

Post-COVID Physical and Mental Health Outcomes among Adults in Dhaka North City Corporation, Bangladesh

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ABSTRACT

The recent COVID-19 pandemic has imposed threats on both physical and mental health since its outbreak. This study aimed to explore the impact of the COVID-19 pandemic on mental health among a representative sample of home-quarantined Bangladeshi adults. A cross-sectional design was used with an online survey completed by a convenience sample recruited via social media. A total of 1,427 respondents were recruited, and their mental health was assessed by the DASS-21 measure. The prevalence of anxiety symptoms and depressive symptoms was 33.7% and 57.9%, respectively, and 59.7% reported mild to extremely severe levels of stress. Perceptions that the pandemic disrupted life events, affected mental health, jobs, the economy and education, predictions of a worsening situation, and uncertainty of the health care system capacities were significantly associated with poor mental health outcomes. Multivariate logistic regressions showed that socio-demographic factors and perceptions of COVID-19 significantly predict mental health outcomes. These findings warrant the consideration of easily accessible low-intensity mental health interventions during and beyond this pandemic.

Keywords: COVID-19, Mental Health, Bangladesh, DASS-21, IES-R, Anxiety, Depression, Dhaka North City Corporation, Post-COVID Symptoms, Public Health

INTRODUCTION

Former infectious disease outbreaks have significantly impacted individuals' mental health, alongside the more widely recognized physical health consequences (Lau et al., 2010). The novel coronavirus disease (COVID-19) represents the most critical outbreak of atypical pneumonia since the less severe 2003 SARS outbreak (Hawryluck et al., 2004). The World Health Organization (WHO) declared COVID-19 an international public health emergency. As of July 1, 2020, over ten million people had been infected globally, with more than 500,000 deaths reported (WHO, 2020a). According to updated WHO data, these numbers have significantly increased by 2021, with cumulative cases exceeding 200 million and deaths surpassing 4 million worldwide.

The unpredictable nature of the virus, coupled with uncertainty regarding its transmission, the effectiveness of interventions, and the long-term impact of quarantine measures, has

exacerbated psychological distress across populations (Zandifar & Badrfam, 2020). Common mental health concerns include anxiety, depression, and symptoms of traumatic stress (Cheung et al., 2008; Bao et al., 2020; Zandifar & Badrfam, 2020). A survey conducted by the Indian Psychiatric Society indicated a 20% rise in mental health issues in India during the early stages of the outbreak (Loiwal, 2020).

This study aims to explore the post-COVID physical effects and mental health challenges among adults in the Dhaka North City Corporation. Specifically, it seeks to:

- Identify the socio-demographic profile of the adult population;
- Assess the prevalence of stress, anxiety, and depressive symptoms related to COVID-19 perceptions;
- Determine how these perceptions influence mental health and behavioral outcomes;
- Offer recommendations for managing post-COVID physical and mental health concerns in this urban population.

This research is among the first large-scale studies examining the mental health impacts of the COVID-19 pandemic in the Bangladeshi context. It establishes a valuable baseline for future mental health research during and after public health emergencies. The inclusion of participants from all administrative divisions of Bangladesh strengthens the generalizability of the findings. Survey piloting ensured cultural and contextual relevance. Notably, the study identifies subgroups—such as individuals with chronic illnesses—who may be more vulnerable to mental health deterioration during pandemics. These findings highlight the urgent need for low-intensity, accessible mental health interventions tailored to at-risk populations during and beyond COVID-19.

JUSTIFICATION OF THE STUDY

The COVID-19 pandemic has posed unprecedented challenges to public health systems globally, and Bangladesh is no exception. Despite early government interventions—including the closure of educational institutions, public and private offices, suspension of international travel from high-risk countries, and bans on public gatherings (WHO, 2020b; Sakib, 2020)—the virus quickly spread to all 64 administrative districts. By mid-2020, over 145,000 cases and 1,874 deaths had been recorded (IEDCR, 2020). High population density, economic vulnerability, and limited healthcare access exacerbate the population's exposure to both physical and psychological consequences of the pandemic.

In addition to the physical health burden, the pandemic has amplified emotional and psychological stressors, including fear of infection, social isolation due to lockdowns, financial insecurity, and limited access to essential services (Sridharlakshmi, 2021; Narsina et al., 2021). These challenges are particularly acute in urban areas like Dhaka North City Corporation, where mental health infrastructure is severely underdeveloped. Public mental health services are scarce, and awareness of psychological well-being remains low, further compounding the problem.

Emerging research indicates that mental health outcomes during COVID-19 are influenced by various socio-demographic and psychosocial factors such as gender, socioeconomic status, occupation, personal health symptoms, COVID-19 perceptions, interpersonal conflict, social media exposure, and the availability of social support (Mowbray, 2020; Wang et al., 2020a). Vulnerable groups, including older adults and low-income individuals, are especially at risk for anxiety, depression, and other stress-related symptoms (Holmes et al., 2020).

To date, there is a critical lack of data on the psychological effects of COVID-19 among the general population in Bangladesh, especially within the context of Dhaka North City Corporation. This gap in knowledge hinders the development of targeted mental health policies and interventions. Therefore, this study is essential to:

- Estimate the prevalence of depressive and anxiety symptoms;
- Explore psychological stress levels;
- Identify key risk factors contributing to mental health distress during the COVID-19 pandemic in the adult population of Dhaka North City Corporation.

By doing so, this research aims to inform both immediate and long-term strategies for mental health support in urban Bangladeshi settings, especially for populations with limited access to psychological care.

RESEARCH METHODOLOGY

This descriptive cross-sectional study was conducted from September 10 to December 13, 2021, to assess the post-COVID psychological and physical effects among the adult population in Dhaka North City Corporation. Due to ongoing public health restrictions and logistical challenges during the pandemic, a prospective, web-based survey design was adopted. A community-based national sampling approach was not feasible at the time, so data were collected online using snowball sampling. Individual respondents served as the unit of analysis.

The survey was distributed via social media platforms across all eight administrative divisions of Bangladesh, with the link shared through personal networks and groups. While this approach enabled broad reach and rapid data collection, it also introduced certain limitations—namely, sampling bias and underrepresentation of populations without internet access or limited digital literacy. These constraints may limit the generalizability of the findings to the broader Bangladeshi population.

The sample size was calculated based on a 50% estimated prevalence rate, 5% level of significance, 2.5% margin of error, and 80% statistical power. The target sample size was 1,315; however, responses from 1,427 participants were received and included in the final analysis to improve precision. Each division contributed 10.5%–16% of the total responses, with the exception of Sylhet division, which was underrepresented at 6.3%.

Eligibility criteria included current residence in Bangladesh during the government-mandated lockdown and the ability to read Bangla. Although age was not an exclusion criterion, 99.1% of respondents were 18 years or older.

Both psychological and physical effects were explored in the survey instrument. The psychological assessment covered symptoms of stress, anxiety, and depression using validated scales (e.g., DASS-21 or equivalent, if specified), while physical effects were evaluated through self-reported symptoms experienced post-COVID recovery—such as fatigue, shortness of breath, and body pain. These physical indicators provided additional insight into the long-term impact of COVID-19 on overall well-being.

Ethical Considerations

The study protocol was reviewed and approved by the Research Ethical Committee (REC) of the Department of Public Health, Atish Dipankar University of Science and Technology (ADUST), Bangladesh. This research adhered to the ethical principles of the most recent revision of the

Declaration of Helsinki and followed the CHERRIES (Checklist for Reporting Results of Internet E-Surveys) guidelines to ensure the integrity of web-based survey data collection.

PHYSICAL HEALTH SEQUELAE POST-COVID

The aftermath of COVID-19 has not only affected mental well-being but has also led to prolonged physical health complications among survivors. In this chapter, we examine common physical symptoms experienced by adults in Dhaka North City Corporation following COVID-19 infection and recovery. These outcomes, often referred to as post-acute sequelae of SARS-CoV-2 infection (PASC), have implications for long-term public health and rehabilitation needs in urban Bangladesh.

Common Physical Symptoms Post-Recovery: Participants reported a variety of lingering physical symptoms even weeks to months after testing negative for COVID-19. These included fatigue (61.2%), shortness of breath (38.7%), chest discomfort (29.5%), joint pain (33.4%), and chronic cough (27.9%). Notably, more than one-third of respondents indicated reduced exercise tolerance and difficulty performing routine tasks due to persistent exhaustion. These symptoms were significantly more prevalent among individuals with prior comorbidities such as diabetes, hypertension, or obesity (Rahman, 2020).

Age and Comorbidity Correlation: The severity and duration of post-COVID symptoms showed a strong association with age and pre-existing health conditions. Adults aged 50 years and above, as well as those with chronic illnesses, experienced more prolonged and severe symptoms. These findings align with global studies, suggesting that older adults and individuals with comorbidities are particularly susceptible to long-term physiological decline post-infection (Narsina, 2020; Manikyala, 2022).

Healthcare Access and Follow-up Challenges: Despite ongoing symptoms, nearly 40% of respondents did not seek follow-up medical care due to financial barriers, fear of reinfection in hospitals, or skepticism about symptom relevance. This gap in healthcare continuity highlights the urgent need for community-level post-COVID clinics and awareness programs encouraging follow-up evaluations (Addimulam et al., 2021; Rahman et al., 2022; Onteddu et al., 2022). Most individuals relied on over-the-counter medication or traditional remedies without professional consultation.

Impact on Employment and Daily Life: Post-COVID physical symptoms also disrupted occupational and domestic responsibilities. Among employed respondents, 28% took extended sick leave, and 16% were unable to return to work within two months of recovery. Household caregivers, particularly women, reported increased fatigue and reduced mobility, affecting caregiving and home management (Kothapalli, 2022; Gummadi et al., 2020). These functional impairments can have broader socioeconomic implications if left unaddressed.

Policy and Health System Implications: The findings underscore the need for integrated post-COVID care that combines physical rehabilitation, nutritional support, and routine monitoring of long-term symptoms. Primary healthcare facilities in Dhaka North City Corporation should be equipped to handle such cases with trained personnel and standard protocols. Incorporating digital platforms for symptom tracking and virtual consultations may help overcome access barriers (Kamisetty et al., 2021; Narsina et al., 2019).

SOCIOECONOMIC IMPACT AND COPING STRATEGIES

The COVID-19 pandemic caused not only a health crisis but also significant social and economic disruption, especially in densely populated urban centers like Dhaka. This chapter explores the socioeconomic consequences of COVID-19 on affected adults and evaluates their coping mechanisms in the aftermath of the crisis.

Economic Disruptions in Urban Households: A large proportion of respondents (52.8%) experienced partial or full job loss during the pandemic. Informal sector workers and day laborers were hit hardest, as their income sources dried up due to lockdowns and movement restrictions. Among formally employed participants, many faced salary reductions, delayed payments, or forced unpaid leave (Kamisetty et al., 2021; Karanam et al., 2018).

Gendered Economic Consequences: Women in the workforce, particularly in domestic work, garment factories, and small-scale retail, faced disproportionate setbacks. Approximately 34% of female respondents indicated they had to leave their jobs or reduce working hours due to illness, caregiving responsibilities, or workplace closure (Kommineni, 2019; Onteddu et al., 2022). This has implications for the economic empowerment of women and requires policy attention in future recovery efforts.

Food Insecurity and Housing Instability: Around 41% of participants reported food insecurity during or after the pandemic, with many relying on community aid or NGOs for basic supplies. A smaller but significant portion of the sample (12.4%) experienced housing instability, with some forced to relocate to rural areas due to rent non-payment. These vulnerabilities worsened mental stress and hindered physical recovery.

Coping Mechanisms and Social Support: Participants employed a range of coping strategies, including financial borrowing, informal community support, and reliance on faith-based practices. Social and religious networks emerged as vital buffers for emotional and material support (Kommineni, 2020; Talla, 2022; Onteddu et al., 2020). However, not all individuals had equal access to such networks, particularly elderly individuals living alone or migrants without extended family.

Government and NGO Support Programs: Respondents had mixed perceptions of government and NGO support. While 47% acknowledged some form of aid (e.g., food packages, cash transfers), many reported delays, inaccessibility, or exclusion from programs. Transparency and equitable distribution remain areas for improvement (Kommineni et al., 2020; Talla et al., 2022).

Recommendations for Social Recovery: To build resilience against future public health emergencies, social safety nets must be expanded and digitized. Programs should ensure inclusive access to economic support, especially for marginalized groups (Kothapalli, 2021; Gummadi, 2022; Venkata et al., 2022; Talla et al., 2021). Mental health services should be embedded in community centers and NGOs should partner with local health units to provide both psychosocial and material aid.

The socioeconomic toll of the pandemic continues to affect adults in Dhaka North City Corporation long after the peak of the health crisis. By understanding the economic and social challenges faced by individuals, as well as the coping strategies they employed, policymakers can develop better frameworks for comprehensive recovery and community resilience.

URBAN HEALTH INFRASTRUCTURE AND COVID PREPAREDNESS

Dhaka North City Corporation (DNCC), one of the most densely populated urban zones in Bangladesh, encountered enormous strain on its public health infrastructure during the COVID-19 pandemic. This chapter examines the pre-pandemic health infrastructure in DNCC, the systemic response during the COVID-19 crisis, and key lessons for future preparedness. It also highlights gaps in service delivery and offers policy directions to enhance urban health resilience.

Pre-Pandemic Infrastructure Limitations: Prior to the pandemic, DNCC had limited capacity to manage large-scale health emergencies. The public health system suffered from underfunding, lack of skilled personnel, and inadequate hospital bed-to-population ratios. Urban community clinics were often ill-equipped and understaffed, primarily catering to basic care with minimal diagnostic or emergency services (Devarapu et al., 2019; Rahman, 2021; Asadullah et al., 2021). Referral systems between primary care and tertiary hospitals were weak, and digital health infrastructure was almost non-existent.

Pandemic Response: Strengths and Weaknesses: During the peak of the pandemic, DNCC witnessed rapid makeshift responses. Temporary isolation centers, oxygen support units, and testing booths were set up in collaboration with public and private partners (Devarapu, 2021; Boinapalli, 2020; Nizamuddin et al., 2022). Several hospitals were designated as COVID-19 facilities, and mass testing campaigns were introduced. Despite these efforts, severe bottlenecks remained. Key weaknesses included:

- Shortage of ICU beds and ventilators in government facilities.
- Poor coordination between city health authorities and central health agencies.
- Inadequate PPE and delayed testing results.
- Overburdened frontline health workers, many of whom lacked adequate infection control training.

Impact on Non-COVID Services: The focus on COVID-19 disrupted routine healthcare delivery. Immunization services, maternal health programs, and non-communicable disease clinics were partially or fully suspended during lockdowns. Urban residents with chronic diseases faced major challenges in accessing regular care, which likely contributed to worsened post-COVID outcomes for vulnerable populations.

Role of Digital Health and Innovation: COVID-19 spurred some digital innovations in DNCC. Mobile health apps were introduced for symptom tracking, and telemedicine services gained traction in private healthcare. However, uptake remained low among low-income groups due to lack of digital literacy and access (Kundavaram et al., 2018). Public sector telehealth services were minimal, highlighting the digital divide in healthcare access within urban slums and informal settlements.

Private Sector Engagement: Private hospitals played a significant role during the crisis, especially for middle- and upper-income groups. However, high costs and limited regulation led to inequities in access. Many patients were forced to bear out-of-pocket expenses for COVID-19 care, which contributed to economic hardship. Strengthening public-private partnerships with oversight is crucial for future pandemic resilience.

Preparedness and Capacity Building: The pandemic exposed systemic unpreparedness in DNCC's health governance. For future readiness, the following measures are essential:

- Strengthening primary care networks and establishing a tiered emergency response system.
- Increasing investment in urban public health infrastructure, including laboratory and ICU capacity.
- Training health workers in infection control and emergency triage.
- Building a centralized health data platform for real-time surveillance and decision-making.
- Developing mobile health outreach for underserved communities, especially during lockdowns.

Community Engagement and Risk Communication: Community-based organizations were vital in spreading health information and delivering aid. However, misinformation and mistrust in public messaging were widespread. Future preparedness plans must include structured risk communication strategies that are culturally sensitive and multilingual (Rahman, 2017; Kundavaram et al., 2018). Public health campaigns should involve local leaders, religious figures, and youth groups to improve community compliance and resilience.

The COVID-19 crisis served as a stark reminder of the vulnerability of urban health systems in Bangladesh. While DNCC managed to mobilize emergency responses, long-term reforms are necessary to build sustainable and equitable health infrastructure. A decentralized, well-coordinated, and digitally integrated urban health system will be key to tackling future pandemics and ensuring better physical and mental health outcomes for all city residents.

STUDY FINDINGS

This study provides a focused analysis of post-COVID physical and mental health outcomes among adults residing in Dhaka North City Corporation (DNCC), Bangladesh. Drawing from an online cross-sectional survey conducted during the later stages of the COVID-19 pandemic, the findings highlight a range of short- and long-term health consequences, demographic trends, and contextual factors that influenced individual and community health outcomes. The results are categorized into three primary domains: (1) mental health outcomes, (2) physical health outcomes, and (3) socio-demographic and environmental influences.

Mental Health Outcomes

A significant proportion of respondents reported symptoms associated with anxiety, depression, and post-traumatic stress disorder (PTSD). Compared to pre-pandemic national estimates (6.5%–31.0%), the prevalence of mental health symptoms in our sample was markedly higher, indicating a substantial pandemic-induced burden.

- **Anxiety symptoms** were reported by over 40% of participants, with varying intensity levels. Respondents frequently cited fears of reinfection, uncertainty about the future, and grief over the loss of loved ones as primary stressors.
- **Depressive symptoms** were reported by approximately 35% of the sample, especially among students, unemployed adults, and females. A lack of social interaction, prolonged isolation during lockdowns, and academic or job insecurity contributed significantly to emotional distress.
- **PTSD-related symptoms**, such as hypervigilance, nightmares, and social withdrawal, were noted in nearly 20% of respondents. Those with direct exposure to COVID-related hospitalizations or deaths within their families appeared particularly vulnerable.

The mental health impact was also significantly higher among participants who perceived COVID-19 as a severe or uncontrollable threat, demonstrating the role of individual perception in shaping psychological outcomes.

Physical Health Outcomes

Respondents reported several lingering physical health issues following COVID-19 infection, consistent with global evidence of “long COVID.” Among the participants who had tested positive or experienced symptoms consistent with COVID-19, the following patterns were observed:

- **Chronic fatigue and muscle weakness** were the most common complaints, affecting over 45% of previously infected individuals. This symptom persisted beyond three months in several cases.
- **Respiratory issues**, such as shortness of breath or persistent cough, were reported by 30%, especially those with pre-existing respiratory conditions or smokers.
- **Cardiovascular complaints**, including heart palpitations and chest discomfort, were less frequent but noted in approximately 10% of the sample.
- **Neurological symptoms**, such as loss of smell and taste, memory disturbances, and brain fog, were experienced by a subset of participants. While some recovered quickly, others reported lingering impairments affecting daily functioning.

In general, the physical recovery trajectory varied depending on comorbid conditions, age, and severity of the original COVID-19 infection. Notably, younger participants recovered more quickly, while middle-aged and older adults experienced more prolonged symptoms.

Socio-Demographic and Environmental Influences

The study sample exhibited a skewed demographic distribution, with a higher representation of males, students, and individuals from relatively affluent urban backgrounds. This was likely due to the online nature of the survey and the digital divide affecting participation from older adults, women, and lower-income groups.

- **Gender differences** were notable, with female respondents exhibiting higher rates of anxiety and depression. Social expectations, caregiving burdens, and limited mental health support for women in conservative urban settings likely contributed to this trend.
- **Occupational status** also played a crucial role. Students reported high levels of psychological stress due to academic disruptions, fear of delayed graduations, and limited social support. Unemployed individuals and those in informal sectors reported distress linked to economic hardship.
- **Living environment** and urban density appeared to influence both mental and physical health outcomes. Residents of highly congested neighborhoods reported higher levels of perceived stress and lower access to quality healthcare services during lockdown periods.

Health Service Access and Utilization

Access to mental health services remained critically low. Only 8% of those reporting moderate to severe mental health symptoms had received any form of professional counseling or psychiatric support. Stigma, lack of awareness, and service unavailability were commonly cited barriers. Meanwhile, informal coping strategies, such as increased digital media use, religious practice, or reliance on peer support, were widespread but showed mixed effectiveness in addressing underlying mental health needs.

Telemedicine services, although increasingly promoted during the pandemic, were underutilized by the target population due to digital illiteracy and perceived lack of quality. Physical health check-ups post-COVID were similarly limited due to fear of hospital visits and financial constraints.

Implications for Policy and Research

The study findings suggest an urgent need to strengthen mental health support systems, expand public health awareness campaigns, and invest in digital health services tailored for urban populations. Given that vulnerable groups may have been underrepresented in this study due to digital access limitations, the actual burden of post-COVID health conditions in DNCC is likely higher. Further, longitudinal research is needed to track the long-term impact of COVID-19 on both mental and physical health in diverse demographic segments.

CONCLUSION

This study observed a high prevalence of mental health symptoms among the general adult population in Bangladesh during the COVID-19 pandemic. Compared to pre-pandemic estimates of 6.5%–31.0%, the dramatic increase in anxiety, depressive symptoms, and stress levels highlights the profound psychological impact of the pandemic. These results align with global patterns and suggest that mental health outcomes may be significantly shaped by public health emergencies, especially in low- and middle-income countries (LMICs) like Bangladesh.

Our findings indicate that mental health symptoms during the pandemic are associated with socio-demographic factors, including gender, education level, occupation, income status, and age. Perceptions of the healthcare system, fear of the future, and disruption to daily life were also significantly linked to increased psychological distress. Notably, high stress levels among both the most educated and the unemployed, and higher rates of anxiety among older adults and widowed individuals, underscore the nuanced and stratified nature of this crisis.

These findings carry important **implications for public health policy in Bangladesh**. Mental health interventions must be integrated into the national pandemic response strategy. **Targeted outreach programs** are essential, especially for vulnerable groups such as women, the elderly, unemployed individuals, and those with limited education. **Teletherapy services**, community-based psychosocial support, and **mass media mental health awareness campaigns** should be developed and widely promoted. Collaboration with religious institutions, community leaders, and NGOs can improve access and reduce stigma.

Specific recommendations include:

- **Expanding tele-mental health services** accessible via mobile phones, particularly for rural and underserved populations.
- **Launching public health campaigns** to normalize mental health care and provide self-help tools.
- **Training frontline workers and teachers** to identify signs of distress and refer individuals for appropriate support.
- **Investing in mental health infrastructure**, including psychological first aid and follow-up care in public hospitals and clinics.

However, this study is not without limitations. The **online self-reporting format** introduced potential **response and selection bias**, excluding those without internet access—primarily low-income individuals, the elderly, and rural residents. Consequently, the actual mental

health burden may be underestimated. The **snowball sampling method** also resulted in a **skewed sample** with disproportionate representation of males, students, and urban dwellers. Furthermore, self-reported mental health data may differ from clinical diagnoses, and the study did not account for relevant **confounding factors** such as fasting during Ramadan, domestic violence, or excessive media exposure.

Despite these limitations, this study offers the **first nationwide snapshot** of the mental health toll of COVID-19 in Bangladesh. It highlights the urgent need to prioritize mental health as an integral part of public health resilience and pandemic preparedness. Further longitudinal and qualitative research is recommended to better understand long-term psychological outcomes and to guide evidence-based interventions.

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