Title: Psychosocial, and socio-economic crisis in Bangladesh due to COVID-19 pandemic: a perception-based assessment

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Abstract

The COVID-19 pandemic situation, disease intensity, weak healthcare facilities, unawareness, and misinformation led people to fear and anxiety in Bangladesh. This study intended to get peoples' perception on psychosocial, socio-economic and environmental crisis amidst the pandemi. An online questionnaire was surveyed nationwide (respondents no.1066). Datasets were analyzed through the Principal Component Analysis (PCA), hierarchical Cluster Analysis (CA), Pearson's correlation matrix (PCM), Linear regression analysis (LRA), and psychometric characteristics were included in the Classical Test Theory (CTT) analysis. There were good associations among the psychosocial, socio-economic and environmental parameters.

A significant association between fear of COVID-19 with struggling healthcare system ($p<0.05$) was found. Also, negative association between fragile health system and government's ability to deal with the pandemic ($p<0.05$) revealing poor governance. Again, a positive association of shutdown and social distancing with fear of losing life, and due to lack of health treatment ($p<0.05$) reveals that shut down hampers normal activities which may lead to mental and economic stress. However, a positive association of socio-economic impact of the shutdown with poor people's suffering, the price hike of basic need, hamper of formal education ($p<0.05$) may lead to severe socio-economic and health crisis. There is a possibility of climate-induced disaster during/after the pandemic, which will create severe food insecurity ($p<0.01$). Daily wage earners and poors will suffer most by food and nutritional deficiency, and the country may face huge economic burden. Proper risk assessment and communications is needed to alleviate fear and anxiety. Thus, financial support and mental boosting is required.

Keywords: COVID-19, Perception-based questionnaire, principal component analysis (PCA), Linear regression model, social panic, social conflict

1. Introduction

With the novel coronavirus disease (COVID-19) commencing from November 2019 in Wuhan, China, the World Health Organization (WHO) chief Dr. Tedros Adhanom Ghebreyesus publicly announced COVID-19 as global pandemic on March 11, 2020 (WHO 2020). COVID-19 has advanced into a pandemic, started with small chains of transmission cumulating into larger chains of transmission in many countries subsequently resulting in the widespread transmission (Anderson et al., 2020). Social isolation, institutional and home quarantine, social distancing, and community containment measures were applied without delay (Hopman et al., 2020). By quick administrative action and raising awareness in individuals for social-distancing and stringent steps were taken to manage the spread of disease by cancelling thousands of activities of social gatherings in offices, classrooms, reception centers, bars, clubs and transport services, travel restrictions, contact tracing leaving the countries in complete lockdown (Cohen & Kupferschmidt, 2020). The remarkable interferences and ventures in public health to quarantine mass people have prevented this virus from spreading transmission between humans in China, Singapore, Hong Kong, and South Korea well to date, despite initial cases (Anderson et al., 2020; Zhang et al., 2020).

However, a surge of COVID-19 outbreak was observed in Asian country Iran, European Union countries Spain, Italy, and Germany, UK, and the USA indicating that the infection had passed the tipping point (Day, 2020). It took 67 days from the first reported of COVID-19 to reach 100,000 cases, 11 days for the second 100,000, and just four days for the third 100,000 (WHO 2020). Today, total global COVID-19 cases rise to about 2.7 millions with total deaths rising to about 190000 persons (23nd April 2020). Total persons recovered is 717,625. USA is the highest affected country from COVID-19 with total deaths of about 47000 (WHO 2020) and the USA is highest in terms of the number of affected persons as well about 0.9 million. The accelerating spread of the COVID-19 and its outcomes around the world has led people to fear, panic, concern, and anxiety (Ahorsu et al., 2020), panic buying of surgical masks (Wang et al., 2020), stigma, depression, racism and xenophobia. In addition, as there is no medication yet, self-prescription of wrong drugs and wrong use disinfectant liquids, methyl alcohols, garlic, lemon tea is amongst the many rumors that boggled peoples' mind and even lead to death.

Bangladesh first confirmed the COVID-19 case on 7 March 2020 (IEDCR/DGHS/GOB, 2020), followed by a nationwide lockdown of all educational institutes, and government and private offices from 26 March and until 24 April 2020 to prevent human transmission. The government deployed armed forces to facilitate the prevention of the disease from 24 March as well as emergency healthcare services and law enforcement services were exempted from this announcement. However, just after the announcement of lockdown, more than 11 million people left Dhaka to be in their home districts and commenced the risk COVID-19 to all 64 districts. Considering the population density, environmental factors, social structure, cultural norms, and health care capacity of Bangladesh, it is certainly hard to lock down the people (Tareq et al., 2020). Besides, Bangladesh hosts the largest refugee camps in Cox's Bazar which is also about to embrace the COVID-19 pandemic.

Today the total 3382 confirmed cases of COVID-19, 110 deaths, 62,911 quarantined cases, and 47,484 released from quarantine (Figure-1). With a highly centralized testing authority, as of today, only 29732 individuals have been tested for COVID-19 by the IEDCR (IEDCR/DGHS/GOB, 2020) and often the tests have been done after the patient expired. Across the nation, media reports saying patients continue to die from COVID-19 related symptoms who have been treated in isolation while others had been refused healthcare in the hospitals and clinics. Compared with the exponential death rate in other countries, the curve remains level in Bangladesh. The argument remains whether Bangladesh entered the third phase of the pandemic as there is just mild proof of the community transmission yet and that many people are undetected. Moreover, there is only 129 ICUs and only 500 ventilators in the country against more than 180 millions of population and a shortage of specialized trained personals to operate the ICUs and even COVID-19 tests.

Amidst the lockdown of the COVID-19 pandemic, Bangladesh also has been facing other epidemics of panic buying, social stigma, fear, and hatred. Surgical masks, hand gloves, hand sanitizers, disinfectant liquids, chloroquine tablets, common cold medicines were out of the market, the price hike of the daily necessities was observed due to low supply. Hatred was observed towards the COVID-19 patients, their family members, the foreign returnees who were the reasons for the preliminary chain of transmission, and the healthcare workers. Foreign returnees who disobeyed home quarantine were mob-beaten, the patients have often been denied ambulance facilities and primary healthcare treatments. Due to the fear and unknown reason private hospitals and clinics are not providing any services specially in the sub-urbas and rural areas. The shortages of the healthcare facilities of other primary and critical care patients are being deprived. The healthcare workers who have treated the patients and infected have been socially hatred. Moreover, irrational uses of PPE were found among the government officials, bankers and other professionals rather than the healthcare workers who were in dire needs. Public protests were observed in many locations against the setup of quarantine facilities, COVID-19 care hospitals and clinics. Social humiliation was a common scenario practised by law enforcement authority and government officials. In addition, family members were found to flee leaving the infected and the deceased and even denied burial in the local graveyards which are basic human rights. It is utterly depicting the scenario of public anxiety which should be immediately dealt with by the Government along with the alliance groups with proper information.

Amidst the scenario of societal anxiety and fear, the possibility of natural disasters such as tropical cyclone preparedness, the rising of dengue fevers and seasonal influenza, infections are potentially overlooked. Furthermore, the consequences of disposal of used PPE without proper treatment in the landfill or the dumps unconventionally will just arise more disease transmission and environmental disasters leaving the country at stake. In these circumstances, this study was therefore designed to analyse the psychosocial, socio-economic and environmental crisis based on public perception in Bangladesh due to COVID-19 outbreak. This assessment might be useful for the government and policy makers of countries with similar socioeconomic and cultural structure like Bangladesh.

2. Methodology

2.1. Perception-based questionnaire

The target population was general Bangladeshi citizens age 18 years or older. The inclusion of the respondents was anonymous and voluntary. Before formulating the study design, literature review, country situation analysis, expert interview was conducted carefully. Data from 1082 respondents were collected *via* a nationwide online survey method, but following the removal of incomplete 16 questionnaires, 1066 were retained for this study. A five-point (1to 5) perception-based Likert scale was used to test whether each understands the variable descriptions that ranged from strongly disagree to strongly agreed with the statements. Total 46 items were used to conduct the perception-based analysis of the psychosocial, socioeconomic, and potential environmental crisis due to the COVID-19 outbreak in Bangladesh (Table-1, S1).

2.2. Demographic Information

A background information dataset containing age, gender, educational qualification, and profession was employed to get demographic information of the participants.

2.3. Data analysis

The descriptive statistics (e.g., frequencies, percentages, student T-test, and chi-square tests) were employed to understand respondents' characteristics. Investigation of psychometric characteristics was included in the Classical Test Theory (CTT) analysis. The CTT analysis added internal consistency, test reliability, corrected item-total correlation, average variance extracted (AVE), and validity of the item selection. Employing the Statistical Package for the Social Science (SPSS) v. 25.0, datasets were analyzed through a set of statistical techniques including Principal Component Analysis (PCA), hierarchical Cluster Analysis (CA), Pearson's correlation matrix (PCM), Linear regression analysis (LRA), and CTT analysis. PCA is a data reduction tool that demonstrates each potentiality of parameters and their confidence level in large sample datasets. Before conducting the PCA, Kaiser-Maier -Olkin (KMO) and Bartlett's sphericity tests were applied to confirm the necessity of this analysis. The results of the KMO >0.5 (the KMO value was 0.931 in this work) and the significance of Bartlett's sphericity test at $p<0.01$ supported our datasets to be fitted for the PCA (Islam et al., 2020). The number of factors chosen was based on the Kaiser's principle, where the only factors with eigenvalues>1.0 were considered. Cronbach's alpha was employed to test the consistency and reliability of the factor loadings in this study. Cronbach's alpha values >0.06 (the Cronbach's alpha value was 0.896 to 9.14) are regarded to be suitable in social science research (DeVellis, 1991). The CA is a crucial means of detecting associations among many psychosocial and environmental parameters. CA assists to demarcate a population into various groups based on the same feature of a set of the dataset that may reveal causes, effects, and or the source of any unidentified psychosocial problems. Furthermore, hierarchical clustering was used to determine the probable number of clusters. The one-way ANOVA test was carried out to verify the significant differences in the variance at $p <0.05$.

2.4. Ethics
The study procedure was performed based on guidelines for the declaration of Helsinki. Informed consent was acquired electronically before data were collected from the respondents. All the respondents were informed before data collection about the purpose of the study.

3. Results and discussions
3.1. Demographics information
According to the survey results, the ratio of male to female participants was 3:2, whereas the composition of age groups were 81.4% (18–30 years old), 13.5.% (31–40 years old), 3.6% (41-50 years old), 0.9% (51-60 years old) and 0.7% (>60 years old), respectively. The young people responded more maybe because of their frequent access to the internet depending on the socio-economic structure of Bangladesh. However, the average age of the participants (n=1066) was 27.80 years (SD±10.05), and the participants had, on average, 12.5 years of formal education (SD±8.1). More than half of the participants were males (n=661; 62%) and remaining (n=405; 38%) females. Nearby, 60% of the youth group was mostly students as they are the dynamic group in the society, also involved in social works, job seeking, and research activities. Also, Bangladesh is a youth dividend country. Rest of the 40% were from various professions of doctors, civil service officials, non-government officials, teachers, policymakers, and researchers.

3.2. The affected psychosocial well-being due to COVID-19 and the fragile healthcare system
From the classical test theory (CTT), according to the corrected inter-item correlation analysis, among 46 variables, four variables have low corrected item-total correlations which were (i.e., the ability of the government to deal the outbreak, −0.054; seriousness of the government, −0.011; government is taking a proper decision, −0.078 and other sectoral involvement to COVID-19, 0.04). The remaining 42 variables in the scale had acceptable corrected item-total correlation (0.257 to 0.602) and were employed for following psychometric testing purposes. From CTT assessment, the Cronbach's alpha (0.894 to 0.902), composite reliability (0.88) and AVE (0.47) were acceptable (Table 1, S2). Pearson correlation matrix further demonstrated a good association among the psychosocial, socio-economic and environmental parameters which may express the potential contribution of psychosocial components. Each pair of variables exhibited significant positive and negative associations (Table-S3). A strong significant positive association was identified between individual mental health condition (MH) and the healthcare system in Bangladesh (HSB) (r=0.104-0.214, p<0.01) (Table-3) while MH also demonstrated a strong significant negative association with GPI (r=-0.07-00.136, p<0.01). Each pair of variables such as socioeconomic issues (SEI) versus mental health (MH), immediate emerging issues (IEI) versus MH, enduring emerging issues (EEI) vs MH, exhibiting strong significant positive associations <p<0.01), while their correlation matrix ranged from 0.113 to 0.194. The positive and negative associations might have indicated the variability of the contributing components or similarities of variables.

Among 45 variables, only 5 variables showed statistically significant associations with the fragile healthcare system of Bangladesh (HSB1) to deal with the recent outbreak of COVID-19 in the country (Table-2). HSB2, HSB5 and IEI1 statistically pose a significant positive effect on the fragile health system of Bangladesh (p<0.01) showing that huge population and lack of healthcare

facilities creating the chance of community transmission of COVID-19 in Bangladesh. This finding is going to happen might be within a short time as IEDCR already announced a mild-level community transmission possibility in Bangladesh on 1st April 2020 (IEDCR press release 1st April 2020). There was also a positive significant association between fear of the COVID-19 outbreak (MH1) with the struggling healthcare system (p<0.05). Also, the negative association between HSB1 and government political decision GPI1 (p<0.05) reveals that the Government is unable to make proper decisions at the right time due to the poor governance in the existing healthcare system.

Any major epidemic outbreak has negative effects on individuals and society (Duan & Zhu, 2020). The fear of mass people is rational in the sense that the data gathered on the COVID-19 so far informs the fatality case of the virus risk is around 1% and that it can kill healthy adults, as well as the elderly people with, existing health problems (Gates, 2020). However, the global situation of fatality is more severe than it was at the beginning of the COVID-19 episode. So far, the fatality rate due to the COVID-19 is 9% in Bangladesh. It is crucial to assess the COVID-19 pandemic independently based on its attributes and not of the past epidemics like SARS or MERS (Hsu et al., 2020). However, the reported case numbers are given by the Bangladesh Government certainly underestimates the actual number of infected persons given the shortages or unavailability of test kits (Ebrahim et al., 2020) and limited to a centralized facilities IEDCR. Decentralization of testing and treatment facilities are required for the healthcare systems to combat the pandemic. Just shortly after the survey of this study (29 March), on 31 March the Government took the decisions to conducts tests in 5 more institutions along with the IEDCR, Bangladesh Institute of Tropical and Infectious Disease (BITID), Dhaka Shishu Hospital, icddr,b, Dhaka medical college and hospital, and Armed Forces Institute of Pathology. As with the COVID-19 outbreak other critical patients and infectious disease affected are being deprived, it is urgent that the patient-management decisions, early diagnosis and rapid testing and detection are needed (Binnicker, 2020). The government needs to take decisions to implement testing facilities for both public and private clinical laboratories all over Bangladesh.

Fair and equitable sharing of health resources can mitigate further risks to public health by meeting community health needs and generates all-important trust and resilience (Berger et al., 2020). The development of resilience is significant to combat any disasters even pandemic. Subsequently, to develop resilience in healthcare systems to tackle any pandemic, good governance is crucial followed by good coordination. In addition, it also requires financing, service delivery, medicines and equipment, health workers, and information (Legido-Quigley et al., 2020). Further, financial resources and investments are required in the health sectors to overcome this burden of the pandemic. Financings are required for the protection of healthcare professionals, caregiver stuffs responsible for emergency handling, intensive care unit (ICU) beds, protective equipment, diagnostic test kits, and mechanical ventilators and additional supports are required for the mentally and physically affected persons survived from COVID-19. Moreover, Governments, institutions and healthcare facilities and the general public all hold a social and ethical responsibility to assess and mitigate risks for those groups so often left behind (Berger et al., 2020). It is, also imperative to continue taking precautions, including screening, isolation of suspected

cases and social distancing even after the pandemic is over. The government should prepare policies and decisions on the early recovery plans which should be inclusive to all races, classes and disabilities.

3.3. The affected psychosocial and socioeconomic fear of COVID-19 and the Government's decision to lockdown

Pearson correlation matrix also showed a strong significant negative association of mental health (MH) with governance and political issues (GPI (r=-0.07-00.136, p<0.01). Each pair of variables such as socioeconomic issues (SEI) versus mental health (MH), immediate emerging issue (IEI) versus mental health (MH), Enduring emerging issues (EEI) vs mental health (MH), exhibiting strong significant positive associations (p<0.01), while their correlation matrix ranged from 0.113 to 0.194 (Table-S3). The positive and negative associations might have indicated the variability of the contributing components or similarities of variables.

The results of linear regression further showed that among 45 variables, only10 variables showed statistically significant associations with the fear of COVID-19 outbreak (Table-2). For instance, mental health variables MH2, MH3, and MH4 statistically pose a significant positive effect on fear of COVID-19 outbreak (p<0.01). On the other hand, fear of COVID-19 outbreak (p<0.05), the health system in Bangladesh (HSB1 and HSB8) pose statistically significant positive impact, e.g., there is a positive association among lack of testing facilities and fragile healthcare system are contributed to fear development due to COVID-19 pandemic in Bangladesh. The socioeconomic issues (SEI 10) and immediate emerging issues (IEI2) have a statistically significant positive impact (p<0.01), e.g., obstruction to the formal education system, and the potentiality of a huge number of people can be infected may contribute to the fear development of COVID-19 outbreak in this country. There was also a positive significant association between the chance of community transmission of COVID-19 immediate emerging issues (IEI1) with fear of the COVID-19 outbreak (p<0.05).

The fear of getting the virus-infected along with the administrative procedure of testing and reluctance of other private clinics and hospitals to admit patients is a sign of weak governance in the healthcare of Bangladesh. In this scenario, other critical care patients are denied admittance, negligence and often left to die without treatments. After the detection of first COVID-19 case in Bangladesh, at least 42 death cases having COVID-19 like symptoms were reported in the different national daily newspaper in Bangladesh of which most of the cases claimed a refusal from the hospital from getting treatment. Moreover, the administrative procedure of the deceased to burial put another confusion and religious fear in the minds of the common people as the victims to COVID-19 are buried without Muslim funeral procedures of baths and family members and relatives cannot be present. In this scenario, it is imperative to deal with the peoples' fear and anxiety by the government. Proper information should be circulated to get the people out of confusion. The Bangladeshi electronic and print media is not always acting responsibly to disseminate truthful information and exposing fake news stories spreading on social media.

Therefore, the Bangladesh government formed a cell to monitor media to eradicate rumours or incorrect information being disseminated on social media platforms and the mainstream media. Since 26 March, this cell formed by the Ministry of Information started monitoring and informing the concerned authorities regarding misleading information sharing to protect the mental health of the people. Media partnerships should be created to prevent societal fear (Hopman et al., 2020).

3.4. The affected psychosocial wellbeing and the Government's capacity to deal COVID-19

Results from regression analysis further showed 8 variables have a significant statistical association with the Governance and political capacity to deal with the COVID-19 outbreak in Bangladesh (GPI1). A significant positive association was found among the governance and political issues (GPI1 with GPI2, GPI3) and socioeconomic issues (SEI2) ($p<0.01$), implying that seriousness of Government's decision to lockdown activities was on proper time and that it enhanced the capacity of Government to deal with the COVID-19 outbreak (Table-2). Successful governance is only possible with a competent early warning system, efficient analysis of the situation, interpretation, sharing, and use of relevant knowledge and information (Gu & Li, 2020). Public health instruction should be established on scientific evidence to reduce the anxiety and distress caused by misinformation and rumours. Epidemiological outcomes need to be informed on time so that they can be accurately evaluated and explained (Xiao & Torok, 2020). Societies where underserved communities exist they strongly fear government information and politics. Public risk communications are therefore needed to prevent misleading information and rumours in social media and news media. The psychosocial risk of children and elderly are particularly vulnerable to mental health in this situation as they are out of touch with schools, classmates, playmates, deprived of physical activities, social activities and thus mentally traumatized which needs to be addressed. In addition, due to home lock-down and to maintain family hygiene, the burden just increases on the women along with her regular household activities. Moreover, it also increases family conflicts between men and women arising from further physical and mental assault towards women. Furthermore, in the refugee camps, it will have catastrophic outcomes (Hopman et al., 2020). These kinds of risk should be properly communicated with the public.

3.5. The potential arising of social conflicts from COVID-19 and governance and political association

However the negative association between governance and political issues (GPI1) and health system of Bangladesh (HSB9) ($p<0.01$) showing that lack of budget created a gap in the response to COVID-19 (Table-2). Moreover, a negative association of governance and political issues (GPI1) with the health system of Bangladesh (HSB4) and socioeconomic issues (SEI3) ($p<0.05$) showing that lack of trained doctors and healthcare professionals, hampering formal and informal business activities are reducing the Government's capacity to deal with the COVID-19 outbreak. Nevertheless, a positive association of governance and political issues GPI1 with socioeconomic issues SEI11 ($p<0.05$) and governance and political issues GPI7 ($p<0.01$) showing that there is a possibility of social conflict due to this outbreak if not managed properly and Bangladesh Government will need support from developed nations and allied forces to deal with this outbreak. It should be mentioned here that containment, risk mitigation, and suppression plans must be as inclusive as possible or risk undermining response efforts. A commitment to inclusion means

responding to COVID-19 in a way that is sensitive to our most vulnerable communities, including homeless people, those without adequate insurance or employment, communities of colour, indigenous communities, immigrant communities, people with disabilities, and certain frontline healthcare workers and emergency responders (Berger et al., 2020). Prisons, nursing homes, homeless shelters, and refugee camps can become focuses for disease outbreaks; people in such settings often have inadequate access to basic healthcare and comorbidities that increase the risk of serious illness (Berger et al., 2020).

As the days of pandemics commencing, each day brings in new arguments, conversations and alarming developments of fake news and propaganda, leaving people in psychological trauma and anxiety (Ali, 2020). Being out of human touch in a home-locked, isolated situation, uncensored social media offers rich grounds for rumours, speculations and government conspiracy theories to go viral. Moreover, religious tensions, personal tensions on job insecurity, financial loss, social insecurity leaves the people even to commit suicide (Hsu et al., 2020). Honest, transparent communication is, therefore, vital for risk communication, while confusing or contradictory health messaging engenders mistrust and leads people to seek information from unreliable alternative sources and thus proliferates rumours (Berger et al., 2020).

3.6. The potential socioeconomic crisis of the COVID-19 outbreak and the suffering poor communities

Regression analysis showed that among the 45 variable, 9 variables showed a significant statistical association with the future impacts of implementing lockdown and social-distancing activities (SEI2). Significant positive association of socioeconomic issues (SEI2) with governance and political issues (GPI1) and socioeconomic issues (SEI3) ($p<0.01$) showing that the Government took the right decision by shutting down the regular activities and implementing the social distancing approach (Table-2). But due to this initiative, the formal and informal business sector and the economy will be hampered. Again, a positive association of socioeconomic issues (SEI2) with mental health (MH3) and healthcare services (HSB5) ($p<0.05$) reveals that this decision of shutting down normal activities was imposed due to the fear of losing lives due to COVID-19 and having lack of healthcare facilities. However, a positive association of socioeconomic issues SEI2 with SEI4, SEI8, SEI10 and enduring emerging issues EEI6 ($p<0.05$) showing that due to this shut down poor people will be severely affected, price of the basic products will increase, the formal education system will be hampered and the possibility of severe socio-economic and health crisis will increase.

The socio-economic fall-out from this pandemic is already high particularly for the disadvantaged poor communities, day labourers, wedge earners, small and medium business start-ups. Already the country's RMG sector lost many global orders due to the pandemic and the remittance flow are the lowest. The job insecurity and financial insecurity is foreseeable by the day and concerns a global depression which will affect the local market as well- the investors. Financial incentives should be given to the poverty-stricken community as well as insurance for the healthcare professional at the frontline.

3.7. Other infectious disease risk management during COVID-19 outbreak

In regression analysis, 8 variables are statistically associated with the possibility of community transmission of COVID-19 (IEI1). A significant positive association between mental health variables (MH1, MH3), healthcare system variables (HSB1, HSB7), Socioeconomic variables (SEI6, SEI11), immediate emerging issues (IEI2, IEI3) (p<0.01) reveals that community transmission will increase the number of infected people which will create further fear and mental pressure of others of losing life due to COVID-19 infection (Table-2). The fragile healthcare system of Bangladesh will be unable to detect most of the infected patients due to a lack of health facilities leads to undermining the actual infected cases. As of the last day of the survey for this study, the testing rate of COVID-19 was lowest in Bangladesh compared to the other similar countries (10 people per 1 million). Also, the lack of a bio-medical waste management facility will put more pressure to maintain consequences. Also, due to the community transmission of COVID-19, many people will lose their livelihoods at a time which might lead to creating social conflict in the worst cases.

3.8. Combating environmental and climate change induced disaster risk during COVID-19 outbreak

Regression analysis further identified more 9 variables are significantly associated with the possibility of occurring climate change induced extreme events (flood, cyclone etc.) that occur after and/ or during the COVID-19 situation and creating a double burden to the country due to enduring emerging issues (EEI2). The positive association between EEI2, SEI9, IEI5, EEI1, EEI3 and EEI4 (p<0.01) showing that there is a possibility of climate change-induced disaster after the COVID-19 situation which will create severe food insecurity (Table-2). Poor people will suffer most by food and nutritional deficiency and the country will face huge economic loss. Also, after the COVID-19 situation lack of bio-medical and solid waste management will add more problems and increase the risk of other diseases. Moreover, a positive association between EEI2, HSB2 and EEI6 reveals that after the COVID-19 situation existing huge population will create more severe socio-economic and health crises.

The utilization of the health-emergency disaster risk management (Health-EDRM) (Health-EDRM) framework is important here to implement. Health-EDRM refers to the "systematic analysis and management of health risks, posed by emergencies and disasters, through a combination of (1) hazard and vulnerability reduction to prevent and mitigate risks, (2) preparedness, (3) response and (4) recovery measures" (WHO 2019) (Djalante, Shaw, & DeWit, 2020). Health-EDRM is thus an umbrella term, which the WHO uses to refer to the broad intersection of health and disaster risk management (DRM). As the patients of dengue and other seasonal diseases are rising, and the possibility of a natural disaster like cyclone remains, the healthcare system should be coping with the changing scenario of the COVID-19 outbreak in Bangladesh.

Moreover, biomedical wastes should be disposed of following national and international guidelines on disposal of infectious biological hazardous materials (Ramanathan et al., 2020). When an exponentially rapid spread of the epidemic of infections breaks out, the generation of biomedical wastes and other related healthcare hazards may be considerably increased within a

very short period. If improperly treated, these wastes may accelerate disease spread and pose a significant risk for both medical staffs, patients and wastes management unit personnel. A complex short-term decision-making problem is required by the authority to deal with the fast accumulation and a specific transportation mode of the medical waste problem. Healthcare centres can either directly transport to the treatment centres or they can transfer and consolidate via a temporary transit centre (Yu et al., 2020). The use of PPE should be distinguished at different risk factors to adopt different epidemic prevention measures, and reduce the waste of personal protective equipment, as these resources are already in short supply (Xiao & Torok, 2020). It is absurd to find many government administrative officers of Bangladesh wearing PPE, leaving the healthcare workers and waste management workers at risk with scanty or no PPE and increasing the unnecessary waste generation. Moreover, repeated use of disposable masks, and not washing the cloth mask could create further risks of infection that need to be dealt with proper information to the public (Feng et al., 2020).

3.9. Overall relationship assessment among the variables

PCA further revealed confidence level of controlling factors in Bangladesh COVID-19 outbreak and how these components are correlated to the psychosocial, socio-economic and environmental crisis components (Table-S4). Nine principal components (PCs) were originated based on standard eigenvalues (surpassed 1) that extracted 55.28% of the total variance as displayed in Table-4 However, the Cronbach's alpha factor scores varied from 0.914 (PC1) to 0.896 (PC9) and thus, they are fit for this analysis. The scree plot was adopted to detect the number of PCs to be retained to insights into the underlying variable internal structure (Figure 2). The loading scores were demarcated into three groups of weak (0.50–0.30), moderate (0.75–0.50) and strong (> 0.75) respectively (Liu et al., 2003; Bodrud-Doza et al., 2016; Islam et al., 2017). The PC1 (First) elucidated 8.967% of the variance as it encompassed a confidence level of weak positive loading of the healthcare system in Bangladesh (HSB1-3: 0.334-0.459); moderate positively loaded of the healthcare system in Bangladesh (HSB4-10: 0.50-0.746). The PC2 (Second) elucidated 8.587% of the variance, and was loaded with moderate positive loading of socio-economic issues (SEI5-9: 0.606-0.702 and SEI11: 0.548); weak positively loaded socio-economic issues SEI2-4: 0.336-0.493) and SEI10: 0.418).

The PC3 (Third) explained 7.196% of the variance and was moderate positively loaded of immediate emerging issues IEI1-5 (0.546-0.665). The PC4 (Four) elucidated 6.792% of the variance, and was loaded with a significant level of strong positive loadings of immediate emerging issues IEI4 (0.751); moderate positively loaded of immediate emerging issues IEI2-3 (0.541-0.683), immediate emerging issues IEI5-6: 0.659-0.686); weak positively loaded of immediate emerging issues IEI1 (0.345).

The PC5 (Five) and PC6 (Six) explained 6.023% and 5.603% of the total variances, and were loaded a significant level of strong positive loading of mental health issues MHI2-3 (0.764-0.832) and government and political issues GPI2-3(0.783-0.787); moderate positively loaded of mental health issues MHI1 (0.746), MHI4 (0.613), government and political issues GPI1 (0.571), and

GPI4 (0.698). Weak positively loaded of mental health issues MHI5 (0.41) and government and political issues GPI7 (0.574) respectively.

The PC7 (Seven), PC8 (eight) and PC9 (nine) elucidated 5.304%, 3.743% and 3.064% of the total variances and were moderate positively loaded of government and political issues GPI5-6 (0.627-0.651), socioeconomic issues SEI1 (0.574), SEI2-3 (0.636-0.637) and immediate emerging issues (IEI1:0.519) respectively; weak positive loaded of socio-economic issues SEI4 (0.397), SEI9-10 (0.317-0.322), healthcare sector of Bangladesh HSB1-2 (0.383-0.430), mental health issues MHI5 (0.313), immediate emerging issues IEI6-7(0.370-0.424).

Cluster analysis further detected total status of regional variations, and how socio-economic and environmental crisis influences psychosocial development (Figure-3). All the parameters were classified into four major groups: cluster-1(C1), cluster-2 (C2), cluster-3(C3) and cluster-4(C4). C1 composed of two sub-clusters of C1-A and C1-B; C1-A composed of (increase in the number of death for not having proper health facilities, lack of bio-medical waste management facilities in Bangladesh will create more problem, there will be many people with psychosocially shocked due to this outbreak and a large number of people will be infected and there is a chance of not detecting most of the infected patients due to lack of health facilities leads to undermining the actual infected case (IEI4-6, IEI2-3). C1-B composed of Socio-economic issues leading to poor people will suffer from the basic foods and nutritional deficiency (SEI2-6 and SEI9). C2 consists of socio-economic issues (SEI7-11). C3 consisted of three sub-clusters of C3-A, C3-B and C3-C. C3-A contained governance and political issues GPI5-6, socio-economic issues that the chance of social conflict due to this outbreak will rise (SEI1). C3-B consisted of immediate emerging issues IEI1-7, while C3-C composed of issues related to the healthcare system in Bangladesh (HSB1-10). Cluster-4 consisted of three sub-clusters of C4-A health system in Bangladesh and immediate emerging issues (HBS9, IEI1), C4-B mental health issues (MHI1-5) and C4-C governance and political issues (GPI1-4 and GPI7).

All these variables and their analysis aids in identifying the association among the variables, which is useful when planning risk mitigation measures concerning the psychosocial, socio-economic and environmental components. Finally, combating the global pandemic is not easy. Therefore, with the great advancements in speed and power of science. International collaborations are required to provide knowledge about the virus and disease recovery (Hsu et al., 2020). Moreover, it is highly recommended by WHO and the other stakeholders from the national level to raise the testing speed and facilities in Bangladesh. Multi-sectoral involvement and proper relief facility to the unprivileged population must be ensured.

6. Concluding remarks

This perception-based study tried to visualize the psychosocial as well as socioeconomic stresses due to COVID-19 pandemic in Bangladesh. It can be undoubtedly proven the mental stress due to the COVID-19 as it forced to lock down the country without ensuring the fundamental needs. The

weak governance in the healthcare systems and facility exacerbated the general publics anxiety. The centralized COVID-19 testing facility and limitations of dedicated hospital units for COVID-19 patients hampered the other critical patients to get healthcare services. As a country of climate change vulnerability, there might be some additional risk factors of occurring natural disaster such as tropical cyclone which may add further tolls for the country. The Shutdown of all educational institutions may increase hatreds and mentally depressed youngs, and business centres except the groceries, pharmacies, and other daily necessities put stress to the country's economy. Another infectious outbreak of dengue might be on the way that might have a cumulative/synergistic negative impacts with COVID-19 on public health in Bangladesh. However, numerous factors can be considered for the upcoming threat due to COVID-19 in Bangladesh are as follows; risk of community transmission, healthcare capacity, governance coordination, and relief for the low-income population, biomedical waste management, and preparation for the possible natural disasters. The recommendations were collected in the perception study can be summarized as to increase COVID-test rate and medical facilities. The decentralization of the COVID-19 medical facilities is very important due to forced migration of more than 11 million people from Dhaka city to 64 districts of Bangladesh after the announcement of partial lockdown. In addition, proper risk assessment and dependable risks communications, multi-sectoral management taskforce development, take care of biomedical waste, ensure basic supports to the people who need, and good governance was suggested to reduce psychosocially, and socio-economic crisis of COVID-19 outbreak in Bangladesh. Finally, this assessment process could help the government and policy makers to judge the public perceptions to deal with COVID-19 pandemic in densely populated lower middle-income countries like Bangladesh.

Conflicts of interest
The authors declare no conflicts of interest.

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Table-1: Descriptive statistics and item-total correlation

Sector	Statement	Denote	Strongly disagree % (n)	Disagree % (n)	Neither agree nor disagree % (n)	Agree % (n)	Strongly agree % (n)	Mean	Std. Deviation	Skewness	Kurtosis	Corrected Item-Total Correlation
Individual Mental health condition (MH)	I am most afraid of coronavirus recent outbreak in Bangladesh	MH1	2.9 (31)	5 (53)	12.4 (132)	33.5 (357)	46.2 (493)	4.152	1.012	-1.271	1.203	0.381
	I am afraid of getting coronavirus	MH2	3.7 (39)	7.8 (83)	22.3 (238)	33.5 (357)	32.7 (349)	3.839	1.080	-0.747	-0.07	0.355
	I am afraid of losing my life or my relatives' life due to this outbreak	MH3	3.4 (36)	7 (75)	13.8 (147)	29.3 (312)	46.5 (496)	4.085	1.087	-1.131	0.525	0.360
	All the news and numbers of COVID-19 in different media increasing my tension	MH4	3.2 (34)	5.9 (63)	15 (160)	32.4 (345)	43.5 (464)	4.071	1.051	-1.11	0.659	0.376
	It makes me uncomfortable to be detached from regular activities	MH5	3.6 (38)	4.6 (49)	12.3 (131)	27.9 (297)	51.7 (551)	4.195	1.052	-1.369	1.301	0.344
Health system in Bangladesh (HSB)	Health system of Bangladesh is fragile to deal with the recent outbreak of COVID-19	HSB1	3.2 (34)	3.8 (41)	8.7 (93)	22.3 (238)	61.9 (660)	4.359	1.010	-1.736	2.476	0.360
	A huge population is a pressure to the existing health system to deal with COVID-19	HSB2	2.3 (25)	2.1 (22)	5.3 (57)	22.2 (237)	68 (725)	4.515	0.873	-2.237	5.195	0.421
	There is a lack of awareness of basic health issues in most of the citizens of Bangladesh	HSB3	1.3 (14)	1.3 (14)	5.9 (63)	24.1 (257)	67.4 (718)	4.549	0.776	-2.147	5.378	0.456
	There is a lack of trained doctors and health professional to deal with the COVID-19	HSB4	2.9 (31)	3.8 (41)	13 (139)	28 (299)	52.2 (556)	4.227	1.008	-1.374	1.451	0.305
	There is a lack of health facilities to combat the COVID-19 outbreak in Bangladesh	HSB5	1.3 (14)	0.9 (10)	4.8 (51)	17.5 (187)	75.4 (804)	4.648	0.734	-2.645	8.058	0.537
	There is a lack of health infrastructure to deal with COVID-19	HSB6	1.3 (14)	1.8 (19)	4.9 (52)	19 (203)	73 (778)	4.606	0.776	-2.432	6.482	0.511
	There is a severe lack of bio-medical waste management facilities in Bangladesh	HSB7	0.7 (7)	1.1 (12)	7.3 (78)	22.4 (239)	68.5 (730)	4.569	0.734	-1.927	4.103	0.533
	There is a lack of COVID-19 testing facility in Bangladesh	HSB8	1.6 (17)	0.9 (10)	3.1 (33)	12.4 (132)	82 (874)	4.722	0.715	-3.295	12.001	0.508
	There is a lack of budget or financial support to response to this outbreak	HSB9	5.3 (57)	7.9 (84)	11.9 (127)	25.7 (274)	49.2 (524)	4.054	1.186	-1.162	0.354	0.309
	Most of the poor people will not have access to existing	HSB10	1.1 (12)	1 (11)	6.1 (65)	15.9 (170)	75.8 (808)	4.643	0.741	-2.495	6.901	0.554

Sector	Statement	Denote	Strongly disagree % (n)	Disagree % (n)	Neither agree nor disagree % (n)	Agree % (n)	Strongly agree % (n)	Mean	Std. Deviation	Skewness	Kurtosis	Corrected Item-Total Correlation
	health facilities if they are infected by COVID-19											
Governance and Political issues (GPI)	Bangladesh government can deal with this outbreak	GPI1	28 (299)	26.2 (279)	21.9 (233)	15 (160)	8.9 (95)	2.506	1.284	0.436	-0.905	-0.054
	Government is taking this outbreak seriously to deal with	GPI2	19.9 (212)	25.2 (269)	22.5 (240)	23.5 (251)	8.8 (94)	2.762	1.257	0.121	-1.088	-0.011
	Government is taking proper decisions in the right time	GPI3	32.6 (347)	30.7 (327)	19.1 (204)	12.3 (131)	5.3 (57)	2.272	1.190	0.664	-0.52	-0.078
	Government is involving other sector actors to combat the COVID-19 outbreak	GPI4	12.3 (131)	18.9 (202)	36.1 (385)	23.8 (254)	8.8 (94)	2.979	1.128	-0.105	-0.654	0.040
	Government need support from the people to reduce the impact of COVID-19	GPI5	1.6 (17)	1 (11)	5.2 (55)	23.6 (252)	68.6 (731)	4.566	0.776	-2.319	6.367	0.435
	Government need to formulate a policy and action plan and implement it immediately	GPI6	1 (11)	0.8 (9)	4.1 (44)	17.5 (187)	76.5 (815)	4.675	0.690	-2.73	8.888	0.499
	The developed nations are going to support Bangladesh in response to COVID-19	GPI7	4.2 (45)	9.8 (104)	38.6 (411)	31.6 (337)	15.9 (169)	3.451	1.007	-0.308	-0.156	0.257
Socio-economic issues (SEI)	Shut down or lockdown of regular activities is a good decision to reduce the chance of infection of COVID-19	SEI1	1.5 (16)	1.2 (13)	4.8 (51)	27.4 (292)	65.1 (694)	4.534	0.774	-2.186	5.877	0.341
	Shut down or lockdown or social distancing will have an economic and social impact in future	SEI2	1.1 (12)	1.4 (15)	6.5 (69)	27.2 (290)	63.8 (680)	4.511	0.774	-1.935	4.453	0.486
	The formal and informal business will be hampered	SEI3	0.7 (7)	1 (11)	6.3 (67)	30.9 (329)	61.2 (652)	4.508	0.719	-1.701	3.719	0.513
	Poor people living in hand to mouth will be severely affected	SEI4	0.8 (9)	0.6 (6)	3.1 (33)	9.9 (106)	85.6 (912)	4.788	0.604	-3.639	15.449	0.525
	Most of the poor people living in urban areas have to leave due to not having any options for income	SEI5	1.4 (15)	3 (32)	8.6 (92)	26.1 (278)	60.9 (649)	4.420	0.875	-1.7	2.797	0.430
	Many people will lose their livelihood/ jobs at a time	SEI6	1.3 (14)	2.5 (27)	9.6 (102)	31.8 (339)	54.8 (584)	4.362	0.856	-1.515	2.416	0.490

Sector	Statement	Denote	Strongly disagree % (n)	Disagree % (n)	Neither agree nor disagree % (n)	Agree % (n)	Strongly agree % (n)	Mean	Std. Deviation	Skewness	Kurtosis	Corrected Item-Total Correlation
	There will be less supply of basic goods/ products for daily use	SEI7	2 (21)	5.6 (60)	12.8 (136)	36.8 (392)	42.9 (457)	4.130	0.971	-1.149	0.956	0.412
	Price of most of the basic products will be higher than usual	SEI8	1 (11)	4 (43)	10.7 (114)	33.5 (357)	50.8 (541)	4.289	0.887	-1.303	1.46	0.401
	Poor people will suffer food and nutritional deficiency	SEI9	0.9 (10)	1.2 (13)	4 (43)	24.4 (260)	69.4 (740)	4.601	0.712	-2.301	6.604	0.531
	The formal education system will be hampered	SEI10	1.7 (18)	2.3 (25)	9.5 (101)	29.4 (313)	57.1 (609)	4.379	0.877	-1.628	2.756	0.448
	There is a chance of social conflict due to this outbreak	SEI11	3.8 (40)	6.4 (68)	20.6 (220)	34.3 (366)	34.9 (372)	3.902	1.068	-0.863	0.201	0.408
Immediate emerging issues (IEI)	There is a chance of community transmission of COVID-19 in Bangladesh	IEI1	0.9 (10)	1.2 (13)	12.2 (130)	29.3 (312)	56.4 (601)	4.389	0.817	-1.373	1.897	0.459
	A huge number of people will be infected	IEI2	1.2 (13)	3.5 (37)	16.9 (180)	30.1 (321)	48.3 (515)	4.208	0.926	-1.056	0.639	0.466
	There is a chance of not detecting most of the infected patients due to lack of health facilities leads to undermining the actual infected case	IEI3	0.9 (10)	1.2 (13)	7.9 (84)	21.1 (225)	68.9 (734)	4.557	0.769	-1.99	4.303	0.508
	There is a chance to increase in the number of death for not having proper health facilities	IEI4	0.8 (9)	1.3 (14)	5.7 (61)	25 (266)	67.2 (716)	4.563	0.736	-2.04	4.96	0.594
	Lack of bio-medical waste management facilities in Bangladesh will create more problem	IEI5	0.7 (7)	1.1 (12)	6.7 (71)	30 (320)	61.5 (656)	4.507	0.728	-1.698	3.573	0.583
	There will be many people with psychosocially shocked due to this outbreak	IEI6	0.6 (6)	2.1 (22)	12.2 (130)	38.7 (413)	46.4 (495)	4.284	0.800	-1.064	1.111	0.498
	The government will lose its trust to the people	IEI7	3.8 (41)	7.4 (79)	27.1 (289)	25.2 (269)	36.4 (388)	3.829	1.118	-0.642	-0.362	0.341
Enduring emerging issues (EEI)	There is a chance of disaster like flood, cyclone, drought etc. in 2020 considering the climate change vulnerability of Bangladesh	EEI1	2.6 (28)	7.1 (76)	32.8 (350)	32.6 (348)	24.8 (264)	3.698	1.004	-0.417	-0.254	0.329
	If any disaster (flood, cyclone etc.) occur after the COVID-19 situation then it will create a double burden to the country	EEI2	0.4 (4)	1.2 (13)	5.5 (59)	18.8 (200)	74.1 (790)	4.650	0.676	-2.202	5.301	0.544

Sector	Statement	Denote	Strongly disagree % (n)	Disagree % (n)	Neither agree nor disagree % (n)	Agree % (n)	Strongly agree % (n)	Mean	Std. Deviation	Skewness	Kurtosis	Corrected Item-Total Correlation
	There is a chance of severe food scarcity due to these events (COVID-19 + Disasters) in the country	EEI3	0.6 (6)	2.7 (29)	13.2 (141)	33.1 (353)	50.4 (537)	4.300	0.840	-1.116	0.89	0.459
	High possibility of huge economical loss	EEI4	0.5 (5)	0.7 (7)	5 (53)	27.2 (290)	66.7 (711)	4.590	0.661	-1.875	4.59	0.555
	High possibility of increasing the poverty level	EEI5	0.5 (5)	2.3 (25)	8.5 (91)	31 (330)	57.7 (615)	4.431	0.783	-1.449	2.065	0.574
	High possibility of severe socio-economic and health crisis	EEI6	0.5 (5)	1.5 (16)	6.3 (67)	32.6 (347)	59.2 (631)	4.485	0.723	-1.57	3.004	0.602

Table-2: Multiple linear regression models for selected statements using perceptions as independent variables (n= 1066)

Perception statement (multiple R^2 value)	Constant of model	Significant (1% and 5% level) regression coefficients for independent variables (standard error of regression coefficients)									Standard error of regression model (ANOVA, F-statistic)
MH1 (0.472)	0.297	+0.314 MH2 (0.03)	+0.14 MH3 (0.03)	+0.181 MH4 (0.026)	+0.053 HSB1 (0.026)	+0.087 HSB8 (0.046)	+0.049 GPI7 (0.025)	-0.075 SEI10 (0.032)	+0.104 IEI1 (0.036)	0.117 IEI2 (0.033)	0.75162 (20.264)

HSB1 (0.252)	0.514	0.075 MH1 (0.037)	0.125 HSB2 (0.036)	0.296 HSB5 (0.058)	-0.076 GPI3 (0.032)	0.118 IEI1 (0.043)				0.89242 (7.619)
GPI1 (0.242)	1.847	-0.083 HSB4 (0.041)	-0.206 HSB9 (0.033)	0.253 GPI2 (0.039)	0.149 GPI3 (0.04)	0.127 GPI7 (0.038)	0.224 SEI2 (0.062)	-0.225 SEI3 (0.072)	0.084 SEI11 (0.04)		1.14184 (7.237)
SEI2 (0.479)	-0.238	0.054 MH3 (0.023)	0.085 HSB5 (0.038)	0.056 GPI1 (0.016)	0.045 GPI3 (0.02)	0.517 SEI3 (0.032)	0.098 SEI4 (0.04)	0.049 SEI8 (0.025)	0.048 SEI10 (0.025)	0.084 EEI6 (0.038)	0.57089 (20.859)
IEI1 (0.396)	0.66	0.078 MH1 (0.027)	0.077 MH3 (0.026)	0.062 HSB1 (0.023)	0.169 HSB7 (0.039)	0.082 SEI6 (0.031)	0.077 SEI11 (0.023)	0.246 IEI2 (0.028)	0.178 IEI3 (0.036)		0.64904 (14.864)
EEI2 (0.428)	0.495	-0.047 MH2 (0.022)	0.046 HSB2 (0.021)	0.09 SEI4 (0.036)	0.11 SEI9 (0.031)	0.088 IEI5 (0.031)	0.085 EEI1 (0.018)	0.112 EEI3 (0.024)	0.178 EEI4 (0.037)	0.07 EEI6 (0.034)	0.52213 (16.989)

Table-3: Correlation matrix of people's perception only addressing significant values (>0.5) (detail matrix is provided in the supplementary data Table-S3)

Statements	Correlations
MH1	MH2 (.584**), MH3 (.511**)
MH2	MH3 (.654**)
HSB5	HSB6 (.644**), HSB7 (.585**), HSB8 (.598**)
HSB6	HSB7 (.551**), HSB8 (.536**)
HSB7	HSB8 (.565**)
GPI2	GPI3 (.605**)
GPI5	GPI6 (.541**)
SEI2	SEI3 (.636**)
SEI4	SEI9 (.540**)
SEI7	SEI8 (.504**)
IEI2	IEI4 (.524**)

IEI3	IEI4 (.597**), IEI5 (.502**)
IEI4	IEI5 (.594**)
EEI4	EEI5 (.667**), EEI6 (.630**)
EEI5	EEI6 (.659**)

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table-4: Varimax rotated principle components

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
MH1	0.122	-0.034	0.25	0.03	0.746	-0.048	0.065	0.049	0.055
MH2	0.041	0.051	0.162	0.094	0.832	-0.041	0.05	-0.047	-0.061
MH3	0.064	0.07	0.172	0.112	0.764	-0.071	0.052	-0.071	-0.031
MH4	0.103	0.088	0.005	0.029	0.613	0.012	0.106	0.118	0.32
MH5	0.171	0.123	-0.036	-0.002	0.41	0.126	0.067	0.313	0.213
HSB1	0.347	-0.047	0.168	0.055	0.106	-0.173	0.098	0.3	0.383
HSB2	0.334	0.031	-0.088	0.204	0.126	-0.024	0.353	0.12	0.43
HSB3	0.459	0.187	0.052	0.076	0.162	-0.123	0.244	0.03	0.197
HSB4	0.637	0.018	-0.008	0.105	0.024	0.003	-0.031	0.009	0.065
HSB5	0.743	0.065	0.218	0.071	0.073	-0.058	0.165	0.124	0.071
HSB6	0.746	0.056	0.213	0.122	0.086	-0.028	0.057	0.072	0.045
HSB7	0.682	0.089	0.216	0.108	0.034	-0.051	0.147	0.166	0.119
HSB8	0.689	0.149	0.221	0.031	0.026	-0.013	0.231	0.034	-0.027
HSB9	0.54	0.263	-0.058	0.166	0.137	0.004	-0.172	-0.143	-0.081
HSB10	0.5	0.292	0.26	0.135	0.095	-0.052	0.286	-0.072	-0.026
GPI1	-0.162	-0.001	0.065	-0.183	-0.061	0.571	0.029	0.062	0.078
GPI2	-0.017	-0.05	-0.186	-0.012	-0.056	0.787	0.111	0.1	-0.059
GPI3	-0.074	-0.07	-0.158	0.012	-0.05	0.783	-0.044	0.026	-0.039
GPI4	0.018	-0.041	-0.096	0.035	-0.001	0.698	0.078	0.001	-0.047
GPI5	0.205	0.047	0.175	0.098	0.032	0.214	0.651	0.133	0.006
GPI6	0.233	0.211	0.298	0.033	0.033	0.044	0.627	0.011	0.039
GPI7	0.056	0.156	0.205	0.068	0.151	0.432	0.085	-0.246	0.088
SEI1	0.053	0.086	0.071	0.068	0.152	0.085	0.574	0.09	0.063
SEI2	0.092	0.336	0.135	0.211	0.035	0.115	0.157	0.636	-0.018
SEI3	0.108	0.37	0.103	0.267	0.035	0	0.225	0.637	-0.024
SEI4	0.115	0.493	0.107	0.188	0.105	-0.045	0.397	0.291	-0.136
SEI5	0.109	0.606	0.051	0.124	0.052	0.055	0.131	0.111	-0.024
SEI6	0.059	0.657	0.192	0.171	0.073	-0.036	0.05	0.164	0.002
SEI7	0.106	0.702	0.014	0.18	0.042	-0.024	-0.035	-0.108	0.152
SEI8	0.106	0.636	0.014	0.12	-0.003	-0.151	0.126	0.024	0.151
SEI9	0.132	0.638	0.107	0.205	0.02	-0.057	0.322	0.115	-0.054
SEI10	0.072	0.418	0.158	0.261	0.001	0.151	0.033	0.317	0.089
SEI11	0.137	0.548	0.208	0.058	0.101	0.059	-0.29	0.201	0.229
IEI1	0.151	0.058	0.663	0.111	0.153	-0.031	0.025	0.177	0.093
IEI2	0.126	0.122	0.655	0.164	0.291	-0.078	0.057	-0.062	-0.036
IEI3	0.263	0.108	0.591	0.145	0.084	-0.198	0.261	0.125	-0.007
IEI4	0.267	0.111	0.642	0.253	0.135	-0.081	0.28	0.039	-0.001
IEI5	0.239	0.121	0.546	0.244	0.151	-0.03	0.239	0.068	0.156
IEI6	0.064	0.277	0.383	0.141	0.078	0.087	0.256	-0.039	0.424
IEI7	0.104	0.281	0.453	0.033	0.04	-0.251	-0.083	-0.034	0.37
EEI1	0.041	0.157	0.114	0.345	0.131	0.043	-0.085	-0.107	0.519
EEI2	0.182	0.146	0.261	0.541	0.043	-0.061	0.236	0.102	0.181
EEI3	0.157	0.227	0.068	0.683	0.082	0.008	0.002	-0.124	0.187
EEI4	0.154	0.208	0.119	0.75	0.093	-0.041	0.093	0.244	0.004

EEI5	0.119	0.321	0.194	0.686	0.09	-0.027	0.067	0.16	0.021
EEI6	0.171	0.27	0.274	0.659	0.029	-0.059	0.11	0.191	0.073
Eigenvalues	4.125	3.95	3.31	3.124	2.771	2.577	2.44	1.722	1.41
% of Variance	8.967	8.587	7.196	6.792	6.023	5.603	5.304	3.743	3.064
Cumulative %	8.967	17.555	24.75	31.543	37.566	43.169	48.473	52.215	55.28
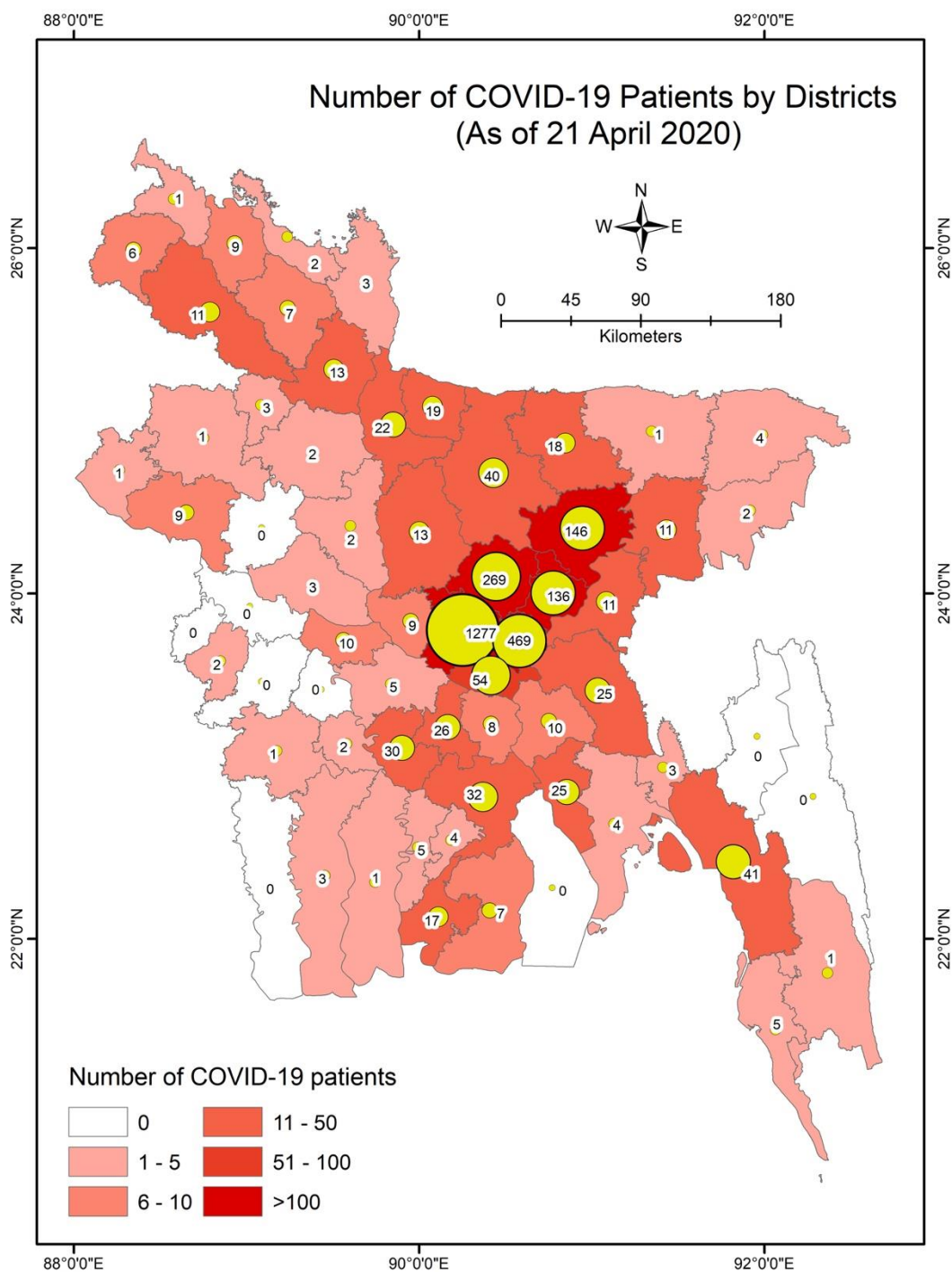
Figure-1: Map of the study area showing number of COVID-19 quarantine and confirmed Patient (Data source: IEDCR; Map: modified after, GroupMappers and GMGISolutions, 2020)
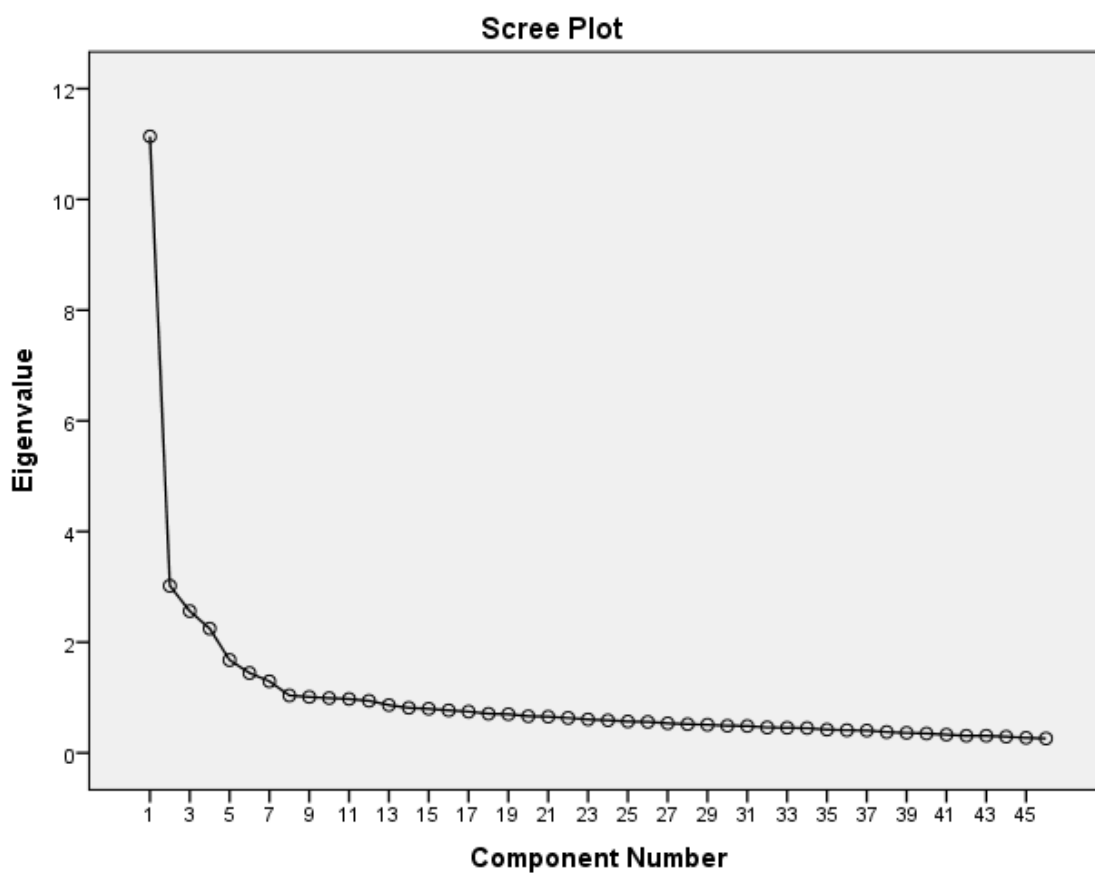
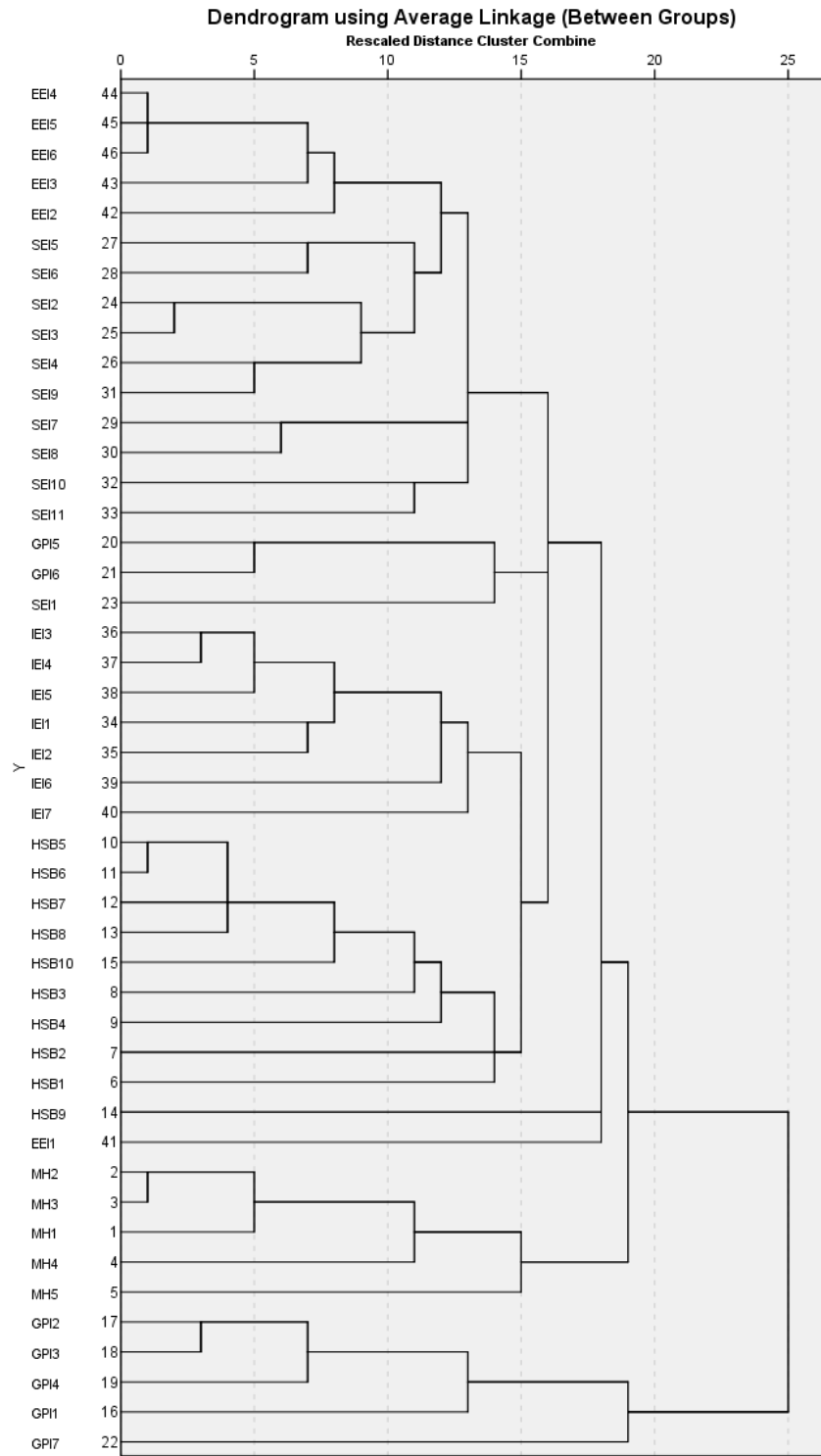**Figure-2: Scree plots of the eigenvalues of PCA**

Figure-3: Dendrogram showing the clustering of people's perceptions on COVID-19 outbreak in Bangladesh