ORIGINAL ARTICLE

Upstream Determinants and Downstream Risk Factors of COVID-19 Infection in Iran: A Qualitative Study of Health Professionals' Views

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Abstract

Background: Iran, after China, emerged as one of the first COVID-19 epidemic countries. Despite all efforts to interrupt new transmission chains, the virus continued to quickly spread across the country. WHO has highlighted a crucial role for social factors and intersectoral collaboration to tackle COVID-19. This study aimed to identify challenges related to the upstream determinants and downstream risk factors of COVID-19 infection in Iran as perceived by health professionals at different levels of service administration.

Methods: We conducted a qualitative study in October 2020. A directed qualitative content analysis was done to explore the views of health professionals and administrators toward determinants of COVID-19 infection in Iran. Using a deductive approach, we tested the implications of the WHO Commission on the Social Determinants of Health (CSDH) framework regarding COVID-19.

Results: The determinants of COVID-19 infection in Iran are referred to as: 1) upstream social determinants, including political considerations in dealing with COVID-19, conflicting authority structures between and within organizations and sectors, poor intersectoral collaboration, unstable macroeconomic environment, pandemic crisis management, poor governance in the health system, cultural and societal values, trust and social capital, and individuals' socioeconomic status; and 2) downstream risk factors, including poor health literacy, poor compliance with COVID-19 prevention guidelines, secrecy related to the infection, individual's health status, lifestyle, and virus characteristics.

Conclusion: It is essential to motivate people to practice preventive COVID-19 infection behaviors. To change the behavior at the population level, a complex fusion of policy and practice, and dealing with the complexity of structural determinants and downstream risk factors are needed.

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Introduction

As coronavirus disease 2019 (COVID-19) has led to a massive global public health emergency, governments around the globe have implemented several non-pharmaceutical interventions as a response to the spread

of the new coronavirus.[1, 2]

On 19 February 2020, the Iranian authorities officially confirmed the first cases due to COVID-19.[3] Since then, to reduce the transmission of the virus, social distancing measures along with several health protocols have been implemented in all provinces due to the lack of vaccines and effective treatments.[4]

Although the government launched social distancing, travel restrictions, and personal protective measures, some people did not comply with the COVID-19 guidelines, and the disease quickly spread throughout the country. Based on the comparison of laboratory-verified cases in Iran and the associated deaths in the region according to the WHO Regional Office for the Eastern Mediterranean (WHO-EMRO), Iran had the highest mortality cases due to COVID-19 relative to its population until February 2021.[5]

It is difficult to identify the specific causal pathway due to the complexity of the nature of COVID-19 virus, and various mechanisms may explain such a high incidence. These mechanisms include downstream risk factors for COVID-19 and a wide range of upstream determinants.[6-9] The downstream risk factors include proximate factors that directly increase the level and duration of exposure to COVID-19. Meanwhile, the upstream drivers of increasing risk of COVID-19 infection and mortality are social determinants of health (SDH), non-medical factors affecting population health such as socioeconomic and political context (e.g., the governance patterns, macroeconomic policies, social and public policies), structural mechanisms, and the resultant socioeconomic status of individuals.[10, 11]

Policymakers and health professionals have dealt with decisions about mitigating and responding to the outbreak.[1, 12] Policies such as implementing social distancing, maintaining good hygiene, avoiding mass gatherings, cancelling public events and rituals, closing schools and businesses, using personal protective equipment, and launching lockdown policies that are somehow beyond the capabilities of health sector have been promoted to prevent and control the COVID-19 pandemic.[1, 8, 11, 13] Recent evidence suggests that many of the policies and actions in response to the COVID-19 outbreak are linked to the SDH. Social risks such as poverty, homelessness, poor living and working conditions, and unemployment can have a significant effect on COVID-19 infection. Several researchers have reported that SDH must be considered as a part of multidisciplinary research priorities for COVID-19 pandemic.[7, 8, 10, 11] However, few studies have focused on unraveling the conditions and contexts that generate the high COVID-19 burden and the mechanisms by which social and environmental factors impact the disease.[8, 10] Accordingly, this study aimed to evaluate how socioeconomic and political contexts that give rise to a set of downstream risk factors shape specific determinants of COVID-19 infection in Iran.

Methods

Study Design

A directed content analysis was conducted to evaluate the views of health professionals and administrators regarding upstream determinants and downstream risk factors of COVID-19 infection in Iran. Using a deductive approach, the implications of WHO Commission on the Social Determinant s of Health (CSDH) conceptual framework[13] about the COVID-19 outbreak were tested. The CSDH conceptual framework was used as a guide to describe how socioeconomic and political contexts influence downstream risk factors leading to establishing individual differences in exposure and vulnerability to COVID-19.

Semi-structured interviews with health professionals and policymakers (N=15) were conducted in October 2020. The sample of privileged informants was small and purposive. The respondents were recruited using snowball sampling. The interviewees were selected from the Ministry of Health experts and healthcare professionals, including policymakers and planners, community physicians, epidemiologists, healthcare executives, health educators, psychologists, and sociologists. Eligibility criteria included having knowledge and/or experience on public health and social determinants of health and willingness to participate in the study.

Data Collection

Interviews were conducted using open-ended questions followed by targeted questions about the predetermined categories based on CSDH conceptual framework.[14] The interviews lasted between 45 to 75 minutes. The questions included the following four items:

- "In your opinion, what are the major causes of COVID-19 infection in Iran?"
- "What contextual and structural factors influence the COVID-19 spread?"
- "How do you explain the high contagiousness and rapid spread of COVID-19 across the country?"
- "To what extent do you think individual behavioral and biological factors and other individual characteristics may influence the risk of infection?"

During the interview, the interviewer used probing questions to explore the participants' views and encourage discussion, such as "What do you mean when you say … ?" and "Would you please give an example of …?"

Data Analysis

A directed content analysis was done. First, using CSDH conceptual framework, the key concepts

as initial coding categories were identified. Next, operational definitions for each category were developed using the CSDH model. Then, all transcripts were reviewed, and the texts describing determinants of COVID-19 infections were highlighted and coded using the predetermined categories as much as possible.[14] Finally, we discussed the extent to which data were supportive of the CSDH conceptual framework.[14, 15]

Trustworthiness

Researchers tried to enhance credibility and dependability through prolonged engagement with the subject, member checks, and collaborative analysis of data.

To ensure confirmability, an audit trail was provided and all data and methods describing how the conclusions and interpretations obtained were documented. Rich quotes were also provided from the participants who depicted each emerging theme.

To ensure transferability, the findings were presented to some health professionals and informants that were not involved in the study. They confirmed that the findings were meaningful and relevant to them.[16, 17]

Results

As shown in Figure 1, two key concepts with nine and six sub-categories were extracted. The participants spoke openly about the determinants of the incidence and prevalence of COVID-19 in Iran. Therefore, despite the relatively small sample size, the interviews were rich in content and contained a great variety of factors that refer to the conditions, behaviors, policies, and actions that play a role in the COVID-19 infection.

The following section includes quotations that best represent the categories generated by the data.

Upstream Social Determinants

Political Considerations in Response to COVID-19

Participants believed that political concerns and politicization of debates about COVID-19 resulted in wrong decisions during the outbreak in Iran. COVID-19 disease was tied to politics since the early days. The political concerns and poor transparency in the initial stage of the outbreak in the country resulted in delay in reporting COVID-19 cases and denying the widespread outbreak of the disease in the country.

"You know, decisions aren't coherent, and they aren't based on the people's health and well-being priorities; rather, political decisions made outside the National Task Force against Coronavirus are the main priority… You know, the political issues are more influential than what the Task Force decides; the contradictions that exist are due to the political problems we have in our governance… Unfortunately, there are no accurate and reliable statistics on COVID-19 people can trust; and the statistics may not be announced accurately due to political issues" (*Interviewee No. 5*).

"Well, no one can deny the fact that the announcement of disease outbreak was late. I think the first positive COVID-19 case was approved by the Ministry of Health after about one week of the diagnosis. The reason might be the coincidence with the elections; due to the political situation in the country, the disease outbreak was not announced in time" (*Interviewee No. 2*).

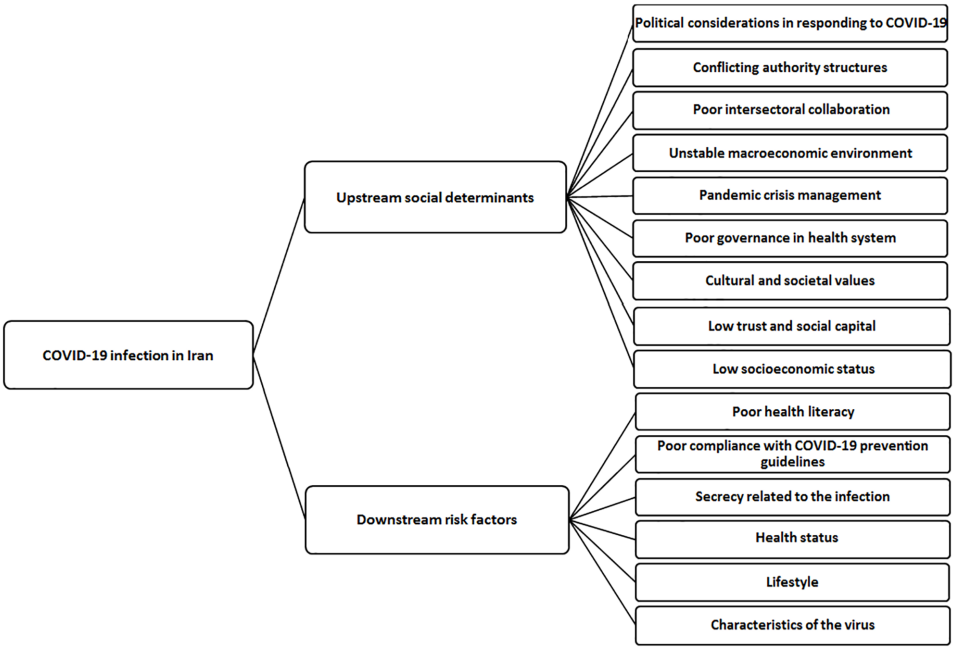

Figure 1: Extracted categories and sub-categories from the interviews.

Conflicting Authority Structures between and Within Sectors

The complex nature of the COVID-19 crisis demands an intersectoral policymaking and participatory approaches. A significant challenge facing the policy makers in Iran is how to plan and prioritize policies to manage the COVID-19 pandemic. The multiplicity of centers of power and conflicts and cleavages between the health sector and other sectors led to contradictory decisions and uncoordinated policies, which accelerated the spread of the disease.

"As you may know, too many contradictory decisions have been made. In a period, there was a lack of appropriate decisions. Recently, they declared that the University Entrance Exam will be canceled... One day, they said it would be held by wearing a mask, and one week later, they rejected it. There are various decision-making bodies for COVID-19 that have caused all the inconsistencies …For example, we have traditional medicine or Islamic medicine, the followers of which can oppose the decisions made by health professionals considering their relatively strong social status. They're even able to disagree with government decisions" (*Interviewee No. 6*).

"Weak administrative structure of the country, existence of various monopolies, lack of proper governance, and many other issues are important factors in increasing the COVID-19 infection" (*Interviewee No. 5*).

"Early closure of international borders has played a key role in the transmission of COVID-19 infection. Iran was not decisive enough in implementing international travel and border control measures, including travel restrictions, border closures, screening programs, and quarantine of travelers... There was no consensus on these actions." *(Interviewee No. 15).*

Poor Intersectoral Collaboration

The lack of coherent policy and poor collaboration between the health sector and other sectors involved in managing the pandemic were reported as upstream determinants of COVID-19 infection in Iran. According to our participants, different organizations and sectors have not supported the health system adequately and somehow left it alone.

"It is true that many departments are getting into control of the disease and are taking a lot of measures, but I still think the health system is alone and is doing a lot... at least, in terms of health, treatment, and prevention" (*Interviewee No. 2*).

"In my opinion, the major problem of the government, the health system, and other organizations is their incompatibility and lack of cooperation. I mean, there is inconsistency between different systems. You know, some sectors listen to what the Task Force declares, but some others don't. I think every department follows its own protocols" (*Interviewee No. 3*).

"Actions are sometimes intersectoral in nature. The health system is not necessarily responsible for controlling the pandemic… and decision-making requires cross-sector collaboration. In the case of COVID-19, there are problems with intersectoral cooperation" (*Interviewee No. 6*).

Unstable Macroeconomic Environment

Iran has faced many difficulties in prevention, diagnosis, and treatment of COVID-19 because of U.S. sanctions in recent years. There was already a weakness in the health system infrastructure that has increased vulnerability to COVID-19. Lack of resources, especially lack of medical equipment such as diagnostic tests and drugs at the beginning of the outbreak, shortage of hospital beds, and limitation in communication and information technologies were described by participants as the key issues that have exacerbated the burden of the epidemic.

"We couldn't do diagnostic tests very extensively and we had serious problems with it; we didn't have kits for performing diagnostic tests, and it was difficult for us to buy them due to the banking sanctions. The World Health Organization helped us manage it. … Since we're in terrible economic situations, the government couldn't insist on harsh forced lockdown and business closure, I reckon. Instability... most of all, there's now economic instability, which in many cases hinders the strict implementation of the guidelines and protocols" (*Interviewee No. 7*).

"Why is the treatment system getting so weak? Due to the shortcomings in the pharmaceutical system and the equipment... the health system does not have some essential drugs or even sufficient oxygen capsules" (*Interviewee No. 2*).

"Initially, there were no diagnostic tools. If laboratory kits or facilities for detecting COVID-19 were provided from the beginning of the outbreak, it could reduce the time needed to detect the virus" (*Interviewee No. 3*).

"IT and technology infrastructures are not suitable for using the Internet and cyberspace. Many measures can be taken using these technologies and tools which do not require the physical presence of people; and if this happens in a society with adequate infrastructure, it can be easily used during the pandemic. By doing so, it can reduce commuting during this period and prevent the spread of the virus" (*Interviewee No. 11*).

"In recent years, due to the recession and economic instability caused by U.S. sanctions, people have had difficulty earning a living. The economic resilience of households is very low. We also do not have a comprehensive welfare system…thus the government cannot enforce complete lockdown for such a long

time." (*Interviewee No. 15*).

Pandemic Crisis Management

The study participants believed that difficulties related to the lack of a proper policy-making system, delays in government decisions, lack of serious attention to the disease by the government in early stages, governments' failure to encourage voluntary compliance behaviors regarding COVID-19, unpreparedness of the health system, prioritization of economy over public health, and dominance of the treatment-oriented approach over the prevention-oriented caused many challenges in controlling COVID-19 pandemic.

"It was logical to quarantine the cities right in the beginning days. Maybe, at the beginning days the policy-makers thought that it would not help, but they might have new ideas now" (*Interviewee No. 11*).

"The COVID-19 crisis was exacerbated by the lack of early identification of the infected patients. The governance and management were weak… Planning and coordination were time-consuming, which was another risk factor due to the importance of time in the spread of the disease." (*Interviewee No. 15*)

"At the beginning of the outbreak, we failed to take effective preventive measures for prevention. As a result, the incidence of the disease increased in our country" (*Interviewee No. 7*).

"Our country wasn't ready to detect the virus at all, and this led to its widespread outbreak at the beginning days. After a while, the management style improved. At first, there was a lot of confusion; the virus was novel, the facilities weren't adequate, and the infection cases were not diagnosed. Overall, it was a specific situation" (*Interviewee No. 3*).

"The national management of this phenomenon was not good at first. There were delays and confusion in the decision-making processes; they failed to announce the outbreak of the disease on time and take the measurements needed. Also, they failed to diagnose the patients, track the infected cases, and manage the situation on time. Wasn't it possible for a city like Qom to be controlled in more serious ways in the early days? Patient management is important… it should be clear how many cases should be managed at home; what is the number of outpatient, inpatient, and ICU cases…" *(Interviewee No. 6).*

"It's normal that we interact with other countries, but, with the outbreak of the COVID-19 disease, we were not decisive in closing the borders. We have not been successful in entry or exit screening and quarantine of travelers, especially those to and from China" (*Interviewee No. 7*).

Cultural and Societal Values

Family values and norms and religious values are core values shared by many Iranian people. Socializing and visiting relatives and friends, along with holding traditional cultural and religious mass gatherings such as the Persian New Year, wedding ceremonies, and pilgrimage to religious sites, mosques, and mourning sessions such as Muharram are cultural challenges in controlling the epidemic of COVID-19 in Iran. It was difficult to cancel such cultural and religious ceremonies during the outbreak, which led to an increase in the incidence of the disease.

"In our country, the virus was spread throughout the country due to the cultural issues and close interpersonal relationships. Our culture encourages us to interact, visit each other, talk, shake hands, and hug. Well, it is very difficult for someone who has lived like this for many years not to do all these behaviors" (*Interviewee No. 2*).

"Facilitation of commuting and social exchanges have spread the disease" (*Interviewee No. 12*).

"Socio-cultural values led to further spread of the virus in the country. Holding some cultural and religious ceremonies is vital in our culture; as a result, even in cities and towns at high risk for COVID-19 transmission, the ceremonies were held with all pervious details" (*Interviewee No. 5*).

Poor Governance in the Health System

Participants mentioned that the health system failed to effectively prevent the spread of COVID-19 due to governance issues such as the inability to mobilize resources and build coalitions across sectors in government and civil society.

"The governance of our health system is intertwined with the general context of the country; it's derived from the same political, economic, and social conditions of the society... we have had serious problems in managing the health systems since years ago, and failure to address these issues led to a continuous COVID-19 crisis" (*Interviewee No. 8*).

"We already had a lot of structures, at least for critical situations, but it was not clear why we did not use them and we came to build a new structure. Creating a new structure is an issue in itself. When you create a new structure, it takes time to make it stable and adjust its settings with the rest of the sections. In crises in which time is very important, it's usually said that you'd better use those established structures. For example, we have a Crisis Management Office and Passive Defense Unit… we have several intersectoral structures for critical situations, though not especially for epidemics. Yet, they decided to create new structures" (*Interviewee No. 6*).

"We should have done better in the health sector. I think the capacity of our health structure is much wider than what we performed. The problem is that you can never empower a structure of which you have

been unaware for years. Suddenly, in the middle of a crisis, you'd remember the forgotten structure! In the case of COVID-19, it was very surprising for us that the National Task Force against Coronavirus was headed by the President, while they could use the same capacity of the High Council of Health and Nutrition Security because it has the legal capacity to act. However, the National Task Force against Coronavirus might not have an accepted legal situation" (*Interviewee No. 7*).

"It is also a misconception that our health system has been strong. The health system is a social system and the way COVID-19 was dealt with showed that it wasn't orderly enough. The regularity of the health system enables it to be prepared not only for the current crisis, but also for future, ... to be able to predict and plan future events" (*Interviewee No. 14*).

In addition to the delay in releasing information about the outbreak and lack of transparency in information at the beginning of the outbreak, most of the initial news related to the virus were contradictory and the information was not provided to all target groups of the community. Some listened to the news and information, and some ignored it because they didn't understand it.

"The COVID-19 arrived in Iran in December, or maybe November 2019, but its first cases were identified in early days of February 2020… and then it was officially announced on 19 February 2020" (*Interviewee No. 6*).

"Well, informing hasn't been given properly yet. Information should be provided according to the target community. There are diverse target groups in the society. The poor, the children, and the elderly should be properly informed, but the informing processing was not proper according to the target community... contradictory information and news that leak from various sources increase the number of infected cases. For example, about the opening of schools, what kind of information was provided by the officials at the community level? Some said the schools are open, some said the schools are still closed, some said they are held face-to-face, and some said online... then, and what should people do? We don't have a unified information system. A single organization should be responsible for this issue. As you see, once they say this medicine can help; after a while, they prescribe a new medicine ... Somebody recommend traditional medicine, some recommend drinking rosewater, and others reject it…" (*Interviewee No. 2*).

Trust and Social Capital

Participants pointed to low linking social ties as a barrier to engaging in social distancing. They emphasized that, in Iran, social capital is at a low level and the relationship between government and citizens is not a two-way relationship based on cooperation, trust, and solidarity. The government lacked adequate social capital from the beginning; then, by adopting inappropriate policies to combat the COVID-19 crisis, this capital was reduced even more than before. As a result, COVID-19 infection dramatically increased in the country.

"In general, the level of mutual trust, partnership, cooperation, and social capital is low in society. In this regard, the government has done little, appeared ineffective, and failed to strengthen social capital or social solidarity and adaptation. Thus, the lack of proper state-nation relations and low level of social capital between the state and the nation are the main causes of morbidity and mortality" (*Interviewee No. 4*).

"Weak social responsibility and people's complete distrust of the information provided by the government and health system are important factors in increasing the incidence of the disease" (*Interviewee No. 5*).

"The government has not been able to properly and coherently organize public engagement during COVID-19" (*Interviewee No. 8*).

"The government does not have a high social capital. Many people won't welcome the words and advice of a government official" (*Interviewee No. 11*).

Socioeconomic Status

Participants often mentioned that people with lower socioeconomic status are more vulnerable to COVID-19 than others. Poverty, worries about family livelihood, and difficulty accessing health services prevent the individuals from fully adhering to COVID-19-related instructions.

"The problem of social class inequality in all diseases causes an upward slope. That is, among people from deprived groups and in the lower classes of society, especially for infectious diseases, we see that the prevalence of the disease is higher, and perhaps in the upper classes it is somewhat lower. Over time, it seems that the prevalence of COVID-19 disease is higher in the lower socioeconomic groups, and unfortunately the complications and mortality of the disease are also higher. It seems, the same factors that affect other infectious diseases, such as income, can also affect the incidence of COVID-19" (*Interviewee No. 7*).

"I can't say for sure that there is a social gradient in Covid-19. However, the evidence shows that in the current situation and due to economic problems, lower income populations, even when they are worried about their health, cannot completely adhere to social distancing. They have to leave home to work… in non-standard working environment, crowded and poorly ventilated.

Infection fatality rates are higher in lower socioeconomic groups due to poor health status and lack of access to health services..." (*Interviewee No. 15*).

Downstream Risk Factors

Together, socioeconomic and political contexts and the resultant socioeconomic position of individuals were referred to as upstream determinants of COVID-19 infection. These structural determinants operate through a series of individual-level factors that were termed as downstream risk factors.

Poor Health Literacy

Participants argued that the health awareness and knowledge is not satisfying in our country. People who do not take the COVID-19 seriously may be less likely to comply with social distancing measures. Low health knowledge and literacy creates the false impression that a person becomes immune after being infected for the first time; as a result, the chance of recurrence increases. Moreover, inadequate health literacy causes a person to consider health as an individual concept that has no effect on the health of others. Thus, by ignoring the protocols, s/he becomes infected with COVID-19 and infects others.

"Social awareness can be effective in how much people are aware and what reliable sources they get their news from. In any case, there's no surveillance over the cyberspace. Everyone gets the information and then acts based on it without even wanting to actually measure its validity. Wise people think about all aspects of the information they get. I think all these factors can contribute to the incidence, transmission, and prevalence of this disease" (*Interviewee No. 3*).

"The wrong messages about immunity after the first-time infection caused the population to have the illusion that they weren't vulnerable. However, it was not just an illusion; the problem was that this led to an individualistic understanding of the issue. In other words, people thought that following the protocols was only for their own health and not for the sake of others" (*Interviewee No. 6*).

Poor Compliance with COVID-19 Prevention Guidelines

Poor compliance with COVID-19-related instructions by both infected and uninfected people plays a key role in the infection. Although the government launched social distancing, travel restrictions, and personal protective measures, some people did not comply with the COVID-19 guidelines, and the disease quickly spread throughout the country.

"As soon as a holiday arrives, people start going on trips, they also participate in a series of ceremonies and rituals. People should cancel their trips for one or two years, but we failed to do so… and we make excuses such as 'I have a house in that city' or 'I'm going from this house to the other one'… I was shopping few hours ago; when I was next to the counter, an individual approached me without wearing mask and maintaining social distancing… overall, nobody cares about it" (*Interviewee No. 8*).

"When people do not pay attention to the protocols and do not even wear a mask, it turns out that the incidence rate increases. Maybe, this can be explained in part by the behavioral fatigue" (*Interviewee No. 14*).

"Many people couldn't comply with social distancing…day laborers who do not have savings, are not insured; how can they stay home for long periods?" (*Interviewee No. 15*).

Secrecy Related to the Infection

Another downstream risk factor for COVID-19 was the secrecy related to the infection, in which a person infected with COVID-19 hides it from others. In this way, he/she plays a deliberate and conscious role in transmitting the disease and infecting others. This secrecy occurs for reasons such as social stigma and exclusion, fear of losing a job, and mistreatment of other people.

"Some infected people denied their infection with the virus because they recognized it as a stigma. In fact, some infected people hide their COVID-19 status" (*Interviewee No. 3*).

"One of the infected people said to me that when the neighbors knew about my COVID-19 disease, they ran away from me; for example, they did not come to the elevator with me... after a few days, I went to work and didn't tell anyone about it..." (*Interviewee No. 5*).

Health Status

The study participants mentioned that poor health status and genetic background could increase the risk of COVID-19 infection. The disease is often more severe in the elderly patients or with health conditions like lung or heart disease, diabetes or conditions that affect the immune system.[18]

"A person with diabetes, high blood pressure, immunodeficiency, or problems with lung adaptation and allergies is more likely to be infected; and if infected, he'll be more vulnerable" (*Interviewee No. 14*).

"Health-related factors, such as mental health or nutrition can be effective or make the body prone to infection" (*Interviewee No. 7*).

"Some evidence suggests that severity of COVID-19 may be influenced by age or genetic factors…I mean the variability in disease severity between individuals can be partly due to their genetic background." (*Interviewee No. 15*).

Lifestyle

The lifestyle changes were described as a risk factor for COVID-19 infection. Rapid lifestyle changes, especially in recent years, and varied nutritional patterns are among the challenges threatening health

that may increase the COVID-19 infection. After the spread of COVID-19 disease, a new lifestyle was formed, which was not widely accepted by the community. Consequently, the number of infected cases increased.

"We didn't take any action on the people's lifestyle, which is an influential factor in new infections. We didn't redefine the correct lifestyle during COVID-19 pandemic, so that individuals would get used to it and follow its principles" (*Interviewee No. 9*).

"I believe that changing lifestyles, nutritional patterns, diversity of dietary patterns, and lifestyle issues have always been important in the development of disease. You know, they should be reconsidered for COVID-19" (*Interviewee No. 12*).

Virus Characteristics

The interviewees pointed out that the incidence and prevalence of the viruses in emerging diseases are always high due to their unknown nature, which lead to extensive damage. The existing knowledge about the SARS-CoV-2 is limited. COVID-19 is of unknown origin and its routes of transmission, prevention, and control are unclear. Doctors, nurses, and health workers had little knowledge about the virus, and there were no guidelines or programs to deal with it.

According to the results, characteristics of this virus, including high transmissibility and frequent mutations, make it difficult to control the disease.

"One of the main problems is that the virus is completely unknown. Everything about the virus, including its mutations, treatment, and prevention is challenging. Of course, these problems exist all over the world" (*Interviewee No. 2*).

"One of the reasons for the high incidence of this disease is its high transmissibility; its rapid spread indicates that it is rapidly transmitted" (*Interviewee No. 13*).

"Canada went through the SARS in 2003, and the death toll was so horribly high… so, this time they took it very seriously. They had a quick understanding of the issues and followed the related protocols... . As a result, the death toll was much lower because they already had the experience" (*Interviewee No. 3*).

"Regarding such novel diseases as COVID-19, there are several important hypotheses such as the ecological manipulation of humans in nature" (*Interviewee No. 12*).

"For sure, COVID-19 is a new and unknown phenomenon countries are dealing with. Even international institutions don't have a single version of what to do and what not to do" (*Interviewee No. 6*).

"COVID-19 is a new disease and the healthcare staff themselves must read the articles regularly to finally figure out which methods and protocols are correct and what should be done" (*Interviewee No. 7*).

Figure 2 shows how the socioeconomic and political contexts may further operate through downstream risk factors leading to differential exposure and vulnerability to COVID-19.

Discussion

Our analysis of interviews with policymakers and healthcare professionals yielded insights into the social determinants of COVID-19 infection in Iran.

In line with previous studies,[10-12, 19] our results showed that implementation of COVID-19 mitigation measures was difficult in people with poor living and working conditions. Based on the participants'

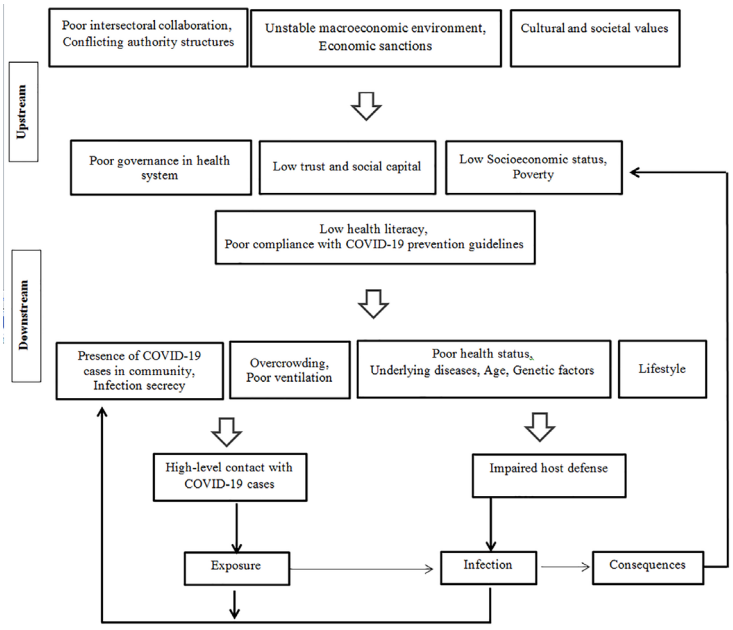

Figure 2: Framework for upstream social determinants and downstream risk factors of COVID-19 infection in Iran.

observation and interviews, people from the lower socioeconomic groups are more exposed to the disease due to such issues as higher chance of contact with an infected individual, poor housing and employment conditions, unstable work situations, impossibility of working from home, weak immunity due to deprivation and poverty, and seeking health services at a more advanced stage of the disease. According to the CSDH model, such daily living conditions are the result of deeper structural conditions that together shape the way societies are organized.[13, 20, 21] The CSDH provided evidence that the upstream drivers of health inequities reside in the social, economic, and political environments.[13, 20, 22] These structural factors, in turn, generate differential rates to health-damage condition, differential vulnerability, as well as differential consequences of the disease.

The WHO has provided many regional plans of action to support country-level measures to reduce the spread of COVID-19. These strategic preparedness and response plans clearly acknowledge various social factors in the context of disease control programs that can help policymakers to identify entry points for action, ranging from policies regarding underlying structural determinants to strategies focused on the health system.[23]

In this study, the participants highlighted the importance of governance and policy issues in both infection process and response to the pandemic. They revealed that the lack of government transparency to the public at the beginning of the pandemic, conflicting authority structures within and between organizations, and the lack of consensus of COVID-19 mitigation strategies led to poor intersectoral collaboration, decreased public trust in government regulations, and reduced public participation in social distancing. As a result, the golden time to interrupt the spread of the virus was missed.[3] Lessons learned from previous pandemics suggest that public health messaging from governments should be clear and consistent to increase the awareness and engagement of different community members in preventive behaviors.[1, 4]

Although some 'structural drivers', such as inappropriate policies and programs, are performed by the governments, they are also affected by globalization and international trade agreements.[19, 20] Out of 20 countries with the highest number of COVID-19 patients and deaths, Iran is the poorest one. The COVID-19 outbreak occurred in Iran when the country's economy was already severely affected by the US sanctions.[3, 19, 24] The capacity of the country to control the outbreak was considerably weakened by unilateral sanctions re-imposed following the withdrawal of the US from the Joint Comprehensive Plan of Action (JCPOA) in 2018, as well as further sanctions imposed on March 18, 2020. As a result, in 2019, inflation in Iran reached a peak of 35.7%, and GDP growth rate reached -9.5%. These financial issues weakened the efforts for testing, treatment, and adequate prevention of COVID-19; as a result, the country failed to take the preventive and protective measures adopted by other countries to cope with the outbreak, such as massive testing and isolating infected cases, forced lockdowns, payment of the total cost of treatments, and expansion of social protection measures.[19, 24]

The health sector in Iran encountered serious governance challenges and economic limitations during COVID-19 pandemic, including challenges in policy making to combat COVID-19, poor authority of the Minister of Health to centrally coordinate a whole-of-government response; insufficient and unsustainable healthcare financing; lack of medical, pharmaceutical, and laboratory equipment; and the problem of COVID-19 disinformation and misinformation.[25-27] The health system did not provide early alert by facilitating affordable and quality health services for the entire population. More in-depth research is required to explore the role of health system as a social determinant of COVID-19 in Iran. It should be noted that the WHO-CSDH framework is distinguished from previous SDH models conceptualizing the health system itself as a social determinant of health. The health system can address differences in exposure and vulnerability by not only providing equitable access to health care services, but also promoting intersectoral action for health.[13]

The WHO-CSDH also acknowledged social capital and social cohesion as social determinant of health.[13] This relationship is not well studied in the COVID-19 literature.[28,29] However, several researchers have reported that trust and cohesion within a country are important determinants of public compliance with national health policies such as social distancing measures.[1, 27, 30] Our results show that negative attitudes towards authorities, weak social cohesion, and solidarity are important to explain poor compliance with preventive measures. COVID-19 pandemic has also reduced trust in health authorities that could potentially lead to poor adherence to public health measures. Further research is needed to empirically test the effects of trust and social capital as the key determinants for voluntary compliance behaviors in Iran.

This study had some limitations. The sample size was relatively small. The experiences of other healthcare frontline professionals and administrators need to be further explored. We also did not conduct focus group interviews during the COVID-19 outbreak. Nevertheless, this study revealed the complexities of interactions between social, environmental, and personal factors that influence COVID-19 infection rate in Iran. Our findings may provide support for the WHO recommendations highlighting a crucial role for

intersectoral policies and action for limiting the spread of the COVID-19 and reducing health inequalities.

Conclusion

The pandemic-related behavior change is crucial to prevent the virus transmission. Our findings suggest that bringing change at the population level involves a complex fusion of policy and practice and dealing with the social determinants of health. The presence of strong linking social capital is also crucial in creating a sociopolitical context in which compliance with COVID-19 prevention guidelines is promoted.

Ethics Approval and Consent to Participate

The study was approved by the Ethics Committee of University of Social Welfare and Rehabilitation Sciences, Tehran, Iran and Kermanshah University of Medical Sciences (IR.KUMS.REC.1399.657 and IR.USWR.REC.1399.107).

Authors' Contributions

Study conception and design: Z.J, Y.S, S.A, M.SH. Acquisition of data: S.A, M.SH, A.B, A.A and T.P. Analysis and interpretation of data: Z.J, S.A, T.P, Y.S and M.SH. Drafting of manuscript: Z.J, S.A. and T.P. Critical revision: All authors have read and approved the final manuscript.

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References

1 Moon, M.J., *Fighting COVID-19 with agility, transparency, and participation: Wicked policy problems and new governance challenges.* Public administration review, 2020. **80**(4): p. 651-656.

2 Haug, N., et al., *Ranking the effectiveness of worldwide COVID-19 government interventions.* Nature human behaviour, 2020. **4**(12): p. 1303-1312.

3 Raoofi, A., et al., *COVID-19 pandemic and comparative health policy learning in Iran.* Archives of Iranian medicine, 2020. **23**(4): p. 220-234.

4 WHO, *In Middle East COVID-19 hotspot Iran, WHO walks the talk.* 2020.

5 EMRO, *Eastern Mediterranean region COVID-19 affected countries.* . 2020.

6 Shushtari ZJ, Salimi Y, Ahmadi S, Rajabi-Gilan N, Shirazikhah M, Biglarian A, Almasi A, Gharehghani MA. Social determinants of adherence to COVID-19 preventive guidelines: a comprehensive review. Osong public health and research perspectives. 2021 Dec;12(6):346.

7 Abrams, E.M. and S.J. Szefler, *COVID-19 and the impact of social determinants of health.* The Lancet Respiratory Medicine, 2020. **8**(7): p. 659-661.

8 Ataguba, O.A. and J.E. Ataguba, *Social determinants of health: the role of effective communication in the COVID-19 pandemic in developing countries.* Global health action, 2020. **13**(1): p. 1788263.

9 Duarte, R., et al., *Different disease, same challenges: Social determinants of tuberculosis and COVID-19.* Pulmonology, 2021.

10 Takian, A., M.M. Kiani, and K. Khanjankhani, *COVID-19 and the need to prioritize health equity and social determinants of health*. 2020, Springer.

11 Varkey, R.S., et al., *Socioeconomic determinants of COVID-19 in Asian countries: An empirical analysis.* Journal of Public Affairs, 2020: p. e2532.

12 Norheim, O.F., et al., *Difficult trade-offs in response to COVID-19: the case for open and inclusive decision making.* Nature Medicine, 2021. **27**(1): p. 10-13.

13 WHO, W.H., *A conceptual framework for action on the social determinants of health.* 2010.

14 Hsieh, H.-F. and S.E. Shannon, *Three approaches to qualitative content analysis.* Qualitative health research, 2005. **15**(9): p. 1277-1288.

15 Potter, W.J. and D. Levine-Donnerstein, *Rethinking validity and reliability in content analysis.* 1999.

16 Speziale SHJ, Carpenter DR. Qualitative research in nursing: advancing the humanistic imperative. 4th ed. Philadelphia: Lippincott Williams & Wilkins; 2007.)

17 Falahat, K., Mirabzadeh, A., Eftekhari, M.B., Sajjadi, H., Vameghi, M., Harouni, G.G. and Feizzadeh, G., 2019. Social determinants of positive mental health in iranian society: A qualitative approach. *International journal of preventive medicine*, *10*.

18 WHO, *COVID-19: vulnerable and high risk groups.* 2021.

19 Murphy, A., et al., *Economic sanctions and Iran's capacity to respond to COVID-19.* Lancet Public Health, 2020. 5(5): p. e254.

20 Blas, E. and A.S. Kurup, *Equity, social determinants and public health programmes*. 2010: World Health Organization.

21 Marmot, M., *Health equity in England: the Marmot review 10 years on.* Bmj, 2020. 368.

22 Lönnroth, K., Jaramillo, E., Williams, B., Dye, C., & Raviglione, M. (2010). *Tuberculosis: the role of risk factors and social determinants.* Equity, social determinants and public health programmes, 219, 241.

23 WHO, *WHO Coronavirus (COVID-19) Dashboard*. 2021.

24 Takian, A., A. Raoofi, and S. Kazempour-Ardebili, *COVID-19 battle during the toughest sanctions against Iran*. Lancet (London, England), 2020. **395**(10229): p. 1035.

25 Gharebaghi, R. and F. Heidary, *COVID-19 and Iran: swimming with hands tied!* Swiss medical weekly, 2020. **150**(1516).

26 Behzadifar, M., et al., *Ensuring adequate health financing to prevent and control the COVID-19 in Iran*. International journal for equity in health, 2020. **19**: p. 1-4.

27 Alimardani, M. and M. Elswah, *Trust, religion, and politics: Coronavirus misinformation in Iran*. 2020.

28 Elgar, F.J., A. Stefaniak, and M.J. Wohl, *The trouble with trust: Time-series analysis of social capital, income inequality, and COVID-19 deaths in 84 countries*. Social Science & Medicine, 2020. **263**: p. 113365.

29 Lindström, M., *A commentary on "The trouble with trust: Time-series analysis of social capital, income inequality, and COVID-19 deaths in 84 countries"*. Social Science & Medicine, 2020. **263**: p. 113386.

30 Bargain, O. and U. Aminjonov, *Trust and compliance to public health policies in times of COVID-19*. Journal of Public Economics, 2020. **192**: p. 104316.