

Zoonosis in Iraq from 2014-2018: An epidemiological study

Hasan Hadi Ali^{1*}, Ali Jawad Alyasiri²

¹Jabir Ibn Hayyan Medical University Najaf, Iraq. Email: [hassanalhelale92\[@\]gmail.com](mailto:hassanalhelale92[@]gmail.com)

*Corresponding Author.

²Department of Biology, Science College, Al-Muthanna University, Iraq.

Email: [ali.abdulaali.sci\[@\]jmu.edu.iq](mailto:ali.abdulaali.sci[@]jmu.edu.iq)

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Abstract:

Zoonosis are diseases that arise from animals where humans contract infectious diseases from animal reservoirs, either naturally or through zoonotic vectors. Multiple databases like PubMed, Google Scholar, Research Gate were searched to collect scientific research articles on 'Zoonosis' in Iraq. Articles were identified through a comprehensive search of the literature and by references from many articles identified through the search process. In addition to the plan for the control of zoonotic diseases issued by the Ministry of Health and Environment / Department of Public Health. On the basis of this review, the numbers of zoonosis during the mentioned five years are compared through a line graph. Emphasis is placed on the increasing annual burden of zoonosis on public health in Iraq. The effects of various factors such as animal husbandry, urbanization, poverty, climate change, and adaptation to pathogens on the emergence of zoonosis are discussed in this article. Public health sectors in Iraq need to be proactive by emphasizing effective periodic surveillance, prior assessment or prediction of zoonosis and public health support. Some zoonotic diseases pose a significant public health threat to humans, while others may cause significant agricultural and social or economic impacts. The well-known nature of many aspects of zoonosis has always been a challenge in preparing for and responding to zoonotic threats at the human-animal interface of the environment, highlighting the critical need for a multifaceted and articulate approach to health to address this health. threats. To meet the challenges of zoonosis in Iraq, one common priority has been identified for zoonosis and individual health systems.

Keywords: Zoonosis, Public health, infectious diseases, Iraq.

Introduction

A zoonotic disease is an infectious disease of humans caused by a pathogen (infectious agent, such as a bacteria, virus, parasite, or prion) that spreads from an animal (usually a vertebrate) to humans. Usually, the first infected person transmits the infectious agent to at least another human, who in turn transmits the infection to others [1]. A zoonotic disease can be defined as the transmission of disease between

humans and animals that occurs due to contact between these two groups. Zoonosis in humans began fourteen thousand years ago when dogs were domesticated for hunting. Many species were domesticated at a later time for the purpose of obtaining meat or dairy products. These animals include goats, horses, cattle and pigs, which contribute to the spread of these diseases [2]. The World Health Organization (WHO) defines zoonosis as those diseases and infections that are naturally transmitted between vertebrates and humans, and diseases that are common between vertebrates and humans. Zoonosis include viral (rabies, yellow fever, influenza, CCHF, etc.), bacterial (anthrax, brucellosis, plague, etc.), protozoa (toxoplasmosis, leishmaniasis, etc.), helminthes (hydatid disease, etc.) [3]. Zoonotic diseases affect not only human health and life, but also animal life. It has recently been reported that more than 72% of infectious diseases are caused by zoonotic pathogens in humans. While significant progress has been made in the management and control of the disease, there are still a large range of areas where pet infection persists. Over the past three decades, Iraq has suffered from many security, social and economic problems that have led to ideal conditions that have led to the spread of many diseases (including zoonosis). The economic impacts of endemic zoonosis, which occur frequently, remain largely undetermined [4].

In the current project, we assume that the incidence of zoonoses in Iraq is highly associated with poor hygiene and poor economic and health status. In the current research, we chose Iraq, the most affected by zoonoses in the Arab countries, to learn about early diagnosis, response to emerging diseases, as well as to deter epidemics.

Research methodology and method

Demographic indicators

As of 2021, the population of Iraq is projected at 41.18 million, up by 2.38% compared with 40.22 million in 2020. Iraq is ranked 36th in terms of population and 39th in terms of population growth rate. There are 1.15 million births in Iraq in 2021. That is 3,150 per day, which is ranked 26th. The crude birth rate is 27.81 per 1000 people. There are 0.19 million deaths in Iraq in 2021. That is 530 per day, which is ranked 49th. The crude death rate is 4.69 per 1000 people. 30.31 million people are living in urban areas, which is 71.12% of Iraq population. Iraq is ranked 97th in terms of urbanization. The Sex Ratio in Iraq in 2021 is 102.52 males per 100 females. There are 20.85 million males and 20.33 million females in Iraq. The percentage of female population is 49.38% compare to 50.62% male population. Iraq has 0.51 million more males than females. Iraq is at 169th position out of 201 countries/territories in terms of female to male ratio [5].

The Importance of research

The goal is a result that the researcher seeks to reach and then formulates those Results in a form that sheds light on the goals about the phenomenon of the most dangerous and deadly diseases in Iraq. The most important objectives of the study can be identified as follows (1) Knowing the increased incidence of communicable

- disease. (2) Follow-up of the temporal development of communicable diseases in Ira. (3) To identify the immediate and future consequences of communicable diseases.

Data and information sources

The study relied on the data provided by the communicable disease patients' records at the Communicable Disease Control Centers and patients' files in governorate hospitals and centers. In addition to the plan to combat zoonotic diseases issued by the Department of Health Planning, Ministry of Health and Environment / Department of Public Health.

Results and discussion

Cutaneous and Visceral Leishmaniasis

Visceral leishmaniasis (VL) is a parasitic disease found mainly in tropical and subtropical regions. It is a chronic systemic disease that mainly affects children under the age of five; It may be associated with malnutrition and other conditions of immunosuppression such as HIV/AIDS. If adequate treatment is not started in time, it can progress to death in 90% of cases [6]. The following is a table 1 showing the numbers of injuries and deaths during the 2014-2018:

Table 1. Numbers of injuries and deaths in Iraq from 2014-2018

Year	Numberof injuries	njury rate per 100,000 population	Deaths	Death rate % of injuries
2014	381	1.06	19	5
2015	437	1.18	14	3.2
2016	183	0.48	1	0.5
2017	172	0.46	2	1.16
2018	259	0.67	2	1.15

Cutaneous leishmaniasis is the most common form of leishmaniasis. It is caused by over 15 different species of the protozoan parasite *Leishmania*, transmitted by infected female sandflies [7]. Table 2 showing the numbers of injuries during the 2014-2018.

Table 2. Numbers of injuries and in Iraq from 2014-2018

Year	Numberof injuries	njury rate per 100,000 population
2014	2920	8.11
2015	17525	47.44
2016	17566	46.42
2017	18854	77,50
2018	11426	97,29

Leishmaniasis remains a serious public health problem in Iraq. The current review proved that leishmaniasis has increased and spread in most governorates of Iraq, and the reason may be clear population growth, poverty and lack of health culture. Moreover, leishmaniasis has spread in Iraq since the fifties until now, in addition to the wars and problems that forced the Iraqi people to migrate from their provinces to other places. All this encouraged an increase in leishmaniasis cases in previously uninfected areas [8].

Toxoplasmosis

Toxoplasma gondii is an obligate intracellular parasite and the causative agent of Toxoplasmosis. Cats and members of Felidae family are definitive hosts while humans and other mammals are intermediate hosts for the parasite. People become infected with *Toxoplasma gondii* through contact with the feces of infected animals (such as cat feces). A healthy person usually does not need treatment for toxoplasmosis, as symptoms are mild and usually go away within a few weeks. Pregnant women and people with weakened immune systems should take precautions against toxoplasmosis. A pregnant woman should avoid contact with cats, as her unborn baby is at increased and dangerous risk of birth defects if the parasites cross the placenta [9]. A noticeable decrease in the number of cases can be observed in Iraq during the years 2014-2018. The reason for this may be due to poor registration and follow-up of cases, as well as the lack of diagnostic and treatment numbers in the public sector, as well as the lack of cooperation between the private and public sector in monitoring injuries figure 1.

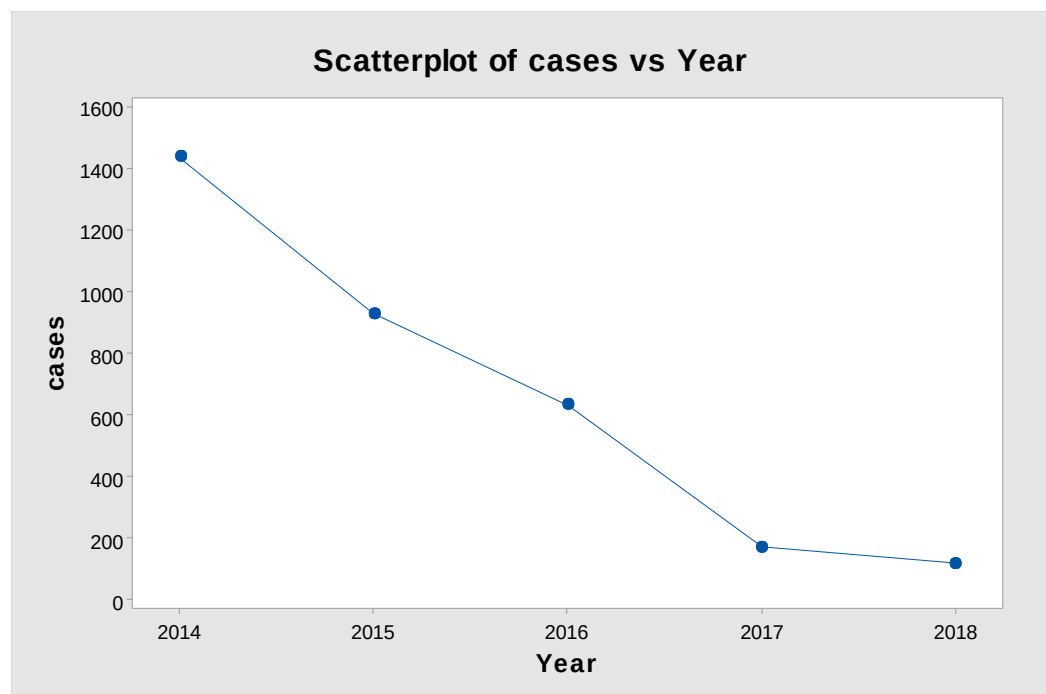


Figure 1. Distribution of toxoplasmosis infections according to the years 2014-2018 in Iraq.

Echinococcosis, hydatid cysts

Echinococcus is a common parasitic disease that is transmitted from animals to humans. This disease occurs as a result of the presence of cysts of different sizes and is caused in humans by the larval stage. It is also called the cystic stage of the *Echinococcus*. Animals are considered to be herbivores such as sheep, goats, and cows are the intermediate reservoirs of this parasite, while carnivores such as dogs, and wolves are among the final hosts of adult worms. Humans are considered an occasional intermediate host for this parasite. Figure 2 showing Distribution of infections during the years 2014-2018, Iraq.

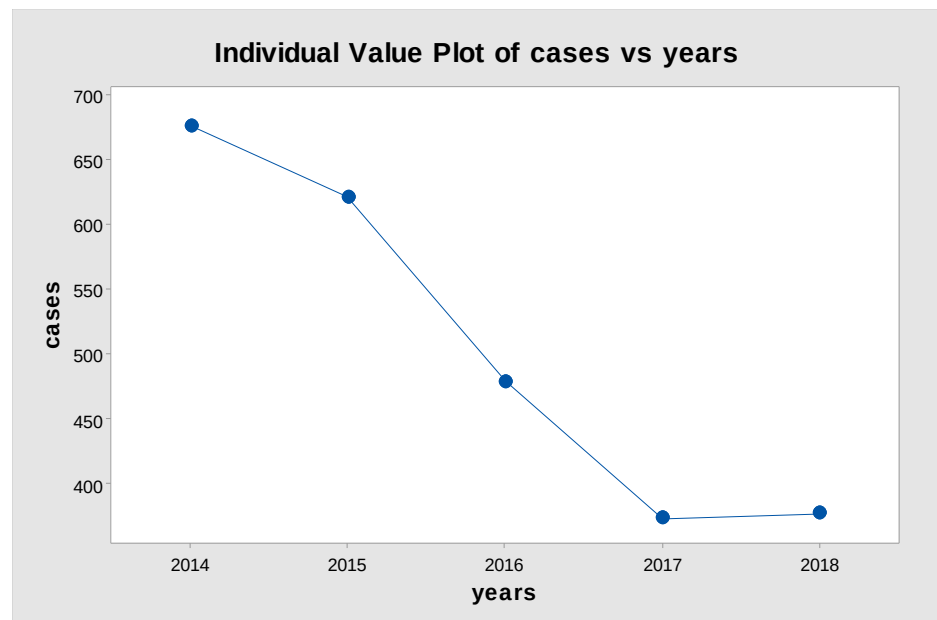


Figure 2. Distribution of echinococcosis infections during 2014-2018, Iraq.

Hydatid disease is an important public health problem in Iraq, where it is endemic in the central area of the Mesopotamian plain, which is the main agricultural zone. Sheep are raised there in great numbers and the inhabitants are closely crowded together with dogs in mud-built huts. The true incidence is difficult to estimate on the basis of available hospital statistics. During the last 20 years 976 patients were operated on for hydatid disease in the Republic Hospital in Baghdad, a rate of 1 in 292 of patients admitted. In 166 (17%) the cysts were located in the lungs. The numbers work out approximately at 1 patient with hydatid disease a week [10]. Hydatidosis a very important disease in Iraq, but control programs require greater education for farmers, making people aware about this disease and controlled conditions for the slaughter of livestock [11].

Brucellosis

Brucellosis is one of the most common animal diseases, with a history dating back to 1937 in Iraq, when it was isolated for the first time by an Iraqi doctor. In order to find a solution to the persistent devastating effects of the disease on humans and livestock, the Brucellosis Control Program was established in the year 1995. The main responsibilities of this program were to develop and implement appropriate strategies to control the disease. After the war in 2003, the Food and Agriculture Organization of the United Nations (FAO) developed a strategic plan to control the disease. The main objective of the project was to improve productivity and reduce the prevalence of disease in sheep and goats to less than 2%, and less than 0.2% in cattle and buffaloes. As for the incidence of brucellosis among humans, the clear decline began in the central and southern regions of Iraq with the vaccination phase of the control program in 2006. The results represented a significant decrease among humans after only four vaccination campaigns for a program that was supposed to last for 15 years [12]. Figure 3: showing Distribution of Malta fever cases for the years 2014-2018, Iraq.

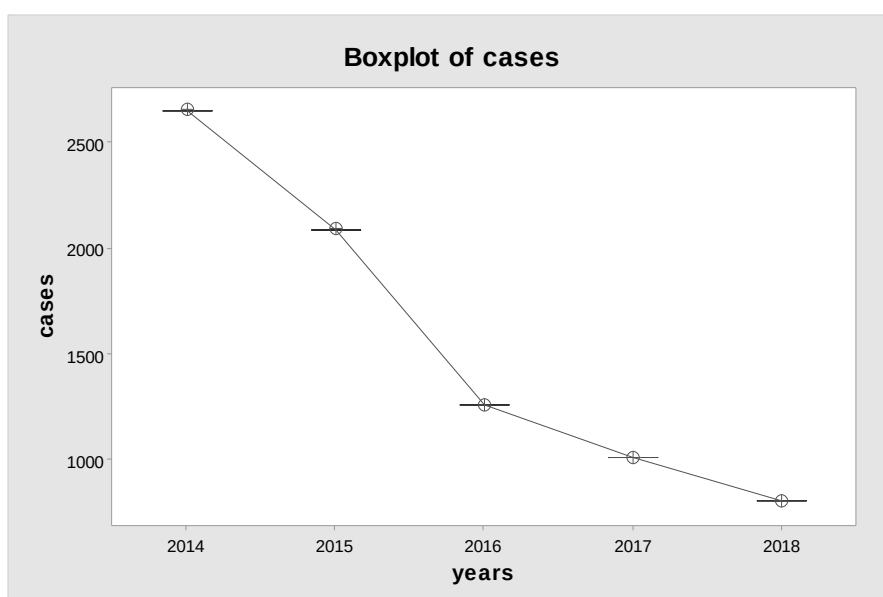


Figure 3. Distribution of Malta fever cases for the years 2014-2018, Iraq.

Anthrax

Anthrax is primarily a zoonotic disease of herbivores caused by a bacterium called *Bacillus anthracis*. Humans generally contract the disease directly or indirectly from infected animals, or through occupational exposure to infected or contaminated animal products. Human *anthrax* is generally not contagious, although there are rare records of person-to-person infection. Anthrax bacteria can survive in the environment for decades by forming spores that surround themselves. The most common type called cutaneous anthrax (more than 95% of cases), it creates dark sores on the skin, from which it gets its name. Figure 4: showing Distribution of anthrax infections by years 2009-2018, Iraq.

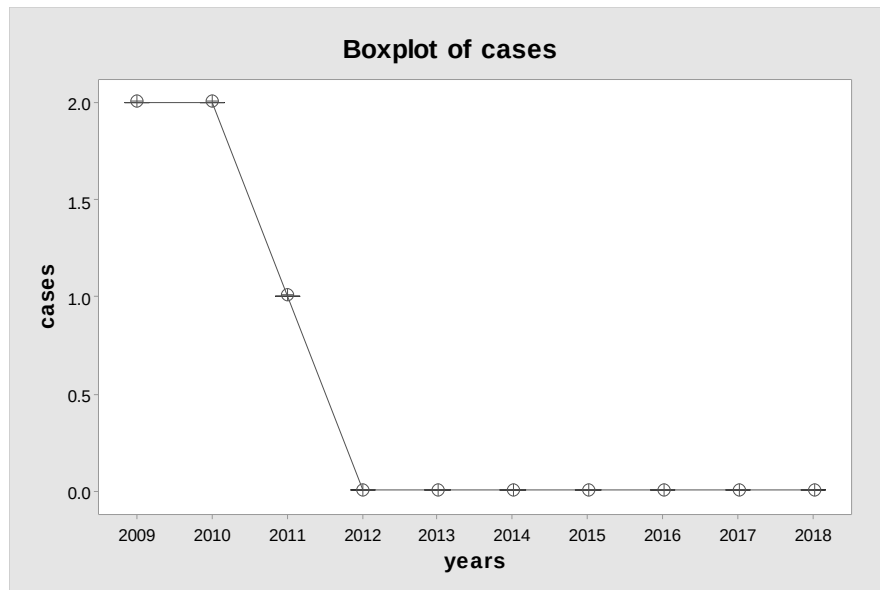


Figure 4. Distribution of anthrax infections by years 2009-2018, Iraq

Anthrax is a zoonotic disease of herbivores caused by bacteria called *Bacillus anthracis*. Humans usually contract the disease directly or indirectly from infected animals, or through direct occupational exposure to infected animal products. Outbreaks of human anthrax have been reported in areas of the eastern Mediterranean such as Pakistan, Iran, Iraq, Afghanistan, Morocco and Sudan. Approximately ninety-five percent of the possibilities are transmission of spores by bacteria from the World Health Organization (WHO)[13].

Crimean Congo Hemorrhagic Fever

Iraq is one of the eastern Mediterranean countries where the disease is endemic. It has been reported in Iraq since 1979 when the disease was first diagnosed in ten patients in the same year. Since then, six cases have been reported between 1989 and 2009; as well as 11 cases in 2010; Three fatal cases were reported in 2018; Recently, 33 confirmed and diagnosed cases including 13 deaths were reported in 2021. Sheep and livestock farming are very common in Iraq. Studies have shown that these animals are regularly infected with ticks, especially *Hylomma* species, the main carrier of the disease [14].

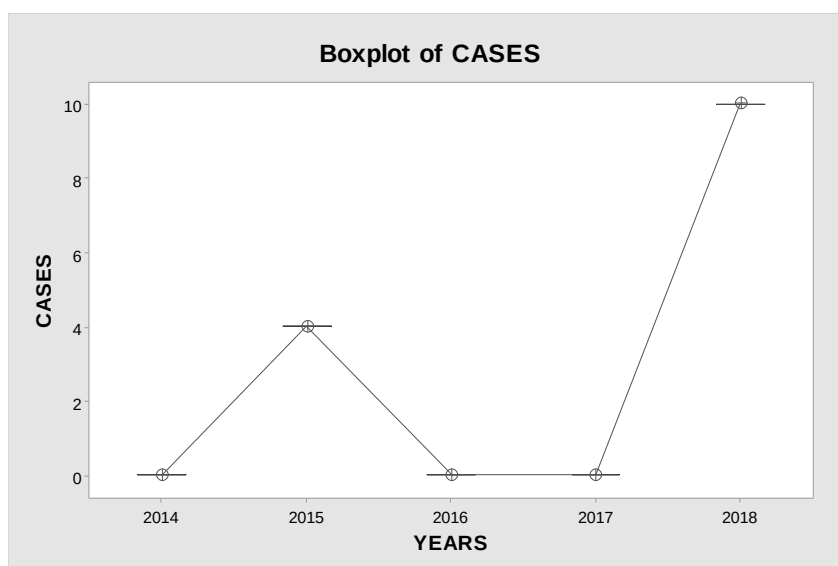


Figure 5. Distribution of Crimean-Congo hemorrhagic fever infections for (2014-2018), Iraq.

Viral hemorrhagic fever is a clinical disease that has become a serious threat to humans and animals. One of the many hemorrhagic fevers is Crimean-Congo hemorrhagic fever (CCHF), an acute, highly contagious, tick-borne zoonotic viral disease that is listed as a notifiable disease. The disease is widespread worldwide with hemorrhagic manifestations and significant mortality in humans, but there are no specific clinical symptoms in animals. The disease is caused by the Crimean-Congo hemorrhagic fever virus, which is a member of the genus *Noroviruses* within the family *Bunyaviridae*. This family includes more than 300 species grouped into five distinct genera [15].

Rabies

Rabies disease: is an acute and fatal viral encephalitis, and it is a common disease that affects wild mammals such as wolves, hyenas and foxes, from which it is transmitted to domestic animals such as dogs, cats and other mammals, which is fatal in the vast majority of cases if clinical signs appear. Today, due to acute progressive encephalitis, this disease is endemic in more than 150 countries worldwide. Although the disease is preventable, it kills an estimated 59,000 people annually. About 40% of the victims of the disease are children under the age of fifteen who live in Asia and Africa [16]. The virus is transmitted from the saliva of infected animals to humans by biting, scratching, or contact of saliva with mucous membranes. The causative agent is the rabies virus, which belongs to the family *Rhabdoviridae* of the genus *Lysavirus*, and the reservoir is the dog, which is the main reservoir for the disease in addition to other infected wild and domestic mammals. The incubation period for rabies usually ranges from two to three months, the World Health Organisation (WHO) and partners have set a target for the global elimination of dog-mediated human rabies, through control of the disease in dogs, by 2030.

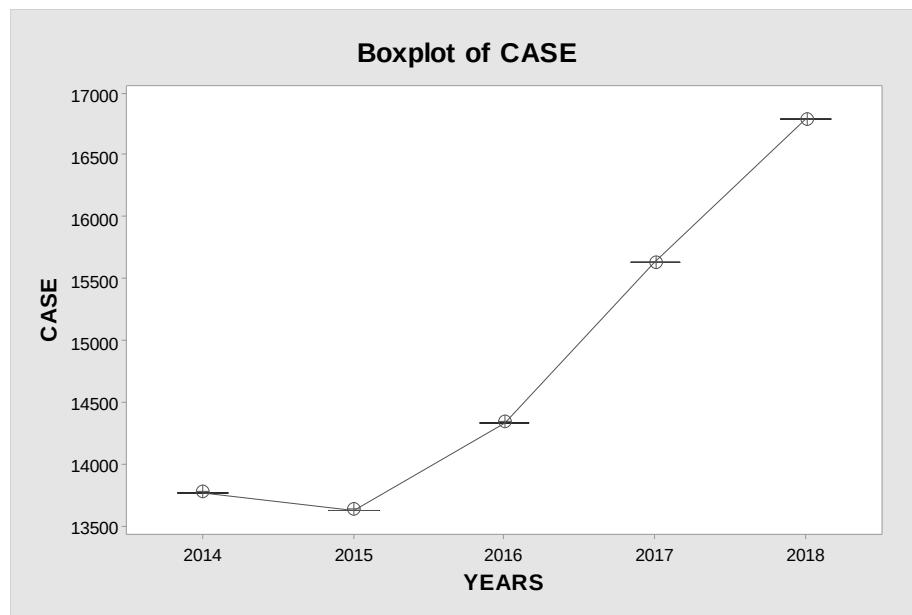


Figure 6. Distribution of people exposed to animal bites for the years 2014-2018, Iraq.

Conclusion

In conclusion, zoonotic diseases are common and cause serious diseases and have significant economic repercussions in Iraq. Many zoonotic diseases are endemic in Middle Eastern countries, especially Iraq. The spread of zoonotic intestinal infections is a major cause of diarrhoea, especially among children in rural areas. Some zoonotic diseases such as cutaneous leishmaniasis are restricted to specific geographical areas. One of the most important diseases studied was hydatidosis, which represents a major threat to health in the region. The inhabitants of the Middle East are at risk of infection from various animal organisms, due to their way of living, their cultural and dietary traditions, their proximity to and interaction with the animal economy. Global and local health efforts should include a program of public health education, which supports water, food, sanitation, animal care, and hygiene development. It is then recommended that public programs be implemented, to educate people about zoonoses and how they infect humans. Public education should address how to care for and improve the health of people's pets. This indicates the need for multidisciplinary cooperation between the Ministries of Agriculture, Health and Environment in all Middle Eastern countries, especially Iraq, to prevent the emergence of these virulent zoonoses, a modern-day scourge that causes great human suffering.

Zoonoses constitute a significant burden in Iraq, interactions at human-animal and human-wildlife interfaces contribute to the transmission of zoonoses, with a wide variety of hosts and vectors playing roles. Zoonoses have a dual impact on animal production systems and human health. Lack of diagnostic tests and clinical awareness of many zoonotic diseases, which is reflected in low levels of diagnosis in clinical settings. The "One Health" approach, which includes the combined efforts of

veterinarians, physicians, public health workers and epidemiologists, is central to policy outlines aimed at controlling such diseases and preventing their transmission.

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