

# The epidemiological status of Brucellosis in Divandarreh city, Kurdistan province, Iran, in 2020

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## Abstract

**Background:** Brucellosis, a zoonotic bacterial disease, is transmitted directly or indirectly from infected animals to humans. This disease has been endemic in Iran for many years, including in Kurdistan province, where it is one of the most common infectious diseases.

**Objectives:** This study aimed to investigate the epidemiological status of Brucellosis in Divandarreh city, Kurdistan Province, Iran, in 2020.

**Methods:** This was a retrospective-analytical study of all patients with Brucellosis who were referred to Divandarreh Health Center in 2020. Demographic and clinical data of all patients were recorded.

**Results:** In 2020, 195 cases of human brucellosis were reported to the Divandarreh Health Center. Of these, 6 (3.1%) patients were from urban areas, and 189 (96.9%) were from rural areas. One hundred and two (52.3%) patients were male, and 93 (47.7%) were female. The highest frequency of brucellosis was observed among housewives, with 81 (41.5%) patients in this category. The age group with the highest frequency of brucellosis was 20–40 years old, accounting for 47.7% of the total cases.

**Conclusion:** In the present study, most cases of brucellosis have been reported in rural areas. The majority of the population of Divandarreh lives in villages that have direct contact with livestock, so planning to increase vaccination for livestock in these areas can be a potential solution to reduce the frequency of the disease.

**Keywords:** Epidemiology, Brucellosis, Zoonosis, Iran.

## Introduction

According to the reports of the World Health Organization (WHO), among 1709 pathogenic agents, 832 agents (49%) are transmitted from animals to humans.<sup>1</sup> Brucellosis is a systemic infection caused by intracellular bacteria of the genus *Brucella* that is passed from animals to humans (zoonosis) and is also known as Gibraltar or rock fever, Bang's disease, Mediterranean fever, Maltese or Malta fever, undulant fever, or Cyprus fever.<sup>2</sup>

This disease occurs in humans in acute, subacute, chronic, and localized forms. Brucellosis is transmitted from animals to humans through contaminated food products, direct contact with infected animals, or inhalation of airborne particles, so the most common way

of transmission is eating and drinking raw or non-pasteurized dairy products.<sup>2</sup>

Malt fever disease, as the most common bacterial disease shared between humans and animals, with an estimate of more than half a million new cases every year around the world, is still a concern from both public health and economic aspects.<sup>3</sup> The prevalence of this disease varies widely from one country to another, so the frequency of brucellosis is higher in agricultural societies and in areas where contact with animals is prevalent.<sup>4</sup>

The epidemiology of this disease has changed dramatically in the last ten decades, and these changes are related to major political and social events.<sup>5</sup> While the incidence of the disease in Eastern, Middle Eastern, and

North African countries is still high, in Latin American countries (except Mexico and parts of Peru) and southern European countries (although at a slower rate in Greece), it is decreasing to a great extent.<sup>6</sup>

In the Eastern Mediterranean, five countries (Syria, Saudi Arabia, Iraq, Iran, and Lebanon) are among the top ten countries with the highest incidence rate in the world. Iran is one of the countries with the highest annual incidence rate of 8–50 cases per 100,000 people in the world.<sup>7</sup>

By examining the incidence and prevalence of disease in Iran, it can be seen that the disease has been increasing from 1980 to 1990. From 1990 to 2010, with the start of the first and second national development programs, it decreased from 170 cases to 15.9 cases per hundred thousand people.<sup>8</sup> In 2006, following the success of increasing livestock vaccination coverage in Iran, the disease trend has been decreasing, although malt fever still occurs in most parts of the country with a high incidence.<sup>9</sup> According to the report of the Department of Zoonotic Diseases of Iran, the number of malt fever cases in the country increased by 55% during 2010–2013, resulting in an incidence of 166% in Kurdistan, 50% in Kermanshah, 128% in Hamedan, 95% in Zanjan, 83% in West Azerbaijan, 82% in Qazvin, and 50% in Kohgiluyeh and Boyer Ahmad in 2013.<sup>10</sup>

## Objectives

One of the most crucial prerequisites for implementing effective health programs for the prevention, control, and eradication of the disease in each region is to have appropriate statistics and epidemiological information. Considering that this disease has been endemic in Iran for many years and is one of the most common infectious diseases in Kurdistan province and Divandarreh city, this study aims to investigate the epidemiological status of Brucellosis in Divandarreh city, Kurdistan Province, Iran, in 2020.

## Methods

This descriptive study was conducted in Divandarreh in 2020. The study included all patients with malaria fever with a definite diagnosis. A definitive diagnosis of malaria fever was made according to the standard definition,

which involves having clinical symptoms such as fever, headache, loss of appetite, sweating, extreme tiredness, back and joint pain, and a positive Coombs test. All patients who were referred to government health centers and private clinics were included in the study. The information collected included the patients' age, gender, occupation, place of residence (city or village), reason for infection, history of non-pasteurized dairy consumption, and season of infection.

## Statistical analysis

The continuous variables were expressed as the mean±SD, and the categorical variables were presented as a percentage and frequency. Because the data showed a non-normal distribution, the chi-squared test was used to compare. All statistical analyses were performed with SPSS (version 16.0, SPSS Inc., Chicago, IL, USA). A "P-value" less than 0.05 was considered significant.

## Ethical considerations

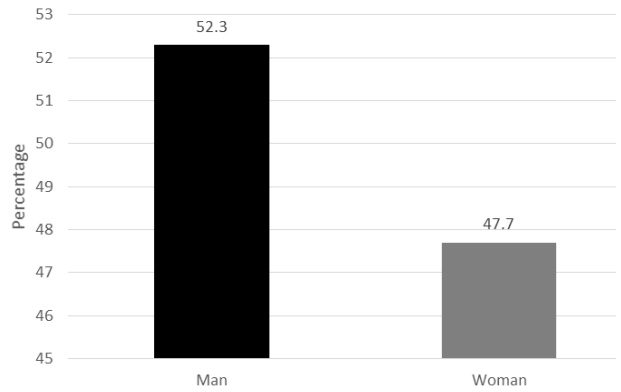
The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval was obtained.

## Results

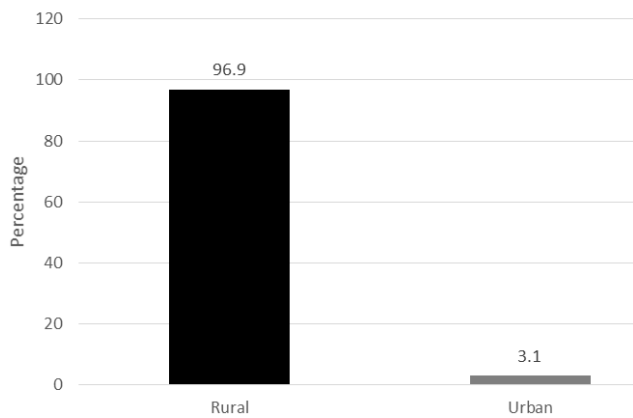
In 2020, 195 cases of human malaria were reported to the health center of Divandarreh city. Regarding geographical distribution, 6 people (3.1%) were from the urban area, and 189 people (96.9%) were from rural areas [Figure 1]. The statistics of malaria patients according to gender were: 102 cases (52.3%) were male and 93 cases (47.7%) were female, and the ratio of male to female was 1.09 [Figure 2]. Regarding age, most cases of malaria were reported in the age group of 20–40 years (47.7%) [Figure 3]. According to the frequency chart of infected people regarding occupation, the highest frequency was related to housewives, with 81 cases (41.5%) [Figure 4]. Regarding seasonal distribution, as shown in Chart 4, the highest rate of disease with 38 cases was reported in July (19.5%) and in the summer season [Figure 5].

The mean age of the patients at the time of the disease was 36.9±15.6 years old, 37.1±16.4 years old in men, and 36.7±14.7 years old in women, and this difference was not statistically significant ( $p=0.92$ ). In the comparison of the

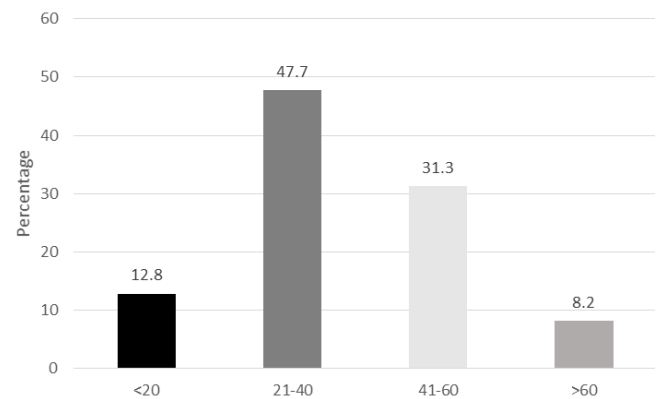
mean age of the patients living in the city and the village, the mean age of the rural patients was  $36.8 \pm 15.7$ , and for the urban patients it was  $40.6 \pm 11.5$ . No significant differences were observed ( $P=0.55$ ). In examining the relationship between the type of disease (new cases or recurrence) and the history of hospitalization, there was a significant relationship ( $P<0.05$ ). No significant relationship was observed between the type of disease and the place of residence, history of contact with livestock, age groups, gender, occupation, illness of other family members, and consumption of dairy products ( $P<0.05$ ).



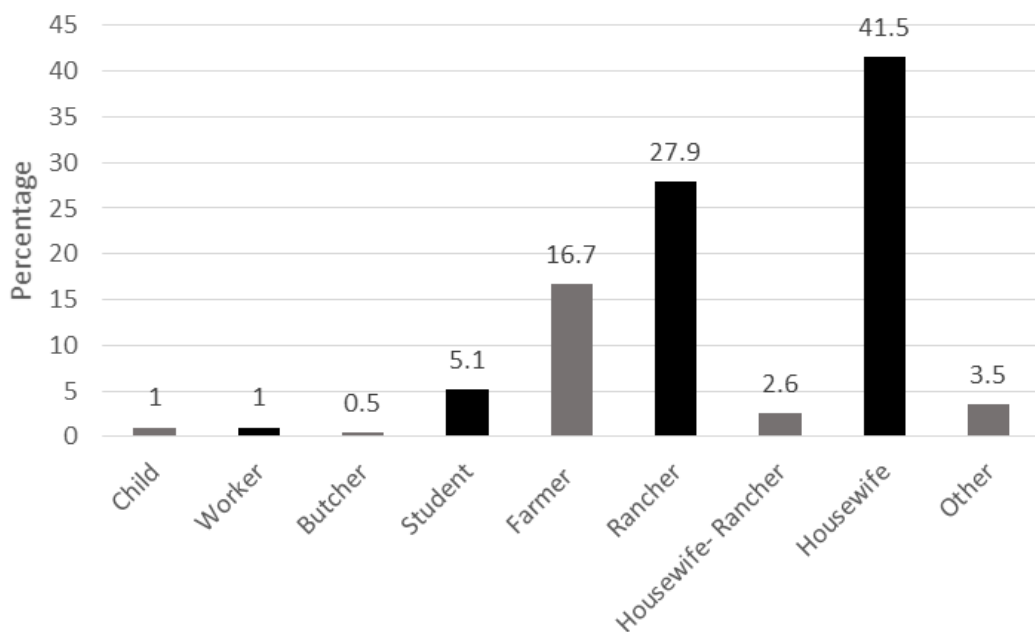
**Figure-2.** Frequency of Brucellosis based on gender (n=195) (Divandarreh city-2020)



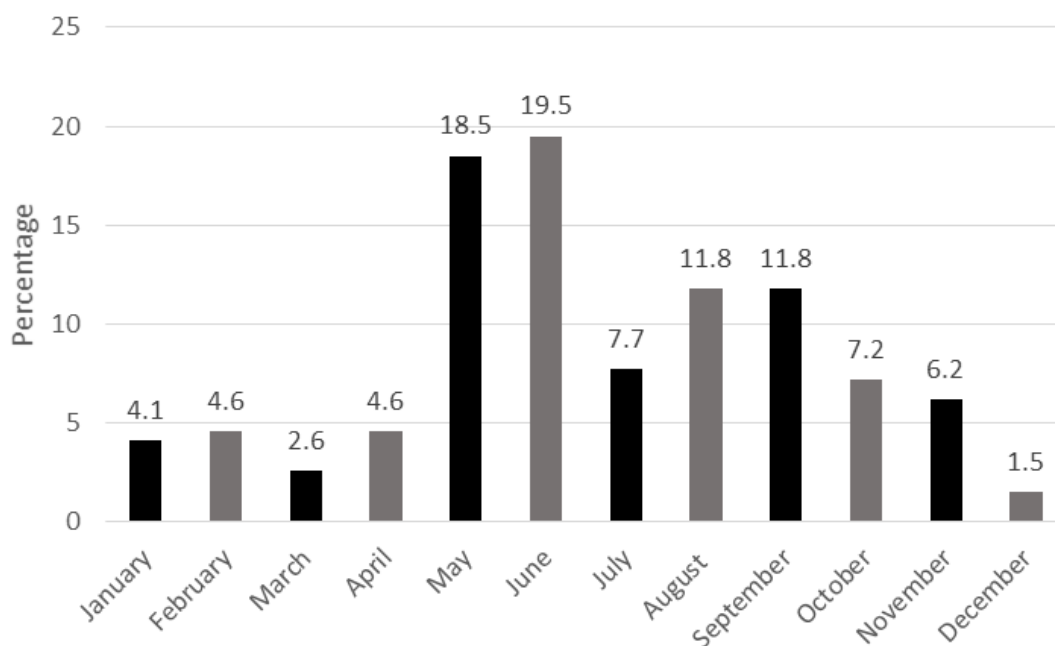
**Figure-1.** Frequency of Brucellosis based on place of residency (n=195) (Divandarreh city-2020)



**Figure-3.** Frequency of Brucellosis based on age group (n=195) (Divandarreh city-2020)



**Figure-4.** Frequency of Brucellosis based on occupation (n=195) (Divandarreh city-2020)



**Figure-5.** Frequency of Brucellosis based on month (n=195) (Divandarreh city-2020)

## Discussion

In this study, most cases of malaria were reported in rural areas because the majority of the population in Divandarreh lives in villages and the majority of rural people are engaged in agriculture and animal husbandry, resulting in greater contact with livestock. Although men are more affected than women (52.3% of men and 47.7% of women), most cases of the disease were observed in housewives (41.5%). Most cases of the disease were reported in the summer season, with 19.5% of cases occurring in July. Additionally, the majority of cases were seen in the age group of 20–40 years old, which is why this age group is more active in terms of earning and employment.

In the study conducted in 2015 in Amol, north of Iran, the most cases of brucellosis were recorded in men (62.1%); also, 68.2% of the infected were from rural areas, and most of the cases occurred in the summer (30.6%). Additionally, the most cases were found in housewives, which is consistent with our study.<sup>11</sup>

In another study conducted in Quchan city, northeast of Iran, in 2013, 54.9% of participants were male and 87% were rural, which is consistent with the current study. Additionally, in this study, the highest prevalence was reported in the spring season, and in terms of occupation,

the highest frequency was observed among livestock farmers with 25.95%.<sup>12</sup>

In the study of Isfahan province, located in the center of Iran, in 2012, most cases of the disease were found in men (69.9 percent), and 87.7 percent of cases were located in rural areas, which is consistent with the current study. In this study, housewives and farmers had the highest percentage of patients, while children had the lowest percentage.<sup>13</sup>

In the study of Gilan-e Qarb city in Kermanshah province, west of Iran, the highest incidence of disease was observed in the occupational group of livestock breeders and farmers. The most common season for the disease was spring, and the highest rate of disease transmission occurred in cases of unpasteurized milk consumption.<sup>14</sup>

In the study of Khorasan Razavi province in the east of Iran, the most cases occurred during the months of May to September, and 85% of the patients were from the village, with men accounting for 56.9% of the cases. The occupations of housekeepers, farmers, and livestock farmers had the most cases of the disease, and the results of this study are consistent with the present study.<sup>15</sup>

The results of the study of Kermanshah province in 2012 show that 47.4% of patients were female, and most of the patients (81.9%) stated that the use of raw milk was the

cause of the disease. Additionally, most cases of the disease have been seen in villagers and in the seasons of spring and summer.<sup>16</sup>

In the study of Baneh city, Kurdistan, west of Iran, in 2012, the majority of cases were found in men (52%), and the most common occupational cases were related to livestock farming (50.4%). Additionally, 85.9% of the cases occurred in the village, and the majority of cases were recorded in spring and June.<sup>17</sup>

In the epidemiological study of brucellosis in North Khorasan province, east of Iran, 55.3% of the cases were male. The majority of patients (71.5%) resided in villages, which is consistent with the present study. Furthermore, the most observed cases were also found in spring and June.<sup>18</sup>

In the current study, we did not have access to all relevant data on malt fever, which is a limitation of this study.

## Conclusions

Considering the high prevalence of malt fever among villagers and particularly among housewives, raising awareness among villagers about this issue and implementing measures such as mechanizing livestock farms and vaccinating livestock in this area can be an effective solution to reducing the prevalence. Therefore, due to the significant economic and social impact of this disease, it is essential to prioritize malt fever as a health issue and utilize all available resources to combat it.

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## Competing interests

The authors declare that they have no competing interests.

## Abbreviations

World Health Organization: WHO

## Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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## Availability of data and materials

The data used in this study are available from the corresponding author on request.

## Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval was obtained.

## Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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