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REVIEW ARTICLE OPEN ACCESS

FIFA World Cup 2022 and the Risk of Emergence of Zoonotic Diseases

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Abstract

The 2022 Federation Internationale de Football Association (FIFA) World Cup will take place in Qatar and will be a one-of-a-kind mega-crowd gathering. This is the first time in history that people from all over the world would gather in such a concentrated place. There is a higher chance of spreading zoonotic illnesses from one community to another among those who travel internationally, therefore tourists should be aware of the dangers they may face and take precautions. The public health system of the country hosting the event must be equipped to avoid the spread of zoonotic diseases considering the current global climate. The potential for an increase in cases of COVID-19 and monkeypox is notably heightened by this event. Possible exotic diseases such as the Marburg virus disease could also be spread. Due to Qatar's inexperience in hosting such major events, it is crucial to invest heavily in training for the early identification of infectious illnesses and the prevention of their spread among event attendees. Visitors to Qatar 2022 should acquire the most up-to-date information available and be aware of the usual precautions that should be followed. Your immunization record must be up to date. Hospitals and other medical facilities in Qatar would be wise to increase their readiness for mass casualty occurrences given that this small location is hosting such an event for the first time. To better meet the health needs of its population, the government of Qatar should promote health advice materials in different languages and keep an adequate supply on hand. The potential for the emergence of zoonotic diseases is briefly reviewed here considering the upcoming FIFA World Cup in 2022.

Keywords: FIFA World Cup, Qatar, Zoonotic Diseases, COVID-19, Monkeypox, Marburg

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INTRODUCTION

The spread and comeback of many zoonotic diseases pose a concern to human health because of the increased opportunities for human and animal contact. Novel viral diseases have emerged over the last two decades, causing significant mortality and morbidity and leaving a huge impact on health systems, society, and the economy of not only the affected states/countries but also the global economy.[1,2] Examples include severe acute respiratory syndrome (SARS), influenza A/H1N1(09), Middle east respiratory syndrome (MERS), Nipah virus disease, Ebola hemorrhagic fever, and the current COVID-19. Even though zoonotic illnesses that cause periodic outbreaks/epidemics have become more common in the last three decades, most countries still lack the comprehensive preventative measures needed to stop them.[3,4] In less than a month, the world will witness the unfolding of yet another season of one of the world's greatest sporting events; the men's Fédération Internationale de Football Association (FIFA) World Cup 2022. Qatar, hosting the 22nd edition of the once-every-four-years most-watched and most lucrative event in sports, is the first country in the Middle East to host this sporting event.[5] The country expects to welcome more than a million visitors during the football carnival. During that time, the country anticipates the largest influx of people in its history, with over 1.5 million tourists arriving from all over the world. Considering that the native population of Qatar is less than 3 million and that it is also a densely populated nation, imported infections may pose a significant threat to public health. No Middle Eastern country has ever hosted a FIFA World Cup. Once upon a time, these competitions were hosted in nations like Brazil, Germany, and the United States. Though minor in comparison to other Middle Eastern nations, Qatar is getting ready to host the 2022 tournament, making it the first Arab country and just the second Asian country (after Japan and South Korea in 2002 to do so.[6]

In addition, large-scale events like sporting competitions or religious conventions are known to transmit diseases among both the visiting public and the locals. Several studies have attempted to gauge this danger by looking back at past regional events, most notably the FIFA World Cup. This year is also exceptional since the COVID-19 epidemic is ongoing. There is also a growing danger of other deadly viruses that can be spread from person to person, such as monkeypox and the Marburg virus.[7] Notably, over the past several months, a number of zoonotic diseases and their accompanying outbreaks have emerged as a major threats to public health, i.e., pandemics. Indeed, this is most true for viral infections, which are much more difficult to treat than bacterial ones. In the absence of prompt action, these diseases may spread uncontrollably, triggering epidemics in the host country and maybe other countries when the tourists return home.[8] Hosting a massive event like the FIFA World Cup requires the host country to take measures to safeguard its citizens and prevent any potential health hazards.[9,10] While fans from every continent visit the newly built stadiums and cheer for their country, the risk of infection cannot be overlooked. It has been evident that public gatherings like sporting events, religious meetings, and political campaigns have the potential to jeopardize public health through the spread of infectious diseases among both visitors and local people.[11] Only around 11% of the 2.8 million residents in Qatar are Qatari, while the rest are immigrants from South Asian countries like India, Bangladesh, Nepal, Pakistan, Sri Lanka, and other countries like Sudan, Syria, Jordan, Lebanon, Kenya, and Iran, working as construction workers, retailers, and maids.[12-14] These aforementioned countries are home to many zoonotic diseases like rabies, zoonotic tuberculosis, brucellosis, Ebola, foodborne infections, and many more. Because these immigrants will be in close proximity to the visitors during the World Cup, thereby increasing the potential for infection. To reduce the likelihood of further epidemics, Qatar must expand its efforts to train all relevant parties. Furthermore, unlike Saudi Arabia or certain western nations, Qatar is viewed as having less experience of arranging events of this scale. That means it might not be ready to handle some health problems.[1,2]

Over a million people will visit Qatar, share a common stadium accommodating just under a million, and reside in the newly built hotels that are expected to fall short of accommodating all the guests visiting the country. The proximity of the stadiums will encourage a large number of people to live within a limited radius, increasing the

likelihood of the subsequent spread of infectious diseases if there is an outbreak of disease. The FIFA World Cup 2022 is the first sporting event post-COVID-19, where a large number of people are expected, in contrast to the Tokyo Olympics, which was supposed to start in mid-2020 but was postponed for a year, courtesy of the pandemic, and had to be held without any visitors.[15,16] With COVID-19 still having its effects, the new public health emergency, the Monkeypox virus, and the re-emerging Marburg fever looming over our heads, public health is at higher risk.[17-19] Moreover, it has been evident from the Hajj in Arabs that mass gatherings have an extremely high risk for the spread of diseases.[20,21] Within this backdrop of the 2022 FIFA World Cup, this paper examines the potential for the emergence of zoonotic diseases.

Risk of emergence of zoonotic diseases

The current pandemic of COVID-19, a public health emergency of international concern caused by monkeypox, and the resurgence of the Marburg virus are all major causes of alarm. Additional illnesses of the respiratory and digestive systems also require close monitoring.[22] Unlike the Tokyo Olympics 2020 (2021), which was held without visiting spectators, the FIFA World Cup 2022 will be the first big sporting event in the COVID-19 era for which such a high number of visitors is expected. Hajj is responsible for one of the largest mass gatherings in the world, and research shows that it dramatically increases respiratory diseases in the Middle East. Research suggests that SARS-CoV-2/COVID-19 is not the only respiratory virus that pilgrims may be exposed to.[23,24] In addition, the prevalence of respiratory infections such as those caused by Streptococcus pneumoniae, Staphylococcus aureus, and Haemophilus influenzae skyrockets when large numbers of people come together in one place.[25] It is also possible that as many as a quarter of the attendees at a large event will have an infection that causes diarrhea. Since people from all walks of life are expected to attend this event, the potential for a wide variety of infectious diseases to break out is elevated.[26-28]

Recently, though, monkeypox has emerged as a major concern. The World Health Organization (WHO) has already called it a global public health emergency. Although monkeypox has been recognized for almost 50 years, it has only recently spread outside of Africa.[29] Although the fatality rate from monkeypox has been historically considerably low, over 57,000 confirmed cases as of September 13 indicate that monkeypox will continue to be a problem well into the foreseeable future.[30] This virus can cause a wide range of health problems, some of which may be deadly. Furthermore, the world is not prepared to manage the virus in the same way it dealt with COVID-19. The need for information and preventative programs about monkeypox is critical, as vaccines against it are not currently available in Qatar or in many other countries.[31]

Since the monkeypox virus, a big double-stranded DNA virus, is better equipped to fix replication faults than an RNA virus like HIV, the now circulating monkeypox virus strain should have acquired only a small number of mutations since it emerged in 2018.[32] Researchers recently stated that after collecting DNA from 15 MPX virus samples and reconstructing their genetic information, they discovered that the true mutation rate was six to twelve times higher than expected. Previous estimations of the substitution rate for Ortho-pox viruses did not predict the large increase in mutation rate seen with MPXV.[33] The researchers stressed the possibility of continuous viral evolution and human adaptation.[34] This substantial uncertainty about the MPX's future is due to the fact that genetic alterations are expected to affect virus characteristics and capabilities like transmissibility, sickness severity, and immune evasion.[35]

The Monkeypox virus, being a large double-stranded DNA virus, is better equipped to fix replication faults than an RNA virus like HIV. Therefore, the current monkeypox virus strain should have only accrued a few mutations when it first began circulating in 2018.[1,2] The DNA from 15 monkeypox virus samples was recently analyzed, and the resulting genetic reconstruction revealed a true mutation rate six to twelve times higher than had been predicted.[7] According to reports, the estimated increase in the monkeypox virus mutation rate is far higher than what would be expected based on earlier estimations of the substitution rate for Ortho-pox viruses.[6,8] Scientists stress the possibility of continuous viral evolution and human adaptation. Genetic

alterations, however, are expected to affect virus characteristics and capabilities like transmissibility, sickness severity, and immune evasion, leading to substantial uncertainty about the monkeypox virus's future.[22,35]

There is also the possibility that Qatar will become the recipient of other exotic illnesses that have never been seen in the country before. For instance, cases of Marburg virus disease have been documented outside of Africa in recent years. The sickness is harmful because it frequently results in hemorrhagic fever and has a high case fatality rate.[1,27]

Frequent mass gatherings due to the event may result in the development of a new strain of pathogens. Individuals can act as mixing vessels for the development of new strains and a new strain of influenza virus or SARS-CoV-2/COVID-19 virus or monkeypox virus, which can be more virulent and more transmissible, may evolve with genetic reassortment of different strains.[36] With the declaration of no requirement for vaccination against coronavirus for visitors,[37] there is more chance of the evolution of new strains and causing another pandemic, as we do not know how new strains will be characterized.

With time, or after the relegation of the visitor's nation, or after the end of the whole event, the return of players and fans to their country can introduce new diseases to their country. Some of the diseases are asymptomatic, so returning visitors can give false information about being infection-free and transmitting the disease to others, and subsequently giving rise to widespread and global spread.

As mentioned in Table, the host country will welcome diverse communities of people across the globe during the event, and many of those countries are endemic to several zoonotic diseases.[21] For instance, Rift valley fever, not diagnosed in Qatar, is endemic to Senegal.[16] Ghana is home to several zoonotic diseases like anthrax, avian influenza, zoonotic tuberculosis, rabies, and zoonotic tuberculosis.[26] Similarly, rabies and leptospirosis are common in Costa Rica.[27] The intermixing of players and staff from 32 countries and fans all over the world will help to spread disease in a country where the disease has already been eradicated, which is a grave concern for disease control and elimination.

Accessibility of Healthcare

Qatar is one of the largest healthcare spenders per capita in the Middle East, and its healthcare sector continues to expand. A national health insurance program was implemented in 2013, but foreigners are not required to have health insurance to use healthcare facilities. However, due to the exorbitant price of medical care, travelers are strongly urged to secure health insurance before arriving in Qatar.[4,27]

Many health and safety concerns have been raised because of the expected influx of visitors to Qatar for the 2022 FIFA World Cup. As a result, medical facilities should take precautions to ensure they can handle a large number of casualties.[1] In Qatar, two groups offer public health services. The Primary Health Care Corporation (PHCC), which oversees 23 clinics, is among those getting ready to implement the mass casualty incident plan in anticipation of the FIFA World Cup. An analysis done in 2018 found that the PHCC is not ready for the event and needs major changes and improvements to show that it is useful.[7,33]

Due to the potential for a large number of casualties, health care facilities in Qatar must be well-prepared for this massive mass gathering event. This includes rectifying any problems with earlier preparations and expanding the capacity of hospitals and depots in Qatar. Having a sufficient workforce, properly educating medical professionals, and offering services in multiple languages to help people communicate with one another are also crucial. By taking these measures, Qatar will be better prepared to deal with emergencies.

Way Forward

We can thank COVID-19 for the many lessons we have learned about how to better protect ourselves against the spread of disease. Of course, not all infections would respond the same way to the same interventions that helped with COVID-19. That implies Qatar needs to make some major changes if it cares about protecting its citizens from dire consequences.[23]

However, dealing with monkeypox would be more difficult. The healthcare providers in Qatar still lack the necessary education and experience to recognize the illness in its earliest stages. Therefore, there must be extensive training

Table. The potential countries participating in the FIFA world cup and the endemic diseases associated with them

Diseases	Modes of transmission	Endemic countries
Rabies	Virus laden saliva.	Asia (India, China,[38] Philippines[39]) and African continent (Caribbean, Congo[40-43]
Brucellosis	Consumption of raw or unpasteurized	Africa, India[44], Central Asia[45], the dairy products. Mediterranean Basin (Portugal, Spain, Southern France, Italy, Greece, Turkey, North Africa), Mexico, South and Central America, Eastern Europe[44]
Tuberculosis	Via air droplet containing Mycobacterium tuberculosis.	India, Indonesia, China, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa[46]
Middle East respiratory syndrome (MERS)	Through respiratory droplets and close contact.[47]	Saudi Arabia,[48] Qatar and Oman[49]
Severe acute respiratory syndrome (SARS)	Via respiratory droplets and close contact.[50]	Worldwide[51]
Rift Valley Fever (RVF)	Via mosquito bite or direct contact with infected animal blood[52]	The Republic of Niger, Republic of Mauritania, Republic of South Africa, Madagascar, Sudan, Kenya, Somalia and Tanzania, Egypt, Saudi Arabia, and Yemen[52,53]
Alkhurma Hemorrhagic Fever (AHF)	Via tick bite or direct contact with infected camel or sheep blood or milk.	Saudi Arabia[54], Egypt, Djibouti[55,56]
Kyasanur Forest disease/ Monkey Fever	Via tick bite or direct contact with infected animal.[57]	India[58,59]
Cirmean-congo haemorraghic fever	Via tick bite or direct contact with infected animal or people. [60,61]	Africa (Kenya, Mali, Mozambique, Nigeria, Senegal, Sierra Leone, SouthSudan, Sudan, and Tunisia), Asian countries (India, Pakistan, Afghanistan, Saudi Arabia, Turkey, Iran, Iraq, Georgia, Kuwait), Eastern Europe (Spain, Russia, Bulgaria, Greece)[61-66]
Zika virus disease	Bite of infected mosquito or via sexual transmission.[67,68]	Brazil, Indonesia, Malaysia, Thailand, Singapore[69-72]
Hantavirus Pulmonary Syndrome (HPS)	With inhalation of virus through air droplets of excreta or saliva or dust from nest of infected rodent[73,74]	USA, Argentina[75,76], Chile, Uruguay, Paraguay, Brazil, Bolivia, Paraguay, and Panama[73,74,77]
Haemorrhagic Fever with Renal Syndrome (HFRS)	With inhalation of the virus thru air droplets of excreta or saliva or dust from the nest of infected rodent.[73,74]	China, Russia, Korea, Scandinavia (Denmark, Norway, Sweden), Central and Western Europe (Austria, Belgium, the Czech Republic, Denmark, France, Germany)[73,78,79]

Table. Cont...

Diseases	Modes of transmission	Endemic countries
West Nile virus	Bite of virus-laden mosquito.[80-82]	Greece, Italy, Romania, France Hungary, Germany Croatia, Austria, Spain Slovakia, Serbia,[83] USA,[84] Canada, Venezuela 82, Tanzania, Zambia,[85] India,[86] Pakistan,[87] China,[88] Malaysia, Cambodia, Myanmar, Thailand, the Philippines,[89] Iran, Jordan, Lebanon, Palestine,[90] Saudi Arabia[91]
Ebola virus disease/ Ebola hemorrhagic fever (EHF)	By direct contact with infected animal or people.[92]	Guinea, Democratic Republic of Congo (DRC), Uganda[93-95], Sierra Leone, Liberia, Nigeria[96,97]
Marburg virus disease/ Marburg haemorrhagic fever	By direct contact with infected animal or people.[98–100]	Angola, DR Congo, Germany, Ghana, Guinea, Kenya, Serbia, South Africa, Uganda [98,99,101,102]
Yellow fever	Bite of an infected mosquito.[103,104]	Argentina, Brazil, Venezuela[105]
Anthrax	Exposure to bacterial spore-contaminated air or food.[106–108]	Central America (Belize, Costa Rica), South America(Argentina, Bolivia, Peru), sub-Saharan Africa(Madagascar, Angola, Benin, Botswana, Burkina, Faso, Burundi Cameroon, Ghana, Niger, Congo, Chad), Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Tibet, Turkmenistan, and Uzbekistan), South-western Asia(Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka), Southern Europe (Spain, France, Greece) and eastern Europe(Romania, Bulgaria, Moldova)[106-109]
Q fever	With inhalation of pathogen through air droplet of excreta or birth products.[110–112]	Spread worldwide except New Zealand[110,113–116]
Salmonellosis	Via food contaminated with bacteria.[117,118]	Worldwide[117,119–121]
Plague	Through the bite of infected flea or ingestion of infected animal product.[122,123]	Democratic Republic of the Congo, Madagascar, and Peru[122]
Campylobacteriosis	Via food contaminated with bacteria.[124–126]	Worldwide[125,127]
Pasteurellosis	Through bite or scratches of infected animal or Via food contaminated with bacteria or via inhalation of infectious particle[128,129]	Worldwide[128,130–132]
Shigellosis	Direct contact with infected animal or person or via contaminated food and water.[133,134]	Worldwide[133,135]
Toxoplasmosis	Eating contaminated food or water or accidental ingestion of oocysts of pathogen.[136,137]	Worldwide[136,138,139]

Table. Cont...

Diseases	Modes of transmission	Endemic countries
Cysticercosis and Taeniasis	Eating contaminated food or water.[140,141]	Worldwide[141,142]
Human African trypanosomiasis (HAT)/ sleeping sickness	Thru infected tsetse flies. [143,144]	Sub-Saharan African countries (Angola, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Equatorial Guinea, Gabon, Ghana, Guinea, Nigeria, South Sudan, Uganda,Kenya, Malawi, Mozambique, United Republic of Tanzania)[143–145]
Giardiasis	Via contaminated food or water or direct contact with infected one.[146,147]	Worldwide [146–149]
Amoebiasis/ amoebic dysentery	Via contaminated food or water or direct contact with infected one.[150–153]	Worldwide[151–153]
Nipah virus infection	Via consumption of virus-contaminated food or water or via direct contact with infected animal or people. [154–161]	Bangladesh, India, Malaysian, Madagascar, Cambodia, Thailand, Indonesia, EastTimor, The Philippines, Cambodia, Burma, Vietnam, Brunei, Indonesia, China, Taiwan, Ghana, Papua New Guinea, Australia[154–156,158,159,162]
Hendra virus infection	Via consumption of virus-contaminated food or water or via direct contact with infected animal.[163,164]	Australia[163–167]
Monkeypox	Direct contact with infected animal or people or contaminated materials.[168,169]	Many parts of the world[170,171]
Lassa fever/ Lassa hemorrhagic fever	Via contamination food or water by excreta of infected animals.[172]	West Africa (Benin, Ghana, Guinea, Liberia, Mali, Sierra Leone, Togo, and Nigeria)[172–174]
Hepatitis E	Thru contaminated food or water.[175]	Worldwide[175–177]

for medical professionals, paramedical workers, and everyone else who plays a role in the event's coordination. That would allow for the early isolation of patients by identifying or tracing the pathogen.[178] In a similar vein, it may be difficult to recognize the symptoms of less prevalent viruses, including the Marburg virus, Ebola, yellow fever, and Zika virus (e.g., for travelers from endemo-epidemic countries for yellow fever, proof of vaccination should be required). As a result, Qatar must double down on its efforts to educate all relevant stakeholders to reduce the likelihood that these diseases will spread. It is also known that Qatar, in contrast to Saudi Arabia and certain western countries, has less expertise in arranging events of this scale. This means that the country's healthcare system may be unprepared to handle certain conditions.[179]

Travelers should be aware of and be ready for the possibility of contracting and spreading infectious diseases while abroad. All travelers planning to attend Qatar 2022 are encouraged to schedule a pre-travel consultation with their doctor four to six weeks in advance to discuss necessary health and safety measures, such as vaccinations.[7,33] Non-pharmaceutical interventions like using mask, social distancing, regular temperature checkup are key strategies required in this event.[180]

CONCLUSION

The FIFA World Cup is undoubtedly a landmark occasion in the annals of sports. However, the public health system of the country hosting the event must be ready to prevent the spread of zoonotic illnesses considering the current global climate. The likelihood of an increase in cases of COVID-19 and monkeypox is notably raised by this event. It might potentially spread uncommon diseases such as the Marburg virus disease across the country. The danger of these infections, however, is distinct from the possibility of spreading respiratory disorders like rhinovirus or gastrointestinal conditions. Due to Qatar's inexperience with hosting such large-scale events, it is crucial to invest heavily in training for early identification of these illnesses and prevention of their spread among event participants.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS' CONTRIBUTION

DS, SP and KPA conceptualized the study. DS, SP, MB and DC wrote the original draft. DS, SP, DC, KPA and KD reviewed and edited the final manuscript for publication.

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