



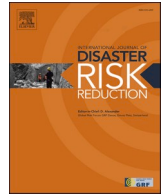
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Public health agencies outreach through Instagram during the COVID-19 pandemic: Crisis and Emergency Risk Communication perspective

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ABSTRACT

Background: Governmental and non-governmental institutions increasingly use social media as a strategic tool for public outreach. Global spread, promptness, and dialogic potentials make these platforms ideal for public health monitoring and emergency communication in crises such as COVID-19.

Objective: Drawing on the Crisis and Emergency Risk Communication framework, we sought to examine how leading health organizations use Instagram for communicating and engaging during the COVID-19 pandemic.

Methods: We manually retrieved Instagram posts together with relevant metadata of four health organizations (WHO, CDC, IFRC, and NHS) shared between January 1, 2020, and April 30, 2020. Two coders manually coded the analytical sample of 269 posts related to COVID-19 on dimensions including content theme, gender depiction, person portrayal, and image type. We further analyzed engagement indices associated with the coded dimensions.

Results: The CDC and WHO were the most active of all the assessed organizations with respect to the number of posts, reach, and engagement indices. Most of the posts were about personal preventive measures and mitigation, general advisory and vigilance, and showing gratitude and resilience. An overwhelming level of engagement was observed for posts representing celebrity, clarification, and infographics.

Conclusions: Instagram can be an effective tool for health organizations to convey their messages during crisis communication, notably through celebrity involvement, clarification posts, and the use of infographics. There is much opportunity to strengthen the role of health organizations in countering misinformation on social media by providing accurate information, directing users to credible sources, and serving as a fact-check for false information.

1. Introduction

During the COVID-19 pandemic, social media has become an essential tool for shaping public opinion and providing up-to-date health information. Recent estimates suggest that about 3.8 billion people use social media, or nearly 60% of the world's population [1]. Yet, social media with its decentralized and fast-moving information diffusion is also prone to misinformation. The World Health Organization (WHO) has referred to the scope and speed of the spread of false information linked to COVID-19 as an 'infodemic' that needs swift addressing.

Online users have the ability to combat misinformation, however average users rarely employ resources to verify the accuracy and

credibility of a site's content, notably health-related information [2]. Amidst crises and disasters, the role of official health agencies becomes critically important in terms of not only educating the public and ensuring fact-based health messaging but also in dispelling myths and countering misinformation [3–7]. A key challenge in the area of health communication research has been the lack of guiding theoretical models [8]. Part of that challenge is that "no one theory and no one model is totally adequate for designing public communication campaigns" [9]. While institutions and scholars have developed several risk and crisis communication models and frameworks, often these fall short when their practicability is put to the test.

In the present study, we expand past work [6,10,11] to examine how

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closely health organizations align their strategic communication to the Crisis and Emergency Risk Communication (CERC) framework. Specifically, we draw on the CERC framework because it was developed on the ground at the US Center for Disease and Control (CDC) to provide guidance and information during a crisis, disaster, or an emergency [8]. The CERC framework has five stages: pre-crisis, initial, maintenance, resolution, and evaluation [12].

In the pre-crisis stage, the emphasis is on creating and testing messages to motivate action, developing partnerships and relationships with different stakeholders, creating plans, and engaging communities in preparedness planning. The initial stage aims to reduce the crisis-related uncertainty through an understanding of emergency management and the crisis circumstances. Furthermore, the initial stage is about sharing content, expressing empathy, promoting action, providing explanations of risk, and establishing credibility. The maintenance stage aims to explain ongoing risks, provide background information, segment audiences by identifying those at most risk, and address misinformation. The resolution stage motivates people to remain vigilant, discuss lessons learned, evaluate plans, and promote community preparedness for possible future crises. The evaluation stage focuses on assessing the effectiveness of the overall communication [12].

Despite not being developed for online environments, the CERC framework has been adapted and extended to apply to a social media context [6,10,11]. We expand on this by looking at Instagram, which is used by a younger and more varied demographic and thus vital for information diffusion [13,14]. Instagram is a particularly relevant site of study because it is an image-based social media platform. While images are one of the most common types of content on social media, image culture is particularly central to Instagram [15]. During emergencies and crises, such as COVID-19, public health organizations can employ images to deliver critical messages and effectively acknowledge public fear and concern [4,16,17]. Instagram is particularly useful and effective for communicating risk because visuals garner higher attention and help users recall as compared to textual information [18,19]. Furthermore, pictures on social media tend to attract higher levels of engagement in the form of shares, comments, and likes [13,20] thereby increasing the reach of a post.

This study fills a gap by examining how four leading health organizations use Instagram to communicate about COVID-19. The Center for Disease Control and Prevention (CDC), and the World Health Organization (WHO), are both health agencies responsible for the oversight and administration of health mandates often placing a greater emphasis on research and information dissemination. By contrast, the International Federation of Red Cross and Red Crescent Societies (IFRC) and the National Health System (NHS) are primarily community-based healthcare systems. For example, the CDC and WHO both provide health information that protects against health threats and counters these when they arise. Conversely, the NHS and IFRC provide high-quality healthcare and humanitarian aid respectively.

Against the backdrop of government mandated lockdowns and social distancing measures, dependence on online social media for health purposes has increased manifolds. Consequently, since the beginning of the pandemic, knowledge about COVID-19 evolved quickly, often requiring constant updating and revising of health information and guidelines [21]. Hence, the current study expands the CERC framework and sheds light on how different organizations within the domain may strengthen strategic health communication through social media. COVID-19 represents a unique opportunity to understand social media messaging in the realm of health communication. We therefore, pose the following research questions:

RQ1: How are key health organizations using Instagram and its image-based features to communicate with the public about COVID-19?

RQ2: What types of messages and images are health organizations posting on Instagram and how closely aligned are these with the CERC principles and objectives?

RQ3: How do Instagram users engage in terms of likes and comments with COVID-19 posts across key health organizations?

2. Methods

Selecting Instagram Accounts A list of 15 potentially relevant health organizations was identified through online repositories of public health response resources on COVID-19 [22,23]. Each of the 15 organization's presence on Instagram was corroborated. Inclusion criteria were established to assess the eligibility of Instagram accounts for the current study that includes messaging in English language only, the number of followers (at least 20,000), number of posts since the account was created (at least 200), and number of posts related to COVID-19 (at least 20). Based on the above criteria, Instagram accounts of four health organizations were included in the current study: @WHO (World Health Organization), @IFRC (The International Federation of Red Cross and Red Crescent Societies), @CDCGov (Center for Disease Control), and @NHSEngland (National Health Services).

Selecting an analytical sample Instagram's API was used to access posts and their associated metadata. All the posts (images with associated captions) and metadata shared by the four official accounts on Instagram between January 1, 2020, and April 30, 2020 were manually gathered and recorded in a spreadsheet. Engagement indices (number of likes and comments) related to each post were also collected. During the four months period, a total of 663 posts were shared by WHO (n = 122), IFRC (n = 207), CDC (n = 249), and NHS (n = 85). From the gathered posts, three phrases – "COVID*", "corona*", and "ncov*" – were used to remove the non-COVID posts (n = 211). We specifically focused on analyzing still images and excluded videos (n = 183) from the analytical dataset. The final analytical sample consisted of 269 image posts (see Table 2).

2.1. Developing the codebook

To guide the systematic classification of the posts' content, a codebook was established in two stages. The initial iteration (by all the authors) of the codebook was based on identifying the relevant metadata that could potentially be used to answer the research questions. Moreover, the theoretical underpinnings of the CERC framework, with a particular emphasis on pre-crisis and initial event phases [12], together with a random sample of 20 posts (five from each of the four Instagram accounts), formed the dominant base during the early stage of codebook development. During the second stage, an agreement among the responsible authors was established through extensive discussions about various aspects of the coding. By applying an iterative process approach, new categories were formed or merged with existing categories to ensure that the coding frame effectively reflected the content to be coded. During this phase, a brief description of each coding dimension was also defined to guide the actual coding process. Before concluding the codebook development, necessary adjustments were made as two authors coded a randomly selected sample of 40 posts (10 from each of the four Instagram accounts). The final codebook consisted of the three key dimensions briefed below.




Content theme: To assess the theme of the posted content, we developed 11 mutually exclusive categories. These themes were grouped under a broader classification that was derived from the CERC framework [8]. A summarized version of the content theme dimension, containing all the thematic categories along with their definitions, is presented in Table 1.

Image content: The different aspects of content depicted in each of the images were assessed. Within the gender depiction category, the portrayal of female(s), males(s), both, or none were assigned. In the case of persons present in the image, ordinary individual(s), frontline worker (s), or celebrity/prominent person codes were used. For image type, either the photograph or infographic categorization was assigned.

Descriptive metadata: The posting date, number of likes, and the number of comments were recorded for each post in the analytical sample.

Coding the images Each post in the analytical sample constituted the unit of analysis. A qualitative analysis approach [24] was adopted to

Table 1
Codebook for content theme with description and representative image.

Theme (Description)	Sub-Theme (Description)	Representative image
1.0. Risks and crisis Information (General public understanding of associated risks)	1.1. Pandemic intelligence (Generic or basic-level statements or numbers about the virus/disease and informational resources. This could be before, during, or after the COVID-19 pandemic)	 <p>A screenshot of a Twitter post from the World Health Organization (WHO). The text reads: "BREAKING Coronavirus Disease #COVID19 #coronavirus". It includes a WHO logo and a link to a WHO page.</p>
	1.2. Symptoms and transmission (Describing probable indications or how COVID-19 might be transmitted to humans)	 <p>A CDC infographic titled "CORONAVIRUS DISEASE 2019 (COVID-19)". It features a blue virus particle and lists symptoms: "Symptoms of COVID-19: Fever, Cough, Shortness of breath". It includes the CDC logo and the URL www.cdc.gov/COVID19.</p>
2.0. Self-efficacy & sense-making (Feedback processes to make sense of the situation and changes in behaviors to reduce the likelihood of harm)	2.1. Personal preventive measures & mitigation (Measures or precautions that can be taken by an individual to protect herself/himself from infection, or mitigation of coronavirus-related issues (including mental and physical health & wellness))	 <p>A photograph of a handwashing station. The station is a white barrel with a blue and red cartoon character of a person wearing a face mask and a blue cap. The text on the barrel says "WASH YOUR HANDS".</p>
	2.2. Social/common responsibility & Empathy (Measures or precautions that can be taken by an individual/community to prevent the spread of COVID-19 or show affection to loved ones or the public)	 <p>An infographic from IFRC titled "#StayHome and spread kindness during #COVID-19". It lists four actions: "Wave to your neighbours from your window, street or garden", "Take the time to listen to the concerns of your loved ones", "Show your support to the people fighting the virus in anyway you can", and "Be patient towards other people's reactions even if you don't understand them". It also includes the text: "Don't be afraid to ask for help if you feel that you or others might need it. We are in this together".</p>
	2.3. Inquisitive Messaging (Addressing public queries about issues related to the COVID-19 pandemic)	 <p>Placeholder for an image representing Inquisitive Messaging.</p>

(continued on next page)

Table 1 (continued)

Theme (Description)	Sub-Theme (Description)	Representative image
<p>3.0. Preparations & Uncertainty Reduction (Public preparation for the possibility of an adverse event)</p>	<p>3.1. Clarification (Alerting/dispelling myths, fake news, or misinformation about the COVID-19 pandemic)</p>	
	<p>3.2. Events, campaigns & activities (Promoting an event/campaign/activity for awareness, relief, or treatment of the COVID-19)</p>	
	<p>3.3. Contributions request (Seeking financial and voluntary contributions for tackling COVID-19)</p>	
	<p>3.4. Showing Gratitude or Reassurance (Expression of thanks, approval, regards, reassurance, and paying tribute to the frontline workers (e.g., doctors, nurses, cleaners, volunteers, etc.))</p>	

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Table 3
Distribution of post themes by health organization.

Category	CDC	WHO	IRFC	NHS	Total (%)
Pandemic intelligence	12 (11.6%)	5 (9.4%)	1 (1.2%)	1 (3.4%)	19 (7%)
Symptoms & transmission	5 (4.8%)	1 (1.9%)	1 (1.2%)	1 (3.4%)	8 (3%)
Personal preventive measures & mitigation	20 (19.4%)	15 (28.3%)	13 (15.5%)	2 (6.9%)	50 (19%)
Social/common responsibility & empathy	10 (9.7)	2 (3.7%)	23 (27.4%)	5 (17.2%)	40 (15%)
Inquisitive messaging	5 (4.8%)	9 (17%)	6 (7.1%)	0	20 (7.4%)
Clarification	0	2 (3.7%)	3 (3.6%)	0	5 (1.9%)
Events, campaigns & activities	1 (1%)	2 (3.7%)	11 (13.1%)	6 (20.7%)	20 (7.4%)
Contributions request	1 (1%)	1 (1.9%)	0	1 (3.4%)	3 (1.1%)
Showing gratitude or reassurance	6 (5.8%)	3 (5.6%)	23 (27.4%)	10 (34.5%)	42 (15.6%)
Risk groups	13 (12.6%)	4 (7.5%)	0	0	17 (6.3%)
General advisory and vigilance	30 (29.1%)	9 (17%)	3 (3.6%)	3 (10.3%)	45 (16.7%)
Total	103	53	84	29	269

campaigns, and activities, images with inquisitive messaging, general information about the pandemic, and posts focusing on various risk groups, such as seniors and people with chronic diseases, were also fairly represented in the sample. A handful of posts were related to symptoms and transmission, clarification in the form of addressing misconceptions, myths, and fake news, etc., and requests for contribution including financial support and volunteering.

RQ3 analyzes user engagement on COVID-19 posts in terms of likes and comments (see Table 4). The engagement indices provide insight into the popularity of different types of image posts as well as the characteristics associated with those images. Despite having the least representation within the analytical sample, image posts representing males received a higher number of comments and likes when compared to images depicting females or both genders. Within the gender depiction and person portrayal, well over half of the images did not portray a person. It is significant to note that images in the “none” category (i.e., not depicting any person) were the most engaging ones, as they received far more comments and likes. Most of these images not portraying any person contained textual information, icons, and illustrations.

Compared to images of ordinary individuals, depictions of frontline workers gained more than double the number of likes. Even though only two images portrayed a celebrity, these received the highest level of engagement in the form of comments and likes. In comparison to photographs, images containing infographics received far more engagement, in terms of the number of comments and likes.

Table 4
Image content analysis by total engagement.

Distribution by category		CDC (n = 103)	WHO (n = 53)	IRFC (n = 84)	NHS (n = 29)	Total (%) (n = 269)	Number of comments (Mean)	Number of likes (Mean)
Person portrayal	Frontline worker(s)	5	3	29	13	50 (19%)	5212 (104)	341100 (6822)
	Ordinary individual(s)	45	0	2	3	50 (19%)	6483 (130)	167951 (3359)
	Celebrity	0	2	0	0	2 (1%)	6167 (3084)	136894 (68447)
	None	53	48	53	13	167 (62%)	91895 (550)	3861459 (23123)
Gender depiction	Male(s)	10	3	7	5	25 (9%)	8538 (342)	240977 (9639)
	Female(s)	28	2	10	5	45 (17%)	5559 (124)	295541 (6568)
	Both	12	0	14	6	32 (12%)	3765 (118)	109427 (3420)
Image type	Photograph	65	5	34	19	123 (46%)	22755 (184)	811827 (6547)
	Infographic	38	48	50	10	146 (54%)	87002 (600)	3695577 (25487)

RQ3 further assessed the engagement indices across different thematic categories, as presented in Table 5. Posts under the clarification theme received a much higher number of comments and likes than any other category. Images highlighting inquisitive messaging, general advisory & vigilance, and pandemic intelligence also received many comments. Likewise, posts within the categories of inquisitive messaging, personal preventive measures & mitigation, pandemic intelligence, risk groups, and general advisory & vigilance received high numbers of likes. Overall, images promoting events, campaigns & activities received the lowest number of comments and likes, followed by images describing social/common responsibility & empathy, and showing gratitude or reassurance.

4. Discussion

A growing body of research suggests that social media is a critical tool in risk communication. Even though, the CERC framework was not developed originally for an online context, it has been adapted and expanded to fit web-based platforms including social media [6,7,10,11]. Within the realm of risk and emergency communication, it is significant to realize that not all outbreaks are the same; each requiring a targeted strategy. For instance, Zika outbreak in Singapore found that leading health authorities were able to strategically use Facebook to manage the outbreak and engage with the public [11]. Drawing on the CERC framework, we assess the strategic communication of four major health organizations on Instagram during the COVID-19 pandemic. We found differences in the communication strategies used on Instagram between community-based healthcare systems (NHS & IRFC) and organizations concentrating on oversight and administration of health mandates (CDC & WHO), which map onto their specific organizational goals and roles.

All the four organizations lacked content under the theme of “clarification” in the form of addressing misconceptions, myths, and fake news, despite the WHO having warned about an “infodemic” linked to COVID-19 (Cinelli et al., 2020; Depoux et al., 2020; Kouzy et al., 2020). This finding resonates with past research involving social media messaging by WHO, CDC, and MSF (Médecins Sans Frontières) specifically the lack of clarification posts combating misinformation during the Ebola crisis (Guidry et al., 2017). There is much opportunity to strengthen the role of health organizations in countering misinformation on social media by providing accurate information, directing users to credible sources, and serving as fact-checks for false information. We found discrepancies in how the four organizations communicated through their Instagram posts (see Table 6). For instance, all the studied Instagram profiles lacked in two key areas: (a) establishing the organization’s credibility, and (b) addressing rumors, misunderstandings, and unclear facts.

Results of the current study further suggest that the CDC aligns its messages most closely to the CERC framework, which reflects the fact that the CDC developed the framework. WHO and CDC both implemented the majority of the CERC principles in their Instagram posts. CDC and WHO largely focused their posts on the “self-efficacy and sense-

Table 5
Themes categories by engagement across health organizations.

Category	Comments					Likes						
	CDC	WHO	NHS	IFRC	Total	Mean	CDC	WHO	NHS	IFRC	Total	Mean
Pandemic intelligence	1425	10043	64	3	11535	607	43936	387439	2293	802	434470	22867
Symptoms & transmission	1264	318	62	2	1646	206	35492	14099	1258	667	51516	6440
Personal preventive measures & mitigation	2375	16040	48	56	18519	370	94768	1085093	2718	14340	1196919	23938
Social/common responsibility & empathy	1399	5638	292	139	7468	187	47384	130174	14415	29530	221503	5538
Inquisitive messaging	1097	13884	0	12	14993	750	21128	481681	0	5104	507913	25396
Clarification	0	6946	0	19	6965	1393	0	379288	0	2290	381578	76316
Events, campaigns & activities	315	1375	666	157	2513	126	2671	117476	28659	18653	167459	8373
Contributions request	54	1004	73	0	1131	377	4014	32743	2655	0	39412	13137
Showing gratitude or reassurance	744	5421	720	438	7323	174	32375	239048	26765	45668	343856	8187
Risk groups	1395	6714	0	0	8109	477	43953	279974	0	0	323927	19055
General advisory & vigilance	6331	23171	51	2	29555	657	159262	676149	1765	1675	838851	18641

Table 6
The revised CERC framework for COVID-19 communication on Instagram.

Health Organization	Communication Principles and Objectives
CDC	<p>Risks and crisis information</p> <ul style="list-style-type: none"> • Pandemic intelligence <p>Self-efficacy and sense-making</p> <ul style="list-style-type: none"> • Personal preventive measures and mitigation • Social/common responsibility and empathy^a <p>Advisories and alerts</p> <ul style="list-style-type: none"> • Risk groups • General advisory and vigilance
NHS	<p>Self-efficacy and sense-making</p> <ul style="list-style-type: none"> • Social/common responsibility and empathy <p>Preparations and uncertainty Reduction</p> <ul style="list-style-type: none"> • Events, campaigns, and activities • Showing gratitude or reassurance^a
WHO	<p>Risks and Crisis information</p> <ul style="list-style-type: none"> • Pandemic intelligence <p>Self-efficacy and sense-making</p> <ul style="list-style-type: none"> • Personal preventive measures and mitigation • Inquisitive messaging^a <p>Advisories and alerts</p> <ul style="list-style-type: none"> • Risk groups • General advisory and vigilance
IFRC	<p>Self-efficacy and sense-making</p> <ul style="list-style-type: none"> • Personal preventive measures and mitigation • Social/common responsibility and empathy^a • Inquisitive messaging^a <p>Preparations and uncertainty Reduction</p> <ul style="list-style-type: none"> • Events, campaigns, and activities • Showing gratitude or reassurance

^a Practices specific to social media.

making” principles by promoting measures that can be taken by an individual, either to prevent infection or to mitigate secondary effects of the pandemic, including concerns related to mental and physical health. Moreover, WHO employed inquisitive messaging and received considerably high levels of engagement in terms of comments and likes. This is in line with recent research indicating that inquisitive messages on social media receive higher levels of public engagement [26].

On the other hand, IFRC and NHS focus on selected themes in the CERC framework, namely empathy, gratitude, and reassurance. Their messages were often targeted toward the health-care sector by expressing gratitude and reassurance to health-care workers and front-line workers and showing empathy with those who are sick, as well as by

fomenting a general sense of responsibility among the population.

Research suggests that it is important in crisis communication to establish trust and source credibility with audiences [5,27,28]. Park and Cameron stress that source credibility is a key factor in the effectiveness of organizational crisis communication. Findings from the current study reveal that as per the CERC model, there seemed to be a lack of concerted effort to address the credibility factor. Our data shows that none of the four organizations posted additional information on establishing their credibility.

When looking at the types of messages shared by the four health organizations, we found that more than half of the posts were infographics. We also found that audiences engaged heavily with these infographics, surpassing engagement with all other categories. This finding is in agreement with prior work, which noted that infographics are quicker and easier to grasp, as they represent complex information visually [29]. This outcome suggests that Instagram can be an effective tool for health organizations to convey their messages through infographics.

Affordances and characteristics of different social media platforms can influence uses and gratifications as well as the audience’s reception of messages [4,19]. As an image-based platform, Instagram is much better suited to sharing photographs or infographics than Facebook or Twitter. Guidry et al. (2017) found that Instagram posts elicited more engagement than those posted to Twitter. Instagram is also considered effective because of its celebrity base. Instagram is known for creating engagement with celebrities in a variety of domains such as sports, film, and fashion. Users perceive social media posts referring to popular personalities and by influencers (e.g. Instafamous accounts) as particularly credible and engaging [30,31]. For example, a post within our sample showing French footballer Paul Pogba in the image and advocating for the use of masks to prevent the spread of COVID-19 received extremely high engagement. As celebrity posts elicited high audience engagement, this could be one way for health organizations to strengthen their reach and, more importantly, credibility.

Advice on what type of mask to wear, the number of people who should gather, and what constituted an effective “social distance” evolved rapidly. In the early days of the pandemic, information about COVID-19 preventive measures was often lacking. Prior knowledge of a particular virus or the nature of a health emergency makes a great difference in the type of messages posted by health organizations. COVID-19 was sudden and took everyone by surprise since the symptoms and its preventive measures were unknown. For example, our findings show that a handful of posts fall under “symptoms and transmission”, “pandemic intelligence”, “risk groups”, and “clarification”. One explanation for the low percentage of posts related to these important categories may be the lack of knowledge available on COVID-19’s transmission, incubation period, and symptoms, and how rapidly knowledge changed during the initial stages.

Alternatively, the response of health agencies is more informed when crisis and risk communication is based on previous knowledge as was in

the case of the Zika virus outbreak (transmission by mosquitoes was known as early as 1948) [32]. For example, in the very beginning of a possible Zika outbreak, health organizations were advising the public to avoid regions where mosquitos are common and enact effective measures. Chen et al. (2018) found that the CDC's response to the Zika outbreak was concentrated in the first quarter of 2016, during which 84% of their tweets were posted. These posts were shared before the disease reached the U.S., where the CDC is based [33].

Researchers interested in the domain may also investigate in more granularity how strategic communication, message type, and content evolves and is perceived in different phases of the crises. The revised CERC framework provided in this current study can be ideal for investigating these themes. For instance, future work may examine the message absorption of the COVID-19 content to assess the realization of social media campaigns. For comparative cross-platform understanding, future research could expand the scope and examine the messaging of health organizations on the wider social media as well as traditional media. Every medium has its unique social and informational affordances which indeed merit attention. Agency web pages, television and radio outlets, and popular social media such as Facebook, Reddit, and TikTok may further help extend the body of knowledge in health communication. Furthermore, the goal of future studies could also be to develop a comprehensive understanding of how health organizations make use of different media at different stages of a crisis.

The present study has a number of constraints, some linked specifically to challenges associated with conducting social media research in general [34], and others linked to unique constraints associated with demographic and data scope. More specifically, we only studied English language content on Instagram, and our study was based on the analysis of a single platform. Second, the digital divide issues may also impact exposure to social media messaging. Factors such as internet access and skills have the potential of shaping information use [35]. Third, it is also understandable that not all engagement is positive, and that there may be instances where a negative social media post attracts significant engagement. Since this was outside the scope of the current study, future studies can evaluate engagement from a broader perspective in terms of positive and negative sentiment.

Delving into the different language-based nuances can also be worthwhile and fruitful in extending the CERC framework. Since, WHO and IRFC have global audiences whose language may not be English, future studies can analyze languages besides English language to provide a more comprehensive and inclusive analysis of Instagram content. For instance, Instagram accounts in other languages such as Spanish (e.g. Secretaría de Salud, Mexico), and Arabic (وزارة الصحة - عمان - Ministry of Health, Sultanate of Oman) can possibly provide a more localized overview of the varied health messaging.

5. Conclusions

A promise of social media is that it provides a level playing field to any entity with varied budgets and mandates. Instagram can be an effective tool in crisis communication, reaching a large, engaged audience through celebrity involvement, clarification posts, and the use of infographics. From a CERC perspective, the current research has identified gaps in social media communication during a pandemic or crisis situation. Our findings also serve as a roadmap for strengthening the strategic social media communications of health organizations during public health emergencies such as COVID-19 pandemic.

Finally, Instagram is an ideal venue for reaching youth in crises and emergencies, as this demographic does not rely on mainstream media as their main source of news information. There is much opportunity to strengthen the role of health organizations in countering misinformation on Instagram and other social media by providing accurate information, directing users to credible sources, and serving as a fact-check for false information.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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