

Research Article

Exploring Public Knowledge, Practices, and Understanding of COVID-19 Science Communication in Bangladesh

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Abstract

This study explores public knowledge, practices, and understanding of COVID-19 science communication messages in Bangladesh, based on a survey of 1,600 respondents. The findings indicate that while knowledge and behavioral compliance with public health measures—such as mask-wearing, handwashing, social distancing, isolation, quarantine, and lockdown—were generally high, a significant portion of the population faced difficulties in fully understanding the meaning of scientific messages behind these practices. For example, although 90% of respondents wore masks and 91.56% practised proper handwashing, over 80% reported difficulties in understanding the associated health messages. This gap between practice and understanding highlights critical issues in the design and delivery of science communication during the pandemic. The study underscores the need for culturally sensitive, accessible, and locally relevant health messages that resonate with diverse segments of the population. It also calls for more strategic use of mass media, interpersonal communication, and public engagement to improve comprehension and trust. The findings advocate for science communication to be treated as a central component of public health policy and emergency response planning in Bangladesh.

Keywords

COVID-19, Science Communication, Knowledge, Practice, Understanding

1. Introduction

The outbreak of the COVID-19 pandemic triggered a global crisis with profound effects on social life, public health, and economic stability [5, 14-16]. As fear, uncertainty, and psychological distress intensified [7], people across the world, including in Bangladesh, increasingly sought health-related information to navigate the pandemic. At the same time, the rapid dissemination of misinformation—especially through online and social media platforms—complicated the situation [6]. In such a context, the role of *science communication*—the process of conveying scientific knowledge to non-expert

audiences—became critically important.

Science communication played a pivotal role in informing the public, shaping health behaviors, and supporting evidence-based decision-making throughout the COVID-19 crisis [14]. It served as a bridge between scientific expertise and public understanding, enabling people to make informed choices about preventive measures such as mask-wearing, hand-washing, social distancing, and vaccination. In many countries, including Argentina, South Korea, and New Zealand, the pandemic response was guided by strong, sci-

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ence-led communication strategies that successfully engaged the public [17].

In Bangladesh, the first case of COVID-19 was reported on March 8, 2020. Since then, the government undertook a range of measures—including lockdowns, border closures, and mass awareness campaigns—to contain the virus. A critical part of this response was daily press briefings, public service announcements, and the dissemination of health messages across various media platforms. These messages were often grounded in global scientific guidelines, particularly those provided by the World Health Organization (WHO), and were delivered by health experts from institutions like the Institute of Epidemiology Disease Control and Research (IEDCR) and the Directorate General of Health Services (DGHS). These efforts represented a significant attempt to provide the public with timely, accurate, and scientifically credible information during an unprecedented health emergency.

Despite these efforts, the effectiveness of science communication during the pandemic remains uncertain. In a country like Bangladesh, where scientific literacy and access to health information are uneven, public understanding of COVID-19 messages may have been limited. Concepts such as "quarantine," "flattening the curve or physical distancing," or "KN95 mask wearing", handwashing are rooted in scientific discourse and often require simplification and contextualization for public comprehension. The widespread use of social media also led to the simultaneous spread of misinformation and rumors, challenging the impact of government-led communication efforts.

While the government, health professionals, and media played active roles in disseminating COVID-19 messages, there has been limited empirical investigation into how the general public perceived and responded to these messages. Did people trust and understand the health messages they received? To what extent did they translate this understanding into preventive practices? What role did various communication channels play in shaping their behaviors? These questions remain central to evaluating the overall effectiveness of Bangladesh's science communication strategy during the pandemic.

Understanding public knowledge, practices, and interpretation of scientific messages is essential for designing effective risk communication strategies in future health crises. But no study has been conducted in line with the determining the role of science communication, knowledge and practices, and understanding of COVID-19 messages. This study, therefore, aims to explore how the people of Bangladesh received, understood, and acted upon COVID-19-related scientific communication, and how these elements influenced public health behavior during the pandemic.

1.1. Research Objectives

- 1) To assess the level of public knowledge regarding COVID-19-related scientific information in Bangla-

desh.

- 2) To examine the practices adopted by the public in response to COVID-19 science communication.
- 3) To explore the public's understanding and interpretation of key COVID-19 messages disseminated through various communication channels.

1.2. Review of Literatures

A growing body of research has highlighted the critical role of science-based communication during the COVID-19 pandemic, as both governments and the general public turned to scientifically credible information to enhance awareness and guide their responses. For instance, a study was conducted in Italy during the initial wave of the pandemic examined the extent of public trust in scientists and health authorities for pandemic-related information [2]. Employing a combination of digital data sources—such as Twitter and Telegram—the researchers gathered input from 8,798 respondents. Their findings revealed a marked increase in public reliance on scientific authorities during the early stages of the outbreak, which began in the province of Lodi on February 21, 2020. By mid-March, all Italian provinces had reported COVID-19 cases. During this period, notable figures such as Roberto Burioni, Ilaria Capua, and Pierluigi Lopalco, alongside institutions like the Ministry of Health and the Italian Red Cross, actively used social media to disseminate scientific health information. The study found that these scientifically grounded messages were perceived as trustworthy and played a key role in helping the public differentiate between accurate information and misinformation or disinformation [2].

In the same way, another study highlighted the dual role of Twitter in the global communication landscape in Covid-19 pandemic time. While it served as an effective tool for rapid dissemination of scientific knowledge, it also contributed to the spread of misinformation—demonstrating both the power and pitfalls of social media in times of crisis [9].

Another notable study evaluated the impact of a science communication initiative titled Dear Pandemic, which was launched in late February 2020 by a team of public health researchers [1]. This project aimed to enhance public understanding of COVID-19, promote media literacy, and empower individuals to challenge misinformation. The initiative was distinguished by its commitment to two-way communication and regular updates—posting 8 to 16 science-based messages weekly across multiple social media platforms. Initially intended for friends and family, the project rapidly expanded in reach. By September 2020, it had amassed approximately 200,000 followers across four social networks, garnered 4 million monthly views, and reached audiences across all 50 U. S. states and over 60 countries. The study highlighted the importance of trusted, community-rooted science communication in enhancing public engagement [1].

In the United Kingdom, an in-depth investigation into the relationship between scientific content in news articles and

public behavioral responses was conducted [4]. The mixed-methods study analyzed 1,520 articles from major newspapers—The Guardian, The Times, The Telegraph, and The Daily Mail—published between November 2021 and February 2022. Using a deductive coding framework based on an 11-category Nature of Science (NOS) salience model, the researchers developed a time-series database and integrated it with national mobility data. Statistical analysis, including Vector Autoregressive (VAR) modeling and Granger causality testing, revealed that certain types of scientific content were linked to measurable changes in public movement. Specifically, exposure to NOS-focused information was associated with reductions in time spent at recreational sites, grocery stores, and parks—suggesting that science-informed journalism could influence behavioral patterns during health crises [4].

Additionally, a study on the evolving trajectory of scientific output on health communication related to COVID-19 using bibliometric methods was carried out [8]. Drawing on the Web of Science database, they analyzed publications from 2020 to 2021 that included terms like “COVID-19” and “health communication.” The study found a dramatic increase in the volume of publications in 2021. Of the articles retrieved using keywords such as “health,” “health communication,” and “coronavirus,” 63.7% were published in 2021. Citation metrics also showed a significant jump: from 184 citations in 2020 to 1,308 in 2021, with an average of 5.74 citations per article and an H-index of 20. The focus of the literature shifted notably over time—early studies emphasized mental health and misinformation, while later publications concentrated on vaccination, infodemic management, and telemedicine [8].

Theoretical Framework

Public health and infection management theories have consistently influenced as foundational directions in shaping healthcare delivery and diseases control strategies. The historical modification from miasma to germ theory explains how developing scientific understanding has framed our knowledge of virus transmission and prevention rules [11].

This study implements the IDEA model [12] as its theoretical framework to examine the effectiveness of science communication approaches during the Covid-19 pandemic in Bangladesh. This model highlights four most important elements of guiding successful crisis communication: Internalization, Distribution, Explanation, and Action.

The first element, “I” stands for Internalization, which refers to the way of motivating people to pay attention and recall the messages by focusing on personal relevance and impact of a crisis or danger. In this study, the Covid-19 pandemic is a crisis, this involved communicating the seriousness of the virus, and its direct impact for audiences and their loved ones. Without Internalization or no emotional connection, it becomes very difficult to motivate the audience to engage with or responsiveness to the messages [13].

The second important element of IDEA models is “D” that stands for Distribution, which highlights the significance of

disseminating messages through different trustworthy and available communication channels to connect diverse audience. This study used this model because this model is specifically perfect for the Bangladeshi context, where the DGHS the top most governmental agencies, and some notable NGOs applied a wide platform, including TV, radio, social media, and small media to disseminate precautionary messages through multiple channels for the diverse audiences during the pandemic in Bangladesh.

The third component, “E” for Explanation, which involves clearly explaining what is occurring in an exact and understandable way with the help of a trustworthy person to the target audiences [12]. This necessitates using very simple language and culturally suitable messaging, preferably disseminated by a credible source. For instance, when addressing the adult’s audience then message might be “Covid-19 is a virus that spreads through respiratory droplets, when an infected person coughs, sneezes, or talks”, however when the audience is children, then messages would be simplified in a very easy way, such as, “Covid-19 is a virus that makes people very sick. It’s so small we can’t even see it when it travels through the air from one person to another when we cough or sneeze or even talk [3].” In this study, Explanation refers to audience understanding. As Covid-19 was a totally new virus, it was necessary that all communication be delivered by prominent persons using clear and available language which acceptable for audiences of all ages and educational background.

Finally, the final element of “A” stands for Action which refers to clear and specific behaviors that audience should adopt or avoid to protect themselves and others from any crisis and response. In Covid-19 pandemic situation, these actions refer to social distancing, washing hands, wearing mask in any public place, and stay home when feel any symptoms [3]. This study implements this model to analyze how successfully such actionable messages were interconnected by the public in Bangladesh, with specific attention to public knowledge, practices, and understanding of COVID-19 science communication.

2. Method

A cross-sectional survey was conducted using a quantitative approach across all eight administrative divisions of Bangladesh. The study was carried out between July 1, 2020 and December 2021. To ensure safety and minimize physical contact amid the pandemic, data were collected through a self-administered online questionnaire using Google Forms. The survey was made available in national language of Bangladesh (Bangla) to ensure broader accessibility and understanding. A group of students voluntarily assisted in distributing the Google Form to potential respondents via various online platforms and email. They were briefed in a Zoom meeting on how to approach respondents during the COVID-19 pandemic. The validity and reliability of the data

collection were checked and rechecked regularly.

The structured questionnaire was divided into two key sections. The first section gathered respondents' gender, age, and education. The second section explored public knowledge, practices, and understanding of core preventive messages related to the COVID-19 pandemic. These messages specifically included six key health directives: mask-wearing, handwashing, social distancing, isolation, quarantine, and lockdown.

Different types of questions were used to measure knowledge, similar to those commonly used by teachers to assess students' learning [10]. These included yes/no, true/false, multiple choice, matching, enumeration, and essay-type questions [10].

For measuring the practice of COVID-19 health messages, two main types of questions were employed: yes/no and multiple-choice. Understanding was operationalised as a comprehensive agreement or consensus on the issue, encompassing realization, internalization, and the ability to explain. It reflects that respondent not only possess scientific knowledge about COVID-19, but also hold positive attitudes, follow health guidelines in practice, and advocate for them.

About 2,000 individuals were invited to participate in the survey, and a total of 1,600 complete responses were collected. The respondents were selected based on self-selection sampling method (volunteer sampling), and convenience sampling. Each submission was reviewed for consistency and completeness before analysis. Qualitative analysis was made for the study.

3. Findings

Table 1. Respondents' Demographic Characteristics.

Gender	Number	Percentage
Female	375	23.4%
Male	1225	76.6%
Age		
Bellow 18	74	4.6%

Gender	Number	Percentage
19-28	1202	75.1%
29-38	227	14.2%
39-48	58	3.6%
49-58	28	1.8%
59-68	10	0.6%
Above 69	1	0.1%
Education Level		
Primary or below	30	1.9%
Secondary	107	6.7%
Higher Secondary	394	24.6%
Graduation	757	47.3%
Post-Graduation	312	19.5%

(Source: Survey, 2021-2021)

Table 1 presents demographic data for 1,600 respondents. The gender distribution reveals a notable imbalance, with 76.6% male and 23.4% female, indicating that male respondents were significantly more engaged in this survey, possibly reflecting access to digital platforms or survey interest.

In terms of age, the majority of respondents (75.1%) were between 19-28 years, confirming a youthful demographic. The age group under 18 comprised 4.6%, while the 29-38 group made up 14.2%. Older age groups were underrepresented: 3.6% (39-48 years), 1.8% (49-58 years), 0.6% (59-68 years), and only 0.1% above 69 years. This shows limited participation from older adults, likely due to digital literacy or access barriers.

Educationally, the sample was well-educated. 47.3% were graduates, and 19.5% had postgraduate degrees, with 24.6% holding higher secondary education. Only 1.9% had primary education or below. This implies that the survey mostly reached individuals with considerable formal education, which may have influenced their responses to scientific information.

Table 2. Knowledge, Practice and Understanding of Mask-Wearing.

Having knowledge about mask-wearing?	Number	Percentage
Yes	1400	87.5%
No	200	12.5%
Did they wear face mask during Covid-19?		
Yes	1440	90%
No	60	10%

Having knowledge about mask-wearing?	Number	Percentage
Public preference between the messages 'wear KN95 scientific face mask' and 'wear general face mask'		
Wear KN95 scientific face mask	1460	91.25%
Wear general face mask	140	8.75%
Whether respondents primarily faced difficulties to understand the meaning of the message, 'wear KN95 scientific face mask'?		
Yes	1460	91.25%
No	140	8.75%

(Source: Survey, 2020-2021)

Table 2 says a significant 87.5% of respondents reported knowing the importance of mask-wearing during COVID-19, reflecting widespread awareness of this preventive measure. In terms of practice, 90% of respondents indicated that they wore masks regularly, suggesting that knowledge translated into behavior for most individuals.

Interestingly, 91.25% of the participants preferred the message "wear KN95 scientific face mask" over "wear general mask," which reflects a relatively high level of understanding regarding the effectiveness of different types of masks. But they 91.25% also reported that they primarily

faced difficulties in understanding the message, wear KN95 face mask that means scientific communication works behind the understanding of the COVID-19 information as the majority followed mask guidelines and understood the need for quality protection, they may have struggled with the scientific or technical language primarily used in public messaging. It suggests a gap between action and comprehension—indicating that scientific messages were followed more out of trust or habit rather than clear understanding, possibly due to jargon or lack of contextual explanation.

Table 3. Knowledge, Practice and Understanding of Handwashing.

Having knowledge about handwashing?	Number	Percentage
Yes	1470	91.88%
No	130	8.12%
Did they wash hands frequently with soap for 20 seconds?		
Yes	1465	91.56%
No	135	8.44%
Public preference between the messages, 'wash hands with soap for 20 seconds' and 'wash hands with ashes and muds'		
Wash hands with soap for 20 seconds	1470	91.88%
Wash hands with ashes and muds	130	8.12%
Whether respondents face difficulties to understand the rules of handwashing?		
Yes	1470	91.88%
No	130	8.12%

(Source: Survey, 2020-2021)

Table 3 shows that a strong 91.88% of respondents had knowledge about proper handwashing during the COVID-19

pandemic. This high level of awareness was closely mirrored in practice, with 91.56% confirming that they frequently

washed their hands with soap for at least 20 seconds, in line with global health recommendations.

When asked about their understanding, 91.88% preferred the message “wash hands with soap” over traditional alternatives like ashes and mud, indicating a scientifically informed preference. However, a notable 91.88% also reported facing

difficulties in understanding handwashing-related messages, highlighting that even though individuals followed the practice, they might have struggled with fully grasping the reasoning or instructions behind it. This again reflects a common theme of high compliance but limited comprehension, possibly due to ineffective or overly technical communication.

Table 4. Knowledge, Practice and Understanding of Social Distancing.

Having knowledge about social distancing?	Number	Percentage
Yes	1540	96.25%
No	60	3.75%
Did they follow/practice social distancing?		
Yes	1319	82.44%
No	281	17.56%
Public preference between the messages, ‘social distancing’ and ‘physical distancing’		
Social distancing	1079	67.4%
Physical distancing	521	32.6%
Whether respondents face difficulties to understand social distancing?		
Yes	1127	70.4%
No	473	29.6%

(Source: Survey, 2020-2021)

According to Table 4, an overwhelming 96.25% of participants knew about social distancing as a preventive measure. However, the practice rate was lower, with 82.44% reporting that they actually followed it. This gap suggests that logistical, cultural, or social limitations might have affected their ability to fully comply.

In terms of understanding, 67.4% preferred the term “social

distancing” over “physical distancing”, showing a familiarity with widely used terminology. Yet, 70.4% of respondents acknowledged facing difficulties in understanding the concept clearly. This suggests that despite broad awareness, there remained confusion about the exact meaning, purpose, or proper application of social distancing—likely due to mixed messaging or lack of localized explanations.

Table 5. Knowledge, Practice and Understanding of Isolation.

Having Knowledge about isolation?	Number	Percentage
Yes	1124	70.25%
No	476	29.75%
Did they practise or advocate for isolation?		
Yes	1251	78.2%
No	349	21.8%
Preference between isolation, and separation and other local languages		
Isolation	1484	92.8%

Having Knowledge about isolation?	Number	Percentage
Separation of a sick person with Covid-19 from others	116	7.2%
Whether respondents face difficulties to understand isolation?		
Yes	662	41.4%
No	938	58.6%

(Source: Survey, 2020-2021)

According to Table 5, showed that 70.25% of participants knew about isolation as a precautionary measure. However, the practice rate was higher, with 78.2% reporting that they actually followed isolation rule. This significant gap suggests that the governments and law enforcement agencies might have played strict role to isolate people.

In terms of understanding, 92.8% preferred the term “isolation” over “separation and others language”, showing a familiarity with widely used terminology. Yet, 41.4% of respondents acknowledged facing difficulties in understanding the concept clearly.

Table 6. Knowledge, Practice and Understanding of Quarantine.

Having knowledge about quarantine?	Number	Percentage
Yes	1307	81.7%
No	293	18.3%
Did they practise or advocate for quarantine?		
Yes	547	34.2%
No	1053	65.8%
Public preference between the messages, ‘quarantine’ and ‘separation’		
Quarantine	1307	81.7%
Staying at a restricted place or a room	293	18.3%
Whether respondents face difficulties to understand quarantine?		
Yes	604	37.8%
No	996	62.2%

(Source: Survey, 2020-2021)

Table 6 highlights that 81.7% of participants knew about quarantine, but only 34.2% reported practising or advocating for it. This represents the largest gap between knowledge and behavior among all topics analyzed, likely due to socio-economic constraints, fear of stigma, or limited space at home to quarantine effectively.

When it comes to understanding, 81.7% preferred the term

“quarantine” over explanatory phrases like “staying in a restricted place,” indicating public familiarity with the scientific term. Nonetheless, 37.8% admitted they faced barriers in understanding what quarantine truly meant or entailed, reinforcing the idea that terms were known but not always well understood in practice.

Table 7. Knowledge, Practice and Understanding of Lockdown.

Having knowledge about lockdown?	Number	Percentage
Yes	1529	95.6%

Having knowledge about lockdown?	Number	Percentage
No	71	4.4%
Did they follow lockdown?		
Yes	1555	97.2%
No	45	2.8%
Public preference between the messages, 'lockdown' and 'entry ban'		
Lockdown	1391	86.9%
Entry ban	209	13.1%
Whether respondents face difficulties to understand lockdown?		
Yes	1515	94.7%
No	85	5.3%

(Source: Survey, 2020-2021)

Table 7 presents a very high 95.6% knowledge rate about lockdown, with an even higher 97.2% of respondents saying they followed lockdown instructions. This suggests strong public engagement and possibly the role of strict enforcement.

However, 94.7% of respondents also reported facing difficulties in understanding lockdown-related communication

messages. Despite mass compliance and wide media coverage, the findings reveal that most people may have followed lockdown orders without fully grasping the scientific or strategic rationale behind them. This underscores the need for clearer, more audience-friendly messages, even for terms that are widely recognized.

Table 8. Summary of the findings.

Messages	High Knowledge (%)	High Practice (%)	High Barriers to Understanding (%)
Mask-Wearing	87.5	90.0	91.25
Handwashing	91.88	91.56	81.88
Social Distancing	96.25	82.44	70.4
Isolation	70.25	78.2	41.4
Quarantine	81.7	34.2	37.8
Lockdown	95.6	97.2	94.7

This summary table indicates that while knowledge and practice were generally high, understanding often lagged, particularly for lockdown, mask-wearing, and handwashing. Quarantine showed a wide gap between knowledge and practice.

4. Recommendations

- 1) COVID-19-related messages should be delivered in simple, everyday language, avoiding scientific jargon. Messages should be easily understood by people with varying literacy levels.
- 2) Health messages must respect and reflect the socio-cultural norms and values of Bangladeshi commu-

nities to improve public receptivity and trust.

- 3) As newspapers and television remain the most trusted information sources, they should be prioritized for disseminating official COVID-19 and health-related updates.
- 4) The government agencies, along with mainstream media, should continue to lead efforts in delivering accurate, timely, and evidence-based messages to counter misinformation.
- 5) Local leaders, community health workers, and NGOs should be engaged to reinforce public understanding through face-to-face or grassroots communication, particularly in rural or low-literacy areas.
- 6) Special training programs should be designed for jour-

nalists, broadcasters, and public health officials to enhance their capacity to convey complex scientific information in crisis settings.

- 7) Mechanisms should be established to collect ongoing feedback from the public to assess comprehension and adjust communication tactics accordingly.
- 8) Science communication should be recognized as a core component of pandemic preparedness and response, with dedicated funding and institutional support.

5. Conclusion

This study underscores the pivotal role of science communication in shaping public responses to the COVID-19 pandemic in Bangladesh. By examining public knowledge, practices, and understanding, the research reveals that widespread dissemination of accurate, accessible, and culturally appropriate scientific information significantly influenced preventive behaviors. The findings indicate that while the majority of respondents possessed a sound understanding of COVID-19 messages, notable gaps between knowledge and actual practices persist — highlighting the need for more targeted, behaviorally informed communication strategies.

The study contributes to the growing body of public health literature by offering context-specific insights from a low-resource setting, an area often underrepresented in global research. Its strength lies in its empirical design, large and demographically diverse sample, and timely relevance. The descriptive data provide valuable evidence for policymakers, health educators, and communication practitioners in designing more effective public health campaigns.

Moving forward, future research should investigate the underlying psychological, social, and structural barriers that hinder the translation of knowledge into consistent health practices. Moreover, longitudinal studies could help assess the long-term impact of science communication efforts on public behavior during and beyond health crises. Strengthening interdisciplinary approaches that combine communication science, behavioral research, and public health policy will be essential to prepare for and manage future public health emergencies.

Abbreviations

COVID-19	Coronavirus Disease 2019
WHO	World Health Organization
IEDCR	The Institute of Epidemiology Disease Control and Research
DGHS	The Directorate General of Health Services
NOS	Nature of Science
VAR	Vector Autoregressive
NGO	Non-governmental Organization

Author Contributions

Mst. Dil Afroza Khatun: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Methodology

Mahamudul Haque: Formal Analysis, Funding acquisition, Project administration, Supervision, Writing – original draft, Writing – review & editing

Shahin Alam: Formal Analysis, Funding acquisition, Investigation, Resources, Validation, Visualization, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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