

Socio-cultural challenges in the implementation of COVID-19 public health measures: Results from a qualitative study in Punjab, Pakistan

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Abstract

Background: Informed public health measures are crucial to curb the COVID-19 pandemic. The socio-cultural context is important to understand the success or failure of implementing public health measures. This study explores the social and behavioral response to COVID-19 and unveils challenges in the implementation of related public health measures in Pakistan.

Methods: Within this qualitative study, we conducted 34 telephonic/online in-depth interviews with youths, adults, old-age people, and healthcare professionals in the Punjab province of Pakistan. Framework analysis was used for data analysis.

Results: People's poor understanding about COVID-19 and the need for preventive measures were the major challenge in implementation of public health preventive strategies. Study participants reported that the lockdown strategy increased poverty and unemployment. People's poor living conditions and living environment compelled them to not follow social distancing and restricting themselves to homes. Additionally, an underdeveloped healthcare system was one of the major challenges for Pakistan. False and misleading information about the disease had significant consequences for the COVID control program. In Pakistan, the culture of denial related to the epidemiology of COVID-19 were important challenges within the implementation of public health preventive measures.

Conclusions: It is extremely important that public health experts and social scientists work together to understand the contextual socio-cultural factors which shape behaviors associated with the spread of a pandemic. This knowledge is needed in order to design and implement preventive strategies that could effectively work in the local context.

Background

COVID-19 is a disease caused by the infection with a coronavirus. It was first reported in Wuhan province of China in December 2019. Within a few months, the virus has spread across the world. On January 30, 2020, the World Health Organization (WHO) declared the outbreak as a public health emergency of international concern [1], and later on March 11, 2020, announced COVID-19 as a pandemic [2]. According to the WHO COVID-19 Dashboard, there have been about 20 million confirmed COVID-19 cases in August, 2020, globally [3].

Due to social and cultural factors that exacerbate the public health risks, it is more difficult to combat the pandemic in countries like Pakistan [4–6]. This is exemplified in an article published in New York Times at March 26, 2020. It highlighted that to combat the spread of COVID-19 in Pakistan, one needs to counteract political and economic instability and rigid social behaviors that further aggravate challenges for the country [7]. Public health experts have repeatedly warned that if the precautionary measures are not adopted, millions of people could be affected by the disease [8, 9]. With already a weak public healthcare system struggling to manage the routine health issues in Pakistan, the only option to avoid a health crisis is to adopt a proactive approach for controlling the spread of the pandemic.

The first case of COVID-19 was detected in Pakistan on February 26, 2020. As of August 28, 2020, the number has risen to 280,340 confirmed cases, including 6,284 deaths [10]. Although the Pakistani government is making serious efforts to enhance its COVID-19 testing capacity, many tend to believe that the actual number of cases could be much higher. Only a very limited number of people have been tested so far – mainly those who have already shown some symptoms [4, 11–13]. Some private laboratories and hospitals are also offering COVID-19 testing services, but that is very expensive for the individuals. The low testing rate in Pakistan could potentially hinder the ability of the government to assess the real magnitude of the disease in the country [4, 13].

Currently, there is no specific treatment or vaccination available for protecting against COVID-19. Based on international research and experiences so far, WHO has emphasized some basic preventive measures against the disease, including acquiring awareness about the disease, keeping social distancing, frequent hand-washing, as well as seeking early medical advice in case of any associated symptom. While these public health measures seem very basic and simple to prevent the spread of coronavirus disease, their meticulous implementation depends on individual's ability to understand the mechanism of transmission and spread of virus.

It may be noted that in developing countries such as Pakistan people may not comprehensively understand the biomedical model of disease causation, especially related to infectious diseases. As a result, local culture offers alternative models of disease causation which are rooted in spiritual, traditional and/or herbal medicines. In such a plural set-up, various confusion and misunderstanding arise to implement the basic preventive measures suggested by WHO. Given this backdrop, socio-cultural factors in a society are very important to understand the success or failure of implementation of preventive public health measures. For the acceptability and feasibility of public health measures, cultural and societal norms need special consideration. Focusing on Pakistan, this study explores the social and behavioral response to the COVID-19 pandemic and unveils challenges in the implementation of public health measures.

Methods

We conducted a qualitative study, based on in-depth interviews. Study participants were from diverse age groups assuming that they have different kind of experiences and perceptions regarding the implementation of various public health measures in the province of Punjab, Pakistan. We included participants from the general public (young [18–25 years], adult [26–60 years], and old age [> 60 years]) and health care professionals who had experience of dealing with COVID-19 cases in healthcare facilities. Thirty-four study participants (7 interviews within each age group of the general public and 6 interviews with healthcare professionals) were recruited from the cities of Lahore, Rawalpindi, Faisalabad and Sialkot which had the highest number of cases in the province of Punjab, in July 2020. The study participants were recruited through a mix of purposive and snowball sampling through university contacts in the study areas. Being part of academic community, researchers had good contact with other academics in universities of the study areas. They approached the participants through these contacts

for telephonic/online interviews via Skype or Zoom, because during the lockdown it was not possible to conduct face-to-face interviews. The interviews were conducted in August 2020 during a three weeks' time period.

A semi-structured in-depth interview guide was used for data collection (Supplementary Appendix 1). The guide was developed for this study on the basis of a literature review on the topic and seeking expert opinion of two healthcare professionals and social scientists. Study participants were first asked about their knowledge related to COVID-19 and its routes of transmission. They were also inquired about COVID-19 preventive strategies and were further probed about maintaining social distancing and its benefits and demerits, hand washing practices and use of face masks. Further questions were asked about the perceived effectiveness of lockdown as a preventive strategy and its effects on the society. Furthermore, we included questions regarding problems the study participants experienced to observe public health measures in their households, in their neighborhoods, and in social spaces. Probing questions were added to ask about social and cultural factors. In addition, we asked what the interviewees think about the challenges for implementing COVID-19 strategies. Questions were also asked about fake news regarding COVID-19, as well as fear and anxiety related factors.

Interviews were performed in national language, that is, in Urdu. Each interview lasted between 60 and 80 minutes. All interviews were audio-recorded and notes were taken during the interviews. All the audio-recorded data was transcribed verbatim and translated into English first. After translation, the data were read independently and carefully multiple times by three researchers. The data was analyzed by using the framework method, because it is a systematic approach to analyze data collected from diverse groups of people such as healthcare professionals, patients and lay people [14]. After multiple reading, meaningful statements and codes were extracted which were grouped together into categories and themes were formulated. Then the three researchers met to compare the themes and conflicting opinions were resolved after through discussion on the contents of the themes. A spreadsheet was used to develop a framework matrix.

The study protocol was reviewed and approved by the Institutional Review Board, University of the Punjab. Written informed consent was taken from all study participants before the start of the interview.

Results

Overall, eight themes have been identified from data analysis, which are described in detail below and exemplified with quotations from the interviewees.

Poor literacy and understanding of disease

All study participants highlighted that due to poor literacy and a lack of education, people's understanding of COVID-19 is limited – particularly in rural areas. The findings show that it is difficult for people to understand the need of social isolation, especially for people who have rigid religious beliefs. This was the reasons that the spread of the coronavirus in Pakistan started from clusters such as congregations at

the time of religious events. One of the study participants who is employed as a general physician in a hospital stated:

Many of the cases which are asymptomatic or reported with mild illness at hospitals did not follow medical guidelines and protective and preventive measures. This resulted in increased local transmission of COVID-19 to their families and relatives.

One young study participant said:

I cannot say 'no' to my friends when they shake their hands with me and hug me. I feel embarrassed if I show reluctance.

In addition, the awareness of the severity is limited. A healthcare professional reported:

Many people are not aware about disease severity. They could not understand that how it could be a serious disease if they have mild symptoms only.

Furthermore, a healthcare worker said:

"People do not know about the significance of social distancing.... They think this is against their culture if they are not meeting with people".

Another medical doctor claimed:

If people do not think it [referring to COVID-19] is a real threat, they will not modify their behavior. So, the first thing is to realize them that COVID-19 is a serious disease.

A public health expert added:

Our people have very casual attitudes towards COVID-19. This is the reason that we are receiving a large number of cases nowadays.

A majority of the healthcare workers were of the view that culture of ignorance and not taking the COVID-19 seriously will accelerate the spread of the virus.

Increasing poverty and unemployment

Almost all of the participants agreed that the lockdown strategy to contain COVID-19 has increased poverty as many people lost their jobs – especially daily wagers. Furthermore, poverty is also considered as the more important problem compared to the pandemic. This is illustrated by the following statement:

For us, the coronavirus is nothing. We are experiencing hunger every day. Me and my family afford usually two meals a day but because of this lockdown we cannot even afford one-time meal. So, for us the coronavirus is not more frightening than the hunger which we experience on daily basis.

One old age study participant said:

We have to fight at multiple platforms. We are fighting against COVID but at the same time we need to fight against hunger and poverty which has increased alarmingly due to last two months lockdown.

Another participant who was working in a factory said:

Like me, many others are engaged in construction, manufacturing and maintenance related jobs. Many of them are working on daily wages and all of these daily wagers are jobless now due to this lockdown. Government needs to relax the lockdown so people should not die from hunger.

One study participant in his late fifties opined:

People from lower socio-economic stratum are largely exposed to such an epidemic because of their lack of resources such as money, knowledge and social networking. They should be extra cautious.

Living conditions and living environment

In Punjab, about 70% of population is living in rural areas or in urban slums. In the majorities of these areas, there are small houses with two rooms with poor ventilation and basic facilities of water and sanitation. In the majority of houses in rural areas animal shed is constructed also within the premises of the house leading to human-animal interaction. In one household about two to three generations are living. One of the study participants from an urban slum of Lahore said:

We are 15 people living in this small two room house. I have three brothers and families of all of my brothers are living in this small house. When some of the family members are outside then it is good social isolation for us. Let me tell how 15 people can have a social isolation in a small house with poor facilities.

Another participant while sharing his story narrated:

I live in interior city where there are small houses with high population density. Experts are talking about social distancing and hand washing. How can I and my family follow these measures when there is no proper sanitation facility available at our home to wash hands with soap and water frequently?

Gendered dimension of lockdown strategy

Due to the COVID-19 related lockdown, women feel themselves more affected. Female study participants reported that there was more stress on women for household tasks as well as their work-related responsibilities. This creates more conflicts among family members. One of the woman participants narrated:

Because of COVID, we have lots of stress. We [referring to women] need to do more cleaning at home, frequent cooking and more kitchen related work as compared to normal days when family members are not at home for whole day because of school and office engagements.

One of the female respondents while narrating her story said:

My husband is a smoker, but he only used to smoke one or two cigarettes a day. Now because of anxiety, he smokes a lot in a day. It creates conflict and quarrel among us.

Because of such domestic issues, the energies of families are tilted towards some nonissues and they are less interested in observing the protective and preventive measures to contain the virus.

Underdeveloped healthcare system

In Pakistan, all passengers coming from other countries need to spend seven days in a quarantine center so they could be identified in case they have the coronavirus disease. A majority of the study participants from the community shared the poor condition of services provided at the quarantine and isolation centers as one of the reasons for not going for testing and screening even if symptoms are present. One of the participants narrated the story of his neighbor who spent some days at the quarantine center:

He [referring to the neighbor] told us that he was kept in very pathetic and unhygienic conditions. He was feeling there as if he was a criminal. There was no doctor and food was thrown to him as if food given to dogs.

One doctor reported:

The underdeveloped healthcare system is one of the major challenges for Pakistan to contain the coronavirus. In countries like Pakistan, where healthcare facilities are not available according to the number of inhabitants, where there is one doctor for 10,000 population, one hospital bed for 1,000 population, one ventilator for 1,000,000 population... Then how can we fight against COVID if we are getting huge number of cases every day? I am worried that the situation can get alarming.

Another doctor said:

The health indicators of our adult population are not good. Half of the adult population above 50 years of age has comorbidities such as diabetics, cardiovascular problems and chronic obstructive pulmonary diseases. This causes them more vulnerable to COVID complications. They are also coming to outpatient departments, which may result in contracting the virus from others.

One healthcare professional opined:

In Pakistan, there is lack of testing facilities. And because of this it is very difficult to follow public health measures of randomly testing and isolating COVID positive cases and tracking and tracing their contacts, although it is necessary if we want to contain the coronavirus.

Infodemic and fake news

False and misleading information about the coronavirus have significant consequences on containing the virus. It creates a challenge for the COVID-19 control program as well as a risk to the public. One of the study participants said:

Fake news is easy to spread and hard to stop. So, it spreads widely within a minute. For example, there are so many conspiracy theories regarding the origin of the coronavirus and many quick remedies are available as its treatment. Sometimes, such information leads to mental torture for the patients and sometimes it leads to more spread of the virus if it is presented as less serious disease.

One female participant reported:

Fake news regarding quick remedies or household totkas [referring to remedy] got us confused. On social media, there is bombardment of such kind of news. I am confused now about what is true?

One participant in his late twenties said:

One day we listen that vaccine is coming, so we get rid of the coronavirus soon. But the other day we hear that the vaccine will take another two years to come. So, I got confused what is true?

One young participant opined:

The fake information was disseminated that the virus cannot infect young people. Many of my friends violated the preventive measures because they think that this disease can affect only the old age population.

Some of the study participants were not happy with the media coverage related to COVID-19:

People are fearful of stigmatization. If they are positive, they have been shown on TV channels as if they have committed some crime.

Religious rituals and fatalistic attitude

Many of the participants were fearful that the COVID-19 cases increased due to congregational prayers during the month of Ramadan. They were of the view that it was very difficult for the COVID-19 control program to contain the virus spread during some religious activities where there was gathering of many people at one place to follow the religious rituals. One of the healthcare professionals said:

“Before the start of Ramadan, I was fearful that it would be very difficult for us to stop roadside arrangements for Iftar [the meal eaten by Muslim after sunset during Ramadan] and Sehri [referring to the meal eaten by Muslims before the sun rise during Ramadan] because it could fast spread the virus”.

Several approached have been taken for infectious disease prevention:

In our neighborhood, jumma prayers was offered in jamat [congregation] on the rooftop of a house after closure of mosques.

However, these measures have not been recognized and accepted by the whole public:

Government advised people not to come out of their homes and to offer five times prayer at home instead of in the mosque. But people didn't listen to them.

About three-fourth of the participants of the view that religious leaders can play a positive role in educating people about use of protective measures.

Our religious leaders can guide the people in the light of religious teaching and according to the guidelines of healthcare professionals.

Almost all of the study participants shared that despite healthcare professionals' instructions and governmental restrictions, social and religious gathering were observed during the time religious festivities.

The attitude that COVID-19 is the result of mankind's sins and punishment from heaven was prevalent among study participants:

"If it is in my kismet [mean fate] written that I will get infected with the virus then nothing can stop it. So, we have to trust in Allah. Nothing will happen".

Another participant said:

Allah is not happy from us. This is a wrath of Allah. We need to give more sadaqa [spend money on poor to make Allah happy].

Culture of denial

Many of the participants reported that the culture of denial is prevalent among people. This was considered a big challenge to implement public health strategies to contain COVID-19. Few of the study participants denied the existence of the COVID-19 pandemic. According to them *"this is just a fiction"*. One of the study participants who was working as a general physician narrated:

Here, people totally deny that the COVID-19 pandemic exists. If people deny the existence of this disease then how we can influence them to follow COVID-19 prevention public health measures?

Discussion

The present study found that people's poor understanding of COVID-19 and need for preventive measures, such as physical distancing, were the major challenges in implementing public health preventive strategies during the COVID-19 pandemic. Global experiences and growth patterns of the pandemic clearly indicate that COVID-19 is directly linked to social behaviors. Social construction of health and illness in any society plays a significant role in the health seeking behavior. Knowledge or awareness about the risks associated with any disease significantly influence what preventive measures people adopt or refuse to adopt. Graham's paradigm of disease development emphasizes to contextualize an epidemic within the social situations in which it occurs [15]. It highlights that timely understanding of

social behaviors associated with the spread of an epidemic can help to frame an effective public health strategy.

Due to diverse local cultural beliefs and sources of knowledge, population sub-groups vary in health risk perceptions. Owing to illiteracy, a traditional belief system, and economic compulsions many people even do not consider COVID-19 as a serious public health risk [7, 12, 16]. A survey conducted in Pakistan assessed the knowledge and practices of people about COVID-19. It shows that people have a limited understanding of COVID-19, especially related to symptoms associated with the disease. Furthermore, gender was slightly associated with the knowledge about the disease [17]. Another study showed significant differences in knowledge and practice of coronavirus preventive measures. However, despite having knowledge about the disease people did not practice preventive measures [18]. Moreover, a majority of the surveyed people were of the view that government and opposition were not on the same page in the fight against the coronavirus. More than a half of the study population had misconceptions about COVID-19 [18]. Therefore, it becomes imperative that public health awareness strategies should counter the myths and misperceptions associated with the pandemic and provide appropriate knowledge.

One of the most effective public health measures to counter the rapid growth of COVID-19 is social distancing. Several studies and epidemiological modeling have shown that the patterns of social networks or social contacts strongly influence the spread of disease in a population [19, 20, 21]. The behavior of people greatly influences the consequences of any public health intervention. Link names this “social shaping of population health” [22]. However, many of our study participants were not agreed with the concept of social distancing. As social distancing was extremely difficult to practice in densely populated countries like Pakistan, where a significant number of people live under one roof along with extended families. Furthermore, they tend to believe that going to public places does not expose them to higher risks than confining themselves in homes, where already a large number of people is living together [4]. In such cases, even when someone is not feeling well, other family members share the same room because they do not have any other option [23]. Large gatherings at times of happiness and sorrow, handshaking and embracing are part of everyday lives of people in Pakistan. Amid the outbreak of COVID-19, public health measures require people to change their routine behaviors to prevent the rapid spread of the coronavirus. Such a sudden change in everyday life is still a cultural shock for many people and they consider it as a threat to their culture. Despite the lockdown and restrictions on gatherings and going to public places, people are not taking the pandemic seriously and are still arranging gatherings for marriage, funeral, parties or other purposes [12].

Financial and skilled human resources are very important to combat any health emergency. A developing country like Pakistan, with strained political and economic structures, is already struggling to tackle poverty, extremism, and other human insecurities. Therefore, a global pandemic such as COVID-19, could be much more devastating in developing countries than in developed ones [7, 24, 25]. In Pakistan, the health sector has not been a priority of the successive governments. Only about 2% of its gross domestic product are spend on healthcare – compared to a global average of 10% [5]. Until now, the country has not been able to control diseases that have been eliminated elsewhere in the world, e.g. polio [7]. The

ministry of health has already issued warnings to be mindful of the pandemic as the resource-limited country is not well-prepared to control any drastic situation caused by the pandemic. If coronavirus cases are not controlled, diagnosed and timely treated, the situation may lead to a more devastating crisis [26]. At the time when corona hit the country, there were 2,200 ventilators available in hospitals, out of which only about half were functional [5]. The fragile public health infrastructure does not have the capacity to provide treatment to tens of thousands of patients of COVID-19, and the major threat for Pakistan is high fatalities due to lack of healthcare services [11, 13].

As the backbone of health infrastructure, physicians, paramedics and nurses are considered frontline fighters against COVID-19. However, they are also extremely vulnerable to get infected in the absence of personal safety measures [24]. Frequently cases are reported in different parts of the country where doctors and paramedics have refused to perform their duties and are protesting due to the lack of availability of personal protective equipment [11, 26, 27]. With already limited healthcare services available in the country, the strike of healthcare personnel and their vulnerability to fall victim of the disease might lead to serious consequences in combatting the pandemic.

In a situation of global health emergency, governments need to take quick proactive public health measures to avoid spreading the pandemic. In Pakistan, many people believe that the government could not assess the severity of the issue and delayed framing its response strategy mainly due to the lack of political consensus [5–8, 28]. Initially, coronavirus-positive cases were detected in Pakistan among those persons who had recently visited the neighboring country Iran, where COVID-19 had already spread [29, 30]. However, at an early stage of the epidemic spread, due to a lack of proper coronavirus testing services and quarantine facilities in the remote town Taftan in Baluchistan province, bordering Iran, there was not proper screening of the visitors coming back to the country. Therefore, it became a source of spreading the virus [31].

In addition to the lack of healthcare services and knowledge about COVID-19, fear and stigmatization associated with the disease also restrict people to seek early medical advice [32]. The study participants in our study perceived that – like other infectious diseases – coronavirus-positive cases are being stigmatized, because they might be responsible to transmit the virus to other people. Moreover, some television channels breached the individual privacy by revealing the personal identities of those people who tested positive and showed clips of ambulances and police vans going to their homes as they were being “arrested”. One study also indicated that a majority believed that coronavirus-related news on media were exaggerated in Pakistan [18]. Further, many people had developed fears of getting exposed to the virus or testing positive, and, therefore, stayed away from hospitals – even when they were not feeling well. Several alarming cases in different parts of the country have been reported in which confirmed and suspected patients of COVID-19 fled from the quarantine/isolation centers [33]. Such irrational behavior was not only life threatening for patients but also exposed others to the virus.

Another significant challenge within Pakistan was to regulate religious gatherings and ritual practices to prevent the transmission of COVID-19. Due to diverse opinions among religious leaders, it has been a

daunting task for the government to develop a consensus on the sensitive issue of religious gatherings [34]. Many people in Pakistan believe that the coronavirus is a punishment of sins from God. Hence, instead of sitting at home, people should gather in mosques and collectively pray to protect them from the epidemic [7, 16, 35]. Even some people are not following the basic preventive measures, wearing masks and maintaining social distance, considering that nothing can happen to them except what already is their fate [12]. Many refused although authorities held several meetings with the clerics to convince them to cooperate with the government in the implementation of the public health measures and restrict congregational prayers and rituals [34]. Therefore, public health experts were of the view that congregational prayers could potentially result in the “explosion” of coronavirus cases in the country [36].

Moreover, developing countries like Pakistan are less likely to enforce appropriate preventive measures and become more susceptible to high penetration of any epidemic due to grave socioeconomic disparities and lack of access to basic services, e.g. water, sanitation, food, and shelter [5, 37, 38]. Health risks are strongly associated with lifestyles shaped by socio-economic structures, as those segments of the population that are already marginalized tend to be more vulnerable to be infected [5]. In Pakistan, the majority of the population does not have access to clean water even for drinking. Washing hands regularly as a preventive measure against COVID-19 is therefore seen as “an unimagined luxury” [23]. Moreover, millions of slum dwellers in the country are among the most vulnerable groups to get infected as maintaining personal hygiene and social distancing could not be practically possible for them [5, 7, 23]. In a lockdown situation, there is no option to work from home or stay at home for poor and daily wagers. Further, the country is amongst the top malnourished countries in the world as a significant proportion of the population does not have access to basic healthy food which makes them susceptible to acquiring the disease [5].

While many countries have ordered the lockdown to prevent the spread of COVID-19, reality is much different in countries like Pakistan, because the lockdown could result in more severe fatal consequences than the pandemic itself. Almost one-fourth of the total population of the country lives under conditions of poverty and earns less than \$2 a day [12, 29, 30, 39]. For such underprivileged groups, the coronavirus is not only a health problem but an economic challenge [24]. After the outbreak of COVID-19 in Pakistan, the government announced a partial lockdown, which still continues with gradual relaxation as millions of people are daily wagers who cannot survive without work for a longer period. Despite limited economic resources, the government announced a support package which was directly distributed among 12 million low-income families [37]. However, the gatherings of a large number of people to receive the financial assistance at designated places could be a public health risk breaching social distancing measures [40]. Moreover, keeping in view the large size of the population and density of poverty within Pakistan, it would not be possible for the government to support every needy family and confine them to home for a longer period.

Limitations

The study findings may not be representative for Pakistan, because the study was conducted in only one province. However, we recruited a large sample size for a qualitative study. The heterogeneous sample allows for including various perspectives in the analysis.

The interview guide was developed based on concepts that emerged from the literature review and expert opinions. This allows for including relevant aspects, although one needs to keep in mind that the COVID-19 pandemic is also characterized by uncertainty and rapidly changing situations. Further studies are needed which focus on culturally and regional specific aspects promoting or hindering the implementation of public health measures in times of a pandemic.

Conclusion

Our study found that in addition to other factors, contextual sociocultural factors play a significant role in shaping social behaviors and determining the efficacy of COVID-19 preventive measures. However, their contribution is usually undermined while designing and implementing public health measures. Socio-culturally informed public health measures are needed to effectively control COVID-19. Comprehensive and inclusive strategies are needed to improve people's understanding about COVID-19 itself, its mode of transmission, its impacts and the need for public health preventive measures. Communication strategies should use a lucid and publically understandable language. All stakeholders – including government, civil society, media and communities – need to play their role in preventing and stopping stigmatization, correcting misconception regarding COVID-19 and in promoting the importance of prevention, lifesaving actions, early screening and treatment [41].

Abbreviations

COVID-19

Coronavirus disease 2019

WHO

World Health Organization

Declarations

Ethics approval and consent to participate

The study protocols were reviewed and approved by the Institutional Review Board, University of the Punjab (Reference No. 598/IRB/PU). All methods were performed in accordance with the relevant guidelines and regulations. Written informed consent to participate was obtained.

Consent for publication

Not applicable.

Availability of data and materials

The data is available from the corresponding author upon on reasonable request.

Competing interests

The authors declare that they have no competing interests. FF serves as Academic Editor for BMC Public Health.

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Authors' contributions

RZ conceptualized and conducted the research. RZ, FY and MZZ analyzed the data and interpreted the findings, FF supervised this process. RZ and FY wrote the first draft of the manuscript. MZZ and FF critically reviewed the manuscript and provided feedback for important intellectual content. All authors read and approved the final manuscript.

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