



Why the COVID-19 Is Not Significantly Reduced in Iran?

*Mohammad Asgharzadeh¹, Behroz Mahdaviipoor², Vahid Asgharzadeh³,
Mahya Pourostadi⁴, Hossein Samadi Kafil⁵, Ali Vegari⁶, Zahra Taghinejad⁷,
Adel Bairamy⁸, *Jalil Rashedi⁹*

1. *Biotechnology Research Center, Faculty of Paramedicine, Tabriz University of Medical Sciences, Tabriz, Iran*
2. *Department of Laboratory Sciences, Faculty of Paramedicine, Tabriz University of Medical Sciences, Tabriz, Iran*
3. *Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran*
4. *Medical Philosophy and History Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*
5. *Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*
6. *Department of Medical Physics, Faculty of Medicine, Urmia University of Medical Sciences, Urmia, Iran*
7. *Hematology and Oncology Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*
8. *Valiasr Tabriz Seminary, Tabriz, Iran*
9. *Tuberculosis and Lung Diseases Research Center, Tabriz University of Medical Sciences, Tabriz, Iran*

***Corresponding Author:** Email: Rashedijalil@gmail.com

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Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was transported from China to Iran via passengers. The virus is transmitted through droplets from coughing, sneezing, talking and contact with infected surfaces. Due to high transmissibility in places such as clinics, medical offices, buses and offices where there are large crowds, it spread rapidly in Iran and caused the mortality of a significant number of people, especially the elderly with underlying disease. Preventing travel and gatherings, as well as applying house quarantine in Apr 2020, reduced COVID-19 somewhat but then due to lack of attention to social distancing, reducing the use of masks by the people and inappropriate decisions by the national committee on combating coronavirus (NCCC), including reducing the working hours of public offices and shops, reducing the staff of government offices, monopoly on the distribution of essential materials and supplies, the presence of overcrowding in clinics of medical centers, hospitals, and private clinics caused the decline of the disease in the country to decrease. Measures can be taken to prevent the spread of the virus as much as possible, including: rapid detection of infected people, their isolation, contact tracing, quarantine of people over 65 and under 15, protection of the elderly, prevention of gatherings, forcing the use of protective equipment in possible gatherings, and electronicizing public services.

Keywords: SARS-CoV-2; COVID-19; Transmission; Crowding; Isolation; Quarantine

Introduction

Coronaviruses are common viruses between humans and animals and are transmitted from one animal to another and also from animal to human

(1). These are large, single-stranded, coated viruses crown-shaped protrusions spaced apart (2) and



usually cause a mild upper respiratory tract infection in humans.

Three new coronaviruses identified in 2002 (3), 2012 (4) and 2019 (5) and could cause severe acute respiratory syndrome in some individuals were: severe acute respiratory syndrome coronavirus-1 (SARS-CoV-1), Middle East respiratory syndrome coronavirus (MERS-CoV) and severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), respectively. SARS-CoV-2 was first identified in Wuhan, China (6) and the resulting disease was named coronavirus disease-2019 (COVID-19). The virus spread rapidly in China and spread to other countries (7), creating a pandemic in the second decade of the 21st century. SARS-CoV-2 has lower mortality than both of SARS-CoV-1 and MERS-CoV but has a higher transmissibility (8).

SARS-CoV-2 is 79.5% genetically similar to SARS-CoV, while its similarity to the RatG13 strain bat coronavirus is 96.2%. One of the important structural proteins of this virus is spike protein (S) (5), which binds to its receptor angiotensin-converting enzyme 2 (ACE-2), like SARS-CoV-1 (9). The virus was first transmitted to countries near China such as South Korea, Japan and Singapore, and it was also transmitted to Iran due to significant traffic between Iran and China and then it spread quickly all over the world. According to WHO until Mar 16, 2021 more than 120 million people around the world have been infected with the virus and the death rate from the virus has risen to more than 2.6 million people (10) and mortality rate among the elderly and people with underlying diseases healthy people are significantly more (11). The outbreak of the virus led to the cancellation of international travel, sporting events, as well as many international gatherings, and the unemployment of a large number of people around the world. If vaccines do not provide adequate immunity, the growing prevalence of the disease could potentially cause serious health, psychological, economic and social problems in the world therefore, preventing the spread of the virus is essential.

The number of infected people is higher in Iran and does not decrease significantly. In this re-

view, the reasons for the lack of reduction of COVID-19 cases in Iran are examined in order to help reduce the disease in Iran and the world by evaluating the ways of cutting off transmission and providing appropriate methods.

SARS-CoV-2 transmission

Generally, viruses are transmitted from one host to another depending on the nature of the reaction between the virus and the host, as well as the number of people infected. SARS-CoV-2 spread rapidly in China due to mass relocation on the Lunar New Year Holiday in 2020 from Wuhan City, Hubei Province by trains and buses (12) and it was transported by air to other parts of the world (13). The risk of transmission during travel is related to the duration of travel and the location of the seat with the infected person, so that the longer the travel time and the shorter the distance with the infected person, the greater the risk of infection (14). The virus is transmitted through droplets from sneezing, coughing, talking and close contact with other people (15).

It can also be transmitted indirectly through hand contact with contaminated surfaces such as steel, glass, aluminum, ceramics and etc. (16). The virus binds to its ACE-2 receptor via the S protein to receptor alveolar epithelial cells and oral mucosa (17) and proliferates within these cells. SARS-CoV-2 has about 10 times more affinity for the ACE-2 receptor than SARS-CoV-1 (18). This virus has a higher transmissibility so that its reproductive marker (R_0) is higher than R_0 of SARS-CoV-1 and MERS-CoV and is about 3.28 (8). The virus can also be transmitted by asymptomatic individuals (19).

Since the number of asymptomatic infected people is high compared to the patients, they can play an important role in infecting other people. The main way of transmitting the virus is contact with the patient people, therefore, the most important way of transmitting the virus is gatherings (20), especially when people are close to each other and they use less personal protective equipment (PPE) and the environment is not cleaned and disinfected.

Clinical manifestations of COVID-19 and its diagnosis

Clinical symptoms in people infected with SARS-CoV-2 vary according to the individual's physiological abilities and immune system. In people with strong immune system, it occurs as a mild upper respiratory tract infection. However, in some people, especially those with underlying disease, it may cause acute respiratory distress syndrome (ARDS) and respiratory failure (21). The most common clinical symptoms are fever, dry cough, fatigue, dyspnea, sputum production. In some cases, they may have symptoms such as loss of appetite, shortness of breath, myalgia, sore throat, headache, anorexia, chills, nausea, vomiting and loss of sense of smell and taste (11, 22). About 31% of infected people have at least one underlying disease. Underlying diseases such as diabetes mellitus, hypertension, chronic liver disease, malignancy, cardiovascular disease, chronic pulmonary disease, and immunodeficiency are as risk factors for the disease. The most common complication in these patients is ARDS. The mortality rate is higher in elderly patients (13, 23). Initial diagnosis of the disease is based on clinical signs and definitive diagnosis is possible based on radiological and laboratory results. About 88% of patients with abnormal chest computed tomography (CT) scan usually have bilateral lung involvement (24). The definitive diagnosis of COVID-19 is based on real-time RT-PCR, but the positive results of this method differ from 43-89% (25). Symptoms such as lymphopenia, leukopenia, thrombocytopenia and increased C - reactive protein (CRP), aspartate aminotransferase (AST), alanine aminotransferase (ALT) and lactate dehydrogenase (LDH) are also seen in these patients (11, 22, 26).

Reasons for not reducing the COVID-19 in Iran

1) Improper decisions of the National Committee on Combating Coronavirus (NCCC)

In general, this committee has made good decisions that have been effective in preventing the increase of cases of disease in Iran, but unfortunately, in some cases, they have made wrong de-

isions in the country, increased the number of gatherings and, as a result, it has increased the rate of the transmission, referred to the following: a) Closing of level 2, 3 and 4 shops from 6 pm on 11/10/20 to 12/10/20 in Tehran and 25 other provinces. This decision led to the early closure of a significant number of shops, and people came to receive the necessary services and supplies before 18:00, which caused crowds and gatherings in the market and shopping centers and services level 2, 3 and 4, while a number of them also did not use protective equipment such as masks, so the possibility of contamination increased. The time limit led to the closure of a significant number of shops during certain hours, which caused congestion in the metro, especially in Tehran. A number of shopkeepers did not comply with the early closure, and inevitably in order to prevent the shopkeepers from disobeying, in some cases the police, and municipal officials were ready, which also created a gathering have been a factor in transmitting infection between these people and to their family.

Fortunately, on Nov 21, the NCCC took another decision to implement a nationwide quarantine based on the red, orange and yellow status of the cities, which automatically overturned the previous inappropriate decision. b) The reduction in the number of employees of the administration and banks, as well as the reduction of the hours of presence of the employees in that administration according to the decision of the NCCC at different times, especially from Nov 21, 2020, it caused the work of the clients to be done later and caused a gathering inside or outside the above centers. c) Lack of proper programs for children and the elderly.

The NCCC has not made a decision regarding the absence of children and the elderly in the streets and markets, which causes their contamination. After the closure of schools in Iran, children play with each other in front of houses and in the streets, especially in poor areas, without PPE while close contact with each other, the virus can be transmitted between them. Children are less likely to be afflicted with COVID-19 (27), and the disease is often asymptomatic with-

out realizing that, they are infecting families, especially the elderly (28). d) Prohibition of intercity travel by private cars from Nov 21, 2020. SARS-CoV-2 has been transmitted to all provinces of Iran and we did not have white and yellow provinces in Nov and there was yellow situation only in small cities, so the ban on intercity travel will not reduce the number of cases. This has reduced the income of the people, especially those who live and work in two different cities and are forced to use public transport such as buses and minibuses, which causes them to overcrowd and cause more transmission.

2. Monopoly on the distribution of essential foodstuffs and consumables

There was a monopoly on the distribution of some foods and items consumed by the general public, such as cooking oil, and poultry by some shopkeepers who gathered in these areas.

3. Accumulation in clinics of medical centers and hospitals, medical offices and private clinics at certain hours

Gathering in these places is due to the relevant doctor wants to visit a significant number of patients in a limited time, which seems to be the rapid release of SARS-CoV-2 in early 2020 in Qom and Gilan provinces due to the accumulation of infected patients has been in clinics and medical offices.

4. Close metropolitan parks

Virus transmission increases in densely populated areas such as subways, buses, shops, factories, and conferences (29) but is less common in open-air parks exposed to sunlight as a means of eradicating the virus (provided that there is no gathering there). Gatherings for any reason causes the continuation of the virus transmission chain (20, 30) so it should be prevented. Metropolitan parks must be closed if they cause crowds, just as parks were closed on Iran Nature Day (April 1, 2020) so that people do not gather in parks. After the Nature-Day, closing parks and banning people from entering the park had no effect on reducing the prevalence of COVID-19

but was exacerbating. This is because some people took to the busy streets for a walk or refrained from exercising, which could also cause stress and depression (31) and trigger a symptomatic illness after the virus enters.

5. Lack of preparation and distribution of cheap face masks

COVID-19 caused a significant number of people around the world to lose their businesses (32). Unfortunately, a significant number of people in Iranian cities are unemployed and do not have enough income and have a hard time living, and the prevalence of COVID-19 is one of the main factors in this issue. Lack of preparation and distribution of cheap masks among these people has made it difficult to control the transmission of infection between them.

6. Wrong habit of some Iranians

There is a misconception among some Iranians that if there is a crowd in a place of service such as a shop, doctor's office, etc., the general public will consider it due to the high quality of the product or the better service. These measures lead to various gatherings, and since there are usually people in these areas who do not wear masks, the transmission of infection increases, just as the initial outbreak of COVID-19 in Iran was probably due to the accumulation of patients in clinics and medical offices.

7. Improper disinfection in some medical centers and hospitals

Disinfection protocol in some medical centers and hospitals in Iran, unfortunately, is implemented without sufficient supervision of the relevant expert and is often assigned by service personnel with low level of education and experience, which leads to the transmission of infection to those referred to the centers.

Ways to reduce the transmission of infection in Iran

a) Rapid identification and isolation of infected people and quarantine of people who have been in contact with infected people.

SARS-CoV-2 is present in sufficient numbers in the nasal, oral and pharyngeal areas of patients during the first 10 days of infection (33). Therefore, these people contaminate the air in closed environments and this plays an important role in transmitting the infection (34). Rapid diagnosis and isolation of patients reduces aerosol transmission and can protect healthy individuals (35) also, contact tracking, as a complement to isolation, is a very important step in controlling COVID-19. South Korea was able to effectively control the disease in that country through extensive testing, isolation of patients, contact tracing and quarantine of those who came in contact with patients (36). Fortunately, Iran has also started screening from homes around December 1, 2020, which will reduce contacts in diagnostic and treatment centers, where the rate of infection is high, so it may be able to better control COVID-19 in the future.

b) Support for the elderly

One of the best ways to control COVID-19 is to quarantine themselves and keep people at home, especially the elderly, but staying home may lead to unemployment and income cuts. Iran has a population of more than 84 million, about one million of whom are men over the age of 75, of which approximately four-fifths are retired, own a business or land for agriculture, or are supported by relief organizations or children. In addition, the majority of women over the age of 75 do not work abroad as they are either retired or supported by their husbands or children and are somehow safe from COVID-19. About 200,000 elderly men have no source of income and have been severely damaged by the closure of business districts. These people are often malnourished due to financial poverty, so they have to go to crowded areas to earn little money, and their chances of becoming infected with SARS-CoV-2 are greatly increased and after hospitalization, due to old age and underlying disease, their mortality rate will be higher (11, 23). Therefore, the government of the Islamic Republic of Iran should support these people in order to reduce the death of these people and control the disease, and through this, they

will be forced to stay at home and be quarantined.

c) Prohibition of travel of persons over 65 years and under 15 years and their quarantine.

SARS-CoV-2 was transmitted from Wuhan, China to other provinces in China and the world (12) so travel restrictions is necessary to control (37, 38). Quarantine is necessary when the prevalence of COVID-19 is high (39), but quarantine can lead to job loss and fear of disease can lead to depression and psychological complications (40). Therefore, it is better for people over 65 yr of age who are at high risk of death to quarantine more severely, and for their daily needs to be provided by relatives and volunteer forces. Moreover, in case of high prevalence of the disease, quarantine should be applied to people under 15 yr of age. Due to the SARS-CoV-2 usually causes less disease in these people, and on the other hand, due to less use of masks and high contact with them, the transmission between them is more frequent and they can eventually transmit the virus to their family (27).

d) Prevent gatherings

Wherever gatherings, at low social distances, occur they can be a potential source of infection. Unfortunately, in medical centers and gathering centers of the People's Volunteer Forces, despite the fact that they themselves are as centers for fighting disease, but due to create necessary or unnecessary gatherings, it is possible for the infection to be transmitted among themselves and through them to their families. In order to reduce the transmission of SARS-CoV-2, gatherings must be prevented, just as South Korea was able to control the corona by preventing gatherings and closing schools and universities (36).

e) Forcing to use protective equipment where other people are present

The main source of infection is viruses released from infected people during coughing, sneezing and talking (15), so it is necessary to use PPE to prevent infection in dealing with other people

and the most important means of personal protection is the face mask (41). As one of the causes of low COVID-19 death in Japan is the use of masks, although in Japan the population is high and the average age is high (42), so those who do not use masks in gatherings in Iran should be fined.

f) Disinfection of high-traffic areas by popular volunteer forces

SARS-CoV-2 stays on the surfaces for several hours to 9 days (16, 43) so disinfecting busy areas and places such as subways, buses, stations, banks, etc. is essential and can be helped by vol-

unteer people who can use sodium hypochlorite (44, 45).

g) Provide electronic public services

In most countries, receiving public services such as municipalities, insurance and banks is mostly done electronically, so this strategy should be implemented in Iran (46). This reduces the density in the relevant centers. The effectiveness of the above measures to reduce COVID-19 cases depends on the serious determination of the authorities, especially the Ministry of Health and the cooperation of various organizations and the performance of each Iranian to control the disease (Fig. 1).

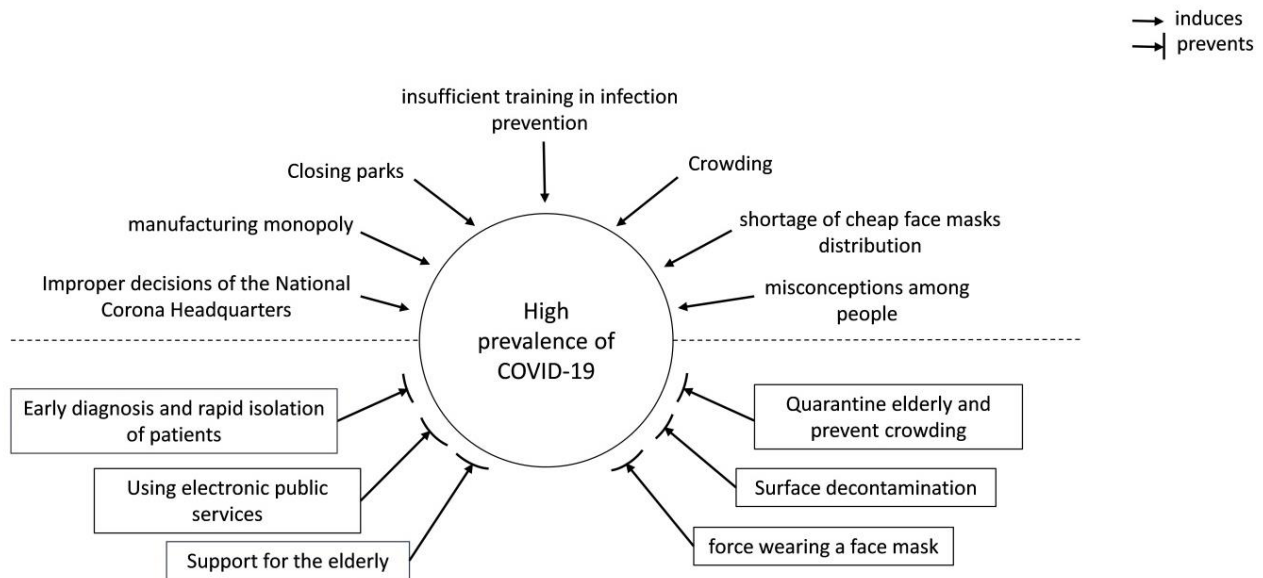


Fig. 1: Ways to reduce the COVID-19 in Iran

Conclusion

Due to insufficient attention of the ministry of health to prevent overcrowding in medical centers, clinics and private medical offices the COVID-19 became an epidemic in Iran and caused the death of a significant number of Iranians. The disease control is possible with rapid diagnosis, isolation and quarantine of people over 65 and under 15, protection of the elderly, pre-

vention of gatherings, forcing the use of PPE in potential gatherings, disinfection of busy places and electronic public services.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission,

redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

All of the authors declare that they have no conflict of interest.

References

1. Cui J, Li F, Shi ZL (2019). Origin and evolution of pathogenic coronaviruses. *Nat Rev Microbiol*, 17(3):181-192.
2. Fan Y, Zhao K, Shi Z-L, et al (2019). Bat coronaviruses in China. *Viruses*, 11(3): 210.
3. Al-Tawfiq JA, Zumla A, Gautret P, et al (2014). Surveillance for emerging respiratory viruses. *Lancet Infect Dis*, 14(10):992-1000.
4. Al-Omari A, Rabaan AA, Salih S, et al (2019). MERS coronavirus outbreak: Implications for emerging viral infections. *Diagn Microbiol Infect Dis*, 9 3(3):265-285.
5. Zhou P, Yang X-L, Wang X-G, et al (2020). A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*, 588(7836):E6.
6. Zhu N, Zhang D, Wang W, et al (2020). A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med*, 382(8):727-733.
7. Del Rio C, Malani PN (2020). COVID-19—new insights on a rapidly changing epidemic. *JAMA*, 323(14):1339-1340.
8. Liu Y, Gayle AA, Wilder-Smith A, et al (2020). The reproductive number of COVID-19 is higher compared to SARS coronavirus. *J Travel Med*, 27(2):taaa021.
9. Li W, Moore MJ, Vasilieva N, et al (2003). Angiotensin-converting enzyme 2 is a functional receptor for the SARS coronavirus. *Nature*, 426:450-454.
10. Organization WH (2020). Coronavirus disease 2019 (COVID-19) Situation Report–67. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200327-sitrep-67-covid-19.pdf?sfvrsn=b65f68eb_4
11. Huang C, Wang Y, Li X, et al (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*, 395(10223):497-506.
12. Li Q, Guan X, Wu P, et al (2020). Early transmission dynamics in Wuhan, China, of novel coronavirus–infected pneumonia. *N Engl J Med*, 382(13):1199-1207.
13. Chen N, Zhou M, Dong X, et al (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*, 395(10223):507-513.
14. Hu M, Lin H, Wang J, et al (2021). The risk of COVID-19 transmission in train passengers: an epidemiological and modelling study. *Clin Infect Dis*, 72(4):604-610.
15. Wu F, Zhao S, Yu B, et al (2020). A new coronavirus associated with human respiratory disease in China. *Nature*, 580(7803):E7.
16. Kampf G, Todt D, Pfaender S, et al (2020). Persistence of coronaviruses on inanimate surfaces and its inactivation with biocidal agents. *J Hosp Infect*, 104(3):246-251.
17. Xu H, Zhong L, Deng J, et al (2020). High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. *Int J Oral Sci*, 12:1-5.
18. Wrapp D, Wang N, Corbett KS, et al (2020). Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation. *Science*, 367(6483):1260-1263.
19. Rothe C, Schunk M, Sothmann P, et al (2020). Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *N Engl J Med*, 382(10):970-971.
20. Rader B, Scarpino SV (2020). Crowding and the shape of COVID-19 epidemics. *Nat Med*, 26:1829-1834.
21. Heymann DL, Shindo N (2020). COVID-19: what is next for public health? *Lancet*, 395(10224):542-545.
22. Guan WJ, Ni ZY, Hu Y, et al (2020). Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*, 382:1708-1720.

23. Rashedi J, Poor BM, Asgharzadeh V, et al (2020). Risk Factors for COVID-19. *Infez Med*, 28(4):469-474.
24. Ai T, Yang Z, Hou H, Zhan C, et al (2020). Correlation of chest CT and RT-PCR testing in coronavirus disease 2019 (COVID-19) in China: a report of 1014 cases. *Radiology*, 296(2):E32-E40.
25. Yang Y, Yang M, Shen C, et al (2020). Evaluating the accuracy of different respiratory specimens in the laboratory diagnosis and monitoring the viral shedding of 2019-nCoV infections. *medRxiv*, doi.org/10.1101/2020.02.11.20021493.
26. Asgharzadeh M, Valiollahzadeh MR, Poor BM, Kafil HS, et al (2020). Laboratory Diagnosis of COVID-19. *Clinical Pulmonary Medicine*, 27(5):148-53.
27. Li X, Xu W, Dozier M, et al (2020). The role of children in transmission of SARS-CoV-2: A rapid review. *J Glob Health*, 10(2): 021101.
28. Golubev AG (2020). COVID-19: A Challenge to Physiology of Aging. *Front Physiol*, 11:584248.
29. Ryan BJ, Coppola D, Williams J, et al (2020). COVID-19 Contact Tracing Solutions for Mass Gatherings. *Disaster Med Public Health Prep*, 15(3):e1-e7.
30. Ebrahim SH, Memish ZA (2020). COVID-19—the role of mass gatherings. *Travel Med Infect Dis*, 34:101617.
31. Pandey D, Bansal S (2020). Psychological impact of mass quarantine on population during pandemics—The COVID-19 Lock-Down (COLD) study. *PLoS One*, 15(0):e0240501.
32. Hossain M (2021). Gender differences in experiencing coronavirus-triggered economic hardship: Evidence from four developing countries. *Res Soc Stratif Mobil*, 71:100555.
33. Herrera D, Serrano J, Roldán S, et al (2020). Is the oral cavity relevant in SARS-CoV-2 pandemic? *Clin Oral Investig*, 24(8):2925-2930.
34. Sciomer S, Moscucci F (2020). SARS-CoV-2 spread in Northern Italy: what about the pollution role? *Environmental Monitoring and Assessment*, 192:325.
35. Triggler CR, Bansal D, Farag E, et al (2020). COVID-19: Learning from Lessons To Guide Treatment and Prevention Interventions. *mSphere*, 5(3):e00317-20.
36. Choi JY (2020). Covid-19 in South Korea. *Postgrad Med J*, 0:1–4. doi:10.1136/postgradmedj-2020-137738.
37. Yang Y, Shang W, Rao X (2020). Facing the COVID-19 outbreak: What should we know and what could we do? *J Med Virol*, 92(6):536-537.
38. Zhao Y, Wang R, Li J, Zhang Y, et al (2020). Analysis of the Transmissibility Change of 2019-Novel Coronavirus Pneumonia and Its Potential Factors in China from 2019 to 2020. *Biomed Res Int*, 2020:3842470.
39. Wilder-Smith A, Freedman DO (2020). Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med*, 27(2):taaa020.
40. Brooks SK, Webster RK, Smith LE, et al (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*, 395(10227):912-920.
41. Leung C, Cheng K, Lam T, Migliori G (2020). Mask wearing to complement social distancing and save lives during COVID-19. *Int J Tuberc Lung Dis*, 24(6):556-558.
42. Iwasaki A, Grubaugh ND (2020). Why does Japan have so few cases of COVID-19? *EMBO Mol Med*, 12(5):e12481.
43. Pradhan D, Biswasroy P, Ghosh G, Rath G (2020). A review of current interventions for COVID-19 prevention. *Arch Med Res*, 51(5): 363–374.
44. Itiki R, Chowdhury PR (2020). Fast deployment of COVID-19 disinfectant from common ethanol of gas stations in Brazil. *Health Policy and Technology*, 9:384-390.
45. Fathizadeh H, Maroufi P, Momen-Heravi M, et al (2020). Protection and disinfection policies against SARS-CoV-2 (COVID-19). *Infez Med*, 28(2):185-191.
46. Bergman BG, Kelly JF (2021). Online digital recovery support services: An overview of the science and their potential to help individuals with substance use disorder during COVID-19 and beyond. *J Subst Abuse Treat*, 120:108152.