

Comparison of the Epidemiological Features of COVID-19 in Iraq and Selected Countries

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ABSTRACT

Background: The COVID-19 pandemic is a puzzling phenomenon and complete knowledge regarding its various aspects is yet to be available.

Objective: This research aims to present a comparative profile of the epidemiological features of the COVID-19 pandemic in Iraq and several other countries.

Methods: This paper used data on the daily cases of COVID-19 pandemic in Iraq and eight other countries—three from the Eastern Mediterranean region (Bahrain, Iran and Lebanon), four from Europe (Greece, Switzerland, Austria and Norway), along with Brazil. These countries were chosen based on the similarity in the date of onset of the pandemic. Relevant data were obtained from several websites, including Corona World meters, www.sehity and the Iraqi Ministry of Health for daily reports on new cases.

Results: Substantial variations were found in the time trend of COVID-19 cases (epidemic curves) and three epidemiological outcome measurements (incidence rate, case fatality ratio and cause-specific mortality rate) during the first five months of the pandemic in the nine countries studied in this paper. The four European countries—Greece, Switzerland, Austria and Norway—achieved a leveled curve and still maintain such leveling despite their differences in the three outcome measurements. The rest of the countries could not achieve any sustainable leveling in their epidemic curves and also had varying outcome measurements. Among these countries, Bahrain showed the highest incidence rate (15531.3/million) but the lowest case fatality ratio (0.4%). Brazil had the highest cause-specific mortality rate (274.7/million), and Greece had the highest case fatality ratio (12.2%). The other countries had values that were within these ranges.

Conclusions: The outcome of COVID-19 within the last five months of experience with the pandemic is very difficult to predict. Different countries have exhibited diverse infection-related behaviors and epidemiological parameters. A study of the multiple factors that might be behind such variations would be helpful in facilitating a successful exit from the pandemic.

Keywords: COVID-19. epidemiology. epidemic curve. incidence rate.

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INTRODUCTION

The COVID-19 pandemic, which was caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), started in Iraq on the 24th of February 2020 when a case was reported in the province of Najaf.¹ Since then, the number of daily reported cases has continued to gradually increase over time. Till June 7, the total number of COVID-19 cases was 12,366,² but the number has soared to almost four folds (47,151), as reported on the 29th of June 2020.³ The pandemic affected all the Iraqi provinces with variable magnitude in the number of cases and deaths.^{2,4} Quite early on, the health authorities and the National Task Force Committee had taken a variety of measures to contain the epidemic, such as halting air travel to and from affected countries, restricting population movement, promoting social distancing, closing all schools and universities and advising the public to practice personal protection by using face masks and maintaining personal hygiene. In addition, the healthcare system took relevant measures to respond to the crisis through the nominating hospitals to be converted into COVID-19 centers for case detection and contact tracing. Despite all these measures, the epidemic continued to fluctuate for at least 15 weeks before escalating substantially to account for more than 1000 new cases per day (the number exceeded 1000 on June 5, 2020). Several previous studies have indicated a moderate epidemic trend, swinging curve and variable incidence rates and fatalities across various provinces.^{2, 4, 5} Moreover, the medical management in hospitals was sustained with innovative contributions such as using convalescent plasma for treating critical and severe cases⁶ and manufacturing laboratory amenities.⁷ Generating and interpreting data on

the COVID-19 epidemic is useful for managing the current situation, envisaging a safe exit from the problem and conducting comparative studies with neighboring countries as well as other countries that have had experiences similar to Iraq at least at the onset of the pandemic. In this paper, we attempt to answer specific research questions: What is the pattern of the epidemic in Iraq? How comparable are the epidemic curve and the outcomes to the selected countries?

PATIENTS AND METHODS

This paper utilized data on the daily cases of COVID-19 patients in Iraq and eight other countries. Three of these countries were from the Eastern Mediterranean region (Bahrain, Lebanon and Iran), and the other five were Greece, Switzerland, Austria and Norway from Europe and Brazil from South America. All of them were selected on the basis that the pandemic had begun in these countries on very close dates. Relevant data was obtained from several websites, including Corona World meters,⁸ www.sehhty³ both depend on the Iraqi Ministry of Health's daily reports on new cases. A daily/weekly inventory was created in as early as the middle of February 2020 to compile the number of new cases in each of the nine countries selected for this study. This process continued prospectively until June 29, 2020, when it was decided that the collected data would be analyzed and this article would be prepared. Graphs were created using Excel. Data on the population of each country was obtained from world meters.⁹ The results were presented in the form of summary tables and epidemic curves using weekly cumulative cases to show the time trend in each country. In addition, three outcome measurements were presented—the incidence rate, the case fatality

ratio and the cause-specific mortality rate. The definitions of these outcome measurements are briefly presented as follows:

Incidence rate (IR): the number of reported cases per 1,000,000 people till June 29, 2020.

Case fatality ratio for closed cases (Closed CFR): the number of deaths among the COVID-19 cases reported till June 29, 2020, divided by the summation of the number of deaths and recoveries over the same period

Cause-specific mortality rate (CSMR): the number of deaths officially attributed to COVID-19 during the period from February 25, 2020 to June 29, 2020 per million individuals in each country.

RESULTS

Time trend of the epidemic curves

The time trend of the pandemic in the nine countries is presented in Table 1 and Fig. 1–4. The pattern seen in the cumulative epidemic curves is quite varied among the nine countries covered in this study.

In Iraq and Bahrain (Fig. 1), two characteristic features can be observed—modesty of incidence for almost 14 weeks and then escalation by the end of May and the beginning of June when the number of daily cases surged and the cumulative curve became sharper, particularly in Iraq. This escalation after almost 15 weeks of low-scale epidemic reflects, at least in part, the inadequacy of the control measures undertaken by the government as well as the increase in the scale of testing. The general pattern also increased in Lebanon but at a much lower scale (Fig. 2).

In Iran and Brazil (Fig. 3), the cases increased exponentially and the pattern did not level out

at all; however, in Iran, it exhibited some degree of deterioration during the last few weeks.

However, in the four European countries (Fig. 4), the picture was different: After the initial phase of escalation, the curves displayed a very early leveling of cumulative cases, reflecting that the control programs undertaken in Greece, Switzerland, Austria and Norway were successful. This leveling took place despite the magnitude of new cases in each country.

Epidemiological outcomes

Table 2 and Fig. 5–7 present the results of three epidemiological outcome measures (incidence rate, case fatality ratio for closed cases and cause-specific mortality rate) till June 30, 2020, 3:00 p.m. GMT. The highest incidence rate could be seen in Bahrain (15531.3/million), followed by Brazil (6447.6/million) and Switzerland (3664.4/million). The incidence rate in Iraq was relatively low (1226.5/million), while the lowest incidence rate was seen in Greece (325.2/million). The case-fatality ratio was also varied, with the highest instance in Greece (12.2%) and the lowest in Norway (3.0%). The cause-specific mortality rate followed a pattern similar to the incidence rate.

Table 1: The cumulative COVID-19 cases reported in Iraq and selected countries sharing the same pandemic onset date

Date	Iraq	Bahrain	Lebanon	Greece	Switzerland	Norway	Austria	Iran	Brazil
Feb-25	5	23	1	5	1	5	2	95	1
Mar-02	27	49	13	7	30	25	18	388	2
Mar-09	71	111	41	84	374	227	131	7160	25
Mar-16	133	235	109	352	2353	1348	1018	14900	234
Mar-23	266	383	267	624	8700	2600	4474	23000	1924
Mar-30	547	528	446	1156	14000	4200	9618	36000	4000
Apr-06	1031	765	541	1755	21657	5865	12297	60500	12183
Apr-13	1370	1387	632	2145	25688	6603	14041	73303	23430
Apr-20	1570	1914	677	2245	27944	7156	14795	83505	40743
Apr-27	1847	2759	710	2534	29164	7599	15274	91472	66501
May-04	2346	3563	740	2632	29981	7904	15621	98647	108266
May-11	2818	5279	859	2726	30344	8132	15882	109286	169143
May-18	3554	7245	931	2836	30597	8257	16269	122492	255368
May-25	4632	9187	1119	2882	30746	8364	16539	137723	376669
June -1	6868	12056	1233	2918	30871	8446	16733	154445	529405
June-8	13481	15734	1350	3049	30972	8561	16968	173832	710887
June-15	21315	19015	1464	3148	31131	8647	17135	189876	891556
June-22	32676	22407	1601	3287	31310	8751	17380	207525	1111349
June-29	47151	26239	1745	3390	31,652	8862	17723	225205	1352728
Country population	40039919	1,689,430	6,831,433	10423054	8654622	5421241	9006398	83777961	212559417
Pandemic onset date	24 th Feb	21 st Feb	21 st Feb	26 th Feb	25 th Feb	26 th Feb	25 th Feb	15 th Feb	25 th Feb

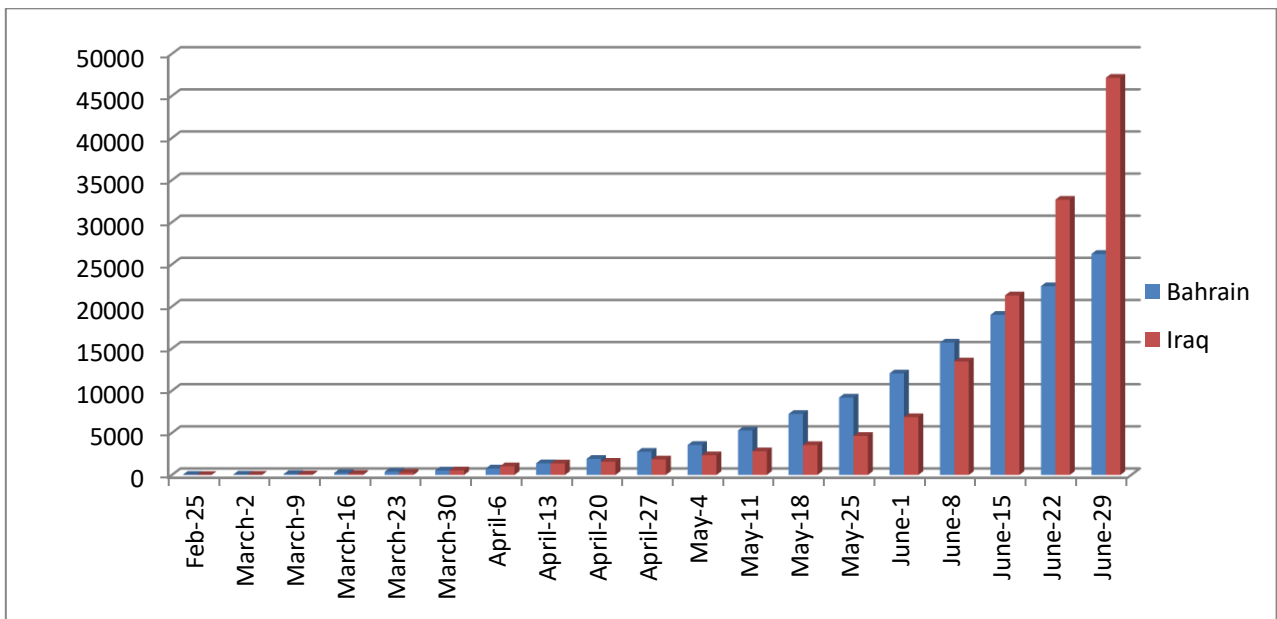


Figure 1: Cumulative epidemic curves of COVID-19 cases in Iraq and Bahrain over a period of weeks from February 25 to June 29, 2020

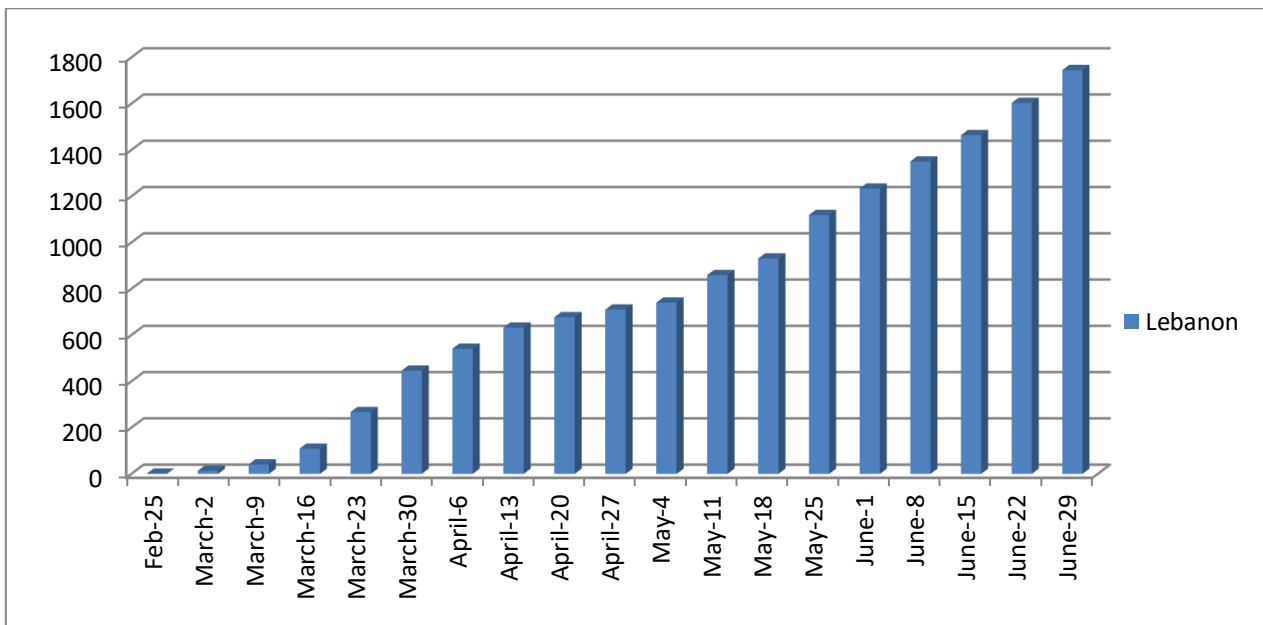


Figure 2: Cumulative epidemic curves of COVID-19 cases in Lebanon based on weekly data from February 25 to June 29, 2020

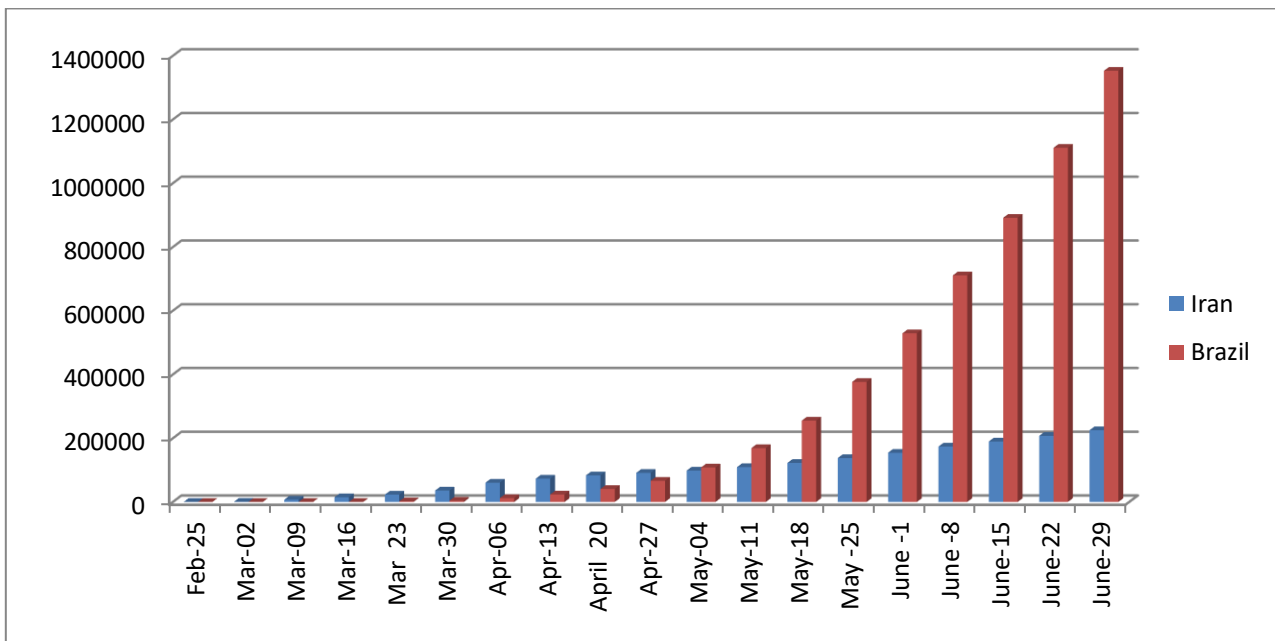


Figure 3: Cumulative epidemic curves of COVID-19 cases in Iran and Brazil based on weekly data from February 25 to June 29, 2020

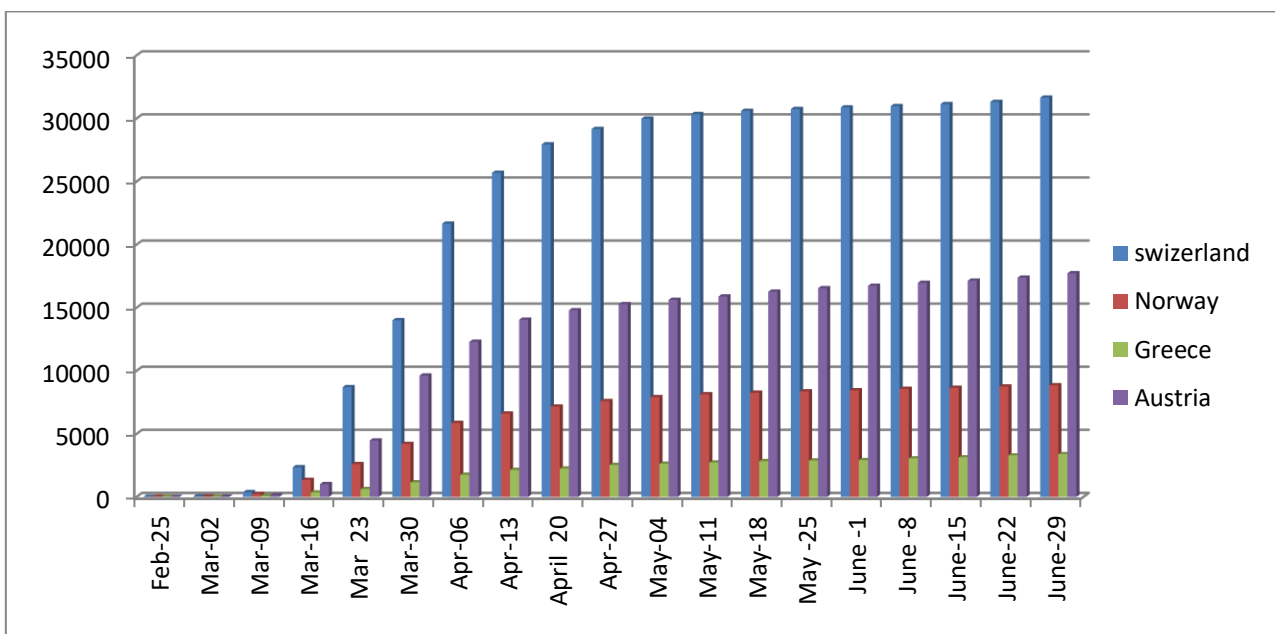


Figure 4: Cumulative epidemic curves of COVID-19 cases in Greece, Switzerland, Austria and Norway based on weekly data from February 25 to June 29, 2020

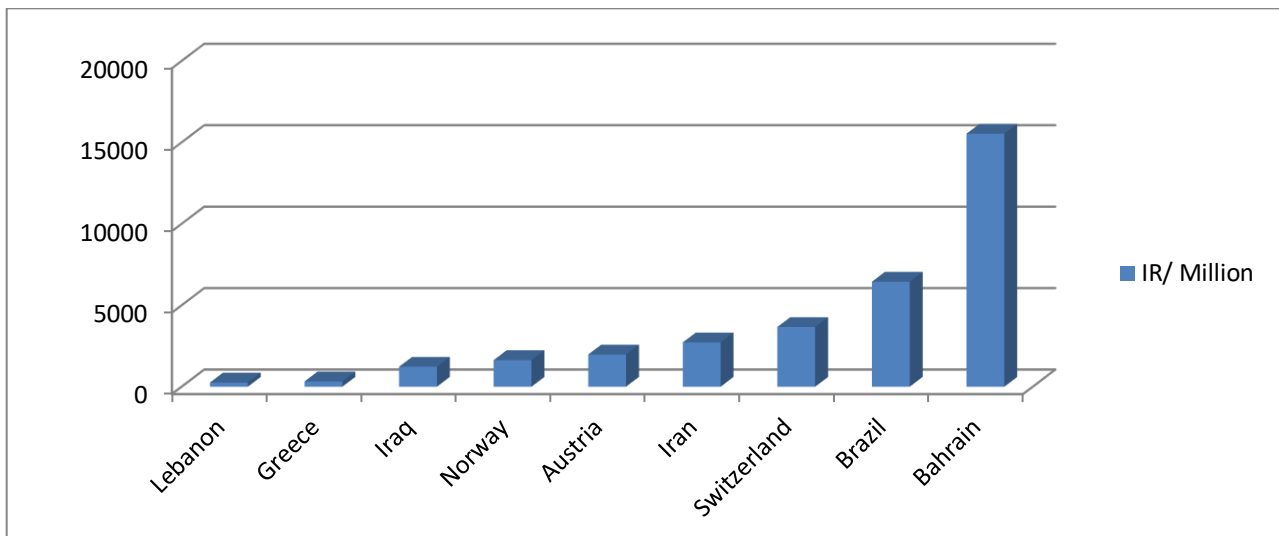


Figure 5: Incidence rates of COVID 19 infection per million people in Iraq and eight countries with the same time of pandemic onset as of June 29, 2020

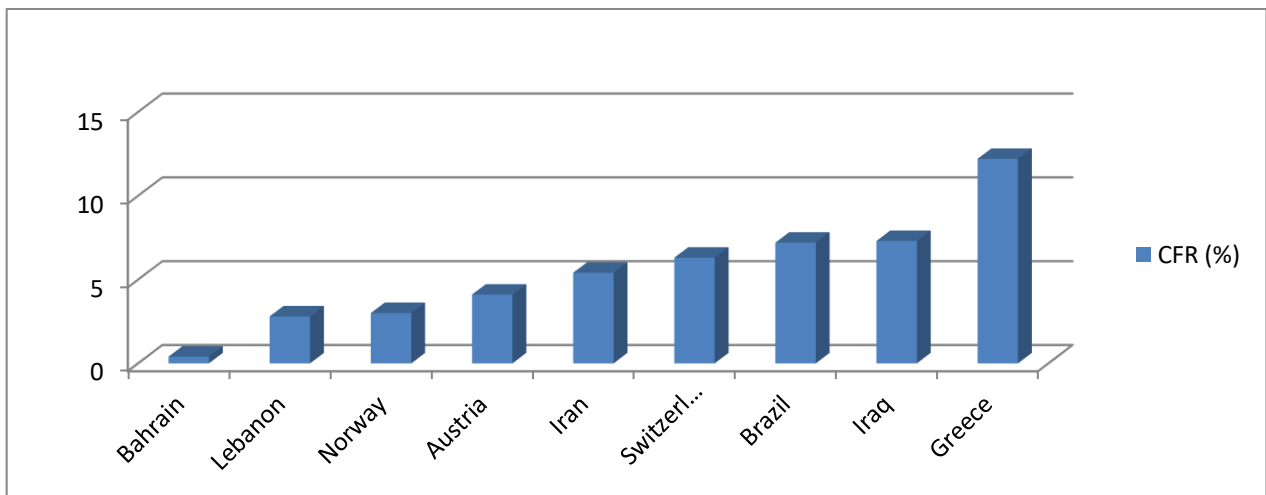


Figure 6: Case fatality ratios (%) of COVID 19 closed cases in Iraq and eight countries with the same time of pandemic onset as of June 29, 2020.

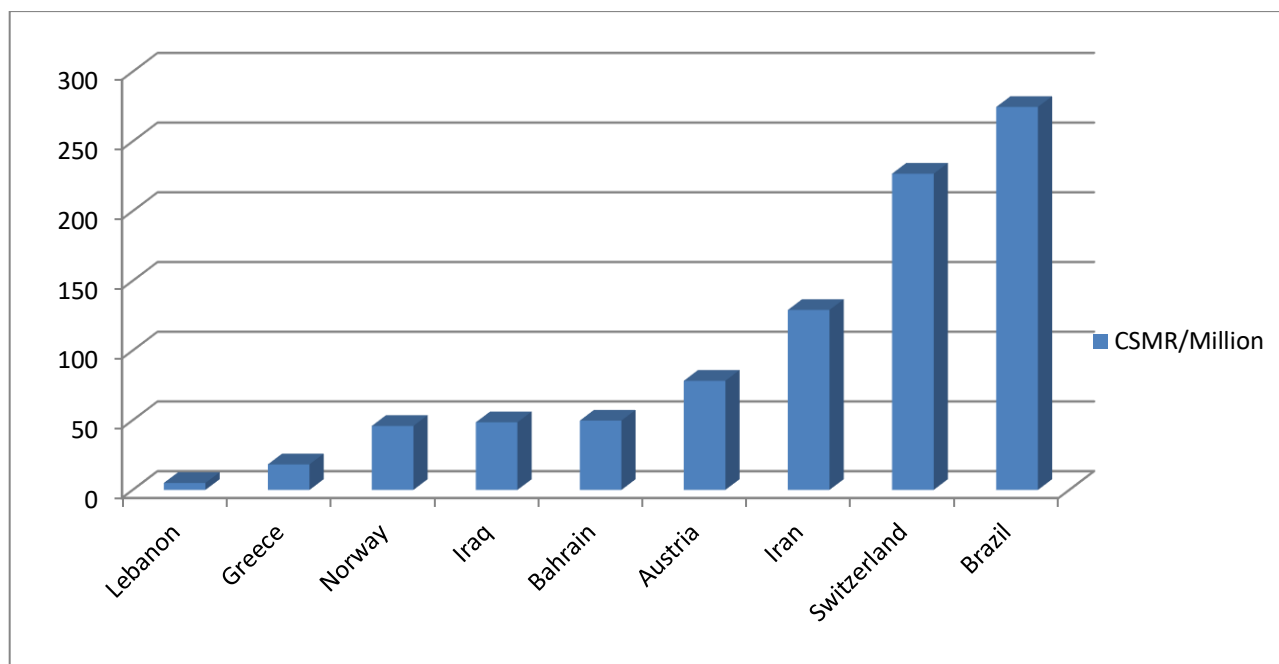


Figure 7: Cause-specific mortality rate of COVID-19 patients per million people in Iraq and eight countries with the same time of pandemic onset as of June 29, 2020

Table 2: Incidence rate, case fatality ratio for closed cases and cause-specific mortality rate as of June 30, 2020, at 3:00 p.m. GMT for the nine countries studied.

Country	IR/Million	CFR(%) for closed cases	CSMR/Million
Iraq	1226.5	7.3	48.5

Lebanon	255.1	2.8	5.0
Bahrain	15531.3	0.4	49.7
Iran	2717.4	5.4	129.1
Brazil	6447.6	7.2	274.7
Greece	325.2	12.2	18.3
Switzerland	3664.4	6.3	226.8
Norway	1635.4	3.0	45.9
Austria	1972.6	4.1	78.3

DISCUSSION

The COVID-19 pandemic has exhibited a highly peculiar behavior across the nations in the world. The extent of new cases and deaths varies from moderate to very high. Government response and public behavior are perhaps the most decisive factors in shaping the pattern of the pandemic in each country. The variations in the epidemiological parameters are also evident within many countries across provinces and cities. Iraq is one example of this. In this paper, we presented data related to the epidemic in Iraq along with comparative results for the selected countries where the onset of the pandemic was almost simultaneous with that of Iraq. The choice of countries for this study was made quite early in the pandemic. The nominated countries have been listed in the "Patients and Methods" section above.

The time trend of the outbreak on the epidemic curve in Iraq was found to have been moderate for about 15 weeks, but it entered the exponential phase by the beginning of June 2020. The initial fluctuation phase reflects the tightening and easing of the measures implemented to contain the epidemic, such as public mobility and social distancing. However, these measures were insufficient to suppress the magnitude of transmission.^{10, 11} Moreover, there seemed to be a changing pattern from cluster transmission to community transmission. The latter led to the flare-up of new cases at the beginning of June, as previously mentioned. This changing pattern is not unique to Iraq and can also be found in other countries.¹²⁻¹⁴

The general pattern of the epidemic time trend in Iraq is similar to that of Lebanon, Bahrain,

Iran and Brazil, but the scale of new cases is quite different among these countries with the lowest being in Lebanon and the highest in Brazil. The difference in the scale of daily new cases is also reflected in the parameters of overall incidence and cause-specific mortality (Table 2). The case-fatality ratio was relatively high in Iraq, Greece and Iran, which was probably due to the constraints in their healthcare systems and the proportion of severe and critical cases.¹⁵

An examination of the pattern of epidemic curves in the four European countries would present a different picture. It appears that the selected European countries were more successful in containing the pandemic at an earlier stage. The cumulative curves entered a leveling phase and have been maintained as of June 29, 2020. Their success can be attributed to the relatively strict measures undertaken by these countries. Even while easing the restrictions, they were extremely cautious so as to avoid a flare-up in incident cases. For example, Austria responded quickly and decisively to its coronavirus outbreak and when the situation began to get under control, the country started to open up again. Austria has become one of the first European countries to loosen its coronavirus control measures without any evident increase in new cases.¹⁶⁻¹⁸ Furthermore, the consistent level of the epidemic curve might reflect a high level of public awareness of the protective behaviors required for reducing the transmission of the virus. However, the risk of further escalation in all the studied countries cannot be disregarded.

Easing of the restrictive measures is necessary, but it must be based on reliable indicators of the state of infection at the population level and supported by sufficient capacity to deal with increasing cases after reopening through the provision of advanced medical care to severe cases at hospitals and primary healthcare centers.¹⁹ It is worth mentioning here some limitations of this study. Information pertaining to the analysis of the pandemic situation specific countries is easily accessible. Further, an extensive analysis of COVID-19 requires international collaboration teams for sound studies.

CONCLUSIONS

Living with COVID-19 appears to be inevitable in the foreseeable future. Thus, the enforcement of lockdowns, restrictions and personal protective measures should be followed by a reduction in incident cases.

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