



Comparative Analysis of Government Health Communication During Crises: Insights from Saudi Arabia, the United States, and the United Kingdom

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Abstract: The year 2020 will always be remembered as ‘the whole world shut down’ year that pushed governments to adopt stringent emergency response measures. A crucial aspect of managing such crises is effective public communication by governments and relevant stakeholders. This study explores government communication during health crises, using COVID-19 as a case study. Specifically, it examines how government officials in Saudi Arabia, the United States, and the United Kingdom utilized the X platform to engage with the public during the pandemic. Drawing on Su et al. (2022), this research also aims to provide insights into strategies that health officials can use to enhance communication with government officials and media professionals.

Through content analysis of a substantial dataset from three representative healthcare X accounts, covering the first five months of 2020, the study identifies four key message types—reassuring, informational, encouraging, and communicative—as the most recurrent across these accounts. Variations in the frequency of these message types were observed among the accounts, along with both commonalities and differences in post characteristics across the three countries. This research contributes to understanding how different governments leveraged social media to manage public communication during a global health crisis suggesting some practicing implications for governments, health organizations, and practitioners.

Keywords: Crises, public healthcare communication, Government Health Communication, X

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Introduction

Crises, such as pandemics, natural disasters, and terrorist attacks, highlight the critical role of effective communication by healthcare officials. Among these crises, this paper will focus on COVID-19, a pandemic that has underscored the importance of timely and accurate information dissemination. Social media platforms, particularly X (formerly known as Twitter), have become vital tools for managing public perception, disseminating information, and combating misinformation during this global health crisis.

As of early 2021, COVID-19 had confirmed over 114 million cases and resulted in more than 2.5 million deaths globally, marking it as a significant public health crisis (Rao et al., 2020). The rapid spread of COVID-

19 prompted governments worldwide to implement unprecedented measures, including lockdowns and quarantines, to control the disease's spread. These actions required governments at all levels to adapt quickly, imposing restrictions and disrupting daily life to ensure public safety (Bradley & Sellars, 2020).

A pandemic of this magnitude necessitates immediate, large-scale government initiatives and public communication to curb the illness's spread (Wilder-Smith et al., 2020). Under these exceptional conditions, effective epidemic communication is essential to keep the public informed about the latest developments, encourage preventative measures, and reassure them of the government's capability to manage the situation. In this context, officials and government spokespeople play a crucial role in reducing public anxiety and fear. Government communication involves "all the communication operations of government bodies that strive to disseminate and share news and information in order to present and explain government policies, programs, decisions, and actions" (Radwan & Mousa, 2020, p. 517).

Given the protracted nature of the COVID-19 pandemic, effective communication is vital for counteracting panic and providing reassurance amidst ongoing uncertainty (Rao et al., 2020). Public health-related communication can significantly influence public attitudes and behaviors, shaping how individuals respond to health guidance and interventions (Bernhardt, 2004). Thus, carefully crafted communication strategies can increase knowledge, raise awareness, and facilitate behavior change (Hornik, 2002).

Statement of Problem

When a crisis hits, governments must move quickly, react wisely, and do whatever it takes to save lives and support citizens. It is a race against the clock with unprecedented circumstances. During the global health crisis of COVID-19, governments play a major role in reassuring, supporting, and guiding their citizens as they are considered the most reliable source of information. Their communication methods, including their message content, style, and language, may significantly influence the publics' awareness of the pandemic.

The government of Saudi Arabia has been acclaimed for utilizing all the effective communicative ways to connect with its citizens and draw their support during this time of the pandemic. According to the Global Entrepreneurship Monitor (GEM) report for 2020-2021, Saudi Arabia's response to the COVID-19 epidemic ranks top in the world (SPA, 2021). A typical example has been the following quote from a speech given by Saudi King Salman bin Abdulaziz on TV amid the pandemic crisis:

Rest assured that we are very keen on providing the necessary medication, food, and living necessities for citizens and residents of this blessed land. All government sectors, led by the Ministry of Health, are doing all they can and taking all necessary measures to ensure the health of the nation's citizens and residents.

(Saudi Arabia's King Salman Bin Abdulaziz)

The speech has received worldwide attention for the King's support and reassurance to the public and the government's efforts in ensuring the public's needs are met. This speech was perceived and described by many journalists as assuring safety to all.

Boris Johnson, on the other hand, depicts the threat of coronavirus in a television statement as "the worst public health disaster in a generation" and informs the British public that "Many families, and many more families, will lose loved ones before their time" [due to the spread of coronavirus]. He further states, "We've done what can be done.". Although the transparency of Johnson's speech could be a warning voice to the public, many people thought it was more terrifying than a warning. Sanders (2020) mentioned that Johnson's statement proved that the British government was not ready for that crisis and unaware of the situation and that it was only providing misleading reassurance to the British public.

Significance of the Study

This research is inspired by Su et al. (2022), which suggested that future studies could investigate strategies health officials can use to improve communication with government officials and media professionals. Enhancing these communication strategies could help avoid miscommunication and mixed messaging, ultimately strengthening society's ability to manage and control pandemics. In light of the findings of this

research, a variety of conclusions can be drawn for governments and public health organizations on their epidemic communication with citizens. Furthermore, this study intends to initiate more research about government communication strategies during emergency outbreaks and lay the groundwork for further research on the governments' tone and style of health communication during outbreaks.

Related Work

During an infectious health crisis, people may experience mixed feelings of uncertainty and anxiety (Brooks, *et al.*, 2018; Qiu, 2020). If not adequately addressed and controlled, such psychological distress may lead to panic and herding behaviors (Liao & Fielding, 2014; Depoux, 2020). Effective and timely outbreak communication by governments is therefore urgently needed. There is an agreement that government communication needs to be instant, informative, clear, and transparent, particularly during a crisis. During pandemics and crises, effective communication plays a central role in guiding the public by raising awareness about the disease and ways of transmission, motivating them to take protective actions, and developing and maintaining public trust (Reynolds & Quinn, 2008; Liao & Fielding, 2014; Gentili, 2020).

During the pandemic of COVID-19, people tend to engage and search for information on which they could rely. This is a "knowledge-gathering process, resulting from a health query or need" (Mukherjee & Bawden, 2012, p. 242). People may seek information for ensuring survival, support of and for others, and emphasizing safety. Furthermore, people during crises start focusing on only their needs for immediate action from governments and getting enough information to understand the situation (Dolina *et al.*, 2016; Barnwal *et al.*, 2019). This is where the governments and leaders' role should come into action.

How a community should prepare, understand and respond to an outbreak such as COVID-19 is the central role of governments and experts to avoid any tragedies. Unfortunately, according to Gu and Li, (2020), "governance systems often turn out to be flawed, incompetent, and chaotic in the face of epidemic outbreaks" (p.160). According to international organizations, such as the WHO (2011), many doctors reported that poor communication, such as partial or insufficient information, formed the most significant challenge they faced during an outbreak. Van-Tam Lambert *et al.* (2010) claimed that the absence of clear communication strategies caused confusion and misunderstanding between the public and professionals, which negatively resulted in the authorities' credibility.

Several countries have been targeted in the examination of COVID-19 related government communication on X. The UK, USA, China, Ghana, and Brazil were some of these countries. According to Sanders (2020), the public's trust in the British government went down from April 18% to 51% in June as a result of the weak communication in the first two months of the virus. Sanders claimed that the Prime Minister, Boris Johnson, did not engage and effectively lead the nation when dealing with the coronavirus outbreak until March when the virus had already invaded the country by multiple routes.

Through analyzing official communication in the United States throughout the COVID-19 crisis, Kim and Kreps (2020) indicated that many countries failed to respond appropriately in the early stages of the COVID-19 pandemic, and the U.S. government was no exception. The failure of an ineffective early response has caused serious damage that could be avoided if communication was instant, informative, and transparent. Another government communication issue emphasized by Kim and Kreps was the lack of communication channels that allow citizens communication with the government and health organizations. Such an absence of communication channels and limited information may direct people to unreliable sources that might cause confusion and frustration.

In China, similarly, government communication about COVID-19 during the early stages was also criticized. The findings of Liao *et al.* (2020) indicated that the public's response to the crisis online preceded the government. By comparing public and government posts, the researchers observed that the content of personal posts focused on showing empathy to affected people and blaming the government, while government posts were limited to providing information and praising people and organizations.

Nevertheless, it is worth noting that some other governments worldwide have adopted an effective communication system with their citizens (Kim & Kreps, 2020). While investigating governmental communication strategies during the COVID-19 pandemic in Ghana, Antwi-Boasiako and Nyarkoh (2020) stated that the Ghanaian government has established an effective communication strategy with the citizens and that their communication with the public was prompt and transparent by providing information, updates, and spreading calm.

As a technique of communicating with the public, social media has become the new norm for governments and response teams; it is a great tool for effectively disseminating outbreak-related updates and vital information. During infectious disease epidemics, it is asserted that people frequently resort to social media for information, which can influence their decision-making and concurrent behaviors (Tang et al., 2018). Individuals and healthcare organizations have increasingly utilized social media platforms to improve their communication and information sharing during emergencies, as these platforms enable people to communicate with each other and with officials for information exchange and consumption (Palen et al., 2009). Before the outbreak of the coronavirus, social media played a vital role and continue to do so as the virus spreads globally (Xue et al., 2020). Haman (2020) asserted that "people are keen on being alerted about emergencies via social networks, and government authorities should utilize them." (p. 1). Literature reveals that there has been a request for a more proactive use of social media to distribute health messages and debunk myths about infectious illnesses among physicians, journalists, and the general public. This has prompted authors to investigate health communication across various social media platforms. Cinelli et al. (2020), for instance, conducted comparison research to identify significant issues during the COVID-19 health emergency on X, Instagram, YouTube, Reddit, and Gab.

Numerous individuals, groups, and governments used a variety of social networks to disseminate information about COVID-19. These included blogging, IM applications, networking, and photo/video sharing. As a microblogging platform, X is one of the most effective public health tools that governments employ to immediately and directly disseminate information about COVID-19 to the general public. Moreover, X functioned as a constant stream of instantaneous information that was always accessible to users (Korda & Itani, 2013). An increasing collection of studies on social media discourse related to disasters and emergencies is based on X (for example, Yeo et al., 2018; Yeo et al., 2020; Xue et al., 2020).

With the current COVID-19 pandemic, X has witnessed an influx of X posts that inform and sensitize users about the disease's state, its transmission, fear factors, and prevention techniques (Rao et al., 2020). Healthcare responsible agencies such as the WHO as well as many other government organizations have provided information repositories on their X accounts to promote the sharing of correct and open-access content related to the pandemic. The content of repositories typically comprises useful articles, important educational links, guidelines/protocols, and updates (Wong et al., 2020).

X data have been analyzed regarding previous epidemics and diseases such as Zika (e.g., Glowacki et al., 2016; Stefanidis et al., 2017) and Ebola (e.g., Morin et al., 2018). In the current pandemic outbreak, X has been instrumental in informing the public, and thus, online discourse on X has already attracted numerous contributions. Haman (2020), for example, examined how state leaders used X during the COVID-19 pandemic and their impact on the public. The findings revealed that many state leaders were active X users during the crisis of COVID-19, as they mainly rposted information to fulfill people's needs. In addition, the number of their followers has increased significantly due to dedicating their main content to the coronavirus health crisis.

Research studies that analyzed COVID-19 related X data varied in the approaches in which they adopted to examine data. Content analysis is a research method that is widely used in health and government communication. COVID-19 communication studies such as Rufai and Bunce (2020) and Alhassan and AlDossary (2021) utilized content analysis. Researchers adopting this method regarded it as flexible for analyzing text data as it provided an in-depth analysis of media communication. Rufai and Bunce (2020) analyzed viral X posts from G7 world leaders, among whom were Boris Johnson, Prime Minister of the United Kingdom (UK), and Donald Trump, President of the United States (US). Analysis revealed three key

themes for viral X posts: 1) Informative; 2) Morale-boosting; 3) Political (i.e., seeking to raise a point of political debate). The majority of viral X posts fell within the 'Informative' category. The current research study seeks to examine COVID-19 X posts from healthcare government officials' accounts targeting the 20 largest industrialized countries (G20).

In the Saudi context, Alhassan and Aldossary (2021) was the only study found to explore government health communication on X with regard to the COVID-19 pandemic. Inspired by a similar motivation as the current study, the study explored epidemic communication techniques and public participation by the Saudi Ministry of Health (MOH). During different phases of the COVID-19 outbreak in Saudi Arabia, the Ministry of Health's (MOH) X account employed varying types of message content and levels of public involvement, as determined by the study's findings. Reduction of doubt, efficacy, and reassurance were the most popular sorts of X posts from the MOH. Due to the paucity of research in the Saudi context, the present study has chosen COVID-19 communication by the Saudi government as one area of emphasis.

Previous research on X and the COVID-19 pandemic did not only focus on the analysis of government communication. Many other authors examined X COVID-19-related data with a focus on public engagement and reaction or prominent topics in general. Garcia and Berton (2021) and Lwin et al. (2020) applied topic modeling and sentiment analysis methods to understand public reactions and information dissemination. The study by Garcia and Berton compared COVID-19 X data in English and Portuguese from April to August 2020, primarily from the United States and Brazil, in reaction to the COVID-19 epidemic. The study discovered ten key subjects associated with COVID-19 in both languages, with negative emotions dominating the vast majority of the topics detected during the coronavirus epidemic. On the other hand, Lwin et al. (2020) analyzed over 20 million retrieved X posts using a lexical approach and the CrystalFeel algorithm. Fear, rage, melancholy, and happiness were identified, and their underlying causes were studied. Furthermore, Thelwall & Thelwall (2020) studied the most reposted English-language X posts during March 2020 that included COVID-19. There were 78 eligible X posts that accounted for 14 million reposts. Lockdown living, attitude toward social limitations, politics, safety messaging, people with COVID-19, support for essential workers, employment, and COVID-19 facts/news were among the major themes.

Research Objectives

This study seeks to examine government public health communication on X about COVID-19 in three countries: The US, the UK, and Saudi Arabia. The objective of this study is to analyze the content of posts by health officials of each country based on data collected from X, which is a major social network site in all three countries. The objectives of this study are to 1) identify the most frequent COVID-19-related messages communicated by health officials of the three countries during the pandemic on X, which is a major social network site in all three countries; and 2) compare and contrast how health officials communicated COVID-19 related messages in the three countries.

Research Questions

This study attempted to address the following research questions:

1. What are the most frequent COVID-19 related messages communicated by health officials of the three countries on X during the pandemic?
2. To what extent were COVID-19 related messages communicated by health officials in the three countries similar or different?

Methodology

This study employs content analysis to examine the X communications of healthcare officials from three countries—Saudi Arabia, the United States, and the United Kingdom—during various crisis events, including natural disasters and health emergencies. The focus is on verified X accounts associated with healthcare organizations and officials, with an emphasis on messages related to public health and safety, emergency updates, and information dissemination.

Data Collection

The data for this study were collected from X accounts of key healthcare officials from the three selected countries. These accounts were chosen based on their role in providing crisis-related content, including updates and guidance on public health issues. The selected accounts are (Table 1 provides further details):

1. **The US:** @SecAzar - This account belongs to Alex Azar, the 24th Secretary of Health and Human Services (HHS). The HHS is tasked with "protecting the health of all Americans and providing essential human services, especially for those who are least able to help themselves" (Department of Health and Human Services, n.d.). Azar served under President Donald Trump's administration and addressed various public health concerns through this account. The primary audience includes American citizens, healthcare professionals, and rural communities.
2. **The UK:** @MattHancock - Managed by Matt Hancock, the Secretary of State for Health and Social Care, this account represents the UK's Department of Health and Social Care. Hancock has been responsible for overseeing health policy and crisis management since July 9, 2018 (The Rt Hon Matt Hancock MP, n.d.). The audience targeted by this account includes the general public, health practitioners, NHS workers, and specific community groups.
3. **Saudi Arabia:** @spokesman_moh - This account is maintained by the spokesperson of the Ministry of Health (MOH) in Saudi Arabia, the largest provider of healthcare services in the country (Statistical Yearbook, n.d.). The account provides information on COVID-19 and other health-related matters, aiming to avoid misinformation and panic. It serves Saudi citizens, non-Saudi residents, and health professionals.

Rationale for Selection

The selected accounts are verified, indicating their authenticity and reliability as sources of official information. According to X (2024), a verified account receives a blue check icon to confirm the legitimacy of the account holder. These accounts were chosen because they are recognized for delivering credible and timely updates on COVID-19, making them suitable for analyzing the communication strategies of healthcare officials during the pandemic.

Data Analysis

The study focused on daily posts shared by these healthcare officials from January to May 2020. The content analysis involved identifying and categorizing the messages based on their themes and purposes. By analyzing these X posts, the study aimed to uncover patterns in how each country's healthcare officials communicated with the public during the crisis.

This methodological approach provides insights into the effectiveness of crisis communication strategies employed by healthcare officials across different geopolitical contexts. Understanding the nuances of these communications can inform future public health messaging and improve crisis response strategies.

Table 1

Detailed information of the three X accounts

	Saudi Arabia	UK	USA
Name of the account	المحدث الرسمي لوزارة الصحة	Matt Hancock	Alex Azar
X handle	@spokesman_moh	@MattHancock	@SecAzar
Joined X	July 2019	January 2009	January 2018
Lifetime X posts	204 X posts	21K X posts	4,759 X posts
Following	6	1,262	161

Followers	355.1 K Followers	419.1K	79.4K
X profile	الحساب الرسمي للمتحدث باسم وزارة الصحة د.محمد العبدالعالي	"Secretary of State for Health & Social Care and MP for West Suffolk"	"Alex Azar was the 24th Secretary of the U.S. Department of Health & Human Services. Privacy policy: http://hhs.gov/privacy.html "
X posts retrieved in total	91	969	988
X posts analyzed	91	414	250

The dataset for this study comprises publicly available X posts from verified accounts of healthcare officials and organizations during significant crises. The selected period for analysis was January 1, 2020, to May 31, 2020, chosen for its critical moments in the early stages of the COVID-19 pandemic, including the initial reports of infections and notable spikes in case numbers. This timeframe was selected to capture government communication during pivotal moments of the crisis.

Data were collected from three verified X accounts representing health officials in Saudi Arabia, the United States, and the United Kingdom: @spokesman_moh (Saudi Arabia), @SecAzar (USA), and @MattHancock (UK). These accounts were selected due to their roles in disseminating official health information and guidance related to COVID-19. The focus was on analyzing daily X posts from these accounts to understand their communication strategies during the pandemic.

All the X posts used in the current study were publicly available. X posts published by the @spokesman_moh were mainly in Arabic, whereas X posts in the other two accounts were only in English. Since all four authors are competent in both English and Arabic, there were no issues in understanding and coding the X posts in all accounts.

X posts were collected using web scraping techniques to circumvent the limitations of X's API, which restricts chronological queries to recent X posts only. For this study, Python-based web scraping libraries were employed to retrieve historical X posts within the specified date range of January 1, 2020, to May 31, 2020. The dataset was assembled on January 5, 2021, and no posts were deleted between the collection and analysis periods.

Python Libraries for Data Collection:

1. **BeautifulSoup and Requests:** Utilized for extracting static content from web pages.
2. **Selenium:** Used to interact with and extract data from dynamic web pages that require JavaScript rendering.
3. **Playwright:** Employed for its ability to handle complex web interactions and dynamic content effectively.

Data Collection Process:

1. **Tool Selection:**
 - **BeautifulSoup and Requests:** For basic HTML parsing and extraction.
 - **Selenium:** For scraping dynamically loaded content that requires user interaction or JavaScript execution.

○ **Playwright:** For advanced scraping needs, including interactions with complex and interactive web elements.

2. **Date Range and Scope:** X posts were collected from January 1, 2020, to May 31, 2020, capturing key moments in the pandemic's early spread. This period was chosen to reflect both the onset and significant spikes in COVID-19 cases.

3. **Data Extraction:** The dataset was compiled into a corpus of 2048 X posts. X posts were filtered based on relevance to COVID-19, using keywords such as "coronavirus," "COVID-19," and "pandemic," resulting in 755 X posts (21979 tokens) for detailed analysis.

4. **Data Handling and Filtering:** Non-relevant X posts were excluded using keyword-based filtering criteria. This approach ensured the dataset focused on X posts related to COVID-19 communication.

5. **Data Assembly:** The scraping process was completed on January 5, 2021, and the dataset remained unchanged from collection to analysis.

Data Extracted

For this study, the following information was extracted during the scraping process:

1. **User Information:** Includes details such as username, name, location, profile URL/image/banner, and follower/following count. This data helps provide context about the accounts from which the X posts originated.

2. **Post Content and Metadata:** The dataset includes the post text and associated metadata, such as hashtags, date posted, number of favorites, reX posts, and media. This allows for a comprehensive analysis of the content and its contextual information.

3. **Interactivity and Reachability Metrics:** While X posts' likes and reX posts were collected, these metrics were not analyzed as part of this study. The focus was on the content and thematic analysis of the X posts.

Prior to analysis, the collected data underwent a rigorous cleansing process to ensure accuracy and relevance. This process involved removing duplicate entries, filtering out irrelevant content, and correcting any errors related to formatting or content. Figure 1 exemplifies the process followed in data collection and analysis.

Figure 1

The main stages of the research methodology and analysis



X posts that were not primarily written about COVID-19 have been excluded from the structured database, and a criterion has been used to identify such X posts. Certain keywords had been selected to sort out the overall 2048 X posts from the databases of the three selected X accounts. Sample X posts were extracted from collected X posts by keeping X posts that contain any of the following keywords: "coronavirus" or "COVID-19", "COVID19", "coronavirus", "pandemic", or "corona". The keywords were determined after reviewing the literature on the most related work and after examination of X posts in all three accounts.

After exclusion of the irrelevant X posts, this research has yielded 755 X posts (21979 tokens) for final investigation. This number of X posts represents 36.86% of the original set. Since X posts from the account representing Saudi Arabia were dedicated to COVID-related communication, all X posts have been included for analysis. The X posts were divided into three sub-corpora based on the account, as detailed in Table 2.

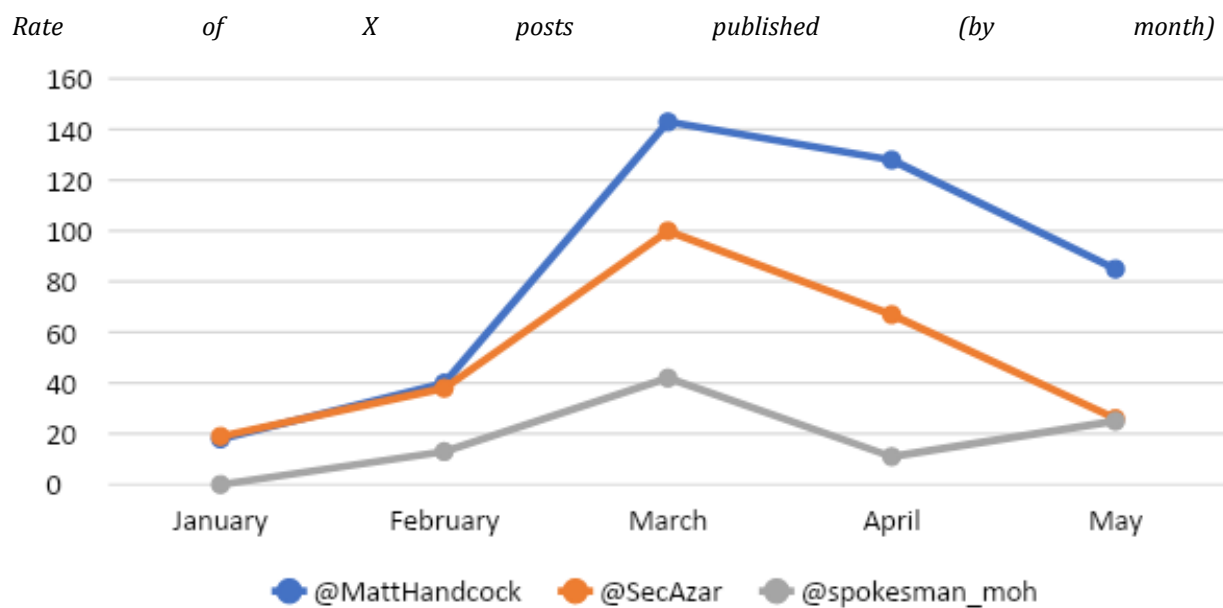
Table 2

The frequency of COVID-19 X posts from January 1, 2020 to May 31, 2020.

	X handle	X posts Published (by month)					Total
		January	February	March	April	May	
1	@MattHancock	18	40	143	128	85	416
2	@SecAzar	19	38	100	67	26	525
3	@spokesman_moh	0	13	42	11	25	91

The frequency distribution of the yielded X posts is presented in Figure 2, which shows that all three accounts had become more actively published X posts in March compared with the post numbers (less than 50 X posts) posted in January and February.

Figure 2



Data analysis

Content analysis was employed to examine the X posts from healthcare officials during different crises, utilizing a systematic three-stage approach. Initially, two researchers independently coded the X posts. They then compared their codes and resolved discrepancies through discussion. Finally, they confirmed the final codes to ensure consistency and accuracy.

To understand the messages conveyed by the three healthcare officials' X accounts in relation to the outbreak, content analysis (CA) was conducted. CA is a well-established research method widely utilized in health studies. It addresses fundamental communication research questions: 'Who says what, to whom, why, how, and with what effect?' (Babbie, 2014, p. 324). This method provides "a careful, detailed, systematic examination and interpretation of a particular body of material in an effort to identify patterns, themes, assumptions, and meanings." (Lune & Berg, 2017, p. 182).

Based on the content and information in the X posts, themes were identified and coded through CA. Previous studies predominantly used quantitative methods; however, Hamad et al. (2016) argued for the inclusion of mixed methods in X content analysis. They proposed a combined content-analysis (CCA) model to design, conduct, and evaluate X-driven content investigations (Hamad et al., 2016). CCA "[r]esearchers using qualitative CA may go beyond counting the frequency of words in a text and focus more on the context, including the analyst's assumptions, pre understandings, or constructions of reality, the conceptual environment, and where the text is situated in relation to other studies." (Hamad et al., 2016, p. 3).

This study adopted CCA to analyze X-driven data, focusing on COVID-19-related content from the three healthcare officials' accounts. The analysis followed a three-stage approach:

1. **Stage One:** Each of the four researchers independently coded the X posts. X posts containing multiple parts were assigned more than one code if necessary, with primary and secondary codes applied as appropriate. Keywords and repetitive language features were highlighted.
2. **Stage Two:** Codes from Stage One were compiled into an Excel file for comparison. Two researchers reviewed random X posts to discuss the appropriateness of codes. Variations in coding terms, such as motivational, encouraging, and informative, were discussed until consensus was reached. The final codes were compiled into a codebook.
3. **Stage Three:** Two researchers revisited the codes from Stage Two to ensure they matched their definitions. Discrepancies were resolved.

Intercoder reliability was tested four times using Cohen's Kappa, yielding a score of 0.313 in Stage Three, indicating fair agreement (Cohen, 1960). This score was deemed sufficient for validation. Once Stage Three was completed, the number of original X posts for each code was quantified. The total number of codes could exceed the number of original X posts as some X posts addressed multiple content functions. A content code is defined in this research as the label used to indicate the communicative function and meaning that could be carried in a post, repost, or reply. Examples are informational, communicative, supportive, and encouraging.

Ethical considerations

There is no universal consensus on ethical guidelines for using social media data. Graham and Hardacker (2017) highlight the lack of unified ethical practices in digital discourse research, which often depend on research questions, data collection, and analysis methods. Some platforms provide their own ethical guidelines for data use. X's privacy policy (2024, para. 4) states:

When you post and share with the general public. You are directing us to disclose that information as broadly as possible. X content, including your profile information (e.g., name/pseudonym, username, profile pictures), is available for viewing by the general public. The public does not need to be signed in to view some content on X. They may also find X content off of X, for example from search query results on Internet search engines.

Since the health officials aimed to publicly disseminate information about COVID-19, the X posts were openly accessible for research purposes. The researchers ensured that ethical considerations were upheld throughout the study.

Results

The dataset coding scheme revealed ten primary content codes used in the analysis of X posts from healthcare officials during the crisis. The codes were designed to capture various aspects of communication strategies employed in response to the pandemic. These are: communicative, informational, reassuring, instructional, cooperation, encouraging, readiness, role-modelling, supportive, and rumor response. Table 3 outlines the codebook and provides operational definitions for each code used in this study.

Table 3

Codebook and its operationalized definition of codes

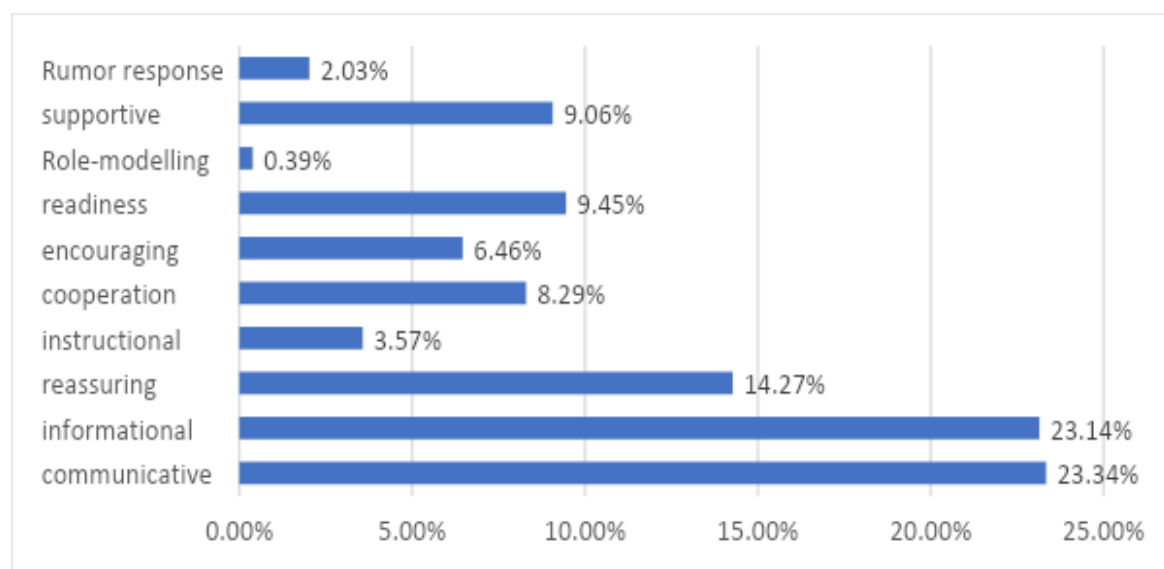
	Post code	Operationalized definition
1	Supportive	X posts offering messages of support, which may include expressions of sympathy, acknowledgment, pride, or gratitude towards the public or specific healthcare professionals such as doctors and nurses.

2	Encouraging	X posts that motivate individuals or groups to engage in specific actions such as volunteering, responding to national calls, or participating in initiatives, including <i>motivational</i> messages.
3	Communicative	General announcements or briefings that provide non-critical information or direct updates from officials to the public.
4	Cooperation	X posts that indicate the sense of involvement within the community including the public and/or healthcare providers. Additionally, X posts that invoke a sense of social responsibility are given the same code.
5	Reassuring	X posts that inform the public of actions taken regarding COVID-19 safety procedures and prevention.
6	Readiness	X posts which include messages indicating preparedness or highlighting efforts and resources to fight against coronavirus.
7	Rumor response	X posts that explicitly include responses to false allegations or rumors related to COVID-19 issues
8	Role-modelling	X posts that include a personal experience from the account holder and/or authoritative figures in any of the countries.
9	Instructional	X posts that include directions or instructions to be followed.
10	Informational	X posts that include general information related to COVID-19 (new information, additional links, supportive materials within the post).

The content analysis identified that among these ten codes, certain types of messages were more prevalent than others. The communicative code received the highest percentage (23.34%) whereas role-modelling (2.03%) and rumor response (0.39%) generated the lowest percentages. There were also some codes that were in-between, such as, readiness (9.45%), supportive (9.06%), and cooperation (8.29%). The total percentages of these ten types of codes are presented in Figure 3.

Figure 3

Total percentages of the identified types of codes

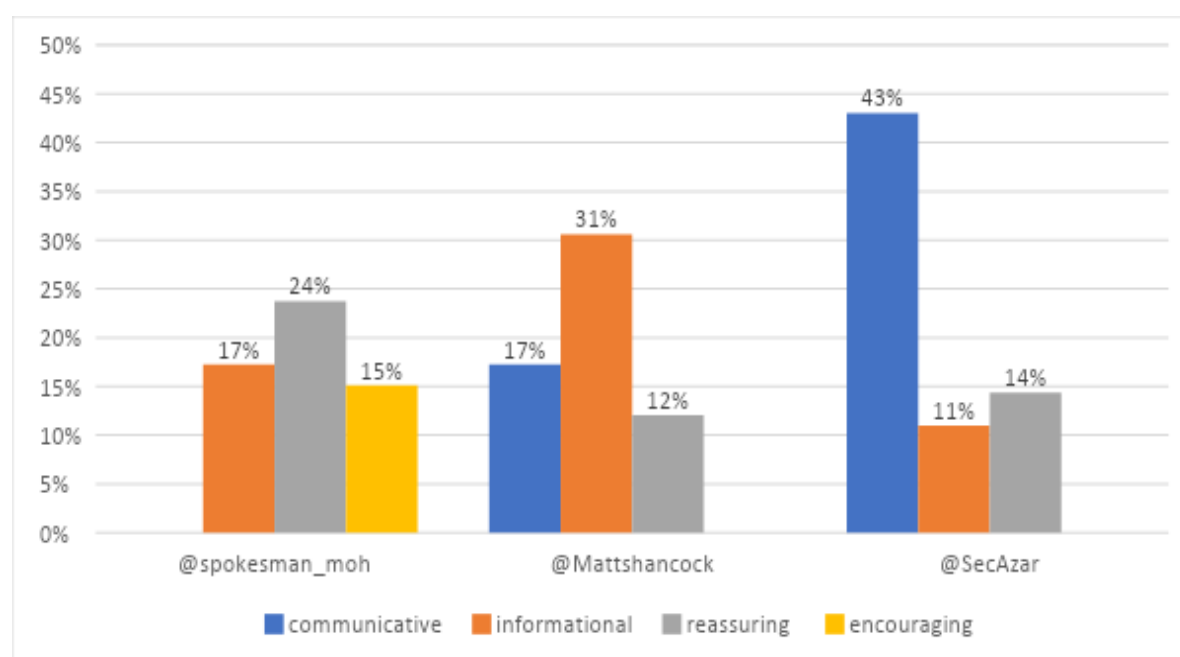


This study aimed to address two primary research questions. The analysis of the dataset revealed that four of the ten identified content codes were most frequently observed across the three healthcare officials' X accounts. Those codes were reassuring, informational, encouraging, and communicative. Specifically, 1) *reassuring* X posts that inform the public of actions taken regarding COVID-19 safety procedures and

prevention; 2) *informational X posts* included general information related to COVID-19 (new information, additional links, supportive materials within the post); 3) *encouraging X posts* that encouraged individuals and/or groups to take actions, such as volunteering or sign-ups and responding to national calls, including *motivational X posts*, were coded as *encouraging*; and 4) *communicative X posts* that contained general announcements or briefings to the public communicating non-critical information or direct reporting from individuals. The frequency of these codes varied across the different X accounts. Notably, *Communicative* posts were most prevalent in the account of @SecAzar. Figure 4 provides a detailed breakdown of the percentages for the most common codes observed in each healthcare official's account, highlighting the differences in communication focus among the officials.

Figure 4

Percentages of the most frequent codes in health officials' X accounts



As displayed in Figure 5, Saudi Arabia's health official X account (@spokesman_moh) showed that reassuring X posts were most prevalent, constituting 24% of the total, followed by Informational (17%) and Encouraging (15%) X posts. On the other hand, in the United Kingdom's healthcare official X account (@Mattshancock), informational X posts led with 31%, followed by Communicative (17%) and Reassuring (12%). Finally, communicative X posts dominated the United States' health official account posts (@SecAzar) at 43%, with Reassuring at 14% and Informational at 11%. As such, it is observed that reassuring and informational types of messages appeared in all the three accounts. The next section will provide a linguistic qualitative analysis for the types of post messages for each account.

Account by account analysis

@spokesman_moh

The Saudi Ministry of Health spokesperson's account predominantly featured Reassuring, Informational, and Encouraging X posts, reflecting the public's need for clarity and motivation amidst the COVID-19 crisis. The first positive COVID-19 case in Saudi Arabia was reported in March 2020 (Worldometer, 2021), and the account saw a surge in Reassuring messages during February and March 2020.

Reassuring Messages:

- **Example 1:** "By the grace of Allah, no registered cases of infection of the new coronavirus were reported in the kingdom until now." (Feb. 28, 29 and Mar. 1, 2020). This post used religious phrasing to convey no COVID-19 cases were reported, expressing gratitude and reassurance to the public. In this

example, it is used to express gratitude that there were no positive cases of COVID-19 reported in the kingdom. Even though many cases had been registered in other countries, no individuals were infected in Saudi Arabia at that time.

- **Example 2:** “The Ministry of Health announces the laboratory results for the first confirmed positive case of the new coronavirus in the country. The case is for a Saudi citizen arriving from Iran through Bahrain who did not declare at the borders his stay in Iran. We, therefore, *assure* everyone that the patient is quarantined in the hospital and is being treated and provided with health services according to approved protocols” (Mar. 2, 2020). This message detailed the first case and reassured the public about the patient’s quarantine and treatment. This post shows that the MOH displayed transparency in disseminating the message, so the public can be informed and aware of the specifics of the situation.

Informational Messages:

- **Example 3:** “The total number of registered cases of the novel #coronavirus in the kingdom (n=86) in which 38 of them are males and 48 females, all adults with an average age of 49 (excluding two children). Out of the 86 cases, 33 are Saudi nationals whereas 53 are non-Saudis (48 Egyptians, 2 Bahraini, 1 American, 1 Lebanese, and 1 Bengali)” (Mar. 13, 2020). This post provided detailed statistical information about COVID-19 cases in Saudi Arabia with a detailed description of the gender of the positive cases, their ages, and nationalities.

Encouraging Messages:

- **Example 4:** “If you have been to Iran during the past 14 days, immediately declare so by calling ...” (Mar. 6, 2020). This post urged the public to report their travel history to prevent the spread of the virus.

@MattHancock

In the same vein, Matt Hancock’s X posts consisted of informational, communicative, and reassuring messages. Each of which are included in various examples such as the following:

Informational Messages:

- **Example 5:** “UPDATE on #coronavirus testing in the UK: As of 2PM on Saturday 25 January 2020...” (Jan. 25, 2020). This post provided updates on testing results and linked to further information.

Communicative Messages:

- **Examples 6 & 7:**
 - “I’ve been responding to your questions on #coronavirus here...” (Apr. 9, 2020).
 - “Glad to welcome @Barbour joining our national effort to tackle #coronavirus...” (Apr. 13, 2020). These X posts involved general updates and announcements related to the pandemic response. Some of his X posts require that users divert from X to other social media platforms, such as Instagram, to follow or attend live streams for information. Communicative X posts also provided general information about the Secretary’s activities with regards to meetings, communications, contacts, or interviews.

Reassuring Messages:

- **Examples 8 & 9:**
 - “I’ll stop at nothing to protect frontline staff in our #coronavirus battle.” (Apr. 2, 2020).
 - “We’re determined to do everything humanly possible to develop a vaccine to tackle #coronavirus.” (May 16, 2020). These messages indicate a sense of responsibility for the public’s health and safety against COVID-19. These messages were directed specifically either to health care staff members and/or citizens and residents of the UK.

@SecAzar

Most of the X posts that were presented in this account were communicative, followed by informational and finally reassuring X posts. These will be analyzed in the following examples.

Communicative Messages:

- **Example 10:** “Had a good phone call yesterday with @WHO Director General @DrTedros about a strong, coordinated international response...” (Feb. 7, 2020). This post updated the public on a discussion with the WHO.

Informational Messages:

- **Example 11:** “Five things to know about #COVID19 from @CDCgov's @DrNancyM_CDC...” (Feb. 21, 2020). This message directed the public to detailed COVID-19 information.

Reassuring Messages:

- **Example 12:** “At this time, the risk to Americans remains low, and we are working to keep it that way. We...” (Jan. 31, 2020). This post aimed to reassure the public about the low risk of COVID-19.

In addition to the above-shown analysis that has answered the second research question, the previously analyzed examples and other X posts in the study displayed some main characteristics. First, there were some X posts that used culture-specific expressions, such as Islamic praises and supplications as in the Saudi X posts. Second, collective and emotional language was found more in the Saudi and American X posts, than that of the UK X posts. The UK X posts, on the other hand, depended on more factual, less emotional language. Furthermore, some of the X posts included additional information that was provided through links that would direct people to different social media platforms and websites, other than X.

All three accounts consisted of X posts that were directed or related to specific ethnic groups such as Muslims in Matt Hancock's account, native Americans in Azar's, non-Saudi nationals and residents were mentioned in some of the Saudi MOH spokesperson's X posts. However, all of the accounts addressed and supported health professionals in some of their X posts. Another similar feature amongst all three accounts was seen in the use of hashtags such as #StayHomeStayLives, #SafeHands, and #كلنا_مسؤول (We are all responsible).

Discussion and conclusion

The current ongoing COVID-19 pandemic is an extreme crisis that has provoked substantial challenges for governments. Effective health communication with the public is thus of crucial importance. This study instigates an initial contribution in research of public health communication by governments in the middle of a crisis. Content analysis of a corpus of COVID-19 X posts that covered five months (January 1 – May 31 2020) has shown several main findings. First, all three healthcare officials constantly posted or reposted COVID-19-related X posts. More importantly, the X posts published seemed to be consistent with the number of cases. The average daily X posts in the X accounts of the Saudi MOH's spokesperson, Matt Hancock, and Azar are: 0.60, 1.68, 2.76 X posts, respectively. The average number of tokens per post are 33.25 for the Saudi MOH spokesperson's account, 28.93 for Azar's, and 28.42 tokens for Matt Hancock's.

A closer examination showed that there are ten identified salient X message codes that were common among all the three healthcare officials' accounts. Those were communicative, informational, reassuring, instructional, cooperation, encouraging, readiness, role-modelling, supportive, and rumor response. Communicative coded X posts were the highest among the analyzed accounts, whereas role-modelling and rumor response were less frequent.

Third, there were some commonalities and differences in post message types in the three healthcare officials' X accounts. However, data analysis has shown that four of the ten codes were the most recurrent ones. Those were reassuring, informational, encouraging, and communicative. Although reassuring and informational types of messages appeared in all the three accounts, variances in frequencies of these types of X posts were identified when examining coronavirus X posts of each account. In Saudi Arabia's health

official X account (@spokesman_moh), the most frequently reposted messages related to COVID-19 were reassuring, informational, and encouraging, with the reassuring X posts being the most.

Both the UK's healthcare official X account (@Matthancock) and the United States' health officials' (@SecAzar) shared the same post types that were commonly published about COVID-19. Those were communicative, reassuring, and informational. Nevertheless, Azar's X posts tended to produce more communicative messages than Matt Hancock's account whose posts contained more informational messages.

Moreover, the UK's healthcare official published communicative X posts, whereas X posts that carried messages of reassurance accounted for the lowest content of all X posts. The USA's health official also displayed reassuring X posts with a few informational messages.

In another finding, it seems that the linguistic messages extracted from the Saudi MOH official's X data has been in correlation with the actual spread of the virus and the number of cases. There was a correlation between the number of coronavirus disease positive cases and types of messages and communication practices from public health bodies. For example, more reassuring messages were prominent during the time before the first positive case was reported in Saudi Arabia. This was also affirmed by Alhassan and AlDossary's (2021) study which observed that during the pre-crisis stage, government communication messages are to focus on decreasing public uncertainty and providing efficacy and reassurance. Additionally, when the number of positive cases and case-fatality rate rises dramatically, a mixture of both reassuring and informational X posts tended to be used by the healthcare spokesperson. When a peak of cases is observed, it is most likely to communicate informational and encouraging types of messages with a hope to be followed by a subsequent decrease of cases.

Findings of the current research are in consistency with Rufai and Bunce's (2020) study in that the majority of viral X posts examined from G7 world leaders' accounts fell within the 'informative' category. Furthermore, Alhassan and AlDossary (2021) studied Saudi government public communication in MOH's X account regarding the COVID-19 pandemic, and their findings share some common types of messages that are similar to findings of this study. Reassurance, for example, was the main common type of post messages identified.

Generally, some of the analyzed X posts used culture-specific expressions, such as Islamic praises and supplications as in the Saudi X posts. Collectivity-based and emotional language was more apparent in the Saudi and American X posts than the UK ones, which represented more factual, less emotional language. Specific ethnic groups such as Muslims, native Americans, non-Saudi nationals and residents were targeted by healthcare officials' X posts. Moreover, health professionals were also addressed and supported in X posts. Other similar features amongst all three accounts include the use of slogan and non-slogan hashtags such as #StayHomeStayLives, #SafeHands, and #كلنا مسؤول (We are all responsible) and hyperlinks to direct users to use different social media platforms and websites outside of X. The inclusion of hyperlinks, multimedia files and hashtags could drive more public engagement (Alhassan & AlDossary, 2021). Therefore, as the analysis shows, some healthcare officials prompted these social media engagements in order to interact with the public and answer questions regarding the pandemic.

Implications to practice

The following are some practicing implications for crisis communication by governments, health organizations, and practitioners:

- During times of crisis, active and constant communication is crucially important. People are more likely to follow leaders and responsible persons when the latter provide information to fulfill their needs during health emergencies (Haman, 2020).
- In public health emergencies such as the COVID-19 pandemic, communication requires proactively releasing timely information that is accurate and reliable.

- Transparency is required for effective communication in addressing misinformation and the “infodemic”. It is important for health communicators to clearly and directly declare what is known and what is unknown, and to adhere to the facts as much as possible (Finset et al., 2020).
- Healthcare communication is required to be inclusive of all groups in the community, including minorities. Accordingly, X posts should be published in several languages.
- A variety of mediums including traditional ones such as television or radio should be used. Since only the youth population are the most users of social media platforms, information should not be limited to social media such as Instagram or X. Older adults generally prefer obtaining information through national evening television and newspapers (Finset et al., 2020).
- Communicative messages, especially non-critical ones, may seem less important to people as they report on events that may not be valuable for them. Therefore, a variety and balanced types of messages are recommended.

Study Limitations and Future Research

Finally, some limitations of this study deserve attention. First, the represented findings are limited to only those used on the X platform. Although some previous research studies have targeted other social media platforms, it would be interesting to include data from other popular social media sites such as Facebook or Instagram in the investigation. Second, this study analyzed only X posts with certain keywords for a focused search. It is possible however that some relevant X posts were to be disregarded if they did not specifically include these words. This could be addressed in future research. Third, the number of published X posts pertaining to the COVID-19 pandemic in one account (i.e., Saudi MOH spokesperson’s) was relatively lower than the other two. Consistency of frequency of X posts could be considered in further investigations. Fourth, X posts analyzed were exclusive to only three governments/countries in this study. For future research projects, communication in other governments could be targeted. Furthermore, this study focused on the first five months of the pandemic which is regarded as the pre- and initial stage of the crisis. Given that the pandemic is still ongoing, future research may examine the resolution or evaluation stage (e.g., communication related to the COVID-19 vaccines). Finally, the analysis focused on only written texts; other multi-model elements were excluded. Since many X posts contained pictures, infographic, and other media types, they may be addressed in future research.

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