

# Assessment Of Economic Damage from Human Echinococcosis in Medical and Preventive Organizations of The Kyrgyz Republic

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## Abstract

One of the main priorities of the state policy is to protect the health of the Kyrgyz Republic population as the most important factor of national security. In this regard, the measures against infectious and parasitic diseases are of particular importance.

**Keywords:** Parasitic diseases, lungs.

## Introduction

One of the main priorities of the state policy is to protect the health of the Kyrgyz Republic population as the most important factor of national security. In this regard, the measures against infectious and parasitic diseases are of particular importance.

One of the most common pathological processes in the human population are parasitic, which occupies the fourth place in the structure of all diseases [1, p.664]. Up to 1.5 million cases of these diseases are registered annually in the country, the total number of patients with parasitosis is approaching 20 million people and tends to increase further [1, p.664]. And the annual economic loss from the incidence of echinococcosis, opisthorchiasis, enterobiasis, heminolepidosis, ascariasis, and trichocephalosis alone is 1.7 billion rubles.

Parasitic diseases, while being ubiquitous, represent a medical, social and economic problem. An increase of many helminthiasis has been observed in Kyrgyzstan in recent years.

Echinococcosis is one of the worst human helminthiasis characterized by lesions of the liver, lungs, and other organs, allergic reactions, and severe complications, which often lead to disability and high mortality. This is one of the most important and widespread parasitic diseases in the world, representing a serious problem not only for veterinary

but also for medicine, causing significant economic damage, which consists of a number of indicators.

Official registration of echinococcosis in the Republic was started in the 60s of the last centuries when the average intensive incidence rate was 2.5 per 100 thousand population, then in the 70s it increased to 3, in the 80s-3.6, in the 90s-8.02, and in 2000-it was already 12.4 per 100 thousand population. The trend of growth in the incidence of echinococcosis continued in the XXI century [3, p. 102-104], it has a pronounced character with an annual growth rate of 14.6%.

According to WHO, about 10 thousand US dollars are spent on the treatment of one patient with echinococcosis due to the duration of the disease (10-15 years). Echinococcosis can lead to severe complications, including disability and death. The number of complications in this disease reaches 30%. From echinococcosis, the quality of life of sick people decreases, many suffer from postoperative complications. According to WHO, the average postoperative mortality rate is 2.2%, and 6.55% of patients have relapses that require a long recovery period. The WHO working group of experts, established in 2015, estimated the annual damage from cystic echinococcosis associated with the identification, treatment of patients, rehabilitation, and medical examination at approximately 3 billion US dollars [4].

Economic damage is the most important quantitative and qualitative assessment in any area of the economy.

Echinococcosis is the cause of approximately 870,000 lost years of life worldwide, including disability each year (DALY). There are more than 8,000 new cases of alveococcosis worldwide, causing more than 300,000 DALYs [5].

Echinococcosis, in addition to morbidity, mortality and human suffering, is responsible for large economic losses in livestock, especially in the loss of meat, milk, wool, reduced fertility, and great damage is expressed in the culling of slaughter products affected by echinococci. The total annual damage caused to humans and animals in endemic countries can range from several tens of millions to two billion dollars [6, p. 195-229; 7]. The global indicator of DALY (Disability Adjusted Life Years) is 1-3 million years annually [5].

According to experts, with incomplete registration of echinococcosis, economic losses from the disease can be 4 times higher than expected. Foreign helminthologists note a significant burden of these diseases [8, p. 353].

The high incidence of echinococcosis in the population is one of the most actual problems in the Kyrgyz Republic.

Echinococcosis is widespread in the country, and an increase of the incidence rate was observed in all regions.

The number of patients with echinococcosis and alveococcosis has been increased not only among the rural population, who engaged in livestock, however among the urban people in the last two decades. [9, p. 40-44; 10, p. 19-25; 3, p. 102-104].

According to international experts, Kyrgyzstan

experiences economic loss from this disease of 10 to 15 million dollars, annually

### The purpose

Identification of defining features of economic loss from human echinococcosis in Kyrgyzstan in modern conditions per 1 person.

### Material and methods

We have selected all confirmed surgical cases of cystic echinococcosis and alveolar echinococcosis registered in the national epidemiological surveillance system in the Kyrgyz Republic over the past 20 years (2000-2019), as well as the official price of each medical services in the health care system for echinococcosis from January 1, 2014, to December 31, 2016. All estimates of morbidity were calculated per 100,000 population. In economic cost calculations, we have used the method of I. L. Shakhanina.

### Results and Discussion

The intensive rate per 100 thousand population of the Kyrgyz Republic for the analyzed period ranged from 9.2 (2004) to 20.4 (2014) (Fig. 1) in addition, the number of cases began to gradually decrease: 2014 - 1185, 2015 - 1134, 2016 - 963, 2017 - 942, 2018 - 986, 2019 - 969 cases [11, p.20-27]. The average annual growth rate was 3.5%. The average long-term intensive incidence of echinococcosis per 100 thousand population was 14.6, the minimum-9.2 (2004) and the maximum - 20.2 (2014). The average long-term intensive incidence of alveococcosis per 1000 population was 2.04, the minimum - 1.2 (2009), the maximum - 3.9 (2015).

Echinococcosis is widespread, and an increase in the incidence rate was observed in all regions [11, p. 20-27].

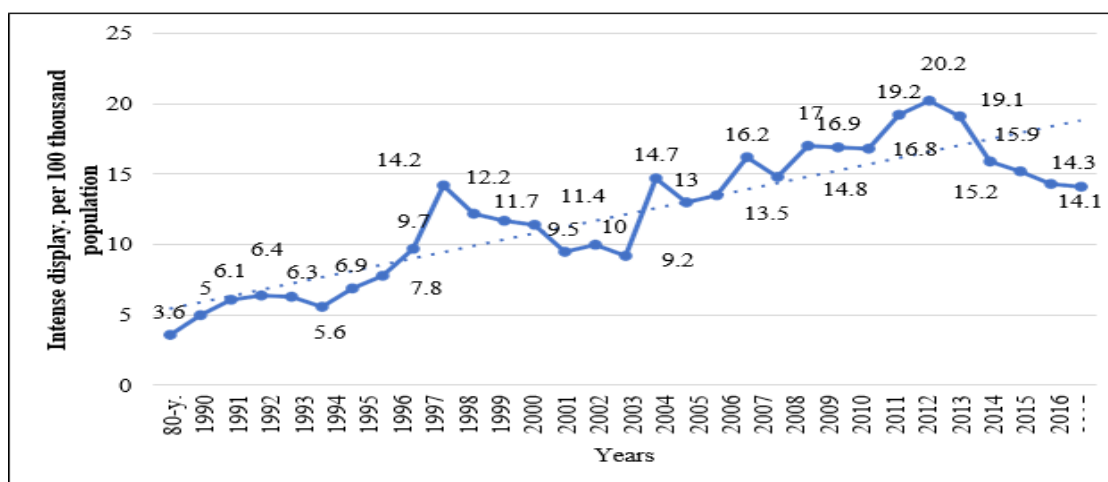


Fig 1: Long-term dynamics of the incidence of echinococcosis in the Kyrgyz Republic for 1980-2019 (intensive rate per 100,000).

As the author shows [12, p.42], the economic loss from intestinal helminthes and protozooses for 1 case is: in Enterobiosis - 218.8 soms, on average, 17500.5 soms were spent annually, Ascariasis – 550.8 soms, on average, 187498.8 soms were spent annually, Hymenolepidosis – 1593.3 soms, on average, 358211.3 soms were spent annually, Cestodoses (teniosis, teniarinhosis, diphyllbothriosis) – 1532.3 soms and Giardiasis – 675.8 soms, on average, 108684.5 soms were spent annually [12, p. 42].

To calculate the economic effect, the economic loss from echinococcosis was calculated by summing up the direct costs. Direct costs include the cost of the following activities per 1 patient:

- reception of the doctor and nurse;
- examination of the epidemic focus by a parasitologist and an assistant;
- laboratory examination (ultrasound, blood test, examination of liver);
- treatment (inpatient and outpatient);
- prophylactic medical examination;

The calculation of economic costs was carried out using the method of I. L. Shakhanina and the cost of medical and diagnostic measures is shown in table 1. Based on these calculations, we determined the average cost per case of echinococcosis. For example, the cost of 1 case of echinococcosis consists of the following measures (table 1):

Thus, based on statistical data and calculations, we can conclude that the estimated economic loss from human echinococcosis is due to the cost of medical services in the health care system. At the same time, in monetary terms, the damage per 1 person officially in 2019 amounted to 19258.76 soms.

In total, during the analyzed period (2000-2019), 15708 cases of echinococcosis were registered in the Kyrgyz Republic, the total economic loss from echinococcosis in the Kyrgyz Republic amounted to 302,516,602 soms (3901,426. 4 in US dollars, exchange rate as of 21.07.2020), not counting non-official expenses for surgery. Annually, on average, 15125830.1 soms (195071.32 in US dollars) were spent on this invasion (Fig. 2). It should be noted that only 1/10 of cases of echinococcosis are officially registered. If patients with echinococcosis were fully

registered, the economic costs would increase by 10 times.

Studies have shown that echinococcosis in the Kyrgyz Republic remains a common parasitic chronic human disease that causes enormous economic loss. In addition, the course of echinococcosis is accompanied by damage to the liver, lungs and other organs, allergization of the body and severe complications that often lead to disability, the treatment of which requires additional costs.

The data obtained should be used for epidemiological and parasitological monitoring and for the development of measures aimed at preventing infection of the population with echinococcosis.

**Table 1:** The calculation of financial expenses (economic loss) of medical services in the healthcare system for the treatment of echinococcal and alveococcal patients (in som).

No	Services	The price for one patient	
		ambulator y	in hospital
1.	Reception of doctor for the first appeal (4,4*1)	4,4	4,4
2.	Job of the nurse	3,9	3,9
3.	Job of the medical orderly	3,5	3,5
4.	Ultrasound of internal organs (complex) and abdominal cavity at the first appeal	198	198
5.	ELISA (serology)	0	350
6.	Hospitalization (operation)	0	1200
7.	Blood test	0	126
8.	Liver test	0	271
9.	Additional medications	0	6000
10.	Reception of doctor four times (during the medical examination and after each course)4,4*4	17,6	0
11.	Job of the nurse 3,9*4	15,56	0
12.	Job of the medical orderly 3,50*4 For conservative treatment	14	0
13.	(chemotherapy) on average albendazole 42 tablets *72*3	9072	0
14.	Liver test (3 times*271 com) Ultrasound 2 times (at the	813	0
15.	beginning of conservative treatment and at the end 2*198)	396	0
16.	Blood test (126*4)	504	0
17.	Visiting the epicenter (focus) by parasitologist	40	0
18.	Visiting the epicenter (focus) by the assistant of parasitologist	20	0
		11101,96	8156,8
<b>Total:</b>		<b>19258,76</b>	

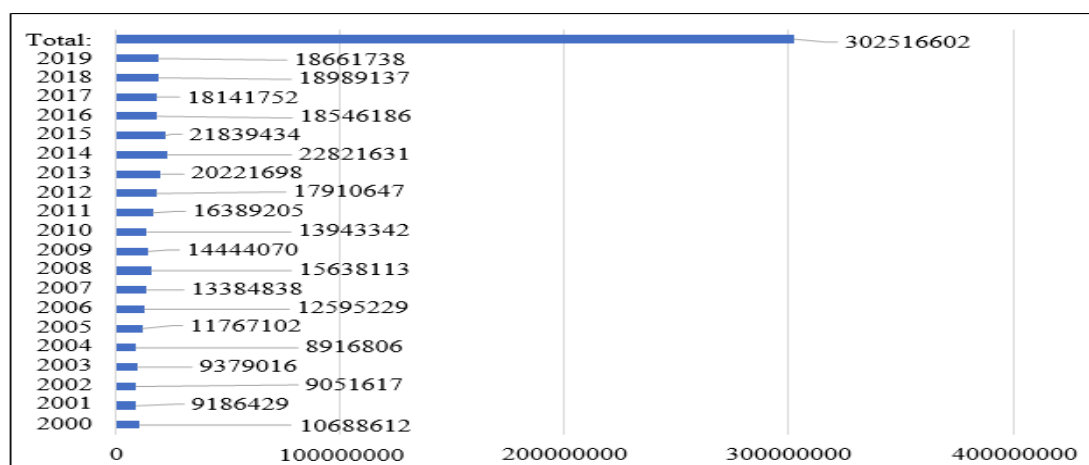


Fig 2: The economic loss from echinococcosis in the Kyrgyz Republic.

### Conclusions

1. Since 2015, the incidence of echinococcosis has been decreasing in the Republic due to the activities carried out over the past 4 years. If in 2014 the intensive indicator was 20.2, then from 2015 to 2019.- 19,2, 15,9, 15,2, 14,3. 14,1 accordingly.
2. Despite the decrease in the incidence of echinococcosis, "hyperendemic territories" remain in the Kyrgyz Republic.
3. In just 20 years, the total economic loss from echinococcosis in the Kyrgyz Republic amounted to 384,357,481. 2 som (4,956,253.8 in US dollars, exchange rate as of 20.07.2020) on average, 19,217,874. 1 som (247,812. 7 in US dollars) were spent annually on this invasion.

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