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Vulnerabilities of older adults and mitigation measures to address COVID-19 outbreak in Bangladesh: A review

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ARTICLE INFO

Keywords:
COVID-19
Older adults
Vulnerabilities
Mitigation measures
Bangladesh

ABSTRACT

The infection with coronavirus disease (COVID-19) had an extremely negative influence on public health and the global economy. Covid-19 infection is more likely to affect the elderly than younger people, and pre-existing medical conditions, such as cardiovascular disease, diabetes, high blood pressure, and respiratory diseases, might lead to death due to COVID-19 infection. In low-income, developing, and highly dense countries like Bangladesh, the aging population is particularly vulnerable to the pandemic due to inadequate health services, socio-economic circumstances, environmental settings, religious and cultural beliefs, personal cleanliness habits, and a contemplative approach to infectious disease. Besides, recent cyclones and floods have combined effects on older people’s increasing vulnerabilities. In this study, we reviewed and examined the vulnerabilities of older adults to the COVID-19 outbreak in Bangladesh. Different mitigation measures are discussed to protect the elderly from the adverse effect of the pandemic. This study proposes several steps to reinforce the commitment to social care and health care services to guarantee well-being, encourage preventive measures, and increase access to older people’s health services in Bangladesh. The core findings will provide a valuable guideline for older adults, scientists, and policymakers to take effective long-term measures to mitigate the pandemic’s risk.

1. Introduction

The Coronavirus ailment 2019 (COVID-19), induced by the Severe Acute Respiratory Syndrome (SARS-CoV-2), was once first reported in Wuhan in December 2019, the capital of Hubei Province of China (Zhou et al., 2020). The World Health Organization (WHO, 2014) formally declared a worldwide pandemic on March 11, 2020 due to COVID-19’s high concomitant and rapid transmission nature. (WHO, 2020a). Since the first discovery of COVID-19, it has affected over 215 countries and territories worldwide, with 221,818,858 confirmed cases and 4,586,139 deaths as of September 06, 2021 (Hopkins University, 2020). COVID-19 has become a pandemic, beginning with small transmission clusters combined with influential groups in many countries, leading to wide-ranging transmission (Anderson et al., 2020).

The most affected group is older adults >60 with comorbid conditions with occasional acute infection cases in younger people (Anwar et al., 2020; Ungar et al., 2022). Increased risk of death was linked to patients with multiple comorbidities, such as cardiovascular disorders, diabetes, obesity, cancer, and chronic respiratory illness. In a case series from Beijing, the mortality rate in the older adult groups was higher than in the young group (50–64) (Wu & McGoogan, 2020). In particular, in older adults >80 years, the case fatality rates (CFR: 14.8%–20.2%) are not negligible (Onder et al., 2020; Wu & McGoogan, 2020).

During the COVID-19 epidemic, any household composition threatens senior citizens’ safety. An older person’s vulnerability to the COVID-19 pandemic increases regardless of the number of people living in their homes. The elderly who live with others are at risk of contracting diseases brought in by those who work or go out, while the elderly who live alone may need assistance with food, emotional and economic support, health care, and other necessities (Romero et al., 2021). During the pandemic, older women showed more significant levels of distress, loneliness, and sadness than older males. Even though males experience less strong feelings of sadness and loneliness, a meta-analysis study on mortality from all causes shows that their impacts can be more lethal (Newman & Zainal, 2020).

A gender gap was identified in how the pandemic affected older persons’ income status (Romero et al., 2021). In addition, a clear correlation was found between low income and poor health, with the

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burden of sickness being borne disproportionately by those in lower socio-economic classes (Bor et al., 2017). A person’s socio-economic status is determined by various variables, including income, housing, education, occupation, and unemployment. Regarding COVID-19, it is claimed that the socio-economic position has a role in shaping behavior that has downstream effects on health outcomes (Khalatbari-Soltani et al., 2020).

Bangladesh has an over 164.6 million population, including 7.7% older adults, and is the eighth-most populated nation. Out of the total population, 2.85% are between the ages of 60 and 64, with 1.49 percent male and 1.36 percent female. Males comprise most city dwellers, whereas females predominate in the countryside (BBS, 2019). About 15 million of the total population still live in extreme poverty, on less than US$190 per day, despite the country’s tremendous macroeconomic growth over the past decade (Zaman & Biswas, 2015). Moreover, a small portion of older adults are engaged in the workforce; 16% of those 60 and over are self-employed in agriculture, while 68% are not engaged in any form of paid work. Most Bangladeshis, over 60%, still live in the countryside (BBS, 2019). Older adults in slums are more likely to be illiterate. Poverty renders life meaningless for the elderly in slum areas. Religious activities and funerals account for a more significant proportion of older people’s time than any other activity. However, the older women in slums never stop working. Due to their position as the ‘poorest of the poor,’ elderly women living in slums often bear the brunt of society’s and family’s misfortunes (Alam, 2015). Even in their last days, older women who live in slums have to work so they can eat three times a day.

The life expectancy of both males and females throughout Bangladesh reached 71 and 74 years, respectively, in 2018 (BBS, 2019). Nevertheless, while the general health and the population’s average life expectancy are substantially improved, geriatric health problems in Bangladesh remain recognized (Barikdar et al., 2016). Although many health indicators have improved over the previous few decades in Bangladesh, it still faces significant difficulties in meeting the needs of its aging population in terms of affordable medical assistance (Sarker, 2021).

Bangladesh announced its first COVID-19 case on March 08, 2020, which led to a national lockdown extended on multiple occasions to August 05, 2021 to stop the spread of the virus. According to the Institute of Epidemiology, Disease Control and Research (IEDCR) Bangladesh, the total number of positive COVID cases was 1,517,166 on September 06, 2021, with 26,628 deaths after sixteen months of its first detection (Fig. 1). The highly diverse cases were between 41 and 59 years of age (55%), while those over 60 years of age (55%) were fatal (Fig. 1-d). The fatality rate in Bangladesh is currently 1.75%, initially 10.4% in the first week of April 2020. Based on the age of group-wise confirmed cases and death statistics, it is assumed that Bangladeshi older adults are especially vulnerable to death by COVID-19 infection. While several aspects of these new diseases remain unclear, it is already clear that the risk of death by COVID-19 infection rises with age. In particular, for those with chronic conditions such as cardiovascular disorders, most recorded deaths are older than 60 (Lloyd et al., 2020).

Bangladesh’s older adults are generally treated as vulnerable due to their family dependency, poor socio-economic conditions, low literacy,
poor access to health services, comorbidities, and lack of proper social security programs (Banna et al., 2022; Ferdousi, 2019). However, recent research has detailed how COVID-19 has affected the lives of older adults with non-communicable diseases (NCDs), highlighting the disruption to essential public health services in Bangladesh (Yadav et al., 2020).

Health care access for older people with non-communicable chronic conditions was a problem in Bangladeshi society long before COVID-19, and the ongoing pandemic has worsened the situation (Mistry, Ali, Yadav, et al., 2021). Access to healthcare centers concentrated in urban areas has been hampered by nationwide travel restrictions and a lack of transportation due to the ongoing pandemic. Most older adults live in rural areas, where drug distribution and availability have been negatively affected by the transportation shutdown (Hossain, Mazumder, et al., 2020; Mistry, Ali, Yadav, et al., 2021). Another study found that low-income older adults may have had a more challenging time because of the COVID-19 pandemic’s impact on their out-of-pocket costs, the cost of medications, and the availability of health care services (El-Khatib et al., 2020). According to a recent study, fear of COVID-19 was also common among Bangladeshi older adults. However, it was more prevalent among those who faced additional social vulnerabilities, such as low income, unemployment, social isolation, and problems gaining access to drugs and health care (Mistry, Ali, Akther, et al., 2021).

Moreover, the COVID-19 pandemic makes them more vulnerable due to their cultural and religious faith, knowledge, attitude, and hygiene practices toward COVID-19 (Sultana & Alam, 2020). In addition, natural disasters added special effects on the vulnerabilities of older adults. In 2020, monsoon floods occurred when this lower-middle-income and the most densely populated country was recovering from cyclone Amphan and working hard to control the spread of the COVID-19 virus (Sultana & Alam, 2020). Monsoon floods inundated more than one-third of Bangladesh and overwhelmed more than five million people (BRCS, 2020, p. 2020). Rural and coastal communities’ vulnerability is higher due to their restricted ability to cope with natural disasters because of determinants like low income or dependency upon the son or daughter, lack of social awareness and training, and inadequate access to health care services (Yadav & Barve, 2017).

Considering the mentioned circumstances, this study aimed to analyze the vulnerabilities of older adults to the COVID-19 outbreak in Bangladesh. First, we provide an overview of the vulnerabilities of older adults to the adverse effect of the COVID-19 outbreak and the overall scenario of older adults in Bangladesh. Second, we answer the main research question, “Which factors influence the vulnerability of older adults during the COVID-19 pandemic?” by the comprehensive literature review. Finally, we describe existing mitigating strategies and propose specific recommendations for mitigating the vulnerabilities of older adults to COVID-19 in Bangladesh, taking the vulnerabilities mentioned above seriously. Core findings of this assessment should provide helpful guidelines to health and social workers, researchers, and policymakers for further intervention and targeting this vulnerable social group to take effective long-term measures.

2. Review methodology

The primary objective of this review is to conduct a comprehensive analysis of available data to gain a better understanding of older adults’ vulnerability to the COVID-19 pandemic in Bangladesh. We used databases including PubMed, Google Scholar, Scopus, Web of Science, Research gate, and this journal’s database. The initial keywords were “COVID-19” and “coronavirus” and other strings like “older adults,” “elderly,” “older people,” “aging,” “vulnerability,” “mitigation measures,” “social security,” and “Bangladesh.” Additionally, we rejected irrelevant papers and selected relevant articles that were double-checked for references, strengthening the scientific value of this study. Besides, we accessed the COVID-19 dashboard of the Institute of Epidemiology, Disease Control and Research (IEDCR) Bangladesh and the world health Organization (WHO, 2014). Relevant information was also collected from news articles and numerous public websites with tone links. Socio-economic conditions, dynamics of COVID-19 outbreak, existing healthcare system, comorbidities, personal health hygiene, awareness level, and environmental settings were considered to understand older adults’ vulnerabilities to the COVID-19 pandemic and possible mitigating strategies in Bangladesh. Additionally, this study reviewed social security programs for older adults to propose comprehensive mitigation measures. Daily confirmed cases, death, tests, and infection distribution–related data were retrieved from the coronavirus dashboard of Bangladesh’s Institute of Epidemiology, Disease Control and Research (IEDCR). Microsoft Excel is used for the data analysis, and the map is prepared with the help of the Arc map 10.6 version.

3. Situation of older adults in Bangladesh

3.1. Increasing trends of older adults

In 2018, the total population in Bangladesh amounted to 164.6 million, and it is the world’s 8th most populous country (BBS, 2019; WHO, 2020b). Older adults increased from 1.38 million to 13 million from 1974 to 2018 (BBS, 2019). Among the older adult statistics in 2018, the 60–64 age group showed the highest percentage (2.9%), while the 75–79 age group showed the lowest percentage (0.7) of the total population in Table 1. In 2018, the life expectancy of Bangladeshi males and females became 71 and 74 years, respectively (BBS, 2019). It was projected that Bangladesh and four other Asian countries would account for approximately one-half of the elderly population worldwide by 2025 (Chaklader et al., 2003, p. pp1). The growth of older adults will continue and have resolved many issues related to their status and responsibilities, care and existence, safety, social support, and welfare (Khan & Leeson, 2006).

3.2. Elderly in the sociocultural context

The elderly population of Bangladesh is becoming more vulnerable due to rising rates of homelessness, rural-to-urban migration, and changes in lifestyle that result in smaller households (Ruzzaque & Shofigul Islam, 1997). Older women are particularly vulnerable because of women’s marginalization in society. While reproductive health for women is a priority in Bangladesh, primary care centers have mostly ignored the needs of adults, and the health of the elderly has been pushed off the public health agenda in favor of a few isolated initiatives spearheaded by NGOs and voluntary (Rahman, 1997). A study found that a family’s financial situation significantly determined health-seeking behavior and healthcare spending; families with a chronic deficit were less likely to have access to expensive allopathic treatment, instead relying primarily on self-care and self-treatment. Fortunately, the use of health care services and money spent on it showed no distinction between older men and women (Ahmed et al., 2005). However, another study found that during the COVID-19 pandemic, older women were more vulnerable to health issues than older men. (Sarker, 2021).

The son is traditionally responsible for food and shelter for his parents and taking care of the rest of his family’s older adults in Bangladesh.

| Table 1 | Older adult percentage of Bangladesh’s total population. |
|-----------------|-----------------|-----------------|
| **Age group** | **Male** | **Female** | **Both sexes** |
| 60–64 | 3 | 2.8 | 2.9 |
| 65–69 | 2.1 | 1.9 | 2 |
| 70–74 | 1.4 | 1.3 | 1.4 |
| 75–79 | 0.8 | 0.7 | 0.7 |
| 80+ | 0.7 | 0.9 | 0.8 |

Source: BBS, 2019.
However, all adult sons of older adult parents are not responsible for their parent’s food and health due to their poor status. As a result, most poor older adults are living with Inhuman. In addition, there has been a rise in cases of elder abuse and abandonment, often prompted by the perception of elderly parents as a financial burden on the children (Barikdar et al., 2016). However, many Bangladeshi families experienced financial hardship due to the lockdown during the COVID-19 pandemic. This hardship may have had repercussions on the care and provision of elderly family members, potentially increasing older adults’ vulnerability (Mistry, Ali, Yadav, et al., 2021).

However, older adults are still respected and revered in society in Bangladesh. They are unique in the family; they are often asked for advice, particularly for major events such as marriage, titles, and many more. Older adults receive care and support from family members in many families and households and have to look after families with financial assistance and take care of grandkids in many nuclear families. Grandparents look after the family in those families where their parents are working. Older people are treated as important family and community counselors. They also play an essential role in addressing family and community problems (Barikdar et al., 2016).

Most people over 60 live in the countryside, with limited access to health facilities and financial and employment opportunities. Older parents’ children live in cities for better study facilities, jobs, or businesses. Older adults comfortably fill the countryside, and often children leave their more senior parents to stay in town (Rahman, 1999). Sometimes older men have to take full responsibility for maintaining their families. Older women face economic insecurity and health problems, particularly widows and those without sons (Abedin, 2003). According to a survey, 44.3% of people live in poverty, and older individuals occasionally engage in begging to sustain their living expenditures and family necessities (Barikdar et al., 2016). However, conventional family structures are disintegrating in Bangladesh, altering norms and values such as respect for older adults at the family and community level. As a result, the elderly are becoming increasingly vulnerable. In addition, the progressive expansion of the nuclear family has increased social isolation among Bangladesh’s elderly, making them more vulnerable regarding their physical and mental health. (Sarker, 2021). The vulnerability manifests in a lack of access to adequate nutrition, housing, medical care, social support systems, and community attitude (Barikdar et al., 2016).

4. Influencing factors of older adult’s vulnerability to the COVID-19 outbreak

Many factors influence older adults’ vulnerability to the COVID-19 pandemic in Bangladesh. These determinants include a fragile health system, comorbid conditions, natural disasters, socio-economic status, religious and cultural faith, knowledge attitude, and hygiene practices toward COVID-19 (Fig. 2). In addition, most factors work simultaneously to increase the vulnerability of older adults to COVID-19 outbreaks.

4.1. Fragile health systems amidst COVID-19 pandemic

The Epidemiological Control and Research Institute (IEDCR) is responsible for researching epidemiological and transmissible diseases like coronavirus (COVID-19) in Bangladesh. At the beginning of the pandemic, IEDCR had a single and centrally operated COVID-19 research laboratory (IEDCR, 2020). While the COVID-19 test laboratories have expanded to 137, all of these laboratories have long waited hours in the central city centers of Bangladesh to be examined. More often, the tests have been done after the patients have died. Notably, 66 laboratories are in Dhaka city (59%), and 46 laboratories are outside Dhaka (41%), where more than 80% of people live outside Dhaka city (Hossain, Mazumder, et al., 2020).

One regular hospital bed is currently allocated for 1196 people and one isolation bed for 23185 people to fight against COVID-19. The country presently has only 1300 ICU beds (602 are in public hospitals and 698 are private) to treat COVID-19 patients, whereas the ideal ratio should be one ICU unit per every ten regular hospital beds (DGHS, 2020; Maswood, 2020). These statistics reflect minimal Medicare facilities for more than 166 million large populations. This enormous lack of intensive care units means that many people under critical conditions, especially older adults, must delay their treatment amid COVID-19.

In Bangladesh, the doctor-patient ratio is currently 1: 2500, South Asia’s second-lowest (WHO, 2020b). In addition, health workers are mal-distributed, with 78% of the people living in Bangladesh’s rural areas, while 70% are posted in urban areas (UNDP, 2020). According to the Directorate General of Health Services (DGHS, 2020a, 2020b) Bangladesh, As of August 13, 2020, medical team members for COVID-19 health services are only 3037 persons, including only 992 physicians and 825 nurses (DGHS, 2020).

COVID-19 tests were free of cost for all citizens of Bangladesh from the beginning. However, the Government imposed 2.40 $ per COVID-19 test for everyone from June 29, 2020 (IEDCR, 2020). As a result, the number of total tests per day decreases, which means vulnerable people, including older adults living under a marginal level, are not frequently registering for the COVID-19 test because test fees 2.405 is a massive amount for vulnerable people. However, recently Government repealed the test fees.

4.2. Comorbid conditions

In certain vulnerable population groups, mainly those older, weaker, or who suffer from multiple chronic conditions, the risk of serious complications is higher (DeCaprio et al., 2020). Recent research on people who have contracted COVID-19 in Wuhan indicates an increased risk of death with age and a higher risk of death for diabetes, heart failure, blood clotting disorders, or sepsis (Zhou et al., 2020). From an overall mortality rate of 1%, the death rate increased to 6% for cancer patients with high blood pressure and chronic respiratory conditions, 7% for diabetes patients, and 10% for cardiovascular patients. The age differential was also increased. The mortality rate among >80+ was 15% (Wu & McGoogan, 2020).
In Bangladesh, the current fatality rate is 1.62%. The highly diverse cases were between 41 and 59 years of age (38%), while those over 60 (53%). Most older adults who expired from COVID-19 had comorbid conditions (IEDCR, 2020). In 2018, approximately 31% of deaths were from cardiac disease. Besides, Cancer, high blood pressure, asthma, kidney disease, respiratory disease, diabetes, and tuberculosis are also causes of mortality among Bangladeshi people (BBS, 2019). The comorbidities mentioned above are mainly found among older adults. As a result, older adults in Bangladesh are more vulnerable to death from COVID-19.

In Bangladesh, nearly half of the total mortality rate amounted to 522,300 dying from non-communicable diseases (NCDs) in 2012 (WHO, 2014). However, the incidence is estimated at 24.7% for hypertension, 12.5% for chronic obstructive lung disease, 7.4% for diabetes, and 5% for coronary heart disease. The risk of mortality for people with multiple comorbidities is higher in the population (Khan, 2020). These comorbidities may increase the vulnerability of older adults to death amid pandemics.

4.3. Environmental settings

The chances of death from COVID-19 are estimated to be higher for patients with previous illnesses such as hypertension, diabetes, heart-related disease, chronic respiratory, and cancer, comprising Non-Communicable diseases (NCDs) (Sakamoto et al., 2020). The main risk factor is poor drinking water quality, which may increase the vulnerability of people to COVID-19 (Sakamoto et al., 2020). Increased salinity in coastal areas is one intrinsic factor, and arsenic pollution in 61 of 64 districts is another inherent factor.

Safe drinking water scarcity is a big issue in the coastal belt of Bangladesh, caused mainly by saltwater intrusion (Hoque, 2009). Most people collect water from tube wells or ponds in coastal areas vulnerable to saltwater intrusion. Over 5 million rural people have been impacted by the country’s only Southwest coast region (Swapan & Mamun, 2006). Saltwater treatment facilities are limited, time-consuming, and expensive. Therefore, people are made to drink salinity-containing water (Rahman et al., 2017).

Prehypertension and hypertension were substantially related to drinking water’s salinity throughout the coastal community. Prehypertension and hypertension were also higher than national rural figures (50.1%) of the above 35-year-old age group for two types of saline water categories. 53.8% of people were found from one category where they intaked 1000–2000 mg of salt from every liter of water, while a maximum of 62.5% of people was found from the over 2000 mg/l intake group (Nahian et al., 2018). A reliable marker for progressive kidney disease is drinking water and urinary sodium with an increased protein excretion (Naser et al., 2017). Coastal people are at the highest risk of kidney disease and hypertension due to drinking saline water. This factor may help create comorbidities in older adults, significantly influencing the death of COVID-19.

Arsenic contamination of drinking water is another risk factor. Arsenic long-term exposure may cause unfavorable health consequences, mainly related to the skin and respiratory, digestive, cardiovascular, and nervous systems (Sakamoto et al., 2020). It was evident that 61 of the 64 districts in Bangladesh have polluted arsenic from groundwater. Arsenic in water was found to be 0.10–0.30 mg/L for most arsenic-contaminated tube wells, while an appropriate 0.05 mg/L level (Ahmad et al., 2018).

4.4. Natural disasters

Due to global climate variability changes, Bangladesh has been affected by the adverse effects of natural disasters, e.g., cyclones, flooding, erosion, salinity intrusion, and other climatic events. Tropical cyclones frequently impact coastal communities and floods throughout the country. Change in climate variability is expected to increase the incidence and intensity, leading to even more impacts on vulnerable populations. Compared to young adults, both older adults and children are more likely to be affected (Malak et al., 2020). Older adults face more serious threats and are more likely to suffer significant attention across all disaster stages (Morrow, 1999); they may also suffer indifference and negligence (Malak et al., 2020).

A severe cyclone Amphan hit Bangladesh amid COVID-19 in 2020, where social distancing made it more difficult to evacuate families and shelters that could not be used to their maximum capacity. The consequence of this cyclone without Covid-19 will be felt in Bangladesh with very little life and property damage. As a developing country, the current challenge is dealing with the Covid-19 pandemic in response to these natural disasters. Recently, Bangladesh has faced a catastrophic flood. After the worst rain in a decade, one-third of Bangladesh was underwater. It affected over 5 million people, submerging houses and roads in villages (UNICEF, 2020). A total of 1519 flood shelter centers have been opened; 88,062 people have taken shelter far from the highest flood-affected areas (BRCS, 2020, p. 2020). The remaining homeless families with kids and older adults were clustered into small polythene tents as thousands lived on the embankment. People are trying to save their lives without considering coronavirus issues (Hossain & Manik, 2020). In addition, currently, Bangladesh is facing another disastrous monsoon flood in 2021 during the parallel COVID-19 pandemic and dengue epidemic. Hundreds of thousands of people have suffered devastating flooding from this monsoon. Over 500,000 people, including older adults and children in 15 districts, have been marooned. This situation may increase older adults’ vulnerability to being infected by COVID-19. Mobility restrictions impair physical access to a primary health care center due to flooding and the COVID-19 pandemic. Therefore, the chances of mortality, morbidity, or lack of nutrition exacerbate the epidemic, rising in 73% of the affected areas. The damage from flooding adds additional stress to vulnerable people, including pregnant women, young girls, infants, older adults, the disabled, and their health and prevention (Humanitarian Response, 2020).

4.5. Socio-economic conditions

Several socio-economic factors reflect why specific individuals within the population are more vulnerable than others to this pandemic. Factors include population density, location (city vs. country), the standard of living, educational opportunities, cultural norms, and typical family size (Lipsitch et al., 2020). Due to higher population density, wider social networks, and poorer personal hygiene practices, COVID-19 is more likely to spread among the vulnerable socio-economic group. The most crucial socio-economic risk factors for contracting COVID-19 are shown in Table 2. Therefore, some socio-economic groups are particularly vulnerable in contrast to others. Consequently, we might anticipate increased mortality rates among specific demographics (Saadat et al., 2020). However, this logic is valid from the COVID-19 death scenario in Bangladesh, where many died from the vulnerable socio-economic group in dense areas (IEDCR, 2020).

These socio-economic factors may significantly influence older adults’ vulnerability to COVID-19. For example, in Bangladesh, adult children, especially sons, are their parents’ primary sources of security and financial support, particularly in a disaster, disease, and aging (Cain, 1986). In addition, many Bangladeshi older people have specific underlying human issues, such as inadequate financial aid, senile diseases, inadequate health and medication, exclusion and neglect, poverty, and socio-economic insecurity (Rahaman, 2000). However, only around a quarter of Bangladesh’s elderly are engaged, mostly in agriculture (16%), while the remaining 68% are mainly unemployed (BBS, 2019). Consequently, most older adults still relied on their adult children for financial support, and the loss of income during the pandemic.
The influence of socio-economic factors on COVID-19 infection

Table 2 Influencing socio-economic factors for COVID-19 infection.

| Socio-economic factors | Influences |
|------------------------|------------|
| Population density     | Close interaction between people is robust in urban areas rather than in a rural environment. |
| Household size          | A large household has more potential to bring the virus home compared to a small household. |
| Social distancing       | Social distancing is very successful in stopping disease transmission, but there are many explanations why different groups may have different rates of social distance. |
| Awareness level         | Educated people are more aware of COVID-19 infections than illiterate people. |
| Lifestyles              | Lifestyle change, i.e., Stay at home more, Avoided public places and transport, canceling plans with family or friends and colleagues may decrease the risk of infected. |
| Personal hygiene practice | Personal hygiene practice, i.e., proper hands wash more, wearing a mask can reduce the spread of coronavirus disease. |
| Healthcare facilities   | The same level of healthcare services is not available to various socio-economic groups. |

may have impacted the ability of the children to provide necessary medical care to their parents. (Mistry, Ali, Yadav, et al., 2021). Therefore, considering the influencing socio-economic determinants, Bangladeshi older adults are more vulnerable to the COVID-19 pandemic.

4.6. Misinformation, religious and cultural faith

Bangladeshi people are generally religious, whereas 90% are Muslim (BBS, 2019). Muslims have a very distinct manner of greeting one another. They love to shake hands, followed by hugging friends and acquaintances. Visiting the sick is also considered a good deed in Bangladeshi culture. Long-time gossiping with friends to pass the time is a common trait of Bangladeshi culture (Alam & Sultana, 2021). It is reported that, during the epidemic, people are moving outside without any need in the locked down areas (Bdnews24, 2020). All the above practices are vital factors for spreading infection.

Misinformation is one of the vital factors for the spreading of the virus. Most illiterate and low-literate people believe the coronavirus will not affect religious people. God will save them in all adverse situations. This belief inspired around 100,000 people to attend funeral rites without maintaining social distancing, including wearing masks and avoiding government rules (Mahmud, 2020). Five times prayers in a day are a significant religious practice for Muslims, and the Government advised most people to perform prayer at home, not going to mosques. However, due to religious views, older adults always like to attend these spiritual activities, making them more vulnerable to infection. If mass gatherings are not controlled, Bangladesh will be wasted by the pandemic.

4.7. Knowledge attitude and hygiene practices toward COVID-19

One of the first studies of attitudes and Knowledge about COVID-19 in Hubei, China, has found that attitudes towards government epidemic initiatives are strongly connected with the level of COVID-19 knowledge. Furthermore, higher education and knowledge levels are related to constructive approaches to prevent COVID-19 activities (Zhong et al., 2020). Besides, knowledge can affect attitudes and practices. Attitudes reflect a motivational or emotional mindset that prepares us to respond correctly or not in a particular situation. Therefore, positive attitudes and acceptable practices may mediate ethical conduct, prevention, and the spread of disease during the COVID-19 outbreak (Zegarra et al., 2020).

One of the earlier studies on knowledge attitudes and practices towards COVID-19 in Bangladesh found that knowledge, attitudes, and prevention rates differ in communities because of numerous economic classes, levels of education, customs, and the rapid expansion trend of COVID-19, and governmental response (Ferdous et al., 2020). Possible clusters of people might be vulnerable to prevention due to less attitude and in-depth knowledge regarding the COVID-19 pandemic (Zegarra et al., 2020). The older adults in urban areas have had less accurate information about the COVID-19 pandemic (Ferdous et al., 2020). In rural areas, older adults sometimes experience difficulties with physical and logistical obstacles or fear of social stigma when referring them to health care centers. Also, the Knowledge about COVID 19 cannot be fully understood by older adults, particularly women, through lower exposure to mass media and increasing awareness initiatives (WASH, 2020). However, it may be feasible that less knowledge of older adults influences their attitudes and practices towards COVID-19, making them more vulnerable to the pandemic. In addition, men, those with more education, those who lived in urban areas, and those who were older than the national average all ranked better in attitude and practice toward COVID-19 (Hossain, Mazumder, et al., 2020). According to a scientific study on Bangladeshi residents, most feared being infected with COVID-19, which was incredibly higher among females and older adults. However, surprisingly, females and the elderly with higher fear tended to take the preventative measures of remaining indoors and wearing masks (Pakpour et al., 2020).

5. Mitigation measures

5.1. Government policies for protecting older adults

In Article 15 (D) of the constitution of Bangladesh, the social security program for older adults is declared to be implemented. Bangladesh subsequently did not implement a specific social security program covering the safety and care of older adults. The Government, however, has introduced many policies for older adults, such as pension schemes, health insurance, and other social security network policies, like the old-age allowance, freedom fighter Allowance, widow and abandoned women’s allowance, and the Vulnerable Group Feeding (VGF) program (Ferdousi, 2019). Older people’s programs have been limited to the Government’s pension scheme and other insurance schemes for public sector workers. However, most older adults, particularly those involved in agriculture and the industrial sectors, do not profit from these programs. Geriatric issues are generally neglected, as old homes, geriatric hospitals, and public and private hospitals have no formal policy and monitoring program (Rahman, 2012).

5.2. Proposed mitigating measures

Despite initiating various programs, as a developing country, support for older adults is inadequate in Bangladesh. Therefore, all public amenities, such as public health services and age-friendly living facilities, job opportunities, and accountability systems in delivering programs, should be offered to older persons as a matter of urgency.

5.2.1. IAGG proposed mitigating measures

Prevention could be the best way to protect the most vulnerable older adult population if there is no effective medication or vaccine to date. A quick, easy-to-understand, direct message may help prevent the spread of COVID-19 in Bangladesh. The following recommendations are being proposed for older adults in Bangladesh, complementary to the recently published guidance on COVID-19 prevention for older adults in the Asia/Oceania (IAGG-AO) region by the International Association for Gerontology and Geriatrics (IAGG) (Chhetri et al., 2020). The COVID-IAGG-AO prevention guidelines are proposed to save older adults from the adverse effects of the COVID-19 pandemic based on various preventative strategies. This extensive consultation covers broad areas which encourage the well-being of older adults, which include:

• To improve physical strength through good sleep, adequate diet, exercise, and the prevention of fragility. In addition, sufficient
morning sunshine to get vitamin D will reduce the risk of infection in older adults with insufficient vitamin D (Grant et al., 2020; Lim et al., 2020).

- To prevent COVID-19 by safe physical distancing and improvement of personal hygiene.
- Enhancing mental stability through positive, rising social engagement and promoting networks using technology appropriately. Traditional media such as television and radio can also play a vital role in multifaceted strategy in environments where the degree of digital literacy is inferior (Lim et al., 2020).
- Ensuring medication access includes the prevention of stockpiling and drug shortages. Pharmacy incentives should be provided for pharmacies to offer home delivery services (Alexander & Qato, 2020).

5.2.2. Additional specific recommendations

In Bangladesh, the majority of older people are facing particular difficulties: family care, physical and mental health, community health care, social care, housing, transport, jobs, income, education, security, service and consumer protection, information access, and decision making (Ferdousi, 2019). Issues that older adults in the country experience and face rely mainly on their socio-economic status and residence (Rahman, 2012). Around two-thirds of the older adults are poor, illiterate, and in observable circumstances in rural areas. Most older adults are not economically secure and cannot engage actively in other activities that ensure their healthy existence (Nath & Islam, 2009). On the other hand, urban older adults have limited access to healthcare, while older rural people are only cared for by their families. Besides, public services for older adults provide either little or no assistance. The old-age allowance does not extend to all older people; it only extends to more vulnerable older adults in rural areas. No plans are made for low-cost apartments or concessions for seniors. Until today, there are no distinct geriatrics units at public and private hospitals, and no home care program for older adults has been developed (Hossain, Mazumder, et al., 2020).

Moreover, the natural disasters and pandemics crumble the national health system in this densely populated country. As a result, of the current situation, older adults are more vulnerable to COVID-19 outbreaks. Therefore, considering the above case, including all initiatives, we propose the following specific recommendations for mitigating the vulnerabilities of older adults to COVID-19 in Bangladesh:

Planning and implementation-

1. Introduce guidelines and instructions on providing care to older people during COVID-19 outbreaks in hospitals, clinics, senior homes, and shelters.
2. Enhancing existing social care programs that support older adults based on specific COVID-19 vulnerabilities and executing these social security acts in the entire phase of the pandemic to reduce older adults’ exposures amid the virus outbreak.
3. Implement a comprehensive health care program for seniors who are financially dependent on their families or have no other source of support.
4. Initiate separate geriatrics units at both public and private hospitals at national and local levels for providing quick medical support to vulnerable older adults.
5. Inauguration of mass media programs, such as radio broadcasts, shows on television, newspaper articles, and online activities, encouraging awareness and knowledge in geriatric healthcare.
6. Provide sufficient care directly or over the phone or online support system at no expense for homebound older adults to help prevent serious injuries, mental stress, or depression.
7. Prepare a particular isolation shelter for older adults in flood and cyclone-prone areas and provide dedicated ambulance and boat services to transport suspected or confirmed COVID-19 cases during a pandemic and catastrophe to the nearest healthcare centers.
8. Provide online training for a minimum of one member from every older adult family to promote preventive practices and improve access to health services for older adults.
9. Set up an older rehabilitation center for every district for disabled, low or no-income older adults.
10. Provide accessible COVID-19 test facilities, including medical services and special medical care packages for older adults with no income.
11. Engage young students as volunteers to increase older adults’ knowledge and hygiene practices towards COVID-19.

Policy recommendations-

12. Develop a combined natural and biological preparedness program at the national level, emphasizing older adults.
13. Include the construction of distinctive geriatric hospital units in the policy to provide special care to the COVID-19 patients.
14. Develop comprehensive legislation for the older adult’s service monitoring system related to the organizations and institutions.
15. Include psychosocial care for older adults as an institutional (e.g., health care centers) policy element.
16. Prepare post-pandemic guidelines for older adults on how to cope with new-normal life.

6. Conclusions

The older adults in Bangladesh are more than 13 million, increasing annually, who often struggle with insufficient access to health services and low socio-economic conditions. In the world population projection, about 20% of this nation’s overall population is expected to be older adults, compared to 21.5% worldwide by 2050. Older adults bear the brunt of COVID-19 for society due to their direct, immediate health consequences and mortality risk, including unintentional indirect impacts. The Government has drawn up a national elderly strategy to provide older people with a healthier, dignified, and poverty-free life, including parent maintenance legislation and other laws and regulations. However, numerous measures to ensure financial protection, well-being, physical security, and recreation must still be addressed. Adequate steps to protect this vulnerable older adult group from this emerging global pandemic are urgently required. The older adult’s condition in dense Bangladesh is worse than in developing countries due to limited resources. A substantial number of older adults live in deplorable circumstances. Recently occurred cyclones and floods add additional impacts on older vulnerability. The older adult who live in flood-prone and cyclone-prone areas often reject healthcare services and other essential human needs and become more vulnerable to the pandemic.

The significant factors of older adults’ vulnerability to the COVID-19 outbreak in Bangladesh include fragile health systems, comorbid conditions, natural disasters, socio-economic conditions, environmental settings, religious and cultural faith, and knowledge attitude and hygiene practices toward COVID-19 disease. However, older adults with comorbid conditions are at high risk for death by COVID-19 infection. After reviewing and investigating the vulnerability of older adults in Bangladesh during the COVID-19 pandemic, mitigating measures have been discussed to protect the older adults from the adverse effect of the pandemic. Besides, we suggest guidelines for balancing the effective prevention of pandemics with the successful management of direct and indirect consequences for older adults. Hopefully, these guidelines will facilitate the implementation of COVID-19 policies that are compatible with the country’s available resources and sociocultural contexts, focusing on older adults in the context of general public health. More senior people contributed significantly to the nation’s building during their youth. So, it is the best time for everyone to assist and protect them.
from the pandemic. Healthcare professionals and institutions may play an essential role in advocating and providing services during COVID-19 promotion of geriatric treatment. Furthermore, policymakers and stakeholders should prepare for the post-COVID adverse management of the older adults in Bangladesh as soon as possible.

Funding

No funding was received at any stage of preparing this article.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

No funding was received at any stage of preparing this article.

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