

Coronavirus Pandemic

COVID-19 in the MENA Region: Facts and Findings

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Abstract

Introduction: Our study aims to assess the prevalence of COVID-19 in the Middle East and North Africa (MENA) region. It aims also to examine the various factors that have led to the unequal distribution of the confirmed cases among the different MENA countries.

Methodology: Data was retrieved from the World Health Organization situation reports issued between January 29 and June 5, 2020. It included the numbers of cumulative cases, new cases, and cumulative deaths reported by MENA countries. Similarly, we searched for relevant articles in PubMed and Medline.

Results: A total of 481,347 cases and 11,851 deaths occurred in the MENA region, accounting for 7.37% and 3.06% of the global cases and deaths respectively. Iran had the highest number of cases and deaths accounting for 34.1% and 68.1% of the MENA cases and deaths respectively. Together the Gulf Cooperation Council (GCC) countries accounted for 52.2% and 10.6% of MENA cases and deaths respectively. Egypt had the highest number of confirmed cases and deaths among the African countries of the region. Syria, Libya and Yemen (countries at war) had the lowest numbers of reported cases. The MENA region overall case fatality rate (CFR) was estimated at 2.46%. The highest CFR (22.75%) occurred in Yemen, and the lowest (0.07%) in Qatar.

Conclusions: The unequal distribution of wealth among the MENA countries, the lack of sociopolitical stability, and the high number of undetected and underreported cases in some of them have resulted in varied incidences of COVID-19 related morbidity and mortality.

Key words: MENA; coronavirus; COVID-19; incidence.

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Introduction

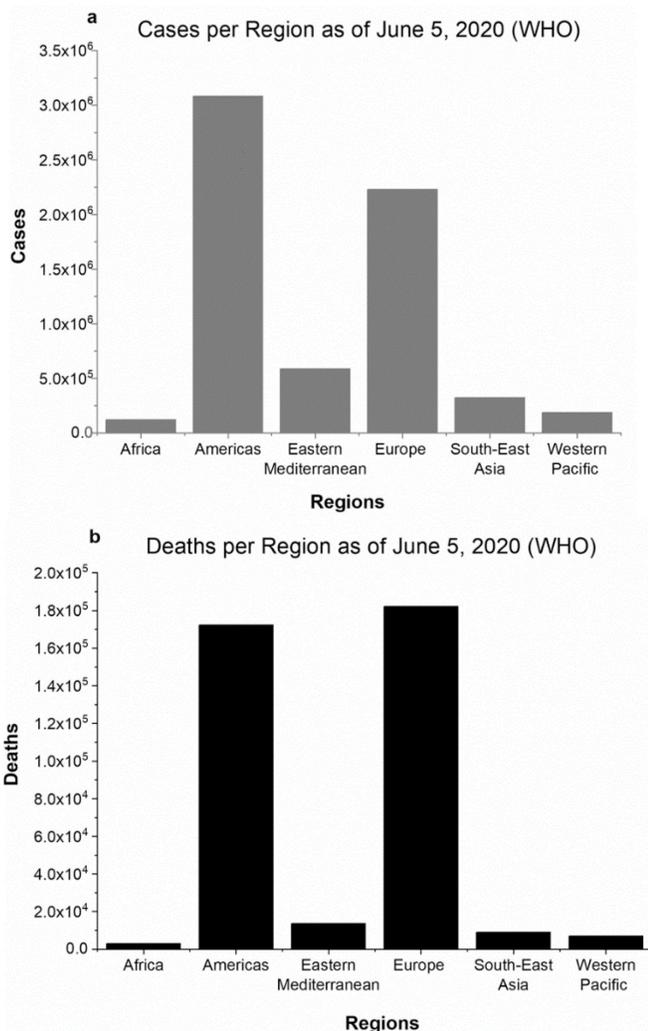
As of December 2019, Coronavirus Disease 2019 (COVID-19) has emerged as a source of grave morbidity and mortality affecting almost all the world continents. Early on, most cases were restricted to China, with Wuhan being the main locus of COVID-19 [1-5]. In Wuhan, the earliest cases were formerly diagnosed as atypical pneumonia that were later proven to be provoked by a novel coronavirus related to the coronaviruses of the Severe Acute Respiratory Syndrome (SARS) and the Middle East Respiratory Syndrome (MERS) outbreaks [3,4,6-8]. By the beginning of February 2020, the disease has evolved to involve around 25 countries including France, Germany, Japan, Thailand, the Republic of Korea, Australia, Canada and the United States of America [9]. Because of this, the World Health Organization (WHO) declared COVID-19 a global pandemic on 11 March 2020 [10]. Since then, cases and deaths have continued to occur in most countries. Until 5 June 2020, 6,535,354 cases and 387,155 deaths were declared globally in more than 210 areas and countries [11]. Around 47.2 %

of the cases occurred in the continents of north and south America (the Americas) [11]. Similarly, 44.5 % and 47.1 % of the COVID19 deaths happened in the Americas and Europe respectively (Figure 1) [11]. Just like all other countries, the Middle East and North Africa (MENA) region have been markedly impacted by the emerging disease of coronavirus 2019. As the name indicates and as per the World Atlas, the region comprises around 20 Middle Eastern and North African nations that include Djibouti and Malta in addition to countries extending straightly from Morocco (in North Africa) to Iran (in South Asia) [12]. To date, cases and deaths have been reported in all countries of the MENA region, with no single exemption. Nevertheless, none of the MENA countries had witnessed a reported case of COVID-19 before the 29th of January 2020 [13,14]. Similarly, in most of these countries, the initial cases were imported from East Asian and European countries formerly invaded by the unprecedented pandemic of COVID-19. Having said that, the first cases occurred in the United Arab Emirates (UAE). They corresponded to a Chinese family of four individuals returning from

Wuhan [13]. Afterward, by 5 June 2020, more than 480,000 cases and 11,000 deaths have occurred in the MENA countries [11]. Herein, in this article, we aspire to assess the prevalence of COVID-19 in the MENA region, and also to evaluate the distribution of the confirmed cases among the different MENA countries. Similarly, we aim to uncover the various factors that have led to this distribution by discussing the measures assumed in a few of these countries. In this context, we will examine four countries besides our country Lebanon. They include Egypt, Iran, Jordan, and Saudi Arabia. The rationale behind this selection has stemmed from a crowd of reasons. First, Egypt represents the country with the largest population in the region, and is likely considered one of the most crowded areas as well

[15]. Second, Iran stands second as per the number of citizens and inhabitants, and it continues to be the epicenter of the unprecedented pandemic in the Region [11,15]. Additionally, as compared to Lebanon, Jordan is a near country with comparable demographic and social dynamics. Both countries have been markedly affected by ongoing near conflicts and wars. In fact, as per the latest statistics released by the United Nations (UN) Refugee Agency (UNHCR) in 2018, Lebanon and Jordan have hosted the largest number of refugees per 1,000 population, respectively [16]. Thus, we aim to compare the evolution and the consequences of the pandemic in both countries. Finally, we will inspect the situation of COVID-19 in Saudi Arabia; the country with the largest surge of cases in the region second to Iran. Additionally, Saudi Arabia has the highest incidence of COVID-19 as compared to nearby countries of the Gulf Cooperation Council (GCC) [11].

Figure 1. Graphs showing cases (a) and deaths (b) reported by WHO, until June 5, in the various regions of the world that include Africa, Americas, Eastern Mediterranean, Europe, South-East Asia, and Western Pacific Region. Most cases occurred in the Americas, followed by Europe. In contrast, deaths were the highest in Europe, followed by the Americas.



Methodology

Data, revealing the number of cases and deaths reported by each of the MENA countries, was retrieved from the World Health Organization (WHO) website [17]. We examined situation reports released by WHO through the period extending from January 29 till June 5, 2020 [18]. We inspected data reported by the following MENA countries: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Palestine, and Yemen. Then, we extracted the following information: number of cumulative cases, number of new cases, and number of cumulative deaths. Supplementary data was recovered from the website of the corresponding ministries of health. Data was extracted mainly from the health ministries of Egypt, Iran, Jordan, Lebanon and Saudi Arabia [19-23]. We looked for the following additional information: number of total recovered cases, and number of local and imported cases. Also, we reexamined the previous data collected from the WHO website to provide a clearer picture, and also to avoid any discrepancy. Additionally, we searched the databases of PubMed and Medline for articles reporting the applied restrictive measures and their impact in each of the abovementioned countries. To note, not all the details were provided explicitly by all the five ministries. Thus, our analysis was confined to reachable data. The case fatality rate corresponds to the fraction of deaths reported until 5 June 2020 and is computed by dividing the cumulative number of reported deaths by the cumulative number of reported cases.

Figure 2. Map showing the distribution of the COVID-19 cases among the countries of the MENA region. The majority of cases occurred in Iran and Saudi Arabia. Yet, the least numbers of cases were reported by Jordan, Libya, Malta, Syria, Palestine and Yemen.

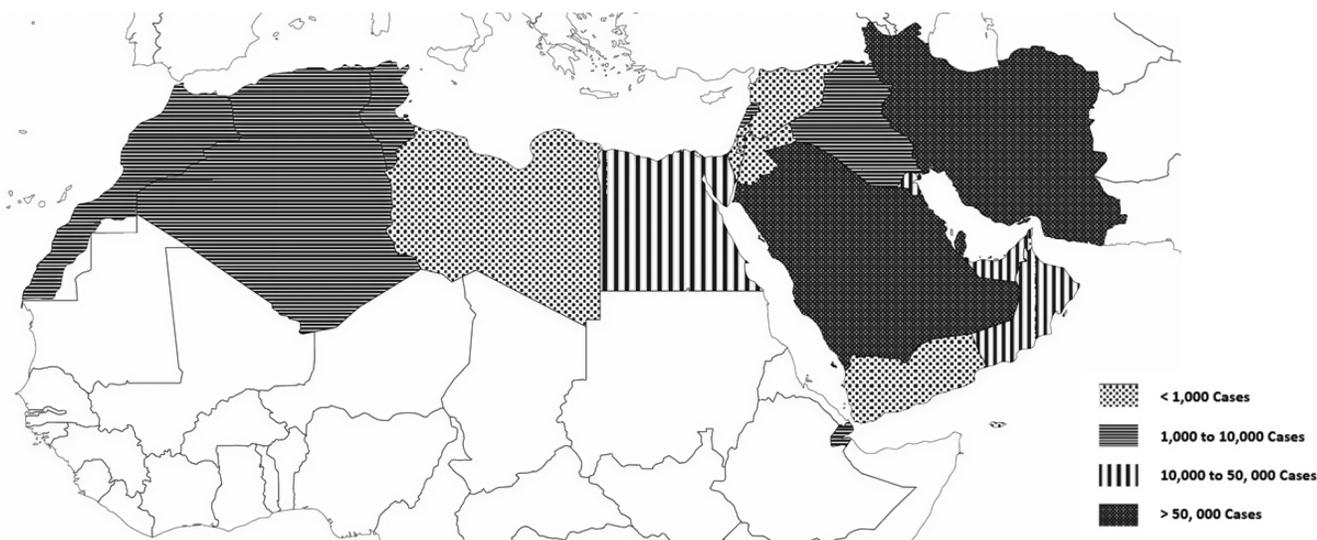


Table 1. Total cases and deaths confirmed in the countries of the MENA region as per the WHO situational report of June 5, 2020. Case fatality rates are computed through the division of the total number of deaths by the total number of cases. Total death and cases per 1 million population correspond to the total number of deaths and cases respectively, divided by the population in million.

Country	Total # of confirmed cases	Total # of deaths	CFR (%)	Population	Total cases per 1 million population	Total deaths per 1 million population	First case reported on
Algeria	9,831	681	6.93	43,829,744	224	16	Feb 25
Bahrain	13,229	21	0.16	1,700,135	7,781	12	Feb 24
Djibouti	4,054	26	0.64	987,610	4,105	26	Mar 18
Egypt	29,767	1,126	3.78	102,281,324	291	11	Feb 14
Iran	164,270	8,071	4.91	83,964,399	1,956	96	Feb 19
Iraq	8,840	271	3.07	40,196,333	220	7	Feb 24
Jordan	765	9	1.18	10,199,764	75	1	Mar 2
Kuwait	29,921	236	0.79	4,268,611	7,010	55	Feb 23
Lebanon	1,306	28	2.14	6,825,415	191	4	Feb 21
Libya	196	5	2.55	6,868,932	29	1	Mar 24
Malta	622	9	1.45	441,503	1,409	20	Mar 7
Morocco	8,003	208	2.60	36,898,570	217	6	Mar 2
Oman	14,316	67	0.47	5,102,846	2,805	13	Feb 24
Qatar	63,741	45	0.07	2,879,493	22,136	16	Feb 29
Saudi Arabia	93,157	611	0.66	34,798,361	2,677	18	Mar 2
Syria	124	6	4.84	17,490,098	7	0	Mar 22
Tunisia	1,087	49	4.51	11,815,369	92	4	Mar 2
United Arab Emirates	37,018	273	0.74	9,887,392	3,744	28	Jan 29
Palestine	643	5	0.78	5,098,184	126	1	Mar 4
Yemen	457	104	22.75	29,807,764	15	3	Apr 10
Total	481,347	11,851	2.46	455,341,847	1,057	26	

The number of total cases per 1 million population is calculated through the division of the total number of cases by the country population in millions. The population of each country is reported as per the United Nations latest statistics (UN World Population Prospects) [15].

Results

MENA region: An overview

Until 5 June 2020, a total of 481,347 cases and 11,851 deaths occurred in the MENA region, accounting for 7.4% and 3.1% of the global cases and deaths respectively (Table 1 and Figure 2). Given this, Iran and Libya declared the highest and the lowest numbers of cases and deaths, respectively. Nevertheless, the number of cases per 1 million population was the highest in Qatar with an overall incidence of 22,136 cases per 1 million population. Similarly, the lowest number of cases per 1 million population were reported in Syria as depicted in Table 1. Yet, despite the large size of its population and with 96 deaths per 1 million population, Iran had the highest number of deaths per 1 million population. In contrast, almost 0 deaths per 1 million population happened in Syria. Furthermore, the MENA region’s overall CFR was estimated to be around 2.46% and was shown to be significantly inferior to the global CFR estimated at 5.92%. Besides, the numbers of overall cases and deaths per 1 million population were computed at 1057 cases and 26 deaths, respectively. Finally, the reported CFRs ranged between 0.07% and 22.75%, with the lowest fatality rate being in Qatar and the highest CFR in Yemen; where out of 457 reported cases, 104 have died.

Egypt

As per the total number of reported cases and with 29,767 cases, Egypt came sixth after Iran, Saudi Arabia, Qatar, UAE and Kuwait, respectively. Moreover, it had the highest number of deaths in the MENA region second to Iran. Yet, owed to its huge population size, only 11 deaths have occurred per 1 million population. Similarly, given the reported numbers, Egypt was the first among the African countries (e.g. Algeria, Libya, Morocco, Tunisia, etc.) of the MENA region as per both the incidence and the mortality of COVID-19. Figure 3a and 3b displays the daily and cumulative cases reported until 5 June 5 2020. Additionally, Figure 4a depicts the total numbers and percentages of active (20,885, 70.2 %), deceased (1,126, 3.8%) and recovered (7,756, 26.1%) cases, respectively.

Jordan

Jordan had the lowest deaths per 1 million population second to Syria. Additionally, only 765 have occurred in Jordan since the first case was reported on the 2nd of March 2020. Out of these cases, 9 have died. Furthermore, the CFR was computed as around 1.18%.

Figure 3. Graphs showing the daily and the cumulative cases reported in each of Egypt, Jordan, Iran, Lebanon and Saudi Arabia until the 5th of June 2020.

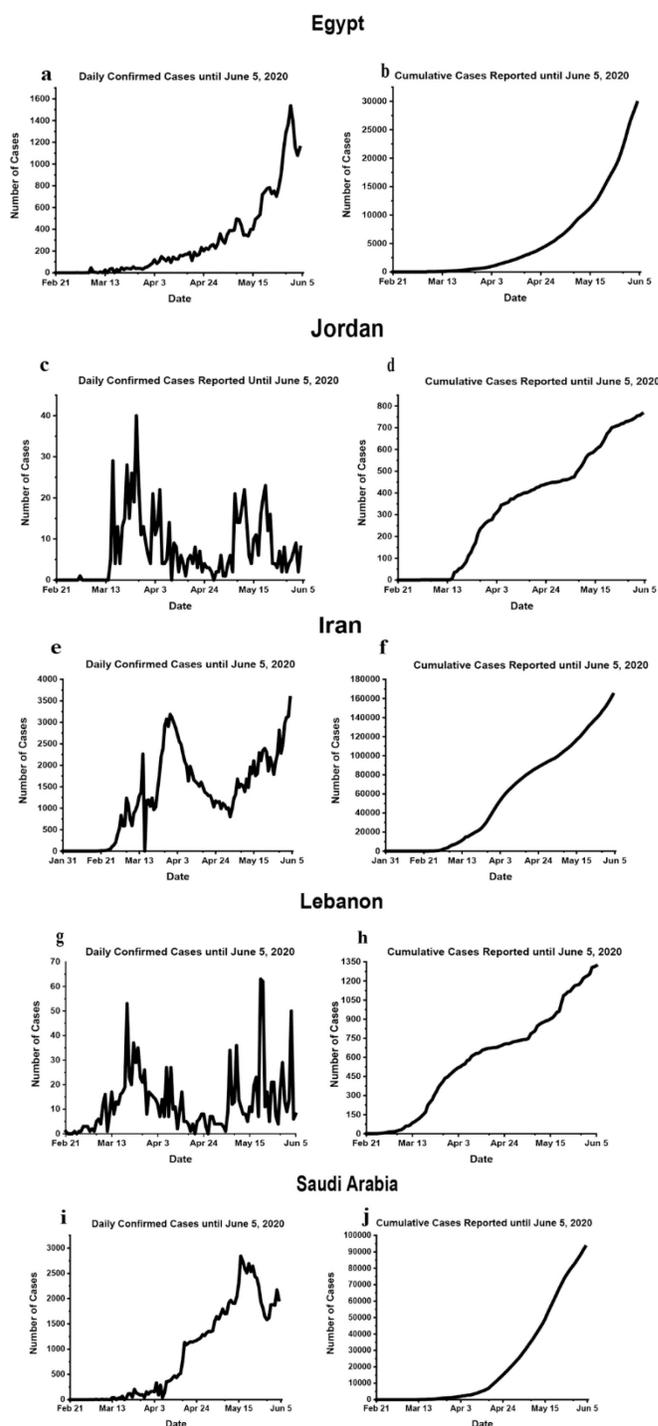


Figure 3c and 3d shows both the daily and the cumulative cases witnessed in Jordan, by the 5th of June. The highest number of daily cases, 40, was reported on the 26th of March. This was followed by a period of varying numbers of daily cases, and then by a month (from April 6 till May 6) of low incidence. Similarly, Figure 4b reveals the numbers and percentages of active (190, 24.8%), deceased (9, 1.2%), and recovered (566, 74%) cases.

Iran

Iran has encountered the largest number of reported cases and deaths in the MENA region, with 164,270 cases and 8,071 deaths, respectively. They accounted for 34.1% and 68.1% of the COVID-19 MENA cases and deaths, correspondingly. Additionally, Iran had the highest number of deaths per 1 million population, and also a marked number of cases per 1 million population despite of its large population size. Further, the estimated CFR was 4.91%; significantly higher than the CFRs estimated in the nearby countries of the Middle East. Figure 3e and 3f displays the daily and cumulative cases confirmed by the 5 June 2020. It illustrates the first upsurge of cases that was followed by a period of declining incidence (from April 1 till May 2). Later on, by the beginning of May, cases have increased significantly, and have reached maximal levels by June 5. Moreover, Figure 4c describes how the cumulative cases were distributed into active, deceased, and recovered cases. The vast majority, accounting for 77.6 % (127,485) of the cases, have recovered.

Lebanon

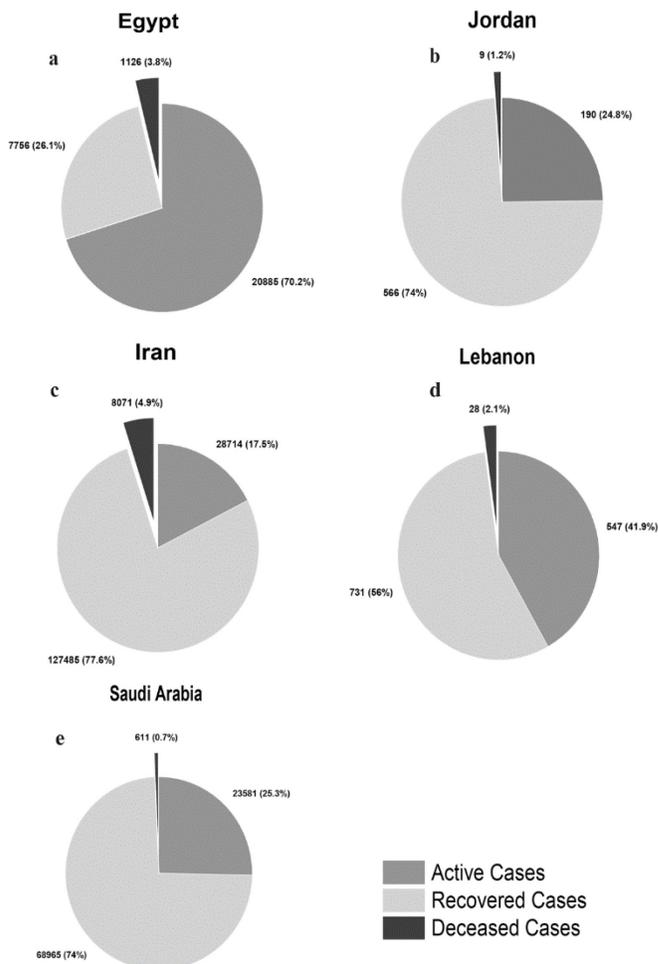
By June 5, 1306 cases and 28 deaths were reported by the Lebanese ministry of public health. Of these cases, 413 (31.6%) were defined as cases imported from abroad. Yet, the rest (893, 68.4%) accounted for locally transmitted cases. Besides, the COVID-19 CFR was estimated to be around 2.14%; fairly close to the MENA region overall CFR (2.46%). In addition, the respective numbers of cases and deaths per 1 million population were 191 cases and 4 deaths; significantly less than the overall numbers of the MENA regions (1057 cases and 26 deaths per 1 million population). Figure 3g and 3h shows the gradual progression of the daily and the cumulative cases reported since 21 February 2020 after the first case was confirmed. In view of this, as per the graph depicting the daily confirmed cases (Figure 3g), the maximal number of daily confirmed cases was the highest on 20 May 2020, with 63 cases reported. This peak was preceded by a milder peak 2 months earlier, on 20 March 2020. In contrast, cases have reached the

lowest values throughout the period extending from the mid of April till 5 May 2020. Finally, Figure 4d depicts the breakdown of the cumulative cases, reported until June 5, into active (547, 41.9%), deceased (28, 2.1%), and recovered (731, 56%) cases.

Saudi Arabia

Saudi Arabia had the second-highest incidence of COVID-19 in the MENA region, with a total of 93,157 cases. In short, it came second after Iran and stood for 19.35% of the total MENA cases. Nonetheless, only 611 deaths were reported over the period extending from the 2nd of March till the 5th of June. Similarly, Saudi Arabia had a CFR of 0.66%; representing one of the lowest CFRs encountered in the MENA region. Moreover, the computed number of cases per 1 million population was 2677, around 2.5 times higher than that of the MENA region. Yet, the computed number of deaths per 1 million population, 18 deaths, was inferior

Figure 4. Pie charts showing the distribution of the cumulative cases reported until the 5th of June into: active, deceased and recovered cases, in each of Egypt (a), Jordan (b), Iran (c), Lebanon (d), and Saudi Arabia (e).



to that of the MENA region. Figure 3i and 3j displays the respective daily and cumulative cases reported during the abovementioned period. As depicted, Saudi Arabia has faced a surge of increasing cases. In light of this, the reported cases were the highest on the 16 of May after which they started to decline modestly until the end of May. Subsequently, this was followed by a period of higher reported incidences. Finally, Figure 4e shows the total numbers of active, deceased and recovered cases reported until June 5. As shown, 74% of the reported cases have recovered by 5 June 2020. Yet, 25.3% of the cases were still in the active course of the disease.

Others

Countries of The Gulf Cooperation Council (GCC)

Equal to Saudi Arabia, the other countries of the Gulf Cooperation Council (Bahrain, Kuwait, Oman, Qatar, and UAE) have witnessed impressive numbers of COVID-19 cases. In this context, as per the data reported until June 5 and concerning the number of total cases, Qatar had most cases after Saudi Arabia. Yet, with 45 deaths, it had the lowest number of deceased cases. On the other hand, the lowest number of cases occurred in Bahrain, which came after UAE, Kuwait and Oman respectively. In summary, together with Saudi Arabia, Qatar, UAE, Kuwait, Oman and Bahrain have observed 251,382 cases and 1,253 deaths accounting for 52.2% and 10.6% of MENA cases and deaths respectively. Additionally, owing to their small populations' size, Qatar, Bahrain and Kuwait had the highest numbers of total cases per 1 million population when compared to the other countries of the MENA region. Equally, the numbers of total cases per 1 million population reported in Oman and UAE were 2,805 and 3744 per 1 million population respectively, around three times higher than the MENA region estimated number of total cases per 1 million population. Furthermore, all of these countries had comparable CFRs ranging from 0.07 to 0.79% with the highest being in Kuwait and the lowest in Qatar. To note, their estimated CFRs were the lowest in the region, and were markedly less than the MENA region overall CFR.

Libya, Syria and Yemen

With 124, 196 and 457 cases respectively, Syria, Libya and Yemen had the lowest numbers of reported cases. Syria and Libya had likely the least number of reported deaths. Yet, with 104 deaths, Yemen had the highest CFR in the region (22.75%). Besides, these three countries had likely the lowest numbers of total

cases and deaths per 1 million population when compared to the remaining countries of the region.

Discussion

The cumulative cases and deaths of COVID-19 were unevenly distributed among the countries of the MENA region. In total, 481,347 cases and 11,851 deaths occurred in MENA throughout the period extending from the 29th of January till the 5th of June 2020. They represented minute portions of the global reported cases and deaths, and accounted for 7.4% and 3.1% of the global numbers respectively. Similarly, the mentioned estimated percentages of MENA were markedly inferior to those of Europe and Americas which accounted for 47.2 % and 34.1 % of the global cases, and 44.5 % and 47.1 % of the global deaths respectively (Figure 1). Nevertheless, before this period, zero cases and deaths were encountered in the region.

Furthermore, together Iran and Saudi Arabi have accounted for around half the cases (53.5%). Similarly, 86.3% of the cases occurred in Iran and the six countries of the GCC, implying that most cases were concentrated in the area of the Persian Gulf that includes Iran, Iraq and the GCC countries. Subsequently, the localization of the pandemic to this area of MENA can be attributed to a set of reasons. First, as of the beginning of the pandemic propagation, Iran has been the country with most cases and deaths, and it has remained the epicenter of the pandemic in the MENA region. In brief, this was linked to the presence of many highly populated religious sites in the country, and also to the delayed (1) implantation of restrictive measures, (2) declaration of full lockdown, and (3) closure of religious sites [24]. The described delays were compelled by various economic and political reasons stemming from the country's desire to sustain good socioeconomic connections with China regardless of the pandemic situation [24]. Ultimately, the abrupt increase in the number of daily reported cases has weakened markedly the public health sector, and affected its response to the COVID-19 pandemic. This upsurge has also accounted for the devastating fatality rates that remained the highest in the region. Equal to Iran and owed to religious and economic causes, Saudi Arabia remains a destination for multinational people. As a result, Saudi Arabia was ranked second in the region concerning the number of reported cases. In short, the massive dissemination of the pandemic in this country was attributed primarily to the presence of many Islamic religious sites, and also to both the presence of and the crucial need for foreign workers in

various Saudi fields [25]. Congruently, the annual pilgrimage hosts millions of people yearly, and is considered one of the largest gatherings in the world. Similarly, the country represents a host for various cultural, educational and economical events. Yet, despite all of these unfavorable attributes, the government has applied strict preemptive measures in the country to contain the spread of the COVID-19 pandemic. They included (1) cancelation of various fairs and festivals, (2) initial restriction of travel from high-risk countries followed by suspension of international travel, (3) closure of academic institutions and religious sites, and (4) banning of social gatherings [25]. These measures have resulted in the low fatality rate depicted by a total of 611 deaths. Besides, the financial capacities of Saudi Arabi and the other countries of the GCC and their subsequent ability to perform extensive testing can explain partly the large number of cases reported by these countries. On the contrary, unlike the wealthy countries of GCC, various countries may have potential underreported incidences of COVID-19 owed to their inability to perform adequate testing and reporting, and also to the lack of security and adequate healthcare services. They included primarily Libya, Syria and Yemen; the countries with the least numbers of reported cases. Moreover, Egypt had a significant number of reported cases and deaths, accounting for 6.2% and 9.5% of the MENA cases and deaths respectively. Furthermore, it was the country with the largest prevalence of COVID-19 as compared to the African countries of the region. In part, the upsurge of cases can be attributed to the overcrowded and overpopulated Egyptian provinces, and also to the extensive use of public transportation. Additionally, the healthcare system has been markedly affected by the ongoing pandemic, and many healthcare providers were lost due to coronavirus 2019. Finally, Jordan and Lebanon have witnessed milder situations. They have observed lower incidences of COVID-19 related morbidity and mortality; this can be largely assigned to the preemptive preventive and protective measures imposed in both countries [26,27], and also to the lack of public means of transport in Lebanon.

Limitations and Considerations

To note, by the time this manuscript has been reviewed and published, the numbers of reported COVID-19 cases and deaths in the MENA countries have increased significantly. Hence, our study is limited by its relatively short duration that entails only the first half of 2020. Marked changes have occurred in the MENA region during the second half of the year. For

instance, in Lebanon, the healthcare system was weakened and affected by the terrific blast of Beirut. Unfortunately, in this country, the cases have increased from 1306 to more than 450,000. Similarly, the pandemic of COVID-19 has claimed higher prevalences in most of the aforementioned countries. Nonetheless, the overall distribution of cases and deaths among these countries and the above-noted demographic and financial considerations are still valid and applicable.

Conclusions

Owed to its natural resources of gas and oil, the Middle East and North Africa region have always been considered one of the wealthiest regions in the world. Yet, due to constant regional wars and tensions, some of its countries have continued to witness increased rates of poverty and sociopolitical instability. Consequently, the unequal distribution of wealth and stability has led to varied incidences of COVID-19 in the distinct countries of MENA, and also to varied fatality rates and applied restrictive measures. Besides, the imminent threat imposed by the unprecedented pandemic of COVID-19 requires extensive cooperation and collaboration between the countries of the region, in order to improve their medical systems' capacity and preparedness, and also to attenuate the fatal consequences of the ongoing pandemic.

Authors' Contributions

NKY and MA developed the study idea. NKY, MR, FB and MA contributed to the study design and interpretation of data. NKY extracted and analyzed the data. NKY wrote the first draft of the manuscript. Additional input was provided by MR and FB. All authors contributed to corrections and adjustment of subsequent iterations of the manuscript. All authors approve and agree with the content.

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