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PROJECT REPORT

Architectural Research: Addressing after COVID-19 Challenges in the Urban Environment of Sylhet and Chattogram, Bangladesh

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ABSTRACT

The pandemic outbreak is compelled people to face challenges in urban areas. Before Covid-19, cities were overcrowded, unhygienic and unhealthy. However, the upsurge of the pandemic has highlighted many issues regarding the urban environment and broadened our views about the urge of the improvement. This research aims to identify the challenges arising after the pandemic in the urban environment respecting social, economic and from the design perspectives. The research work is conducted in two cities: Chattogram city and Sylhet city. This study has outlined all the issues in urban space by reviewing literature publications, articles, news and physical survey. The report depends on primary data, hence qualitative and quantitative data have been collected through the survey procedure. This paper has also searched for possible solutions by analyzing feasible international and national case studies. In terms of research outcome, the analysis focuses on the challenges, changes and complications concerning the environment in urban spaces after Covid-19. Moreover, the study has identified the factors that directly influence the design in urban areas. Finally, the possible solutions, given in this study, have provided a schematic idea to solve the complications.

Keywords:
Challenges, COVID-19, Design perspectives, Socio-economic, Urban environment.

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1. INTRODUCTION

The dramatic and widespread outbreak of pandemics impacts the whole world's environment. It interrupts normal life, hampers financial conditions and necessitates the demand to revise many designs consideration in urban spaces. The World Health Organization (WHO) has announced COVID-19 as a global pandemic on March 11, 2020 (WHO, 2020). The SARS-CoV-2 virus is an infectious disease that is accountable for the Coronavirus Disease (COVID-19) (WHO, 2020). By 11th June 2022, two hundred and thirty countries reported 538,332,720 Coronavirus cases, 6,327,166 deaths were recorded, and 511,566,574 totally recovered cases have been registered. Consequently, in Bangladesh, by 11th June 2022, the registered number of Coronavirus cases are 1,953,935, reported deaths (figure 1) were 29131 and the number of total recoveries is 1,905,065. Figure 2 shows regular COVID-19 cases in Bangladesh (Worldometer, 2022). COVID-19 is proven to be a pandemic capable of wreaking havoc on societies and the economy; the world is now facing an unprecedented challenge. Firstly, this pandemic is a threat to older people as it leads to many medical problems. The rapid spread of COVID-19 has caused people to experience anxiety, panic, worries, fear, stigma, frustration, xenophobia and racism (Gautam et al., 2022). Secondly, this pandemic situation is no longer limited to health hazards, instead, it is having a long-lasting, astonishingly dreadful impact on social and economic sectors (UNDP, 2020). Recent statistics from the International Labor Organization (ILO) data showed that 50% of the world's workforce might lose their jobs due to the coronavirus pandemic, with 1.6 billion employees in the simple economic system are being directly at risk (Gautam et al., 2022). As a result of Covid-19's effects and strict containment measures, the nation's long-standing macroeconomic stability has also been harmed, eventully it is causing disruptions to people's livelihoods and a rise in poverty to 40.9 percent by 2020. The epidemic has put an undue pressure on the nation's weak health care system, educational system, human development system, delivery of basic public services and social upliftment (UNDP, 2020). Besides, Coronavirus has primarily disseminated by direct contact with infected surfaces and respiratory droplets from people who have gotten injections, particularly older people and those with underlying medical issues (Gautam et al., 2022). Hence, according to the public health advice by WHO, quarantine, social distancing, and self-isolation are crucial to stop the spread of this disease worldwide (Eltarabily & Elghezanwy, 2020). These guidelines conflict with both the layout of public spaces in cities and people's needs for social interaction (Kelly et al., 2012). Although city connectivity is a significant factor of economic and social advancement, it is also contributed to the development of the disease. Therefore, it would initiate many inquiries from planners and designers regarding the distinction amongst the trend in design in the direction of strengthening interpersonal relationships (Eltarabily & Elghezanwy, 2020). Furthermore, it is essential to focus on how the urban environment and cities are planned in a way that provides a sound environment for people. The interconnectedness of metropolitan components, such as its streets, public parks and infrastructure has a profound influence on the effectiveness and quality of life for its inhabitants (Kibert, 2015).

The main goal of this report is to identify issues that has arisen in the urban environment after the pandemic, taking into account social, economic and design perspectives. This research works with the direct viewpoint of people in different professions to search challenges for current crises. It also analyses the issues and makes an attempt to give some possible strategies and solutions in order to mitigate the recent emergency in the city area.

Figure 1. Regular COVID-19 death reports in Bangladesh; [Source: adopted from (Worldometer, 2022)]

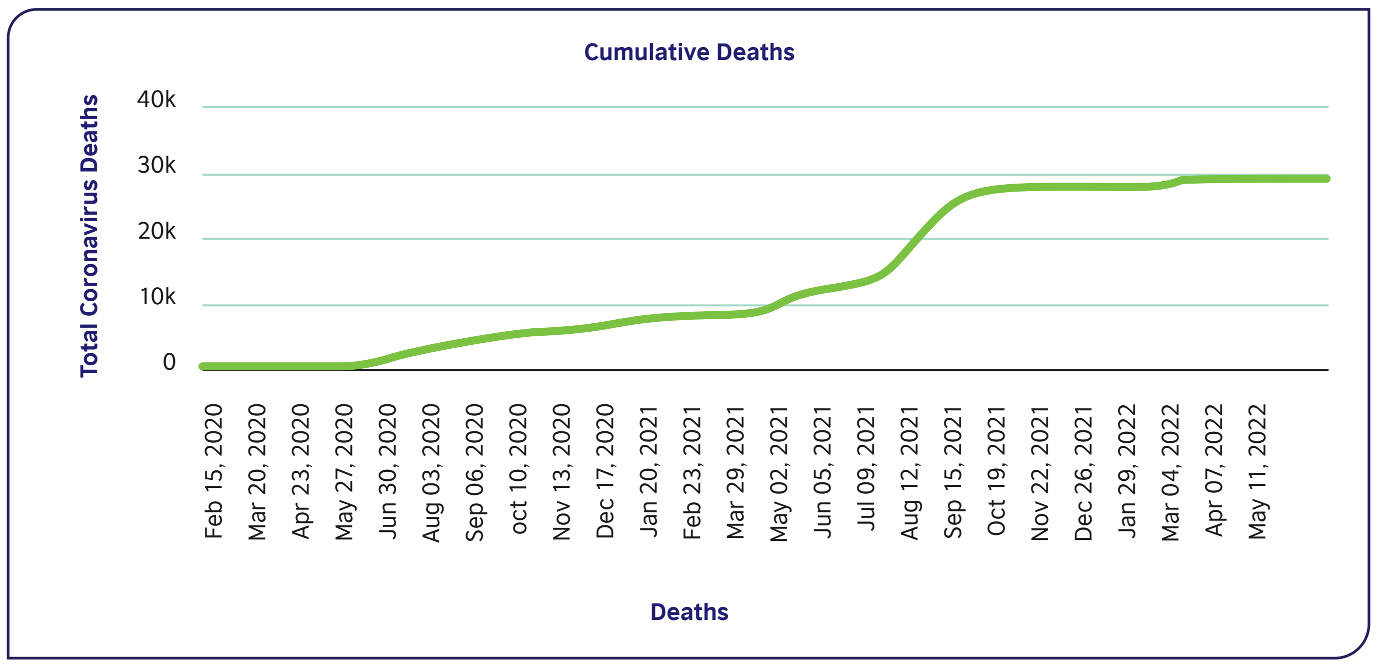
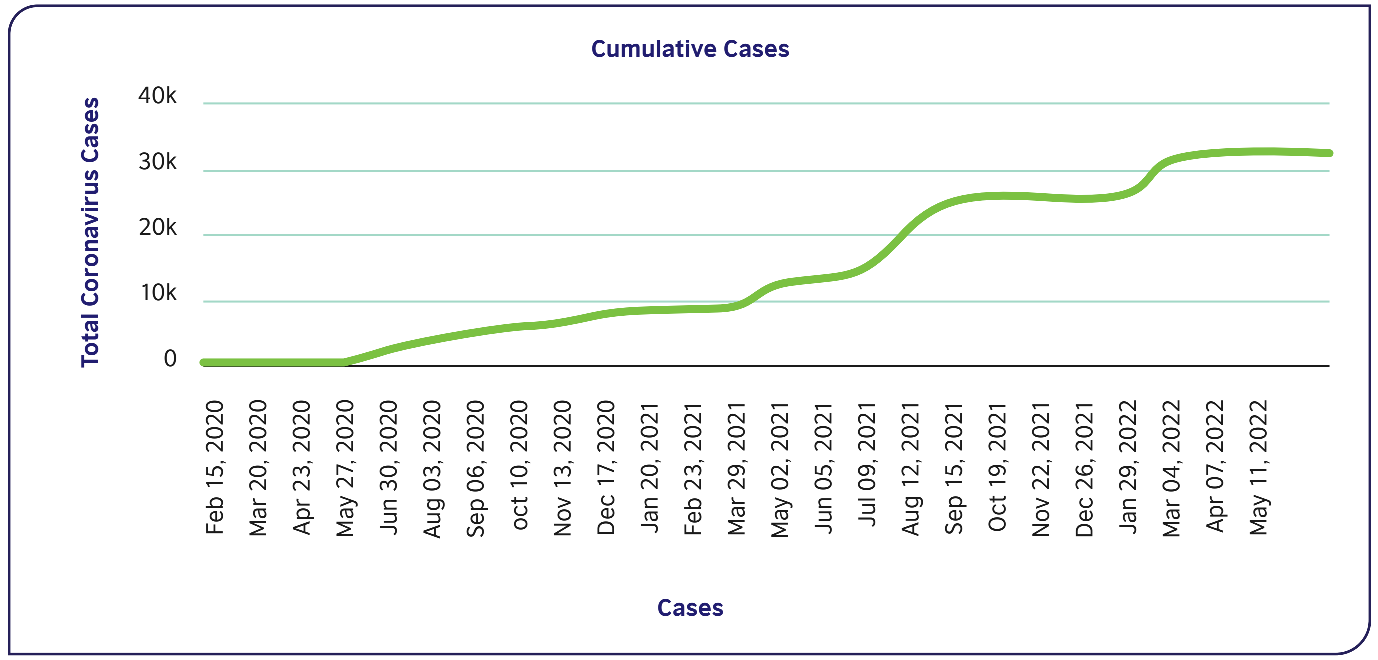


Figure 2. Regular COVID-19 cases in Bangladesh; [Source: adopted from (Worldometer, 2022)]



2. Materials and Methodology

The materials and methodology of the research work are created through a process following a study design: then, following different types of surveys and analyzing the data by applying tools and methods. Moreover, most of the information is dependent on primary data and three views are taken into account when outlining the entire research work: 1. Social perspectives, 2. Economic perspectives, and 3. Design perspectives. Figure 3 is projecting the framework of the research work step by step.

2.1 Study design

The work is a cross-sectional descriptive study. In this total research work, no pragmatic intervention is applied.

2.2 Study location

The study area includes two cities in Bangladesh, Chattogram city and Sylhet city. In both cities, only the metropolis areas are considered as the study area. The study areas are identified using GIS (Geographical Information System). Besides, two cities with different urban spaces are chosen to project a variety of obstacles for this study.

2.3 Study population

Urban residents from Sylhet city and Chattogram city under the metropolis areas are taken as the study population. To get the true population number of the participants for the questionnaire, Solvin's formula is applied (Isip, 2021). Hence, a predetermined number of people—referred to as "samples" of surveying—are chosen to participate in the surveys (Bandyopadhyay, 2000). Also, the age ranges of the respondents are between 16 to 65+, and they have participated voluntarily.

2.4 Study period

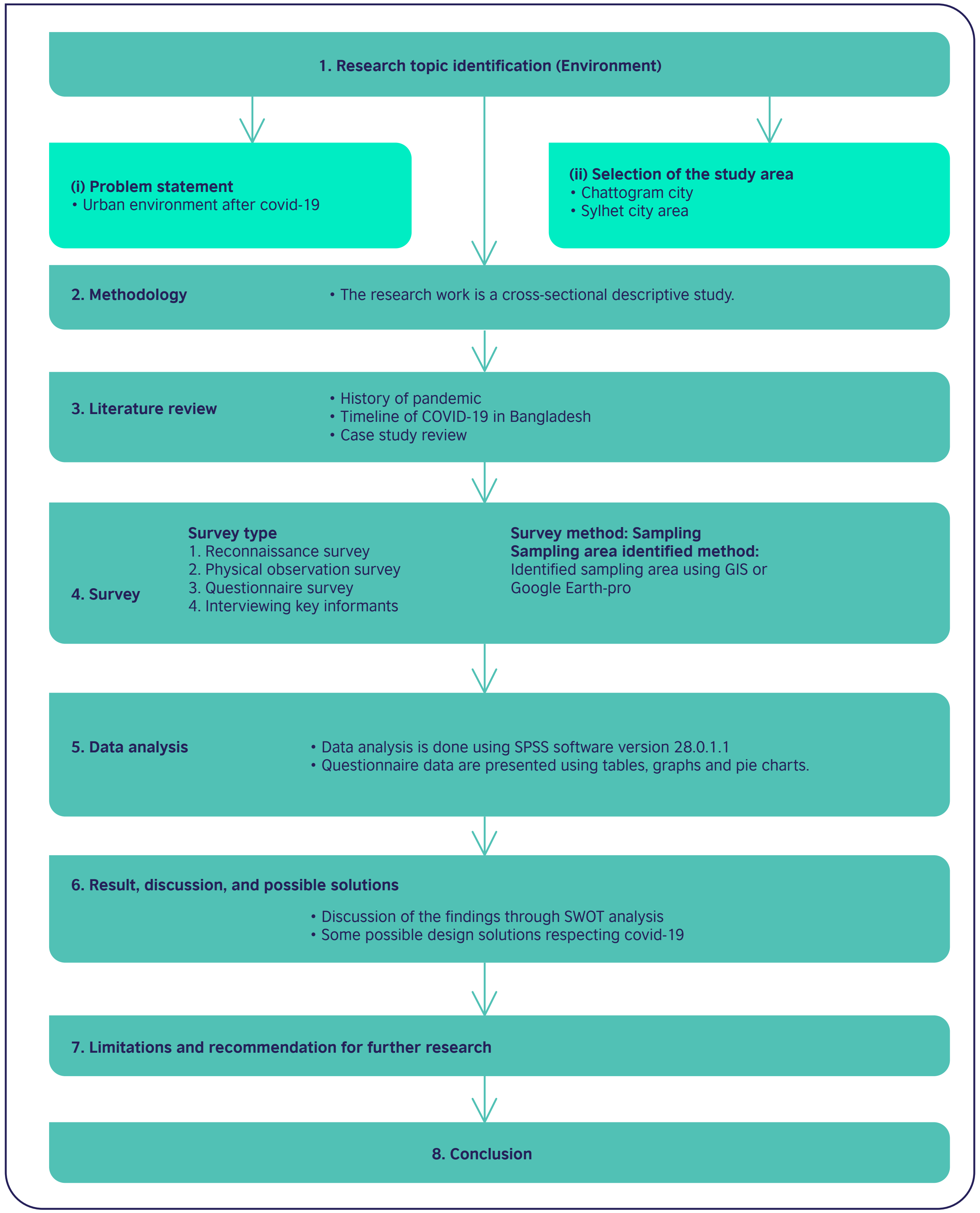
The total study duration is lasted from 1st April to 15th August.

2.5 Data collection procedure, methods and tools

2.5.1 Primary data collection process

The majority of the research is based on primary data. To conduct the survey, a questionnaire (Appendix A) following the ordinal and nominal scale based on the literature review and the survey areas existing challenges are designed. The data collection has been conducted both online and offline. The offline data is prepared using the office word file and the online questionnaire is prepared in the Google form and are filled out by sending to different groups on social media and WhatsApp. Both online and offline survey has operated from 9th May 2022 to 10th June 2022. Participants volunteer from any study area location and their minimum age have to be at least 16 years old. Additionally, engagement is entirely voluntary, and participants do not receive any monetary compensation for their contribution. It should be stated that the study's primary goal is exploratory and that the distribution methods for the questionnaire could lead to bias because a subliminal selection of respondents is made to match the intended participants. To comprehend people's post-pandemic issues in the urban setting, a total of 25 elements are taken into consideration when creating the questionnaire.

Figure 2. Regular COVID-19 cases in Bangladesh; [Source: adopted from (Worldometer, 2022)]



2.5.2 Secondary data collection process

Secondary data have been collected by compiling relevant papers, news articles, books, websites, and national and international reports. Original research articles are screened from April to July in PubMed, Google Scholar, Science Direct and Taylor & Francis. When choosing the literature, this paper is focused on and identified a number of potential things based on the difficulties people encounter in urban settings after COVID-19. Another piece of information is studied and used based on how other nations planned, how they came up with solutions and handled the pandemic.
To gather the required data for the analysis described in the following section, the chosen literatures have been carefully analyzed. Two steps are taken in completing the review. The Chief Investigator and the Research Assistants (RA) first read through all the literature and gathered information. Additionally, the substance of the literatures is connected to the study issues. The author has double-checked the collected data and divided them into categories.
The research framework, questionnaire, research method and suggested solutions are all created using the findings from the literature review.

2.5.3 Methods and tools

Data are gathered with the use of a population-based questionnaire survey, Excel and the SPSS-28.0.1.1 (Statistical Package for Social Sciences) version have both been applied for analysis after the data collection. Additionally, PowerPoint was used to present the demographic data (M. N. Haque et al., 2020)
Four prominent techniques are followed in the survey procedure. They are 1. Reconnaissance survey, 2. Physical observation survey, 3. Questionnaire survey and 4. Interviewing key informants. Besides, self-observation survey is also conducted while inspecting some areas (Bandyopadhyay, 2000). On the other hand, for conducting surveys, it is impossible to ask each person about his or her opinion. That is the reason for which sampling method has been applied.

2.6 Recommendations

In order to determine potential solutions for the recommendation sectors, several implemented case studies or planned case studies have been analyzed.

3. Literature review

3.1 Pandemics history and its influence

The world has seen numerous pandemics that have claimed millions of lives (LePan, 2020); see table 1; history demonstrates that these pandemics influenced the urban environment, the economy and the health sector. A pandemic is a worst-case scenario when an illness spreads beyond a nation's boundaries. (Eltarabily & Elghezanwy, 2020)
In 430 BC, the Athenian Plague and the 14th century Black Death in Europe are the first pandemics that come to mind while reviewing history. We can witness more information about the effects and outcomes of altering urban planning, zoning regulations, and the first quarantine idea after the pandemic break (Editors, 2022). For instance, the Black Death epidemic impacted the urban planning of European civilizations by urging the establishment of more expansive public areas that increased opportunities for connecting with nature and lessened the sense of isolation. The innovative urban planning of the Renaissance was further improved by pandemics, which led to the expansion of towns to avoid congestion(J. N. Hays, 2015).

When cholera outbreaks began to spread over the world in the early 19th century, according to data from the WHO, which generated from combining clean drinking water with wastewater in London in 1850 was one of the leading causes of the cholera outbreak. ((J. N. Hays, 2015), (Eltarabily & Elghezanwy, 2020)) The disease greatly impacted how waste was managed in the streets, strengthening the desire for open places with daylighting and ventilation for people to walk through.
After that, between 1918 and 1919, the "Spanish Flu pandemic," the deadliest respiratory virus in pandemic history clearly impacted the slowing of urban growth, which led to temporary restriction of public life to slow down the spread of the disease. For instance, walking in quiet streets had taken the place of public transportation, most people were staying home, and the sidewalks were empty at night, all these are related to the present pandemic.
Typhoid and cholera outbreaks in Philadelphia in 1908 were brought on by mixing sewage with the water supply in the Schuylkill River; moving residences and businesses away from the riverside in order to replace them with a sizable Fairmount Park was the first preventive phase. (Eltarabily & Elghezanwy, 2020)

Table 1: History of pandemics. [Source: by the Author, adapted from (Eltarabily & Elghezanwy, 2020), (LePan, 2020).]

SN	NAME OF PANDEMIC	YEAR OF PANDEMIC
1	Antonine Plague	165 AD
2	Plague Justinian	541 AD
3	Japanese Small Pox pandemic	735 AD
4	Black death	1300-1347
5	Small Pox	1520
6	17th Century Great Plague	1600
7	18th Century Plague	1700
8	Yellow fever	1800
9	Cholera 6	1817
10	Third Plague	1855
11	Russian Flu	1889
12	Spanish Flu	1918
13	Asian Flu	1957
14	Hong Kong Flu	1968
15	HIV/AIDS	1981
16	SARS	2002
17	Swine Flu	2009
18	MERS	2012
19	Ebola	2014
20	COVID-19	2019

Most emerging human diseases have been transmitted by wild animals, frequently through domesticated cattle or fowl. One of these diseases is COVID-19, including HIV, Nipah, Ebola Virus Disease H1N1, H5N1, and it is predicted that there will be others in the future as well (Leach et al., 2021). There are numerous methods for determining the source of a disease. For instance, "Wet marketplaces" in urban China has been identified as the source of COVID-19. In contrast, small-scale chicken farms were the cause of the avian influenza outbreaks and pig farming for swine influenza crises. In both instances, the impact of pandemics on agricultural output and food systems as well as the capital circuits involve, intertwined with specific farming techniques and human-animal relationships (Leach et al., 2021).

The 2014 Ebola outbreak was thought to have been caused by a bat-borne virus. Because of Ebola, there had been significant changes to the forest ecosystem. In this area of West Africa, decreased human-bat contact and linear deforestation were not permitted. The Ebola outbreak in West Africa provided a new obstacle for planners to plan cities effectively (Eltarabily & Elghezanwy, 2020), (Leach et al., 2021).

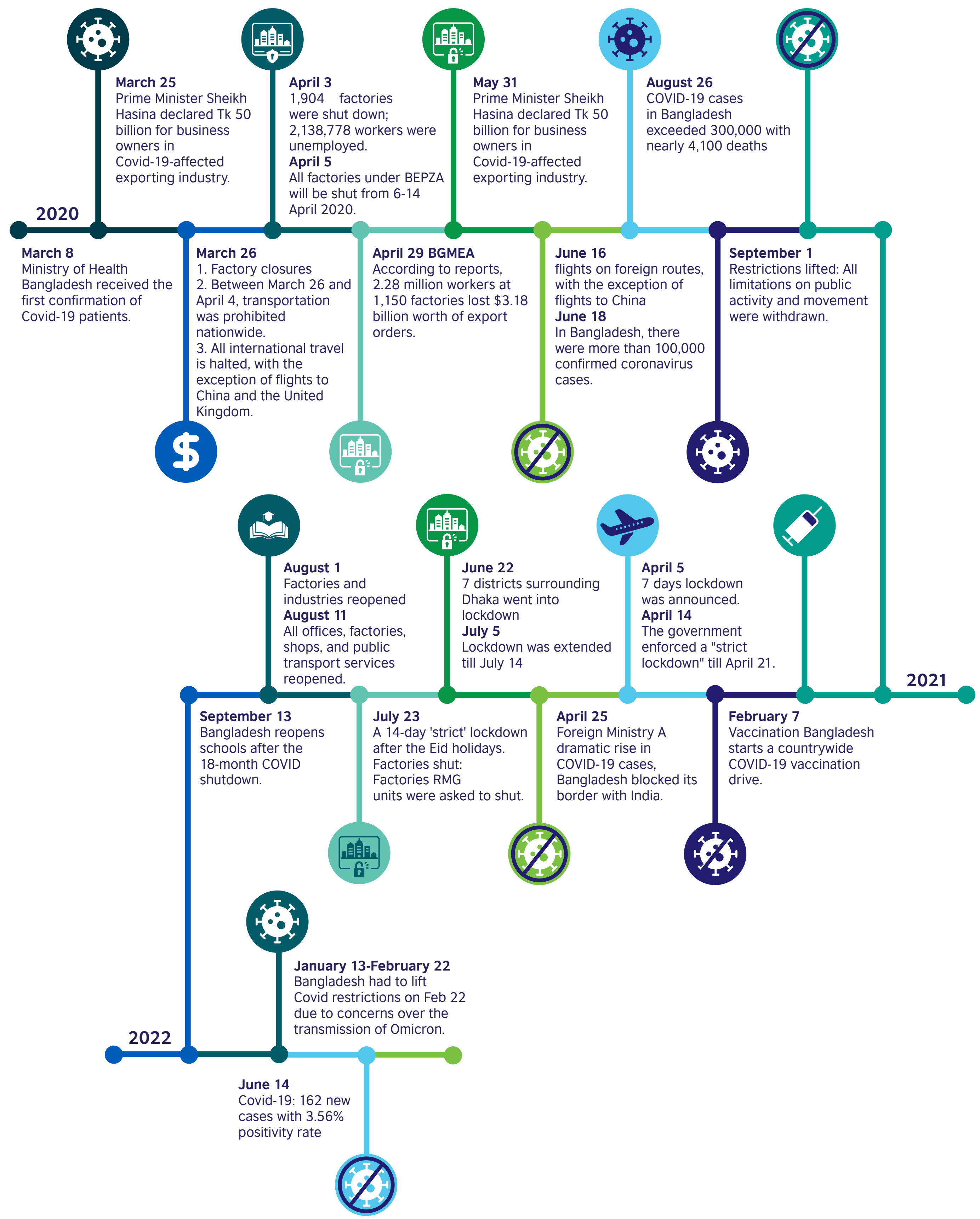
Precautionary measures highlight the importance of isolation and restriction of public venues when epidemics, particularly respiratory ones, erupt. Additionally, it creates an empty impression of the environment of cities and public spaces, especially after the crisis has ended. The city's layout needs to change to incorporate community health practices and social thinking into urban planning (Leach et al., 2021).

3.2 COVID-19 timeline in Bangladesh

In Wuhan, China, the novel coronavirus disease (COVID-19) started to spread in November 2019. COVID-19 had developed as a pandemic after a few minor transmissions leading to global transmission (Bodrud-Doza et al., 2020). In Bangladesh, the government took immediate action to implement home and institutional quarantine, community restraint measures, social isolation and social distancing (Islam et al., 2020). Also, to control the dissemination of the disease, administrators enforced rules by restraining many locations, including educational institutions, offices, transport services, clubs, travel restrictions and wholly prohibited social gatherings (Bodrud-Doza et al., 2020). This

disease had a significant impact on the socio-economic condition, health sector and the environment (Rice, 2020). The major effect of COVID-19 and its response in Bangladesh have been shown in figure 4.

igure 4. Timeline of COVID-19 in Bangladesh. [Source: by the Author, adapted from (Joarder et al., 2020), (BetterWork, 2022)]



On March 8, 2020, the first COVID-19 cases were established in Bangladesh. Then, the Bangladeshi government had announced a Tk 50 billion stimulus package for the owners of exporting industries hit by Covid-19. The funds would be made available as bank loans at 2 percent to support pay the wages and salaries of workers affected by the incident. From March 26 to May 30, the entire country was under lockdown to prevent human transmission. During this period, the industry sector resisted a lot which led to harm to the economy of the country. For example, the president of the Bangladesh Garment Manufacturers
and Exporters Association (BGMEA) advised all members to notify the public of the scheduled factory
closures on March 26. On April 3, DIFE (Department of Inspection for Factories and Establishments) estimated that 1,904 export-oriented RMG factories had closed between March 19 and 31, leaving 2,138,778 workers unemployed. Bangladesh Export Processing Zones Authority (BEPZA) had advised all members to notify the public of the scheduled factory closures from 6-14 April 2020 at all eight of the nation's export processing (BetterWork, 2022). Moreover, the migration of ready-made-garment (RMG) workers happened on April 25, 2020, to the industrial districts, resulting in a limited lockdown in the nation (Bodrud-Doza et al., 2020).
In Bangladesh, the Institute of Epidemiology Disease Control and Research (IEDCR), under the Ministry of Health and Family Welfare (MFHW) and Directorate General of Health Services (DGHS), is in charge of performing research on epidemiology, communicable diseases and disease surveillance and control procedures (Bodrud-Doza et al., 2020). According to the Directorate General of Health Services (DGHS), more than 300,000 COVID-19 cases and over 4,100 fatalities in Bangladesh had been recorded as of August 26. On September 1, the Cabinet Division abolished all public activity and movement restrictions.
Bangladesh's Directorate General of Health Services (DGHS) begins the national COVID-19 vaccination campaign (February 7, 2021). From April to July, there was a lockdown. A nationwide lockdown was implemented in response to an increase in Delta variant illnesses and mortalities. In July, Bangladesh consistently reported the most significant number of daily deaths and new cases (15,192 new cases and 247 fatalities on July 26). On August 1, 2021 the lockdown was lifted, and all businesses—including offices, factories, stores and public transportation—reopened. Despite nationwide mass vaccination initiatives, there was still a lot of COVID-19 infections and fatalities. After an 18-month COVID closure, Bangladesh reopens its schools (September 13,2021) (VOA, 2021).
Bangladesh imposed COVID limitations from January 13 to February 22, 2022, due to worries about the spread of Omicron (Express, 2022). Till June 14, 162 new cases were detected (Worldometer, 2022).
From the timeline, it is evident that because of the impact of the Coronavirus country's economy, health and educational fields were damaged a lot. Private hospitals and clinics were not operating during the lockdown without concern for contact transmission. As a result, patients, doctors and nurses were affected. Healthcare professionals who had treated patients and contracted the disease had come under societal criticism and stigma from the community.

Additionally, people with middle and low incomes lost their employment and sources of income during the lockdown, and they were particularly heavily hurt. Naturally, any outbreak of infectious disease has negative impacts on both society and people It is challenging to lock down a nation of 165 million people while considering factors like cultural norms, population density, social structure, healthcare capability, educational attainment and on top of that dealing with the frequently new policies implemented by the Bangladesh government (Bodrud-Doza et al., 2020).

3.3 Different countries' impact and strategies on COVID-19

Different nations have implemented various strategies to deal with the challenges they have confronted during COVID-19. While reviewing countries' cases, it has been well acknowledged that urban planning and policy can contribute more effectively to handling the pandemic.

Greece
The usage of public transportation, particularly during rush hours and exposure to the noise produced by it might be a reason in Athens' increased frequency of headaches. But the lack of noise pollution was noticed when the amount of public transportation was decreased during the COVID-19. Nearby large parks were linked to the residential area had increased life satisfaction in Thessaloniki prior to and during COVID-19. Research shows that these results are consistent with the health advantages of urban nature (Mouratidis & Yiannakou, 2022).

Nepal
The significance of thorough planning and preparation for a disaster is something that this worst epidemic has taught the underdeveloped countries like Nepal. To combat COVID-19, the Nepali government had implemented the 6T principle, which stands for travel restriction, tracking, treatment, testing, tracing, togetherness and treatment (Sharma & Bhatta, 2020).
London
Climatic variables are not an excellent tool for comprehending COVID-19 transmission. Following the adoption of the lockdown measure, London achieved success. Every urban city had a highly populated work environment, housing stock and public transportation for commuting. Given the possibility of a future pandemic, a clear urban policy should be implemented immediately (Ghosh et al., 2020).

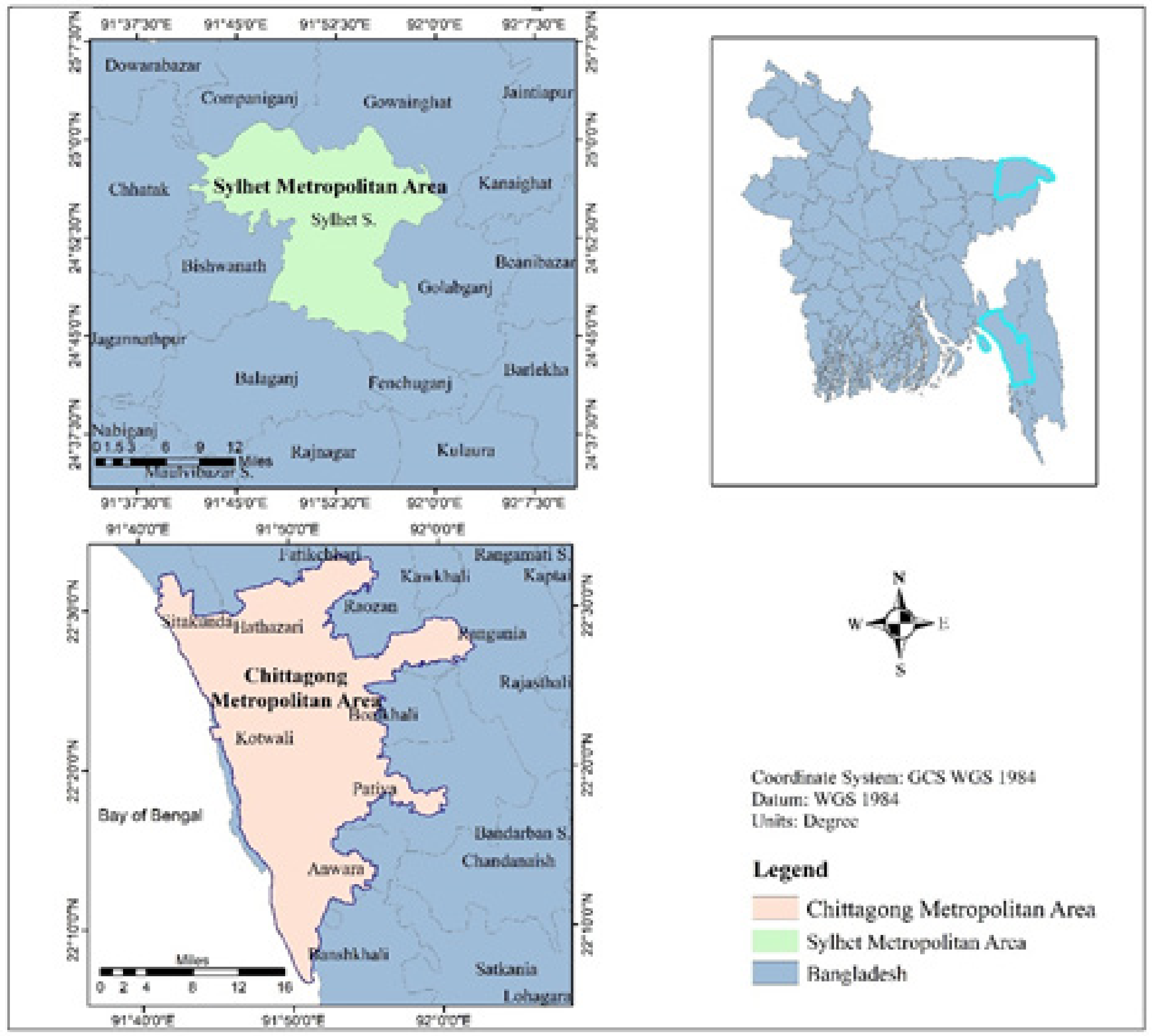
France
In France, the economy suffered around 1.5 percent decline every two weeks of lockdown. Nonetheless, a drop in NO2 levels of roughly 62 percent resulted from the severe lockdown, which was considered a great benefit for the environment. Lockdowns caused similar trends in air pollution reduction and air quality improvement which were witnessed in numerous other nations. The levels of air pollution were returning to those from before COVID-19 as lockdown restrictions were being relaxed (Girdhar et al., 2021).

India
One of the biggest wholesale markets in Tamil Nadu provided 35% of the Covid-19 cases. It is one of the southern states of India. For such circumstances, better designing and planning approaches are required. The case study also emphasizes the need to take into account and promote awareness of post-pandemic behaviors in public settings (Mahima et al., 2022a).

4. Study Area

The two cities of Bangladesh are selected as a study area to get the alternative challenges of post-pandemic situations (Figure 5). Chattogram is known as a port city and the second largest city in Bangladesh. The metropolitan area of Chattogram's estimated Population is 2,581,643. On the other hand, Sylhet is situated in the northeastern part of Bangladesh. The city's metropolitan area consists of 526,412 population (Bangladesh Bureau of Statistics, 2015)

Figure 5. The study area map is shown Chattogram city and Sylhet city metropolitan area. [Source: by the Author]



4.1 Identification of sample size

The overall research is conducted by investigating these two areas, which are shown in figure 5. In addition, while applying Solvin's formula to get the sample population size (n), the metropolitan population number is input in the formula (Isip, 2021). Solvin's formula,

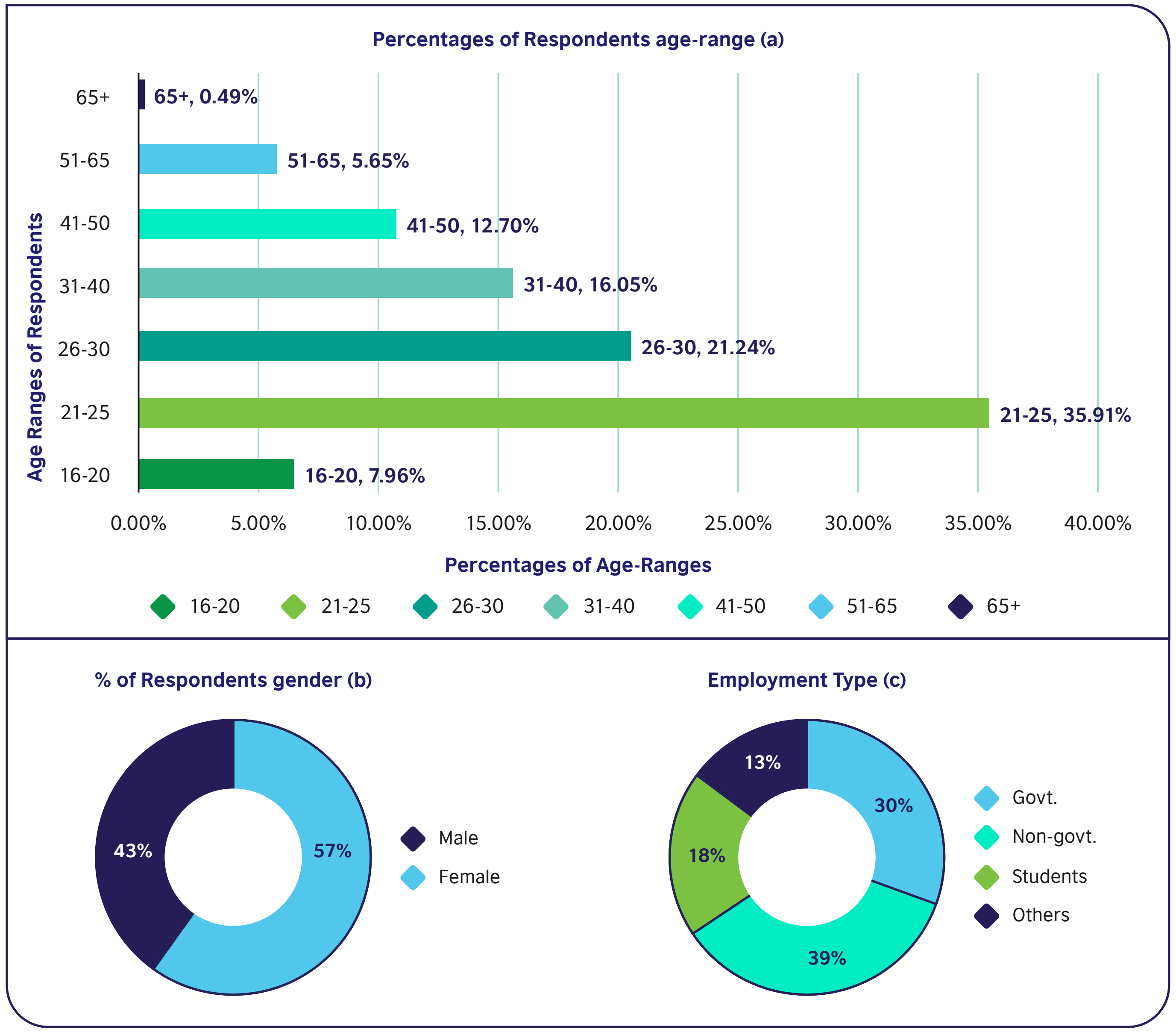
$$n = \frac{N}{1+Ne^2} \qquad (1)$$

By taking 95% as the confidence level, the margin of error, e =0.05, N= total survey area population
The value input in the sample size equation (1). The sample population is, a minimum of 400 for each city. From May 9 to June 10, 2022, an online and offline survey has been conducted using the sample number (n=866) and questionnaire forms are filled out (Appendix A). Among them, few professionals related to public health and people who are involved in the business are filled with some additional questions related to health and economic sectors.

4.2 Demographic distribution

The demographic data are presented in figure 6. It is apparent from figure 6 (b) that the male respondent's number is 57%, and the female respondents' number is 43%. The ratio is similar to the country meter chart of Bangladesh (Countrymeters, 2022). Besides, different age groups are considered to get the social, environmental and design challenges of the post-pandemic situation in Bangladesh, and the 21-40 age range participant number is high (Figure 6 a). Also, the research analyzes the economic impact as data are collected from several professionals, both governmental and non-governmental service holders, people in business, students, drivers, daily workers and house makers. The details employment percentages are shown in figure 6 (c)

Figure 6. Demographic distribution of population sample study area. (n=866) [Source: by the Author]



5. Data analysis

5.1 Social perspective

The coronavirus disease 2019 (COVID-19) pandemic has devastated civilization and presented several unprecedented challenges (Escandón et al., 2021). In this study, the social consequences have been discussed in the context of post-pandemic. The focus is mainly on discussing social behavior changes, actives or habitual challenges, social cautiousness and struggles in the public sector.

5.1.1 Social challenges

According to WHO data, there were 29,308 deaths and 2,007,870 confirmed cases of COVID-19 in Bangladesh between 3 January 2020 to 11 August 2022 (WHO, WHO Coronavirus COVID-19 Dashboard, 2022). Coronavirus outbreak has had a significant impact on social life and behavior. After lockdown, everything has been entirely reopened in March 2022. However, from the house arrest condition to facing busy public life again took a toll on human life which resulted in several changes. From the table-2, it was visible that life satisfaction after the COVID-19 rate decreased. In contrast, personal relationship comparably improved, and family bonding has improved as people got the chance to spend time with their close ones.

Table: 2 Summary findings of respondents' opinions about social challenges. [Source: Generated by Author from questionnaire]

Topic	Finding	Total respondents (n=866)				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Life Satisfaction After COVID-19	Decreased	3%	19%	37.9%	31.8%	8.1%
Personal Relationship improvement after COVID-19	Improved	4.3%	25.6%	45.1%	19.1%	5.6%
Face challenges in food after COVID-19	Faced challenges	4%	37.3%	23.4%	32.21%	3%
Face challenges to exercise after COVID-19	No issues	5.9%	22.2%	18.2%	50.8%	2.5%
Face challenges to maintain hygiene after COVID-19	Faced challenges	5.6%	68.6%	15.7%	7.83%	2.1%

More than ten million poor urban people in Bangladesh are facing food security and nutrition challenges due to the COVID-19 pandemic. Many underprivileged urban residents of towns and cities already have experienced food insecurity, a lack of food and malnutrition (Gautam et al., 2022). Furthermore, it is visible in the survey as 41.33% of people are facing challenges with their food. Besides, most of the respondents (53.3%, n=866) have no issues regarding exercise. While interviewing some of the respondents it has been found that they did not exercise before the pandemic and were not concerned about it. The significant challenges (74.4%, n=866) are shown in maintaining hygiene. After speaking with a few respondents, it has been discovered that especially people related to public health are facing more challenges. Some doctors and nurses have developed OCD (Obsessive-Compulsive Disorder) regarding cleaning by dealing with corona patients in the Corona ward.

5.1.2 Effect on healthcare professionals

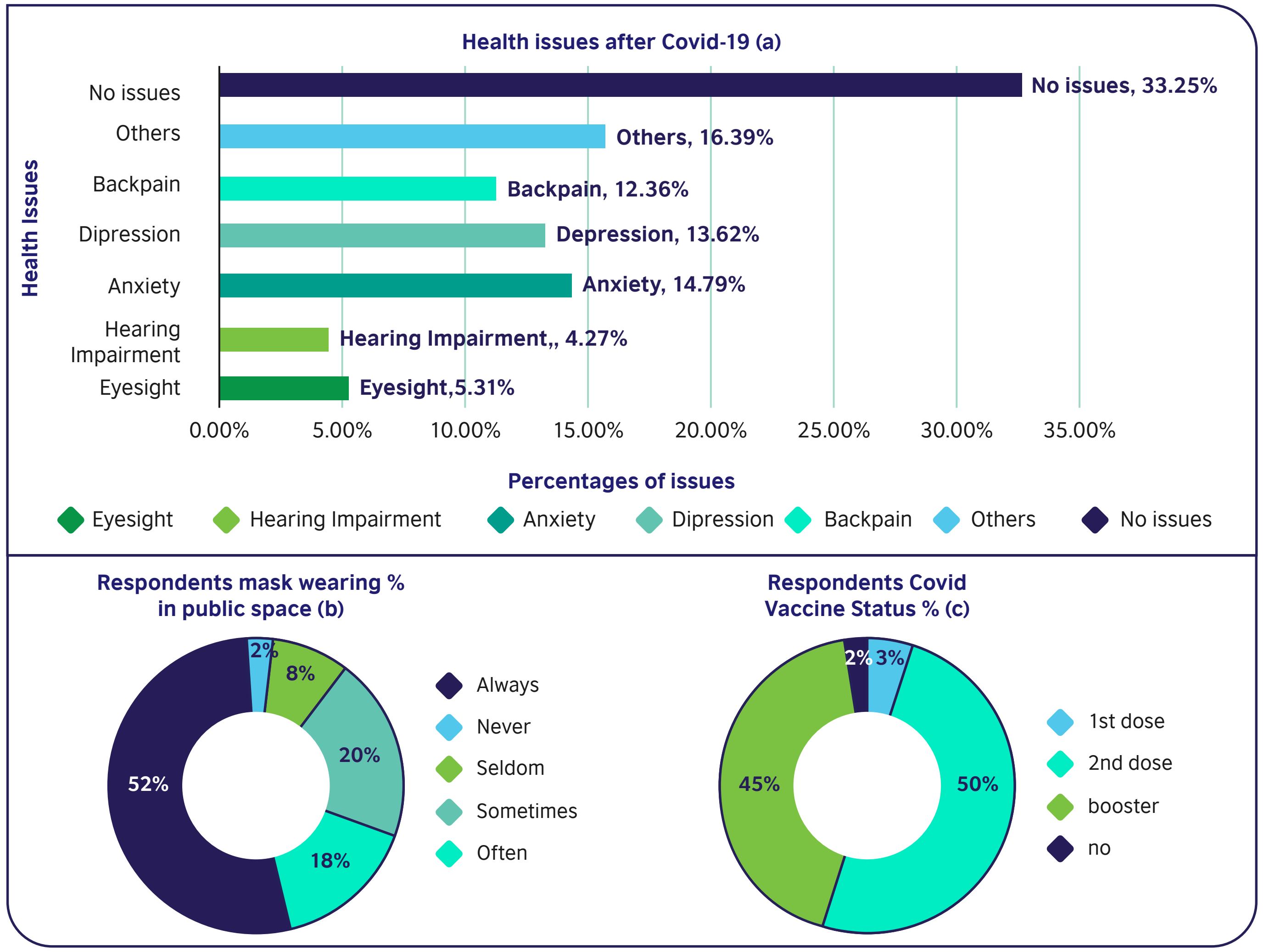
Because of the earlier COVID-19 outbreak and the lack of reliable information, the internet, social media, smartphones and other channels have all contributed to the boost of panic that has disperse in society. The shutdown undermined primary healthcare procedures in hospitals and private clinics. Many emergency service workers, including front-line doctors, nurses, healthcare workers, bankers, members of the police and military forces, and government officials with the disease, became separated from families and even passed away. Private hospitals as well as suburban and rural clinics were closed because of the risk of infection. Healthcare professionals who have treated patients with the coronavirus have faced social stigma.

5.1.3 Health issues due to Covid-19

The Covid-19 lockdown's social isolation tactics brought to light the value of social health (Rice, 2020). In addition to the direct adverse effects of the Covid-19 virus on physical health, some related and indirect effects are also harmful to health, such as domestic violence, loneliness, anxiety and depression. As the office, universities and schools have been mobilized to go online due to the pandemic, the average screen time has increased, leading to a rise in eyesight problems. Other adverse effects include hearing impairment, back pain, sleep problems and dizziness. The health issues are highlighted in figure 7(a).
People with no issues are mainly lower-class people who live under the poverty line and lack access to proper medical facilities to understand the problem. The second highest proportion (14%) struggle with anxiety problems. Adolescents are growing more nervous and concerned about their test scores and the future of their education which was resulted from the lack of certainty regarding the fact that when will their schools resume physically (star, 2021). In addition, because of online offices, schools and spending more time on social media during the lockdown, back pain (12.36%), hearing impairment (4.27%), and eyesight problems (5.31%) has occurred. Because all the family members stayed at home during the lockdown, homemakers spent more time making meals than usual, which impacted women's health. Additionally, it is learned from the participants that women often have experienced domestic abuse and violence from their husbands and in-laws.
The dramatic dissemination of COVID-19 has broad implications for population's mental health, which are valid for specific populations, such as those who already have a mental illness. Due to the higher prevalence of physical illness compared to people who do not have a mental problem, their life expectancy have decreased by 7–25 years (Campion et al., 2020).
Additionally, the deceased was prohibited from being buried in a local cemetery, which is against fundamental human rights and was often managed by the government (Gautam et al., 2022). Experiences such as being stigmatized have significantly affected human psychology and health.

Coronavirus's aftermath exposed us to many new practices. Protective measures such as washing hands, maintaining social distance and wearing masks were found to be practiced by most people even after the lockdown was lifted. According to the participants' answers in figure 7(b), a substantial portion (52%) always wear masks in public places, including malls, hospitals, banks, restaurants and religious spaces.

Figure 7. Health issues after COVID-19 (a), mask-wearing rates in public spaces (b) and covid vaccine status (c) are depicted, participants (n=866) [Source: by the author generated from questionnaire data]

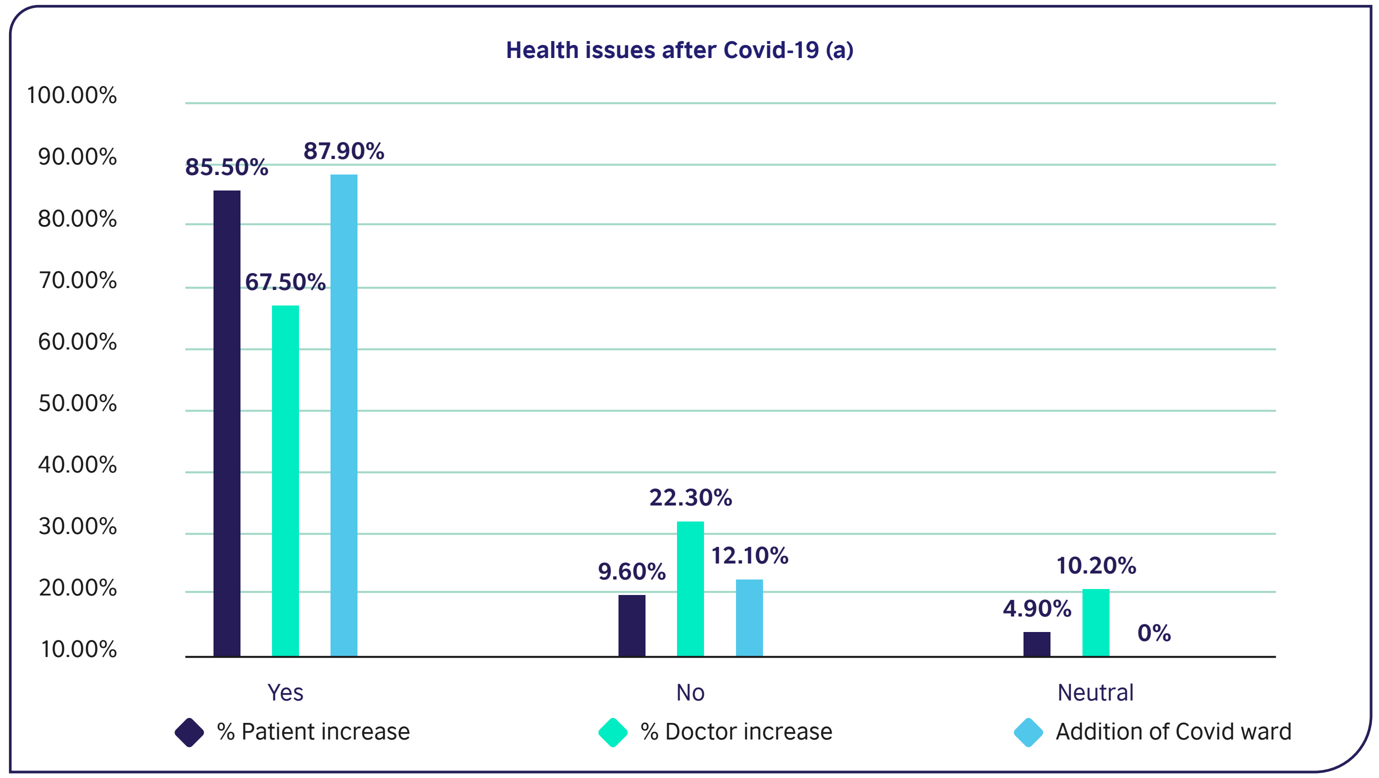


5.1.4 Vaccination status of Bangladesh

Bangladesh has successfully rolled out mass Covid vaccination programs. A total of 291,544,006 persons have received vaccinations as of August 7, 2022 (WHO, WHO Coronavirus COVID-19 Dashboard, 2022). From figure 7 (c), it is evident that only 2% of participants did not take covid vaccine yet.
The urban poor are the worst sufferer of COVID-19. During pandemics, the urban poor has limited access to medical care. A major amount of the urban population now lives in slums with inadequate living and sanitary conditions in many regions due to rapid and uneven urban expansion. Lack of access to essential amenities like hand washing facilities to comply with clean water and medical care (such as hospital beds) further exacerbates conditions in slums and informal settlements(Sharifi & Khavarian-Garmsir, 2020).

5.1.5 Changes in health-care facilities after Covid
To understand health-care facilities in Bangladesh, professionals related to public health (Doctors, Nurses, job holders in hospitals) have filled a few additional questions in the questionnaire (Appendix-A). From questionnaires and interviewing professionals related to public health, some other challenges are found and mentioned in the following section. The interviews have taken place in hospitals in Chittagong Medical College (CMC), Anderkilla General Hospital, Chattogram Maa-O-Shishu Hospitals in Chattogram, Sylhet MAG Osmani Medical College Hospital (SOMCH), Mount Adora Hospital, Akhalia, Friends Eye Hospital, Surma and Jalalabad Ragib-Rabeya Medical College and Hospital in Sylhet.
From the figure 8 graph, it is evident that patients' and doctors' numbers are increased due to the pandemic. And the covid ward is included in the hospital.
The patient number is so high during a pandemic that the healthcare team experiences a much higher workload and psychological distress, which causes tiredness and weakness. Additionally, according to the WHO, only 3.05 doctors and 1.07 nurses work in Bangladesh for every 10,000 inhabitants (Gautam et al., 2022). As a result of excessive pressure, doctors could not focus on their careers. Moreover, after Covid-19, while treating patients, doctors struggle with face-to-face contact. Professionals in the dental sector find it hard to handle instruments as the diseases spread via airborne particles and droplets.

Figure 8. Health facility changes after COVID-19, participants (n=157). [Source: by the author generated from questionnaire data]



5.1.6 Medical waste

The volume of various waste types has increased at an unprecedented rate because of coronavirus. The COVID-19 epidemic has significantly amplified the wearing of masks, use of gloves, PPE (personal protective equipment), boots, protective shields, water bottles, takeaway food containers, and one-time plastic goods globally due to its highly infectious nature, lockdown and quarantine set-up. During this epidemic, there has been a massive priority for the protection and preservation of health. These have led to an increase in products with harmful environmental impacts (S. Haque et al., 2020).

Most hospitals functionally dispose of medical waste by either dumping it in landfills or placing contagious garbage in municipally controlled dustbins. The land filled with wastage sites could lead to future disease transmission. Some medical institutions burn things outside in their backyards. Among surveyed hospitals, the Chattogram Maa-O-Shishu Hospitals in Chattogram ensure that they have an incineration chamber for Bio-Medical Waste.

5.2 Economic perspective

Governments all over the world have imposed unprecedented economic restrictions to suppress COVID-19 (Leach et al., 2021). The urban economy has been severely damaged by the long period of economic disruptions caused by the COVID-19 epidemic The outbreak has significantly impacted migrant workers, tourism, small and medium scale enterprises, the supply chain for urban food, tourism and hospitality and local tax revenues (Sharifi & Khavarian-Garmsir, 2020) COVID-19 negatively impacts Bangladesh's economy because the government implemented lockdown in several industries. The three main economic sectors in Bangladesh are industry, agriculture and services, which contributed 29%, 18%, and 53% of the country's GDP, respectively. The COVID-19 pandemic had a significant effect on agriculture. Most of the farmers' produce (fruit and vegetables, fish) went unsold or was damaged, so they had to sell it to the retailer for less money during the pandemic than they would have usually received (Gautam et al., 2022).

5.2.2 The effect on the sector of employment

The socioeconomic effects of this pandemic were severe in Bangladesh, especially for the underprivileged poor people, wage earners, RMG (Ready Made Garments)-sector workers, daily workers and newly established small and medium businesses. Due to the pandemic, Bangladesh's RMG sector lost numerous international orders and remittance flow are at an all-time low (Bodrud-Doza et al., 2020). According to estimates, Bangladesh's total apparel exports will decline by 8–15% from the baseline (Shadat, 2020). For developing nations like Bangladesh, the impact of remittances could be enormous as Bangladesh is reliant heavily on overseas remittances and big exporters of migrant labor every year (Gautam et al., 2022). To combat the economic losses brought on by the coronavirus scenario, The Bangladeshi prime minister suggested a package totaling 72,750 crore BDT, of which 30,000 crore BDT had been allotted for the service industry, RMG sector and other vital industries. (Bodrud-Doza et al., 2020).

In addition, Bangladesh's unequal and uneven spatial and social distribution pattern causes the poorest individuals and most disadvantaged areas to suffer more social and economic harm (Sharifi & Khavarian-Garmsir, 2020).

5.2.3 Increased of expenses

The cost of practically all daily necessities has risen in the kitchen market, adding to the problems of those on fixed incomes who are already suffering from the pandemic's effects on the economy. The literacy rate of a nation will determine its future economic development. In Bangladesh, schools have been closed for 18 months due to outbreak. The epidemic has hampered education and career, according to 50% of participants (Table 3).
The cost of needs has steadily increased since the Covid-19 outbreak started, heavily burdening those with low incomes and fixed incomes, also many of whom have lost their employment as a result of the pandemic. Over the past two years, the rising costs of fuel, liquefied petroleum gas, water and transportation fee have added to people's hardships, along with the high prices of everyday necessities like lentils, rice, sugar, flour and edible oil.
The administration has also made new attempts to increase the prices of water, electricity and gas even after the budget announcement. Tipu Munshi, the minister of commerce, claimed that the growth in the cost of goods on foreign markets was responsible too for the rise in the price of soybean oil and other commodities ((Bangladesh, 2022).

Table 3. Economic impact after COVID-19. [Source: by Author; generated from questionnaire]

Framework	Findings	Response (866 Persons)				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Do you feel a financial crisis after Covid-19?	Increased	21.02%	36.95%	25.98%	13.51%	2.54%
After Covid-19, do you feel that Expenses increased in every Material?	Increased to a large extent	41.69%	35.33%	9.82%	5.89%	7.27%
After Covid-19, do you feel that your study is hampered?	Faced Challenges	42.73%	7.74%	27.37%	4.61%	17.55%

The daily commodities price changes from March 2020 are described in table 4.

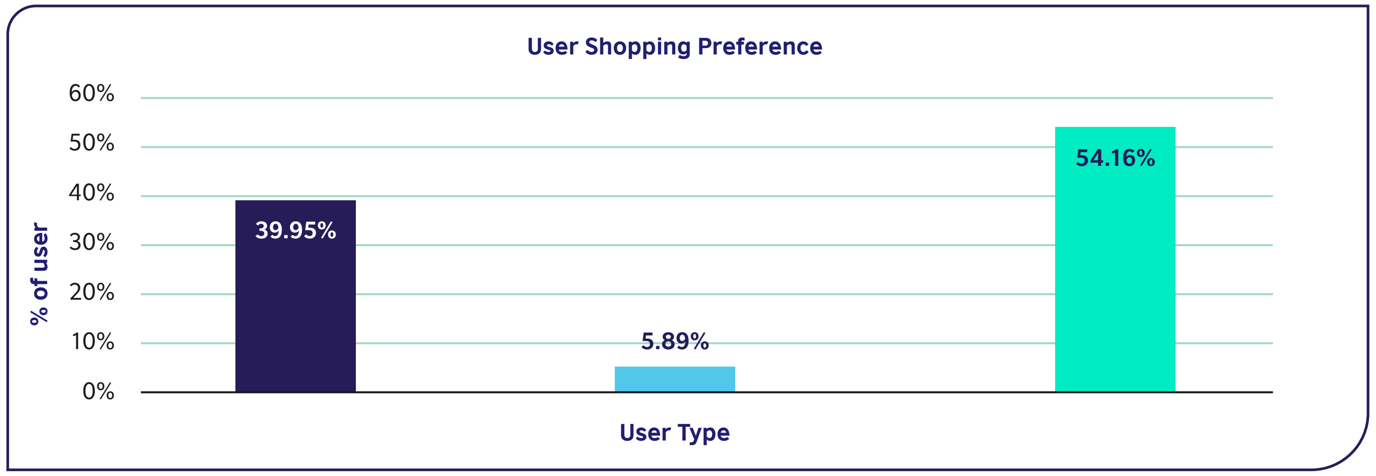
Table 4. Price chart of daily commodities. [Source: Author and adopted from (Bangladesh, 2022)]

Product	March 6, 2020	February 16, 2022	August 15, 2022
Miniket/ Najirshail rice (1kg)	Tk55-60	Tk60-68	Tk72-80
Soya bean oil (packaged 1 liter)	Tk100-108	Tk160-168	Tk182-185
Red lentil (1kg)	Tk65-70	Tk95-100	Tk105-100
Flour (1kg)	Tk33-45	Tk42-45	Tk50-52
Sugar (1kg)	Tk65-70	Tk75-80	Tk90-92
Egg (per dozen)	Tk80-84	Tk94-96	Tk156-160

5.2.4 Impact on Business sector

The number of online businesses has increased after Covid. This situation occurred because city residents have become dependent on online shopping because of the shutdown. The availability and service of all kinds of products is also another reason behind it. Nowadays, more people prefer online and offline shopping (54.16%) figure 9. In Bangladesh, many entrepreneurs had started their businesses during the lockdown. This condition opens doors for many people, but offline business has to go through a competitive situation.
There may be fewer job choices, a lower standard of employment and a decrease in salary for contract workers in the time of Covid-19 (Martínez & Short, 2021). While doing an offline survey, the lower- income people are asked to share their alternate work during the pandemic when their main business was off in lockdown. Some responded that they went back to the village area, some took a loan from their owner and started repaying in current times, and some started working as day laborers. However, due to the coronavirus shutdown, many people nowadays have changed their occupations after losing their old jobs.
In addition, Because of the coronavirus outbreak, many individuals living in poverty in Chattogram and Sylhet City have turned into beggars as a means of this unethical behavior has persisted after the pandemic since it is a method to get money without working. It is common to see beggars lining up at the entrances to numerous public spaces.

Figure 9. User shopping preference after COVID-19. [Source: by author; generated from questionnaire]



The economic status of the business sector and the public health-related professionals' experiences after the outbreak are summarized in Table 5. These factors explain the post-Covid conditional in various ways. Medical practitioners struggle to maintain their standard of living. They have spent a fixed amount of money buying a protective apron, face mask (N95), face shield and other necessary equipment. The dental industry finds it difficult to adopt additional safety measures for its medical equipment.
Similarly, Business professionals experience financial hardship. Shopping centers, restaurants, convention halls, playgrounds and many other places were closed due to government regulations. Most small business owners have spent their savings during pandemics and rely on loans to keep their operations going. Even though the most significant number of people have begun to profit, it will take a long time to become financially stable. From responses, it has been acknowledged that some people could not continue their business after the shutdown.

Table 5. Descriptive statistics of dependent variables. [Source: by author; generated from questionnaire]

Variables	N	Min/Max	Profession related to business (n=136)					Findings
			Mean	(s.d)*	Yes	No	Neutral	
Do your profit more after Covid-19?	136	1/3	1.79	0.82	40.1	24.8	21.7	Profit more
Do you do the same business as you did before Covid-19?	136	1/2	1.27	0.45	63.1	23.6	N/A	Doing the same business
Do you follow any rules given by the government for covid-19 in recent times?	136	1/2	1.30	0.46	60.5	26.1	N/A	Maximum number follow
Do you take a loan to run the business after Covid-19?	136	1/2	1.61	0.49	33.8	52.9	N/A	A higher number take a loan
Variables	N	Min/Max	Profession related to business (n=157)					Findings
			Mean	(s.d)*	Yes	No	Neutral	
Do you feel extra expenses increased for PPE, masks, and other instruments due to Covid-19?	157	1/3	1.25	0.57	82.2	10.8	7.0	increased
Do you face difficulties in handling medical instruments?	157	1/3	1.82	0.85	47.1	24.2	28.7	Facing difficulties

Notes:
N/A= Not Applicable. *Respondents perceptions were measured using the following scale: 1=Yes, 2=No, 3=Neutral

5.3 Design perspective

Although design variables can affect the dynamics of pandemics, the majority of study so far has been concentrated on aspects related to environmental pollution, transportation and street, public spaces, residents' demands, and other factors that are not well explored. Different urban streets scape and places are visited while conducting the survey. From Chattogram city GEC circle, Chattogram Railway Building (CRB) area, Chattogram rail station, bus terminal, ChawkBazar area, Jamal khan, DC hill park, M A Aziz Stadium area, Biplob Uddan area are visited. Alternatively, Keane Bridge, Jallarpar walkway, Jail Road, Nayasarak, Sagordighir par and Shahi Eidgah area are surveyed from Sylhet city.

5.3.1 Environmental Impact

COVID-19 benefits Earth by minimizing the environmental effects on a global scale (Gautam et al., 2022)
According to research from Bangladesh, the levels of the meteorological air quality indicators had decreased when the full shutdown began. It demonstrates how changes in human activity alter local weather features (Mahima et al., 2022b). There are also some positive effects of lockdown on physical health, such as significant reductions in crime, traffic congestion, noise pollution and urban air quality in many urban areas, as well as an increase in active travel such as walking and bicycling, especially for those who would not normally engage in these activities and a revival of attitudes toward nature in urban areas (Rice, 2020). Remarkably, travel limits have importantly decreased NO2 and CO, two pollutants closely related to the transportation industry (Sharifi & Khavarian-Garmsir, 2020).

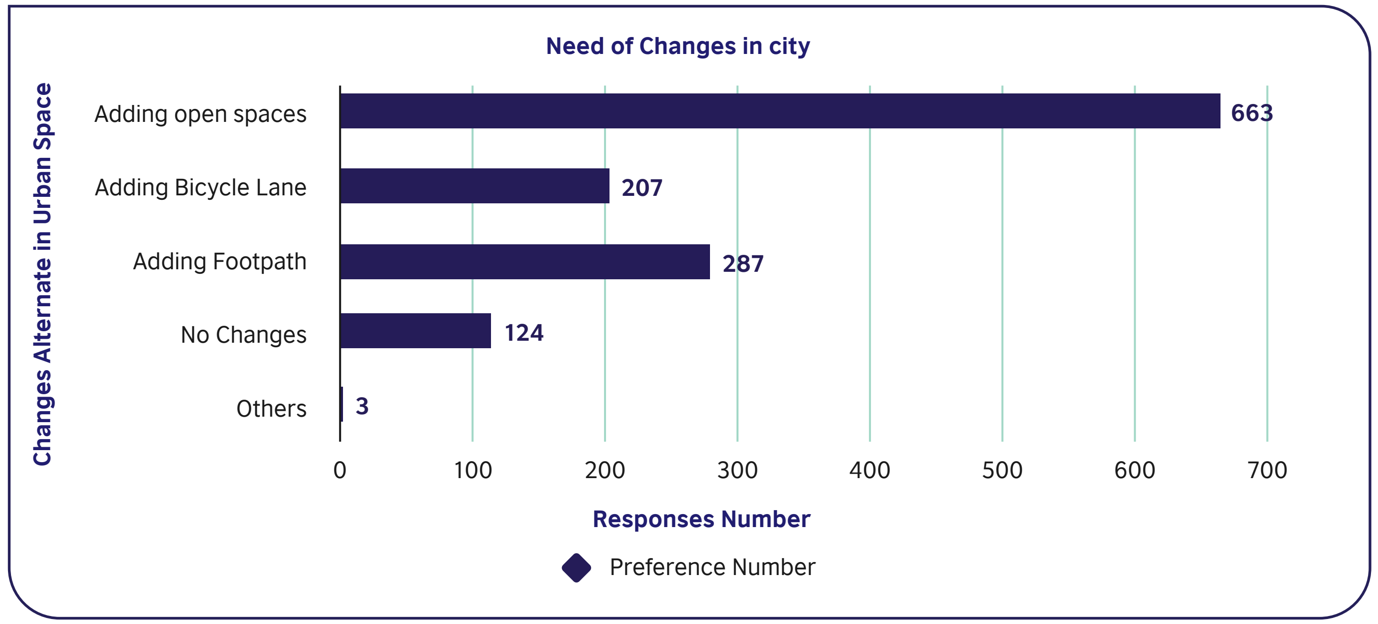
The quality of the available water resources has improved. In many nations, including Bangladesh, water pollution at the beach has decreased during the lockdown (Gautam et al., 2022). Patenga Beach in Chattogram has demonstrated the expansion of nature and the existence of animals and insects. Environmentalists explain this as a result of healthy ecology on the seashore (Standard, 2020).

In contrast, when everything is opened again after a pandemic, water contamination increased. Medical drugs, domestic and industrial wastewater are discharged into the environment without being treated due to a lack of a wastewater treatment plan in developing countries like Bangladesh.

.3.2 Changes in demand in both public spaces and private spaces

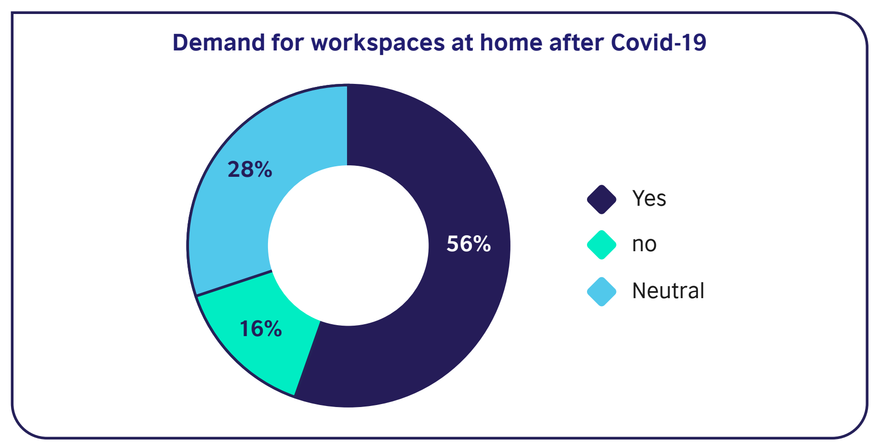
Our interaction with public areas has changed considerably as a result of the shutdown. Fortunately, those who have experienced extreme or restrictive conditions could have a newfound respect for plazas and parks (Honey-Rosés et al., 2021).
Social distancing strategies to restrict places of meetings (restaurants, museums, theaters, libraries and public sports facilities) are among the most crucial fundamental steps to combat this pandemic (Eltarabily & Elghezanwy, 2020). Respondents are asked to submit their desires for their respective city's urban open spaces. The participants are given a number of preference alternatives. The outcome represented in figure 10, 663 of the 866 participants intend to include open areas. More than 200 people want to construct a bicycle lane and a sidewalk for their streets.

Figure 10. Need of changes in cities after COVID-19, participants (n=866, multiple responses). [Source: by the Author generated from questionnaire data]



Many participants, during the duration of the shutdown, stayed at home and performed their work from home. Besides, some people become interested in growing their careers by freelancing or entrepreneurship. Hence, those reasons create the demand for workspaces in their own house. According to the pie chart (figure 11), we get that 56% of city residents prefer having workspaces at home after the COVID-19 situation. Also, the survey found that citizens are urged to have more interactive open spaces in their residential. As Chattogram and Sylhet are bustling and densely populated cities, others (3 people) have emphasized the value of urban green spaces.

Figure 11. Demand for workspaces at home after COVID-19, participants (n=866). [Source: by the author generated from questionnaire data]



Additionally, many planners believe that recent time is the perfect time to reconsider how the streets can design by prohibiting automobiles from certain areas and also by increasing space for walkers and bikes, making the city more environmentally friendly and low-carbon (Eltarabily & Elghezanwy, 2020).

5.3.3 Impacts on public streets and transportation

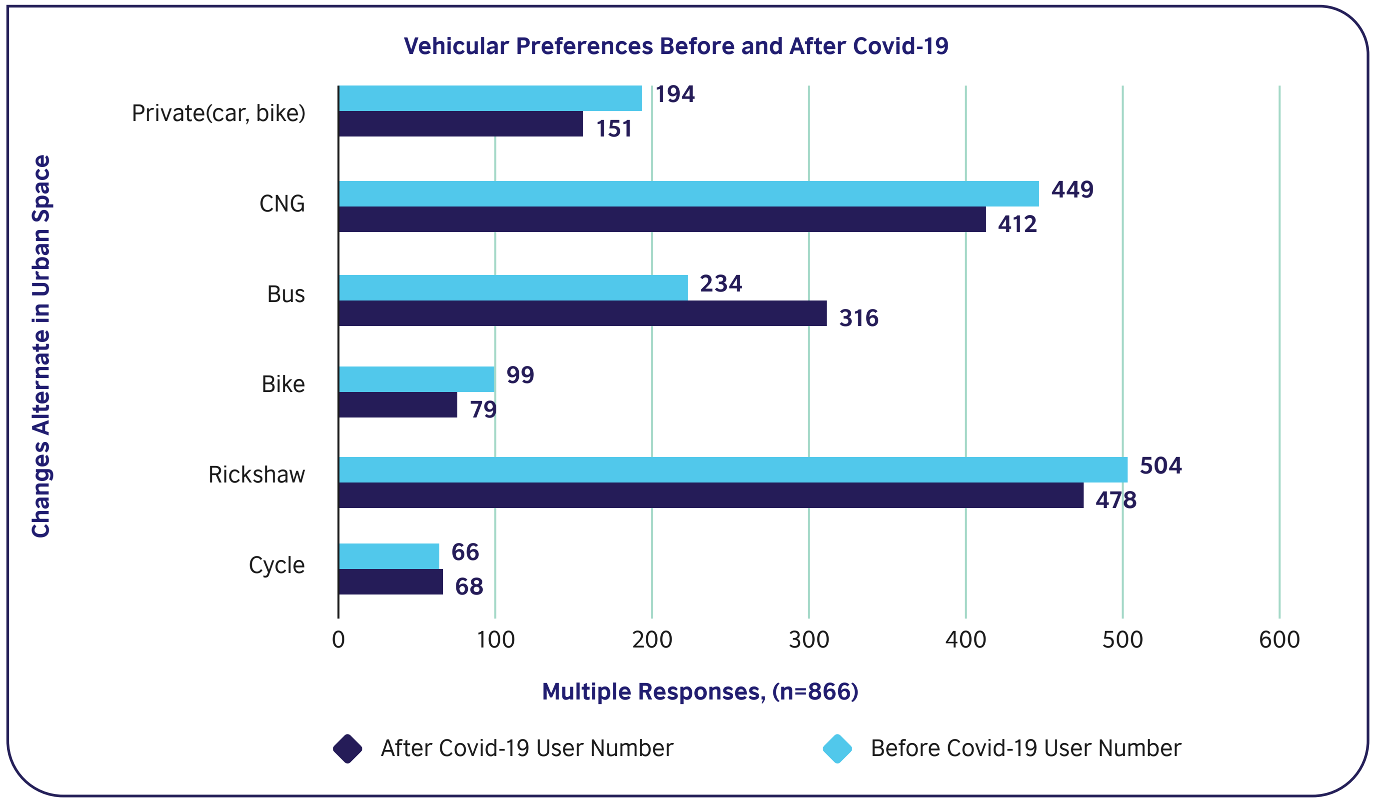
In Bangladesh, flooding is a frequent occurrence. Different parts of Bangladesh are submerged in water every year. The northeastern Bangladeshi districts of Sylhet and Sunamganj were devastated by a flash flood in May (Society, 2022). Street flooding is a public hazard from the extreme weather pattern brought on by climate change. The city's water bodies are in danger due to pollution during heavy rain events (Banai, 2020)

Every metropolis and urban environment depend heavily on transportation, which is why pandemics frequently aid in transmitting infectious diseases(Sharifi & Khavarian-Garmsir, 2020). To stop pandemics from spreading, severe limits on public transportation were put in place. Due to the crowded nature of public vehicles, including trains, buses, airlines and ferry terminals, there was an increased risk of Coronavirus epidemics in the stations from people touching handles, armrests and seats (Eltarabily & Elghezanwy, 2020).

The primary reason for people to travel is to go to their workplaces (Bhouri et al., 2021). Varying mobility options may be available to residents at different densities, and these options may have been more or less affected by the epidemic. Evidence suggests that residents of low-density areas are more likely to travel by private vehicle, whereas those of high-density areas favor walking or taking public transportation. Due to worries about crowded areas and virus infection during the outbreak, public transportation and walking in public decreased, whereas driving was less affected (Wang et al., 2021).

After the pandemic, population movement has increased as everything has been reopened. People prefer private vehicles over public transportation in post-pandemic conditions since the latter has a risk of disease transmission. Urban people's preference for vehicles changed to low-risk and affordable vehicles. From figure 12, it is visible that the use of public transport has decreased. As Chattogram is a crowded city, the changes appear more there. Instead of using public buses, those who can afford, prefer CNG taxis, rickshaws, or take bike rides when covering the shortest distance. On the other hand, in Sylhet city, CNG is the only mode of public transport. After the crisis, people reserved their CNG taxis for cutting off the crowd. The number of private vehicles increased, which creates traffic jams and pollutes the air. Hence, urban people require extra time to reach their destination. Different planning organizations such CDA (Chittagong Development Authority), Chittagong City Corporation, and Sylhet City Corporation are visited to collect information for future government policy or planning considering the pandemic. It is found that those organizations do not develop any policy or strategy instead of wearing mask policy in urban spaces.

Figure 12. Vehicular preferences before and after Covid-19, participants (n=866, multiple responses). [Source: by the Author generated from questionnaire data]



6. Result, discussion, and possible solutions

The discussion in this research paper describes in detail the challenges in an urban environment faced by the city people after COVID-19. The factors considered throughout the research work delineate in figure 13. In this figure, the main three perspectives and sub-factors are mentioned. The COVID-19 pandemic brought unfamiliar challenges to an urban environment. In the data analysis part, many challenges are addressed from the respondent's viewpoints and survey. The result of the analysis is described with the help of SWOT analysis in the table 5 below

Figure 13. Integration of three perspectives (Social, Economical & Design). [Source: generated by Author]

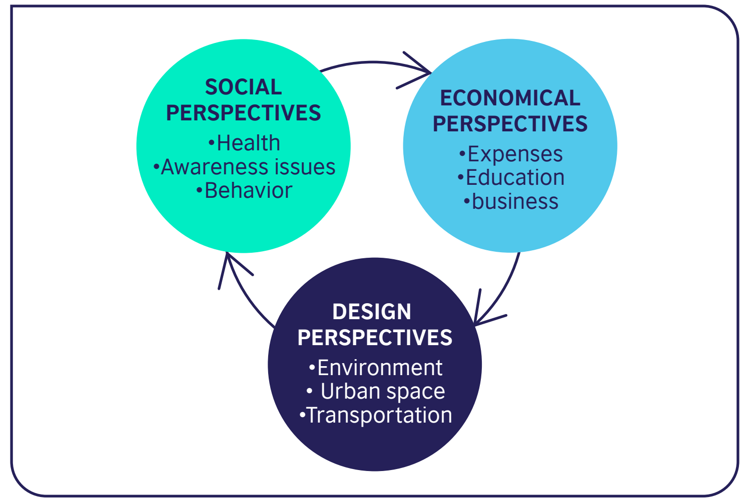


Table 5. SWOT analysis of all findings from data analysis. [Source: generated by Author]

Characteristics	Strength (S)	Weakness (W)	Opportunity (O)	Threat (T)
Social perspective	—More people are aware of health issues than before. —There is an improvement in relationships, and family bonding strengthens.	— The incident has weakened the medical sector and created anxiety, depression and fear.	— COVID-19 prepares citizens to handle any upcoming pandemic.	—Among all professionals, the public health sectors are at risk.
Economic perspective	— There is more room for entrepreneurship.	— Industry and remittance in the dependent economic sector are in jeopardy.	— Technological advancements open up more opportunities to achieve financial stability.	—Every day, a sizable amount of plastic waste is collected. There is also contamination of the air and water.
Design perspective	—Architects, Urban planners, and designers have the opportunity to rethink while designing in the urban environment.	—The air pollution which is caused by the current street conditions has a negative effect on the environment.	—There might be scope for planners to do experiments with spaces.	—The use of private vehicles and the growing demand for spaces can imbalance the planning harmony in developing countries like Bangladesh.

The pandemic affected urban people's lifestyles, and the increased reliance on technology in the built environment may impact all aspects of urban planning and design (Megahed & Ghoneim, 2020). Numerous cities have accepted this challenge and utilized the situation to redesign traffic, restricting vehicle access and enlarging cycle paths and pedestrian pathways. (Jasiński, 2022). For example, People prefer larger pedestrian areas, so they may use them for activities like running, talking, playing, and walking (Mehta, 2020). Besides, the Open space office idea should be changed to reduce the transmission (WHO & ILO, 2021).

The findings make it clear that action must be taken in order to resolve the problems. Since the commencement of the viral outbreak, the government of Bangladesh, non-governmental organizations, and NGOs have continuously worked.

The study recommends possible solutions and policies to recover from the present crisis.

–Healthcare facilities can either move and consolidate their trash through a temporary transit center or transport the waste directly to the treatment centers.

–Disinfection protocols needed to be followed in public spaces with maximum chances of infection.

–Health insurance for healthcare professionals, caregivers and emergency responders could be introduced.

–Physical activity can promote by the public health sector. It has various positive health effects, including boosting the immune system, lowering the risk of infection, diabetes, cancer, osteoporosis, depression and cardiovascular disease, as well as improving overall health.

– The government should tackle the economic sector from multiple angles. Better self-sufficiency and more varied economic arrangements may be paramount.

–Plans for long-term economic recovery must concentrate on things like job creation, encouraging the adoption of greener technology like renewable energy, and correcting market inefficiencies.

– Designers can focus on recreational and rediscovering social uses, redesigning by keeping human needs in mind, and creating pandemic-resistant and adjustable settings.

–Transportation development can substitute bicycle pathways and walking alternatives for car-based transportation infrastructure, especially in central urban areas. That modes of mobility change options can decrease air pollution.

–Natural urban recreational spaces; parks, and beaches should be preserved.

–Redesign workspaces to control the contamination.

– Refocusing on urban green areas and altering property ownership patterns of land to create more green and open space.

– Design more interactive spaces in the residential area to help people socialize and communicate in their neighborhood.

–Planning policies need to be more flexible and have revised options.

7. Limitations and recommendations for further research

The study's limitation is that it only examines post-Covid-19 from a social, economic and design perspective. For a brief period of time, the research was carried out in Chattogram city and Sylhet city, two cities in Bangladesh. As a result, the data result might not accurately represent the entire

8. Conclusion

This comprehensive study narrative urban citizens' challenges after the pandemic. The challenges are addressed by respecting different viewpoints such as socio-economic, environment, health and design. From this viewpoint, this research tries to answer how COVID-19's presence created challenges in human life. The study is aimed to find out how COVID-19 creates challenges. In addition to trying to direct some possible solutions to achieve a healthy urban environment.

Through this study, it is found that after almost two years of social isolation (March 2020 to February 2022), various problems have arisen. The impact of coronavirus on human life is enormous. Unemployment, social isolation, public expenditures, reduction in gross domestic product, industry profit, pollution, mental health degradation and death of closes one shows that the costs of coronavirus are immense. However, the epidemic has brought about some positive climate change. The current challenges disrupt regular life and recent time is a crucial moment for everyone. As a result of COVID-19, our way of life has abruptly and significantly changed. It would take some time for people to get over the situation and return to their everyday lives after adjusting to adopting a new pattern of human livelihood. This condition demands proper planning for each sector. The step-by-step transformation can improve the condition. Therefore, the government, urban planners, economists, public health officials and all citizens should come forward and cooperate to build healthier cities.

(Appendix-A) Urban Research Questionnaire

(The research work is conducted under the British council on the topic of "Architectural Research: Addressing after COVID-19 Challenges in the Urban Environment of Sylhet and Chattogram, Bangladesh")

Date: ☐

Participant name: ☐

Location: ☐

Profession: ☐

Please tick the one response that best describes your answer:

1.(i) Gender	☐ Male ☐ Female ☐ Others	1.(ii) Age	☐ 16–20 ☐ 21–25 ☐ 26–30 ☐ 31–40	☐ 41-50 ☐ 51–65 ☐ 65 above	
1.(iii) Employment type/ Institute type	☐ Governmental		☐ No Govt.		☐ others
2. Do you wear a mask in public spaces? (ex. shopping mall, hospital, parks, restaurants, religious spaces, etc.)	☐ Never	☐ Seldom	☐ Sometimes	☐ often	☐ always
3. For you, a mask disposal area would be	☐ Dustbin		☐ Road/Street		☐ Others
4. Vaccination status	☐ 1 dose	☐ 2 doses	☐ booster		☐ no
5. Do you feel any health issues after Covid-19? (Can click more than one option)	☐ Eyesight	☐ hearing impairment	☐ anxiety	☐ depression	☐ back pain
6. Click on the preferable option	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
(i) Financial crisis after Covid-19	☐	☐	☐	☐	☐
(ii) Life Satisfaction after Covid-19	☐	☐	☐	☐	☐
(iii) Personal Relationship improvement after Covid-19	☐	☐	☐	☐	☐
(iv) Expenses increased in every material after Covid-19	☐	☐	☐	☐	☐
7. In which way, do you shop for the product?	☐ Online		☐ Offline		☐ Both
8. After Covid-19, do you face challenges in the section below?	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
(i) Food	☐	☐	☐	☐	☐
(ii) Exercise	☐	☐	☐	☐	☐
(iii) Hygiene	☐	☐	☐	☐	☐
(iv) Study	☐	☐	☐	☐	☐

9. Vehicular use of preference (Before Covid-19)	☐ Cycle	☐ Rickshaw (rent)	☐ bike (rent)	☐ bus (rent)	☐ CNG (rent)	☐ Private (car/bike)
10. Vehicular use of preference (After Covid-19)	☐ Cycle	☐ Rickshaw (rent)	☐ bike (rent)	☐ bus (rent)	☐ CNG (rent)	☐ Private (car/bike)
11. Do you feel the need for changes in your city? (Can click more than one)	☐ adding open spaces		☐ adding a bicycle lane		☐ adding a broad footpath	
12. Do you feel the demand for workspace in your home after Covid-19?	☐ Yes	☐ No				
If profession related to public health (Doctor, Nurse, Diagnostic center, etc.) then fill up this part						
13. Do you believe the number of patients at the hospital grew due to Covid-19?	☐ Yes	☐ No				
14. Do you feel that the number of doctors and nurses increased in hospitals due to Covid-19?	☐ Yes	☐ No				
15. Does your hospital have a Covid ward?	☐ Yes	☐ No				
16. Do you think there will be more waste material in the hospital following Covid-19?	☐ Yes	☐ No				
17. Do you feel extra expenses increased for PPE, masks, and other instruments due to Covid-19?	☐ Yes	☐ No				
18. Do you face difficulties in handling medical instruments?	☐ Yes	☐ No				
19. Any challenges you are facing after Covid-19; you want to mention?						
If profession related to businessmen (restaurants, shops, pharmacies, etc.), freelancers, and entrepreneur, then fill up this part						
20. Do your profit more after Covid-19?	☐ Yes		☐ No			☐ Neutral
21. Do you do the same business as you did before Covid-19?	☐ Yes		☐ No			
22. What was your alternate work during Covid-19?	☐ Yes		☐ No			
23. Do you follow any rules given by the government for covid-19 in recent times?	☐ Yes		☐ No			
24. Do you take a loan to run the business after Covid-19?	☐ Yes		☐ No			
25. Masks are worn by the customers and waiters/sellers in recent time	☐ customer	☐ waiter		☐ seller		☐ No one

Credit authorship contribution statement

Farhana Hoque: Conceptualization, Methodology, Investigation, Data curation, Writing-original draft, review & editing, Supervision, Project administration.
Research Assistants: questionnaire survey, field survey, prepare the graphical presentation, data analysis, review writing draft.

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Declaration

Conflict of interest
The author declares that she has no conflict of interest.

Ethical approval and consent to participate
The author is certain that all the processes used in this project complied with the Helsinki Declaration of 1975 (Association, 2013). In addition, Participants' confidentiality and privacy were maintained. Informed consent was obtained from the participants. In the offline survey, there was a consent option in the questionnaire about whether they wanted to participate or not. On the other hand, the author took an anonymous consent form from the participant before filling up the questionnaire in the offline survey.

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