

Brucellosis in Kyrgyzstan

Participant's Guide

Learning Objectives

After completing this case study, the participant should be able to:

- ❑ Describe the key principles of public health surveillance,
- ❑ Describe criteria for including a disease in a national surveillance system,
- ❑ Describe the data flow of a surveillance system,
- ❑ Discuss the advantages and disadvantages of disease's case definition,
- ❑ Summarize and interpret surveillance data,
- ❑ Define incidence and prevalence of a disease and calculate the incidence rate.

This case study is based upon surveillance and investigation activities conducted by the Kyrgyz Ministry of Health in collaboration with the Applied Epidemiology Training Program (AETP) of the Central Asia Region. The investigation to describe the epidemiology of and identify risk factors for human brucellosis in the Batken Region of Kyrgyzstan was undertaken in 2003 by an AETP participant with the assistance of the CDC office in Central Asia.

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Part I — Basic Epidemiology and Surveillance

Since Kyrgyzstan became an independent state after the collapse of the Soviet Union in 1991, the Kyrgyzstan Ministry of Health has conducted public health surveillance for infectious diseases

of public health importance. The primary system used for this surveillance is called the National Infection Disease Surveillance System.

Question 1: What is public health surveillance? What is the purpose of public health surveillance?

Question 2: What is passive surveillance? What is the alternative? When might you use which type of surveillance?

Question 3: How does sentinel surveillance differ from population-based surveillance?

Question 4: What criteria might you use in deciding whether a disease should be included in the National Infectious Disease Surveillance System?

One disease included in the National Infectious Disease Surveillance System is brucellosis. Brucellosis, caused by bacteria of the genus *Brucella*, generally occurs in humans after they come into contact with contaminated animals or animal products. Person-to-person transmission of brucellosis is extremely rare. However, brucellosis has been classified as a Bioterrorism Category B disease because of its potential to be weaponized and disseminated by aerosol.

Brucellosis has become endemic among livestock in Kyrgyzstan following the collapse of the Soviet Union and its strict veterinary and sanitary controls. The incidence of brucellosis among humans is higher in Kyrgyzstan than in any other Central Asian country.

Brucellosis in humans often presents with flu-like symptoms including fever, sweats, malaise, anorexia, headache, myalgia, and back pain. While many cases remain asymptomatic and mortality is low, some cases progress to the undulant form with undulant fevers, arthritis, and epididymo-orchitis in males. Some cases become chronic, with symptoms of chronic fatigue syndrome, depression, and arthritis. Progression to the chronic form is thought to occur up to twice as commonly in Kyrgyzstan as reported in the medical literature, with disabilities occurring in 30% of cases. Standard treatment of the acute form of brucellosis costs \$150 US; the average monthly salary in Kyrgyzstan is about \$25 US.

Question 5: Do you agree that brucellosis should be included in the National Infectious Disease Surveillance System? Why or why not?

Question 6: For the features of a surveillance system listed below, what would you propose for surveillance of brucellosis in Kyrgyzstan?

- Passive vs. active
- Population-based vs. sentinel
- Frequency of reporting
- Individual vs. aggregated case reports
- Case definition – confirmed only? Probables? Suspects?

Question 7: How would you assess the usefulness of the system?

Question 8: Who should be required to report cases of human brucellosis to the surveillance system?

Question 9: Draw a chart of the data flow of the surveillance system. Identify surveillance tasks at the local level, intermediate level, and national level.

The National Infection Disease Surveillance System uses a standard case definition for brucellosis surveillance.

Question 10: What is a case definition? Explain the difference between *suspect*, *probable*, and *confirmed* cases.

The National Infection Disease Surveillance System uses the following case definition for brucellosis:

Case classification:

- *Probable*: a clinically compatible case that is epidemiologically linked to a confirmed case or that has supportive serology (i.e., *Brucella* agglutination titer of greater than or equal to 200 in one or more serum specimens obtained after onset of symptoms)
- *Confirmed*: a clinically compatible case that is laboratory confirmed

Question 11: What are the advantages and disadvantages of this case definition? What modifications might you suggest to this case definition?

Question 12: How might a case definition for an outbreak of brucellosis differ from the surveillance case definition?

Question 13: What is the role of the laboratory in brucellosis surveillance in Kyrgyzstan?

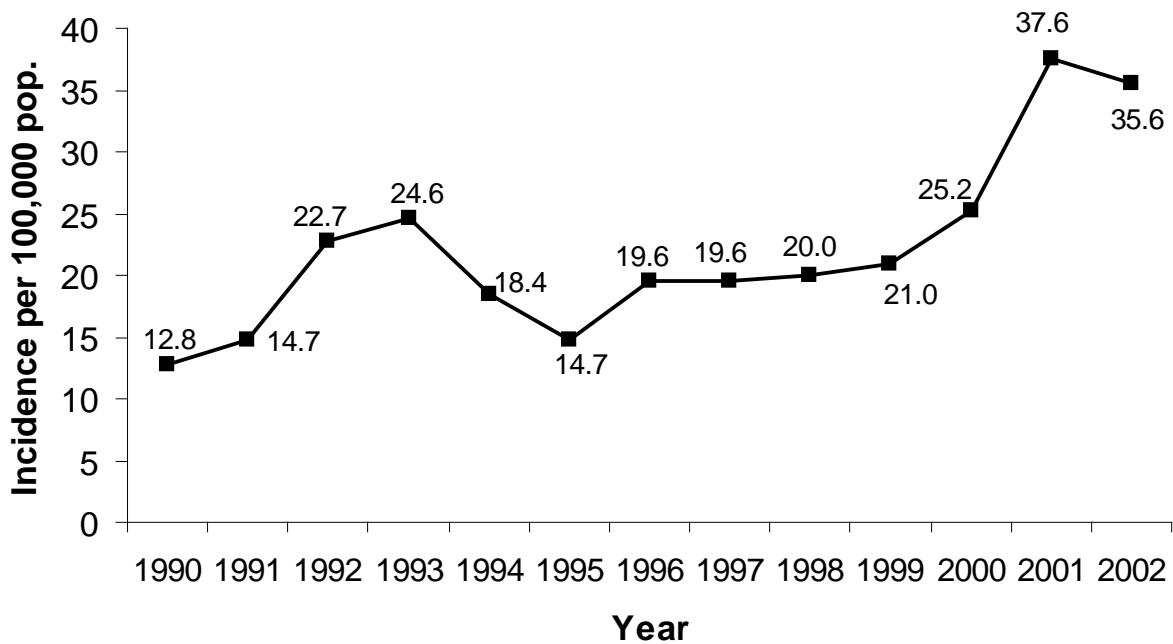
Question 14: What minimum information should be collected on the brucellosis case report form?

Part II – Analysis of Surveillance Data

The incidence of reported cases of brucellosis in humans in Kyrgyzstan from 1990 to 2002 is shown in Figure 1. At the same time, the Kyrgyz Ministry of Agriculture reported no increase in

the prevalence of brucellosis in animals. In the summer of 2002, the Ministry of Health issued a “prikaz” (directive) for improving the national brucellosis surveillance system.

Figure 1. Reported incidence (per 100,000 population) of human brucellosis by year, Kyrgyzstan, 1990–2002



Question 14: Review and interpret the data in Figure 1.

Batken Region experienced the largest increase in the number of human brucellosis cases between 2001 (20 cases) and 2002 (226 cases). Batken Region is a rural, mountainous area in the southwest part of the country (see map below). It is made of three districts — Batken, Leylec and Kadamjay. The annual number of reported cases of human brucellosis in each district is shown in Table 1.

Figure 2. Map of Kyrgyzstan



Table 1. Number of reported cases of human brucellosis by year, Batken Region, Kyrgyzstan, 1990–2002

<u>Year</u>	<u>Batken District</u>	<u>Leylec District</u>	<u>Kadamjay District</u>
1990	3	13	17
1991	3	20	18
1992	3	36	11
1993	4	33	12
1994	28	23	7
1995	4	8	8
1996	6	4	9
1997	4	7	9
1998	11	7	8
1999	13	11	11
2000	18	17	11
2001	13	8	12
2002	18	109	118

Question 15: What is the difference between incidence and prevalence? Do you think incidence or prevalence of brucellosis will be higher in Kyrgyzstan?

Table 2. Number and incidence (per 100,000) of reported cases of human brucellosis by district, Batken Region, Kyrgyzstan, 1990–2002, and population in 2003

	<u>Batken District</u>	<u>Leylec District</u>	<u>Kadamjay District</u>
Total number of cases, 1990—2001	_____	_____	_____
Population, 2003	83,475	104,285	148,148
Average annual incidence rate per 100,000 pop., 1990—2001	_____	_____	_____
Incidence rate per 100,000 pop., 2002	_____	_____	_____
Ratio of 2002 rate to expected	_____	_____	_____

Question 16: Complete Table 2 by calculating the district-specific brucellosis incidence rates for 1990—2001 and for 2002 using the 2003 population (assume that the population has been stable for the past 13 years). Using the average annual incidence rate as the “expected” and 2002 as the “observed,” what is the ratio of observed to expected for each district?

Question 17a: What are some of the artifactual reasons that results in an increase in the number of reported cases in an area?

Question 17b: What are some of the reasons for a true increase in the number of reported cases in an area? Which ones of these potentially apply to brucellosis in Batken Region?

Question 17c: Do you think the dramatic increase in the number of brucellosis cases in Batken Region in 2002 is likely artifactual or real?

Question 18: Define the terms *endemic*, *outbreak*, *epidemic*, and *pandemic*. How would you characterize the brucellosis situation in 2002?

References / Reading — Surveillance, General

1. Teutsch SM, Churchill RE, eds. Principles and Practice of Public Health Surveillance, 2nd edition. New York: Oxford University Press, 2000.
2. CDC. Lesson 5 — Public Health Surveillance. In: Principles of Epidemiology in Public Health Practice, 3rd edition. Atlanta: CDC, 2006. Available at: <http://www.cdc.gov/training/products/ss1000/ss1000-ol.pdf>
3. CDC. Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines working group. MMWR 2001;50(No. RR-13):1–35. Available at: <http://www.cdc.gov/mmwr/PDF/rr/rr5013.pdf>
4. World Health Organization. Protocol for the evaluation of epidemiological surveillance systems. Geneva:World Health Organization, 1997. Available from: http://whqlibdoc.who.int/hq/1997/WHO_EMCDIS_97.2.pdf
5. Doherty J. Establishing priorities for national communicable disease surveillance. Can J Infect Dis Med Micro 2000;11:1–8. Available at: http://www.pulsus.com/INFDIS/11_01/dohe_ed.htm

References / Reading — Brucellosis

6. FAO. Guidelines for coordinated human and animal brucellosis surveillance. Rome, 2003. Available at: <http://www.fao.org/DOCREP/006/Y4723E/Y4723E00.HTM>
7. Al-Nassir W, Lisgaris MV. Brucellosis. Available at: <http://www.emedicine.com/med/topic248.htm>
8. Corbel MJ. Brucellosis: an overview. Emerging Infectious Diseases 1997;3(2):213–222. Available at: <ftp://ftp.cdc.gov/pub/EID/vol3no2/adobe/vol3no2.pdf>