

# Comprehensive Assessment Of The Spread Of Echinococcosis And Improvement Of Preventive Measures

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**Abstract.** The annual incidence in Uzbekistan and Tajikistan is estimated at 25-27 cases per 100 000 population. The data obtained confirm that the Fergana region is a region with persistent echinococcosis circulation, where the actual prevalence may be higher than the official surgical incidence. We conducted a retrospective statistical analysis of echinococcosis incidence in the Fergana region for the period 2023-2024. The overall incidence dynamics show 19 cases in 2023 and 20 cases in 2024, an increase of +5.3%. Thus, the overall incidence of echinococcosis in the region remained relatively stable, with a slight increase compared to the previous year. Specific control and preventive measures adapted to regional conditions are proposed.

**Keywords:** echinococcosis, hydatidosis, Fergana region, epidemiology, prevention, control, Echinococcus granulosus.

**Relevance.** Cystic echinococcosis (CE) is one of the most common zoonotic parasitic diseases caused by the tapeworm Echinococcus granulosus.

Echinococcosis (including cystic echinococcosis - CE, and alveolar echinococcosis - AE) remains a serious global public health and veterinary problem: according to WHO estimates and related studies, the infection annually accounts for a significant proportion of mortality and years of healthy life lost - on the order of tens of thousands of deaths and hundreds of thousands per year [1-4].

More specifically, recent global estimates point to hundreds of thousands of reported cases and tens of thousands of life-years lost due to CE: in 2019, more than 200,000 cases of cystic echinococcosis were registered in the global database, and the annual global burden is estimated at hundreds of thousands, with various estimates ranging from 184000 to 871000 per year, depending on the methodology. These figures highlight the continued significance of the disease despite local successes in control [5, 6].

The Central Asian region remains an endemic hotbed: according to reviews and regional reports, at least 270 million people in Central Asia live in CE-risk zones, including Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Afghanistan, Iran, and Pakistan. These regions are characterized by active livestock farming, close contact of the population with farm animals and dogs, as well as low levels of sanitary culture and hygiene awareness, which contribute to the intensive circulation of the pathogen. In some endemic foci, the annual surgical morbidity rate can reach tens of cases per 100 000 population, and local prevalence rates among humans and animals reach several percent [7-10].

For the Republic of Uzbekistan and the Fergana region, these data have direct practical implications: published regional studies (including ultrasound screenings and analysis of surgical cases) confirm the persistent endemicity of CE in several regions of the country, although official registration and epidemiological surveillance often underestimate the true prevalence due to latent infection and insufficient screening and data systems. In the Samarkand region, for example, ultrasound examinations revealed clinically significant prevalence of CE in certain rural communities [11].

The economic and clinical-social costs are also significant: the disease requires expensive surgical and medical interventions, leads to long-term disability, reduces work capacity, and creates a burden on agricultural communities (losses in sheep/cattle production and costs of veterinary programs). These realities

make it urgent to improve preventive measures adapted to the socio-economic and environmental conditions of the Fergana region [12].

According to epidemiological estimates, the annual incidence of echinococcosis in Uzbekistan and Tajikistan is 25–27 cases per 100 000 population, significantly higher than in most developed countries. In some rural areas of Central Asia, the infection rate in animals and humans reaches 10% or higher, indicating an unfavorable epidemiological situation [13].

Several studies have noted an increase in the number of new cases and the overall disease burden in Uzbekistan in recent years; some estimates indicate a significant increase in the number of detected cases over the past decades. Regional screening studies (for example, ultrasound examinations in the Samarkand region) have confirmed the existence of a hidden population-based infection rate, highlighting the need for active early detection and prevention measures. Of the 2057 participants in the study, 498 (24.2%) were men. Abdominal hydatid cysts were detected in 12 subjects (0.58%). A total of 5 active/transitional cysts (1 - CE1, 1 - CE2, 3 - CE3b) and 10 inactive cysts (8 - CE4, 2 - CE5) were identified. Two subjects had cystic lesions without pathognomonic features of CE. In addition, another 23 subjects reported previous surgeries for CE, mainly in the following organs: liver - 65.2%, lungs - 21.6%, spleen - 4.4%, liver and lungs - 4.4%, brain - 4.4% [14].

Alveolar echinococcosis (AE) It is also endemic in Central Asia and is recognized as a serious problem in some Tibetan communities, where up to 6% of residents of individual villages are infected. In the Fergana region, 5 to 30% of the population are seropositive for *Echinococcus granulosus* antigens, indicating widespread exposure to the parasite [15, 16].

Although echinococcosis control programs have been initiated in some Central Asian countries, these measures remain fragmented and uncoordinated.

This problem is particularly significant for the Fergana region, where small- and large-scale livestock farming is traditionally prevalent, while living conditions and veterinary monitoring remain inadequate. The continued high incidence of echinococcosis among the population requires an in-depth study of risk factors, an assessment of the epidemiological situation, and improved preventive measures for the population and veterinary services.

Thus, studying the prevalence of echinococcosis and developing effective preventive measures in endemic areas, including the Fergana region, is an urgent scientific and practical task for healthcare in Uzbekistan.

**Purpose of the study.** To assess the prevalence of echinococcosis among the population of the Fergana region and formulate practical recommendations for prevention and control, based on local epizootic and sociocultural conditions.

**Material and methods.** We have carried out A retrospective epidemiological study and literature review were conducted. The data sources used included official healthcare statistics of the Fergana region (regional reports and the surgical registry), departmental reports of the veterinary service (epizootological data on sheep/cattle and dogs), medical records of patients in surgical departments (surgeries for hydatid cysts) for the period 2023-2024, and data from prospective and population-based surveys published in peer-reviewed sources. The criteria included all cases of clinically and morphologically confirmed echinococcosis registered in healthcare structures of the Fergana region during the specified period, epizootological reports, and screening data. The following analytical methods were used: descriptive statistics (frequency, incidence per 100000 population, age and sex characteristics), geographic mapping of outbreaks (at the regional district level), risk factor analysis (contact with dogs, livestock practices, animal carcass disposal), and comparison of human and epizootic data. Publications and regional reviews from Central Asia were used for comparison.

### Research results.

1. A retrospective analysis of official data from the Fergana region revealed stable registration of echinococcosis cases during the study period; the surgical incidence rate fluctuates (local official statistics varied by year), and hidden (ultrasound) prevalence in neighboring regions indicates a possible underestimation of the true disease burden in the population (Table 1). These observations are consistent with national and regional data for Uzbekistan and Central Asia.

Table 1

**The incidence rate of echinococcosis in cities and districts of the Fergana region in 2023-2024**

	Districts	Years	Number of patients	Intensive indicator (100000 population)
1	Fergana city	2024	4	1.1
		2023	4	1.2
2	Kokand	2024	0	0
		2023	0	0
3	Margilan	2024	3	1.2
		2023	2	0.8
4	Kuvasai	2024	2	1.9
		2023	0	0
5	Altyarik	2024	1	0.4
		2023	1	0.4
6	Kushtepa	2024	4	1.9
		2023	4	1.9
7	Baghdad	2024	2	0.8
		2023	0	0
8	Besharik	2024	3	1.2
		2023	6	2.5
9	Buvaida	2024	1	0.4
		2023	1	0.4
10	Dangara	2024	0	0
		2023	1	0.5

2. In patients, liver localizations predominated, while pulmonary and multifocal lesions were less common; the proportion of laparotomies and resections of liver cysts remained significant in the structure of surgical interventions.

3. Risk groups and factors have been identified: The main risk factors are close contact with dogs (including the use of guard and herding dogs), the practice of feeding entrails from slaughtered animals to dogs, low rates of routine deworming of dogs, unsafe disposal of entrails, and poor public awareness of transmission routes. These factors are consistent with international observations and risk factor reviews.

4. Epizootic surveys in vivo and data from slaughterhouses/slaughterhouses have demonstrated the persistent presence of hydatid cysts in sheep and other livestock, while studies of dogs have revealed infectivity in the dog population in certain areas. This maintains the circulation of the parasite within the livestock life chain.

**Discussion of results.** The data obtained confirm that the Fergana region is a region with persistent echinococcosis circulation, where the actual prevalence may be higher than the official surgical incidence. A similar picture has been observed in other regions of Uzbekistan and throughout Central Asia: high-risk

groups include farms with intensive sheep farming, inadequate deworming of dogs, and inadequate disposal of livestock carcasses.

We conducted a retrospective statistical analysis of the incidence of echinococcosis in the Fergana region for the period 2023-2024. Overall incidence dynamics show 19 cases in 2023 and 20 cases in 2024, representing an increase of +5.3%. Thus, the overall incidence of echinococcosis in the region remained relatively stable, with a slight increase compared to the previous year. Research data shows some regional differences in echinococcosis incidence (Table 2).

Table 2

**Differences in the incidence of echinococcosis by districts of the Fergana region for the period 2023-2024.**

District	2023	2024	$\Delta$ patients	% change	$\Delta$ intensity
Fergana city	4	4	0	0%	-0.1
Kokand	0	0	0	-	0
Margilan	2	3	+1	+50%	+0.4
Kuvasai	0	2	+2	-	+1.9
Altyarik	1	1	0	0%	0
Kushtepa	4	4	0	0%	0
Baghdad	0	2	+2	-	+0.8
Besharik	6	3	-3	-50%	-1.3
Buvaida	1	1	0	0%	0
Dangara	1	0	-1	-100%	-0.5

**Increase in morbidity:** The number of new cases was recorded in Margilan, Quwasay, and Baghdad, which may indicate an epidemiological resurgence in these areas. A decrease was observed in Besharik and Dangara, which is likely due to improved prevention or fluctuations in registration. Stable indicators were observed in Fergana, Kushtepa, Altyarik, and Buvayda, and no cases were observed in Kokand in both years. When calculating intensive indicators (per 100,000 population), the average intensive indicator in 2023 was 0.96, and in 2024, 1.09. This is an increase in intensity of 13.5%, indicating a moderate increase in the risk of infection.

As the study progresses, the following retrospective analysis conclusions can be drawn:

1. In the Fergana region, endemic levels of echinococcosis persist.
2. The greatest contribution: The structure of morbidity included: Fergana, Kushtepa, Besharik (around 55% of all cases in total).
3. Local outbreaks possible in Quwasay and Baghdad, where growth was recorded after zero figures.
4. Enhanced epidemiological surveillance is needed and health education work in rural areas.
5. Screening examinations and comprehensive preventive measures based on the One Health principle are recommended.

Transmission of echinococcosis in the region is largely associated with social factors, including low public awareness of echinococcosis, small-scale livestock farming, home slaughter of livestock, and feeding raw entrails to dogs.

The main problem is the "latent" nature of many infections (the long asymptomatic period during which cysts form), which often leads to the disease being detected at a stage requiring surgical intervention. Early screening (ultrasound) in risk groups shows a significantly higher prevalence than official surgical registration suggests and should be considered as a tool in a regional monitoring strategy.

The prevention strategy must be comprehensive (One Health), combining public health, veterinary, and public education measures. Key elements include regular deworming of dogs (praziquantel), vaccination of sheep (EG95) when appropriate, safe disposal of infected organs, controlled slaughter, public health education programs, and improved access to diagnosis and treatment. These approaches are described in international guidelines and have proven effective in pilot programs.

Thus, a comprehensive assessment of the spread of echinococcosis in the Fergana region and the development of evidence-based preventive measures are scientifically and practically sound initiatives: they fill gaps in regional epidemiological surveillance information, localize high-risk groups, and enable the formulation of effective, cost-effective interventions—from veterinary and sanitary measures and deworming of dogs to human screening and educational programs for rural communities.

### Conclusions:

1. The Fergana region demonstrates endemic echinococcosis with persistent circulation of the parasite in livestock production chains; the actual prevalence among the population is likely higher than the official surgical incidence.
2. A regional control program based on One Health principles is needed, including:
  - regular deworming of dogs (mass campaigns with praziquantel),
  - improving slaughter by-product disposal practices and banning the feeding of infected offal to dogs,
  - pilot screening ultrasound examinations in risk groups,
  - educational programs for rural communities and livestock workers,
  - monitoring of morbidity in animals and humans with the creation of an interdepartmental registry.
3. For scientific support of control, it is advisable to carry out interventions in the form of cluster studies (assessment of the effectiveness of deworming, vaccination of sheep, educational campaigns) followed by an economic assessment of the cost-effectiveness of the measures.
4. It is recommended to strengthen cooperation with national parasitology centers and international organizations to exchange experience and methodological materials.

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