Coronavirus Pandemic

The Impact of COVID-19 on Iraqi Community: a descriptive study based on data reported from the Ministry of Health in Iraq

Mohammed Hadi Ali Al-Jumaili[1]

[1] Department of Medical Laboratory Techniques, Dijlah University College, AlDoura, Baghdad, Iraq

Abstract

Introduction: Coronavirus is a new pandemic disease that has emerged in Wuhan, China, and then spreads around the world. The cases number of the COVID-19, which have been daily reported in Iraq, has risen slowly. However, no confirmed study has been undertaken to evaluate the situation of the COVID-19 in concerning the confirmed cases, death cases, and recovered.

Methodology: The current study is undertaken to describe and assess the COVID-19 of the present situation in Iraq out of the range of the confirmed, deaths and recovered cases from the date 21 February to 30 April 2020 in Iraq.

Results: The study findings have revealed that there is a gradual increase of COVID-19 cases onwards until the top peak in 7th Apr. in which the cases reach 684, then decrease regularly. The total infected people of the study scope is 2085 persons according to the Ministry of Health in Iraq, while the World Health Organization (WHO) states 2003 person. The spatial distribution quantile map showed the hot spots in the province of Babylon, Maysan, and Diyala. However, less was found in three provinces (Nineveh, Salahaddin, and Al Anbar). The result shows that 39% recovered and 3% death cases out of total infected people.

Conclusions: COVID-19 in Iraq comes to be limited via the procedures of Iraqi government. However, the infected people will be increased gradually and many international reports that predict the end of this pandemic in the world will be doubtful as there are many vaccines developed and under development which led to reduce to effect of this pandemic.

Key words: Iraq; COVID-19; pandemic; confirmed cases; health system response; spatial analysis.

Introduction

Since five decades, the emergence of many coronaviruses that cause a wide variety of human and animal diseases has been existed. These viruses are made of genetic material inside a protein coating which are very tiny germs that cause familiar infectious diseases such as common cold, flu, and warts or causes severe illnesses such as Ebola, Spanish influenza and COVID-19 [1]. The virus that causes COVID-19 is not the most deadly pandemic as compared to other viruses. Ebola kills upwards of 50% of people it infects, while the Spanish influenza pandemic killed about thirty percent of the world's population which occurred in 1918–19 [2]. The coronaviruses cause severe acute respiratory syndrome and Middle East respiratory syndrome, which may result in death in some cases. Coronavirus disease (COVID-19) is an infectious disease newly discovered that has spread throughout the world [3]. According to the World Health Organization, coronaviruses can infect birds and mammals, including humans, and make up a large family of viruses [4].

Those coronaviruses such as (SARS-CoV-2) and (MERS) were outbreak in China, December 2019 and South Korea in 2015. The severe acute respiratory (SARS) pandemic, which were responsible for the numerous outbreaks around the world in 2002-2003 [5].

Some coronaviruses cause devastating epidemics, others cause mild to moderate respiratory infections, like the common cold, which has an incubation period of five to six days [6].

Most people don't require special treatment when infected with COVID-19. However, the people with underlying medical problems develop serious illness such as diabetes, chronic respiratory disease, and cardiovascular disease [7].

Iraq has faced the spread of the COVID-19 virus with an exhausted health system and unstable situation for years, such as the social crises that resulted in the protests in the beginning of 2020 [8]. The whole world covered by the pandemic, which led to the suspension of the lockdown waiting for the vaccine, while WHO continued to provide updated information for clinical trials evaluating potential treatments. Besides, many

vaccines were developed and has focused on efficacy at preventing disease such as (Moderna 94%, Sputnik V 92%, Pfizer–BioNTech 91%, Novavax 89%, and AstraZeneca 75%) [9]. These vaccines are better at protecting against severe disease, which led to prevent the virus from getting to the point of severe disease easier than preventing all symptoms. However, the AstraZeneca vaccine looks to have lower efficacy than the Pfizer vaccine at preventing mild to moderate disease, but has proven very useful in preventing severe disease [10].

Iraq's health system has faced many challenges, including the world's biggest mass displacement in 2014–2016 and internal conflict few years ago, all of these affected on the health system. The Government of Iraq faced the battle against the COVID-19 spreading with a few actual measures including boycott for the gathering places, lockdown, school closure, social distance, and implement mass quarantine to decrease the morbidity rate of COVID-19 [11]. Ministry of Health in Iraq take action especially for the COVID-19 patients, giving vital free clinical materials and setting up team committee for the COVID–19 to check the people who have been infected with the virus and mandatory quarantine them then start carrying out human trial for coronavirus vaccine. Iraq's authority late lockdown all the states, closure of borders and air terminals after coronavirus cases rise gradually as a feature of the measures to forestall the pandemic COVID-19 [12].

Universities, schools, and cinemas in Baghdad were closed on 27 February, and the major religious gatherings during prayer were banned. However, the Kurdish Regional Government were taken partial lockdown on religious gatherings on the 13th of March and severely applied on the 4th of April, after discovered the third of all cases in the Erbil city comes from 2 funeral gatherings on the 21 and 23 March [13]. This study aims to assess the impacts of COVID-19 lockdown conditions on Iraqi community and evaluate the situation of the confirmed, recovered and death cases in the period of 69 days when the virus hit Iraq in 21 February 2020. The study was described by the spatial distribution quantile map was applied to determine the infected zone on Iraq map. However, Iraq government faced many problems except coronavirus, which is not the main problem of Iraq.

Symptoms of COVID-19

Symptoms of COVID-19 can include fever, cough and shortness of breath. In more severe cases, infection can cause pneumonia or breathing difficulties [14].

These symptoms can develop into pneumonia, with chest tightness, chest pain, and shortness of breath followed by a dry cough**,** which requiring a hospital treatment and more rarely, the disease can be fatal [15].

The COVID-19 infection rarely seems to cause a runny nose (2.1%), and tonsil enlargement (1.3%), headache (10.7%), sore throat (11.3%), and nasal congestion (4.1%) [16]. The signs of a cold are stuffy nose, sore throat, and sneezing**.** Symptoms of COVID-19 can vary from person to person. Symptoms may also vary in different age groups of people or pregnant and non- pregnant women. Also, people with existing chronic conditions seem to be more vulnerable to severe illness [17].

COVID-19 transmission

The virus can pass between individuals through touching or shaking hands with a person who infected. Therefore, most of the people during their lifetime may infect with coronavirus. The virus could infect the people through touching their nose, or mouth after sharing the lifetime with the infected person. The virus also may spread through some animal coronaviruses, such as feline coronavirus (FCoV). However, the highest risk of developing infection of COVID-19 in several groups of people include: People aged 65 years or older, women who are pregnant, young children [18].

COVID-19 spread

There are important steps which help to reduce the spread of COVID-19 and protect yourself and those who are most at risk. Two things required to reduce disease spread: a) Masks is the most effective way in public to prevent spreading of the virus, the ability of surgical masks helped to reduce the amount of flu virus shed through coughing or sneezing when worn by infected people [19]. However, public mask wearing is most effective at stopping spread of the virus when compliance is high. The scientist found that surgical masks reduce coronavirus infection but not first line of defense. b) Limit contacts of infected individuals led to slowing down the rate and number of new coronavirus infections, which is critical to reduce the risk that large numbers of critically ill patients cannot receive life-saving care. The following actions help prevent the spread of COVID-19, as well as other coronaviruses such as, good hygiene, social distancing, and public gatherings.

Vaccine against COVID-19

Many **s**cientists around the world are working on potential treatments and vaccines for the coronavirus to

determine its safety and efficacy before it use widely. The development of vaccines starts just after the definition of the SARS-CoV-2 genome. Based on a living microbe that has been weakened, so it can not cause disease, the vaccination begins [20]. Therefore, it was crucial to prevent infection by implement mass quarantine with never before-seen measure [21]. Many vaccines for SARS-CoV-2 are under development and small number of them have succeeded and approved under emergency authorization such as (Pfizer 95%, Moderna 94%, Sputnik V 92%, Sinopharm 86%, AstraZeneca 70%, Sinovac). However, a majority of the vaccines that approved or under development are targeting the healthy population. Therefore, there is a necessity to produced different types of vaccines for differing populations such as pregnant women, immunocompromised individuals, infants and children [22].

Impact of COVID-19 on diabetes and blood pressure patients

COVID-19 is spreading rapidly around the world and must consider the impact on the patients with diabetes and blood pressure. Diabetes and blood pressure are common and facing a higher risk among other patients who die from COVID-19 because of alterations in the immune response. The older age and a more complex set of comorbidities such as diabetes and blood pressure compared with young patients effected by COVID-19 severity and death [23]. Diabetes causes an increase in risk of thromboembolic events as it is tied to a prothrombotic state, which led to increases in coagulation activity by COVID-19 infection [24]. That will lead to cause intravesical coagulation during an infection. Among COVID-19 patients, hypertension was the most common comorbidity, which is accompanied by higher risk of infection, worse outcomes and prognosis [25]. Hypertension and diabetes patients have significantly more pronounced endothelial damage, which is essential in pathogenesis of complications related to COVID-19. However, COVID-19 could also induce new onset of diabetes with metabolic complications and necessity for insulin therapy [26]. Therefore, life-threatening findings were more common in patients with hypertension and diabetes. There are insufficient data to show if those patients with diabetes or hypertension are more likely to become infected with COVID-19. Patients with diabetes have worse outcomes such as higher rates of serious complications in compared with non diabetes according to the American Diabetes Association. The cytokine storm is more likely to occur in patients with diabetes because these patients at baseline carry a risk for low-grade chronic inflammation [27].

Pandemic life cycle Iraq

COVID-19 is not only a health and pharmaceutical problem. It is becoming an economic, political and civilization challenge that affects everybody, everywhere and for some time. It is important to understand the problem to advise the best possible decisions at personal, local, national and international level. Two main battles in COVID-19 conflict, foremost the health battle to control the epidemic dissemination at the national, regional and local level, to delay and lower the peak of infection looking at the evolving capacity of the health systems and the time to find treatments and vaccines. Then, the economic battle to recreate the economy not only to recover from the crises, but also to use the opportunity to create sustainable places and sites and over the world. The world today naturally want to know when the COVID-19 pandemic will end. Estimating the quite dates has been unknown for the majority as it is important for the world health and economics. It is possible but not sure to predict the end date of COVID-19 based on the historical pandemic and also continually update the predictions as its evolves and generates more data which can make planning, proactive actions, decisions and mentality practice. Today the most reporting focuses on the actual cases of infection, recovery and death, which mainly lead to take action such as lockdown the city with many infections [28].

Iraq Economy Via COVID-19

While Iraq's economy is gradually recovering, after the contraction in 2019 due to the war against ISIS. The healthiest of oil production, coupled with ongoing reconstruction efforts, rising domestic demand and improved security conditions led to a GDP growth of 4.4%. The COVID-19 pandemic was hitting Iraq. The outbreaks of the COVID-19 in Iraq destroyed the economic, GDP growth fall to -9.7% in 2020 in compare with 4.4% in 2019, according to the updated IMF forecasts on 14 April 2020, and expected to pick up 1.9 in 2021 [29].

The government admits at least 22.5% are below the poverty line. Meanwhile, there is no government plan to support the people laid off due to the pandemic. However, government employees can depend on their steady salary while day laborers have been particularly hit hard as they rely on what they make day to day and often have no cushion of savings.

The combined effect of a lagging government response, woefully inadequate health care infrastructure, and developing financial crisis will lead to the huge risk from an outbreak that could kill many thousands in the coming weeks.

Iraq's crude oil export prices crashed to 28.4 USD per barrel in March 2020, with companies announcing cutbacks in Iraq and the Kurdistan Region due to financial uncertainty [30].

The World Bank state, Iraq will face extreme difficulties in financing basic expenditures planned at this price for 2020. Therefore, Baghdad must think and plan to grow its non-oil economy at a much faster pace. However, alternative sources of revenue are not faring much better.

Methodology
Data
The study undertook a descriptive analysis of the impact of COVID-19 in Iraq using data reported from the Ministry of Health in Iraq and the World Health Organization from the date 21 February to 30 April 2020 of the confirmed, deaths and recovered cases in Iraq. The prevalence of COVID-19 cases, fatalities attributed to COVID-19, and the case fatality rate for each of the 18 Iraqi governorates were accessed from the Ministry of Health in Iraq and compared with the World Health Organization, and we additionally calculated COVID-19 incidence based on the infected, recovered and death cases per a day according to their population and governorate. The country specific point prevalence and incidence of COVID-19 on case fatality associated deaths were tested to display their spatial distribution with geographic heat maps by the Global Moran's I along with Local indicator of Spatial Auto correlation (LISA).

Results and Discussion
Early mobilization campaigns to distribute WHO COVID-19 educational materials have succeeded in raising public awareness and grasped the danger to protect general individual health. Chinese authorities identified a deadly new coronavirus strain, SARS-CoV-2 since (January 7, 2020); WHO declared a pandemic on (March 11, 2020). During this, Iraq government authority lockdown on (February 27, 2020).

Coronavirus COVID-19 hit the majority of the world, Iraq is one of those countries that has also been infected. As most of the infected countries, Iraq has reported its first confirmed case of SARS-CoV-2, infections on 22 Feb, 2020, and the infected was from Najaf. And then, more cases have been confirmed in all 18 Iraqi governorates, with the Kurdistan region, that reach 451 cases on 27 March. The total number of cases in Iraq till the date of Apr. 30, is 2085 confirmed cases. The rates of infection indicate a fast growth cases number were observed in the city of Baghdad 567 cases, Basra with 431 cases followed by Najaf with 303 cases due to the international airports and partial mass quarantine while a much lower infection rate cases number were in Salahaddin 4 cases and Al-Anbar 2 cases due to the closure of the essential, non-essential sectors and mandatory quarantine. The details of the cases are registered in various cities are plotted in Figure 1 and the result is analyzed using descriptive statistics to present data obtained that are confirmed by the Ministry of Health in Iraq and the World Health Organization as well.
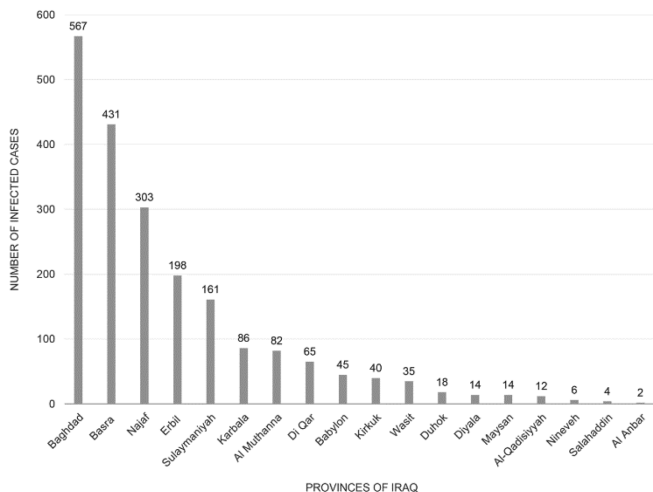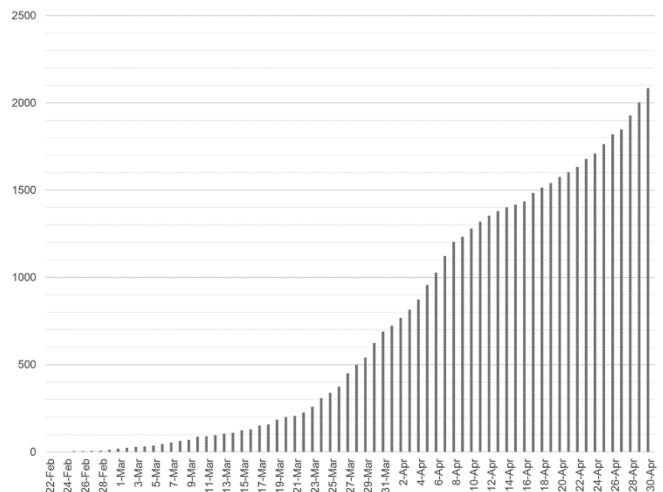
Figure 1. Number of COVID-19 cases in Iraq.

**Figure 2.** Daily report of COVID-19 cases in Iraq.

Apart from the total number of infected persons which reach to 2085 on 30 April, tens of thousands of people in Iraq are quarantined at home or in hospitals and the government established quarantine centers. Some reports state, there may be a number of people already infected, but could not be recorded yet because of the slow pace of testing in the country. Until now (30th April 2020) only 92061 coronavirus tests were conducted according to the Ministry of Health in Iraq which is counted among the lowest in the world. In addition to that, 1375 patients have been recovered from the COVID-19, and 96 patients died which represents 3% of the registered cases. This recover cases represent 39% of the registered cases, while the remaining are under the treatment (Figure 3).

The total morbidity rate is lower in Iraq as compared with the western countries, as the rate of mortality in the registered cases is quite high. According to a part of a study under investigation, which explains the resistance of the Arab bodies to coronavirus, unlike Western countries, in which it states the Arabs of the Middle East possess genetics SNPS in their bodies which easily fight the virus [31].

The number of cases that are registered during the months of February, March, and April are shown in Figure 2 and Table 1. As seen from this figure, the number of COVID-19 cases increased slightly started from 22 Feb with a case, then reach to 684 cases on April 7. 2020 which is the highest peak registered in Iraq. After the April 7, the infected people were slightly decreased, but it still high compared to March due to the decrease in preventive security measures and partial lockdown.

Figure 3. Total number of COVID-19 cases.
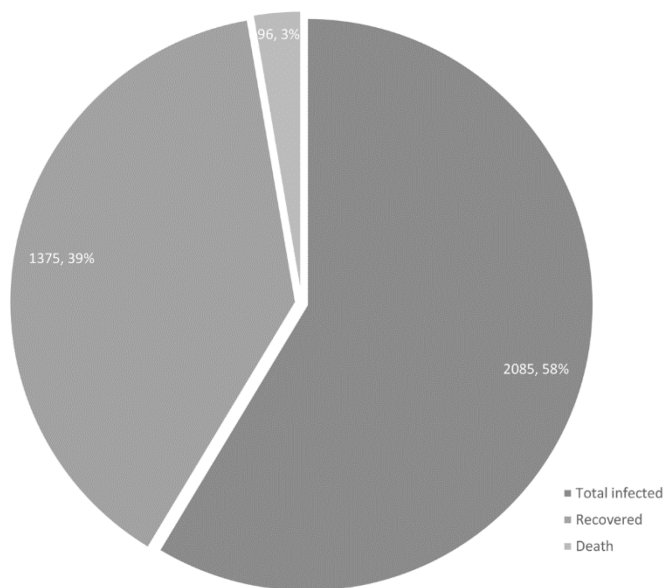
The infection keeps increasing in Iraq, but it is less than a western country and other Arab countries which is due to easing the lockdown and reopening the essential sectors. According to some reports, the COVID-19 spread in Iraq through Iran and neighboring countries but Iran has the biggest concentration of the disease and the highest concentration of deaths per resident. Therefore, the Iraq government had decided to close its borders with Iran in late February which is too late, only allowing Iraqi citizens that were returning after the pandemic has been spread where some of them were infected with the coronavirus. Until, WHO declared the disease as pandemic on 11th March.

Table 1. COVID–19 outbreak according to Ministry of Health and world health organization in Iraq.

Region	Total Cases	Recovered	Death	Population / 2017
Baghdad	567	332	40	8,318,696
Najaf	303	271	6	1,500,522
Basra	431	187	17	2,972,162
Erbil	198	162	1	1,896,753
Sulaymaniyah	161	141	4	2,212,099
Karbala	86	80	6	1,241,273
Dhi Qar	65	50	3	2,132,149
Al-Muthanna	82	33	3	824,831
Wasit	35	28	2	1,401,442
Kirkuk	40	26	2	1,629,625
Diyala	14	15	4	1,660,007
Babylon	45	9	5	2,093,416
Duhok	18	15	0	1,318,458
Al-Qadisiyyah	12	10	1	1,311,699
Maysan	14	7	2	1,134,968
Nineveh	6	6	0	3,793,982
Salahaddin	4	1	0	1,615,924
Al-Anbar	2	2	0	1,796,557
Total Number of confirmed cases	2,085	1,375	96	38,854,563

Iraq banned travels from Germany and Qatar on March.13, while the passengers from China, France, Iran, Italy, Japan, Singapore, Spain, South Korea, and Thailand also were on the ban list on 15 March, in an attempt to stop the disease.

The government announced that all flights to and from Baghdad and Najaf airport between 17 and 24 March would be suspended. Then a curfew was imposed in the capital, Baghdad, over the same period.

Analysis of Emerging Spatial and Temporal Hot Spots

The spatial distribution quantile map has been prepared to represent hot spots. Besides, to understand the spatial pattern and cluster of case fatality in Iraq, spatial autocorrelation statistics have been used. In this context, Global Moran's I along with Local indicator of Spatial Autocorrelation (LISA) statistics have been tested on case fatality. The global Moran's I value reveals that whether there is a spatial dependency of the pattern and cluster of case fatality in the country. It can be express by the following:

$$I = \frac{N \sum_{i=1}^{n} \sum_{j=1}^{n} Wij (Xi - X)(Xj - \overline{X})}{\left(\sum_{i=1}^{n} \sum_{j=1}^{n} Wij \right) \sum_{i=1}^{n} (Xi - \overline{X})2} \qquad (1)$$

Where: N= No of Provinces Xi= case fatality value of a province; $\overline{X}$= Mean of the case fatality rate; wij=

Weight indexing provincei relative to province ; Xj= Case fatality value in another provinces.

In this context, LISA statistics has been applied to identify the spatial pattern of case fatality in different provinces of the country. Local Indicator of Spatial Autocorrelation (LISA) which is also called Local Moran's I Index, can be represented by following:

$$Ii = \frac{(Xi - \overline{X})}{S^2 i} \sum_{j=1, j \neq i}^{n} Wij \left(Xj - \overline{X} \right)^2 \qquad (2)$$

Where: X_i = CF value for the ith province; $\overline{X}$= Mean of the CF; wij= spatial weight between province i and j; n = total number of observations and, $S^2 i = \frac{\sum_{j=1, j \neq i}^{n} Wij(Xj - \overline{X})^2}{n-1}$.

Conditional map has also been prepared based on COVID-19 prevalence and case fatality rate among different regions of Iraq. The maps have been prepared with the help of GeoDa software.

Analysis

The prevalence rate is found to be comparatively higher in the province of Babylon, Maysan, and Diyala (Figure 4a), and less in four provinces (Duhok, Nineveh, Salahaddin, Al Anbar) situated at the western part of the country. Global Moran's I statistics have been represented by scatter plot (Figure 4b) Moran'I value (0.129) with the significance level (*p*-value = < 0.05) shows a positive spatial dependency of case fatality pattern in Iraq. In this LISA cluster map, one type of significant spatial autocorrelation (Low-low) and one type of significant spatial outlier (Low-high) has been found in the study area (Figure 4c). Province of Dohuk, Nineveh, and Erbil significantly represents a

Figure 4. Spatial distribution and cluster of COVID-19 case fatality rate by 30 April 2020 in Iraq. (a) Quantile map shows the distribution of cumulative closed case fatality in different regions of Iraq. (b) Moran's Scatter Plot of closed case fatality rate of COVID-19 on 30th April, 2020 (c) LISA cluster map of case fatality rate, dark and light blue colour shows the spatial cluster of low and high case fatality rate with positive and negative spatial autocorrelation respectively. (d) LISA Significance map of spatial Cluster.
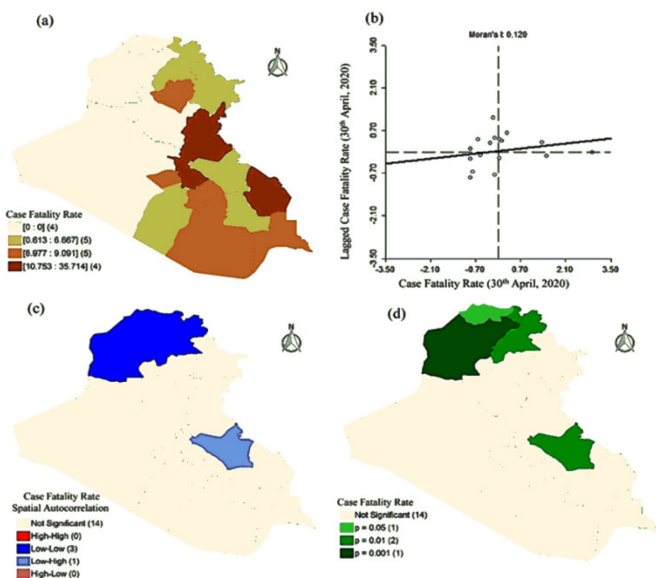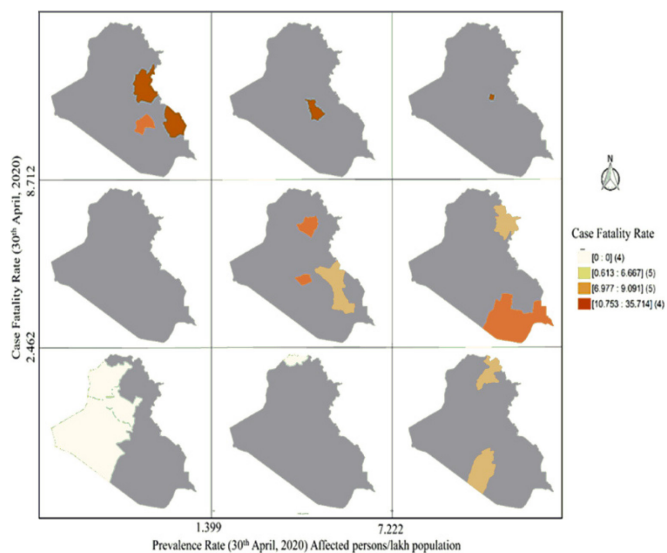

Figure 5. Regional distribution of case fatality rate in association with disease prevalence rate on 30 April 2020 in Iraq.

low case fatality rate (cold spot) with low spatial autocorrelation whereas the province of Wasit exposed with low case fatality rate with high negative spatial autocorrelation. LISA significant map (Figure 4d) shows the significance level of the spatial clustering among the provinces of Iraq in terms of case fatality rate. Out of 18 provinces, three showed the highest outbreak in the case confirmed, death and recovered are (Baghdad, Najaf, Basra) which represent 32.9% of the Iraq population.

Conditional Map shows the changes in the case fatality rate along with the increase of prevalence rate among different provinces of the country (Figure 5). The provinces of the extreme western part shows a relatively very low prevalence rate with low case fatality. Diyala and Maysan erode with a low prevalence rate but high case fatality, which indicates the poor management of the health system over the last 15 years. However, Iraq's healthcare system is in crisis the high number of patients. There's a shortage of drugs and the medical staff to administer them. Despite facing a very high prevalence rate, the case fatality is very low in Al-Najaf. Only Baghdad is facing with high prevalence rate with high case fatality due to the high population rate and the presence of the international airport.

Conclusions

This pandemic comes not to be terminated, but to continue and strengthens in each phase, unlike the other viruses. It affects the respiratory system of the human and can hide in many positions within the human body to protect itself from the new vaccines. Protection of human lives which outcome will influence the economic recovery and trust is the challenge of the world against the virus. COVID-19 in Iraq comes to be limited via the procedures that have been undertaken by the government, as the ban and curfew may be enough to avoid a sharp increase in the number of infected cases and death. Unfortunately, some groups did not consider these procedures by congregation visiting shrines, which lead to spread. Accordingly, the government becomes stricter for all kinds of gathering people. It reveals that the number of COVID-19 cases in Iraq rises slowly, followed by a gradual number of recovered cases and few numbers of death cases during 69 days from 21 Feb to 30 April 2020. It is considered that the virus still under control in Iraq as some reports state that, the number of infected people will be increased with the partial lock-down. However, COVID-19 will be able to decrease community transmission with shelter-in-place orders, mandatory masks, and social distancing measures that would reduce the risk of the increased patients.

References
1. Li C, Zhao C, Bao J, Tang B, Wang Y, Gu B (2020) Laboratory diagnosis of coronavirus disease-2019 (COVID-19). Clin Chim Acta 510: 35–46.
2. Yamin M (2020) Counting the cost of COVID-19. Int J Inf Tecnol 13: 1-7 [online ahead of print].
3. Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, Jin HJ, Yan Y (2020) The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak–an update on the status. Military Med Res 7: 11.
4. Chen Y, Liu Q, Guo D (2020) Emerging coronaviruses: genome structure, replication, and pathogenesis. J Med Virol 92: 418-423.
5. Chowell G, Abdirizak F, Lee S, Lee J, Jung E, Nishiura H, Viboud C (2015) Transmission characteristics of MERS and SARS in the healthcare setting: a comparative study. BMC Med 13: 210.
6. Ajbar AM, Ali E, Ajbar A (2021) Modelling the evolution of the coronavirus disease (COVID-19) in Saudi Arabia. J Infect Dev Ctries 15: 918-924. doi: 10.3855/jidc.13568.
7. Zheng Z, Peng F, Xu B, Zhao J, Liu H, Peng J, Li Q, Jiang C, Zhou Y, Liu S, Ye C, Zhang P, Xing Y, Guo H, Tang W (2020) Risk factors of critical and mortal COVID-19 cases: A systematic literature review and meta-analysis. J Infect 81: e16-e25
8. Al-Malkey MK, Al-Sammak MA (2020) Incidence of the COVID-19 in Iraq–implications for travellers. Travel Med Infect Dis 38: 101739.
9. Olliaro P, Torreele E, Vaillant M (2021) COVID-19 vaccine efficacy and effectiveness - the elephant (not) in the room. Lancet Microbe 2: E279-280.
10. Zhou D, Dejnirattisai W, Supasa P, Liu C, Mentzer AJ, Ginn HM, Zhao Y, Duyvesteyn HME, Tuekprakhon A, Nutalai R, Wang B, Paesen GC, Lopez-Camacho C, Slon-Campos J, Hallis B, Coombes N, Bewley K, Charlton S, Walter TS, Skelly D, Lumley SF, Dold C, Levin R, Dong T, Pollard AJ, Knight JC, Crook D, Lambe T, Clutterbuck E, Bibi S, Flaxman A, Bittaye M, Belij-Rammerstorfer S, Gilbert S, James W, Carroll MW, Klenerman P, Barnes E, Dunachie SJ, Fry EE, Mongkolsapaya J, Ren J, Stuart DI, Screaton GR (2021) Evidence of escape of SARS-CoV-2 variant B. 1.351 from natural and vaccine-induced sera. Cell 184: 2348-2361.
11. Ahmad AR, Murad HR (2020) The impact of social media on panic during the COVID-19 pandemic in Iraqi Kurdistan: online questionnaire study. J Med Internet Res 22: e19556.
12. Ibrahim MA, Al-Najafi A (2020) Modeling, control, and prediction of the spread of COVID-19 using compartmental,

logistic, and gauss models: a case study in Iraq and Egypt. Processes 8: 1400.

13. Ali KM, Tawfeeq HM, Rostam HM (2020) COVID-19 second spike as an aftermath of the sudden restrictions ease: Kurdistan Region of Iraq as an example. Passer 2: 57-61.

14. Abdi M (2020) Coronavirus disease 2019 (COVID-19) outbreak in Iran: actions and problems. Infect Control Hosp Epidemiol 41: 754-755

15. Akdogan D, Guzel M, Tosun D, Akpinar O (2021) Diagnostic and early prognostic value of serum CRP and LDH levels in patients with possible COVID-19 at the first admission. J Infect Dev Ctries 15: 766-772.

16. Kunhua Li, Jiong Wu, Faqi Wu, Dajing Guo, Linli Chen, Zheng Fang, Chuanming Li (2020) The clinical and chest CT features associated with severe and critical COVID-19 pneumonia. Invest Radiol 2: 327-331.

17. Luo Q, Yao D, Xia L, Cheng Y, Chen H (2021) Characteristics and pregnancy outcomes of asymptomatic and symptomatic women with COVID-19: Lessons from hospitals in Wuhan. J Infect Dev Ctries 15: 463-469. doi: 10.3855/jidc.14010.

18. Terzic-Supic Z, Todorovic J, Bajcetic M, Jankovic J, Santric-Milicevic M, Stamenkovic Z, Djikanovic B, Mandic-Rajcevic S, Piperac P, Jovic-Vranes A, Matejic B (2021) Knowledge, attitudes and practices and fear of COVID-19 among medical students in Serbia. J Infect Dev Ctries 15:773-779. doi: 10.3855/jidc.14298.

19. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, Agha R (2020) World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). Int J Surg 76: 71-76.

20. Forni G, Mantovani A (2021) COVID-19 vaccines: where we stand and challenges ahead. Cell Death Differ 28: 626-639.

21. Elizalde-González JJ (2020) SARS-CoV-2 and COVID-19. A pandemic review. Med Crit 34: 53-67.

22. Kashte S, Gulbake A, El-Amin III SF, Gupta A (2021) COVID-19 vaccines: rapid development, implications, challenges and future prospects. Hum Cell 34: 711-733.

23. Ciardullo S, Zerbini F, Perra S, Muraca E, Cannistraci R, Lauriola M, Perseghin G (2021). Impact of diabetes on COVID-19-related in-hospital mortality: a retrospective study from Northern Italy. J Endocrinol Invest 44: 843-850.

24. Zhou Y, Chi J, Lv W, Wang Y (2021) Obesity and diabetes as high-risk factors for severe coronavirus disease 2019 (Covid-19). Diabetes Metab Res Rev 37: e3377.

25. Savoia C, Volpe M, Kreutz R (2021) Hypertension, a moving target in COVID-19: Current views and perspectives. Circ Res 128: 1062-1079.

26. Huiqing Li, Shenghua Tian, Ting Chen, Zhenhai Cui, Ningjie Shi, Xueyu Zhong, Kangli Qiu, Jiaoyue Zhang, Tianshu Zeng, Lulu Chen, Juan Zheng (2020) Newly diagnosed diabetes is associated with a higher risk of mortality than known diabetes in hospitalized patients with COVID-19. Diabetes Obes Metab 22: 1897-1906.

27. Al Hayek AA, Robert AA, Alotaibi ZK, Al Dawish M (2020) Clinical characteristics of hospitalized and home isolated COVID-19 patients with type 1 diabetes. Diabetes Metab Syndr 14: 1841-1845.

28. Wang VX, Xing BB (2020) Talk about the Coronavirus Pandemic: Initial Evidence from Corporate Disclosures. SSRN, 51p. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3585951 . Accessed: 28 April 2020.

29. Price RA (2018) Iraqi State Capabilities. K4D Helpdesk Report 345. Brighton, UK: Institute of Development Studies. Available: https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/13806. Accessed: 18 May 2018.

30. Aljawareen AF (2019) Iraqi economy post ISIS: challenges and opportunities. Manag Econ Res J 5: 799383.

31. Lee JY, Bae S, Myoung J (2019) Middle East respiratory syndrome coronavirus-encoded ORF8b strongly antagonizes IFN-β promoter activation: its implication for vaccine design. J Microbiol 57: 803–811.

Corresponding author
Mohammed Hadi Ali Al-Jumaili, PhD
Department of Medical Laboratory Techniques, Dijlah University College, AlDoura – 10022 Baghdad, Iraq
Phone: 009647502656618
Email: mohammed.hadi@duc.edu.iq

Conflict of interests: No conflict of interests is declared.