**Tehran University of Medical Sciences Publication**
**http://tums.ac.ir**

**Iran J Parasitol**

**Open access Journal at**
**http:// ijpa.tums.ac.ir**

**Iranian Society of Parasitology**
**http://isp.tums.ac.ir**

## Letter to the Editor

# The Potential Risk Factors of Cystic Echinococcosis in Armenia

***Ani Manukyan [1], Gayane Grigoryan [1], Karine Gevorgyan [1], Gayane Melik-Andreasyan [2], Ara Keshishyan [3], Gayane Sahakyan [4]**

1. *Department of Zoonotic and Parasitic Diseases Epidemiology, National Center for Disease Control and Prevention (NCDC), Yerevan, Armenia*
2. *Deputy Director for Science, Reference Laboratory Centre of NCDC, Yerevan, Armenia*
3. *Parasitology Laboratory, Reference Laboratory Centre of NCDC, Yerevan, Armenia*
4. *National Institute of Health, Yerevan, Armenia*

*Received* 15 Apr 2025
*Accepted* 24 Apr 2025

*Correspondence Email:
manukyan_ani@aol.com

## Dear Editor-in-Chief

*Echinococcus* spp. are Taeniidae cestode parasites belonging to the genus *Echinococcus* posing significant health and economic concerns. The genus has a global distribution, with species found on all continents (1). Cystic echinococcosis (CE) and alveolar echinococcosis (AE) represent the predominant types (2). From 2014 to 2023, the estimated average incidence per 100,000 population in Armenia was 2.6 for CE and 0.03 for AE (Fig. 1).

We reviewed 163 epidemiological case investigation forms for CE collected through the passive surveillance system of the National Center for Disease Control and Prevention between 2020 and 2023, covering six administrative regions (Aragatsotn, Ararat, Armavir, Gegharkunik, Kotayk, Shirak) and Yerevan city. Descriptive statistical analysis was conducted to characterize the epidemiological features, identify potential risk factors, and provide recommendations to improve work efficiency.


DOI: https://doi.org/10.18502/ijpa.v20i2.19052

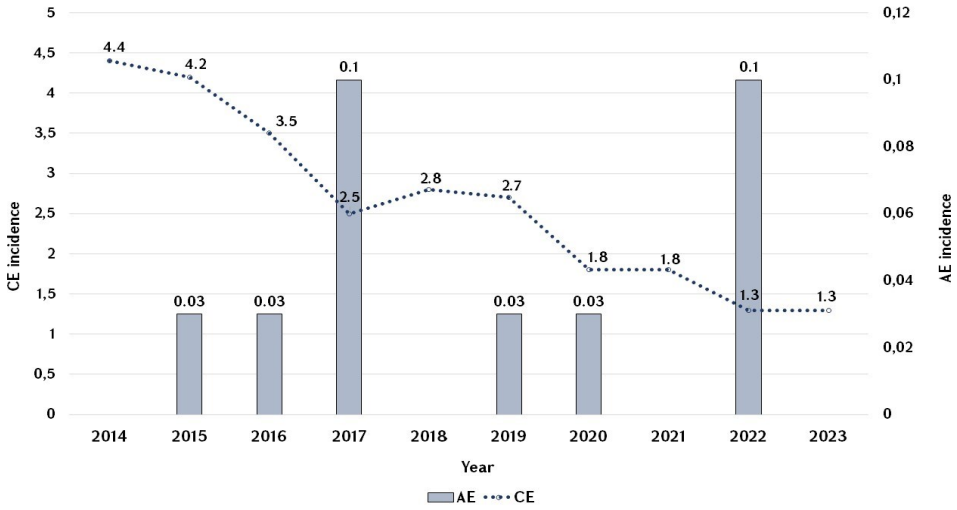


**Fig. 1:** Incidence of CE and AE per 100 000 population in Armenia, 2014-2023 (3)

**Table 1:** Demographic characteristics of cystic echinococcosis, 2020-2023

| Demographic characteristics | | Cases (N) | Frequency (%) |
|---|---|---|---|
| Gender | Male | 73 | 45 |
| | Female | 90 | 55 |
| Age | ≤ 19 | 44 | 27 |
| | 20-29 | 17 | 10 |
| | 30-39 | 34 | 21 |
| | 40-49 | 17 | 10 |
| | 50-59 | 17 | 10 |
| | ≥ 60 | 33 | 21 |
| Residence | Urban | 67 | 41 |
| | Rural | 96 | 59 |
| Accommodation | Apartment | 48 | 30 |
| | House | 103 | 63 |
| | Unknown | 12 | 7 |
| Occupation | Unemployed | 106 | 65 |
| | School pupil | 24 | 15 |
| | Retired | 18 | 11 |
| | Other | 15 | 9 |

The majority of cases were female, from rural area and under 19 years of age (Table 1). The age ranged from 3 to 90 years with the mean of 35 years. Location of cysts: liver (74%), lungs (13%), spleen (2%), kidney (1%), unusual (7%) and combined (3%). Six patients (4%) with hepatic echinococcosis had relapse.

In terms of occupational setting, 106 cases were not working. 73% of cases did not keep domestic or agricultural animals and the source of infection could not be identified, 22% of cases stated having a dog, 5% of cases associated their infection to the presence of stray dogs in the area. Only 65% of households had centralized water supply system.

It is clear, that living in a rural area, being a female increases the chance of infection. Similar results were reported from China, Iran (4, 5). Overall, in Armenia awareness on echinococcosis is low. It is challenging to determine

the cause-and-effect relationship of the disease due to its long asymptomatic incubation period. Laboratory methods accessible in Armenia, are not suitable to perform differential diagnosis for echinococcosis types. In addition, other challenges are low acceptability and willingness of epidemiologists to fill the investigation form, absence of screening programmes, low-value use of imaging methods. In the villages with recorded cases, there are no slaughterhouses, leading to yard slaughtering without personal protective equipment and throwing offal to dogs. In addition, investigation and deworming of dogs is crucial for prevention (4).

Human echinococcosis remains largely neglected disease in Armenia which require strengthened governmental support and development of a national control program based on the "One Health" concept (). We recommended to revise the epidemiological case investigation form of echinococcosis making it simple to fill and including details on epidemiological links, such as:

1) Years spent in the current address,
2) Cyst staging based on the who informal working group on echinococcosis (IWGE) classification (6, 7),
3) Owning livestock and cat,
4) Description of occupation (agricultural worker, livestock keeper, breeder, meet processor, slaughter, butcher),
5) Availability of waste disposal sorting system at the place of its generation,
6) The habit of petting (frequency) the pets,
7) Feeding of dogs with raw offals,
8) Deworming domestic pets,
9) Using dog to guard livestock,
10) Dogs allowed in the house,
11) Behavioral habits: hand hygiene practices and handwashing before meals/cooking/eating, eating self-grown/unwashed/uncooked vegetables, chewing grass blades, nail biting, smoking, using toothpicks,
12) Use of alternative water sources near the household (non-potable water: rivers, springs, ponds).

## Conflict of interest

The authors declare that there is no conflict of interest.

## References


1. Woolsey ID, Miller AL. *Echinococcus granulosus* sensu lato and *Echinococcus multilocularis*: A review. Res Vet Sci. 2021;135:517-522.
2. Kakamad FH, Anwar KA, Ahmed HK, et al. Risk factors associated with human echinococcosis: a systematic review and meta-analysis. Front Vet Sci. 2024; 11:1480579.
3. Manukyan AH, Danielyan RR, Gevorgyan KM, Sahakyan GF, Vanyan AV, Melik-Andreasyan GG. Human Echinococcosis in Armenia: An Old and Neglected Challenge. Medical Science of Armenia. 2024; 64(2): 80-88.
4. Ma T, Wang Q, Hao M, et al. Epidemiological characteristics and risk factors for cystic and alveolar echinococcosis in China: an analysis of a national population-based field survey. Parasit Vectors. 2023;16(1):181.
5. Safarpour AR, Omidian M, Pouryousef A, Fattahi MR, Sarkari B. Serosurvey of Cystic Echinococcosis and Related Risk Factors for Infection in Fars Province, Southern Iran: A Population-Based Study. Biomed Res Int. 2022; 2022:3709694.
6. Acosta-Jamett G, Hernández FA, Castro N, et al. Prevalence rate and risk factors of human cystic echinococcosis: A cross-sectional, community-based, abdominal ultrasound study in rural and urban north-central Chile. PLoS Negl Trop Dis. 2022; 16(3): e0010280.
7. Uchiumi L, Mujica G, Araya D, et al. Prevalence of human cystic echinococcosis in the towns of Ñorquinco and Ramos Mexia in Rio Negro Province, Argentina, and direct risk factors for infection. Parasit Vectors. 2021;14(1):262.