Information Dissemination During the COVID-19 Pandemic in Bangladesh

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ABSTRACT

The main aim of this study is to identify the role of information dissemination on urban and rural citizens of Bangladesh during the COVID-19 pandemic and the role of misinformation in this process. The study also aimed at finding appropriate counter misinformation strategies regarding COVID-19. An online questionnaire was prepared to collect the viewpoints of the urban and rural citizens of Bangladesh regarding dissemination of information during COVID-19, misinformation regarding COVID-19, and counter misinformation strategies. Along with demographic and general information, a five-point Likert scale was used to measure COVID-19 related misinformation beliefs and how to counter them. Chi square tests were used to determine the association between current residency, information sources, the importance of information dissemination, reactions after getting COVID related information, and evaluative steps after getting information and before disseminating it. Additionally, nonparametric Mann–Whitney U and Kruskal–Wallis tests were conducted to know the significance of difference in respondents' assessment on COVID-19 related misinformation in terms of their demographic characteristics. Cronbach's alpha score was obtained to see the reliability of the questionnaire items. The current study reveals that both urban and rural citizens of Bangladesh are influenced by information dissemination regarding COVID-19 and they have lower level of misinformation belief. The respondents have differences in misinformation belief by different demographic groups. Respondents' educational status, information literacy, sources of getting information, and evaluative steps after getting information have significant differences in misinformation belief. The study also noticed the support of respondents for countering misinformation strategies regarding COVID-19.

Keywords: information dissemination, misinformation, counter misinformation strategies, COVID-19, Bangladesh

1. INTRODUCTION

Information dissemination is a complex phenomenon. It is necessary to address what information is before going deeper into the topic of information dissemination. Simply, information may be defined as a fact or circumstance of which one is told (Madden, 2000). But information is not confined to a specific notion. Attempting to learn more about "information" immediately runs into obstacles. Since information is concerned with getting informed, with the decrease of ignorance and uncertainty, it is paradoxical that the term "information" is itself ambiguous and can be employed in a variety of ways in different contexts (Buckland, 1991). According to *Merriam-Webster dictionary* (n.d.), information can be defined as knowledge that one gets about someone or something: facts or details about a subject. *Cambridge Dictionary* (n.d.) defines information as facts or details about a person, company, product, etc. The *Oxford Learner's Dictionaries* (n.d.) considers information as facts or details about somebody/something. According to *Collins Dictionary* (n.d.), information consists of the facts and figures that are stored and used by a computer program. Braman (1989) noted that single-definition and pluralistic approaches to define 'information' are difficult. All decision-making concerns can be addressed through a hierarchy of four categories of definitions that expand in scope and complexity of the social structure to which they are applied, as well as the degree of authority granted information. Information can be classified as a resource, a commodity, a pattern perceiver, and a constitutive force in society.

Dissemination is the method of spreading information, messages, thoughts, and so on. The act of disseminating, sharing, or broadcasting information is known as information dissemination. Furthermore, it refers to the act of distributing and disseminating information of various types to those who require it or to those who are deserving of such information (IGI Global, n.d.).

In December 2019 the Novel Coronavirus was initially detected in Wuhan, which is located in China, and subsequently announced as SARS-CoV-2 (World Health Organization, 2020a). The virus spread across the world within about three months, triggering a global public health emergency. COVID-19, an acute respiratory disease caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was declared a pandemic by the World Health Organization on 11 March 2020 (World Health organization, 2020b). On 8 March 2020, Bangladesh found 3 confirmed patients who were affected by Coronavirus,

which was an indication of the arrival of COVID-19 in the country (Hasan & Shaon, 2020). Approximately half a billion affected patients got into the report worldwide, and this deadly virus has caused the death of over 6 million lives as of July 2022 (Worldometer, 2022).

de Bruin et al. (2020) noted that governments across the earth introduced various risk reduction measures to minimize the outbreak of coronavirus, such as social distancing, mobility restrictions, socioeconomic restrictions, and hygiene measures. However, the global economic situation and healthcare system were badly affected by the initiatives taken. They have also had a significant impact on people's social, physical, and psychological health (Dinleyici et al., 2021; Wang et al., 2020).

The spread of COVID-19 has influenced the dissemination of information. A dramatic rise of misinformation surrounding it has also been seen in this COVID-19 pandemic. During this pandemic, there has been unprecedented collaboration among researchers in the medical sector. However, such progress has been accompanied by a deluge of misinformation. Such misinformation poses a serious threat to public health. Treating misinformation has become a great part of scientific inquiry (Agley, 2020; Oliver & Wood, 2014).

Misinformation and conspiracy theories are common phenomena in crises situations. Various conspiratorial thoughts normally spread during social crises. At such moments, endorsement of misinformation and conspiratorial thinking is very common. In the US, many people believe in conspiracy theories while affirming the uncertainty of the possibilities of such theories (van Prooijen & Acker, 2015). This same phenomenon can also be noticed in the case of COVID-19 conspiracy theories (Miller, 2020). A study conducted by Brennen et al. (2020) indicated fact-checkers revealed that a significant proportion of misinformation is generated on social networking platforms. The widespread presence of misinformation reminds us that believing in misinformation is not only caused by delusions or discrete pathologies. Belief in misinformation and conspiratorial theories are varied across various socio-demographic groups (Agely, 2020). Education level and status play a significant role in shaping conspiratorial beliefs of people (Douglas et al., 2019; Freeman & Bentall, 2017; Galliford & Furnham, 2017). Political ideology plays a pivotal role in making people believe in misinformation. The role of misinformation in politics was widely noticed during the 2016 US presidential election (Guess et al., 2020). Belief in conspiracies positively correlates with rejection of science (Lewandowsky et al.,

2013; Lobato & Zimmerman, 2019; van der Linden, 2015). Interestingly, misinformation about COVID-19 is sometimes disseminated through confusing interpretations of preliminary empirical studies. Yet it should be kept in mind that those who share misinformation may not have the intent to harm others. People might have various motivations to share a particular piece of misinformation via social media. They can share misinformation to encourage discussion on social media and to ensure the validity of that particular misinformation (Lobato et al., 2020).

This study has made an attempt to investigate the role of information dissemination on general citizens, including both urban and rural people in Bangladesh during the COVID-19 pandemic, and the role of misinformation in this process. It has also tried to navigate the workability of counter misinformation strategies.

2. LITERATURE REVIEW

2.1. Information Needs During Crises

A crisis is considered to occur when people of a society, an institution, a city, or a country experience a sudden threat to fundamental values or activities based on leading lives. Therefore, the situation might deal with uncertainty (Rosenthal et al., 2001). A variety of threats may arise from a crisis. The crisis may be both man-made and natural: for example, SARS, MERS, tsunamis, and cyclones, which are considered to be natural crises. On the other hand, the missile crisis in Cuba, Chernobyl, and 9/11 are known as man-made crises.

In the time of pandemics like the H1N1 virus in 2009, bioterrorism threats, or natural calamities, most people want to know information on how the threats behave and how to react in these crisis moments. Over the last two decades, people's interest in the necessity of the reliability of sources of information about how to minimize the effects of such risks have increased, especially in the case of the emergence of Anthrax attack, West Nile virus, and the outbreak of SARS in the early 2000s. Diseases like *Escherichia coli* and *Salmonella* also increased the intention to get the right sources of information during a crisis (Zach, 2011).

The output obtained from the cases of communication regarding health risks reflects the fact that people search for solid, appropriate, and competent information that may be taken to protect themselves and their families (Wray et al., 2008).

2.2. Information Dissemination During the COVID-19 Pandemic

Information dissemination is defined as the distribution of information to intended users while meeting specific conditions such as timeliness, dependability, and so on. Information dissemination can be accomplished in a variety of ways (Wu et al., 2016). Although in a simple sense, information dissemination is regarded as the exchange of information, in a comprehensive sense it is not just a one-way activity. There has to be a sender to deliver the message and a recipient to decide how the rest of the exchange should proceed. These involved people exchange thoughts, facts, opinions, perceptions, and ideologies (Ifukor, 2013).

During the COVID-19 pandemic, disseminating information has been the most significant aspect of the twenty-first century. There has never been a time when the requirement for rapid information dissemination was more essential than it is during the COVID-19 outbreak. Social media is a legitimate and fast communication tool that is utilized for the dissemination and gathering of information specially related to health (Kudchadkar & Carroll, 2020).

People from urban and rural areas can barely access authentic information and materials. They often receive and disseminate information via various platforms (e.g., social media), in which the circulated information can be unreliable. Since librarians and information workers have access to credible sources of information, they should disseminate that information as far as possible. They must reach user groups and satisfy their desire for the most up-to-date information that is relevant to them (Okike, 2020).

In the time of global public health crises like the pandemic, dissemination of reliable and authentic information plays a significant role regarding strategies to control the outbreak. Timely and proper information of the pandemic can help to take precautionary steps and other measures for responding in that critical situation, which may in turn contribute to the betterment of health outcomes (Voeten et al., 2009). It has been observed that appropriate dissemination of information to the general public can help to minimize reactions generated by a negative mentality (Hall et al., 2003).

It has been reported that the selection of information sources can shape people's knowledge, which in turn influences health beliefs and preventative steps. Studies have found that choice of information sources and way of disseminating information may vary due to people's place of living (e.g., urban and rural), educational qualifications, and ethnicity (Ifukor, 2013; Voeten et al., 2009).

Awa (1998) and Fayose and Dike (2002) stated that the attendance of family members during various familial programs helps to disseminate information in the rural community. Oral literature is composed of three major categories: discussion, music, and drama. All of these transfer information that are essential to a society's welfare.

Different social gatherings are an essential part of rural people's lives. Yazidu (1975) highlighted social gatherings, traditional meetings like wedding ceremonies, celebrating birthday functions and burial arrangements, and agricultural festivals as means for disseminating information interpersonally. Likewise, Aboyade (1987) stated that announcers using loudspeaker instruments, gatherings of rural people, churches, and mosques are a medium of acquiring and disseminating information among rural people.

The advancement of infrastructure and technology has enhanced urban people to avail Internet facilities. People from urban areas seek more information, including about health, on the Internet than do people living in rural areas (Flynn et al., 2006; Licciardone, 2001). Use of the Internet may be useful for people to make important decisions including about health care through linking people to local and broader social networking sites to avail information and suggestions if it is used properly (Boase et al., 2006). Researchers state that there is some interlinked connectivity so that distinct usage of the Internet can influence social welfare. For instance, people can search for information regarding health to help others to take significant health-care decisions; improve accessibility to and acquirement of health-care resources, including information exchange with healthcare personnel and the ability to participate in support groups; buy medical and health-related resources online; and enhance interaction with their social networks, both near and far away in geographical location (Boase et al., 2006; Cotten, 2001).

2.3. Misinformation and COVID-19

Misinformation occurs when individuals firmly adopt false beliefs, differentiating between illiteracy (or lack of knowledge) and confident but faulty knowledge (Kuklinski et al., 2000). More than a pandemic has occurred since the introduction of the novel coronavirus (COVID-19). The virus is generating a variety of other problems as it spreads over the world. One of these concerns is a storm of misinformation (Krause et al., 2020). Along with the COVID-19 pandemic, there has been seen a parallel 'infodemic' or fake news, with bizarre ideas spreading across

the globe via social media platforms such as Twitter, Facebook, TikTok, and WhatsApp. Even leading politicians also claimed that the virus was nothing but a hoax. Others suggested that if it was not, there was nothing to worry about because even pushing hot hairdryer air up one's nose might destroy it. Gun-toting mobs have formed in the western United States to turn back fanciful busloads of 'Antifa' gangs that persist mostly on their Twitter feeds (Buchanan, 2020).

It can be noticed that several types of misinformation are being circulated through social media platforms during this pandemic. Some of the most common ones are summarized in the following:

- A tropical climate creates hindrance in spreading COVID-19 (Harvey, 2020)
- Wearing facemasks are not effective against coronavirus (Hornik et al., 2021)
- Coronavirus was formed in a laboratory (Guevara et al., 2021)
- Consumption of alcoholic substances can cure coronavirus (World Health Organization Eastern Mediterranean Regional Office, n.d.)
- Bill Gates played a role in the spreading of COVID-19 (Huddleston, 2021)
- 5G towers play an impact in the spreading of coronavirus (Goodman & Carmichael, 2020)

When research demonstrates that lies are now spreading quicker than truths it is threatening to notice that human psychology is severely flawed (Vosoughi et al., 2018). Experts, however, feel that the true problem is a series of subtle practices that, by altering human interactions and the way they make decisions, have transformed social media into a source of misinformation (Buchanan, 2020).

According to Chakravorti (2020) and Taylor (2020), misleading information regarding the COVID-19 pandemic is fast spreading and often these misleading materials include references to ostensible remedies such as gargling with salty water, eating oregano, and even drinking bleach. Further spreading of misconceptions is aided by other sorts of incorrect information, such as pointing to "bat soup" eating as the source of the illness, or conspiracy theories, such as the virus being manufactured by the United States. Aguilera (2020) stated that these types of news not only support the development of racist ideas and actions but also jeopardize public health and the ability of governments to successfully execute prevention measures. In this outbreak of the coronavirus the spread of misinfor-

mation, fake news, and conspiracy theories has emerged as an additional concern. This is why the World Health Organization also considered this scenario as an 'infodemic' (The Lancet Infectious Disease, 2020). Many studies have found that the majority of COVID-19 YouTube videos that are watched contain misleading information (Nguyen & Catalan-Matamoros, 2020). Searches including "COVID-19" and "coronavirus" indicated around 27.5% of content on YouTube that was not authentic; on top of that such material was also viewed over 60 million times (Li et al., 2020). Therefore, the detection and eradication of various COVID-19 misinformation is required (West et al., 2020).

2.4. Social Media and COVID-19 Misinformation

Social media platforms are Internet-based apps that allow communities of users to produce, interact with, and share material with others. There are various platforms for different content categories, and each platform has its own set of features. Real-time communication among users is enabled by them, allowing users to actively participate in a public conversation. In contrast to traditional media, social media enables users to easily create and share content globally without the need for editorial oversight or approval (Puri et al., 2020). Even though social media has provided great tools for individuals to engage with one another, it has also played a significant role in the spread of false information that is potentially hazardous to public health (Wilson & Wiysonge, 2020).

In moments of crisis, social media may have both direct and indirect effects on the public (Austin et al., 2012). During times of crisis, people's use of social media increases (Princeton Survey Research Associates International for the Pew Internet & American Life Project, 2006), and in some cases they regard social media as more credible sources of information than traditional forms of media (Procopio & Procopio, 2007). COVID-19's quick spread and resulting global pandemic have recently become a subject of intensive social media discourse, with Twitter reporting a COVID-19-related post every 45 milliseconds; the hashtag #coronavirus quickly became the second most used in 2020 (Cinelli et al., 2020). Sadly, inaccurate and misleading information concerning COVID-19, and possibly harmful treatments, continues to spread via social media platforms (Brennen et al., 2020; Kouzy et al., 2020). Cinelli et al. (2020) investigated the "infodemic" in the initial phases of COVID-19, utilizing epidemic modeling to information dissemination on different social media platforms to measure basic reproduction numbers for the

"transmissibility" of posts on each platform. Regardless of platform, there were no significant differences in the dissemination patterns of doubtful versus reliable information.

Various misinformation and conspiracy theories regarding the COVID-19 vaccine are also being spread throughout the world via social media, such as claims that the vaccine contains a microchip, the vaccine causes infertility, the vaccine changes DNA, and the vaccine controls human brains (Nuzhath et al., 2020). COVID-19-related health behavior is being negatively affected by the propagation of misinformation and conspiracy theories on social media platforms such as Facebook and Twitter (Tasnim et al., 2020). A significant portion of general people in Bangladesh are hesitant to take COVID-19 vaccines due to dissemination of such various misinformation and conspiracy theories (Mahmud et al., 2021).

Pennycook et al. (2020) noted that members of the general public spread inaccurate and misleading information about COVID-19 through social media because they fail to consider whether or not the content they were about to share is accurate before they do so. This phenomenon could be countered by reminding people to check their facts before they confirm their social media post, which would result in a more than twofold increase in participants' willingness to share the truth. Although spreading misinformation through social media is a phenomenon that is not recently observed, the emergence of COVID-19 related misinformation via social networking sites during this outbreak has created a sense of need for tackling the circumstance and deploying necessary steps.

2.5. Countering COVID-19 Misinformation

Alongside with the COVID-19 pandemic, people are also going through a condition called *infodemic*. Fake news, misinformation, and conspiracy theories have become commonplace in the age of social media, and their prevalence has increased significantly since the outbreak of the coronavirus. This scenario is particularly concerning because it undermines public confidence in healthcare organizations and initiatives (The Lancet Infectious Diseases, 2020). A number of individuals are propagating a wide range of misinformation through the Internet and social media by disseminating unscientific, false, or misleading statements or distributing false news, both intentionally and unintentionally. The broad dissemination of erroneous COVID-19-related misinformation has the potential to spread the disease rapidly (Mejova & Kalimeri, 2020; Shimizu, 2020; Thomas, 2020). Misconceptions

regarding COVID-19 may have negative effects on the fight against COVID-19 and control of the pandemic, as previous SARS and Ebola outbreaks were noticeable instances (Cheung, 2015; Maunder et al., 2003; Person et al., 2004).

In light of the fact that misleading information spreads quickly and extensively via a variety of channels, providing reliable information that expresses accurate scientific perspectives on COVID-19 is the most effective strategy for reducing fear and panic associated with misconceptions about scientific facts and epidemiology of the coronavirus (Garrett, 2020). Local community and health organizations, non-governmental organizations, the print and electronic media, and other support groups should make every effort to convey accurate information regarding COVID-19 to their constituents and the general public. In order to achieve this goal, collaboration at the local and global levels is necessary, as well as the integration of physical and digital resources via collaborative endeavors to ensure that authoritative information is disseminated throughout many media forms (Tasnim et al., 2020).

Technical corporations can be assigned, in collaboration with health institutes, for developing a centralized system for identifying YouTube, Facebook, and Twitter offenders. Advertisements, including video messages, should be intercepted and deleted from media sharing platforms that make fictitious and/or unrealistic (i.e., deceptive) medical claims in order to project COVID-19-related information for monetary advantage. These objectives can also be fulfilled through the application of modern technology, such as natural language processing or text mining, to detect online information that lacks empirical support. Data mining algorithms have been helpful in identifying distinguishing characteristics of fake news or misinformation that has been eliminated from various platforms (Shu et al., 2017).

Existing fact-checking structures should be integrated into new strategies to promote accurate COVID-19-related information on practical preventive measures (e.g., washing hands with soap frequently, using hand sanitizers, using facemask, receiving vaccines, and maintaining social distancing), which should be implemented immediately. Local authorities and media workers should engage with public health specialists, particularly those who are experts in infectious disease, in order to clearly deliver accurate and timely information to the public and reduce anxiety among the population (Mian & Khan, 2020). Another rigorous step might include charging those responsible for the creation and dissemination of COVID-19 misinformation or false news on online news portals and forcing them to appear in court in order to serve as a deterrence to other possible perpetrators of the crime. Notification of these issues should be made to the appropriate local and national governing bodies as well as law enforcement agencies so that the required procedures can be taken to carefully handle them in different regions (Ahinkorah et al., 2020). Dib et al. (2022) noted that digital health literacy, such as capability to search, access, and comprehend information related to health from online resources, is also necessary to counter misconceptions regarding COVID-19. Widespread literacy, which integrates both informative and scientific literacy, is essential to gain knowledge and the ability to use information efficiently in the pandemic situation (Gu & Feng, 2021).

Although identifying authentic information is a tough task, there is a check list which can be helpful to detect it. The check list according to the Pledgetopause (2021) has been outlined in the following:

- By whom it was made
- The origin of the information
- From which way it came
- The reason why you are going to disseminating this
- The date of its publication

Since the dissemination of misinformation regarding COVID-19 is being spread quickly, especially via Internet and social media, which ultimately has negative effects on the fight against this deadly disease and control of this pandemic, the necessity of countering this issue by taking essential steps and ensuring the proper dissemination of reliable information has increased.

There are a few reported studies regarding the role of information dissemination on ordinary citizens during the COVID-19 pandemic in the Asian sub-continent, but no reported study has been found in Bangladesh so far. Without these kinds of studies, government agencies are at a loss; hence, the current study has been conducted to explore the role of information dissemination on general citizens in this pandemic situation and how misinformation belief influences them.

3. RESEARCH AIM AND OBJECTIVES

The main aim of this study is to identify the role of information dissemination on general citizens, including both urban and rural citizens, of Bangladesh during the COVID-19 pandemic. This study also includes the follow-

ing objectives:

1. To know the sources of information related to CO-VID-19
2. To know the extent of misinformation related to COVID-19
3. To determine effective methods to counter CO-VID-19 related misinformation

Based on the objectives stated above, the current study combines the following research questions (RQs):

RQ1. What is the major source of getting COVID-19 related information?
RQ2. Is influence of information dissemination associated with respondents' current residency?
RQ3. What demographic characteristics are associated with belief in COVID-19 related misinformation?
RQ4. How do the ratings for COVID-19 misinformation differ depending on respondents' demographics?

4. HYPOTHESIS OF THE STUDY

The present study tests the following null hypothesis.

H01: There is no relationship between current residency and sources of getting information.
H02: There is no relationship between current residency and importance of information dissemination.
H03: There is no relationship between current residency and reaction after getting COVID related information.
H04: There is no relationship between current residency and evaluative steps after getting information and before disseminating it.

5. METHODOLOGY

To gather data for this study, an online survey was undertaken in Bangladesh from January 2022 to May 2022. To facilitate a larger involvement of residents from all backgrounds the survey was constructed in Google Forms using Bengali, as it is the native language of the country. A target group of around 700 people was chosen by the convenience sampling method and the survey link via emails and personal messages. The respondents were assumed to be active on social networking sites. The respondents had to be citizens of Bangladesh and they were at least able to comprehend and write as well as they have given their consent to participate in the survey.

The structure of the questionnaire contained three sections. The first section of the questionnaire included the respondents' demographic and general information, such as sex, age, educational qualifications, and place of living. The second section comprised COVID-19-related misinformation, taken from previous studies as well as social networking platforms. Participants of the study were asked to rate their level of agreement with such fraudulent information on a five-point Likert scale, from 1 – 'Strongly disagree' to 5 – 'Strongly agree.' In the third part, participants rated their opinions on strategies to be taken to combat misinformation on a 5-point Likert scale (Appendix).

Descriptive statistics were obtained to examine respondents' demographics and general information. Regarding the ratings on misinformation related to COVID-19 and the strategies to be undertaken, the data were also analyzed descriptively using frequencies and percentages, and by means and standard deviations. Cronbach's alpha score was obtained to see the reliability of the questionnaire items. Cronbach's alpha score was 0.872, which was in the range of 0.81-0.93 (See Table 1). This implies a high degree of internal consistency in the responses to the individual measures, as α values above 0.7 are acceptable indicators in this respect. Chi square tests were used to determine the association between current residency and sources of getting information, current residency and importance of information dissemination, current residency and reaction after getting COVID related information, current residency and evaluative steps after getting information, and before disseminating it. Moreover, nonparametric Mann–Whitney U tests and Kruskal–Wallis tests were applied to know the significance of difference in respondents' assessment on COVID-19 related misinformation in terms of their demographic characteristics. The statistical analysis was carried out using IBM SPSS Statistics version 25 (IBM Co., Armonk, NY, USA).

5.1. Reliability Statistics
The reliability of the questionnaire has been tested by using the SPSS program. Table 1 shows the reliability coefficient of the questionnaire. Cronbach's alpha score is 0.872,

Table 1. Reliability statistics

Cronbach's alpha	No. of items
0.872	24

Table 2. Demographic profile of the respondents (N=406)

Demographic/personal characteristics	Frequency	%
Sex		
Male	281	69.2
Female	125	30.8
Age groups (yr)		
<18	7	1.7
18-30	278	68.5
31-40	63	15.5
41-50	26	6.4
51-60	15	3.7
>60	17	4.2
Highest academic qualification		
Primary	7	1.7
SSC/Equivalent	19	4.7
HSC/Equivalent	113	27.8
Graduation	180	44.3
Postgraduation	87	21.4
Current place of living		
Urban area (e.g., Metropolitan, City)	312	76.8
Rural area (e.g., Small town, Village)	94	23.2
Sources of getting information		
Social media	271	66.7
Print and electronic media	84	20.7
Friends/Family	17	4.2
Experts/Doctors	8	2.0
Government information portal (e.g., Bangladesh National Portal)	26	6.4
Reaction after getting COVID-19 related information		
Disseminate the information without checking the fact	14	3.4
Check the source of the information before dissemination	310	76.4
Ignore	82	20.2
Evaluative steps after getting information and before disseminating it		
Check quality of links/references provided	191	47.0
Check number of links/references provided	54	13.3
Check the length of the article	16	3.9
Check others' reactions/opinions	46	11.3

Table 2. Continued

Demographic/personal characteristics	Frequency	%
Check information about the author/poster	49	12.1
Check tone/style of writing/argument	42	10.3
Nothing	8	2.0
Importance of information dissemination		
To spread the information	109	26.8
To raise awareness among people	225	55.4
To become popular	4	1.0
To pass leisure time	46	11.3
Don't know	22	5.4

SSC, secondary school certificate; HSC, higher secondary certificate.

which can be called as reliable as the alpha value is greater than 0.05.

6. DATA ANALYSIS

6.1. Demographic Profile of Respondents

A total of 406 respondents participated in this study. Among them, 281 (69.2%) were male and 125 (30.8%) were female. A vast majority of the respondents (278, 68.5%) were between the ages of 18 and 30 years. The greater portion of respondents had bachelor's or similar degrees, followed by those who had higher secondary certificate (HSC) or equivalent degrees. In case of place of living, a vast majority of the participants belong to urban areas, whereas the number of respondents from rural areas was low. The largest group of participants considered social media as sources of getting information, followed by those who considered print and electronic media. All the demographic details of the participants are demonstrated in Table 2.

6.2. Misinformation and COVID-19

The result, illustrated in Table 3, revealed the frequency and percentage of COVID-19 related misinformation on a five-point Likert scale. The majority of respondents strongly disagreed with statements like "Drinking alcohol may prevent COVID-19" (176, 43.3%), "COVID-19 is a deception" (171, 42.1%), and "COVID-19 does not affect religious people" (167, 41.1%), respectively. A vast majority of the participants neither agreed nor disagreed with the misinformation, suggesting that they were uncertain

about its reliability. Table 3 highlights that the highest mean score of 3.12 was gained for the statement "COVID-19 affects urban people more than rural," with a standard deviation of 1.36. Other items were negatively rated in term of mean score (<3.00). The mean scores for all the items indicated an overall negative rating that means low levels of misinformation belief, although the high SD values suggested that the participants had differences in their ratings for the statements among themselves as they showed wide variability in their responses.

The results of Mann–Whitney U test found no significant difference between respondents' residency and misinformation except for "Facemasks don't work" (Mann–Whitney U=17,178.500, $p<0.05$) and "COVID-19 does not spread in the hot and humid weather" (Mann–Whitney U=16,695, $p<0.05$). No significant difference was found between respondents' previous infection with COVID-19 and misinformation regarding COVID-19. No significant difference was noted between the deaths of family members of respondents due to COVID and misinformation related to COVID. There is no significant difference between respondents' vaccine uptake and COVID-19 misinformation except for "Facemasks don't work" (Mann–Whitney U=2,800.500, $p<0.05$), "5G towers may spread COVID-19" (Mann–Whitney U=2,171, $p<0.05$), "COVID-19 was created in the lab" (Mann–Whitney U=2,443.500, $p<0.05$), and "COVID-19 affects urban people more than rural" (Mann–Whitney U=2,869, $p<0.05$).

Mann–Whitney U testing found significant difference between respondents' sex and certain COVID-19 related

Table 3. Misinformation and COVID-19 on a five-point scale (N=406)

Misinformation about COVID-19 vaccine	Strongly disagree Freq. (%)	Disagree Freq. (%)	Neutral Freq. (%)	Agree Freq. (%)	Strongly agree Freq. (%)	Mean (SD)
Facemasks don't work	83 (20.4)	135 (33.3)	68 (16.7)	66 (16.3)	54 (13.3)	2.69 (1.323)
COVID-19 is a deception	171 (42.1)	109 (26.8)	77 (19.0)	15 (3.7)	34 (8.4)	2.09 (1.228)
5G towers may spread COVID-19	142 (35.0)	78 (19.2)	139 (34.2)	25 (6.2)	22 (5.4)	2.28 (1.163)
Bill Gates is behind COVID-19 pandemic	144 (35.5)	79 (19.5)	135 (33.3)	20 (4.9)	28 (6.9)	2.28 (1.195)
Drinking alcohol may prevent COVID-19	176 (43.3)	95 (23.4)	87 (21.4)	13 (3.2)	35 (8.6)	2.10 (1.243)
COVID-19 does not spread in the hot and humid weather	104 (25.6)	119 (29.3)	117 (28.8)	36 (8.9)	30 (7.4)	2.43 (1.175)
COVID-19 was created in the lab	59 (14.5)	69 (17.0)	183 (45.1)	58 (14.3)	37 (9.1)	2.86 (1.115)
COVID-19 does not affect religious people	163 (40.1)	104 (25.6)	88 (21.7)	19 (4.7)	32 (7.9)	2.15 (1.224)
COVID-19 Vaccine does not work	97 (23.9)	140 (34.5)	110 (27.1)	32 (7.9)	27 (6.7)	2.39 (1.129)
COVID-19 does not affect poor people	167 (41.1)	115 (28.3)	76 (18.7)	19 (4.7)	29 (7.1)	2.08 (1.194)
Thankuni leaves may prevent COVID-19	148 (36.5)	100 (24.6)	111 (27.3)	23 (5.7)	24 (5.9)	2.20 (1.166)
COVID-19 affects urban people more than rural	75 (18.5)	55 (13.5)	95 (23.4)	107 (26.4)	74 (18.2)	3.12 (1.362)

SD, standard deviation.

information such as "Facemasks don't work" (Mann–Whitney U=13,491.500, $p<0.05$), "COVID-19 is a deception" (Mann–Whitney U=14,071, $p<0.05$), "5G towers may spread COVID-19" (Mann–Whitney U=15,074, $p<0.05$), "COVID-19 does not affect religious people" (Mann–Whitney U=13,511, $p<0.05$), "COVID-19 vaccine does not work" (Mann–Whitney U=12,796, $p<0.05$), "COVID-19 does not affect poor people" (Mann–Whitney U=13,788, $p<0.05$), "Thankuni leaves may prevent COVID-19" (Mann–Whitney U=14,852, $p<0.05$), and "COVID-19 affects urban people more than rural" (Mann–Whitney U=1,308, $p<0.05$).

Kruskal–Wallis testing revealed no significant difference was noted between ages of the respondents and COVID-19 related misinformation. Significant difference was also not found among respondents' maintenance of COVID related guidelines and misinformation regarding COVID-19, except for "Vaccine doesn't work against COVID-19" ($p=0.018$). There is no significant difference among respondents' frequency of Internet or social media usage and misinformation regarding COVID-19 except for "Facemasks don't work" ($p=0.016$) and "Bill Gates is behind the COVID-19 pandemic" ($p=0.031$).

Significant difference was found among level of education and all misinformation except for "COVID-19 was created in a lab" ($p=0.86$). Significant difference was also noted among respondents' level of information literacy and COVID-19 related misinformation except for "COVID-19 was created in a lab" ($p=0.707$) and "COVID-19 affects urban people more than rural" ($p=0.655$). Significant difference was noted among respondents' sources of getting information and certain misinformation like "COVID-19 is a deception" ($p=0.09$), "Drinking alcohol may prevent COVID-19" ($p=0.014$), "COVID-19 does not affect poor people" ($p=0.044$), "Thankuni leaves may prevent COVID-19" ($p=0.028$), and "COVID-19 affects urban people more than rural" ($p=0.024$). Significant difference was noted among respondents' evaluative steps after getting information and certain COVID-19 related misinformation such as "Facemasks don't work" ($p=0.016$), "Vaccine doesn't work" ($p=0.031$), and "COVID-19 doesn't affect poor people" ($p=0.045$).

6.3. Strategies to Counter COVID-19 Related Misinformation

Data presented in Table 4 indicate that respondents have shown their support in the case of most of the strategies to counter COVID-19 related misinformation. They strongly supported steps like removal of false social media contents (207, 51.0%), easy and straightforward representations of information regarding COVID-19 (192, 47.3%), awareness campaigns or workshops (178, 43.8%), developing tools and guidance to promote and disseminate trusted information regarding COVID-19 (177, 43.6%), only sharing scientific facts will be helpful (173, 42.6%), religious scholars can play an important role to eradicate

COVID-19 related misinformation (171, 42.1%), and print and electronic media can provide right information regarding COVID-19 (164, 40.4%). Respondents provided some support for steps like the role of local information centers and libraries in disseminating right and accurate information regarding COVID-19 (201, 49.5%), the role of information professionals in providing accurate information (200, 49.3%), and the role of interactions with health officials that are polite, nonjudgmental, and factual (198, 48.8%).

6.4. Hypotheses Testing

H01: There is no relationship between current resi-

Table 4. Strategies to counter COVID-19 related misinformation on a five-point scale (N=406)

Misinformation about COVID-19 vaccine	Strongly disagree *Freq*. (%)	Disagree *Freq*. (%)	Neutral *Freq*. (%)	Agree *Freq*. (%)	Strongly agree *Freq*. (%)	Mean (SD)
Interactions with health officials that are polite, nonjudgmental, and factual will be helpful	0 (0.0)	3 (0.7)	49 (12.1)	198 (48.8)	156 (38.4)	4.25 (0.688)
Only sharing scientific fact will be helpful	0 (0.0)	1 (0.2)	41 (10.1)	191 (47.0)	173 (42.6)	4.32 (0.660)
Promoting information literacy, media literacy, and health literacy	0 (0.0)	5 (1.2)	50 (12.3)	186 (45.8)	165 (40.6)	4.26 (0.716)
Easy and straightforward representations of information regarding COVID-19	0 (0.0)	5 (1.2)	41 (10.1)	168 (41.4)	192 (47.3)	4.35 (0.710)
Public figures/celebrities may play a role to eradicate COVID misinformation	4 (1.0)	15 (3.7)	44 (10.8)	203 (50.0)	140 (34.5)	4.13 (0.821)
Information professionals can disseminate right and accurate information regarding COVID-19	0 (0.0)	6 (1.5)	40 (9.9)	200 (49.3)	160 (39.4)	4.27 (0.694)
Local information centers and libraries can disseminate right and accurate information regarding COVID-19	0 (0.0)	3 (0.7)	42 (10.3)	201 (49.5)	160 (9.1)	4.28 (0.672)
Print and electronic media can provide right information regarding COVID-19	0 (0.0)	7 (1.7)	43 (10.6)	192 (47.3)	164 (40.4)	4.26 (0.715)
Religious scholars can play an important role to eradicate COVID-19 related misinformation	0 (0.0)	8 (2.0)	58 (14.3)	169 (41.6)	171 (42.1)	4.24 (0.766)
Removal of false social media contents will be beneficial	0 (0.0)	3 (0.7)	27 (6.7)	169 (41.6)	207 (51.0)	4.43 (0.651)
Developing tools and guidance to promote and disseminate trusted information regarding COVID-19	1 (0.2)	3 (0.7)	29 (7.1)	196 (48.3)	177 (43.6)	4.34 (0.666)
Through awareness campaigns or workshops	0 (0.0)	8 (2.0)	31 (7.6)	189 (46.6)	178 (43.8)	4.32 (0.700)

SD, standard deviation.

dency and sources of getting information.

Chi-square test for current residency and sources of getting information found that there is no significant relationship between current residency and sources of getting information (χ^2=7.422; Df=4; p=0.115). So, the null hypothesis can be retained.

H02: There is no relationship between current residency and importance of information dissemination.

Chi-square test for current residency and sources of getting information found that there is significant relationship between current residency and importance of information dissemination (χ^2=17.533; Df=4; p=0.002). So, the null hypothesis can be rejected.

H03: There is no relationship between current residency and reaction after getting COVID related information.

Chi-square test for current residency and reaction after getting COVID related information found that there is significant relationship between current residency and reaction after getting COVID related information (χ^2=7.101; Df=2; p=0.029). So, the null hypothesis can be rejected.

H04: There is no relationship between current residency and evaluative steps after getting information and before disseminating it.

Chi-square test for current residency and evaluative steps after getting information and before disseminating it found that there is no significant relationship between current residency and sources of getting information (χ^2=4.957; Df=6; p=0.549). So, the null hypothesis can be retained.

7. DISCUSSION

During the COVID-19 pandemic, dissemination of information is one of the most important components of the twenty-first century. There has never been a time when swift and prompt dissemination of information was more crucial than it is in this coronavirus outbreak (Kudchadkar & Carroll, 2020). The current study reveals that the general citizens of Bangladesh are influenced by dissemination of information related to COVID-19 and they have a lower level of misinformation belief. However, the respondents have differences in misinformation belief by different demographic groups (e.g., sex).

Statistically significant differences were found between education levels and misinformation related to COVID-19 included in this survey. A significant difference was reported between participants' sources of getting information and their misinformation belief. There was also a significant difference between their evaluative steps after getting information and their belief in misinformation. The respondents have also differences in misinformation belief by their level of information literacy. It was found that a vast majority of the respondents use social media platforms as their sources of getting information.

When it comes to global public health crises like pandemics, the dissemination of reliable and authentic information is critical in terms of outbreak control strategies. Timely and accurate information about the pandemic can assist in taking precautionary measures and other steps for responding in that critical scenario, which may result in improved health outcomes (Voeten et al., 2009). In terms of recommendations indicated by the respondents based on strategies to fight against misinformation related to COVID-19, authorities must apply essential measures to eradicate social media posts that are incorrect. The proactive authenticity, clarification, or even elimination of incorrect content on social media can be improved to reduce its spread by misinformation monitoring and surveillance. The health ministry under the government has to deliver impartial, appropriate, and authentic COVID-19-related information to mass audiences.

In order to reach the general public, health instructions should also be created, ideally in the mother tongue. Appropriate videos and documentaries should be broadcasted on television regarding COVID-19. All COVID-19-related information should be simple to understand and need to be created after consulting regional authorities. Justified and convenient information regarding prevention strategies related to coronavirus also needs to be delivered through print and electronic media. Moreover, information literacy, media literacy, and health literacy should be promoted among the mass public. As Jones-Jang et al. (2021) noted, information and media literacy might not be enough to counter the negative impact of misinformation. The dissemination of appropriate and convenient information can serve as a barrier to the spread of COVID-19-related misinformation.

The influence of regional public libraries or information centers in circulating information regarding coronavirus is also crucial. They may play a vital part in obtaining access to coronavirus related authentic information. Hence, these regional institutions are useful for disseminating this kind of information. Information professionals can also be helpful in this regard. Religious scholars can also play a vital role to stop the spreading of misinformation. Stopping the circulation of misinformation cannot be possible by a single approach. To address this issue,

many flexible techniques and policy-level initiatives are required.

8. LIMITATIONS AND FUTURE RESEARCH

The survey could not reach out to people located in backward places and those who are not properly aware of COVID-19. That is why the study population was not entirely representative. As a result, the results cannot be generalized. But still this study can provide critical insights for further studies. Further, the misinformation included in the study was adopted from earlier research and social media platforms. There are many local misinformation beliefs which were not included this study. Upcoming studies may include local misleading information beliefs and study their impact on the people of Bangladesh. Alongside demographics, there might be other issues such as political beliefs, religious viewpoints, and socio-economic conditions that might be influential factors. These factors need to be investigated in upcoming studies.

9. CONCLUSION

This study's findings lead to the conclusion that there is a significant role of information dissemination in the case of the general public, including both urban and rural citizens of Bangladesh, during this COVID-19 pandemic. The findings provided insight from where urban and rural citizens get their information regarding COVID-19 and indicated that most of them depend on social media as their information sources. Although people have lower belief of misinformation regarding COVID-19, differences in misinformation belief were based on demographics such as sex, educational status, sources of getting information, and information literacy. Steps should be taken to reduce misinformation belief and stop spreading misinformation. Dissemination of timely, authoritative, and accurate information regarding the pandemic can help in taking necessary measures for responding in this pandemic situation, which may lead to better health outcomes.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Appendix. Questionnaire

Section A. Demographic and general information

1. Your age:
   - Below 18
   - 18-30
   - 31-40
   - 41-50
   - 51-60
   - Above 60

2. Your sex:
   - Male
   - Female

3. Highest educational qualification:
   - Primary school
   - SSC/Equivalent
   - HSC/Equivalent
   - Graduation
   - Postgraduation

4. Where do you currently live?
   - Urban area (e.g., Metropolitan, City)
   - Rural area (e.g., Small town, Village)

5. Did you get infected with Coronavirus?
   - Yes
   - No

6. Has anyone from your close family members died of COVID-19?
   - Yes
   - No

7. Do you follow the guidelines regarding COVID-19 (e.g., staying at home, wearing masks, social distancing, washing hands frequently, etc.)?
   - Yes
   - No
   - To some extent

8. Have you taken a COVID-19 vaccine?
   - Yes
   - No

9. What are the sources you often use to get information?
- Social media
- Print and electronic media
- Friends/Family
- Experts/Doctors
- Govt. information postal (e.g. Bangladesh National Portal)

10. "Information literacy is a set of abilities requiring individuals to 'recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.'" According to the mentioned definition rate the level of your information literacy is:
- Extremely low
- Low
- Moderate
- High
- Advance

11. How often do you use the Internet and social media?
- Several times a day
- At least once a day
- At least once a week
- Occasionally
- Never

12. Why do you disseminate information/Why is dissemination of information important for you?
- To spread the information
- To raise awareness among people
- To become popular
- To pass the leisure time
- Don't know

13. How do you react when you get COVID-19 related information?
- Disseminate the information without checking the fact
- Check the source of the information before dissemination
- Ignore

14. What evaluative steps do you take after getting any information and before disseminating it?
- Check quality of links/references provided
- Check number of links/references provided
- Check the length of the article
- Check others' reactions/opinions
- Check information about the author/poster
- Check tone/style of writing/argument
- Nothing

Section B. COVID-19 misinformation

COVID-19 misinformation	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Facemasks don't work					
COVID-19 is a deception					
5G towers may spread COVID-19					
Bill Gates is behind COVID-19 pandemic					
Drinking alcohol may prevent COVID-19					
COVID-19 does not spread in the hot and humid weather					
COVID-19 was created in the lab					
COVID-19 does not affect religious people					
COVID-19 Vaccine does not work					
COVID-19 does not affect poor people					
Thankuni leaves may prevent COVID-19					
COVID-19 affects urban people more than rural					

Section C. Strategies against COVID-19 related misinformation

Strategies against COVID-19 misinformation	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Interactions with health officials that are polite, nonjudgmental, and factual will be helpful					
Only sharing scientific fact will be helpful					
Promoting information literacy, media literacy, and health literacy					
Easy and straightforward representations of information regarding COVID-19					
Public figures/celebrities may play a role to eradicate COVID misinformation					
Information professionals can disseminate right and accurate information regarding COVID-19					
Local information centers and libraries can disseminate right and accurate information regarding COVID-19					
Print and electronic media can provide right information regarding COVID-19					
Religious scholars can play an important role to eradicate COVID-19 related misinformation					
Removal of false social media contents will be beneficial					
Developing tools and guidance to promote and disseminate trusted information regarding COVID-19					
Through awareness campaigns or workshops					