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A comparative study of strategies for containing the COVID-19 pandemic in Gulf Cooperation Council countries and the European Union

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ABSTRACT

Background: The COVID-19 pandemic has impacted every aspect of human lives including health, businesses, and lifestyles. In spite of governments implementing various strategies across the globe, the pandemic is still expanding with increasing numbers of positive cases. In addition, countries are reopening and easing lockdown restrictions in order to get their economies back on track, and this has led to an increase in the transmission of novel coronavirus. Therefore, it is essential to regularly review the containment strategies employed in different regions in order to understand the characteristics of COVID-19 transmission and to formulate a future course of actions.

Objective: The objective of this study is to review the COVID-19 transmission statistics in Gulf Cooperation Council (GCC) and European Union (EU) countries, and to compare these data with the various containment strategies implemented for containing the spread of the virus.

Methods: A review method was adopted along with different statistical methods for comparing and analyzing COVID-19 data and containment strategies. Transmission types and the Case Fatality Rate (CFR) in the countries in both regions are used to present the current state of the pandemic. In addition, changes in the number of COVID-19 cases are compared with the mitigation and suppression strategies implemented in both regions and their impact is analyzed.

Results: Countries in the EU were slow in reacting to the pandemic, as delays are observed in the implementation of mitigation strategies. However, suppression strategies were implemented soon after mitigation strategies. GCC countries, on the other hand, were quick to react, and they implemented both mitigation and suppression strategies simultaneously, as soon as the pandemic emerged. The CFR was found to be low among GCC countries compared to EU countries. In addition, a second wave of transmission was observed in the EU, whereas in GCC countries there has been no second wave, although a gradual increase in the number of cases is observed. Community transmission was observed among the majority of countries in both GCC and EU countries.

Conclusions: With the reopening of markets, the focus of governments should be on developing integrated user-centric preventive strategies, with a blend of awareness creation, motivation, and support.

1. Introduction

COVID-19 is caused by a virus strain belonging to the family of

coronavirus and its full name is Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV2). It leads to a disease that has been named COVID-19 among infected people [1]. It was first discovered in Wuhan

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city, China, in December 2019 and it rapidly spread across almost the entire world [2]. There were more than 35 million confirmed cases recorded up to 5th October 2020 and 1 million deaths globally [3]. On an average, there has been no significant reduction in the total number of globally confirmed cases or deaths resulting from COVID-19 in the past three months [3]. Currently, the US ranks top in the number of COVID-19 cases, recording more than 7.3 million and 208,064 deaths, followed by India with over 6.6 million cases and 102,685 deaths, and Brazil with more than 4.9 million cases and 1.45 million deaths [3]. Symptoms related to COVID-19 include a dry cough, fever, breathlessness etc. As the number of infections increased, new symptoms were identified that included a loss of taste, fatigue, blood clots etc. [4–7]. The major methods of novel coronavirus transmission is through nasal droplets produced by coughing or sneezing, or by coming in to close contact with infected persons [7–10]. Therefore, various preventive strategies such as wearing masks, washing hands regularly, and social distancing were proposed by the World Health Organization [11].

Various studies have identified the impact of policies on the transmission of novel coronavirus. It was identified that variables such as transport accessibility, socio-economic and territorial conditions, pollution etc. were significantly associated with the transmission of COVID-19 [12]. Population density, mobility habits, and particulate matter (PM) pollutants were also found to be directly related to the rise in infection rates, while temperature was identified as having an inverse relationship with transmission rates [13–15]. These contributing factors can be correlated with the steep rise in infection rates in European countries where there are low temperatures, a high population density, and PM pollutants, and with low transmission rates in GCC countries where there are high temperatures and a lower population density.

The COVID-19 pandemic has affected every aspect of life, and as a result the people and governments are adopting various strategies for preventing the spread of infection. The intensity of the COVID-19 infection in a region can be assessed using the reproduction number (R0), which indicates the probability that one person with COVID-19 will infect other persons. Currently, the global average R0 varies between 1.5 and 3, indicating that one COVID-19 infected person can transmit the infection to up to three other people [16]. However, the R0 varies across regions [17]. In addition, rising ambiguity with asymptomatic cases [18] and the opening of markets and businesses has placed increased responsibility on the people and governments for containing the spread of the virus. Therefore, effective containment strategies need to be developed in line with the infection rates and other challenges in different regions. These strategies take on two forms. First there are mitigation strategies, which are mainly focused on slowing down the pandemic, but they do not completely restrict the transmission of the virus (for example, social distancing, quarantine etc.) [16]. Second there are suppression strategies, which mainly focus on reducing the infection rate, and they can include pharmaceutical interventions such as developing vaccines, and also non-pharmaceutical interventions such as lockdowns, curfews, the closure of schools and markets, preventing community gatherings etc. [19]. It has been identified that mitigation strategies are less effective in reducing the infection rate compared to suppression strategies [19] and this can be assessed from events in countries that are adopting suppression strategies (for example, Singapore, China, Taiwan) and effectively containing the transmission [19]. In order to develop and implement both mitigation and suppression strategies, it is important to consider various types of information. There is a need for specific types of information such as the number of cases (cumulative and daily new cases), the number of deaths, the impact of existing strategies such as lockdowns, curfews, preventive policies, business operations etc., and these need to be analyzed in order to aid decision making about effective containment strategies. Considering these aspects, this study reviews and compares the containment strategies adopted in Gulf Cooperation Council (GCC) and EU member states. Accordingly, the containment lockdown strategies of countries in both regions are reviewed in the following sections.

2. COVID-19 transmission status in the European Union

The COVID-19 pandemic in the EU reflected different trends in terms of total recorded cases, deaths, types of transmission, and the CFR (number of deaths/total number of cases), as identified from the data published by World Health Organization [20], presented in Table 1.

The total number of recorded cases in the EU as of 5th October 2020, was 3,023,822 with 148,872 deaths. Among the countries in the EU that had exceeded 300,000 total cases were Spain, with the highest number of cases, followed by France, Italy, and Germany. The number of recorded cases in The Netherlands, Romania, and Belgium were very similar, ranging from 130,000 to 136,000. Seven countries recorded less than 10,000 cases: Luxembourg, Slovenia, Lithuania, Estonia, Malta, Latvia, and Cyprus.

Observing the total cases across the EU, as shown in Fig. 1, there was a rapid increase in the number of cases from April (394,995 cases) to May (1,114,554) 2020, followed by a steady increase from May to August (1,392,884). A steep increase in total cases was identified from September, as shown in Fig. 1, indicating a second wave across the EU. It can be observed that the majority of the cases in the second wave were mainly in Spain and France, which recorded a steep increase in the number of cases from August. In addition, Germany, which managed to contain the spread of infection in the initial days of the pandemic, experienced a steady increase after August 2020. Italy, which was one of the worst affected countries in the initial days, also recorded a steady increase in the number of cases.

Focusing on the current state of transmission, 12 out of 27 countries have still managed to prevent community transmission, limiting the spread of the virus to particular clusters. However, 15 out of 27 countries entered the community transmission phase, indicating that there would be a huge increase in the number of cases if strict preventive measures were not implemented. The CFR differed widely across the EU. Slovakia recorded the lowest CFR (0.42) and Italy the highest (11.06). Other countries with high CFRs included Belgium (7.73), Sweden (6.25), France (5.39), Ireland (4.76), The Netherlands (4.75), and Spain (4.06). These differences were related to the increase in the total number of

Table 1
COVID-19 statistics in European Union.

Country	Total Cases	Total Deaths	Transmission Classification	Case Fatality Rate
Spain	789,932	32,086	CC ^a	4.06
France	593,248	32,001	CT ^a	5.39
Italy	325,329	35,986	CC	11.06
Germany	300,619	9534	CC	3.17
Netherlands	135,749	6445	CT	4.75
Romania	134,065	4947	CT	3.69
Belgium	130,141	10,064	CT	7.73
Poland	98,140	2604	CT	2.65
Sweden	94,283	5895	CT	6.25
Czechia	82,446	727	CT	0.88
Portugal	78,247	1995	CC	2.55
Austria	48,618	813	CT	1.67
Ireland	38,032	1810	CT	4.76
Hungary	31,480	833	CT	2.65
Denmark	29,680	658	CT	2.22
Bulgaria	21,587	844	CC	3.91
Greece	19,842	409	CC	2.06
Croatia	17,659	298	CT	1.69
Slovakia	13,139	55	CC	0.42
Finland	10,538	345	CT	3.27
Luxembourg	8709	125	CT	1.44
Slovenia	6498	140	CC	2.15
Lithuania	5185	94	CT	1.81
Estonia	3607	67	CC	1.86
Malta	3139	37	CC	1.18
Latvia	2086	38	CC	1.82
Cyprus	1824	22	CC	1.21

^a CC: Clusters of Cases; CT: Community Transmission.

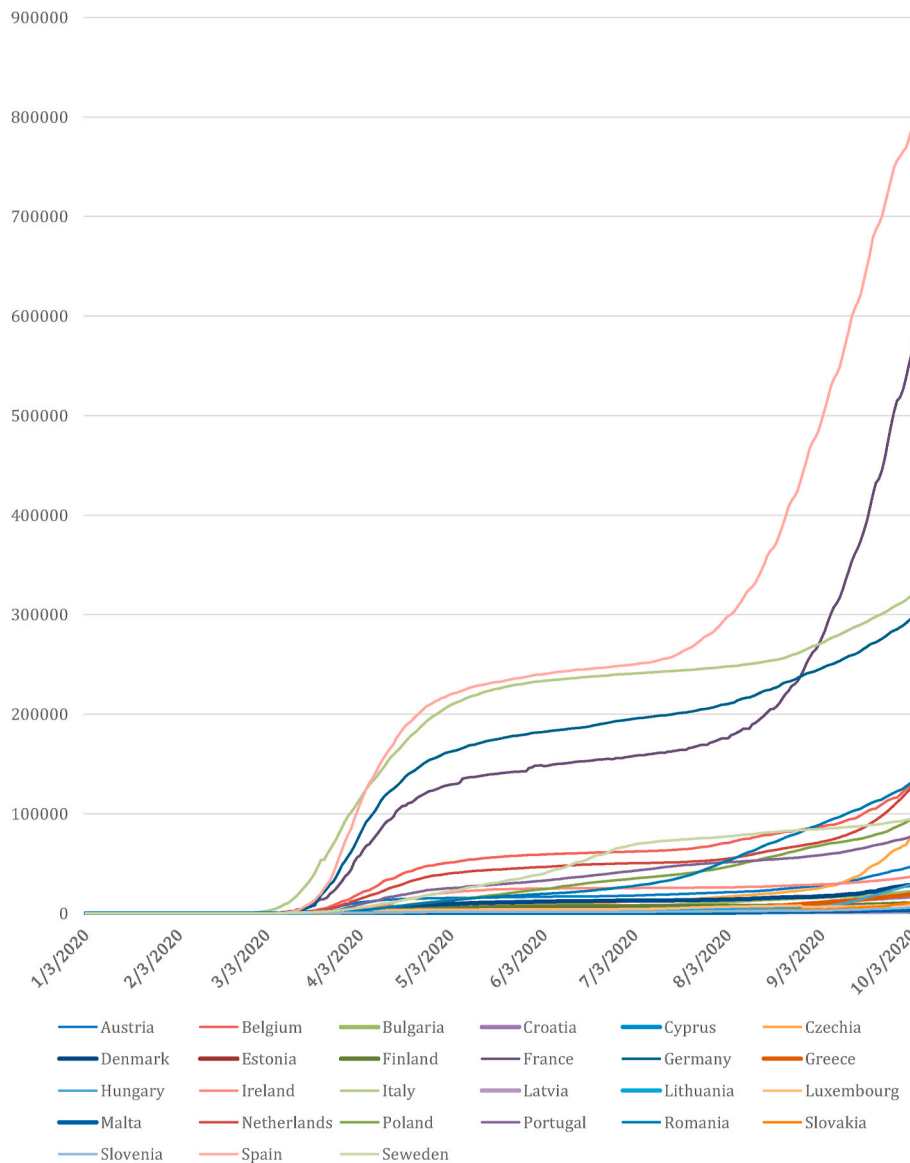


Fig. 1. Total number of cases across the european union [20].

COVID-19 cases and the variation in CFRs across the EU can be attributed to the different mitigation and suppression strategies implemented by the countries in the EU. For instance, Italy, which was one of the worst affected countries at the beginning of pandemic, initiated nationwide lockdown on 11th March, one month after detecting the first case (February 21, 2020) [21]. However, the government also implemented other preventive actions such as stopping flights from China (31st January), closing schools (4th March), and closing industries (22nd March) [22].

The timeline for the implementation of suppression strategies in four EU countries with the highest number of COVID-19 cases is shown in Fig. 2. Italy was the first to implement its regional and nationwide lockdowns compared to other EU nations. France and Spain directly implemented nationwide lockdowns in March, but Germany took longer to implement a regional lockdown after the first case was detected and it reopened within a month of implementing this lockdown. France reopened late (in May) compared to other countries, which reopened in April. The lack of a timely response by the authorities, poor mitigation strategies (for example, delaying quarantine), an ageing population, and increased stress on healthcare systems were a few of the factors identified as contributing to the increase in the number of cases across the EU



Fig. 2. Suppression strategies timeline of major EU nations [23].

[24].

The strategies in the EU mainly focused on containing the clusters or infected zones, increasing testing, and ensuring healthcare access for COVID-19 patients. With the increase in the number of cases, healthcare resources in non-infected zones had to be utilized, which further

increased the risk of transmission [25–28]. The healthcare capacity in South-West Europe was considered to be high, but even then, high numbers of COVID-19 cases were reported in these regions. Advanced healthcare systems with rapid testing and contact tracing procedures and the inefficiency of the authorities in implementing effective suppression strategies in South-west Europe may be a few reasons for this paradox [28]. In addition, awareness strategies were promoted in order to contain the spread of COVID-19 myths across the Europe, such as the idea that burning down 5G towers would help as they were contributing to the spread of the virus, or that drinking alcohol could kill the virus, to name but two [29,30]. Thus, a variety of strategies were implemented in the EU to contain the spread of COVID-19. However, a gradual reopening, poor awareness, and ineffective mitigation and suppression strategies led to the increase in the number of cases.

3. COVID-19 transmission status in GCC states

The COVID-19 pandemic in GCC member states reflected different trends in terms of total recorded cases, deaths, types of transmission, and CFR (number of deaths/total number of cases), as identified from the data published by the World Health Organization [20], presented in Table 2.

The total number of recorded cases in GCC member states as of 5th October 2020, was 769,981, with 7118 deaths. Among the countries in the GCC, Saudi Arabia recorded the highest number of cases with 336,387 and 4875 deaths. The total number of cases in Qatar, Kuwait, and Oman ranged from 100,000 to 127,000. The UAE (98,801) and Bahrain (72,662) recorded the lowest numbers of COVID-19 cases among GCC member states. Although Saudi Arabia recorded the highest number of cases among GCC states, the transmission rate remains sporadic (occasional occurrence of COVID-19 cases). However, the CFR was less than one in all of the GCC countries except Saudi Arabia, which recorded a CFR of 1.44.

Observing the rise in the number of cases, the GCC curve shows a steady increase in the number of total cases since May 2005. However, there was no second wave observed in these countries, as observed in Fig. 3. All of the GCC member states began to slowly ease lockdown restrictions and reopen from June 2020 onwards, which may be the cause of the increase in the number of cases [31]. However, suppressive strategies and strict policies among GCC countries led to a containment of transmission, and medical assistance led to high recovery rates [32].

GCC states have different demographics compared to other countries. The majority of the population in these countries live in urban areas, with frequent family gatherings [33,34], which possess a high risk of contamination. Most of the states initially focused on implementing mitigation strategies such as social distancing, and they very soon moved on to implementing suppression strategies such as curfews. In addition, the GCC states' previous experience in recent times of dealing with similar outbreaks such as the Middle East Respiratory Syndrome (MERS) could have helped with controlling the spread of novel coronavirus [35]. Bahrain was the first country to quickly react in order to contain COVID-19 transmission in the month of February, as shown in Fig. 4. The UAE also reacted quickly to the pandemic; all COVID-19

cases were treated as emergencies, just two days after detecting the initial case on January 29, 2020. The UAE government also decided to treat COVID-19 patients free of charge [36]. This was followed by the closure of schools, the suspension of flights, curfews, and the launch of drive-through COVID-19 testing centres [37]. Similarly, Saudi Arabia reacted quickly by suspending flights and Umrah (the 'minor pilgrimage to Mecca' required at least once in the lifetime of Muslims that can be undertaken at any time of the year) [38], followed by a complete lockdown of holy cities, including Mecca and Madinah. There were strict policies and bold decision making as part of the implementation of suppression strategies [39]. Similarly, other GCC states initially adopted mitigation strategies that were soon followed by suppression strategies [36]. The timeline of implementing strategies is shown in Fig. 4.

4. Discussion and conclusion

With countries reopening and easing restrictions to get economies back on track, the World Health Organization has laid down strategies that mostly focus on preventive measures such as intensive testing, contact tracing, quarantine, social distancing, wearing masks, regular hand washing etc. [40]. Different countries have adopted different strategies for containing the spread of novel coronavirus, and the results of these strategies have been observed in the past few months. For example, countries like China, Thailand and Singapore adopted containment and suppression strategies, such as extensive testing, contact tracing, and isolation. Rapid testing has led to the effective identification of COVID-19 cases, which could then be isolated and treated in order to limit the transmission of the virus. In addition, using new innovative technologies, the test result time was reduced to 4 h [41]. GCC countries similarly implemented suppression strategies such as curfews, lockdowns, and strict rules such as punishments for violating the public COVID-19 regulations [42]. In comparison, countries in the EU were late to respond. They initially adopted mitigation measures, which were then followed by suppression measures. For instance, Italy was late to identify COVID-19 cases, and to restrict movement in the cluster zones where the number of cases was high. As a result, the number of cases rose rapidly in the months of March and April. However, with easing restrictions and the reopening of markets, the number of cases in EU have grown since September 2020, reflecting a second wave of cases. Czechia and The Netherlands, for example, witnessed a rapid increase in the number of cases, with 66.9% and 43.5% increases in the number of cases in the last two weeks of September, respectively [43]. However, the second wave seems to be having less impact than the first wave, as the CFRs among EU countries have remained low in the past three months [43]. The GCC states have recorded a steady increase in the number of cases, compared to the EU, which has already recorded a second wave of COVID-19 cases, as shown in Fig. 5.

The differences in the effects of the strategies adopted by the EU and GCC can also be seen in light of the number of daily new cases, as shown in Fig. 6.

It can be observed that the number of daily new cases across the EU was rapidly increasing, whereas in GCC countries they tended to decrease in July and August, followed by a very slight increase in September 2020.

The differences in the COVID-19 statistics across the EU and GCC countries could be related to the different mitigation and suppression strategies adopted. However, the transmission rate can also be related to a variety of other factors such as people's awareness of COVID-19, self-care and management practices, and a lack of support from the authorities. With the markets reopening, the ambiguity surrounding preventive strategies has been increasing, as the negative impact of the COVID-19 pandemic can be seen from various perspectives, such as mental disorders, stress, anxiety, COVID fatigue etc. [44–46]. Therefore, there is a need to employ a different outlook on the formulation of strategies for containing the spread of the COVID-19 pandemic. The focus should be on collaboration between countries, sharing data and

Table 2
COVID-19 statistics in GCC.

Country	Total Cases	Total Deaths	Transmission Classification	Case Fatality Rate
Saudi Arabia	336,387	4875	Sporadic Cases	1.4400
Qatar	126,498	216	CT ^a	0.1708
Kuwait	107,025	624	CT	0.5830
Oman	101,270	977	CT	0.9647
UAE	98,801	426	CT	0.4312
Bahrain	72,662	260	CC ^a	0.3578

^a CT: Community Transmission; CC: Clusters of Cases.

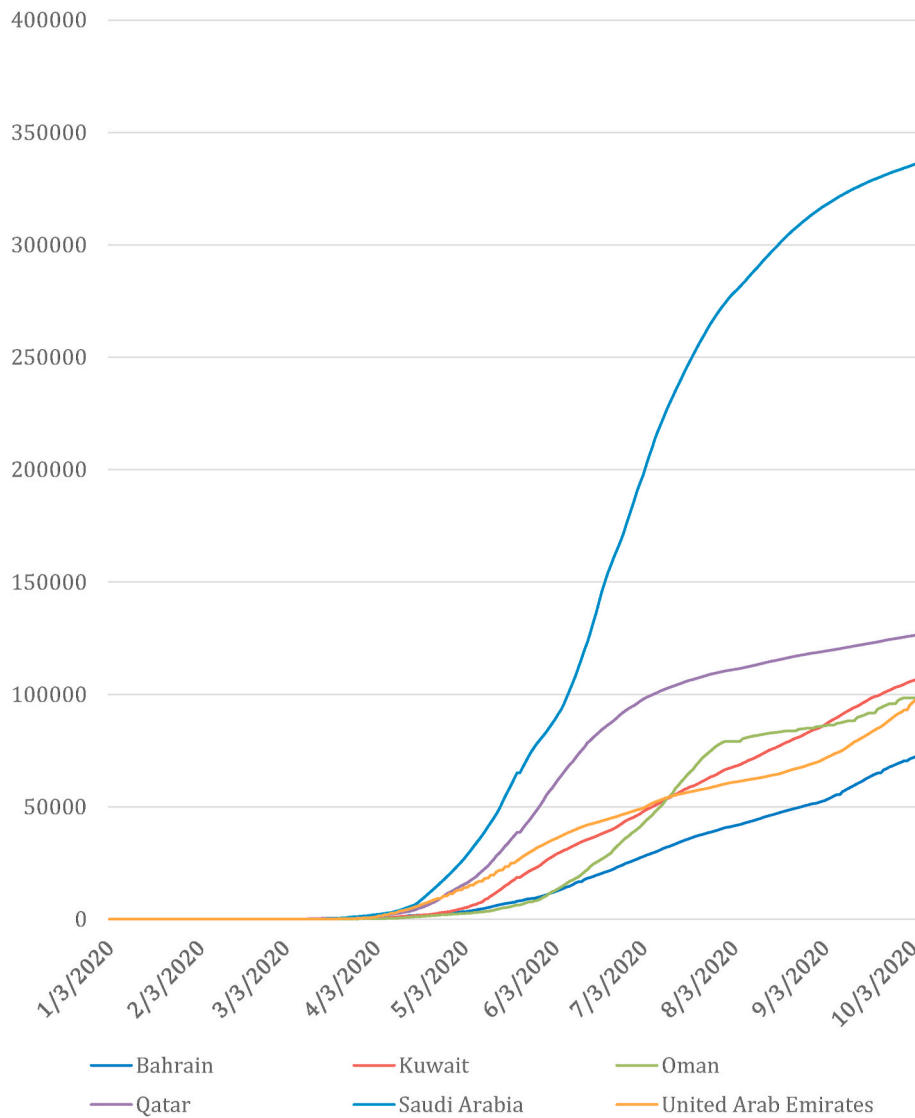


Fig. 3. Total COVID-19 cases across GCC states [20].



Fig. 4. Timeline of implementing various COVID-19 containment strategies in GCC member states [32] * Only partial suspension of flights.

resources, and creating awareness among the public – these are particularly essential now that countries are aiming to completely reopen. Accordingly, the strategies being formulated for COVID-19 should consider communities at their heart, and implement various measures

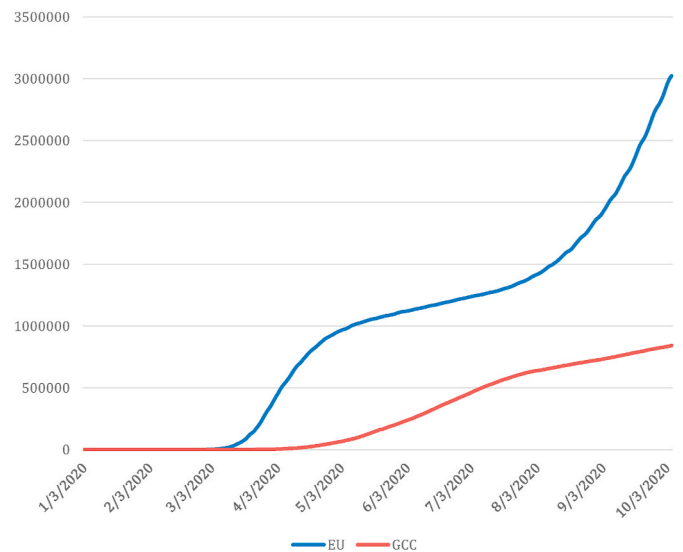


Fig. 5. Comparison of total confirmed COVID-19 cases across countries [20].

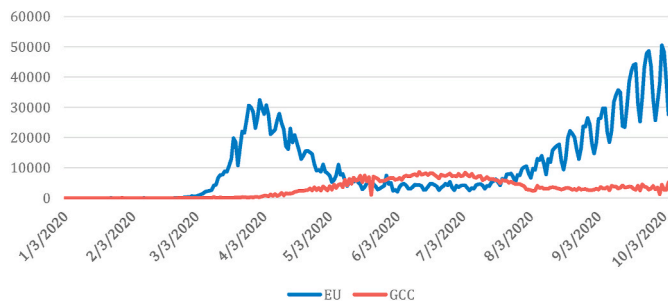


Fig. 6. Comparison of daily new COVID-19 cases in the EU and GCC member states [20].

such as:

- Gathering public opinions at regular intervals and acknowledging their participation in controlling the pandemic.
- Developing containment strategies by considering the public and their needs and requirements.
- Adopting a collaborative approach to implementing preventive strategies and raising awareness among the public by involving communities.
- Ensuring that public life is not affected to a great extent by reducing the risk of transmission using innovative strategies.

As the prolonged implementation of suppression strategies affecting public mental health, there is a need for developing user-centric strategies based on awareness creation, motivation, self-management, and innovation.

5. Limitations and future research ideas

Employing multiple methods such as quantitative, qualitative, and other relevant methods can help researchers with collecting and analyzing data from the perspectives of the public and authorities. This can help to identify new trends in COVID-19 transmission and the impact of new strategies being implemented. In addition, this study only compared the GCC and EU regions, which are two different geographical/climatic regions, focusing mainly on lockdown containment strategies and interventions for battling COVID-19, while other strategies related to healthcare, socio-economic, political, and cultural factors were not considered. These limitations can be considered as points for future research.

6. Implications

Both theoretical and practical implications can be drawn from this study. Firstly, this study contributes to the literature by providing a comprehensive review of various strategies adopted by various governments, and it updates the current literature in relation to the COVID-19 pandemic. In addition, the review of strategies adopted by various countries can guide governments in the design and development of containment, mitigation, and suppression policies and strategies for battling COVID-19.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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