



Crisis risk communication and public behavior: Analysis of the COVID-19 pandemic in Pakistan

Syed Abdul Siraj ^{1*} , Maryam Noor ¹ 

¹Department of Media Studies, Bahria University, Islamabad PAKISTAN

*Corresponding Author: asirajbuic@bahria.edu.pk

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ABSTRACT

This study underpins the crisis risk communication (CRC) theory, investigating the integral role of social media in Pakistan towards COVID-19, its influence on cognitive priming processes, and behavior regulation. Empirical findings reveal predominantly positive public sentiment toward preventive behaviors, with mask-wearing and sanitizer use widely embraced. However, the inclination to avoid gatherings with risk groups is comparatively lower. This collective adherence to preventive measures suggests a shared effort to curb COVID-19, influenced by factors like the perceived helpfulness of social media. The populace exhibits a predominantly favorable attitude towards COVID-19 vaccination, signifying widespread acceptance of vaccines within the country. Additionally, the study assesses public satisfaction with the government's pandemic management, revealing an overall positive sentiment. Nonetheless, concerns emerge regarding essential needs, including food, shelter, and treatment. Enhancing our insight, this study sheds light on the intricate interplay between CRC, social media, and public behavior amidst a health crisis. The insights gleaned from this study provide valuable guidance for policymakers and public health practitioners to refine future communication strategies and address societal concerns effectively during pandemics.

Keywords: COVID-19, crisis risk communication, social media, life-threatening factors, preventive measures, Pakistan

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INTRODUCTION

The world has witnessed several respiratory disease outbreaks in recent decades, with COVID-19 as the most severe and highly fatal virus among various contagious diseases. It ranks as one of the most devastating pandemics, impacting public health and the global economy, ranking as one of the most devastating crises since World War II (Christopher et al., 2020; Saqlain et al., 2021). Originating in Wuhan, China, on November 18, 2019, COVID-19 swiftly spread globally (Rothan & Byrareddy, 2020). The gravity of the situation prompted World Health Organization (WHO) to declare it a global health emergency on January 31, 2020. By January 2022, 59,365,688 confirmed COVID-19 cases and 934,735 reported deaths worldwide (Gavi Org., 2022).

COVID-19, primarily transmitted through respiratory droplets, is a rapidly spreading respiratory disease that often leads to severe acute respiratory syndromes (Aziz et al., 2022). The pandemic has had far-reaching effects, caused immense human loss, and disrupted various aspects of life, including public health, food supply, employment, work, and education on a global scale (Li et al., 2020). The socio-economic repercussions of the COVID-19 pandemic have placed millions at risk

of extreme poverty, jeopardizing the livelihoods of a substantial portion of the global workforce and affecting 3.4 billion people (Nicola et al., 2020; WHO, 2020a, 2020b).

The infected individuals showed asymptomatic or displayed mild to severe symptoms. Approximately 80.0% of patients exhibited mild signs of the virus. The fatality rate hovers around 2.4% for critical and elderly patients. Studies indicated that symptoms of COVID-19 include sore throat and cough, headache, chills, fatigue, fever, shortness of breath, nausea, abdominal pain, vomiting, and diarrhea (Wang et al., 2020). The virus poses minimal risk to children and those with underlying cardiovascular conditions, but it is particularly lethal for those over 70 years old, with a fatality rate of 14.8%. The course of illness leading to death can vary from 7 to 14 days, depending on factors like age, immune response, and underlying health conditions (Gautret et al., 2020; Heneghan et al., 2020).

Every country worldwide responded to the crisis by applying recommended measures such as social distancing, lockdowns, confinements, travel restrictions, and vaccination campaigns. In line with global standards, Pakistan also employed these measures alongside robust testing protocols to diagnose COVID-19 cases (Aziz et al., 2022; Pakistan Health Department, 2020).

During the last period of the pandemic, a new variant, Omicron, emerged, known for its rapid transmission but comparatively lower fatality rates. Notably affected countries include the USA, France, Iran, the U.K., Russia, Brazil, India, and Italy (Akhtar et al., 2021). Pakistan also faced significant challenges due to COVID-19, with hospitalizations and fatalities peaking from April to September 2020 (Pakistan Health Department, 2020). The virus's impact was more pronounced in older individuals and healthcare workers, who faced heightened vulnerability (Rajewska et al., 2020).

Pakistan's Landscape of COVID-19

Pakistan, a developing nation with a population of approximately 220 million, faced significant challenges during the COVID-19 pandemic, especially in major urban centers like Karachi, Lahore, Rawalpindi, and Faisalabad (Abid et al., 2020; Aziz et al., 2022). As of August 30, 2020, the government reported 293,261 confirmed cases, 6,244 casualties, 276,829 recoveries, and 686 critical cases (Aziz et al., 2022). Limited resources, an overloaded urban population, and socio-economic disparities worsened healthcare (Abid et al., 2020).

The sharp spike in COVID-19 cases in early 2020 in major cities in Pakistan placed immense pressure on government hospitals, resulting in a surge of critically ill patients. Securing admission became a challenge due to the limited capacity of medical facilities, and the prohibitive costs of private hospitals rendered them inaccessible to a considerable portion of the population. A critical priority was addressing the shortage of ventilators. Some relief came through collaborative initiatives in local production (Abid et al., 2020; Aziz et al., 2022; Noor, 2022).

The government took many preventive measures to mitigate the pandemic. These include lockdowns, travel restrictions, quarantine, medical facilitations, and establishing vaccination centers (Aziz et al., 2022). Social and traditional media were used to disseminate needful messages to convince people to use preventive measures effectively against the pandemic (Noor, 2022). Despite these efforts, the public raised complaints regarding deficient food and medical supplies, the convenient availability of COVID-19 testing, and concerns about the admission of severe cases into government hospitals. Consequently, many COVID-19 patients reluctantly sought admission to costly private hospitals (Khattak & Daadullah, 2021).

Despite stringent measures such as lockdowns, restrictions on social gatherings, and the closure of educational institutions, the impact on daily wage earners was profound. Compliance with government COVID-19 standard preventive measures, particularly regarding social distancing, proved less effective among lower-income groups (Khattak & Daadullah, 2021). Pakistan's developing status and the occurrence of religious festivals posed additional challenges to the effective implementation of social controls (Aziz et al., 2022). While the government's response and information dissemination through media were generally deemed credible and useful (Aziz et al., 2022), the inconsistent adoption of SOPs and the emergence of variants like Omicron signaled ongoing challenges in maintaining uniform public behavior (Noor, 2022; Shazia et al., 2022).

Social Media & COVID-19

The COVID-19 pandemic significantly amplified the global impact of social media, with WHO designating it as the primary source of the COVID-19 "info-demic" in 2020. This phenomenon disseminated accurate information and misinformation, heightening global anxiety

(Li, 2020; Li et al., 2020). McCombs and Stroud (2014) posit that uncertainty increases individuals' social and psychological need for information, drawing them to news media for clarity during uncertain times. Throughout the crisis, individuals instinctively turned to social media for updates, fostering a sense of connection and facilitating the exchange of experiences. However, it is crucial to note that social media sometimes amplifies rumors, contributing to uncertainty (Cinelli et al., 2020). Misleading content makes it challenging for individuals to discern credible sources, intensifying anxiety, fear, and stress during the pandemic (Huang & Zhao, 2020; Rodríguez-Hidalgo et al., 2020).

Nevertheless, social media played a pivotal role during COVID-19 by providing real-time information on the pandemic's progression, new cases, and evolving global and local scenarios. Its immediacy and networking capacity granted individuals swift access to vital information, influencing public concerns during crises and meeting the imperative need for relevant information (Aziz et al., 2022; Li, 2020; McCombs & Shaw, 1972; Smith et al., 2020). Aziz et al. (2022) examined the Pakistani government's purposeful usage of social media and mobile phones as successful public communication tools, particularly during crises. The government uses these channels to promptly communicate updates to the public, including critical aspects like identifying hotspots, carrying out targeted smart lockdowns, and advocating for COVID-19 preventative measures (Aziz et al., 2022). This study looks into the impact of social media on the perception of sanitary measures in Pakistan. With high illiteracy rates, especially among older people, social media is critical for crisis communication (Siddiqi, 2023).

LITERATURE REVIEW

The COVID-19 pandemic has had a huge global impact, inflicting extensive misery, death, and despair (Mouffak et al., 2021). Various challenges, including food supply, border closures, trade interruptions, and lockdowns, have paralyzed life and affected distress, worry, and overall well-being (Mouffak et al., 2021). The effective use of the media, specifically social media, prompted individuals to take protective measures against the disease (Akhtar et al., 2021). Every country uses its customized preventive measures to avoid the virus. Duan and Zhu (2020) report that people globally used common preventive measures against the COVID-19 pandemic, including mask usage, social distancing, handwashing using sanitizers, avoiding public gatherings, and adopting general hygiene standards. To mitigate the pandemic, international collaboration for sharing knowledge and resources was crucial for collective strategies, especially in developing vaccines. Although vaccines play an effective part in mitigating the pandemic, the media reported vaccine hesitancy in many people from different regions of the world (Sallam et al., 2022).

Relentless media coverage has contributed to mood disorders, and the shift to online education during lockdowns has amplified anxiety among students (Duan & Zhu, 2020; Gao et al., 2020; Huang & Zhao, 2020; Mamun & Griffiths, 2020; Rodríguez-Hidalgo et al., 2020). Disruptions in food and essential supply chains due to border closures and lockdowns have severe consequences, leading to job losses, illness, and loss of life (WHO, 2020a, 2020b). The psychological effects of COVID-19 have become a global symbol of fear, causing heightened anxiety and depression, particularly in directly affected countries (Huang & Zhao, 2020; Taylor, 2019). Factors contributing to fear include stringent lockdowns, economic disruptions, age-related

concerns, immune system vulnerabilities, and underlying health conditions (Huang & Zhao, 2020; Taylor, 2019). Studies in China detected rising anxiety and depression rates as the pandemic unfolded (Huang & Zhao, 2020; Taylor, 2019). Fear levels related to COVID-19, measured on a scale of one to 10, revealed a score of seven among Americans, with distress escalating alongside the mounting case count (Fitzpatrick et al., 2020).

Disparities in fear perception across demographic groups, job loss association with elevated COVID-19 apprehension, and a surge in symptoms related to depression and anxiety were observed. Tragically, instances of suicide also increased due to pervasive COVID-19 fear (Mamun & Griffiths, 2020). Depression and anxiety among healthcare professionals in Latin America and other regions were also found to be high. Factors influencing susceptibility to COVID-19 highlight age, sex, and underlying health conditions as pivotal variables. However, young adults aged 19 to 25 exhibit mild symptoms, with males potentially bearing a more substantial disease burden than females (Cao et al., 2020; Rodríguez-Hidalgo et al., 2020; Su et al., 2020; Wenham et al., 2020).

Adoption of COVID-19 Prevention Strategies

The preventive measures against COVID-19, as highlighted by WHO (2020a, 2020b), include a range of practices, such as wearing masks, social distancing, handwashing, use of sanitizers, surface sanitization, observance of general hygiene, and proper coughing or sneezing etiquette. Adopting the mentioned preventive measures against COVID-19 is complex due to factors such as gender, belief, attitude, education, occupation, income, cultural values, tradition, and religiosity was also (Dohle et al., 2020; Sharifipour, 2020). In the Pakistani situation, various socio-economic factors shape individuals' behaviors to protect themselves from the disease. The decisive factors for adopting preventive measures include the virus's perceived severity, age, and immunity levels of individuals (Khattak & Daadullah, 2021).

People in different regions and countries adopted preventive measures against COVID-19 at different rates; Khattak and Daadullah (2021) highlights that individuals in Pakistan showed health-protective behavior, with 85.0% adopting mask-wearing in public spaces and 65.0% practicing social distancing. Similarly, Peng et al. (2020) reveal a high level of virus awareness among participants, coupled with a positive inclination toward preventive measures in China. Other nations have adopted protective measures based on their circumstances in response to the global health threat of COVID-19 (Khattak & Daadullah, 2021).

COVID-19 Risk Factors

The severity of COVID-19 was observed as a severe illness, and the potential fatality in individuals affected by the disease accentuates adherence to preventive measures (Shi et al., 2020). Although both genders contracted the virus, however, females face a relatively higher mortality risk. Studies also reveal that individuals with cardiac issues are susceptible to mortality risk. Children showed a lower vulnerability and mild symptoms during the pandemic (Kopel et al., 2020; Salih et al., 2020; Shi et al., 2020).

Besides, the role of nutritious supplements, such as vitamins C, D, and Zinc, has shown promise in boosting immunity and reducing the risk of catching the virus (Chowdhury, 2020). Studies have revealed that the immunity function of an individual and other physiological factors about the disease severity influence the adoption of protective behaviors (Chiappelli, 2020). Different age groups may perceive the

severity of COVID-19 differently; for example, older individuals are more vulnerable and cautious about preventive behaviors against the virus (Statsenko et al., 2021). These observations underscore the intricate interplay of various factors shaping individuals' susceptibility to and experiences with COVID-19. To address the risk factors in the Pakistani context and their interconnectedness with adopting preventive measures, we included a hypothesis and research question.

COVID-19 Vaccines

Vaccines against COVID-19 emerged as a crucial tool to combat the virus's transmission and severity. The countries actively developing vaccines against COVID-19 were the USA, the UK, China, and Russia. They developed several prominent vaccine brands, including Pfizer Inc. and BioNTech S.E., Moderna, Oxford-AstraZeneca, Sinopharm, and Sinovac (Mouffak et al., 2021). As reported by these companies, the Pfizer-BioNTech BNT162b2 vaccine boasts an efficacy rate of 95.0%, necessitating stringent transportation conditions at -70 °C. In contrast, with a 94.1% efficacy rate, the Moderna vaccine maintains stability for six months and requires fewer storage conditions at -20 °C. The Oxford-AstraZeneca AZD1222 vaccine requires a stable vector and can be stored at typical refrigerator temperatures. Russia's Sputnik V vaccine employs a two-vector approach with a storage temperature of 2-8 °C. On the other hand, the Chinese-developed Sinopharm BBIBP-Cor-V and Sinovac CoronaVac vaccines are conventional inactivated vaccines. BBIBP-Cor-V showcases an efficacy of 79.3% and can be transported and refrigerated at 2-8 °C. While vaccination plays a significant role in disease mitigation, the effectiveness of individual vaccines varies across a spectrum (Rahman et al., 2021).

In Pakistan, free vaccines such as AstraZeneca, Sinopharm, and Moderna were available at public centers for the general public. Despite the positive efforts, challenges persisted, such as vaccine shortages, distribution hurdles, and storage complexities that frequently hindered public access to these vaccines (Junaidi, 2023). The administration of booster shots also faced variations in timing. National database and regulatory authority maintained records of vaccinated individuals, contributing to a comprehensive understanding of vaccination progress and impact in Pakistan. Even as COVID-19 vaccines are being administered, medical experts emphasize that essential preventive measures remain indispensable in curbing the disease's spread. Wearing masks, practicing social distancing, avoiding densely populated areas, and maintaining rigorous hand hygiene are vital strategies. These measures are crucial until medical science accomplishes widespread herd immunity across the global population (Junaidi, 2023). To investigate vaccine hesitancy, we included a research question (see section of research question).

COVID-19 Vaccination Hesitancy

COVID-19 vaccine reluctance is a worldwide issue, as evidenced by varying acceptance rates throughout regions and populations. This reluctance derives from historical difficulties such as trust in government and healthcare systems, access to information and education, and cultural and religious influences, all of which present significant challenges to public health efforts (Sallam et al., 2022).

According to Callaghan et al. (2020), as of June 2020, 31.1% of Americans were opposed to receiving the COVID-19 vaccine, with women, Blacks, and conservatives expressing particularly strong opposition. Similarly, Ruiz and Bell (2021) discovered lower acceptance rates, with 14.8% refusing and 23.0% undecided. Loomba et al. (2021)

found that by September 2020, only 54.1% and 42.5% of participants in the USA and the UK were willing to “definitely” take the immunization. Sallam’s (2021) detailed investigation revealed global disparities, including lower acceptance rates in Africa, the Middle East, Russia, and some European countries.

Bangladesh has a high level of vaccine fear, with reported rates of 32.5%. Male gender, old age, marital status, tobacco use, political affiliation, no history of physical sickness, and low income all contribute to this reluctance (Ali & Hossain, 2021). Notably, concerns about potential side effects, uncertainty about efficacy, and doubts about the vaccine’s Indian origin appear to be major reasons for rejection (Mahmud et al., 2021). In India, Chandani et al. (2021) found higher levels of reluctance across various races. Women are cautious at 38.0%, urban inhabitants at 40.0%, full-time or paid employees at 41.0%, and those with a university degree or above at 41.0%. Furthermore, 65.0% of people who voice vaccination concerns are apprehensive (Chandani et al., 2021). The study also revealed that people believing COVID-19 is not a serious disease are 66.0% less likely to acquire the vaccine. Furthermore, 37.0% of people without COVID-19 are suspicious of vaccines (Chandani et al., 2021).

Conspiracy theories assert that the COVID-19 virus was deliberately created to spread misinformation widely, exacerbating concerns about the safety and effectiveness of vaccinations. This has contributed to the proliferation of anti-vaccine sentiment (Muhammad et al., 2022). In this regard, Pakistan’s health authorities employed calculated communicative strategies for confidence-building in vaccination acceptance. The government also established immunization centers in rural and urban localities for free vaccines (Muhammad et al., 2022). Despite early resistance, the vaccination strategy finally convinced people to accept vaccination.

Theoretical Framework

Effective communication is crucial during any crisis, particularly in public health emergencies. This study employed Timothy Coombs’ crisis risk communication (CRC) theory, established in 1995, concentrating on ‘priming’ and ‘behavioral control.’ ‘Priming’ includes the media frequently debating a specific matter to persuade behavioral change, while ‘behavioral control’ refers to individuals familiarizing their actions based on new information (Conner, 2020; Eytayo et al., 2022; Zarocostas, 2020).

Based on the mentioned theory, we scrutinized the impact of social media during the COVID-19 pandemic on shaping people’s perceptions (priming) regarding life-threatening factors such as severity, immunity, and age. Furthermore, we investigated how individuals modified their behavioral patterns (control behavior) to adopt preventive measures in response to the media priming effect during the pandemic. Using CRC theory is crucial for our study because it helps us grasp how social media effectively shares information about risks. The following research questions and hypotheses provide a clear roadmap for us to investigate how social media influences people and to untangle the intricate link between the life-threatening nature of the COVID-19 pandemic and how individuals choose to take preventive measures.

H1. The impact of social media on individuals’ awareness of COVID-19 is anticipated to be greater when juxtaposed with the influence exerted by traditional media channels.

RQ1. What is the differential impact of media consumption, specifically examining social media and traditional media, on shaping audience awareness of COVID-19?

RQ2. What is the prevailing societal context influencing the adoption of protective measures against COVID-19 among the general public?

H2. There exists a positive correlation between the perceived helpfulness of social media usage and the propensity of individuals to adopt preventive measures against COVID-19.

H3. Adoption of preventive measures against COVID-19 is contingent upon a multifaceted interplay of factors, encompassing the perceived severity of the pandemic, individual perceptions of immunity, and age as significant determinants.

RQ3. To what degree did individuals exhibit hesitancy towards COVID-19 vaccination, considering factors such as concerns, attitudes, and perceptions influencing their decision-making process?

RQ4. To what extent did individuals’ express satisfaction with the government’s management of the COVID-19 situation in Pakistan, considering factors such as communication strategies, policy implementation, and public health outcomes?

METHOD

This quantitative research delves into the impact of social media on the adoption of preventive measures during the COVID-19 pandemic in Pakistan, with a specific emphasis on the threatening factors associated with COVID-19. The study employs Timothy Coombs’s CRC model as a framework to investigate the influence of social media exposure on individuals concerning information about the life-threatening risks posed by COVID-19 (priming). Additionally, the research explores how individuals adopted preventive measures (behavioral control) in response to information about the COVID-19 pandemic.

The study examines the information consumption habits of respondents regarding COVID-19 on social media during the pandemic. Additionally, the reliance on traditional media is considered for comparison and a broader context for understanding risk communication and adopting preventive behaviors throughout the pandemic. A stratified sampling technique was employed to gather data, and 363 respondents from the district of Rawalpindi participated in the study. This district was chosen due to its substantial population density, amounting to 5.406 million, according to the Pakistan Census of 2017. Notably, Rawalpindi experienced many positive COVID-19 cases during the study period in Pakistan, as documented by Noor (2022). The decision to focus on Rawalpindi was influenced by its proximity and convenience for data collection. The assumption was that social media users, particularly on Facebook, in Rawalpindi would have a higher frequency of COVID-19-related posts (Noor, 2022), contributing valuable insights into the local information scene during the pandemic.

Table 1. Characteristics of sample

| Variable | | n (%) |
|-----------|-------------------|------------|
| Gender | Male | 209 (56.9) |
| | Female | 154 (43.1) |
| Age | 25-30 | 135 (36.8) |
| | 31-35 | 108 (29.4) |
| | 36-40 | 53 (14.4) |
| | 41+ | 71 (19.0) |
| Education | 10-year education | 5 (1.4) |
| | 12-year education | 38 (10.4) |
| | 14-year education | 124 (33.8) |
| | 16-year education | 200 (54.5) |
| Income | Less than 50,000 | 182 (49.6) |
| | 51,000-100,000 | 89 (24.2) |
| | 101,000-150,000 | 36 (9.8) |
| | 150,001+ | 60 (16.3) |

Questionnaires & Survey Items

Media, sociology, psychology, and health experts validated our survey questionnaire, which was pre-tested for clarity and precision, and refined it based on expert and sample group feedback. Cultural sensitivity was a priority. Most questions used a 5-point Likert scale for attitudinal and behavioral concepts, with one as the lowest and five as the highest response. The questions items in the questionnaire were based on the following concepts.

Perceived Risk Factors

The survey questions explored different aspects of the risks associated with COVID-19, including how people see the seriousness of the pandemic, think about immunity, and consider their age. Drawing on Chiappelli's (2020) findings, we know that people take precautionary measures when they believe a serious health threat exists. Supporting this idea, studies by Shi et al. (2020) report that people are more likely to take preventive actions when aware of severe illness or reported fatalities from COVID-19. These results align with our research theory on 'CRC,' which guided our study. We included these specific risk factors in the survey to understand how people's perceptions of risk relate to their behaviors, especially in adopting preventive measures for COVID-19. Participants in our survey rated these factors on a 5-point Likert scale, where one meant the lowest rating, and five indicated the highest.

Preventive Measures

The survey included questions regarding individuals' adherence to measures to curb the spread of COVID-19. These preventive measures, as highlighted by WHO in 2020, include practices like social distancing, wearing masks, regular handwashing, sanitizing surfaces, adherence to general hygiene protocols, and the promotion of responsible coughing or sneezing habits, such as using the elbow or a disposable tissue.

Demographic Characteristics

The survey used demographic characteristics encompassing gender, age, income, and education. **Table 1** presents a comprehensive overview of the sample characteristics. Notably, a significant proportion of respondents fell within the 20-30 age bracket, predominantly identifying as male and possessing 16 years of education. Financially, the majority reported earning less than Pakistani Rupee 50,000 a month. The data further underscores that respondents

Table 2. Reliability report

| Variables | n | PR | FR |
|--------------------------------|----|------|------|
| Social media helpfulness | 4 | 0.65 | 0.71 |
| Adoption of preventive measure | 12 | 0.68 | 0.74 |
| Perceived severity | 3 | 0.72 | 0.76 |
| Weak immune | 2 | 0.71 | 0.73 |
| Age factor | 2 | 0.72 | 0.71 |
| Government's handling | 5 | 0.71 | 0.74 |
| Vaccination | 3 | 0.73 | 0.75 |

Note. n: Number of items; PR: Pilot reliability; & FR: Final reliability

predominantly relied on social media and television as their primary sources for COVID-19-related information.

Additional Question Items

Beyond the topics mentioned above, the questionnaire also incorporated inquiries about respondents' trust in government agencies regarding pandemic-related information, covering aspects such as food supply, restricted areas, testing, and vaccination centers. Participants were also asked about curative behaviors concerning the disease from both Islamic and scientific perspectives. The question regarding Islamic curative behaviors was posed about the prevalence of information on social media about the Islamic concept of pandemics and associated treatment procedures.

Reliability of Data

In **Table 2**, we used Cronbach's alpha to evaluate the questionnaire's internal consistency reliability, which included 34 major components but excluded demographic factors. The questionnaire, designed as a Likert scale with multiple-choice responses, was thoroughly tested to confirm its dependability. Before the full-scale dissemination, a pilot test was conducted with 30 conveniently selected Rawalpindi volunteers. During the pilot test, research indicated that two questions had Cronbach's alpha values lower than the allowed threshold of 0.7. Following this discovery, we actively adjusted and modified the questionnaire's quality. In the final form of the questionnaire, all items displayed internal consistency within the established criteria, with Cronbach's alpha scores ranging from 0.70 to 0.76. The finalized questionnaire has an average Cronbach's alpha of 0.73 (see **Table 2**). Notably, the changes made resulted in a significant improvement in the items' internal consistency. Shodiya and Adekunle (2022) recommend reliability ratings ranging from 0.70 to 0.85, citing this range as indicative of appropriate reliability for verifying the legitimacy of acquired data. As a result, the reliability scores reported in **Table 2**, with an average of 0.73, indicate high internal consistency across the survey items.

Overview of Analysis

To analyze the data for this study, we employed SPSS and applied both descriptive and inferential statistical methods to address the research questions and test the hypotheses. Primarily, we used descriptive statistics, including frequency and percentage distribution, and cross-tabulation on the variables to explain the overall trends in the phenomenon in the study sample. The inferential statistics we used were chi-square, t-test, ANOVA, Pearson correlation, regression, and path analysis tests to answer the research questions, test the hypotheses, and generalize the result on the study target population.

Table 3. Linear regression of media influence on COVID-19 awareness

| Variable | B | Standard error | Beta | t | Sig. |
|-------------------------|--------|----------------|--------|--------|------|
| Constant | 17.944 | 0.960 | | 18.689 | .000 |
| Influence of television | 0.240 | 0.349 | 0.039 | 0.687 | .492 |
| Influence of radio | 0.592 | 0.342 | -0.092 | 1.732 | .084 |
| Influence of newspapers | 0.587 | 0.340 | -0.091 | 1.728 | .085 |
| Influence of Facebook | 2.120 | 0.370 | 0.330 | 5.728 | .000 |

Note. Dependent variable: COVID-19 awareness; R=.424, R-square=.180; Adjusted R-square=.168; Standard error=5.758, F-value=15.458; p=.000; Sig.: Significance

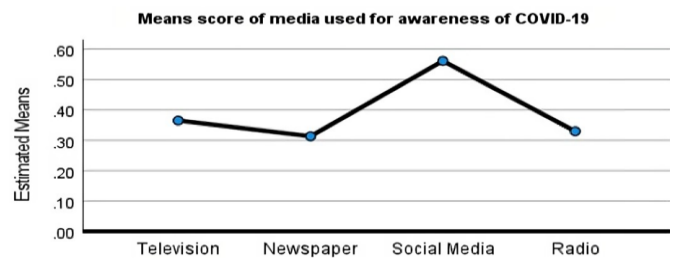


Figure 1. Public adherence to COVID-19 preventive measures (Source: Authors)

Table 4. Adoption of preventive measures for COVID-19 pandemic

| | Stay home | Avoid public gathering | Wash hands | Use mask & sanitizer | Social distancing | Avoid meeting risk groups | Total |
|----------------|-----------|------------------------|------------|----------------------|-------------------|---------------------------|-------|
| n | 266 | 257 | 256 | 302 | 243 | 208 | 1,532 |
| Percentage (%) | 17.4 | 15.9 | 16.7 | 19.7 | 16.8 | 13.6 | 100 |

Table 5. Relationship between social media helpfulness & adoption of COVID-19 preventive measures

| | Mean | Standard deviation | 1 | 2 | 3 | 4 | 5 | 6 |
|------------------------------|-------|--------------------|--------|--------|--------|--------|--------|--------|
| 1. Social media helpfulness | 1.44 | .51875 | | | | | | |
| 2. Avoid meeting risk groups | .7248 | .44723 | .044 | | | | | |
| 3. Regularly wash hands | .7003 | .45876 | .146** | .289** | | | | |
| 4. Avoid public gathering | .6975 | .45995 | .073 | .232** | .398** | | | |
| 5. Use of masks | .8229 | .38228 | .135** | .178** | .382** | .440** | | |
| 6. Social distancing | .6621 | .47363 | .122** | .282** | .476** | .483** | .408** | |
| 7. Stay home | .5668 | .49620 | .152** | .286** | .532* | .430** | .415** | .515** |

RESULTS

This study involves a comprehensive analysis of the hypotheses and the research questions, employing a combination of descriptive and inferential statistics.

H1. The impact of social media on individuals' awareness of COVID-19 is anticipated to be greater when juxtaposed with the influence exerted by traditional media channels.

Table 3 shows the analysis of the linear regression results supporting the hypothesis that the impact of social media on audience awareness of COVID-19 will be greater than that of traditional media. The overall model demonstrates statistical significance (F=15.458, p=.000), signifying a substantial relationship. The model accounts for 18.0% of the variance in audience awareness (R-square=.180). Social media influence (B=2.120, p=.000) was significant for audience awareness. In contrast, traditional media platforms such as television, radio, and newspapers did not significantly influence audience awareness. These findings increase our understanding of the dynamic media landscape and the diverse impact of different platforms on public health communication. In crisis risk health communication, social media emerges as a more potent influencer than traditional media due to its speed and ready availability.

RQ1. What is the differential impact of media consumption, specifically examining social media and traditional media, on shaping audience awareness of COVID-19?

Figure 1 answers question 1 in support of **H1** and examines audience exposure to various media platforms during the COVID-19 pandemic.

The data reveals a noteworthy disparity in mean scores among different media platforms. Specifically, the mean score for social media (0.5613) stands out significantly higher than those for other platforms,

including television (0.3651), radio (0.3297), and newspapers (0.2262). The statistical analysis, employing the repeat ANOVA test, underscores the robustness of these observed differences. The obtained F-value of 35.684, coupled with a p-value less than 0.000, attests to the statistical significance of the disparities in audience exposure across diverse media channels.

RQ2. What is the prevailing societal context influencing the adoption of protective measures against COVID-19 among the general public?

Table 4 provides insights into the public adherence to various COVID-19 preventive measures. As evident from **Table 4**, 19.7% of respondents used masks and sanitizers, 17.4% reported staying home as a preventive measure, 16.8% maintained social distances, 16.7% adhered to regular handwashing, 15.9% avoided public gatherings to mitigate the risk of contracting the virus, and 13.6% showed the least concern by not avoiding meetings with high-risk groups.

In summary, **Table 4** reveals the overall adoption of COVID-19 preventive measures, highlighting masks and sanitizers as the most common at 19.7% and avoiding meetings with high-risk groups as the least reported at 13.6%.

H2. There exists a positive correlation between the perceived helpfulness of social media usage and the propensity of individuals to adopt preventive measures against COVID-19.

Table 5 presents the correlations between individuals' perceptions of social media helpfulness and their engagement in COVID-19 preventive measures. Beyond avoiding gatherings involving risk groups, social media exhibits a positive and significant influence on adopting various preventive measures against COVID-19. This suggests a widespread adoption of multiple behaviors among those who perceive social media as helpful.

Table 6. Multiple regression of influence risk factors & adoption of preventive behaviors

| Model | B | SE | Beta | t-value | Sig. |
|--------------------|----------------|------|------|---------|------|
| Constant | 3.422 | .132 | | 25.864 | .000 |
| Perceived severity | .313 | .105 | .156 | 2.974 | .003 |
| Week immune | .281 | .113 | .131 | 2.489 | .013 |
| Age factor | .094 | .039 | .122 | 2.397 | .017 |
| R | .256 | .065 | | | |
| R ² | .065 | | | | |
| F-value | 8.460 & p<.000 | | | | |

Note. Dependent variable: Adoption of preventive measures against COVID-19 & SE: Standard error

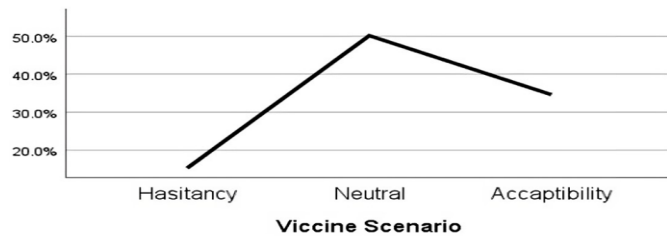


Figure 2. Vaccine hesitancy & acceptability scenario in Pakistan (Source: Authors)

Effect of Risk Factors & Adopting Behavior

H3. Adoption of preventive measures against COVID-19 is contingent upon a multifaceted interplay of factors, encompassing the perceived severity of the pandemic, individual perceptions of immunity, and age as significant determinants.

In **Table 6**, we present the results of a regression analysis examining the impact of COVID-19 risk factors, namely severity, immunity, and age, on individuals' adoption of preventive measures within society. **Table 6** reveals that the overall model is statistically significant (p<.000), indicating a meaningful relationship. Collectively, the predictors—severity, weak immunity, and age—account for 6.5% of the variance in the dependent variable. Each predictor demonstrates a statistically significant relationship with the dependent variable (p<0.05). The coefficients (B) signify the change in the dependent variable associated with a one-unit change in the respective predictor, while Beta represents the standardized coefficients. Despite these factors' statistical significance, the model's overall explanatory power remains modest at 6.5%. Other unexplored factors may also play a role in influencing preventive behaviors.

Vaccination landscape in Pakistan

RQ3. To what degree did individuals exhibit hesitancy towards COVID-19 vaccination, considering factors such as concerns, attitudes, and perceptions influencing their decision-making process?

Figure 2 illustrates the prevailing sentiments regarding vaccination in Pakistan. Notably, a predominantly positive attitude is observed among the populace, outweighing negative sentiments. This positive inclination is crucial for understanding the overall acceptability of vaccines in the country. A statistical validation through the chi-square test reinforces this observation, revealing a substantial association between positive attitudes and vaccine believability among the respondents. The test yielded a chi-square value of 67.232 with a significance level (p-value) less than 0.001.

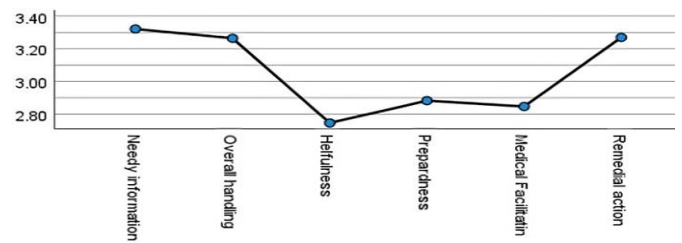


Figure 3. Government handling of pandemic (Source: Authors)

Government Handling of the Pandemic

RQ4. To what extent did individuals express satisfaction with the government's management of the COVID-19 situation in Pakistan, considering factors such as communication strategies, policy implementation, and public health outcomes?

Figure 3 depicts respondents' confidence in the government's handling of the pandemic situation in Pakistan. Notably, there is widespread satisfaction among the populace regarding the government's communication of essential information, implementation of remedial actions, and overall handling of the pandemic. However, it is crucial to highlight that despite the general satisfaction, the mean score for the government's assistance in solving people's difficulties in food, shelter, and providing treatment was relatively low. This indicates respondents' potential concern or dissatisfaction regarding the government's response to the pandemic. The ANOVA test results confirm a statistically significant association between the government's provision of essential information during the COVID-19 pandemic and the public's overall trust in this information. The high F-statistic of 5198.703, with a p-value less than 0.000, underlines the robustness and reliability of government-provided information.

DISCUSSION

Social Media Effect on COVID-19 Pandemic

This study underlines the influence of media on public response to the COVID-19 pandemic in Pakistan, highlighting a notable shift in audience preference towards social media over traditional mediums like television, radio, and newspapers. This transition can be attributed to the dynamic nature, diversity, and easy accessibility of social media, which strongly influence audience awareness and its relation with adherence to protective measures during the pandemic. Similarly, results found in the previous studies research of Aziz et al. (2022), Gozzi et al. (2020), Cinelli (2020), and Medina-Jimenez et al. (2022).

CRC theory, affixed in priming and behavioral control principles, demonstrated effectiveness in this study, as COVID-19 triggered a global health emergency that also affected Pakistan badly. The swiftness and immediacy of social media dissemination and its easy accessibility facilitated the individual during the COVID-19 pandemic have an impact on individuals' preventive behaviors. The importance of these findings extends to the potential for effectively leveraging social media in public health campaigns to promote and reinforce preventive behaviors during health crises.

The selected theoretical framework for this study aligns with the context of the COVID-19 pandemic. The swift dissemination and easy

accessibility of crisis-related health information on social media have significantly impacted individuals' preventive behaviors in response to the pandemic. The significance of these insights lies in the potential for effective use of social media for public health campaigns in reassuring preventive behaviors during health crises.

Adherence to COVID-19 Preventive Measures in Pakistan

The study investigation of adherence to COVID-19 preventive measures reveals positive and negative aspects. The positive trend shows that a wide-range observation indicates a commitment to preventive measures. One positive tendency is the prevalent recognition of the importance of using masks and sanitizers as main preventive measures, reflecting a shared understanding of preventive measures in safeguarding against the virus. However, some grave areas underscore the influence of cultural factors in adherence to preventive measures. The noticeable challenge is a low preventive priority of avoiding contact with people, particularly those in high-risk groups.

Pakistani society is closely associated with regular religious congregations' cultural and social bonds and exceptional workplace dynamics, significantly determining these adherence patterns. During the pandemic, there were media reports that individuals continued to attend religious events such as Eid and Ramazan and pray regularly in the mosques. These cultural and religious practices signal a crucial need for policy formulation to ensure public safety.

Moreover, discrepancies in adopting preventive behaviors were evident, especially among laborers and low-paid workers who consistently reported to the workplace during the pandemic. Their relatively lower adherence to preventive measures underlines the influence of socioeconomic factors, requiring a more insight and context-specific approach to future health crises.

To tackle these challenges and promote widespread adherence to the strategy, there is a need for comprehensive social and educational campaigns. These initiatives should particularly engage religious leaders, leveraging their influence to enhance awareness and compliance. Developing a strategic plan for workplace improvements is essential to better address and rectify issues during future health crises akin to the challenges posed by the COVID-19 pandemic.

Vaccination Scenario in Pakistan

The positive than negative attitude toward vaccine acceptance among Pakistanis is aligned with the acceptance rates in Ecuador, Malaysia, Indonesia, and China (97.0%), (94.3%), (93.3%), and (91.3%), respectively, as reported by Sallam et al. (2022). This widespread acceptance of vaccine attitudes in Pakistan encourages progressing public health initiatives in mitigating the spread of the COVID-19 pandemic. The effective social media campaign about the severity of the pandemic contributed to the positive vaccine acceptability.

Risk Factors & Adoption of Preventive Measures

Our path analysis confirmed the positive effect of the awareness of risk factors on adherence to preventive action against the COVID-19 pandemic. The support of hypotheses explains the effective use of social media in elaborating the risk factors related to COVID-19 in shaping individuals' commitment to preventive measures. The results are consistent with the previous research that individuals are more persuaded to take protective actions when perceiving the health threat as severe (Bish & Michie, 2010; Kopel et al., 2020; Shi et al., 2020).

Government Pandemic Response: Navigating Approval & Gaps

The government of Pakistan's handling of the pandemic encouraged. People generally showed a positive attitude toward the government's preparation for COVID-19. However, grave areas such as food supply, shelter, and healthcare raise concerns, causing public dissatisfaction. Policymakers in developing countries need to concentrate more on treating adjustments for impending health crises.

CONCLUSIONS

This study investigates Pakistan's response to the COVID-19 pandemic, emphasizing social media's pivotal role in shaping public behavior. The shift from traditional to social media is evident, highlighting its influence and user-friendly nature. Positive correlations exist between perceived social media helpfulness and the adoption of preventive measures. Despite cultural and socioeconomic challenges, encouraging adherence to preventive measures is observed. Favorable attitudes toward vaccination align with international acceptance rates, emphasizing effective communication strategies. The study contributes to CRC theory, exploring social media's impact on cognitive processes and behavior regulation in Pakistan's sociocultural context. Positive public sentiment towards preventive behaviors contrasts challenges in avoiding gatherings. The study reveals widespread acceptance of COVID-19 vaccination, supporting effective health efforts. While the government's pandemic management garners overall positive sentiment, concerns persist in essential areas. The multifaceted analysis advocates adaptive strategies, leveraging social media, addressing cultural nuances, and ensuring comprehensive public health and safety crisis management. These insights guide future communication strategies and crisis management, offering a holistic perspective on CRC.

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Ethics declaration: The authors declared that the study received approval from the Ethical Committee of Bahria University, Islamabad, on 10 December 2023 with approval code: 24356-2024. The authors further declared that the study does not involve patients' data or other sensitive issues. The data was obtained from the general public during the COVID-19 pandemic, mostly comprising demographic variables, adopting protective measures against the COVID-19 pandemic, assessing the effectiveness of social media use during the pandemic, and adaptive behaviors. However, consent was obtained for data gathering along with the questionnaire.

Declaration of interest: The authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

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