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Original Research Article

The Pattern of Notifiable Infectious Diseases in Iraq

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Abstract

Background: The year 2020 witnessed the emergence of covid-19 disease as a new notifiable infectious disease in Iraq and throughout the world. Little is known about the pattern of notifiable infectious diseases in Iraq during the first year of covid-19 pandemic. The aim of this paper is provide a description of the pattern of notifiable infectious diseases in Iraq during the year 2020, the first year of covid-19 global pandemic. ***Materials and methods:*** The available unpublished and published data including official documents and reports of health authorities about notifiable infectious disease in Iraq in 2020 were reviwed. ***Results:*** The population of Iraq in 2020 was estimated at 40.150.174 (20.284.823 males and 19.865.351 females). A total of 718393 cases of notifiable infectious disease including covid-19 disease were registered in Iraq in 2020. During the year 2020, 595291 cases of covid-19 disease were registered by the national and local health authorities in Iraq, while there were 123102 patients with notifiable infectious diseases other than covid-19 disease registered. Therefore, the registered cases of covid-19 disease was about 4.8 times more than the number of all notifiable infectious disease registered in Iraq during the year 2020. Scabies was the second most common notifiable disease after covid-19, and accounted for 6% of all notifiable infectious disease in Iraq in 2020. Chicken pox was the third most common notifiable disease, and accounted for 1.7%. Cutaneous leishmaniasis was the fourth most common notifiable disease and accounted for 1.1%, while tuberculosis, the fifth common notifiable disease accounted for 0.7%. ***Conclusion:*** Notifiable infectious diseases in Iraq were associated with a significant mortality during the year 2020, and that was because of the emergence of covid-19 disease as a new notifiable infectious diseases. Covid-19 disease, the most common notifiable infectious disease in 2020 changed the previously reported national mortality pattern. Contradictory, to the general belief that mortality associated with covid-19 disease was generally restricted to the older age groups, 117 children under the age of ten years died because of covid-19 disease in 2020. This number of childhood deaths suggests the need to consider vaccination of the younger age groups and to perform the relevant research.

Keywords: Notifiable infectious diseases, pattern, Iraq, covid-19 pandemic, mortality.

INTRODUCTION

Notifiable infectious diseases in Iraq in 2020 included childhood communicable diseases (Measles, mumps, rubella, poliomyelitis, chicken pox diphtheria, pertusis), tuberculosis, meningitis, rabies, hemorrhagic fever, H1N1 and H3N2 influenza, typhoid fever, kala azar, cutaneous leishmaniasis, viral hepatitis diseases, hydatid cyst, tetanus, human immune deficiency disease, scabies, toxoplasmosis, food poisoning, cholera, bacillary dysentery, bilhariziasis, and acute flaccid paralysis. Cases of pneumonias and genital infectious were registered by the local and national authorities, but they are generally not considered notifiable diseases. Covid-19 disease has emerged as a new notifiable infectious disease in Iraq and throughout the world.

There are four genera of coronaviruses including alpha-coronaviruses, beta-coronaviruses, gamma-coronaviruses, and delta -coronaviruses. Alpha and beta-coronavirus can infect mammals, while gamma-coronavirus and delta-coronavirus generally infect birds. Four coronaviruses are known to cause mild upper respiratory infection in humans of all ages including infants.

The transmission of coronaviruses from animals (birds) to causes respiratory illness has been reported as early as 1969 by Kapikian *et al.* Community-wide outbreak associated with 229E-like coronavirus has be reported as early as 1970 by Cavallaro and Monto. Until December, 2020, two beta-coronaviruses (SARS coronaviruses and MERS-

coronaviruses were known to cause severe, potentially fatal pneumonia-like illness [1-6].

Errors in the replication of viral genomic RNA of zoonotic coronaviruses led to the emergence of genetically related diverse quasi-species, while the transmission of some of them to a new host species led to the emergence of human severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV).

SARS-CoV emerged for the first time in Guangdong China in 2002 and spread rapidly too many other counties causing more than 8000 cases with about 10 % mortality rate.

In 2012, it was thought that MERS-CoV was transmitted to humans from bats through an intermediate camel host leading to 1700 cases in 27 countries with about 40% mortality [1-4].

Increasing number of cases of severe potentially fatal pneumonia caused by a new β-coronavirus was reported from Wuhan China in December 2019, and human-to-human transmission was confirmed early. On the 12th of January, 2020 the World Health Organization (WHO) officially named the condition coronavirus disease 2019 (covid-19). The Coronavirus Study Group of the International Committee suggested naming the new coronavirus "SARS-CoV-2" [1-4].

The year 2020 witnessed the rapid spread of covid-19 pandemic in Iraq and in almost all the countries in the world. This spread has created a serious health crises and a public health emergency in Iraq and throughout the world [7-10].

MATERIALS AND METHODS

The available unpublished and published data including official documents and reports of the local and national health authorities about notifiable infectious disease in Iraq in 2020 were reviwed.

RESULTS

The population of Iraq in 2020 was estimated at 40.150.174 (20.284.823 males and 19.865.351 females, with 102 males for each 100 females). 40.5% of the population was under the age of fifteen years, and 5% above the age of 60 years. Figure-1 shows the age distribution of Iraq population during the year 2020. 69.8 % of the population was living in urban areas and 30.2% were of the living in rural areas.

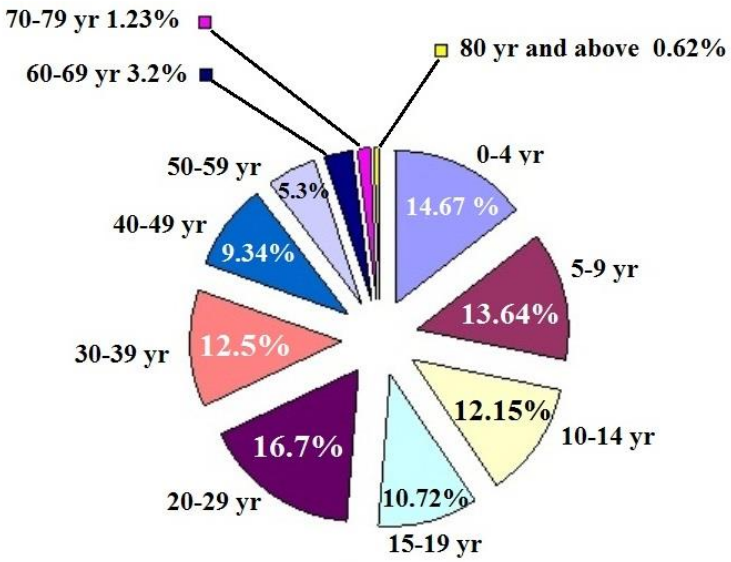


Fig-1: The age distribution of Iraq population during the year 2020 Covid-19 disease

Covid-19 disease has emerged as a new notifiable infectious disease in Iraq and changed the pattern of notifiable infectious diseases in Iraq. However, there were 123102 patients with notifiable infectious diseases other than covid-19 disease registered by the national and local health authorities in Iraq in 2020. Therefore, the registered cases of covid-19 disease was about 4.8 times more than the number of all notifiable infectious disease registered in Iraq during the year 2020.

A total of 718393 cases of notifiable infectious disease including covid-19 disease were registered in Iraq in 2020. Figure-2 shows the percentage of the main notifiable infectious diseases including covid-19 registered in Iraq in 2020.

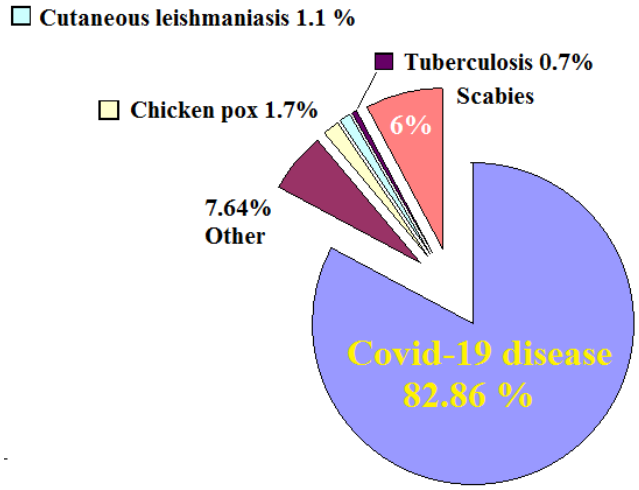


Fig-2: The percentage of the main notifiable infectious diseases including covid-19 registered in Iraq in 2020

During the year 2020, 595291 cases of covid-19 disease were registered by the local and national health authorities, 12813 (2.15%) patients died and 537841 (90.3%) patients experienced recovery. 256 patients who died from covid-19 disease were affiliated to the Iraqi Ministry of Health including 56 medical personnel and 133 health personnel.

The spread of covid-19 disease in Iraq was first recognized during February, 2020 with the report of the first confirmed cases of the infection on the 22nd of February in the province of Najaf.

The first reported case in Iraq was an Iranian student of religion. The first case of covid-19 in the Kurdish region of Iraq in the North of the country was reported on the first of March, 2020. However, the first death from covid-19 disease in Iraq was reported from the province of Suleimaniya in the Kurdish region of Iraq. The patient was a 70-year-old man who was known to have chronic heart failure associated with asthmatic manifestations.

The second death from covid-19 diseases in Iraq was reported from the province of Baghdad, while the first recovery was reported on the 6th of March.

On the 27th of March, 2020, all 19 Iraqi provinces have reported confirmed cases, and on the 7th of April, 28,414 tests have been performed with 1202 of them were positive.

On the first of April, 2020, the total number of confirmed covid-19 disease cases in Iraq was 728. Early during June, the number of the reported cases exceeded 12,000, and the deaths exceeded 300. Table-1 shows the confirmed cases of covid-19 disease in the provinces of Iraq on the 7th of June 2020.

On the 28th of June, the Iraqi Medical association reported the occurrence of 45402 cases of covid-19 diseases including 788 Iraqi doctors, and 1756 patients died including 13 Iraqi doctors.

People who were considered to be healthy and possibly having good immunity like former football players and bodybuilding champions (Figure-3A) also died during the year 2020.

Table-1: The confirmed cases of covid-19 disease in the provinces of Iraq on the 7th of June 2020

Province	Cases	Deaths	Recovered
Baghdad	2,234	97	941
Al-Anbar	6	0	5
Al-Qadisiyia	15	1	11
Babil	49	5	39
Basra	747	18	578
Thi Qar	96	4	72
Diyala	45	5	21
Duhok	102	0	26
Erbil	397	4	243
Halabja	25	0	22
Kerbala	152	8	118
Kirkuk	72	2	59

Maysan	52	2	45
Muthanna	117	4	95
Najaf	431	6	324
Nineveh	12	0	6
Suleimaniya	811	23	246
Saladin	127	0	18
Wasit	1,018	18	139
Total	**12,366**	**346**	**5,168**

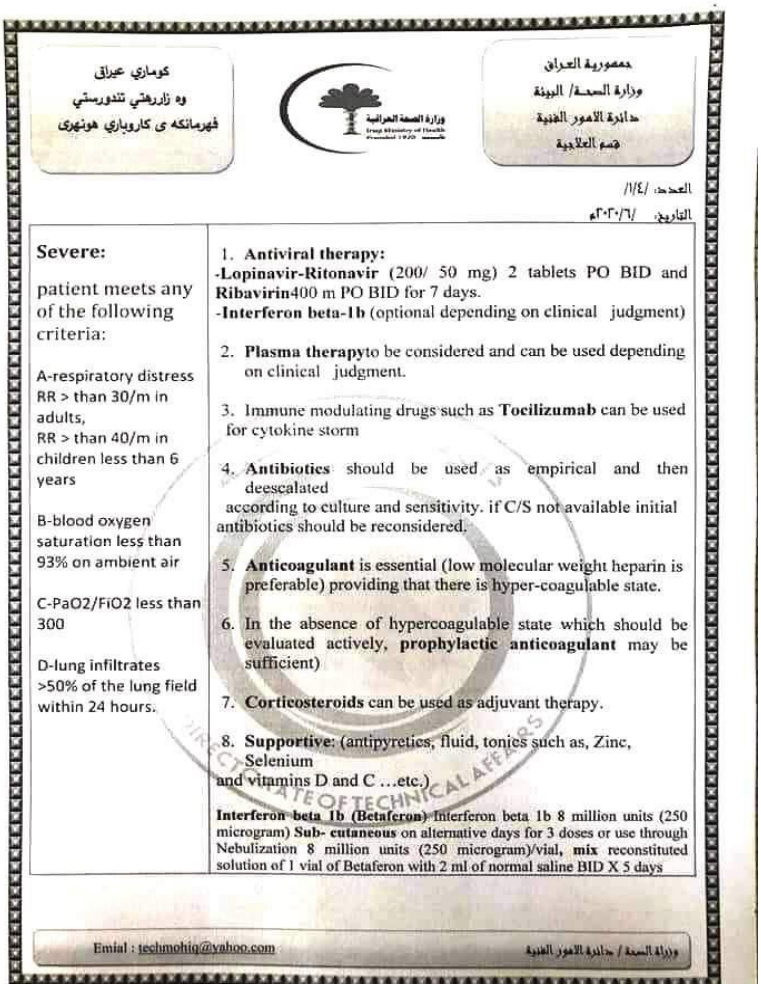
Fig-3A: Mohammed Al-Kaabi, an Iraqi bodybuilding champion who died because of covid-19 disease during the year 2020

The death of Ahmed Radhi (Figure-3B), a former player of the Iraqi National football team during June 2020 was associated with public criticism for the Iraqi Minister of Health during that time who was regarded as a non-technocrat minister as he was a military pharmacist and nor a real physician. Shortly after the death of Ahmed Radhi, Haider Al-Mulla, a politician asked the prime minister to appoint a real Minister of Health. It is worth mentioning that Hassan Mohammed Abbas, the minister of health during that time was forced to resign during the year 2021 following the occurrence of a huge fire in Ibin Al-Khateeb Hospital in Baghdad and killed many patients.

In Iraq, a high covid-19 disease ministerial committee was established by the Iraqi Ministry of health to lead the efforts to control. The committee designed an official protocol (Figure-3C) for the treatment of the disease and distributed it to hospitals.

Lopinavir/ritonavir + ribavirin combination was at the top of the suggested therapies to be used in the treatment of covid-19 disease, and that was excellent from the evidence-based medicine point of view. However, the suggested treatment was not available at all in the country. The second suggested treatment was plasma therapy which was impossible to offer to any patient needs treatment supposing that it is an acceptable therapeutic option.

Fig-3B: Ahmed Radhi in hospital before his death. He was a former player of the Iraqi National football team who died during June, 2020, and his death was associated with public criticism for the Iraqi Minister of Health



كومارى عيراق
وه زارهتى تندورستى
فهرمانگه ى كاروبارى هونهرى

جمهورية العراق
وزارة الصحة/ البيئة
دائرة الامور الفنية
قسم العلاقية

العدد: /٤/١/
التاريخ: /٦/٢٠٢٠م

Severe:

patient meets any of the following criteria:

A-respiratory distress RR > than 30/m in adults,
RR > than 40/m in children less than 6 years

B-blood oxygen saturation less than 93% on ambient air

C-PaO2/FiO2 less than 300

D-lung infiltrates >50% of the lung field within 24 hours.

1. **Antiviral therapy:**
-Lopinavir-Ritonavir (200/ 50 mg) 2 tablets PO BID and **Ribavirin**400 m PO BID for 7 days.
-Interferon beta-1b (optional depending on clinical judgment)

2. **Plasma therapy**to be considered and can be used depending on clinical judgment.

3. Immune modulating drugs such as **Tocilizumab** can be used for cytokine storm

4. **Antibiotics** should be used as empirical and then deescalated according to culture and sensitivity. if C/S not available initial antibiotics should be reconsidered.

5. **Anticoagulant** is essential (low molecular weight heparin is preferable) providing that there is hyper-coagulable state.

6. In the absence of hypercoagulable state which should be evaluated actively, **prophylactic anticoagulant** may be sufficient)

7. **Corticosteroids** can be used as adjuvant therapy.

8. **Supportive:** (antipyretics, fluid, tonics such as, Zinc, Selenium and vitamins D and C …etc.)

Interferon beta 1b (Betaferon) Interferon beta 1b 8 million units (250 microgram) **Sub- cutaneous** on alternative days for 3 doses or use through Nebulization 8 million units (250 microgram)/vial, **mix** reconstituted solution of 1 vial of Betaferon with 2 ml of normal saline BID X 5 days

Emial : techmohiq@yahoo.com

وزارة الصحة / دائرة الامور الفنية

Fig-3C: The official protocol designed by the higher ministerial committee for the treatment of covid-19 disease

During the year 2020, 182607 cases of covid-19 disease were registered in Baghdad accounting for 31% of the total cases of the disease in Iraq. Table-2 shows the number of covid-19 disease cases in the Iraqi provinces during the year 2020 and their outcomes of death or recovery.

7680 (1.4%) of the covid-19 disease in Iraq during the year 2020 were under the age of ten years, and therefore this age group was the least to be affected with covid-19 disease in this study. 133176 (23.9%) of the covid-19 disease in Iraq during the year 2020 aged between 30 and 39 years, and therefore this age group was the most affected with covid-19. Figure-4 shows the age distribution of covid-19 patients during the year 2020. Table-3: Shows the percentage of the recovered patients in various age groups.

Table-2: The number of covid-19 cases in the Iraqi provinces during the year 2020

Province	Cases	Deaths	Recovered
Baghdad	182607	2843	173186
Al-Anbar	7739	71	7486
Al-Muthanna	12501	231	11779
Al-Qadisiyia	18352	407	17678
Babil	20795	592	19882
Basra	39835	915	38967
Thi Qar	23808	813	22443
Diyala	21413	273	20889
Duhok	33932	681	23075
Erbil	35717	912	25771
Kerbala	22594	513	21486
Kirkuk	31521	784	26824
Maysan	18435	445	17695

Najaf	22025	318	21484
Nineveh	23762	490	22184
Saladin	15478	253	12321
Suleimaniya	32741	1797	23027
Wasit	32036	475	31664
Total	**595291**	**12813**	**537841**

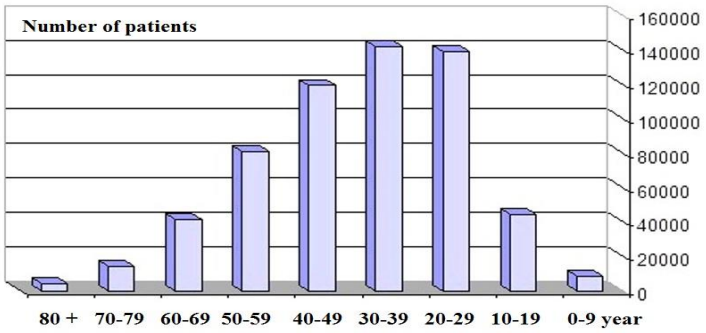


Fig-4: The age distribution of covid-19 patients during the year 2012

Table-3: The percentage of the recovered patients in various age groups

Age group	Percentage the recovered patients
0-9 year	**90.65 %**
10-19 year	**90.45 %**
20-29 year	**93.3 %**
30-39 year	**93.56 %**
40-49 year	**87.32 %**
50-59 year	**90 %**
60-69 year	**84 %**
70-79 year	**80.26 %**
80 and older	**70 %**

During the year 2020, 173928 individuals died in Iraq including 12813 deaths because of covid-19 disease which accounted for 7.36 % of the total deaths in Iraq during the year 2020. Covid-19 resulted in a death rate of 33/ 100000 population in Iraq during the year 2020.

117 (0.9%) of the patients who died because of covid-19 disease in Iraq during the year 2020 were under the age of ten years, and therefore patients in this age group are the least likely to die from covid-19 disease.

2418 (18.9%) of the patients who died because of covid-19 disease aged 50 to 59 years. Therefore, according to this study, patients in this age group are the most likely to die from covid-19 disease. Figure-5A shows the number of deaths in various age groups, and figure-5B shows the percentage of deaths in various age groups.

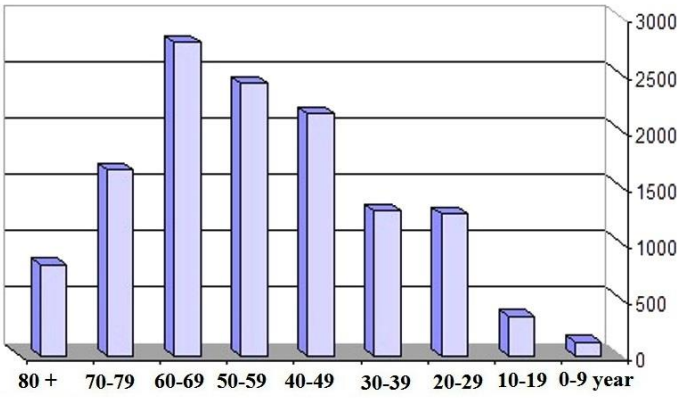


Fig-5A: The number of deaths in various age groups

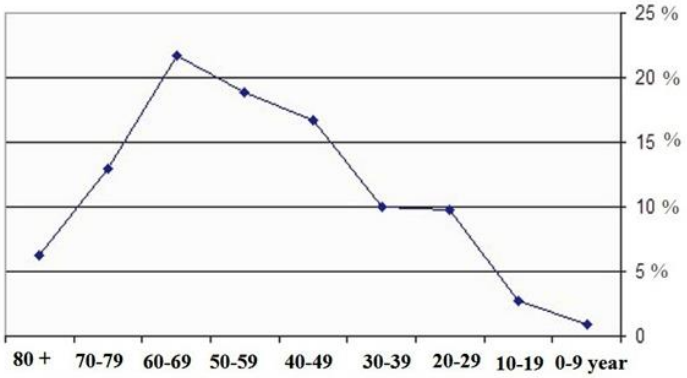


Fig-5B: The percentage of deaths in various age groups

Covid-19 disease was the second most common cause of death in Iraq accounting for 7.36% of all deaths in 2020. Covid-19 disease was also the second most common cause of death in males, but it was the sixth most common cause of death in females. However, covid-19 disease was the third most common direct cause of maternal death**.**

Scabies

Scabies was the second most common notifiable disease after covid-19. 42714 (21432 males and 21282 females) cases of scabies were registered in Iraq in 2020 [106.4/100.000 population]. Figure-6A shows the age distribution of the cases of scabies in 2020. Figure-6B shows the numbers and gender distribution of cases of scabies in 2016, 2017, 2019, and 2020. Figure-6C shows the incidence of scabies per 100.000 population in 2016, 2017, 2019, and 2020.

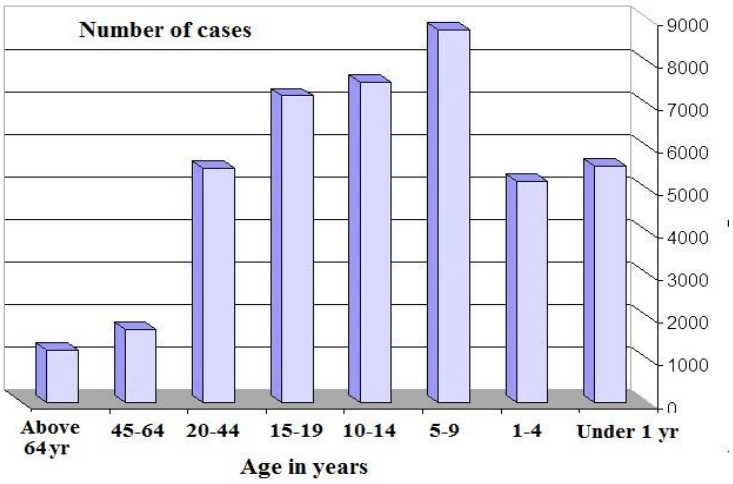


Fig-6A: The age distribution of the cases of scabies in 2020

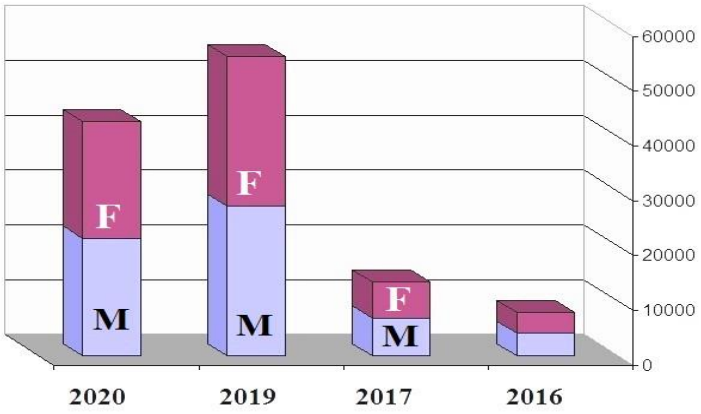


Fig-6B: The numbers and gender distribution of cases of scabies in 2016, 2017, 2019, and 2020

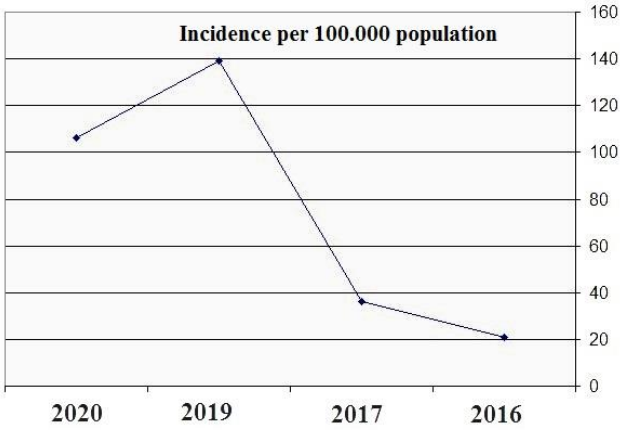


Fig-6C: The incidence of scabies/100.000 population in 2016, 2017, 2019, and 2020

Chicken pox

12251 (6573 males and 5678 females) cases of chicken pox were registered in Iraq in 2020 [30/100.000 population]. Figure-7A shows the age distribution of the cases of chicken pox in 2020. Figure-7B shows the numbers and gender distribution of cases of chicken pox in 2016, 2017, 2019, and 2020. Figure-7C shows the incidence of chicken pox per 100.000 populations in 2016, 2017, 2019, and 2020.

Cutaneous leishmaniasis

7957 cases of cutaneous leishmaniasis (4417 males and 3540 females) were registered in Iraq in 2020 [19.8/100.000 population]. Figure-8A shows the age distribution of the cases of cutaneous leishmaniasis in 2020. Figure-8B shows the numbers and gender distribution of cases of cutaneous leishmaniasis in 2016, 2017, 2019, and 2020. Figure-8C shows the incidence of cutaneous leishmaniasis per 100.000 populations in 2016, 2017, 2019, and 2020.

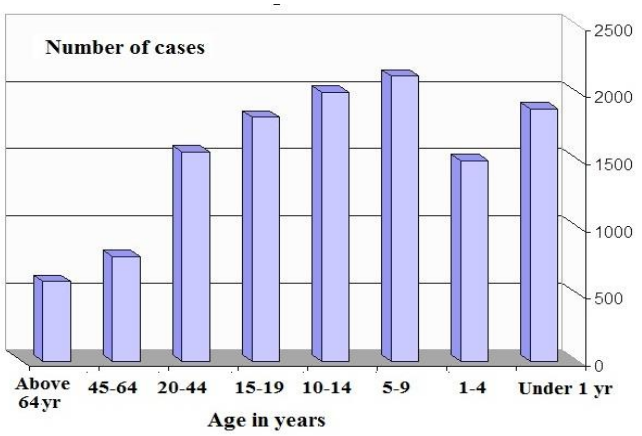


Fig-7A: The age distribution of the cases of chicken pox in 2020

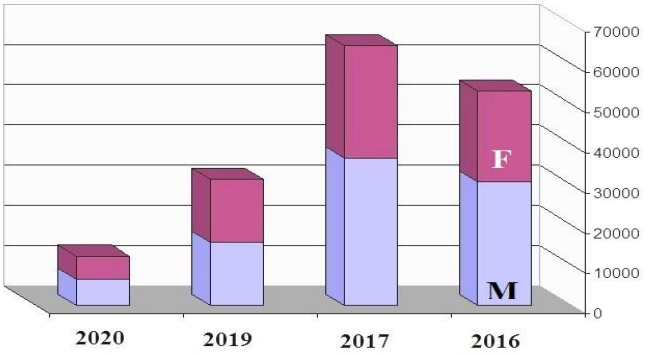


Fig-7B: The numbers and gender distribution of cases of chicken pox in 2016, 2017, 2019, and 2020

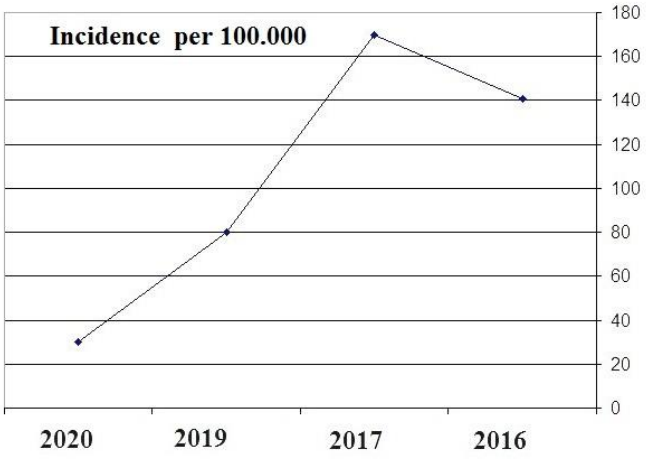


Fig-7C: The incidence of chicken pox per 100.000 populations in 2016, 2017, 2019, and 2020

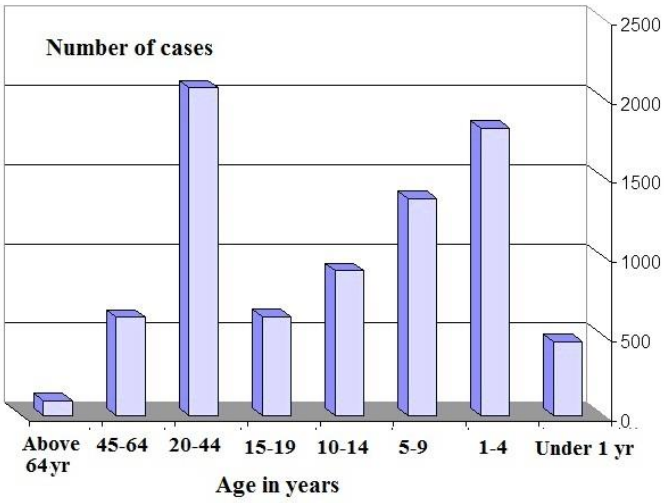


Fig-8A: The age distribution of the cases of cutaneous leishmaniasis in 2020

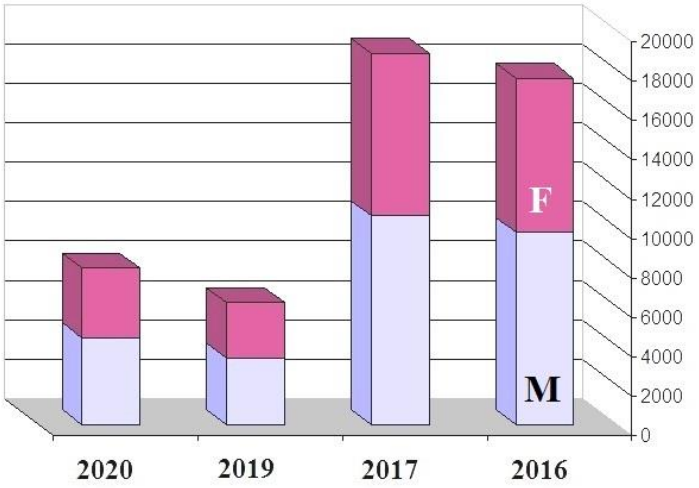


Fig-8B: The numbers and gender distribution of cases of cutaneous leishmaniasis in 2016, 2017, 2019, and 2020

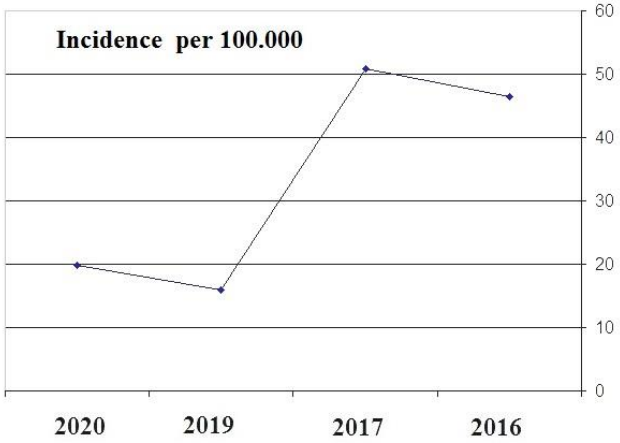


Fig-8C: The incidence of cutaneous leishmaniasis per 100.000 populations in 2016, 2017, 2019, and 2020

Tuberculosis

5015 cases (2461 males and 2554 females) of tuberculosis were registered in Iraq in 2020 [12/100.000 population] including 2643 patients (1415 males and 1228 females) with pulmonary tuberculosis [7/100.000 population], and 2372 patients (1046 males and 1326 females) with extra-pulmonary tuberculosis [6/100.000 population]. Figure-9A shows the numbers and gender distribution of cases of pulmonary tuberculosis in 2016, 2017, 2019, and 2020, figure-9B shows the numbers and gender distribution of cases of extra-pulmonary tuberculosis in 2016, 2017, 2019, and 2020. Figure-8C shows the incidence of pulmonary and extra-pulmonary tuberculosis per 100.000 populations in 2016, 2017, 2019, and 2020.

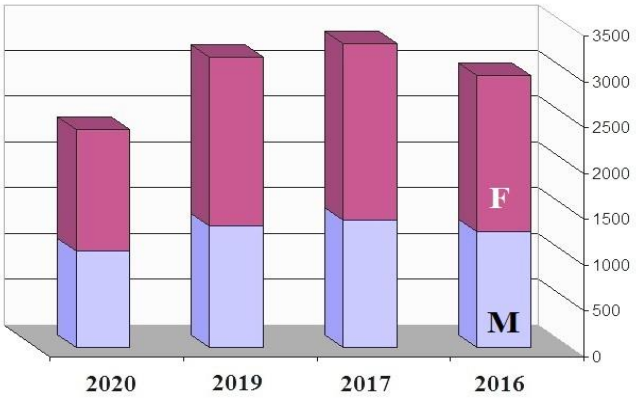


Fig-9A: The numbers and gender distribution of cases of pulmonary tuberculosis in 2016, 2017, 2019, and 2020

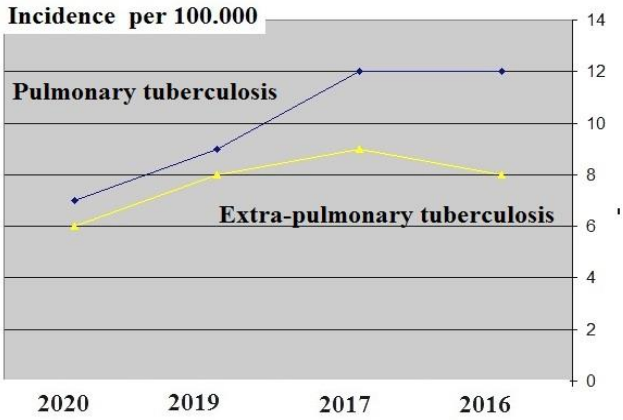


Fig-9B: The numbers and gender distribution of cases of extra-pulmonary tuberculosis in 2016, 2017, 2019, and 2020

Figure-9C: The incidence of pulmonary and extra-pulmonary tuberculosis per 100.000 populations in 2016, 2017, 2019, and 2020

Infective hepatitis

There were a total of 1521 cases of infective hepatitis registered in Iraq in 2020. 662 (335 males and 327 females) cases of hepatitis A infection were registered, and the disease occurred in 1.6 individuals of each 100.000 population. Only one patient was under the age of one year, and only 2 patients were above the age of 64 years Figure-10A shows the age distribution of patients with hepatitis A infection.

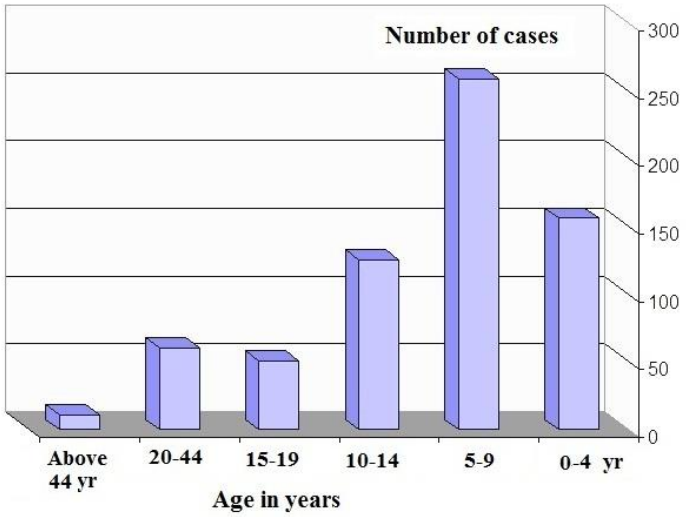


Fig-10A: The age distribution of patients with hepatitis A infection

574 (332 males and 242 females) cases of hepatitis B infection were registered, and the disease occurred in 1.43 individuals of each 100.000 population. Only one patient was under the age of one year, and two patients were between the ages of 1 to 4 years. Figure-10B shows the age distribution of patients with hepatitis B infection.

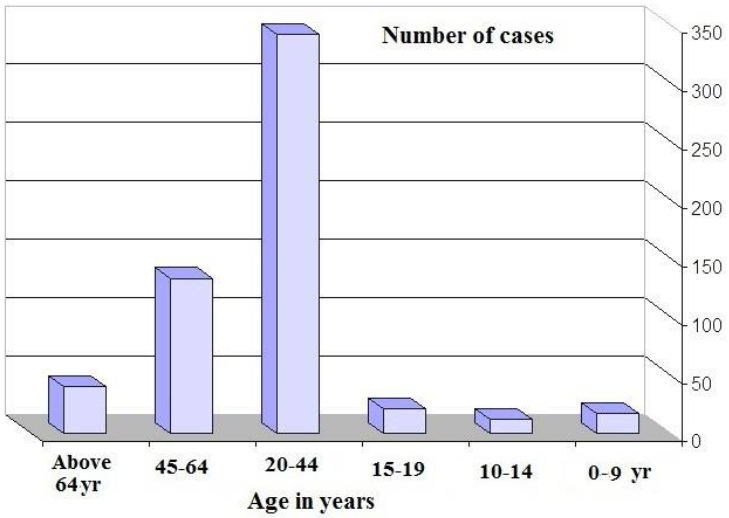


Fig-10B: The age distribution of patients with hepatitis B infection

284 (127 males 157 females) cases of hepatitis C were registered in Iraq in 2020 [0.7/100.000 population. Figure-10C shows the age distribution of patients with hepatitis C infection. Only one case of hepatitis E which occurred in a male was registered in Iraq in 2020.

Mumps

860 cases of mumps (490 males and 370 females) were registered in Iraq in 2020 [2/100.000 population]. Only one patient was under one year of age, and two patients were older than 64 years. Figure-11A shows the age distribution of patients with mumps infection. Figure-11B shows the numbers and gender

distribution of cases of mumps in 2016, 2017, 2019, and 2020. Figure-11C shows the incidence of mumps per 100.000 populations in 2016, 2017, 2019, and 2020.

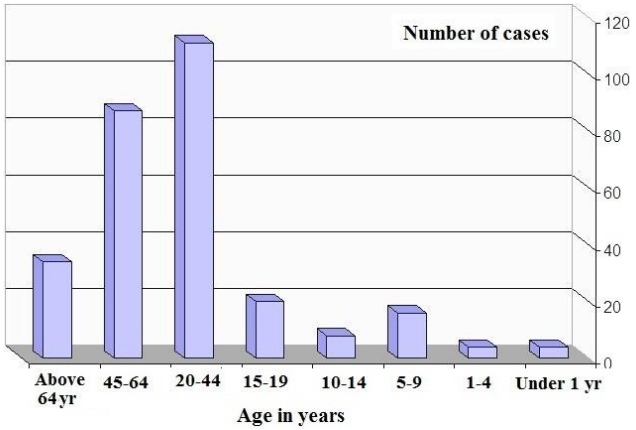


Fig-10C: The age distribution of patients with hepatitis C infection

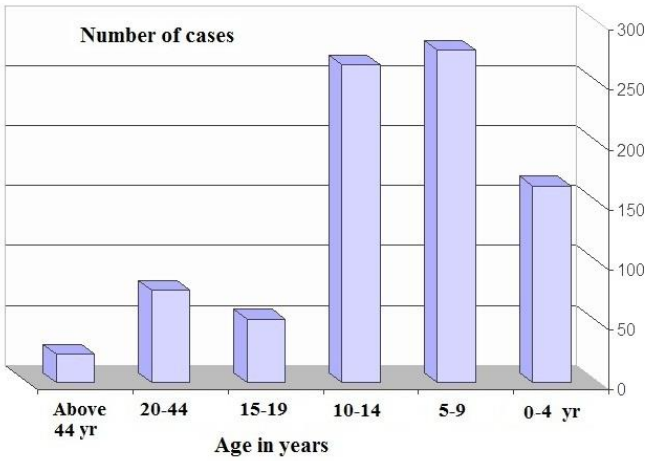


Fig-11A: The age distribution of patients with mumps infection

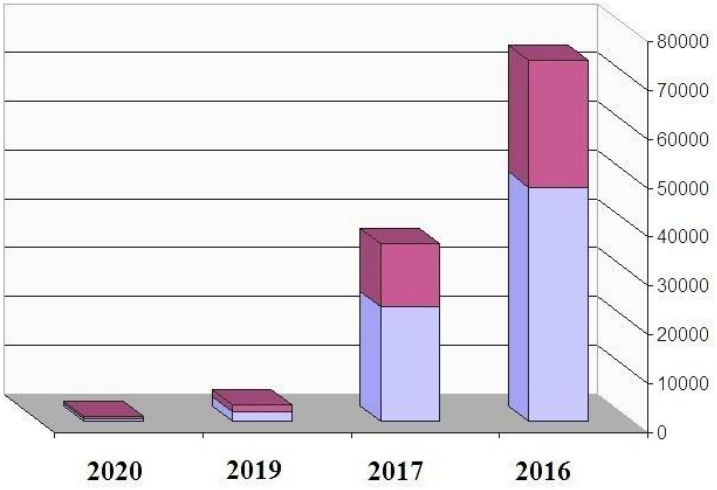


Fig-11B: The numbers and gender distribution of cases of mumps in 2016, 2017, 2019, and 2020

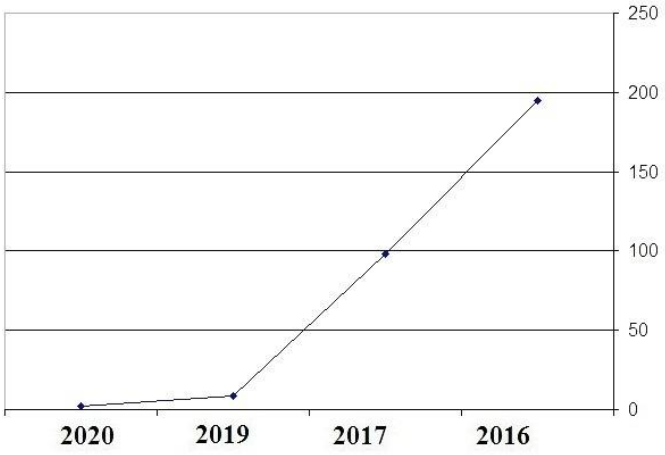


Fig-11C: The incidence of mumps per 100.000 populations in 2016, 2017, 2019, and 2020

Acute flaccid paralysis

361 cases (213 males and 148 females) of acute flaccid paralysis were registered in Iraq in 2020 [0.9/100.000 population. 179 patients were between the ages of 1 to 4 years , 136 patients were between the ages of 5 to 9 years , and 46 patients were under the age of one year.

Brucellosis

330 (202 males and 128 females) cases of brucellosis were registered in Iraq in 2020 [0.8/100.000 population]. 16 cases were under the age of one year, 26 cases were between 1-4 years, 21 cases were between 5-9 years, 24 cases were between 10-14 years, 18 cases were between 15-19 years, 139 cases were between 20-44 years, 61cases were between 45-64 years, and 25 cases patients were above 64 years.

Typhoid fever

298 (165 males and 133 females) cases of typhoid fever were registered in Iraq in 2020 [0.7/100.000 population]. Two patients were under the age of one year, 51 patients were between 1-4 years, 68 patients were between 5-9 years, 43 patients were between 10-14 years, 15 patients were between 15-19 years, 84 patients were between 20-44 years, and 35 patients were between 45-64years.

Measles

281 cases (132 males and 149 females) of measles were registered in Iraq in 2020 [0.7/100.000 population]. Figure-12 shows the age distribution of patients with measles.

Meningitis

280 (169 males and 111 females) of all types of meningitis were registered in Iraq in 2020 [0.7/100.000 population].

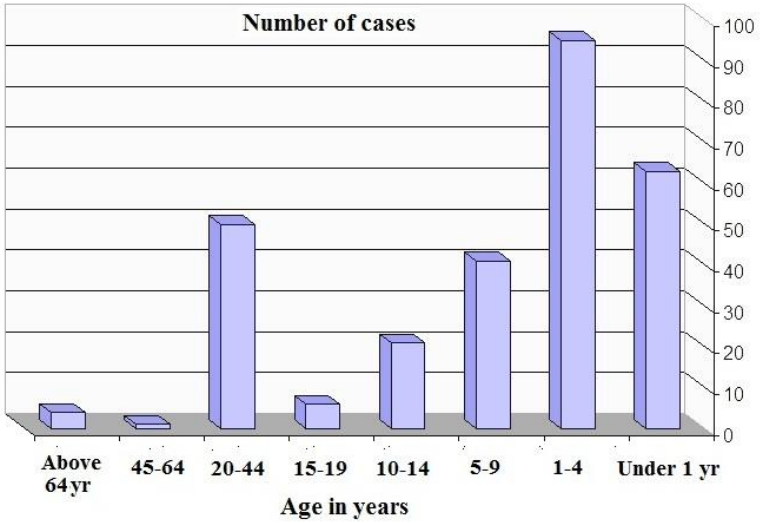


Fig-12: The age distribution of patients with measles

179 cases of viral meningitis were registered including 71 patients under the age of one year, 64 patients were between 1-4 years, 19 patients were between 5-9 year, 11 patients were between 10-14 years, 2 patients were between 15-19 years, 5 patients were between 20-44 years, and 7 patients were above 44 years, 3 of them were above 64 years.

88 cases of bacterial meningitis were registered including 45 patients under the age of one year, 21 cases were between 1-4 years, 6 cases were between 5-9 year, 2 cases were between 10-14 years, 4 cases were between 15-19 years, 5 cases were between 20-44 years, and 5 cases were above 44 years, 3 of them were above 64 years.

Human immune deficiency

210 (175 males and 35 females) of human immune deficiency infection was registered [0.5 affected individuals of each 100.000 population], and 12 (8 males and 4 females) patients died.

Food poisoning

203 cases of food poisoning were registered in 2020 including one patient under the age of one year, 19 patients were between 1-4 years, 41 patients were between 5-9 year, 43 patients were between 10-14 years, 25 patients were between 15-19 years, 62 patients were between 20-44 years, and 12 patients were above 44 years, 2 of them were above 64 years.

Pertusis

76 cases of pertusis (38 males and 38 females) were registered in Iraq in 2020 [0.02/10.000 population]. 28 patients were under one year of age, 23 patients were between 1 to 4 years, 21 patients were between 1 to 4 years, 2 patients were between 5 to 9 years, and 2 patients were between 10 to 14 years.

Kala azar

46 cases of kala azar (25 males and 21 females) were registered in Iraq in 2020 including 14 patients under the age of one year, 29 patients were between 1 to 4 years, 2 patients were between 5 to 9 years, and one patient was between 10 to 14 years.

Hydatid cyst

41 cases of hydatid cyst (10 males and 31 females) including 3 patients between the age of between 5 to 9 years, 5 between 10 to 14 years, 6 patients were between 15-19 years, 14 patients were between 20-44 years, and 13 patients were above 44 years including one patient above 64 years.

H1N1 and H3N2 influenza

There were 26 (14 males and 12 females) registered cases of H1N1 influenza, and 5 cases (2 males and 3 females) of confirmed H3N2 in 2020.

Rabies

Eleven cases of rabies (9 males and 2 females) were registered, including 2 patients between the ages of 5-9 years, 5 patients were between 10-14 years, 2 patients were between 20-44 years and 2 patients were above the age of 44 years, one of them was above the age of 64 years.

Tetanus

Ten cases of tetanus were registered, including five patients between the age of 5-9 years, 2 patients were between 10-14 years, three patients were above 19 years including one patient above 44 years, and one patient above 64 years.

Toxoplasmosis

Eight cases of toxoplasmosis which occurred in 8 females aged 20 to 44 years were registered.

Rubella

One case of rubella which occurred in a female aged 5-9 years was registered.

Hemorrhagic fever

One case of hemorrhagic fever which occurred in a male was registered.

Bacillary dysentery

One case of bacillary dysentery which occurred in a male aged 15-19 years was registered.

Notifiable infectious diseases that were not registered during the year 2020 included cholera, poliomyelitis, neonatal tetanus, malaria, bilhariziasis, and diphtheria.

DISCUSSION

Acute tonsillitis was the most common cause of outpatient morbidity in Iraq in 2020 [11, 12]. Table-4 shows the percentage of the most common causes of outpatient morbidity in Iraq in 2020 (Excluding the three Kurdish Provinces in the North of Iraq).

Table-4: The percentage of the most common causes of outpatient morbidity in Iraq in 2020 (Excluding the three Kurdish Provinces in the North of Iraq)

	Disorder	Percentage
1	Acute tonsillitis	6.4 %
2	Acute bronchitis/ bronchiolitis	5.3 %
3	Acute pharyngitis	4.3 %
4	Urinary system disorders	3.9 %
5	Essential (primary) hypertension	2.8 %
6	Influenza	2.7 %
7	Acute upper respiratory infection	2.6 %
8	Infective gastreoeritis	2.5 %
9	Diseases of the skin and subcutaneous tissue	2 %
10	Insulin dependent diabetes mellitus	2 %

Cases of pneumonia (not caused by covid-19 disease) and cases of genital infectious were registered by the local and national health authorities, but they are not generally considered notifiable diseases.

20941 cases of pneumonia (not caused by covid-19 disease) were registered in 2020 including 9203 cases under the age of one year, 6369 cases were between 1-4 years, 2963 cases were between 5-9 years, 1567 cases were between 10-14 years, 552 cases were between 15-19 years, 200 cases were between 20-44 years, 71 cases were between 45-65 years and 16 cases were above the age of 64 years [11, 12].

65909 (5516 males and 60393 females) cases of genital infectious including sexually transmitted diseases were registered in Iraq in 2020 (Table-5) [11-12].

Table-5: The numbers and gender of genital infectious including sexually transmitted diseases registered in Iraq in 2020

	Disease	Number	Male	Female
1	Non-gonococcal cervicitis	20064	0	20064
2	Candidosis	19760	511	19249
3	Bacterial Vaginosis	12512	0	12512
4	Trichomoniasis	4337	84	4253
5	Molluscum contagiosum	2171	978	1193
6	Genital warts	1783	567	1216
7	Syphilis	1510	1419	91
8	Non-gonococcal urethritis	1314	1314	0
9	Chancroid	945	128	817
10	Genital herpes	799	567	232
11	Pubic pediculosis	253	84	169
		65909	5516	60393

In 2020, covid-19 disease was the sixth most common cause of hospitalization of patients aged 20 to 24 years in Iraq except the Kurdish provinces in the North of Iraq during the year 2020, accounting for 0.95 % (Table-6) [11, 12].

Table-6: The main causes of hospitalization of patients aged 20 to 24 years in Iraq, except the Kurdish provinces in the North of Iraq during the year 2020

	Disorder	Percentage
1	Disorders of the digestive system	5.8 %
2	Disorders of genitourinary system	3.0 %
3	Hematological disorders	2.2 %
4	Injury, poisoning and other external causes	2 %
5	Disorders of the respiratory system	1.4 %
6	Covid-19 disease	0.95 %
7	Specific medical procedures	0.94%
8	Disorders of circulatory system	0.66 %
9	Undiagnosed illnesses	0.28 %
10	Infectious and parasitic diseases	0.26 %

During the year 2020, 173928 individuals died in Iraq including 92210 (53%) individuals died in medical facilities and 81718 (47 %) died out side medical facilities. The crude death rate during the year 2020 was 4.4 / 1000 of the population. During the year 2020, ten conditions accounted for 64.6% of the total deaths in Iraq except the Kurdish provinces in the North of Iraq during the year 2020 (Table-7A). Covid-19 disease was also the second most common cause of death in males (Table-7B), but it was the sixth most common cause of death in females (Table-7C) [11-12].

Table-7A: The main causes of mortality in Iraq, except the Kurdish provinces in the North of Iraq during the year 2020

	Disorder	**Percentage**
1	Ischemic heart disease	11.2 %
2	Covid-19 disease	8.6 %
3	Cerebro-vascular disorders	8.5 %
4	Hypertensive disease	8.1 %
5	Non-ischemic, non hypertensive heart disease	6.3 %
6	Diabetes mellitus	6 %
7	Cancers	5.8 %
8	Renal failure	4.1 %
9	Neonatal cardiopulmonary disorders	3.7 %
10	Road Traffic accidents	2.3 %

Table-7B: The main causes of mortality in males in Iraq, except the Kurdish provinces in the North of Iraq during the year 2020

	Disorder	**Percentage**
1	Ischemic heart disease	14.1 %
2	Covid-19 disease	8.8 %
3	Cerebro-vascular disorders	6.8 %
4	Hypertensive disease	6.5 %
5	Non-ischemic, non hypertensive heart disease	6.1 %
6	Diabetes mellitus	4.9 %
7	Renal failure	4.9 %
8	Neonatal cardiopulmonary disorders	4.8 %
9	Road Traffic accidents	2.8 %
10	Cancers	2.2 %
	Ten most common causes of death	**61.9** %

Table-7C: The main causes of mortality in females in Iraq, except the Kurdish provinces in the North of Iraq during the year 2020

	Disorder	**Percentage**
1	Ischemic heart disease	13.5 %
2	Cerebro-vascular disorders	10.5 %
3	Hypertensive disease	9.2 %
4	Cancers	9.2 %
5	Non-ischemic, non hypertensive heart disease	7.3 %
6	Covid-19 disease	6.2 %
7	Renal failure	6.2 %
8	Diabetes mellitus	4.2 %
9	Neonatal cardiopulmonary disorders	3.5 %
10	Bacterial diseases	2 %
	Ten most common causes of death	**71.8** %

The covid-19 pandemic changed the mortality pattern in Iraq as covid-19 disease emerged as the second most common cause of death [11-12]. Table-8 shows the most common causes of death in Iraq in 2018 and 2019.

Table-8: The most common causes of death in Iraq in 2018 and 2019

	Disorder	2018	2019
1	Ischemic heart disease	12.06%	12.03%
2	Cancer	9.43%	9.33%
3	Cerebro-vascular disorders	10.36%	8.4%
4	Hypertensive disease	6.7%	6.8%
5	Non-ischemic heart disease	7.37%	5.9%
6	Renal failure	5.85%	5.3%
7	Road Traffic accidents	4.57%	4.9%
8	Diabetes mellitus	4.19%	4.8%
9	Neonatal cardiopulmonary disorders	3.89%	4.1%
10	Sepsis and infective disorders	N/A	2.6%

On the first of June 2021, 1,201,352 cases of covid-19 disease were reported by the Iraqi Ministry of Health, and 16375 patients died because of the disease. During, the first week of June, 2021, the death of three Iraqi patients having covid-19 disease complicated by mucormycosis was reported [13-16]. We are recommending adding mucormycosis to the list of notifiable infectious diseases in Iraq.

Notifiable infectious diseases differ from country to country and also from time to time. Yohannes *et al*. reported that there were 57 notifiable infectious diseases in Australia in 2002, and the most common notifiable diseases were, sexually transmitted infections (32%), gastrointestinal infections (27%) and blood borne infections (24%). Vaccine preventable diseases including measles accounted for 12% of notifiable infectious diseases in Australia in 2002. Other notifiable infectious diseases in Australia during that period included vector-borne diseases, zoonotic infections, Vibrio cholerae O1, infective hepatitis and other bacterial diseases [17].

Hasan reported that crusted scabies became a formally notifiable disease in the Northern Territory of Australia in 2016 [18].

Sunderkötter emphasized that scabies is not a notifiable infectious disease in Germany [19], while Kosanović Ličina *et al*. emphasized that scabies is a notifiable disease in Croatia [20].

Mao *et al.* reported their observations during the pre-covid-19 era which suggested that tuberculosis, scarlet fever, measles, influenza, and mumps were the major notifiable respiratory infectious diseases in China. They noticed that the incidence of tuberculosis, measles, and mumps was decreasing, while the incidence of scarlet fever and influenza was increasing [21].

CONCLUSION

Notifiable infectious diseases in Iraq were associated with a significant mortality during the year 2020, and that was because of the emergence of covid-19 disease as a new notifiable infectious disease in Iraq.

Covid-19 disease, the most common notifiable infectious disease in 2020 changed the previously reported national mortality pattern.

Contradictory, to the general belief that mortality associated with covid-19 disease was generally restricted to the older age groups, 117 children under the age of ten years died because of covid-19 disease in 2020. This number of childhood deaths suggests the need to consider vaccination of the younger age groups and to perform the relevant research.

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