

REVIEW ARTICLE

Health Consequences During Pandemic: A ReviewNazar Mohd Zabadi Mohd Azahar¹, Muhammad Amin Ahmad Zaki², Navin Kumar Devaraj^{3,4}¹ Department of Medical Laboratory Technology, Faculty of Health Sciences, Universiti Teknologi MARA, Cawangan Pulau Pinang, Kampus Bertam, 13200 Kepala Batas, Pulau Pinang, Malaysia.² Department of Nursing, Faculty of Health Sciences, Universiti Teknologi MARA, Cawangan Pulau Pinang, Kampus Bertam, 13200 Kepala Batas, Pulau Pinang, Malaysia.³ Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.⁴ Institut Penyelidikan Penuaan Malaysia (MyAgeing™), Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.**ABSTRACT**

COVID-19 pandemic has brought many changes in daily life. The pandemic has affected all populations in the world and lead to WHO calling for the global action to minimize the spread of this infection. Social distancing, work from home and movement control order are some of the strategies implemented to mitigate this infectious outbreak. Health consequences on non-communicable disease, mental health, social crisis among schoolchildren and burnout among healthcare providers have been affected during the pandemic. This review will provide a brief explanation on these health consequences of COVID-19 to the population. Future strategies that can be implemented during pandemic will also be discussed in the review.

Keywords: Pandemic, COVID-19, Coronavirus, Health consequence, Mental health**Corresponding Author:**

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) was first detected in December 2019 at Wuhan, Hubei Province, China. This disease outbreak has since affected all countries across the world and has been announced as pandemic by the World Health Organization (WHO). This global health crisis has call for vigorous public health actions to minimize the spread of infection (1). Almost all countries worldwide have implemented countless methods to mitigate this pandemic such as working from home, movement control order, circuit breaker and social distancing.

This pandemic has brought new changes in daily life such as the renewed practice of physical or social distancing all over the world. This preventive measures subsequently has caused behavioral changes and closure of usual daily institution, services and schools. It has been proven that social distancing is the best method to mitigate this pandemic (2), however, there are quite a number of health consequences affecting the wellbeing of the people in both short and long terms. Considering the huge impact of this pandemic on subsequent impact

to the population health, this current review is intended to update the existing literature on health consequences during COVID-19 pandemic. This review will highlight about consequences of a pandemic in terms of non-communicable disease, mental health, depression among elderly, health and social crisis in schoolchildren and burnout among healthcare providers. This review is of paramount importance for the healthcare providers to identify the possibility of mitigating these health consequences and subsequently to design and implement future strategies in minimizing the impact of this pandemic.

NON-COMMUNICABLE DISEASE

Disease outbreak has a strong impact on the non-communicable diseases such as cardiovascular disease, cancer, diabetes and chronic respiratory diseases. Patients who have cardiovascular risk factors may be predisposed to develop COVID-19 infection and may have higher risk for poor prognosis if infected (3, 4). Due to the implementation of work from home policy by certain countries, the prevalence of cardiovascular risk factors is elevated due to preponderance of sedentary lifestyle. In a recent meta-analysis, researchers revealed that COVID-19 patients also have high blood pressure, diabetes and cardiovascular diseases (5). During the initial stage of infection, researchers from China have reported that 40% of the patients who have pneumonia secondary to SARS-CoV-2 already have pre-existing

cerebrovascular disease and coronary artery disease (CAD) (6). High prevalence of COVID-19 has been identified among elderly, hypertensives (30%), current smoker (17%) and diabetic patients (19%) (7).

Home isolation has been highlighted as one of the factors for decrease in the moderate-to-vigorous physical activity among the population (8). Sedentary behavior is to be expected and this will increase the prevalence of obesity. Due to the closure of sport facilities such as gymnasium, swimming pool and recreational parks, people tend to practice sedentary lifestyle and spend their time at home watching movies. Physical inactivity has a detrimental effect on the cardiovascular health. Individuals who have physical inactivity have higher relative risk of developing coronary heart disease and total mortality by 1.16 and 1.28, respectively (9). In addition, the prevalence of active smokers is expected to continue to rise due to the fact that most of the people now spend their time at home. Home isolation also might result in social isolation and mental distress and these will inevitably increase the need for smoking (10). The rise and worsening of the number and severity of the NCDs seen has been potentiated by the pandemic which has been contributed mainly by tobacco use, physical inactivity, unhealthy diet and alcohol consumption.

High prevalence of diabetes mellitus has been found among patients with COVID-19 infection (11). This co-morbidity is one of the important risk factor for infection severity and mortality. Researchers have elucidated several pathophysiological mechanisms between diabetes and COVID-19 infection such as impaired immune response and increased infection severity due to the increased viral entry into cell (11). The pandemic also complicates the diabetes management due to increase in stress level, changes in the diet, physical activity and routine care (12). On the other hand, the pandemic also has significant impact on the diagnosis of cancer. Cancer diagnosis might be delayed due to the unavailability of cancer screening programs and due to the delay of patients in seeking cancer-related healthcare services as they may fear exposing themselves to this infection (13). On top of that, the immunosuppressed status of cancer patients either due to the disease itself or due to the treatment, will increase their risk of infection compared to the normal healthy population. Immunosuppression also may cause serious complications, treatment delay and prolonged hospitalizations that will negatively impact the patient's prognosis (14). Patients who have chronic respiratory disease will usually have a more advanced COVID-19 infection (15). In a study conducted among COVID-19 patients in China found that, patients with chronic obstructive pulmonary disease have trifold risk for ICU admission, mechanical ventilation or death after adjusting for age and smoking status (16).

While COVID-19 is on the news now and then, healthcare needs among non-COVID-19 patients may not receive sufficient attention or regular treatment due to limited resources or fears of getting exposed to the infection (17). Hospital and healthcare institution should provide standardized approach for all patients irrespective of their COVID-19 status. In order to avert premature death due to sedentary lifestyle, health care providers and other public health organizations should promote physical activity even during quarantine. However, precaution and close monitoring should be considered for home-based programs as patients with CVD are also considered as a vulnerable group (18).

MENTAL HEALTH: ANXIETY AND DEPRESSION

Widespread outbreaks of infectious disease significantly influence the population's mental health. Due to the implementation of social distancing and Movement Control Order by the government, residents have to minimize physical contact or gathering even in the presence of family members only. COVID-19 outbreak has brought upon a significant rise in the psychological illness and symptoms of mental disorder (19). Recent evidence has shown the prevalence of depression, anxiety and stress among China population representing 16.5%, 28.8% and 8.1% respectively (20). Lockdown had several implications towards mental health, with people aged 12 to 21 years will have higher psychological consequences of this pandemic (21). The researchers also have summarized that female gender, student, poor perceived health and having symptoms suggestive COVID-19 were found to have higher prevalence of anxiety and depression (20). The nature of this disease such as uncertainty, unpredictability, severity of the disease together with social isolation and misinformation are among the factors that contribute to this increased mental morbidity (22).

In another study, anxiety was found to have positive association with stress and was negatively associated with self-efficacy, social support and sleep quality (23). Anxiety has been reported to be one of the main psychological responses in disease outbreak. It has been suggested that training of healthcare providers and the application of technological methods in providing mental health care are crucial during a pandemic (24). Improving screening for mental health and provide accurate information are essential in reducing abnormal responses such as panic among the population (25).

Historically, natural disasters such as hurricanes and environmental disaster have increased the prevalence of depression, posttraumatic stress disorder (PTSD), drug abuse, domestic violence and other mental and behavioral disorders (26). For instance, communities in the Deepwater Horizon oil spill were diagnosed with clinical symptoms of anxiety and depression

(27). Meanwhile, individuals who experienced the Hurricane Ike in 2008 developed major depression after the disaster (28). The SARS epidemic also has an impact on the mental health. This disease outbreak will increase the prevalence of stress, PTSD and other psychological disease among SARS survivors and also healthcare providers. The impact of SARS on mental health can be observed even after a long time (29). The nature of disease transmission appears to have impact on the severity of these psychological distress such as loneliness, drug abuse and domestic violence (30). It has been proven that natural disaster such as COVID19 is causing increase in social isolation.

COVID-19 also has an impact on the socio-economic status of the communities, especially among low-income families. Due to this pandemic, some of the companies and organizations have decided to shutdowns their operations, and in other scenarios, the companies have decided to limit the number of employees in their companies. Due to job loss, people isolate themselves from the communities and this will enhance the risk of getting mental health problems. It has been documented that this pandemic had a strong impact on the economy well-being that it triggered panic and fear such as hoarding and stockpiling of essential resources (31). The spread of COVID-19 could once again result in a surge of mental health disease among the population particularly in the regions with high number of positive cases (32).

Psychiatrists should be more aware about this issue and identifying individuals with early signs of mental health disorders is crucial in minimizing the consequences of this pandemic (33). In this review article, we would like to emphasize the need to improve mental health care especially for the vulnerable groups. Large scale mental health intervention and integration of mental health services in the disaster management plan should be implemented in the future.

Depression among elderly

Social distancing is one of the best proven method to reduce the risk of getting infections. However, this important prevention strategy have negative consequences to some group of people especially among the elderly age group. For example, in the UK and some part of the world, the elderly population were requested to self-quarantine for a longer period of time. This practice was aimed at protecting the elderly population since they are susceptible for this infectious disease. Lockdown, curfew and social distance were instigated to prevent an over-burdened health system (34). Nevertheless, social isolation among elderly posed a serious public health threats because this preventive measure will increase risk of developing neurocognitive problems, cardiovascular, autoimmune and mental health problems (35). Social isolation increase the risk of anxiety and depression among elderly (36). High

prevalence of established symptoms for depression and lack of mental health care services are among the health issues that were raised among the elderly during this pandemic (33).

Many community nursing homes for older people have been closed to limit the spread of this infection. Older people also were "banned" from being visited by their family members and friends and thus, decreasing their already limited social participation (37). Decreasing social interaction among elderly could have negative impact on their mental and physical health since they usually have limited social activities in the community (38, 39). Targeted approach should be delivered for subgroups of people who are at increased risk for depression. It has been suggested that elderly population are one of the subgroups who are at increased risk for suicidal attempt (40). Those who normally have outdoor social contact such as visiting places of worship and community centers will have greater risk of having mental health problems due to social isolation. Single elderly people are dependent on the social care and are at additional risk of getting mental health disease (34).

In a pandemic environment, many countries made an announcement that encourages people to live in a new norm, significantly to limit the movement or social lockdown. Therefore, without this social interaction, it may burden the psychology and physiology of the elderly people who need someone to care for them, thus create barriers for them to access the treatment. Elderly people who are living alone, in social-isolation and loneliness are well-recognized predictors for suicide (41). Elderly individuals may be exposed to suicidal attempts due to physical distancing, loss of usual social opportunities, higher risk of anxiety and depression and through a heightened sense of disconnectedness from society (36). Several recommendations have been proposed to deal with mental health among the elderly group during the pandemic. Keeping social connections through the internet application, video chat, telemedicine, telephone support groups and cognitive stimulation are some of the strategies that can be delivered to the elderly (38, 42, 43). Adherence to mitigation measures should be scrutinized to prevent transmission and at the same time to minimize the morbidity of COVID-19 associated diseases among the elderly.

HEALTH AND SOCIAL CRISIS AMONG THE SCHOOLCHILDREN

While COVID-19 continues to affect the global population, many countries have decided to close the schools for temporary period. This step is important as part of advocating the social distancing practice and to slow the transmission and to reduce the burden to the healthcare system. Until July 20th, 107 countries have decided to close the school nationwide and this closure has affected more than 60% of the enrolled students

(44). The school closure has significant social and health impact especially to the children living in poverty and augmented the existing social and health inequalities. Lancker & Parolin (2020) have proposed two mechanisms in which school closure will affect the children, especially from a poor family (45). First, the school closure can affect food insecurity among the children. Some of the schools are providing school lunch for the children. For the poor children, school is not just a place for learning, but some of them assume school as their main source for a healthy diet. Evidences have shown that taking school lunch is connected to academic improvement while food insecurity has been found to be associated with a low educational attainment, risk of detrimental physical and mental health wellbeing (46, 47).

Second, the school closure also affects the educational outcomes. Research have found that there is a difference in the mathematics subject and literacy skills between children from lower and higher socioeconomic status and the gap often widens during the school holidays (48). The school holiday has been found to cause a loss in academic performance among the children with lower socioeconomic status, but not among children from higher socioeconomic status (49). Although some of the school continued their session virtually, the schools closure are likely to broaden the learning gap between children from low- and higher-income families. Children from lower-income status face difficulties for online digital learning as this platform need computers and a stable internet access. A few factors have been identified that could impede home schooling such as no access to the internet, availability of appropriate place to do homework, no access to the outdoor leisure facilities and unavailability of books (50). Children from low-income family have to struggle to finish their homework and online classes with limited resources and then cause social crisis and stress among them.

This pandemic calls for action among policy makers and school administrators alike. Healthy nutrition and identifying learning needs for children from lower-income family should be given utmost priority. The school should consider to continue providing school lunch during school closure to prevent the emergence of food insecurity among poor children. Teachers also should design alternative strategies for students who have limited access to the internet, computer or equipment's for digital learning. Otherwise, teachers also can have other strategies such as printed materials posted to the schoolchildren residency in order to reduce the teaching-learning gap. School also have to prepare their own educational strategies after the pandemic subsides. From the policy-maker perspectives, the government could provide financial support for the children from low-income families to purchase computers or other equipment's required for digital learning.

BURNOUT AMONG HEALTHCARE FRONTLINERS

Healthcare workers are among the most important profession in treating and managing disease outbreak. During this difficult time, the frontline healthcare providers faced significant risk of adverse mental health consequences. They usually experience physical fatigue, shortage of protective kit, loneliness and separation from the beloved ones (51). Historically, during the outbreak of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), healthcare providers that provide care to these patients also had reported to have a high risk of infection, understaffing, stigmatization and insecurity (52, 53). Recently, the frontline healthcare providers that treat patients with COVID-19 have higher risk of getting mental health symptoms, insomnia and stress (54).

Healthcare providers particularly hospital staff deal with numerous hazards, high workloads, risky working conditions and experience job stress due to a few factors such as physical burden, understaffing, emotional pressure, long and irregular working hours and a gross imbalance between effort and reward (55-57). Prolonged exposure to stressful events related to work has been proven to cause burnout (58). Burnout is a well-known condition related to job stress and composed of emotional exhaustion, depersonalization and impaired personal performance (59). Work-related burnout significantly impacts the mental health, poor sleep pattern, anxiety and consumption of alcohol as their coping strategies (60). Factors like heavy workloads, shift work, intense pressure and shortage of time to rest have been identified as predictors for burnout in nursing profession (61).

Accordingly, intention to leave among nurses have a great challenge to the healthcare system due to staff shortages and subsequently can influence the quality of care provided to the patients (62). Heavy workloads also have been found to affect the nursing performance and care provided to the patients (63). In Europe, about 33% of nurses stated their intention to leave the nursing profession (64). The loss of nurse can cause financial impact which could incur cost around 1.3 times higher than their salary to employ one new nurse (65). Moreover, the levels of work-related burnout and job dissatisfaction will be escalated especially during the periods of natural disaster such as COVID-19 pandemic. Addressing the basic needs among healthcare providers is one of the top priority during pandemic. Basic needs such as provision of rest area, training on the care of COVID-19 patients, leisure activities, basic physical needs such as food, periodic visit by counsellor and information on protective measures have been identified as mitigation measures among the healthcare frontliners (66). Mental health status of the healthcare providers

especially those who are working in the critical care units should be monitored closely to reduce the stress and minimize the risk of depression (67). In this review, we would like to emphasize the importance of monitoring the population's mental health status as this pandemic has caused significant impact not only to the current psychiatric patients, but also has caused impact to several groups such as general population, the elderly, other vulnerable population and healthcare workers.

FUTURE STRATEGIES TO OVERCOME HEALTH PROBLEMS DURING A PANDEMIC

While some of the scientific evidence is not so clear about the effectiveness of these proposed strategies, nevertheless it helps in minimizing the effect brought upon by this pandemic. There are 3 methods that we would like to address; 1) screening the elderly, and single mother group or communities that have the risk of loneliness and targeting this group of population as intervention. The use of digital technology is recommended to bridge this social distance though there might be disparities in accessing this technology (68, 69). Gym, yoga, aerobics and other physical fitness centers can create online activities and virtual environments where people can still practice some social life and connect to each other. These strategies might be helpful for the elderly to have a normal daily life so that there are not virtually alone, literally speaking. Also, employees can work from home and still have their salary to support their living costs provided that they have daily inputs monitored by their supervisors. Social media is one of the best platform to encourage people to connect and can provide resources for mental health support. This technology can also be used to monitor their health needs (30). Telemedicine and delivery of care through technology will be a promising approach especially during times of crisis. The simplest and the most convenient way to provide social support and to address their healthcare needs is through frequent telephone contact made by family members, voluntary organizations or healthcare providers.

For non-communicable diseases, teleconsultation between healthcare providers and patients could be arranged to monitor the patient's condition. Healthcare providers can arrange the teleconsultation with patients with well controlled chronic diseases after normal office hours or even during weekends to prevent large crowds from attending at healthcare facilities. Patient empowerment that encourages self-efficacy and management among patients of their chronic diseases should also be emphasized.

Furthermore, the strategy we can implement is to create a peer support group through social media. This group can interact through social media such as Telegram® or WhatsApp® where patients can share problems and opinions about their own illness. What is equally

important is, this peer group discussion will need the presence of a medical consultant who will try to provide an explanation if any unresolvable query arises. The existence of this peer group will enable patients to get more information about their disease and their current health status. Then only, if a further check-up is required, a face-to-face consultation should be arranged. In this way, there is no need for patients to be present regularly at the health facilities just to enquire on minor things, thus reducing the transmission risk of infectious diseases in crowded places.

The next strategy that can be implemented during a pandemic is to ensure that schoolchildren have access to regular programmed work. Online educational sessions are helpful to ensure that all schoolchildren have the platform for continuous learning and socialization with their colleagues. However, not all children have the luxury to afford and have accessibility for online education. Alternative mechanism should be designed for this group of the population. Social service organizations have to plan appropriate approaches for this population.

Despite of having some difficulties in managing diseases during pandemic, this difficult period nonetheless has created a few opportunities in maximizing the higher education system's ability in delivering digitalized technology or online based learning approach. On the other hand, this pandemic also has allowed the government to evaluate and improve the national healthcare capacity to provide a better holistic care to all levels of the community.

CONCLUSION

As the number of infected patients is increasing every day, this pandemic brings together both challenges and opportunities. One of the greatest challenge is to cope with the current situation as some countries have very limited medical resources while one of the opportunities is to implement all the recommendations for all levels of population and to design our own disaster plan in order to mitigate this outbreak or any other similar natural disasters in the future.

Due to pandemic, the government should improve the coordinated and protective strategies to cope with the situation. Social support should be continuously targeted to the vulnerable population. Other than that, efforts in delivering accurate information, reduce the stigma associated with this pandemic and maintaining the new norm while adhering to safety measures should be sustained in order to empower the people to handle the COVID-19 pandemic.

Long term strategies also should be planned for future preventive measures. The government and research bodies should produce a solid and holistic disaster

management plan in order to mitigate the outbreak. The government also should enhance the research and development activities in the country by supporting national manufacturers that can produce personal protective equipment's. Research activities on vaccine development should be intensified. Managing the impact of this pandemic requires concerted effort from all levels of the population.

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