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Chapter

The COVID-19 Pandemic and Mental Health

Swati Mittal, Smriti Sinha and Shilpi Bhat

Abstract

The COVID-19 crept in silently and subsequently spread at a rapid pace ultimately progressing into a pandemic with a high rate of morbidity, mortality, loss of income and sustained social isolation for billions of people. This sudden human tragedy required heavy adjustment and was difficult to adapt quickly as we humans are gregarious in nature and always need social connect in our lives especially during a crisis. History has shown that mental health impact of pandemics outlasts the physical impact. In general, mental health and related issues are not recognized in public and with global pandemic these silent and insidious issues can be either misdiagnosed or go unnoticed completely.

Keywords: coronavirus, COVID-19, psychological effects, mental health

“World leaders must move fast and decisively to invest more in life-saving mental health programmes—during the pandemic and beyond.”

- Dr. Tedros Adhanom Ghebreyesus

1. Introduction

The novel coronavirus disease (COVID-19) has become the fifth pandemic reported since 1918 Spanish flu pandemic. COVID-19 first reported in December 2019, Wuhan, China and is caused by a virus called severe acute respiratory syndrome (SARS-CoV-2) It is an enveloped and spherical virus containing a positive-sense single-stranded RNA genome and belongs to the subfamily Coronavirinae. Like many other respiratory viruses, coronavirus is transmitted through droplets projected out during breath, cough or sneeze. The symptoms of respiratory tract infections vary from mild cold to severe acute respiratory distress [1]. It crept in silently and subsequently spread at a rapid pace progressing into a pandemic.

The Coronavirus Disease was unprecedented in recent history with a high rate of morbidity, mortality, loss of income and sustained social isolation for billions of people. Now it has been affecting the world at an alarming rate, unfolding a tsunami of changes and leaving it in shambles, at the same time triggering a global collaboration to disease containment. Being a novel disease, COVID-19 has presented itself as a mystery infection to the health and research field. SARS-CoV-2 has a tendency for genetic evolution resulting in quick mutation and multiple variants that may

have different features compared to its ancestral strains. The coronavirus has created frequent challenges ranging from virus isolation, detection, prevention, vaccine development to clinical and mental health issues. Besides, the tremendous research and insights about nature of virus, the studies regarding short term and long-term consequences on mental and psychological health of the community need to be focused.

2. Effects of lockdown on the psyche of people

To restrict the rate of both infections and death of fellow-citizens from COVID-19 and meanwhile also to prepare ourselves for the pandemic of such a magnitude, inter-individual physical contacts were restricted in the form of social lockdown. Under this situation, minimal and only emergency movement of general public was allowed. The central objective was to forbid people from two different families or nearby inhabitants to come in close contact with each other and thus break the cycle of infection [2]. Following this there was a significant reduction in the growth rate and increase in doubling time of cases [3]. But this swift change in people's daily life in the form of loss of freedom and dissociation from family members led to dramatic consequences. Confinement of physical space, lack of mobility, fear of contraction, loss of income, hopelessness and growing ambiguity along with uncertainty and unpredictability over the disease were some of the observed collective experiences affecting the wellbeing during lockdown [4]. COVID-19 led to roughly 5–20% contraction of global economy which could result in an increased poverty rate for the first time since 1990 with Asia, Africa and Latin America enduring the hardest blow [5]. Factories and industries were shut down forcing thousands of informal workers to return back to their native villages in absence of any form of conveyance. A survey conducted by International Labor Organization in April 2020 estimated roughly 2.5 crores job loss in 2020 alone worldwide due to the pandemic, predicting a deep economic crisis in coming days. The situation of Crises often reveals the structural inequalities present in the social and political dimensions (such as the unequal distribution of resources or the uneven delivery of healthcare). United States unemployment rates rose and the country neared a recession and as the pandemic progressed it created a situation of socioeconomic crisis which was reflected across the borders. Unemployment rate in urban India rose to 20.9% during the April–June quarter of 2020 pushing over 40 crores informal workers jobless [6]. Roughly 80 million children of under 1 year missed their routine vaccination while an estimated 38% increase in maternal mortality was registered due to health system disruption resulting from COVID [5]. This sudden human tragedy required heavy adjustment and was difficult to adapt quickly as we humans are gregarious in nature and always need social connect in our lives especially during a crisis [4]. This was the largest psychological experiment ever conducted as 1/3rd of the world's population was living under some kind of lockdown, dealing with an intense stressor called "loneliness" [7].

3. Loneliness and mental health

According to the World Health Organization (W.H.O.), mental health is a "state of wellbeing in which an individual realizes his or her own abilities, can cope with normal stressors of life, work positively and fruitfully and is able to make a

contribution to his or her community” [8]. Keyes identified 3 components of mental health: emotional, psychological and social well-being and its definition is said to be influenced by the culture that defines it [9].

Psychological distress, a common mental health disorder is defined as a state of emotional suffering typically characterized by symptoms of depression and anxiety [10]. An important point to remember here is that, mental health can change over time, and depends heavily over the prevailing conditions. More so, when the demand exceeds the resource of coping abilities, it is heavily impacted. People became vulnerable to psychological impact of COVID-19 infection due to both the pandemic and its cascading consequences worldwide including lockdown and economic recession. It negatively affected people’s mental health and created new barriers for ones already suffering from mental illness. A broad body of work links social isolation and loneliness to both poor mental and physical health. Loneliness and frustration seemed to originate from inhibition of daily activities, interruption of social necessities and inability to indulge in social networking, leading to psychological distress and progressing to unhealthy ways of coping in form of overeating and substance abuse [11]. This abrupt situation exposed that individuals were largely emotionally unprepared to the detrimental effects of biological disasters and everyone was feeling frail and helpless. It had a remarkable and variable psychological impact in various countries, depending on the phase of the pandemic. Also, certain features were distinct to psychological presentations of the catastrophe. First, the overlapping of psychological issues was very frequent i.e. anxious people may also have depression and smoke or drink alcohol to reduce the problem. Second, normal individuals presented with psychological problems were overwhelmed by an exceptional stressor. And thirdly, a huge number of people presenting with pandemic associated psychological disturbances got better naturally over time or with brief psychological support. As a consequence, these presentations did not necessarily lead to an overtly psychiatric diagnosis. A report published by W.H.O. following a survey conducted on 130 countries provides the first global data screening the devastating impact of COVID-19 in form of compromised access to mental health services, reduced compliance and poor supervision of patients leading to disruption of mental health services in nearly 93% of countries worldwide, while the demand kept on increasing, underscoring the urgent need for surge in funding [12]. Unfortunately, in a frantic search for biological cure and vaccines against the virus, these issues were all the more neglected, contributing to an increased public health burden. Forced into physical separateness we were united by a common trauma, a common fear as all of us were terrified for our own safety and that of our loved ones.

4. Preceding pandemics and mental health

Previous researches reveal profound and wide range of impact on mental health of individuals, communities and countries, during past outbreak of infectious diseases primarily on disease survivors (Ebola, SARS) [13]. Studies report adverse psychological symptoms in the form of mood alteration, insomnia, anger and emotional exhaustion. The psychological trauma of bereavement during Middle East Respiratory Syndrome (MERS) outbreak showed that surviving individuals were stigmatized, marginalized and socially isolated even after successful treatment [11]. Literature published during Severe Acute Respiratory Syndrome (SARS) outbreak a decade ago suggested 50% of health care workers (HCW) were at an increased risk of acute

distress syndrome (ADS) during these periods [14]. Moreover, long term behavioral changes in the form of vigilant hand washing and avoidance of crowds many months even after quarantine have been reported, depicting that pandemic and isolation has a definite long-term impact on the mental health of humans [15].

5. COVID-19 and its symptoms of mental disruption

The emotional and psychological effects of COVID-19 outbreak ranged from biological factors like the neurotropic effects of SARS-CoV-2 (causative agent of COVID-19) and involvement of limbic system along with its psychological factors of fear, discomfort, uncertainty, anger, addiction, socioeconomic issues of isolation, xenophobia, stigma, domestic-violence, loss of livelihoods and constraint of open spaces. Global studies have established COVID-19 to be increasingly associated with neuropsychiatric manifestations such as delirium, anxiety, depressive disorders, insomnia and incidences of increased self-harm. Meanwhile, COVID-19 itself can progress to neurological and mental complications like delirium, stroke, cerebrovascular accidents, seizures and agitation that can have added psychiatric associations. Further on, those with pre-existing psychiatric conditions might be at increased risk of COVID infection due to lack of supervision and inadequate compliance to many precautionary measures [16]. The emotional outcome of subjects who were quarantined compared to those who were not, shows presence of acute stress disorder, anxiety, irritability, insomnia, boredom, poor concentration and performance, post-traumatic stress disorder (PTSD) and nervousness. Other psychological reactions reported during mass quarantine were generalized fear, collective hysteria and pervasive community anxiety. These symptoms are typically associated with disease outbreaks and escalation of new cases, together with inadequate anxiety provoking information provided by the media [15]. Reports of people emptying supermarkets and panic buying was indicative of their escalated levels of anxiety [4]. Anxiety may be related to sensorial deprivation and pervasive loneliness initially in the form of insomnia and later progressing to depression and PTSD. Moreover, other health measures get compromised in presence of abnormally elevated anxiety. The butterfly effect of increased anxiety and depression could also lead to a global increase in chronic illnesses including heart-disease-related deaths as people diagnosed with depression are up to five-times more likely to die within six months of having had a heart attack than those without depression [17]. Factors associated with a greater psychological vulnerability seem to be more important than factors associated with the risk of infection in predicting mental health consequences of the pandemic. Furthermore, symptoms of the infection, such as fever, myalgia, hypoxia and cough, as well as adverse effects of treatment, such as insomnia caused by corticosteroids, led to feelings of fear of contracting COVID-19 causing worsening of anxiety and mental distress. As mental and physical health are equally important and closely connected, a sound state of mental health plays a crucial role in people's ability to maintain good physical health. **Table 1** shows the various research conducted globally to study the impact of COVID -19 on mental health.

Zhao et al. highlighted that even close contacts of people with COVID-19 experienced distress and prolonged mental health consequences including severe depression and chronic fatigue in the post-COVID period in a study comprising 1169 close contacts. The study revealed that old age, heavy financial loss and perception of poor health were significantly associated with depression in them while the cause of fatigue reported

Sl. No.	Study	Sample characteristics	Research tool	Outcome
1.	Varshney et al. [18]	Cross- sectional study of 1106 participants across India	IES(R)	One-third participants had psychological impact (mostly mild) which was higher in younger age group and female participants
2.	Khanna et al. [19]	2355 Ophthalmologists	Mean patient health questionnaire score	One-third participants had depressive symptoms (mostly mild). Predictor of depression being young age, gender, marital status and profession
3.	Chandu et al. [20]	307 participants	COVID-19 related Anxiety scale	Higher anxiety in lower educational qualification group
4.	Narsimhan et al. [21]	Hospital based study with 96 alcoholic middle-aged males	Changepoint analysis	95% participants reported alcohol withdrawal symptoms due to sudden cessation of alcohol during lockdown.
5.	Roy et al. [22]	Cross- sectional study with 662 participants in Indian Population	Online Semi-Structured Questionnaire	80% participants were preoccupied with thoughts of COVID-19. 72% reported overuse of gloves and sanitizer, 37.8% had paranoia about acquiring the infection, 36.4% had distress related to social media and 12.5% had sleep disturbances
6.	Grover et al. [23]	Cross sectional study with 1685 participants	PHQ-9, GAD-7 Warwick Edinburgh mental well- being scale	74.1% had moderate stress, 40.5% had either depression or anxiety, 38.2% had anxiety and 10.5% had depression
7.	Chakarborty and Chatterjee [24]	Regional survey of 507 participants from West Bengal, India	Self-designed questionnaire	71.8% and 24.7% showed increased worries and depressive symptoms during pandemic. 69.6% were worried about the financial loss, 30.8% perceived higher health anxiety and feared it to continue post lockdown
8.	Chatterjee et al. [25]	Cross sectional study of 152 doctors	DASS-21	34.9%, 39.5% and 32.9% were depressed, anxious and stressed respectively. Stigma and discrimination against frontline workers were important factors contributing to stress.
9.	Mohindra et al. [26]	3083 HCWs across north India	Interview	23.9% of HCWs reported anxiety disorder and 20% depression which was higher in females, aged and unmarried participants
10.	Wang et al. [27]	1210 participants across China	IES(R) and DASS-21 scales	53.8% participants had a psychological impact (moderate or severe); 16.5%, 28.8% and 8.1% reported moderate to severe depression, anxiety and stress

Sl. No.	Study	Sample characteristics	Research tool	Outcome
11.	Rehman et al. [28]	403 participants	Family affluence scale, Response accuracy scale and DASS	Students and HCWs had higher depression, anxiety and stress, which was negatively correlated with family affluence.
12	Gao et al. [29]	Cross sectional study of 4827 participants China	GAD-7, WHO-5	22.6% had anxiety while 48.3% suffered from depression
13	Gonzalez Sanguino et al. [30]	Cross sectional study of 3480 participants across Spain	GAD-2, PCL-C-2, PHQ-2	21.6% had Anxiety, 18.7% had Depression while 15.8% had PTSD symptoms
14	Mazza et al. [31]	Cross-sectional study of 2766 participants conducted in Italy	DASS-21	18.7% suffered from anxiety, 32.7% Depression and 27.2% had stress
15	Sonderskov et al. [32]	Cross-sectional study of 2458 participants conducted in Denmark	WHO-5	25.4% suffered from Depression

Table 1.

Various studies conducted across globe depicting adverse impacts of COVID-19 on mental health.

was frequent use of mass media [33]. Among the varied corollaries of the pandemic, one among them was diametrically opposite incidences of both alcohol abuse as well as alcohol withdrawal symptoms in different circumstances due to sudden lockdown. The migrant labourers who represent 4.7% of the global labour workforce along with refugees, having limited access to healthcare, living in overcrowded environments, working in marginalized sectors and lacking workplace and social protection were the worst sufferers of pandemic and economic shutdown [16]. Researches depict that people working on site, within lower income bracket, job loss and households with children under the age of 18 yrs. were more likely to report negative mental health outcome in form of anxiety, stress or depression [34]. Lack of authentic information, dissatisfaction with fulfillment of basic needs, poor sleep quality, ambiguity about SARS-CoV-2 and a relatively lower confidence in health care fraternity could be the stipulated reason for ongoing extreme stress.

6. Challenges faced with age, sex and profession

Even though the SARS-CoV-2 was considered a public health calamity, certain sections of the society were at clearly defined risk and the morbidity as well as mortality correlated well with age, sex, profession and socio-economic conditions. This exposed the existing socio-economic, gender, ethnic and health inequities present in the social determinants of health community and exacerbated it some extent [35].

6.1 Children

In March 2020, schools across India were shut down to curb the transmission of infection. But now, children have been at home for longer periods of time than ever before in recent memory. Closure of schools led to disruption of their daily routine along with lack of extracurricular and outdoor activities. This sudden unexpected

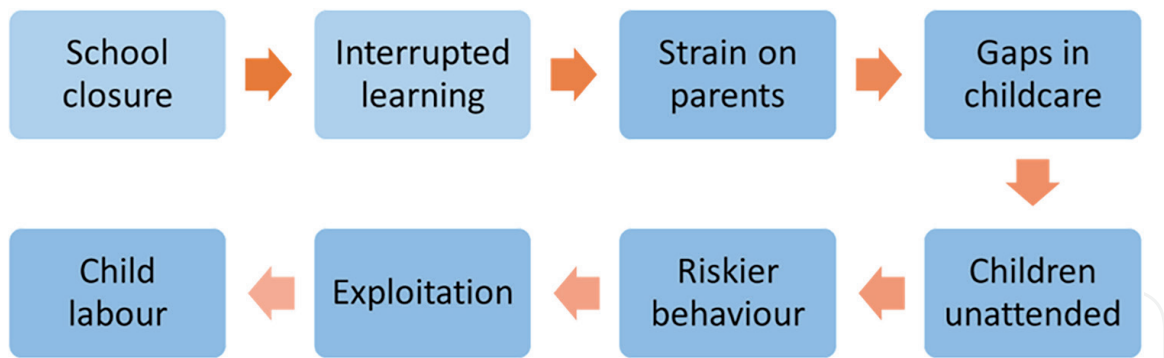


Figure 1.
Depicting the domino effect of school closure on children.

change caused altered eating and sleep habits, anguish, irritation and lack of peer time fostering monotony and diverse neuropsychiatric symptoms in them. Commonly reported psychological problems among them were inattention, clinginess, boredom, irritability, restlessness, nervousness, distraction and stress about the pandemic with the risk greatly increasing in those already suffering from some form of mental disorder. The domino effect of school closure on children is shown in **Figure 1**.

The social disruption which happened due to job loss, progressed to financial insecurity and threatened loss of loved ones impacting the quality of family relationship between parents and children causing a significant risk of adjustment to more than 370 million children in India, given their dependence on positive family processes for a host of developmental outcomes [30]. As COVID deaths among adults occurred within weeks, the families had little or no time to prepare for mental trauma and agony that a child underwent in a case of death of a parent or caregiver. An estimated 1.5 million children globally, experienced orphanhood either due to sudden death of their parents or death of their custodian grandparents or kin due to COVID-19. Such children usually face poverty, physical, emotional and sexual violence apart from depression, family separation and institutionalization in upcoming days [36]. Although home is the safest place for a child, physical, sexual and psychological abuse saw a significant rise in numbers and severity during the pandemic leading to heightened child abuse related hospitalizations. Child abuse leads to immediate emotional and psychological problems and an adverse childhood experience linked to possible mental illness, substance abuse and suicidal ideation later in life.

6.2 Adults

Young adults (<35 yrs.) experienced pandemic related consequences in form of closure of universities, uncertainty about future, financial crisis and space crunch that contributed to poor mental health. The stigmatizing psychological pressure of performance during the timespan when universities were shut led to aggravated feeling of guilt, shame, regret, sadness, self-pity, anger, internalized emotions, overwhelmed feelings, negative self-talk, unrealistic expectations and perceived sense of failure among the ones who could not perform due to various reasons [11]. Some of the reviewed studies have highlighted increased correlation of social media exposure with psychological issues like hampered social communication, sleep deprivation and increased gaming behavior, that was inversely related to physical activity in students and finally impairing

their overall health [16]. Researches from prior economic downturns show that job loss is associated with increased depression, anxiety, distress and low self-esteem leading to higher rates of substance abuse and “deaths of despair”. A study done on 1543 respondents to assess the prevalence of distress found 21–35 years old more prone to distress as compared to other age groups, maybe due to heavy pressure of managing finances along with reduced resilience and coping mechanisms [4, 33].

6.3 Geriatrics

Older adults were susceptible both to the virus and to its psychological impact as they have unique physical, psychosocial and environmental vulnerabilities owing to frailty [37]. Latest reports from Nature Medicine quoted those below 30 and above 59 years were 0.6 and 5.1 times more likely to die after developing symptoms respectively. According to the Centre for Disease Control and Prevention (CDC), people having chronic illness such as chronic lung diseases, asthma, serious heart conditions and diabetes are at an increased risk of COVID-19. Moreover, mental health disorders are a common comorbidity among older adults, which may get exacerbated by their fear and trepidation of being vulnerable to severe illness from COVID-19 [34]. This form of stress is associated with reduction in immunity compounding the already weakened physiological defense systems in an elderly. Recently, a study found that 18% individuals who received a COVID-19 diagnosis were later diagnosed with a mental health disorder such as anxiety or mood disorder and both was found to have a higher prevalence in the older age group as compared to middle aged and youngsters [38]. Neglected older people can even serve as vulnerable ‘hidden pockets’ of viral load that can contribute to increased infection spread due to under-reporting of the psychiatric symptoms in them. This leads to under-detection of symptoms, faulty treatment and increased prevalence of them being asymptomatic carriers. Higher viral load and virulence among geriatrics increases the fatality rate from 3.6% in 60–69 yrs. suddenly to 18% in more than 80 years [37]. Loneliness, especially when chronic and associated with lack of physical activity is a potent risk factor for depression and cognitive disorders. In 2018, an estimated 27% adults aged 65 and above were reportedly living alone [34]. In face of older elderlies not being well-versed with technology, their inability to conduct virtual meetings led to increase distancing during the pandemic. Finally, the social stigma of ageism magnified by COVID-19 outbreak led to marginalization, segregation, abuse, increased institutionalization and suicidal ideation among senior citizens. Banerjee et al. has shown increased depressive disorders, PTSD and adjustment reactions in geriatrics due to the pandemic [38]. On the other hand, poor perception of one’s own health could lead to health-related anxiety which may further result in depression, headache, insomnia, and even suicidal tendency in the aged [33].

6.4 Females

Females reported elevated distress due to closure of schools and day care with increased household chores along with their regular professional work during times of crisis and quarantine. Apart from this, women also faced the brunt of domestic violence, which was reportedly at an all-time high since last 10 yrs. in India during COVID lockdown [30]. Generally, both prior to and during the pandemic, women have reported higher rates of anxiety and depression compared to men. Further, it was observed that the recovery rate of unemployment

post-national lockdown in India was lower in case of females as compared to males and the gaps seems to have widened [6].

6.5 Health Care Workers

It appears that disaster management workforce was itself not immune to the psychological consequences of the pandemic. While others were under strict vigil of lockdown and quarantine, the local hospitals continued to receive suddenly thousands of critically ill COVID-19 patients and were forced to implement their emergency protocols [15]. With overwhelming hospitals and a rapidly increasing demand along with supply shortage, frontline HCW were put to immense stress. Previous studies on the infectious outbreaks of SARS, MERS and Ebola have revealed the severity of emotional distress among medical practitioners and law enforcing agents who faced PTSD, depression, anxiety, exhaustion and burnout at the onset, during and even after the outbreak of such epidemics [11]. A study conducted on 1563 health professionals found roughly half of them to suffer from depression, whereas 44.7% and 36.1% from anxiety and sleep disturbances. Higher depression, anxiety and acute overall psychological burden was reported particularly in those directly diagnosing and treating COVID cases [34]. Spoorthy et al. suggested that 68.7%–85.5% of medical staff comprises of females and were likely to be affected in the COVID-19 pandemic by elevated degrees of anxiety, distress and depression [39]. Psychological symptoms were frankly correlated with increased duty hours, lack of shift rotations, societal stigma, inadequate medical protective equipment, increased witness to death and dying, increased risk of exposure and self-blame, as well as the guilt and fear of spreading the infection to the family members [39, 40]. They suffered the worst sleep quality and sleep time. The discrimination, isolation, negative emotions of patients and lack of contact with own families for long led to frustration and hopelessness. Some studies have even depicted burnout of young nurses and found them to be more anxious and depressed when compared to doctors, which could be accounted due to low nurse to patient density (Figure 2) [39].

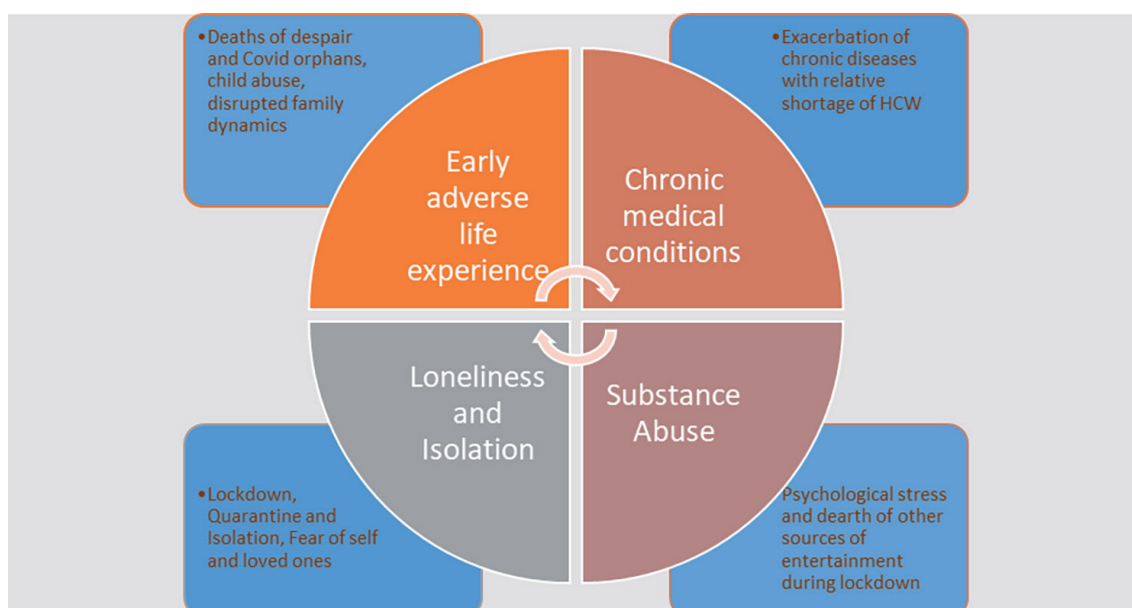


Figure 2.
The text in the inner circle depicts the probable causes of mental health disorders while that in the boxes depict how those circumstances were created and got aggravated due to COVID-19.

7. What can be done now?

Although government regulations were necessary to maintain social balance and guarantee the safety of individuals, a strategy to deal with psychosocial issues related to the crisis and its consequences in the community was relatively lacking [15].

History has shown that mental health impact of pandemics outlasts the physical impact, suggesting that today's elevated mental health need may continue well beyond the coronavirus outbreak itself and we may be heading towards an outbreak of a second pandemic, that of mental health crisis. As people faced the onslaught of pandemic related stressors, they wished and wanted to lean over, on each other for connection and coping strategies to ease the weight of public health crisis on their mental health, which was sadly cut down due to lockdown and isolation. Dissatisfaction with levels of social interaction led to negative affect which was further associated with a slowing of passage of time. The slower the passage of time, the higher was the negative emotions experienced escalating the feelings of helplessness and anxiety. A report highlights that the number of adults with anxiety or depression in U.S. increased four-hundred percent in the sixteen months following COVID-related lockdowns [11].

As rightly said by Dr. Tedros Adhanom, DG of W.H.O. "Good mental health is absolutely fundamental to overall health and wellbeing" [12]. During this public health emergency when the external environment is not in our control, it is imperative to focus on building and strengthening our mental immunity. People with strong psychological resilience and a healthy life appear to be less affected by COVID-19. This statement underpins that fear of pandemic disrupts people's psychology and the psychology of those who had an underlying illness before the pandemic or had family or friends who were infected or had died. Therefore, psychological resilience and being healthy are important individual characteristics that can be developed in facing the fear of COVID-19 and the psychological problems caused by this fear [41]. Other lessons learnt are that safety policies, accurate information dissemination about pandemic prevention and pandemic prevention impacts should be emphasized. There was a negative influence of attitudinal construct and mythical behavior on disease prevention practices especially in South-Asian countries [42]. Peer support, risk averse behavior and internet based cognitive behavior are some pragmatic implications for stress management at macro and micro level during an epidemiological level. Apart from these, individuals and communities could deliberately cultivate resilience, healthy coping strategies, mindfulness and well-being. These all are processes and they can be acquired with practice and learned dynamically. Recent researches have depicted those healthy coping strategies have helped individuals to stay positive, view lockdown as a golden opportunity to ruminate on their individual and social identity and to march ahead to enhance their skills [43]. Cultivating a sense of community belongingness may also help and prepare people to face the mental health issues that they may endure in the upcoming days. Throughout the pandemic, leading public health organizations — including the CDC, Substance Abuse and Mental Health Services Administration (SAMHSA), the World Health Organization, and the United Nations — have released general considerations and resources addressing the mental health and well-being of both general populations and specifically high-risk groups during the pandemic [34]. In India, along with the National Institute of Mental Health and Neurosciences (NIMHANS), the Indian Psychiatric Society also brought out a rulebook for effective mental health management titled "Mental Health Challenges during COVID-19 pandemic: Guidance for psychiatrists. It covers telepsychiatry,

psychopharmacology, and brain stimulation practices during COVID-19, also catering to special populations like children and adolescents, older adults, perinatal groups and rehabilitation settings and can be referred.

In general, mental health and related issues are not recognized in public and with global pandemic these silent and insidious issues can be either misdiagnosed or go unnoticed completely. Thus, the role of mental health professional can be vital in this regard especially in educating, training, encouraging mental health-promoting behaviors, maintaining cross-specialty integration, facilitating problems solving approaches, empowering patients and allied professionals, and finally enabling self-care strategies for resilience [16]. Despite the common mental health problems and disorders among patients and HCW during the pandemic, most health professionals working in isolation units and hospitals did not receive any training in providing mental health care [13]. In this regard, mental health services, facilities and specialized psychiatric treatment teams including psychologists, psychiatrists and psychiatric nurses should be established to address psychological health concerns in the general public and we need to validate and value their immense selfless contribution. W.H.O. has previously highlighted the chronic underfunding of mental health prior to the pandemic, but the pandemic has suddenly increased its requirement, especially in the South Asian countries which suffer from an inadequate psychiatrist-patient ratio. Based on this, the Primary Care first and Collaborative Care model which has been suggested by Türközer and Öngür, teletherapy: Telemedicine and teletherapy should be established to provide psychological help which can be a boon during restrictive conditions of an infectious disease outbreak like COVID-19, but at the same time, limited accessibility and poor Internet connectivity in various areas are the existing challenges. Standardization of treatment, online surveys and local management of stable patients to reduce risk of infections can also be of help during this crisis [16]. It is suggested that public health machinery should conduct mental health audits during epidemiological emergencies which are critical for effective management of community mental health. Bouncing forwards for a new normal, we need to:

- Identify people at risk during clinical visit or teleconsultation, especially younger age, females and those having a preexisting mental health condition for which COVID-19 data disaggregated by characteristics such as age, gender, sex and race are needed to help tackle the health inequalities.
- Screen for psychiatric and psychosocial effects of social distancing of vulnerable population.
- Ask direct questions about wellbeing and safety at home.
- Specialized psychiatric treatments and appropriate mental health services for patients with comorbid mental disorders.
- Tremendous interconnectedness including cross country collaboration and research [4, 13, 16].

8. Prevention of future pandemics

Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) hints at more severe and frequent pandemics in coming times. SARS, MERS, H1N1 to name

a few along with COVID-19 testify to its damage [44]. With more than 2/3rd of the recently emerging diseases and almost all known pandemics being zoonotic diseases, following are some of the probable reasons of spill over of diseases from other organisms to humans, which needs to be addressed on a priority basis:

- **Deforestation:** With deforestation of over 25%, human and their livestock are likely to contact wildlife leading to vectors probably feeding near human settlements. Such contacts lead to and determine risk of novel human virus transmission.
- **Wildlife trade spill over:** Markets that sell wild animals have been the hotbeds of diseases. The US agency for international development (USAID) PREDICT project analyzed the spill over of viruses in people with high wildlife contact in as high as 31 countries.

The risk further increases with climate change, intensive farming and international travels enabling disease to spread across the world at an alarming rate. The estimated present cost of prevention of pandemics for 10 years is estimated to be only 2% of the cost incurred during the COVID-19 pandemic. A few stringent steps can go a long way in detection and managing them. Working on these lines, December 27th is proclaimed as the international day of Epidemic Preparedness – a day to embark on the importance of prevention of, preparedness for and partnership against epidemics like COVID-19. To prevent and be prepared for future pandemics, we need to invest in 4 core spheres i.e., surveillance, early detection and control, manufacturing and coordinated research and development.

- **Surveillance:** Effective surveillance for faster detection and control of diseases requires a multidisciplinary approach integrating meteorological, veterinary and medical surveillance with livestock farmers and local community playing a key role. It includes risk characterization and participatory surveillance of unusual events along with animal supply chains. Laws enforcing the ban of national and international trade in high-risk diseases reservoir species should be enforced to control zoonotic diseases. In this context, Regional Wildlife Enforcement Network (WEN's) and Convention on International Trade in Endangered Species of Fauna and Flora (CITES) should be strengthened which could form part of an effective response frontier. Building locally owned and internationally connected genomic surveillance network will also ensure that we can spot potential dangers and prevent future pandemics.
- **Early detection and Control:** SARS and COVID emerged as respiratory disease outbreaks in Guangdong and Wuhan respectively but the serological survey of people at Yunnan, a nearby province showed 3% had antibodies to similar virus species from their principal reservoir. This proves that there's substantial under-reporting of exposure to zoonotic diseases. Lags in detection and identification of diseases have decreased with time but still varies geographically, especially in economically weaker countries.
- **Manufacturing:** There is an urgent need to increase the regional manufacturing capacity for drugs and vaccines in low- and middle-income nations or regions, which go a long way to prevent and control future pandemics globally and

ensuring that local needs are met. Kusuma et al. revealed that unavailability of protective gears including face masks and sanitisers adversely affected the COVID-19 prevention adoption in 4 south Asian countries including India.

- **Co-ordinated Research and Development:** Since the inception of pandemic, the world has seen an incremental investment in research, distribution and manufacturing of COVID-19 tests treatment and vaccines. Paradoxically the same increase in Research and Development for other infectious diseases of becoming pandemics of tomorrow is not witnessed. Given the cross-border nature of pandemics, international boards like world health organization (W.H.O.) or the Global fund should work through existing global health architecture [45].

And for such a rigorous pandemic preparedness, we need to have a sound financial footing and a collective investment globally, to support the key gaps in infrastructure. The emergence of SARS-CoV-2 showed the limits of current approach and the overall long reaction time of international reporting systems. The need of the hour is to improve global coordination and leadership while action is needed at local, national and regional levels. Establishing a trusted dialog between scientists, politicians and public could also be helpful if we want to act fast. The participation of community health workers who play a crucial role in covering the last mile in delivery of services also cannot go unacknowledged. International agencies like FAO, WHO need to endorse these decisions on a slow roll out plan when the prevalence of cases is low and show the advantages of long-term investment in proper system [46].

9. Conclusion and future directions

The infamous COVID-19, apart from being highly contagious, had severe physical, social and psychological manifestations in the form of isolation, quarantine and lockdown which hampered our social support system on a large scale. COVID-19 looks to be a lingering stressor and is bound to induce acute panic, anxiety, obsessive behavior, paranoia, depression and PTSD in long term even if the cases subside. The notable psychological consequences looming out of this disaster need to be addressed. Altered mental status and behavioral changes have been mentioned to be acute effects of the virus, and a putative link between those affected with COVID-19 and long-term psychiatric comorbidities might merit further research. So, all efforts should be directed towards minimizing the negative effects of this traumatic pandemic event on mankind including its mental health implications. Lessons learnt from this pandemic can help shape interventions and legislations in the near future. Therefore, either we identify the probable rising impact on mental health and work upon it or we will pay the price in the form of worsened quality of life in the post pandemic aftermath when we will need all the able bodies to help the world economy recover.

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