causes—how we would measure and account for politicization or trust in health authorities, for example—and more detailed analysis of the particular contexts that shaped the evolution of the COVID-19 pandemic in particular countries.

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Supplementary information

Table 5. Monthly evolution of the use of sources in Chilean social media coverage of the pandemic (top five sources)

Chile	Political	Scientific	Health	Business	Citizen	Total
January	54,92%	5,51%	18,39%	5,25%	6,75%	90,82%
February	58,74%	4,28%	13,48%	5,93%	7,43%	89,86%
March	60,87%	3,92%	10,48%	4,50%	6,09%	85,86%
April	56,68%	5,29%	12,57%	4,13%	7,02%	85,69%
May	60,85%	4,81%	13,09%	3,80%	5,93%	88,48%
June	53,34%	8,11%	15,02%	5,58%	5,27%	87,32%
July	60,69%	6,32%	10,85%	5,52%	4,95%	88,33%
August	57,16%	6,09%	12,64%	5,52%	5,88%	87,29%
September	57,60%	6,29%	11,44%	5,48%	5,84%	86,65%
October	60,04%	6,35%	11,86%	5,69%	5,06%	89,00%
November	54,32%	6,73%	14,33%	9,08%	5,58%	90,04%
December	56,20%	5,39%	14,51%	5,67%	5,91%	87,68%

Table 6. Monthly evolution of the use of sources in UK social media coverage of the pandemic (top five sources)

UK	Political	Scientific	Health	Business	Citizen	Total
January	43,04%	11,94%	22,68%	2,92%	8,51%	89,09%
February	46,15%	10,61%	20,39%	5,44%	7,90%	90,49%
March	46,19%	7,46%	23,90%	3,89%	4,86%	86,30%
April	46,28%	7,85%	24,97%	3,10%	5,42%	87,62%
May	49,27%	12,58%	18,48%	2,43%	5,51%	88,27%
June	48,33%	10,38%	20,42%	3,25%	5,44%	87,82%
July	50,96%	10,03%	17,00%	3,42%	7,06%	88,47%
August	43,62%	14,64%	19,24%	3,78%	8,32%	89,60%
September	54,48%	12,02%	17,14%	2,84%	5,08%	91,56%
October	53,94%	11,61%	17,22%	2,39%	4,43%	89,59%
November	49,56%	12,35%	17,65%	4,74%	5,53%	89,83%
December	46,22%	13,08%	20,19%	3,51%	5,84%	88,84%

Table 7. Monthly evolution of the use of sources in German social media coverage of the pandemic (top five sources)

Germany	Political	Scientific	Health	Business	Citizen	Total
January	42,42%	4,04%	12,12%	12,63%	14,65%	85,86%
February	41,78%	6,16%	15,07%	14,04%	14,04%	91,09%
March	46,10%	6,50%	12,41%	8,27%	9,10%	82,38%
April	49,58%	7,75%	11,69%	7,61%	12,39%	89,02%
May	48,83%	7,03%	11,71%	6,31%	11,35%	85,23%
June	47,35%	12,39%	7,30%	8,19%	11,50%	86,73%
July	45,35%	8,35%	13,84%	5,73%	11,22%	84,49%
August	42,76%	9,35%	6,31%	8,64%	11,92%	78,98%
September	50,65%	10,44%	9,40%	8,36%	8,88%	87,73%
October	52,79%	6,85%	10,63%	5,59%	10,63%	86,49%
November	48,11%	14,71%	8,35%	5,57%	7,95%	84,69%
December	42,17%	9,33%	12,00%	11,17%	8,50%	83,17%

Table 8. Monthly evolution of the use of sources in U.S. social media coverage of the pandemic (top five sources)

U.S.	Political	Scientific	Health	Business	Citizen	Total
January	43,31%	7,18%	19,17%	3,53%	15,58%	88,77%
February	53,58%	5,19%	15,47%	4,58%	12,31%	91,13%
March	48,62%	4,58%	17,23%	4,20%	11,33%	85,96%
April	43,67%	5,28%	17,28%	3,52%	15,59%	85,34%
May	43,70%	7,48%	16,78%	3,19%	14,55%	85,70%
June	47,28%	7,13%	18,41%	3,12%	11,20%	87,14%
July	45,06%	9,54%	16,33%	4,03%	12,23%	87,19%
August	46,92%	11,35%	15,03%	3,26%	14,33%	90,89%
September	45,43%	8,53%	17,86%	5,56%	13,30%	90,68%
October	47,55%	7,62%	16,30%	4,38%	13,09%	88,94%
November	39,56%	7,62%	18,99%	7,53%	14,62%	88,32%
December	40,52%	6,11%	21,24%	4,77%	14,15%	86,79%

Table 9. Monthly evolution of the use of sources in Brazilian social media coverage of the pandemic (top five sources)

Brazil	Political	Scientific	Health	Business	Citizen	Total
January	49,77%	7,00%	19,94%	3,81%	8,68%	89,20%
February	52,70%	7,36%	17,87%	3,00%	7,21%	88,14%
March	56,69%	4,11%	17,98%	1,92%	5,51%	86,21%
April	52,81%	5,16%	19,15%	1,79%	6,18%	85,09%
May	53,58%	7,22%	15,26%	2,46%	8,04%	86,56%
June	48,58%	8,06%	19,33%	2,69%	6,72%	85,38%
July	52,95%	8,31%	16,36%	2,42%	4,84%	84,88%
August	46,88%	10,12%	19,00%	3,87%	5,92%	85,79%
September	48,23%	9,12%	18,81%	5,49%	4,47%	86,12%
October	52,24%	7,81%	18,69%	3,49%	5,15%	87,38%
November	48,79%	9,65%	18,99%	7,47%	2,65%	87,55%
December	49,97%	5,59%	18,66%	5,31%	4,26%	83,79%

Table 10. Monthly evolution of the use of sources in Spanish social media coverage of the pandemic (top five sources)

Spain	Political	Scientific	Health	Business	Citizen	Total
January	44,16%	5,08%	28,18%	2,77%	10,56%	90,75%
February	47,45%	5,27%	23,73%	2,86%	10,77%	90,08%
March	50,48%	3,39%	19,10%	2,65%	7,69%	83,31%
April	54,25%	4,28%	17,31%	2,92%	7,75%	86,51%
May	54,39%	5,80%	18,57%	2,82%	7,24%	88,82%
June	50,07%	6,17%	22,41%	2,20%	8,57%	89,42%
July	52,63%	7,31%	18,75%	2,37%	8,00%	89,06%
August	47,65%	8,12%	20,14%	2,53%	8,05%	86,49%
September	51,48%	6,78%	19,67%	4,50%	7,02%	89,45%
October	51,01%	5,84%	19,73%	4,12%	7,18%	87,88%
November	46,13%	6,23%	22,03%	7,18%	8,55%	90,12%
December	47,53%	5,67%	20,95%	4,74%	8,12%	87,01%

Table 11. Monthly evolution of the use of sources in Mexican social media coverage of the pandemic (top five sources)

Mexico	Political	Scientific	Health	Business	Citizen	Total
January	48,44%	5,14%	27,11%	3,71%	7,87%	92,27%
February	49,63%	5,16%	22,58%	6,64%	8,96%	92,97%
March	55,03%	4,58%	16,53%	4,85%	7,82%	88,81%
April	48,58%	6,11%	24,96%	4,70%	6,96%	91,31%
May	46,82%	7,70%	24,53%	3,80%	7,70%	90,55%
June	48,82%	8,01%	24,10%	3,46%	7,44%	91,83%
July	51,25%	8,29%	19,23%	5,09%	7,78%	91,64%
August	49,68%	9,95%	20,19%	4,65%	7,15%	91,62%
September	52,35%	7,49%	20,11%	7,01%	5,24%	92,20%
October	56,02%	6,67%	18,61%	6,67%	4,46%	92,43%
November	48,43%	6,82%	19,11%	10,25%	6,27%	90,88%
December	49,69%	4,92%	22,12%	6,96%	5,66%	89,35%