What we can learn from information flows about COVID-19: Implications for research and practice

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ABSTRACT

COVID-19 has become a global pandemic affecting billions of people. Its impact on societies worldwide will be felt for years to come. The purpose of this research is to examine information flows about COVID-19 to understand the information-specific underpinnings that are shaping understandings of this crisis. As a starting point, this research analyses information about COVID-19 from a selection of information sources, including the World Health Organization (WHO), the National Health Commission of the People's Republic of China (NHCPRC), and three news outlets with vast global coverage. The analysis reveals some distinctive information underpinnings about COVID-19, including (a) flows of information becoming regular and larger around certain dates, (b) preponderance of information imperfections such as incomplete information, misinformation, and disinformation, and (c) absence of information about some key turning points. The implications of these information imperfections in that they create information failures and, hence, ineffective approaches to dealing with this crisis warrant further investigation.

KEYWORDS
COVID-19, information environment, information flows, practice, research

1 | BACKGROUND

Due to the magnitude of COVID-19, there have been massive flows of information about different aspects of this pandemic. Information about COVID-19 is coming through multiple sources and in different formats. Often, this information, instead of providing answers, has left people bewildered. Though there have been efforts to provide information about specific aspects of COVID-19 (e.g., Coronavirus resource center at John Hopkins University [https://coronavirus.jhu.edu/map.html], World Health Organization [WHO] situation reports, ABC [Australian Broadcasting Corporation] COVID-19 cases projection), there remain many unanswered questions and the COVID-19 information environment is also rampant with many information imperfections.

The purpose of this research is to examine information flows about COVID-19 and to identify the information-specific underpinnings that are shaping the information environment of this pandemic and contributing to understandings of and abilities to manage and control this crisis.
2 | LITERATURE REVIEW

An information environment represents a collection of information sources, communication technologies, and the myriad of social, cultural, and political factors shaping the information produced, disseminated, used, and discarded in an environment. This information environment plays a highly significant role in informing public views and guiding human behavior. Information available through different sources create an information environment at the most general level (Lievrouw, 2000, p. 156) which becomes highly important to individuals when they get to know the available information and find it relevant to their needs. According to Lievrouw (2000), various institutions, including government, cultural, and business organizations, produce information, which is then shaped by media. In addition to shaping and filtering information, media also produce information based on what is happening regionally, nationally, and globally. Any information environment can have numerous flows of information coming from different sources and about different issues. For instance, sources such as newspapers, websites, social media, databases etc. can all be used to get information about one particular issue or about different issues.

An information flow is a communication of information between senders and receivers (Durugbo, Tiwari, & Alcock, 2013); the information underpinning these flows is the real substance of any information environment and determines to a great extent how people will perceive, understand, and respond to an issue. Information in its variety of forms (e.g., visual, verbal, written) is essential for all human endeavors, ranging from day-to-day activities to cutting-edge research and policy making. Failure to possess the correct information can lead to political debacles, adverse health care events (e.g., MacIntosh-Murray & Choo, 2006), and inability to respond to emerging challenges.

Information has different properties, which can play important roles in shaping an information flow and, thereby, an overall information environment. These properties include completeness, accuracy, relevance, and timeliness (e.g., Knight & Burn, 2005; Lee, Strong, Kahn, & Wang, 2002). There is a notable body of research in economics and finance demonstrating the impact of incompleteness on valuation (e.g., Aboody & Lev, 2000; Akerlof, 1970; Kim & Park, 2016). The marketing discipline has also produced a significant amount of research on the role of information properties in shaping consumer perceptions (e.g., Keller & Staelin, 1987; Lurie, 2004). In information science, many scholars (e.g., Rieh, 2002; Savolainen, 2011) have investigated the properties of information and their impact on human behavior.

The nature of the information used to create information flows about any crisis can have significant implications for individuals, policy making, and the public. For instance, if incomplete information is used to report any event, then it is likely that significant and even serious information failures will result. The preceding point is supported by studies on information failures during disasters (e.g., Choo, 2008; Turner & Pidgeon, 1997). Turner and Pidgeon (1997) analysed 84 official accident reports published by the British Government and noted that it is important to consider not only the available information before a disaster but also the distribution of this information during the disaster and any factors that inhibited the flow of this information.

Similarly, Choo (2008) examined some organizational disasters and identified three information impairments that can contribute to mishaps: (a) blind spots, (b) risk denials, and (c) structural impediments. Therefore, it can be suggested that information that is incomplete, misleading, or ambiguous can have serious implications for both understanding a crisis and managing it.

3 | RESEARCH APPROACH

To chart information flows about COVID-19, it was important to understand the basic building blocks of the information environment around this crisis. Further, due to the huge amounts of existing information about COVID-19, it was also important to limit the scope of this research to a certain time frame.

Regarding the basic building blocks of the COVID-19 information environment, the work of Lievrouw (2000) guided the identification of organizations highly relevant to this crisis and news outlets with vast global coverage. The WHO and the National Health Commission of the People’s Republic of China (NHCPRC) were identified as two highly relevant organizations generating information about COVID-19. Additionally, the British Broadcasting Corporation (BBC), Cable News Network (CNN), and ABC News were selected to analyze regarding information about COVID-19 due to their large audiences in English-speaking countries. Information from all of these sources was content analyzed. The content analysis, in the case of websites, focused to gain understanding of the overall scope of information provided. In the case of news outlets, the content analysis aimed to identify the main theme of each news item and to guide categorization of collected information.

The websites of the WHO (https://www.who.int/) and the NHCPRC (http://en.nhc.gov.cn/index.html) contain large amounts of information on COVID-19. The
WHO provides information about many aspects of COVID-19 but this research focused on “rolling updates” and “situation reports.” On the NHCPRC website, regular updates about COVID-19 were categorized under “news,” and information from this section was also reviewed.

The BBC (http://news.bbc.co.uk/hi/english/static/help/archive.stm), CNN (http://edition.cnn.com/WORLD/archive/archive-1.html), and ABC News (https://www.abc.net.au/news/archive/) web archives were searched using keywords of “coronavirus” and “COVID-19” to identify the first instance when information about COVID-19 or coronavirus was mentioned. Following that identification, searches were conducted to identify the instances when information about any aspect of COVID-19 was disseminated through these news outlets. The searches were restricted to the time frame starting from the first mention of COVID-19 in news to the end of February 2020.

3.1 | Data analysis

From the BBC, ABC, and CNN news web archives, a total of 120 news items about COVID-19 were identified (see Table 1). These news items appeared between January 1, 2020 and February 29, 2020. The gathered information was reviewed to ascertain the aspects of COVID-19 that were covered in these news items.

Each news item was reviewed to identify its central topic. Information pertaining to the same topics was grouped into common categories, leading to a total of eight categories. These categories included: (a) outbreak, (b) economy, (c) educational, (d) misinformation/disinformation, (e) sports, (f) politics, (g) racism, and (h) evacuation. Information pertaining to the spread of COVID-19, the number of fatalities, and the number of identified cases was grouped under the “outbreak” category. The category of “economy” included information about the impact of COVID-19 on trade, industry, stocks, and overall business activities. Information aiming to educate people about the virus and measures of protection against it was grouped under the “educational” category. All news items highlighting the instances of misinformation and/or disinformation were used to develop “misinformation/disinformation” category. The category of “politics” covered news that casted doubts about a national or a foreign government’s ability to deal with COVID-19 and any news that used the virus to depict a turbulent domestic political environment. Instances involving discriminatory behavior

| TABLE 1 | News data |
|---|---|---|---|
| | BBC | ABC | CNN |
| No. of news and/or stories about COVID-19 | 64 | 33 | 23 |
| Categorization of Information | 8 Categories | 8 Categories | 5 Categories |
| First reference to virus | January 10 | January 1 | January 6 |

| TABLE 2 | Categories and information flows |
|---|---|---|---|
| | BBC | ABC | CNN |
| Most frequent categories | Outbreak (29X) Misinformation/Disinformation (6X) Sports (6X) | Outbreak (14X) Economy (14X) | Outbreak(12X) Economy (5X) Politics (3X) |
| Less frequent categories | Educational (4X) Politics (4X) Racism (4X) Economy (3X) Evacuation (2X) | Educational (4X) Sports (2X) Racism (1X) Politics (1X) | Educational (2X) Misinformation/Disinformation (1X) |
| Start—Regular flow of information | January 18 | January 20 | January 20 |
| Increased flow of information | January 30 | January 30 | January 30 |
| Important Information | -Misinformation & Disinformation -Racism | -Educational information -Economy | -Politics |
against people of Chinese descent due to coronavirus was coded under “racism” category. The “sports” category included information about the events being canceled or postponed due to COVID-19 whereas the “evacuation” category included information about the passengers evacuated from different cruise ships (see Table 2). Four categories (i.e. outbreak, educational, economy, and politics) were common across all three news outlets. The category of “misinformation/disinformation” was common between BBC and CNN whereas the categories of “sports,” and “racism” were common between BBC and ABC.

In addition to the topics of news items, it was important to identify the time frame within which information flows about COVID-19 became regular and greater in magnitude across the news outlets. For this identification, the lag between the dates on which COVID-19 news items appeared and the frequency of news stories about the virus appearing on the same date were examined. For instance, the regular flow of information about COVID-19 on BBC started around January 18, 2020; almost every day after this date, some form of news item about the virus appeared. In the cases of CNN and the ABC, the starting point for the regular COVID-19 information flow was January 20. The magnitude of this flow on all three news outlets increased around January 30, 2020; from this date, almost every day, multiple news items about COVID-19 appeared.

Though there was near uniformity in terms of the kinds of topics covered by the three news outlets, some topics were highlighted more by one or two channels. For instance, the BBC strongly emphasized disinformation and misinformation, whereas the ABC and CNN highlighted the economic implications of COVID-19.

The WHO rolling updates and situation reports were reviewed to understand (a) the kind of information about COVID-19 that was disseminated to the world and (b) the timing of events. The rolling updates were used to provide brief information about different aspects of COVID-19 ranging from reporting a field visit to China to providing training to African health workers. These updates about COVID-19 started on December 31, 2019, when China first reported pneumonia of unknown cause to the WHO’s China office, thereby making December 31 a key date. Similarly, a rolling update on January 10, 2020 is important because the WHO issued its first guidance on the coronavirus with an objective to help nations assess their capacities in the areas of detection and response. Situation reports, on the other hand, followed a structured approach to provide regular updates about (a) countries reporting first cases of COVID-19, (b) total number of confirmed cases in China on the day of the report, (c) confirmed cases of COVID-19 outside of China on the day of report, and (d) WHO’s evolving initiatives to tackle this virus.

Information about COVID-19 available under the news sections at the NHCPRC website highlights (a) the efforts made by the Chinese government in managing and controlling this virus, (b) efforts aiming to develop a vaccine, (c) the extraordinary commitment of medical staff to dealing with the crisis, (d) encouraging signs in terms of recoveries, and (e) praise of the Chinese response to this crisis by international organizations and governments. This information is important because it tells a story about the crisis; however, its scope is rather limited and does not help much in knowing the scale of crisis, the problems and challenges faced by medical staff and the public, and the exact nature of the efforts involved in managing the virus in China.

**4 | DISCUSSION, IMPLICATIONS, AND LIMITATIONS**

The analysis of information about COVID-19 is revealing in many regards. For example, regular flow of information in the three news outlets, and the increased magnitude of this flow, started on almost the same dates (January 18–20 and January 30, respectively). This suggests that some events must have been occurring around these dates and, hence, information about them was disseminated through these news channels. In terms of regular information flow about COVID-19, the following are some possible explanations: (a) cases of COVID-19 outside China began to be reported around January 13–20 (https://www.abc.net.au/news/2020-01-29/coronavirus-timeline-from-wuhan-china-to-global-crisis/11903298?nw=0&pfmredir=sm), (b) the number of cases in China also started to increase at this time, and (c) the first meeting of the WHO Emergency Committee regarding the coronavirus outbreak (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen) occurred between February 22 and 23. Regarding the increased magnitude of information flow about COVID-19, events such as the following occurred: (a) the confirmation of infections outside China started to become more regular and the virus reached 20 countries by January 30 (https://www.abc.net.au/news/2020-01-31/coronavirus-map-tracks-spread-throughout-world/11912828), (b) concerns about the virus becoming a global crisis began to be voiced by researchers in scholarly communication and in mass media (e.g., Riou & Althaus, 2020; https://www.bbc.com/news/world-asia-china-51249208), and (c) the WHO started issuing “situation reports” on January 21, providing daily updates on COVID-19, leading to the declaration of the novel
coronavirus as a “public health emergency of international concern” on January 30, 2020.

Some of the most frequently appearing categories in the news shed light on the emphasis that was placed on certain aspects of COVID-19. The category of “outbreak” included information that informed the public of the progression of COVID-19 and, as the situation evolved, to know the number of fatalities. When the spread of the virus outside China started to become a reality rather than a possibility, “educational” information also began to appear with greater frequency. For instance, ABC News provided educational information about the virus, ways in which it spreads, and ways to avoid infection.

Misinformation and disinformation also appeared numerous times across the three news outlets. Perhaps realizing the dangers of information imperfections associated with any crisis, news channels variously discussed misinformation and disinformation. The BBC, at the very onset of COVID-19, raised questions about the accuracy of the numbers reported in Wuhan (https://www.bbc.com/news/health-51148303). CNN also reported on January 31 about the possible lack of transparency in the availability of vital information about COVID-19 (https://edition.cnn.com/2020/01/31/asia/wuhan-virus-china-censorship-intl-hnk/index.html). Preponderance of misinformation about the spread and alleged cures for this virus has also been noted (https://www.bbc.com/news/technology-51337357).

The analysis of information about COVID-19 in this study highlights important information problems. These problems include incomplete information, disinformation, misinformation, and lack of timely information. For instance, crucial events such as when exactly the first case of COVID-19 was identified and the exact number of infections and fatalities in China still require more information. Further, it is important to identify the underlying reason for this incomplete information—that is, whether it was caused due to disinformation or due to absence of timely information. As long as this incomplete information exists, understandings about the evolution of COVID-19 as a global pandemic will remain partial. It is also crucial to understand the impact, if any, of incomplete information on the handling of COVID-19 at the international level.

Misinformation about different aspects of COVID-19 was found to be rampant by the three news outlets and reported quite often in their stories. Misinformation about (a) the reason the virus appeared and became a global crisis (e.g., different conspiracy theories), (b) suggested cures for the virus, and (c) the ways in which it spreads was noted by different news stories.

These information problems led to what Turner and Pidgeon (1997) called “information failures”—that is, instances in which crucial pieces of information either were missing, buried under other information, or were available but were simply not heeded. These information problems and information failures warrant further investigation if researchers and policy makers are ever to paint a complete picture of COVID-19 and avoid a crisis of such a nature in the future.

There are important implications for practice as well, for instance, regarding what role information professionals can play both during this crisis and after it. Most importantly, information professionals can use their education and skills to develop simple and easy-to-use information packages aiming to inform the public about essential information regarding COVID-19. This information need not be limited to only health aspects but can also include, for example, ways to access social security benefits and links to online help to deal with the effects of social distancing. Misinformation and disinformation are widespread during this crisis, so online resources offering education against these two information problems will be helpful.

Finally, researchers are and will be seeking reliable and easy-to-use information sources and data sets on COVID-19. Therefore, information professionals can assist research efforts to control and eliminate the virus by developing such information sources.

The data set in this study was limited to 2 months, omitting other significant pieces of information about COVID-19. Consideration of information flows in later months will be essential to developing a comprehensive understanding of this pandemic and the role played by different information imperfections in shaping some of the impacts of COVID-19. Though an effort was made to cover all news items in the three news outlets, it is likely that inadvertent omission of some news items may have occurred.

5 | CONCLUSION

The purpose of this research was to examine information flows about COVID-19 with the objective of understanding different information properties underlying these flows. Information available about COVID-19 through the WHO, NHCP, and three news outlets was analyzed. The analysis revealed that there are significant information imperfections in COVID-19 information flows, including the preponderance of incomplete information, misinformation, and disinformation, and the absence of information about some key turning points. Moreover, COVID-19 information flows present a distinctive pattern in terms of the amplification of frequency and magnitude of information.
dissemination. The implications of these information imperfections in terms of creating information failures and hence ineffective approaches to deal with this crisis warrant further investigation.

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