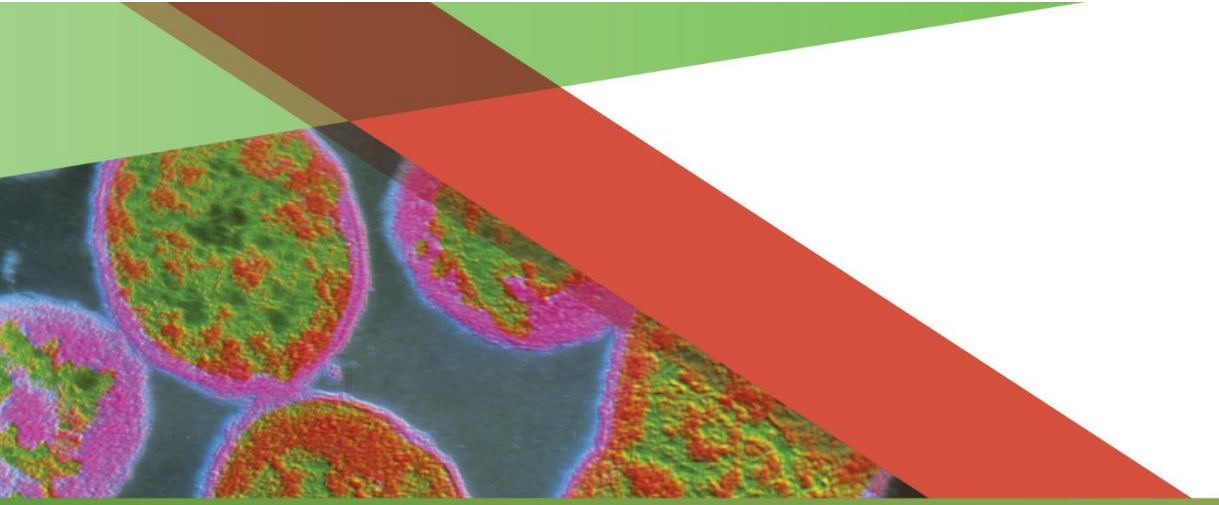


SURVEILLANCE REPORT

Brucellosis

Annual Epidemiological Report for 2022

Key facts

- In 2022, 199 confirmed brucellosis cases were reported in the EU/EEA.
- The notification rate in the EU/EEA was 0.04 cases per 100 000 population. As in previous years, Greece reported the highest notification rate (0.33 cases per 100 000 population).
- After a significant decline in notification rates in 2020, primarily because of the COVID-19 pandemic, the EU/EEA notification rate increased in 2021–2022.
- The highest rates were detected in males over 65 years of age (0.08 per 100 000 population) and in females between 45–64 years old (0.04 per 100 000 population).

Introduction

Brucellosis is an infection caused by *Brucella* bacteria. Brucellosis occurs worldwide, but the Mediterranean region has been particularly affected. Humans can get the disease when they are in contact with infected animals (sheep, goats, cattle, pigs and dogs) or contaminated animal products (unpasteurised milk and dairy products or undercooked meat). The symptoms are both general (fever, weakness, joint pain) and organ-specific (including infections in the brain and heart valves). If untreated, brucellosis can become chronic or lead to death.

Methods

This report is based on data for 2022 retrieved from The European Surveillance System (TESSy) on 1 February 2024. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1]. An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

For 2022, 29 European Union/European Economic Area (EU/EEA) countries reported brucellosis data. In Denmark, brucellosis is neither notifiable nor under surveillance. The notification of brucellosis is mandatory in all reporting EU/EEA countries except for Belgium, where notification is based on another (not specified) system.

Suggested citation: European Centre for Disease Prevention and Control. Brucellosis. In: ECDC. Annual epidemiological report for 2022. Stockholm: ECDC; 2024.

Stockholm, April 2024

Seventeen Member States used the latest case definition (EU 2018), five used the previous case definition from 2012, three reported in accordance with the one from 2008 and four reported using other definitions or did not specify which case definition they used. The majority of Member States (27) undertook passive surveillance and 22 countries had surveillance systems that integrated laboratory and epidemiological data from physicians or hospitals. The surveillance systems for brucellosis have national coverage in all reporting EU/EEA countries. For 2020–2021, Spain did not receive data from all regions which normally report, and the case numbers are therefore lower than expected and no notification rate was calculated. Twenty-eight Member States reported case-based data and Bulgaria reported aggregated data.

In addition to TESSy reporting, information from event-based surveillance for brucellosis clusters or outbreaks with a potential EU dimension was collected through EpiPulse - the European surveillance portal for infectious diseases (europa.eu)

Epidemiology

For 2022, 29 EU/EEA countries reported data on brucellosis. Among these, 18 countries reported 199 confirmed cases. Eleven Member States reported zero cases. France, Germany, Greece, Italy, Portugal, and Spain reported the highest numbers of confirmed cases, accounting for 81% of all cases reported in the EU/EEA. The EU/EEA notification rate for 2022 was 0.04 cases per 100 000 population. Greece had the highest rate at 0.33 per 100 000 population, followed by Luxembourg, Portugal, and Sweden, with 0.15, 0.13 and 0.10 cases per 100 000 population, respectively (Table 1, Figure 1). Luxembourg reported only one confirmed case, but the low population in the country resulted in a relatively high notification rate.

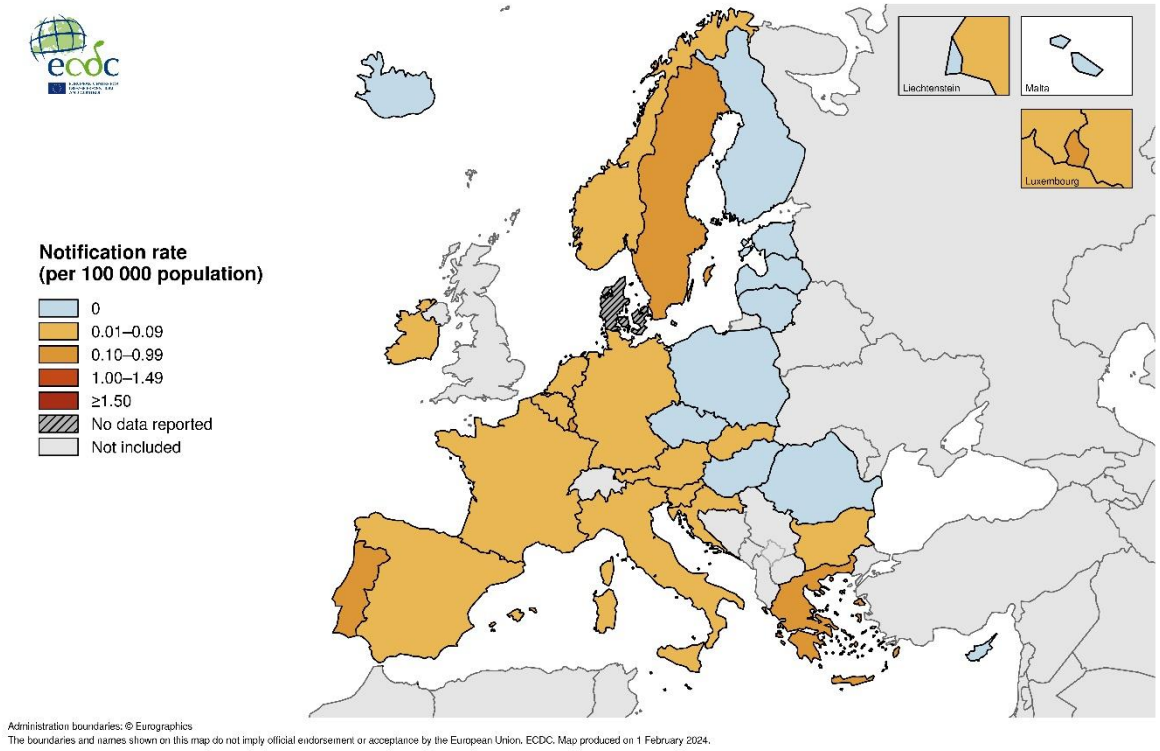
Information on hospitalisation status was provided for 40% (80/199) of confirmed brucellosis cases by 11 countries. Of the cases with known hospitalisation status, the majority (70%; 56/80) were hospitalised. No fatalities were reported.

Table 1. Confirmed brucellosis cases and rates per 100 000 population by country and year, EU/EEA, 2018–2022

Country	2018		2019		2020		2021		2022	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Austria	7	0.08	6	0.07	8	0.09	6	0.07	7	0.08
Belgium	9	0.08	3	0.03	4	0.03	7	0.06	3	0.03
Bulgaria	1	0.01	0	0.00	1	0.01	0	0.00	2	0.03
Croatia	3	0.07	3	0.07	1	0.02	2	0.05	2	0.05
Cyprus	0	0.00	0	0.00	0	0.00	1	0.11	0	0.00
Czechia	4	0.04	4	0.04	0	0.00	1	0.01	0	0.00
Denmark	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC	NDR	NRC
Estonia	1	0.08	1	0.08	0	0.00	0	0.00	0	0.00
Finland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
France	26	0.04	34	0.05	19	0.03	21	0.03	37	0.05
Germany	37	0.04	36	0.04	19	0.02	13	0.02	35	0.04
Greece	97	0.90	65	0.61	30	0.28	24	0.22	35	0.33
Hungary	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Iceland	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Ireland	0	0.00	0	0.00	0	0.00	0	0.00	1	0.02
Italy	94	0.16	49	0.08	18	0.03	32	0.05	20	0.03
Latvia	0	0.00	0	0.00	1	0.05	0	0.00	0	0.00
Liechtenstein	NDR	NRC	NDR	NRC	NDR	NRC	0	0.00	0	0.00
Lithuania	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Luxembourg	0	0.00	0	0.00	0	0.00	1	0.16	1	0.15
Malta	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Netherlands	5	0.03	7	0.04	2	0.01	2	0.01	5	0.03
Norway	3	0.06	4	0.08	2	0.04	3	0.06	1	0.02
Poland	0	0.00	2	0.01	0	0.00	1	0.00	1	0.00
Portugal	19	0.18	33	0.32	9	0.09	10	0.10	13	0.13
Romania	1	0.01	1	0.01	0	0.00	0	0.00	0	0.00
Slovakia	0	0.00	1	0.02	2	0.04	6	0.11	3	0.06
Slovenia	3	0.15	6	0.29	1	0.05	0	0.00	1	0.05
Spain	40	0.09	20	0.04	10	NRC	25	NRC	22	0.05
Sweden	11	0.11	14	0.14	7	0.07	10	0.10	10	0.10
EU/EEA (30 countries)	**361**	**0.08**	**289**	**0.06**	**134**	**0.03**	**165**	**0.04**	**199**	**0.04**
United Kingdom	NDR	NRC	24	0.04	NDR	NRC	NA	NA	NA	NA
EU/EEA (31 countries)	**361**	**0.08**	**313**	**0.06**	**134**	**0.03**	**NA**	**NA**	**NA**	**NA**

Source: Country reports; NDR: No data reported; NRC: No rate calculated; NA: Not applicable.
No data from 2020 onwards were reported by the United Kingdom, due to its withdrawal from the EU on 31 January 2020.

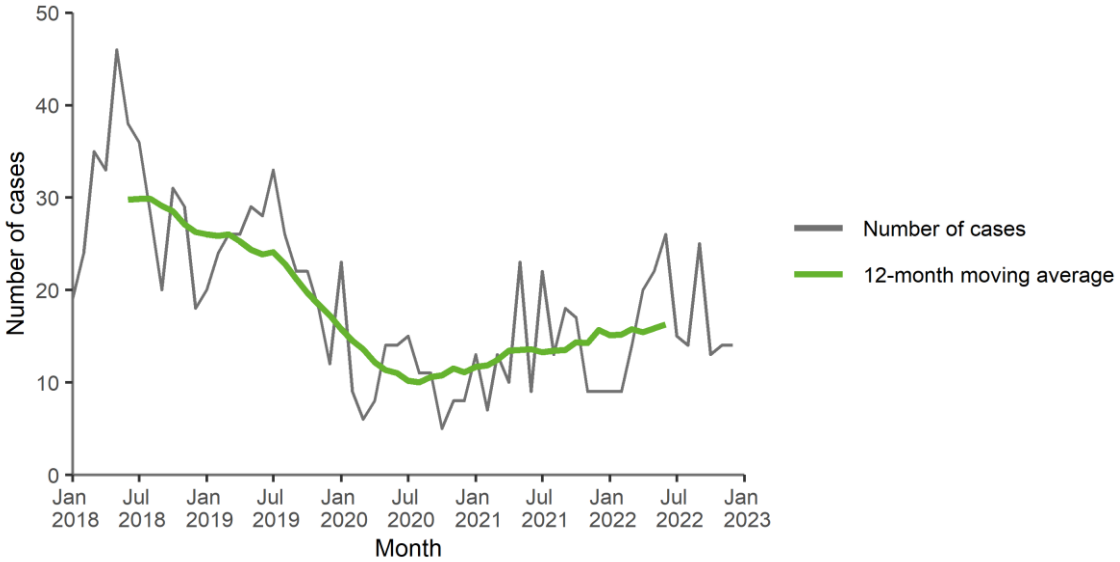
Figure 1. Number of confirmed brucellosis cases per 100 000 population by country, EU/EEA, 2022



Source: Country reports.

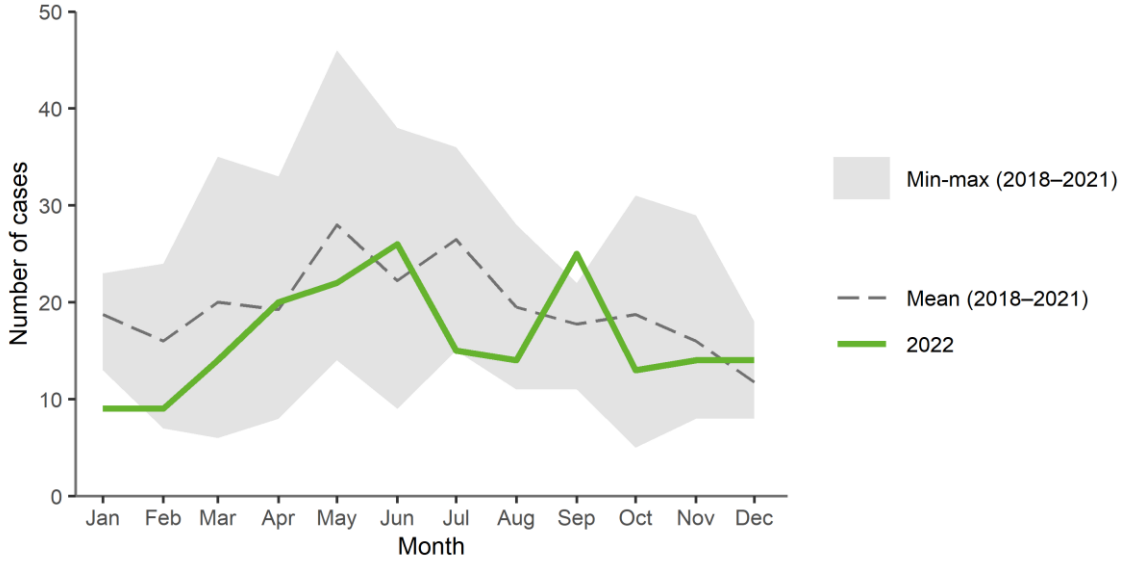
The number of brucellosis cases at the EU/EEA level dropped from 2018 to 2020 and slightly increased in 2021–2022 (Figure 2). In 2022, the lowest number of cases was reported in January and February and the cases peaked in June and September (Figure 3).

Figure 2. Confirmed brucellosis cases by month, EU/EEA, 2018–2022



Source: Country reports from Austria, Belgium, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

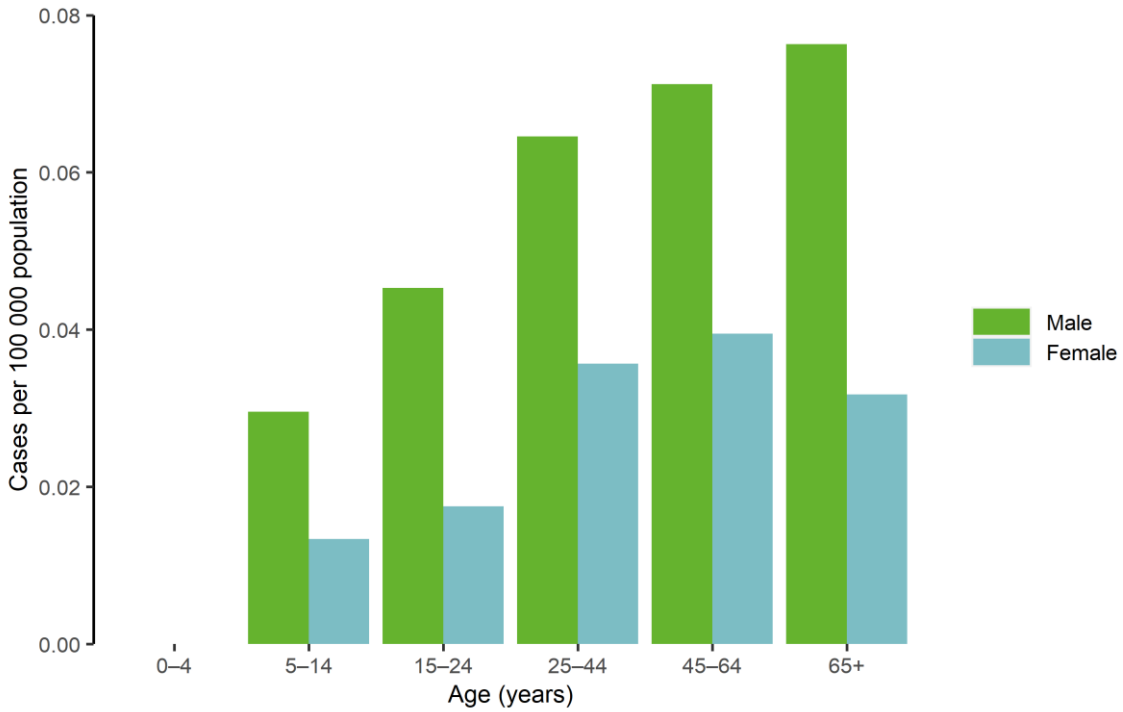
Figure 3. Confirmed brucellosis cases by month, EU/EEA, 2022 and 2018–2021



Source: Country reports from Austria, Belgium, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Gender was reported for all confirmed brucellosis cases: 65% were males and 35% were females, corresponding to a male-to-female ratio of 1.8:1. More males than females were reported in all age groups, and the notification rate increased with age. By gender, the highest rates were detected in males over the age of 65 years (0.08 per 100 000 population) and in females between the ages of 45–64 (0.04 per 100 000 population) (Figure 4).

Figure 4. Confirmed brucellosis cases per 100 000 population, by age and gender, EU/EEA, 2022



Source: Country reports from Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

Outbreaks and other threats

No national or multicounty brucellosis outbreaks were reported through EpiPulse in 2022.

Discussion

Brucellosis remains a rare but severe disease in the EU/EEA, with the majority of cases hospitalised. The overall trend of reported brucellosis cases has steadily decreased from 2018 to 2020. The COVID-19 pandemic significantly impacted the number of reported cases of brucellosis in 2020 with the case numbers decreasing to their lowest level since the beginning of EU-level surveillance in 2007. In 2021–2022, the number of cases and notification rate slightly increased in the EU/EEA but did not reach the pre-pandemic level.

As in previous years, the highest rate of domestically-acquired cases in the EU/EEA in 2022 was reported by Greece, where the notification rate was eight times higher than the EU/EEA average. A decreasing trend in the notification rate of brucellosis was observed in Greece from 2005 to 2018. A sharp decline in the notification rate was reported between 2019 and 2021. As control and eradication programs did not substantially change during the same period, the decrease was probably mainly because of the consequences of the COVID-19 pandemic [4].

France, Germany, Italy, Portugal, Spain and Greece accounted for the majority of brucellosis cases reported in the EU/EEA in 2022 . An overall decrease of cases was notified in Italy and Spain in the last 20 years, but brucellosis remains an important health problem, particularly in some of regions of those countries. In Italy, 89% of the annual cases are reported in the southern part of the country [5]. In Spain, the highest incidence was observed in interior regions with the highest livestock density [6]. The eradication of brucellosis in bovines was achieved in Spain in 2022 [7]. In Portugal, the notification rate has been decreasing since 2009, even though *Brucella* still represents an ongoing public health threat, with the notification rate more than three times higher than the EU/EEA average. Greece, Italy, and Portugal have not yet obtained the status of being officially free from brucellosis in cattle, or in sheep and goats. Despite all elimination efforts in animals, brucellosis remains an endemic disease in these countries. In 2022, most of the cases of brucellosis were caused by *B. melitensis*. This information is important when optimising control measures to further reduce the disease in humans, considering that *B. melitensis* is mainly associated with brucellosis in sheep and goats [3,7].

In Germany, even though the number of confirmed cases increased in 2022 it did not reach the pre-pandemic level, whereas in France the highest number of cases was reported since 2007, which was the beginning of brucellosis surveillance in the country [3]. In both countries most cases were reported as travel related, which was also the situation in Sweden, which reported the third highest notification rate in the EU [3]. Where the information on travel destinations was available, the majority of cases were linked to travel outside the EU/EEA.

A large proportion of cases occurred in working-age males, possibly indicating occupational exposure. Persons working with farm animals, including farmers, livestock breeders, butchers, abattoir workers and veterinarians, are known to be at increased risk of brucellosis, which remains the predominant occupational disease throughout the world [8]. Food-borne exposure is normally limited to persons consuming unpasteurised milk, dairy products or undercooked meat and is often the result of consuming food products from countries where brucellosis is endemic in animals.

Bovine brucellosis, as well as ovine and caprine brucellosis, has been widely eradicated by most EU Member States. As a result, brucellosis has become rare in northern and western Europe, where most of the cases are linked to travel outside the EU/EEA. Disease incidence may also be elevated among migrants who have recently arrived from geographic areas where brucellosis is endemic, such as the Middle East and parts of Africa, Asia and Central and South America [9,10].

Public health implications

In Member States that are not free from ovine and caprine or bovine brucellosis, EU-co-funded national brucellosis eradication programmes are important for reducing brucellosis in animals. Besides efforts to control brucellosis in animals, organised prevention efforts and raised awareness are needed within the occupational health framework. The migration of persons from endemic areas may cause an increase in the number of cases in countries where brucellosis was not previously prevalent. Physicians and diagnosing laboratories should be aware of the symptoms of the disease, which is caused by highly pathogenic bacteria. Information on occupational and travel history should be consistently collected as part of brucellosis surveillance in humans. The isolation of antibiotic-resistant *Brucella* strains highlights emerging challenges for treatment.

References

1. European Centre for Disease Prevention and Control (ECDC). Introduction to the Annual Epidemiological Report. In: ECDC. Annual epidemiological report. Stockholm: ECDC. Available from: http://ecdc.europa.eu/annual-epidemiological-reports/methods
2. European Centre for Disease Prevention and Control (ECDC). Surveillance systems overview 2022. Stockholm: ECDC. Available from: Table-surveillance_systems_overview_2022_20240119.xlsx (live.com)
3. European Centre for Disease Prevention and Control (ECDC). Surveillance atlas of infectious diseases. Stockholm: ECDC. Available from: http://atlas.ecdc.europa.eu/public/index.aspx?Dataset=27&HealthTopic=8
4. Kefaloudi C, Mellou K, Dougas G, Vorou R, Mitrou K, Kontopidou F. Human Brucellosis in Greece, 2005–2020: A Persistent Public Health Problem Vector-Borne and Zoonotic Diseases. 2022 22:3, 163-169
5. Facciolà A, Palamara MAR, D'Andrea G, Marano F, Magliarditi D, Puglisi G, et al. Brucellosis is a public health problem in southern Italy: Burden and epidemiological trend of human and animal disease. J Infect Public Health. 2018 Nov-Dec;11(6):861-866.
6. Rodríguez-Alons B, Almeida H, Alonso-Sardón M, Velasco-Tirado V, Romero-Alegria Á, Pardo-Lledias J, et.al. Epidemiological assessment of 5598 brucellosis inpatients in Spain (1997–2015). Epidemiology & Infection. 2021; e149, 1–8. https://doi.org/10.1017/S0950268821001151.
7. European Food Safety Authority (EFSA) and European Centre for Disease Prevention and Control (ECDC). The European Union 2022 One health Zoonoses report. EFSA Journal 2023. Available from: https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2023.8442
8. Mukthar M, Mahamudul H, Faija Sadia Pory. Occupational exposure to livestock and risk of tuberculosis and brucellosis: A systematic review and meta-analysis, One Health, 2022; Volume 15.
9. Norman FF, Monge-Maillo B, Chamorro-Tojeiro S, Pérez-Molina JA, López-Vélez R. Imported brucellosis: A case series and literature review. Travel Med Infect Dis. 2016 May-Jun;14(3):182-99.
10. Georgi E, Walter MC, Pfalzgraf MT, Northoff BH, Holdt ML, Scholz HC, et al. Whole genome sequencing of *Brucella melitensis* isolated from 57 patients in Germany reveals high diversity in strains from Middle East. PLoS One. 2017 Apr 7;12(4):e017425.