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Peculiarities of Brucellosis Spread in Urban and Rural Areas of Jalal-Abad Region, Kyrgyz Republic

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ABSTRACT

Brucellosis remains a significant public health concern in regions with developed livestock farming, requiring continuous epidemiological monitoring and targeted prevention strategies. This study presents the results of a comprehensive analysis of the epidemiological situation of brucellosis in the Jalal-Abad region over the period 2014–2024. The findings demonstrate a steady decline in overall incidence, from 36.9 to 23.8 cases per 100,000 population. However, marked disparities persist between urban and rural populations, as well as between genders. The majority of cases occurred among males (63.1%), and incidence rates were considerably higher in rural areas (26.4 per 100,000) compared to urban areas (15.6 per 100,000). The situation is particularly concerning among children. In rural areas, the incidence rate among the child population reached 16.1 cases per 100,000, which is 3.8 times higher than in urban areas (4.2 per 100,000). Analysis of occupational and social groups identified the main risk categories as the non-working population (44.1%), schoolchildren (19.3%), and employed individuals (14%). Small ruminants were identified as the primary source of infection (48.9% of cases). Microbiological analysis revealed that Brucella melitensis biotype III accounted for 95% of all isolated cultures. The practical significance of the study lies in identifying key risk factors and epidemiological patterns, which provide a foundation for developing targeted preventive and control measures in the region.

Keywords: *Brucellosis, Rural population, Urban population, Age groups, Risk groups, Infection sources*

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INTRODUCTION

Brucellosis is also among the most endemic zoonotic diseases that share the same geographical area where livestock rearing is still a key component of the economy and livelihood. The disease remains a challenge to the public health and veterinary field despite the established control programs of the disease, since it has complex transmission and affects both animals and humans. The health condition of citizens living in the places of brucellosis infestation is greatly determined by the efficiency of the prevention, timely observation of cases, proper treatment, and isolation of infected animals and carriers (Qureshi *et al*., 2023). The sanitary and veterinary activities of monitoring livestock, safe animal husbandry, and control of slaughtering activities and sale of meat and dairy products should be coordinated in order to reduce the incidence of zoonotic diseases. The clinical importance of human brucellosis is due to its ability to develop systemic complications. The infection can cause inflammatory and degenerative lesions of the different organs and systems, such as epididymitis, orchitis, prostatitis, cervicitis, salpingitis, sacroiliitis, radiculitis, plexitis, bursitis, corneal ulcers, and endocarditis (Shin *et al*., 2024). These manifestations lead to long-term morbidity, temporary or permanent disability, as well as poor quality of life. The preventative approach thus goes deeper into the area of medical therapy and incorporates the part of enhancing veterinary control, advancing animal husbandry safety, and educating the

public on food safety and work-related safety. The fact that the collaboration between the public health and veterinary services is one of the essential requirements to ensure the effective control of brucellosis and to reduce the epidemiological and economic impact (Hoy-Gerlach & Townsend, 2023).

Although preventive and anti-epidemic measures have been taken, brucellosis is still reported in numerous areas every year, which means that the animal population becomes infected and poses a significant threat to the human population. The differences in living standards, work exposure, and access to veterinary care have a tendency to result in dissimilarity between urban and rural cohorts (Ntivuguruzwa *et al*., 2025). The rural dwellers, especially those who deal with livestock breeding and processing of animal products, might be exposed to more risks of being affected by infected animals or deteriorating raw products (Moreno *et al*., 2022). Simultaneously, the urban cases can also be related to the use of raw dairy products or, eventually, illegal meat trading. These contextual conditions build a heterogeneous epidemiological environment that needs to be assessed, which is region-specific. The issue is further added by the chronic nature of the disease as well as the challenges linked to early diagnosis (Almuzaini & Elbehiry, 2025). Non-specific clinical manifestations at the early stages may postpone medical attention and lab verification, and help in creating underreporting or delayed therapy. Besides this, lack of adherence to sanitation in animal farming, lapses in the ratio of vaccination in livestock, and the unofficial business of animal food products could perpetuate infection cycles. Follow-up of demographic factors such as age, gender, and working status, as well as the location of residence, is thus crucial in the detection of the vulnerable populations and enhancement of the specific means of prevention. Without the systematic epidemiological research on the levels of the region, the performance of the implemented measures can hardly be estimated, as well as the areas that need stronger control (George *et al*., 2021).

These challenges are considered by the current study by carrying out an elaborate epidemiological examination of the incidence of brucellosis in the urban and rural populations of the Jalal-Abad region during a specific observation period. The innovation of the presented work is the presence of a full evaluation of the dynamics of long-term incidence with the stratification of the populations by residence and groups. The study does not investigate overall morbidity only, but incorporates urban and rural differences, risky social groups, and patterns that should be implemented to assist in the planning of the health of populations. The other research's unique characteristic is the combination of epidemiological results and the contextual risk factors based on the livestock exposure and population structure. The investigation will offer a better insight into the distribution of brucellosis in the area over time and across populations of incidence. In this way, a more accurate definition of risk groups can be achieved, and evidence-based preventive actions can be developed in accordance with local factors. The objective of the work is to carry out the epidemiology of the incidence of brucellosis in the population in the city and rural areas of the region of Jalal-Abad. The study aims to offer a factual foundation for enhancing prevention, reinforcing control efforts, and alleviating the brucellosis burden in the area through the systematic analysis of the morbidity indicators and population features.

MATERIALS AND METHODS

Study design and setting

This study was designed as a retrospective descriptive epidemiological analysis of officially registered cases of brucellosis in the Jalal-Abad region. The analysis covered a ten-year observation period (2014–2024) and included both urban and rural populations of the region. The objective was to assess incidence dynamics, identify demographic and territorial differences, and determine the distribution of cases across population groups.

Data sources

The study was based on official surveillance data obtained from district and city Centers for Disease Prevention and Sanitary and Epidemiological Surveillance (CDSES). The primary source of information was the monthly and annual statistical reporting Form No. 1, "On Infectious and Parasitic Diseases." These reports are routinely compiled at the district and city levels and subsequently submitted to the Regional CDSES, where consolidated data are maintained. The dataset included information on the number of registered brucellosis cases, population size, place of residence (urban or rural), age categories, gender distribution, and social or occupational status of patients. Data on sources of infection and laboratory-confirmed pathogen characteristics were also considered when available in official records. Only officially registered and confirmed cases recorded in the reporting system were included in the analysis.

Inclusion criteria

All confirmed cases of brucellosis registered in the Jalal-Abad region during the study period were included. Cases were classified according to standard reporting categories used in the national surveillance system. Population data used for calculating incidence rates were based on official regional demographic statistics corresponding to each reporting year.

Epidemiological indicators

The main epidemiological indicator analyzed was the incidence rate per 100,000 population. Incidence rates were calculated separately for: Total population, urban population, rural population, child population, and gender groups. Comparative analysis was performed to assess differences between urban and rural areas, as well as between male and female populations. The distribution of cases across social and occupational groups was analyzed in percentage terms.

Statistical analysis

Analytical and statistical processing of the data was carried out using a personal computer. Calculations were performed in Microsoft Excel 2002 utilizing the "Analysis ToolPak" package within the Windows XP operating environment. Dynamic analysis was conducted to evaluate trends in incidence over the ten-year study period. Results are presented in tabular and calculated form, with emphasis on identifying epidemiologically significant differences between territorial and demographic groups.

Ethical considerations

The study protocol was reviewed and approved by the Ethical Committee of Osh State University, Osh City, Kyrgyzstan. All procedures were conducted in accordance with the principles outlined in the Declaration of Helsinki (World Medical Association, 2013). No personal identifiers were used, and confidentiality of patient information was fully maintained throughout the study.

RESULTS AND DISCUSSION

Impact of the COVID-19 pandemic on brucellosis detection in 2020

The regional statistics committee has the latest data that reveals that the total population in Jalal-Abad Oblast is 1,306,704 individuals. Among them, 430,770 are children aged 14 and lower which is a significant percentage of the population. This population setup can be used to explain the rates of incidence, especially when one carries out an analysis by age. The evaluation of brucellosis incidence in most of the ten years (2014-2024) shows a general decreasing trend. The rate of incidence in 2014 was 36.9 cases in 100,000 citizens. This information demonstrated that by 2024, the number had dropped to 23.8 cases per 100,000 people. The decrease will be a slight decrease in registered cases over the course of the study that would reflect an improvement in the epidemiological situation **(Figure 1)**.

The most marked shift in the general trend was also seen in 2020 when the incidence rate decreased to 18.7 cases per 100,000 population. This reduction was in relation to the COVID-19 pandemic. At this stage, the development of a few healthcare uses and access to medical services possibly affected the identification and reporting of new cases of brucellosis. Consequently, the decreased figure in 2020 is to be taken cautiously since, in part, it can be attributed to a decrease in the identification of cases and less so to the decrease in transmission. All in all, the long-term statistics demonstrate a slight decrease in the rate of brucellosis in the area. Nonetheless, other external conditions, such as the COVID-19 pandemic disruptions, are to be viewed when examining short-term fluctuations in reported rates.

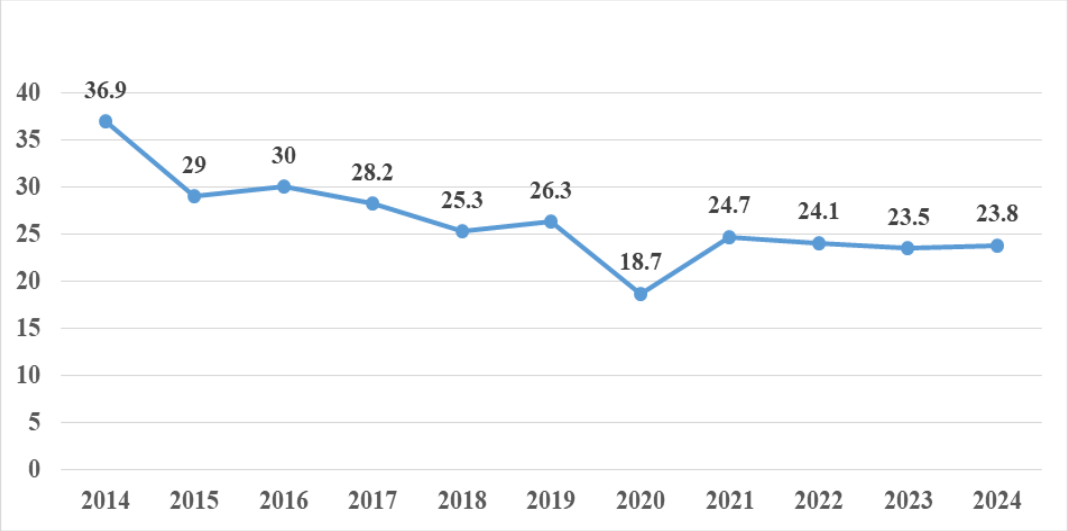

Figure 1. Brucellosis incidence among the population from 2014 to 2024 in the Jalal-Abad region of the Kyrgyz Republic

Gender differences in brucellosis incidence and temporal trends (2014–2024)

The incidence of brucellosis in the area from 2014 to 2024 is statistically analyzed, which proves the existence of gender disparities in the prevalence of this disease. **Figure 2**. The prevalence of brucellosis is such that there are more males than females. The median prevalence rate in males stood at 63.1, but the range of values was 56.5 to 68.7. In women, the rate was considerably lower, being 36.9, and ranged between 31.3 and 43.5. The incidence is very dynamic over time. The latest data indicate that the highest prevalence rates among the male population were registered in 2024 (68.7%), whereas the lowest level of the indicator was observed in 2016 (56.5%). The same could not be said of women: the highest incidence rate was reached in 2016 (43.5%), and the lowest in 2024 (31.3%). The results obtained show some seasonality and periodicity in the distribution of brucellosis among various groups of genders in the area.

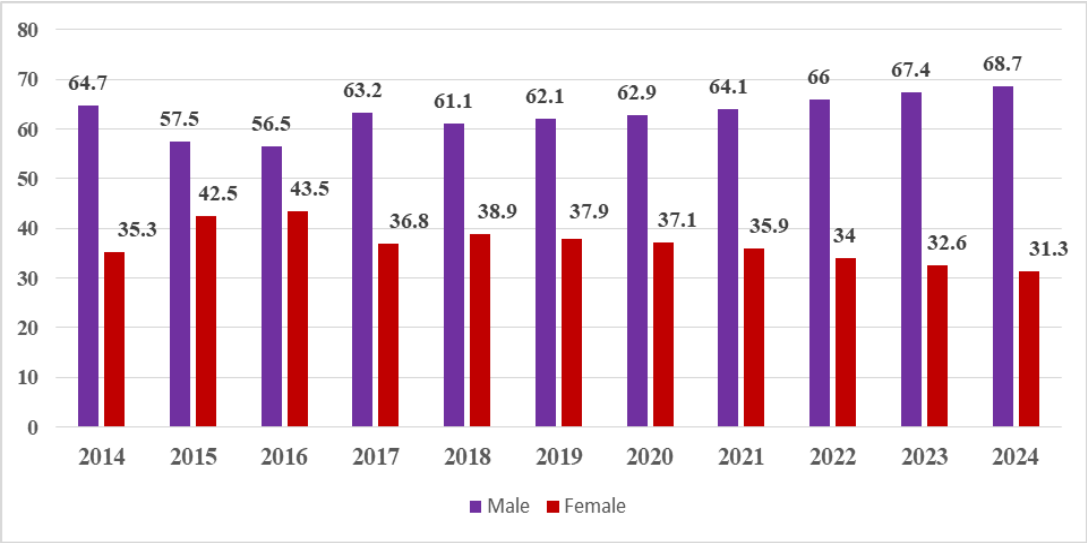

Figure 2. Brucellosis incidence by gender, for 2014-2024 (proportion) in the Jalal-Abad region of the Kyrgyz Republic

Though the proportion of women and men in urban and rural areas is equal, with 50% of the rural population consisting of women and 50% of the men **(Table 1)**, there are noticeable disparities in the rural morbidity of brucellosis. Men constituted 70.8 per cent of all registered cases among the rural residents, and women constituted 29.2 per cent. The incidence ratio has been calculated, and it shows that the women residing in rural districts have about 2.4 times less chance of developing brucellosis compared to men. Such a discrepancy could be linked to variations in work, contact with livestock, and the type of farming work, specifically between men, which carries more direct animal contact and manipulation of animal products. These results indicate that there is a very large gender based gap in the risk of brucellosis infection in rural regions, although among the entire population of men and women, the proportions have been equal (Alhussain *et al*., 2022; Balaji *et al*., 2022; Constantin *et al*., 2022; Mojsak *et al*., 2022; Sugimori *et al*., 2022; Delcea *et al*., 2024; Essah *et al*., 2024; Frost *et al*., 2024; Kajanova & Badrov, 2024; Lee & Ferreira, 2024; Ribeiro *et al*., 2024; Rosellini *et al*., 2024; Sanlier & Yasan, 2024; Umarova *et al*., 2024; Uneno *et al*., 2024).

Table 1. Brucellosis incidence in urban and district population by gender in the Jalal-Abad region of the Kyrgyz Republic for 2024

Name	Total	Floor			
		Men		Women	
		Absolute number	Specific gravity	Absolute number	Specific gravity
Total for the district	281	199	70.8	82	29.2
Total by city	34	17	50.0	17	50.0
Total for the region	315	216	68.7	99	31.3

Age, territorial, and clinical characteristics of brucellosis incidence

The epidemiological situation analysis showed the presence of significant differences between the prevalence of brucellosis in various population groups. The incidence was also higher among children below 14 years of age, as it recorded 33.9 cases per 100,000 children as opposed to 23.8 cases per 100,000 adults. There were also evident inequalities between rural and urban regions according to geographic distribution. The rate of infection was nearly twice in rural areas (26.4 cases per 100,000 population) compared to the urban areas (15.6 cases per 100,000 population). It was especially noticeable in children, where the incidence rate was much higher in rural areas (16.1 cases per 100,000 children), which is 3.8 times higher than the incidence in urban areas (4.2 cases per 100,000) **(Table 2)**.

There was also a difference in the place of residence in the clinical structure of the disease. In total, the acute type of Brucellosis was the most common in the area, which claimed 92 percent of the total number. Acute form was detected in 96.1 percent of rural regions, and only 3.9 percent of these cases developed into chronic forms. However, in urban areas, the situation was different: 58.8% of cases were acute, whereas in rural areas, the cases were 41. 2% chronic. Such results show a clear pattern of territory when it comes to incidence as well as disease progression. The census of rural children and the higher proportion of chronic cases in urban populations indicate that urban and rural areas should be presupposed by the differentiated prevention and treatment measures, paying attention to the epidemiological peculiarities of every region.

Table 2. Brucellosis incidence in rural and urban populations Jalal-Abad region of the Kyrgyz Republic for 2024 by type of disease (intensive indicator per 100 thousand population)

Name	Total	Children under 14 years old	Acute brucellosis	Chronic brucellosis

	n	Intensive indicator	n	Intensive indicator		Under. weight	n	Under. weight
Total patients districts	281	26.4	52	16.1	270	96.1	11	3.9
Total patients cities	34	15.6	3	4.2	20	58.8	14	41.2
Total for the region	315	23.8	55	33.9	290	92.0	25	8.0

Age and territorial patterns of brucellosis incidence in the population

The prevalence of Brucellosis spreads in the area across all ages. In **Table 3**, the epidemiological profile shows that there is clear age dispersion with different incidences (Adeleke, 2022; Sri *et al*., 2022; Guzek *et al*., 2023; Simonyan *et al*., 2023; Tsiganock *et al*., 2023). The greatest level of incidence is observed in the population older than 30 years of age, which is 27.2 cases per 100 thousand population. The second position is filled by adolescents within the age bracket 15-19 years, with an indicator of 24.3 cases. Children between the ages of 6 and 14 years (18.9 cases) form the third place. The 20-29 age group shows the lowest level of incidence in this group (14.5 cases). It has a higher incidence among those in the rural population than it does in the urban population. Of particular difference is the child population: Rural: - children aged 0-5 years old: 4.7 cases per 100 thousand. Children 6-14 years old: 21.6 cases per 100,000. In the cities, no cases were reported under 0-5 years. Children aged 6-14 years old: 6.8 cases/100 000 (3.2 times less than those in rural areas). It is also interesting to note that the incidence rates are nearly the same in the elderly age group (above 30 years) in rural (27.3 cases) and urban (26.4 cases) regions. Nevertheless, there is a remarkable disparity between the youths: the percentage of 15-19-year-olds in the country is 1.5 times higher. Among the 20-29 age bracket, the same trend whereby the rural indicators appear more than 1.5 times higher. The received information demonstrates that socio-economic factors and lifestyle play a major role in the occurrence of brucellosis among various age and territorial groups of the residents (Razhaeva *et al*., 2022; Rojas *et al*., 2022; Al Abadie *et al*., 2023; Lee *et al*., 2023; Aksoy & Akaydin, 2025; Kebe *et al*., 2025).

Table 3. Brucellosis incidence in urban and rural population by age structure in the Jalal-Abad region for 2024

Name	**n**	**Age/years**									
		0-5		6-14		15-19		20-29		30 and older	
		Abs. h	I.p.	Abs. h	I.p.	Abs. h	I.p.	Abs. h	I.p.	Abs. h	I.p.
Total patients district	281	7	4.7	45	21.6	23	25.9	26	15.2	180	27.3
Total patients urban	34	-	-	3	6.8	3	16.6	3	10.0	25	26.4
Total for the region	315	7	3.9	48	18.9	26	24.3	29	14.5	205	27.2

Socio-demographic distribution of brucellosis cases

The largest percentage of brucellosis was registered in the unemployed population, taking 44.1% of the cases, taking the leading role in all the social groups **(Table 4)**. None of these are rural since most of them are urban dwellers in suburban settlements or household whichever of them tend to keep small-scale livestock farming. They normally maintain an animal population of between 2 and 4 and 10-15 head of small livestock and 1-3 head of cattle with full-time animal care. In the rural districts, 38.8% of the cases of brucellosis were seen among the unemployed population, with the total burden of the area being 39.4, indicating a strong burden at all times.

School children came second in incidence structure, where they had a regional average of 19.3. The incidence among the schoolchildren was 8.8 in urban areas and 20.6 in rural areas. The elevated rates, especially in rural areas, are linked with the indirect exposure of children to the exposure by the weathering of parents in the care of livestock and household farming activities. The working population was in the third rank and had a regional average incidence as 14%. In urban localities, this incidence was 23.5 and 12.8 in the rural localities. Much to the point, however, it was 1.8 times higher in urban workers as compared to rural workers, which can be explained by some urban residents (who do live in the outskirts) also being occupied with livestock rearing. Another category consists of pensioners: significantly higher territorial disparity was also noted here, 5.8% urban and 10.7% rural. The relatively increased cases in the two settings are probably attributable to the active engagement in retirement in the form of private farming and livestock rearing.

Table 4. Brucellosis incidence in the rural population by cohort. Jalal-Abad region of the Kyrgyz Republic for 2024.

Name	**Total**	**Social status**							
		Unorganized group	**Organized group**	**Schoolchildren**	**Students**	**Workers**	**Pensioners**	**Non-working**	**Other**
		1	2	3	4	5	6	7	8
In total, among the district population	281	8	2	58	2	36	30	109	36
	Under weight	2.8	0.7	**20.6**	0.7	**12.8**	10.7	**38.8**	12.8
In total, among the urban population	34	-		3	1	8	2	15	5
	Under weight	-		**8.8**	2.9	**23.5**	5.8	**44.1**	14.7

Total for the region:	315	8	2	61	3	44	32	124	41
	Under weight	2.5	0.6	**19.3**	0.9	**14.0**	10.1	**39.4**	13.1

Epidemiological structure of brucellosis infection sources

The research formed the following structure of the sources of brucellosis infection in the area **(Table 5)**. Small ruminants were identified as the ones with the most epidemiological importance. In the rural regions, there were 51.9 cases per 100000, which were related to small ruminant infections, and in urban regions, the ratio was significantly smaller at 23.5. The average weighted in this region was 48.9, which proved its dominance in transmission. Cattle were in the second place in the category of sources of infection. Forty-one point two percent of cases were associated with cattle in the rural environment, relative to 17.4 percent in the urban environment. At the regional level, 20 of the infections were related to cattle. A significant part of the cases were the unknown sources of infection. In cities, the source was not identified in 35.3% of cases, and in villages, this was 30.7%. Altogether, there were 31.1 percent of cases in the region in which the source had not been recorded. The results indicate the importance of bettering epidemiological surveillance, enhancing the ability to trace the origin of infections, and improving investigation protocols used to make sure that even cases of brucellosis are identified as having more accurate transmission pathways.

Table 5. Sources of brucellosis infection in cities and districts of the Jalal-Abad region of the Kyrgyz Republic for 2024

Name	**Total**	**Small ruminants**		**Cattle**		**Unknown**	
	n	n	Under weight	n	Under weight	n	Under weight
Total patients districts	281	146	**51.9**	49	17.4	86	30.7
Total patients cities	34	8	23.5	14	**41.2**	12	**35.3**
Total for the region	315	154	**48.9**	63	20.0	98	31.1

Laboratory diagnosis and characterization of brucella melitensis in the region

The 8,676 people were tested in the area as part of the serological testing of brucellosis. Out of these, 6,594 were done in district bacteriological laboratories and 2,082 in the medical facilities in the cities. This distribution has been used to reflect the wider coverage of rural populations by the laboratory network within the region. A screening test by Heddelson was done based on clinical indicators, and went by the result to figure out that, in the rural areas, there were 539 positive cases, which is 8.1% of the screening tests. There were 167 positive responses in the urban areas, making up 8.0 percent of the population tested. These results suggest a similar level of primary seropositive outcome in the two territorial groups.

A high diagnostic yield was later confirmed by the Wright agglutination test, which is used on positive samples. A total of 511 cases were validated, which represents 72.4% out of all the cases that were initially seropositive. In villages, the confirmation rate was 80.7 percent, and in cities, that of villages was 45.5 percent. Such a difference could be attributed to differences in clinical presentation, time of testing, or pattern of referral. In 114 cases, Brucella *melitensis* was identified by bacteriological examination, which is 28.2 of the sampled. The pathogen was isolated in 26.7 percent of cases in district labs, and in city labs, the positivity is 36.9 percent, which is 1.4x greater than in the district ones. The fact that positive cultures in urban laboratories are highly recommended for further consideration in the evaluation of local epidemiology. Isolates of the identified strains were characterized, revealing that 95% of them were of the B. *melitensis* biotype III, which implies that it is predominant in the Jalal-Abad area. The remaining 5 percent of the isolates belonged to the type I biotype of B. *melitensis* that was found in the Toktogul district and the city of Mailuu-Suu.

Future Recommendations

Strengthen preventive measures in rural areas: Specific actions are sought to be targeted on enhancing veterinary control, safe livestock handling, and increasing the awareness of the populace about the risk factors of coming into contact with and eating animal products that are not pasteurized (Seitkamzina *et al*., 2023; Nogueira *et al*., 2025).

Prioritize protection of the child population: Prevention programs should involve health education for the families that are involved in livestock farming, early screening of symptomatic children, and the indirect exposure of infected animals in the household (Rahman *et al*., 2020; Siddiqui, 2021).

Improve identification of infection sources: The epidemiological research must be enhanced to lower the rate of cases with no established route of transmission by enhancing the practice of case tracing, intersectoral coordination and documentation of cases (Alam *et al*., 2022; Kayembe-Mulumba *et al*., 2025).

Develop differentiated prevention strategies: Control measures should be adapted to territorial and socio-demographic characteristics, taking into account differences between urban and rural populations, occupational exposure patterns, and age-specific risks (Siddiqui *et al*., 2022; Li *et al*., 2024).

Enhance laboratory surveillance of circulating strains: There must be ongoing monitoring of pathogen specifications, e.g. strain typing and bacteriological confirmation, to track the dynamics of Brucella circulation and also to enable evidence-based practice of public health choices (Siddiqui *et al*., 2023; Ghssein *et al*., 2025).

CONCLUSION

The overall estimation of the epidemiological situation of brucellosis in the Jalal-Abad region reveals the gradual reduction in the total incidence rates of 36.9 to 23.8 cases per 100,000 population between 2014 and 2024, but the decrease, which occurred in 2020, must be treated with caution because of the possible influence of the COVID-19 pandemic on the population in access to healthcare of importance and the number of cases detected. The gender distribution shows that the cases are predominantly found in men (63.1%), and

especially in rural regions where men occupy 70.8% of the cases, which are influenced by occupational and exposure-related risk factors. Great territorial differences were pointed out; rural incidence (26.4 per 100,000 population) was by far higher than urban (15.6 per 100,000 population), and children residing in rural areas were found to have a relatively high incidence. The highest incidence of this illness is recorded in persons who are above the age of 30 years (27.2 per 100,000), with significant disparity in the urban and rural populations. Morbidity is socio-professional, with the largest prevalence of the non-working population, then schoolchildren, and then employed people (44.1, 19.3, and 14 percent). The small ruminants are the primary source of infection (48.9% of cases), with in 31.1 cases the source was not determined, which means that there should be an increased focus on strengthening the epidemiological monitoring and source-tracing operation. Findings in the laboratory confirm that the major circulating type in the region is Brucella melitensis biotype III (95 out of the most isolated cultures).

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CONFLICT OF INTEREST: None

FINANCIAL SUPPORT: None

ETHICS STATEMENT: Informed oral consent was obtained from the patient for participation in this study. Ethical approval was granted by the Institutional Review Board of Osh State University, and the study was conducted in accordance with the principles of the Declaration of Helsinki.

REFERENCES

Adeleke, O. A. (2022). Development and enhancement of liquisolid compact containing rifampicin and quercetin: An in-vitro and in-vivo investigation. *Pharmaceutical Sciences and Drug Design*, *2*, 14–25. doi:10.51847/lw1PmMAVuw

Aksoy, C., & Akaydin, A. (2025). Exploring the influence of strategic leadership on employee performance in the aviation sector. *Annals of Organizational Culture, Communications and Leadership*, *6*, 8–15. doi:10.51847/kbN4B2z6Bs

Al Abadie, M., Sharara, Z., Ball, P. A., & Morrissey, H. (2023). Pharmacological insights into Janus kinase inhibition for the treatment of autoimmune skin diseases: A literature review. *Annals of Pharmacy Practice and Pharmacotherapy*, *3*, 1–8. doi:10.51847/lhABjfuIwh

Alam, A., Abubaker Bagabir, H., Sultan, A., Siddiqui, M. F., Imam, N., Alkhanani, M. F., Alsulimani, A., Haque, S., & Ishrat, R. (2022). An integrative network approach to identify common genes for the therapeutics in tuberculosis and its overlapping non-communicable diseases. *Frontiers in Pharmacology, 12*, 770762. doi:10.3389/fphar.2021.770762

Alhussain, B. S., Alamri, F. S., Alshehri, F. A., Aloraini, A. A., Alghamdi, S. M., Alfuhaid, N. A., & Alarefi, M. S. (2022). Influence of mechanical properties and occlusal fit on the success of CAD/CAM ceramic endocrowns. *Journal of Current Research in Oral Surgery*, *2*, 20–26. doi:10.51847/2MEMcd7epS

Almuzaini, A. M., & Elbehiry, A. (2025). Unraveling brucellosis: Advances in pathogenesis, diagnostic strategies, therapeutic innovations, and public health perspectives. *Frontiers in Medicine, 12*, 1629008. doi:10.3389/fmed.2025.1629008

Balaji, A., Jei, J. B., Murugesan, K., & Muthukumar, B. (2022). Case report on distal extension edentulous rehabilitation using claspless extra-coronal attachments. *Journal of Current Research in Oral Surgery*, *2*, 16–19. doi:10.51847/OhXCPOyjBp

Constantin, V. D., Silaghi, A., Epistatu, D., Dumitriu, A. S., Paunica, S., Bălan, D. G., & Socea, B. (2022). Diagnostic and therapeutic insights into colorectal carcinoma. *Archives International Journal of Cancer and Allied Sciences, 2*(1), 24–28. doi:10.51847/HojLmKBDvP

Delcea, C., Gyorgy, M., Siserman, C., & Popa-Nedelcu, R. (2024). Impact of maladaptive cognitive schemas on suicidal behavior in adolescents during the COVID-19 pandemic: A predictive study. *International Journal of Social Psychological Aspects of Healthcare*, *4*, 42–46. doi:10.51847/EHCf9HzLEP

Essah, A., Igboemeka, C., & Hailemeskel, B. (2024). Exploring gabapentin as a treatment for pruritus: A survey of student perspectives. *Annals of Pharmacy Education and Safety in Public Health Advocacy*, *4*, 1–6. doi:10.51847/h8xgEJE3NE

Frost, N., Deckert, P. M., Nolte, C. H., Kohl, R., & Schreiber, S. J. (2024). Challenges and strategies in recruiting patients for a trial on patient-centered navigation in age-associated diseases. *Annals of Pharmacy Education and Safety in Public Health Advocacy*, *4*, 50–62. doi:10.51847/BLHlqwfTFT

George, J., Häsler, B., Komba, E., Sindato, C., Rweyemamu, M., & Mlangwa, J. (2021). Towards an integrated animal health surveillance system in Tanzania: Making better use of existing and potential data sources for early warning surveillance. *BMC Veterinary Research, 17*, 109. doi:10.1186/s12917-021-02789-x

Ghssein, G., Ezzeddine, Z., Tokajian, S., Khoury, C. A., Kobeissy, H., Ibrahim, J. N., Iskandar, C., & Hassan, H. F. (2025). Brucellosis: Bacteriology, pathogenesis, epidemiology and role of the metallophores in virulence: A review. *Frontiers in Cellular and Infection Microbiology, 15*, 1621230. doi:10.3389/fcimb.2025.1621230

Guzek, K., Stelmach, A., Rożnowska, A., Najbar, I., Cichocki, Ł., & Sadakierska-Chudy, A. (2023). A preliminary investigation of genetic variants linked to aripiprazole-induced adverse effects. *Annals of Pharmacy Practice and Pharmacotherapy*, *3*, 40–47. doi:10.51847/ZT28xcs95J

Hoy-Gerlach, J., & Townsend, L. (2023). Reimagining healthcare: Human–animal bond support as a primary, secondary, and tertiary public health intervention. *International Journal of Environmental Research and Public Health, 20*(7). doi:10.3390/ijerph20075272

Kajanova, J., & Badrov, A. (2024). Medical students' perspectives on trust in medical AI: A quantitative comparative study. *Asian Journal of Ethics in Health and Medicine*, *4*, 44–57. doi:10.51847/36mpdZ9AZ8

Kayembe-Mulumba, B., N'gattia, A. K., & Belizaire, M. R. D. (2025). One health, many gaps: Rethinking epidemic

intelligence in resource-limited settings to prepare for the global threat of Disease X. *Microorganisms, 13*(11). doi:10.3390/microorganisms13112615

Kebe, I. A., Kahl, C., & Liu, Y. (2025). The role of transformational leadership in enhancing employee performance: A study of the Vietnamese banking industry. *Annals of Organizational Culture, Communications and Leadership*, *6*, 21–30. doi:10.51847/g7jtt7Qgxk

Lee, M. J., & Ferreira, J. (2024). COVID-19 and children as an afterthought: Establishing an ethical framework for pandemic policy that includes children. *Asian Journal of Ethics in Health and Medicine*, *4*, 1–19. doi:10.51847/haLKYCQorD

Lee, S., Kim, J., & Byun, G. (2023). The interplay of political skill, ethical leadership, and leader-member exchange in shaping work outcomes. *Annals of Organizational Culture, Communications and Leadership*, *4*, 45–53. doi:10.51847/vAKE892Paf

Li, J., Zhang, X., Zhang, M., Wang, L., Yin, P., Li, C., You, J., Huang, Z., Ng, M., Wang, L., et al. (2024). Urban-rural differences in the association between occupational physical activity and mortality in Chinese working population: Evidence from a nationwide cohort study. *The Lancet Regional Health – Western Pacific, 46*, 101083. doi:10.1016/j.lanwpc.2024.101083

Mojsak, D., Dębczyński, M., Kuklińska, B., & Mróz, R. M. (2022). Ewing's sarcoma in a 58-year-old man: Challenges of cancer diagnosis during the COVID-19 era. *Archives International Journal of Cancer and Allied Sciences*, *2*(1), 37–41. doi:10.51847/J1EMRn8tE2

Moreno, E., Blasco, J. M., & Moriyón, I. (2022). Facing the human and animal brucellosis conundrums: The forgotten lessons. *Microorganisms, 10*(5). doi:10.3390/microorganisms10050942

Nogueira, R., Pinho, J. O., Plácido, A. I., Coelho, A. C., Oliveira, P. A., Figueiras, A., Roque, F., & Herdeiro, M. T. (2025). Exploring the knowledge, attitudes, and practices of livestock veterinarians on antibiotic prescription and use: Insights from focus group discussions. *Animal, 19*(10), 101648. doi:10.1016/j.animal.2025.101648

Ntivuguruzwa, J. B., Kabalisa, E., Bosco Asifiwe, H. J., Uwamahoro, A. G., Nyampinga, I., Mukarurangwa, A., Rujeni, N., Habimana, J. P., Mukamuhirwa, M. L., Karemera, P., et al. (2025). Seroprevalence and risk factors associated with brucellosis in humans and livestock in Nyagatare district of Rwanda. *Frontiers in Public Health, 13*, 1665341. doi:10.3389/fpubh.2025.1665341

Qureshi, K. A., Parvez, A., Fahmy, N. A., Abdel Hady, B. H., Kumar, S., Ganguly, A., Atiya, A., Elhassan, G. O., Alfadly, S. O., Parkkila, S., et al. (2023). Brucellosis: Epidemiology, pathogenesis, diagnosis and treatment–A comprehensive review. *Annals of Medicine, 55*(2), 2295398. doi:10.1080/07853890.2023.2295398

Rahman, M. T., Sobur, M. A., Islam, M. S., Ievy, S., Hossain, M. J., El Zowalaty, M. E., Rahman, A. T., & Ashour, H. M. (2020). Zoonotic diseases: Etiology, impact, and control. *Microorganisms, 8*(9), 1405. doi:10.3390/microorganisms8091405

Razhaeva, M. U., Khuchieva, L. A., Musaev, S. A., Rustamov, A. K., Bicherkaeva, K. S., & Usmanova, K. S. (2022). Environmental impact of the Y-isomer of HCH: Unveiling its role in cancer formation. *Asian Journal of Current Research in Clinical Cancer*, *2*(2), 1–5. doi:10.51847/Rtj57FuF6z

Ribeiro, A., Martins, S., & Fonseca, T. (2024). Progress and gaps in national medicines policy implementation in SADC member states: A comprehensive desktop review. *Interdisciplinary Research in Medical Sciences Special*, *4*(1), 42–56. doi:10.51847/0eVBxAI8y0

Rojas, P., Soto, M., & Vargas, I. (2022). Influence of patient age on the biological profile and prognosis of operable early-stage breast cancer. *Asian Journal of Current Research in Clinical Cancer*, *2*(2), 33–42. doi:10.51847/AsL4oopFGu

Rosellini, E., Giordano, C., Guidi, L., & Cascone, M. G. (2024). Creation of a novel surgical suture material designed to inhibit arterial thrombosis formation. *Journal of Medical Sciences and Interdisciplinary Research*, *4*(1), 1–7. doi:10.51847/7denx72XdE

Sanlier, N., & Yasan, N. (2024). Exploring the link between COVID-19 and vitamin D: A concise overview. *Interdisciplinary Research in Medical Sciences Special*, *4*(1), 23–32. doi:10.51847/skW1PmtWeB

Seitkamzina, D., Akmambaeva, B., Abulgazimova, G., Yelemessova, B., Ussenbayev, A., Omarov, K., Tokaeva, M., Zhakiyanova, Y., & Zhanabayev, A. (2023). Prevalence of endo and ectoparasitism of sheep in northern Kazakhstan. *American Journal of Animal and Veterinary Sciences, 18*(3), 223–228. doi:10.3844/ajavsp.2023.223.228

Shin, I.-S., Roh, S.-G., Gill, B.-C., Kim, Y.-S., & Hwang, K.-W. (2024). Assessment of brucellosis-causing pathogens with an emphasis on the prevalence of *Brucella melitensis* in the Republic of Korea: Insights from a decade of pathogen surveillance (2014–2023), a retrospective study. *Osong Public Health and Research Perspectives, 15*(6), 489–496. doi:10.24171/j.phrp.2024.0134

Siddiqui, M. F. (2021). IoMT potential impact in COVID-19: Combating a pandemic with innovation. In K. Raza (Ed.), *Computational intelligence methods in COVID-19: Surveillance, prevention, prediction and diagnosis* (pp. 349–361). Springer. doi:10.1007/978-981-15-8534-0_18

Siddiqui, M. F., Mouna, A., Nicolas, G., Rahat, S. A. A., Mitalipova, A., Emmanuel, N., & Tashmatova, N. (2022). Computational intelligence: A step forward in cancer biomarker discovery and therapeutic target prediction. In K. Raza (Ed.), *Computational intelligence in oncology* (Vol. 1016, pp. 233–250). Springer Singapore. doi:10.1007/978-981-16-9221-5_14

Siddiqui, M. F., Nohra, L., Saleh, M., Thakkar, K., Trivedi, R., Moujally, S. N., Deeb, H., Nicolas, G., & Emmanuel, N. (2023). Pediatric oncology, palliative care and low- or middle-income countries: A call for action. *Global Pediatric Health, 10*, 2333794X231188591. doi:10.1177/2333794X231188591

Simonyan, R., Babayan, M., Yekmalyan, H., Alexanyan, A., Simonyan, G., Alexanyan, S., Darbinyan, L., Simonyan, K., & Simonyan, M. (2023). Identification and extraction of superoxide-generating protein assemblies from Helianthus tuberosus, Daucus sativus, and Solanum tuberosum. *Special Journal of Pharmacognosy, Phytochemistry and Biotechnology*, *3*, 15–20. doi:10.51847/Vj5MeBCcDs

Sri, K. B., Fatima, M. S., & Sumakanth, M. (2022). Development and validation of a stability-indicating UV spectroscopic method for baricitinib in bulk and formulation. *Pharmaceutical Sciences and Drug Design*, *2*, 8–13. doi:10.51847/JxHXkcB6tD

Sugimori, T., Yamaguchi, M., Kikuta, J., Shimizu, M., & Negishi, S. (2022). The biomechanical and cellular response to micro-perforations in orthodontic therapy. *Asian Journal of Periodontics and Orthodontics*, *2*, 1–15. doi:10.51847/Z9adSJ59rj

Tsiganock, A. S., Bgantseva, A. E., Vostrikova, V. R., Shevel, D. S., Saidarova, A. I., Bekbuzarov, I. M., Kurbanov, T. K., & Shadova, S. M. (2023). Exploring the wound healing potential of aqueous extracts from Caucasus herbs in diabetes mellitus. *Special Journal of Pharmacognosy, Phytochemistry and Biotechnology*, *3*, 31–38. doi:10.51847/Y5Fvcyw12s

Umarova, M. S., Akhyadova, Z. S., Salamanova, T. O., Dzhamaldinova, Z. I., Taysumova, Z. D., Bekmurzaeva, M. R., Tapaeva, M. M., & Ivanushkina, A. M. (2024). Influence of vibrations and other negative physical factors of production on protein metabolism and protein dynamics in the body. *Journal of Medical Sciences and Interdisciplinary Research*, *4*(1), 39–44. doi:10.51847/Jk38F1v5XH

Uneno, Y., Morita, T., Watanabe, Y., Okamoto, S., Kawashima, N., & Muto, M. (2024). Assessing the supportive care needs of elderly cancer patients at Seirei Mikatahara General Hospital in 2023. *International Journal of Social Psychological Aspects of Healthcare*, *4*, 13–19. doi:10.51847/o4njwxvRSF

World Medical Association. (2013). World Medical Association declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA, 310*(20), 2191–2194. doi:10.1001/jama.2013.281053