

## Preplanned Studies

## Analysis of Epidemiological and Issues Encountered in Case Reports on Echinococcosis — China, 2022

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### Summary

#### What is already known about this topic?

Echinococcosis is classified as a Class C infectious disease in China. It is endemic in 370 counties located in the agricultural and pastoral regions of western China.

#### What is added by this report?

This report provides a comprehensive overview of the cases of echinococcosis reported in China in 2022. Following a thorough evaluation conducted by provincial CDCs, it was identified that 105 new cases were not reported through the National Notifiable Disease Reporting System. Furthermore, there were 1,051 cases that were reported among patients who had been previously diagnosed with echinococcosis.

#### What are the implications for public health practice?

The reported cases of echinococcosis in non-endemic counties of provincial-level administrative divisions where the disease is endemic need to be given more attention, as there is a potential risk of it spreading within the non-endemic areas. Inadequate reporting practices by clinical medical institutions are hindering the subsequent investigations carried out by CDCs. It is important to implement enhanced health promotion efforts that focus on high-risk populations to address unhealthy lifestyles.

This article aims to analyze the reported cases of echinococcosis in China in 2022, providing insights into the distribution and epidemiological characteristics of the disease. The analysis will contribute to the development of effective prevention and control strategies. The data of reported cases were collected and analyzed using descriptive epidemiological methods. In 2022, a total of 2,711 cases were reported nationwide, including 105 cases that were not captured by the National Notifiable Disease Reporting System (NNDRS) and were subsequently reported by provincial CDCs after verification. Among the reported cases, 1,051

(39.33%) were re-visited in the epidemic provincial-level administrative divisions (PLADs), 39 cases (1.44%) were reported in 16 non-endemic PLADs, and 154 cases (5.76%) were reported in non-endemic counties within the epidemic PLADs. The reported cases of echinococcosis in China have consistently declined for three years until 2022. However, there are still challenges in the national program of echinococcosis control, necessitating continued reinforcement. It is important to reinforce the reporting of cases in non-endemic areas and remain vigilant about the potential for spread. The government should increase investments, enhance public health facilities, and elevate the standards of primary medical and healthcare services.

Echinococcosis, also known as hydatidosis, is a globally prevalent zoonotic parasitic disease caused by *Echinococcus* larvae. It poses significant threats to human health and life, while inflicting substantial economic losses on animal husbandry production (1–3). China is heavily affected by echinococcosis, with two types: alveolar echinococcosis and cystic echinococcosis. Echinococcosis is widespread in 370 counties within western agricultural and pastoral areas of China, threatening nearly 60 million people. This has a significant impact on public health and animal husbandry development in endemic areas (4–5). The Qinghai-Xizang Plateau is particularly affected, ranking first in the world in terms of epidemic scope, threatened population, and number of patients (6–7). According to the Chinese Law on the Prevention and Treatment of Infectious Diseases, echinococcosis is classified as a Class C infectious disease. Since 2004, it has been included in the NNDRS. Echinococcosis cases have also been reported in non-endemic PLADs for an extended period (8–9).

The echinococcosis cases reported by the NNDRS in 2022 were retrieved using the search criteria of a final review date between January 1, 2022, and December 31, 2022. Suspected and duplicate cases were excluded from the study. Echinococcosis cases from Hong Kong Special Administrative Region

(SAR), China; Macao SAR, China; and Taiwan, China, were not included. The cases were determined based on the Diagnostic Criteria for Echinococcosis (WS257-2006). The provincial CDCs reviewed the retrieval results and identified revisiting patients who had previously been diagnosed with echinococcosis and sought re-examination or drug dispensing at hospitals in 2022. Duplicate reported cases, where the same ID number was reported multiple times within the same month, were eliminated. Additionally, missing reported cases that were diagnosed by medical institutions according to WS257-2006 in 2022 but were not found in the retrieval results were included. For basic descriptive statistical analyses, Microsoft Excel (version 2016, Microsoft Corp., Redmond, USA) and SAS Software (version 9.4, SAS Institute Inc., NC, USA) were used. The statistical significance was determined using a two-tailed  $P$ -value  $<0.05$ .

In 2022, a total of 2,711 echinococcosis cases were reported across 25 PLADs, including cities and autonomous regions. Fortunately, there were no deaths reported. Of these cases, 1,051 were revisiting cases, and 105 cases were initially unreported but later confirmed. The majority of cases (98.56%,  $n=2,672$ ) were reported in endemic PLADs. The three PLADs with the highest number of reported cases were Xinjiang Uygur Autonomous Region, Sichuan Province, and Qinghai Province. Additionally, there were 39 cases reported in 16 non-endemic PLADs, which is 14 cases fewer than in 2021.

In 2022, cases of echinococcosis were reported in various age groups in China. The median age in endemic PLADs was 48 years, with the majority falling within the age brackets of 50 and 40, accounting for 23.02% (624/2,672) and 20.91% (567/2,672), respectively. Non-endemic PLADs had an average age of  $38.21 \pm 17.27$  years, mainly concentrated in the age groups of 40 and 10, comprising 30.77% (12/39) and 15.38% (6/39), respectively. There was no statistically significant difference in the age distribution between endemic and non-endemic PLADs ( $\chi^2=12.51$ ,  $P=0.085$ ). The male to female ratio was approximately 1:1.14 in endemic PLADs and 1:1.44 in non-endemic PLADs; however, this gender distribution difference did not reach statistical significance ( $\chi^2=2.28$ ,  $P=0.131$ ) (Table 1).

In 2022, there were reported cases of echinococcosis observed in China among various population groups. In the endemic PLADs, the highest number of cases were reported by farmers (44.12%, 1179/2,672), followed by herdsmen (25.94%, 693/2,672), and houseworkers and unemployed individuals (6.96%, 186/2,672). In non-endemic PLADs, the primary

reporting groups were farmers, commercial service personnel, students, as well as houseworkers and unemployed individuals, accounting for a total proportion of 79.49% (31/39) (Table 1).

In 2022, 77.03% (285/370) of the counties affected by the epidemic reported cases, comprising 92.88% (2,518/2,711) of the total reported cases in China. Among these counties, there were 65 with 10 or more cases, 66 with 5–9 cases, and 154 with less than 5 cases. Yining City in Xinjiang Uygur Autonomous Region (43 cases), Gande County in Qinghai Province (34 cases), Chabuchal County in Xinjiang Uygur Autonomous Region (32 cases), Dari County in Qinghai Province (31 cases), and Yining County in Xinjiang Uygur Autonomous Region (29 cases) had the highest number of reported cases after revisiting and removal of cases. Loss to follow-up accounted for 2.56% (1/39) of cases, and 5.13% (2/39) of cases were linked to overseas sources. Additionally, six non-endemic PLADs reported suspected local infections: Guizhou (3 cases), Shandong (3 cases), Hebei (2 cases), Heilongjiang (1 case), Hunan (1 case), and Liaoning (1 case). Further investigation in non-endemic PLADs found that 28.21% (11/39) of cases had no travel or living history in endemic areas, while 64.10% (25/39) had a travel or living history in endemic areas, with the majority (60%) originating from Xinjiang (Figure 1).

In 2022, there were a total of 154 reported cases in non-endemic counties within the epidemic PLADs, which accounted for 5.76% (154/2,672) of all reported cases in the epidemic PLADs. Specifically, Shaanxi, Inner Mongolia, and Yunnan had higher proportions of reported cases in non-endemic counties, with proportions of 84.62% (11/13), 37.14% (13/35), and 28.57% (8/28) respectively (Table 2). The counties with the highest number of reported cases in non-endemic counties within the epidemic PLADs were Xinshi District of Xinjiang (11 cases), Shaybak District of Xinjiang (10 cases), Chengzhong District of Qinghai (8 cases), Chengxi District of Qinghai (7 cases), and Tianshan District of Xinjiang (7 cases).

A total of 1,051 revisiting cases were identified in the epidemic PLADs across China in 2022, comprising 39.33% (1,051/2,672) of all reported cases in these PLADs. Among the PLADs, Sichuan had the highest proportion of revisiting cases, accounting for 81.88% (524/640), followed by Qinghai with 49.92% (299/599), Gansu with 41.11% (104/253), and Ningxia with 37.50% (51/136). Please refer to Table 2 for detailed information.

TABLE 1. Characteristics and distribution of reported echinococcosis cases in China, 2022.

Feature	Number of reported cases of endemic PLADs												Non-endemic PLADs	
	Inner Mongolia	Sichuan	Yunnan	Xizang	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	XPCC	Total	Composition rate, %	Number of reported case	Composition rate, %
Age, years														
0–	0	11	0	4	0	0	9	1	53	3	81	2.99	2	5.13
10–	1	33	2	7	0	6	26	0	97	7	179	6.60	6	15.38
20–	1	71	0	18	0	5	66	1	49	5	216	7.97	5	12.82
30–	7	112	2	28	1	17	87	13	84	8	359	13.24	5	12.82
40–	7	152	4	29	3	37	149	19	159	8	567	20.91	12	30.77
50–	8	125	5	29	3	84	144	28	171	27	624	23.02	4	10.26
60–	3	71	12	10	4	48	56	33	89	3	329	12.14	3	7.69
70–	8	65	3	12	2	56	62	41	60	8	317	11.69	2	5.13
Occupation														
Nursery children	0	1	0	2	0	0	1	0	9	1	14	0.52	0	0
Scattered children	0	10	0	1	0	0	7	0	7	0	25	0.94	0	0
Students	1	19	2	4	0	3	16	1	125	10	181	6.77	7	17.95
Teachers	0	0	0	0	0	1	7	2	5	0	15	0.56	1	2.56
Household assistants and childcare providers	0	0	0	1	0	0	0	0	0	0	1	0.04	0	0
Service providers	0	1	0	0	0	0	0	0	1	0	2	0.07	0	0
Commercial service	3	3	0	1	2	4	2	1	32	2	50	1.87	7	17.95
Medical personnel	0	1	0	0	0	0	2	0	2	0	5	0.19	0	0
Workers	0	5	1	5	0	1	5	0	25	7	49	1.83	0	0
Peasants	8	291	17	55	7	195	140	102	344	20	1,179	44.12	12	30.77
Herdsmen	10	220	3	43	0	14	360	1	40	2	693	25.94	0	0
Seafarers and long-distance drivers	0	0	0	0	0	0	0	0	1	0	1	0.04	0	0
Staff	2	3	1	4	1	2	3	0	21	1	38	1.42	2	5.13
Retirees	3	6	2	8	3	10	13	9	55	10	119	4.45	0	0
Unemployed or at home	8	24	0	6	0	14	20	19	85	10	186	6.96	5	12.82
Religious professionals	0	31	0	0	0	2	13	0	0	0	46	1.72	0	0
Freelancers	0	0	1	0	0	0	1	1	3	0	6	0.22	0	0
Others	0	1	0	1	0	0	0	0	1	1	4	0.15	1	2.56
Unknown	0	24	1	6	0	7	9	0	6	5	58	2.17	4	10.26
Gender														
Male	17	256	13	65	10	126	269	54	405	36	1,251	46.82	23	58.97
Female	18	384	15	72	3	127	330	82	357	33	1,421	53.18	16	41.03
Total	35	640	28	137	13	253	599	136	762	69	2,672	100.00	39	100.00

Abbreviation: XPCC=Xinjiang Production and Construction Corps; PLADs=provincial-level administrative divisions.

## DISCUSSION

The number of reported echinococcosis cases in

China has shown a consistent decrease, declining from 6,800 cases in 2017 to 2,711 cases in 2022, which indicates that the epidemic in our nation has been

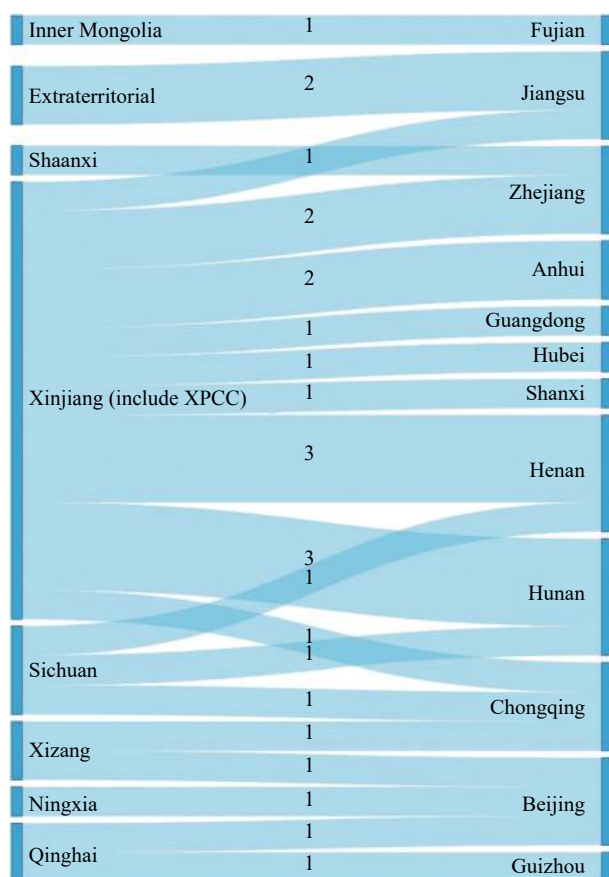


FIGURE 1. The Sankey diagram of exported PLADs and imported non-endemic PLADs of echinococcosis in China, 2022.

Abbreviation: XPCC=Xinjiang Production and Construction Corps; PLADs=provincial-level administrative divisions.

effectively contained. The data reveals that individuals in occupations such as farmers, herdsmen, houseworkers, unemployed individuals, and students are still at a high risk for echinococcosis infection. It is evident that there is a lack of awareness regarding the transmission risks of echinococcosis among certain individuals, particularly those living in non-endemic PLADs and regions. This lack of awareness has resulted in a deficiency of effective preventive measures. Some areas still suffer from inadequate public health facilities, including limited access to hand-washing facilities. Furthermore, certain regions continue to engage in practices such as consuming undercooked animal meat and drinking untreated water, which creates favorable conditions for the transmission of echinococcosis. The limited healthcare resources in these regions have also posed challenges to the national program for echinococcosis control.

During the data verification process, we encountered several challenges. These included instances of duplicated reporting of previous cases, as well as omissions of newly detected cases and statistical errors in certain disease-affected regions. After consulting with the staff of the primary CDCs, we discovered that some new cases had been identified during the screening of key groups conducted by CDCs in collaboration with medical institutions. However, due to potential delays in seeking hospital treatment, these individuals may have been unintentionally overlooked in the reporting process, despite being confirmed cases according to the diagnostic criteria established by

TABLE 2. Case composition reported in endemic PLADs.

PLADs	Number of reported cases (%)			
	Endemic county report	Non-endemic counties in the PLADs	Revisiting	Total
Inner Mongolia	18 (51.43)	13 (37.14)	4 (11.43)	35
Sichuan	80 (12.50)	36 (5.63)	524 (81.88)	640
Yunnan	19 (67.86)	8 (28.57)	1 (3.57)	28
Xizang	137 (100.00)	–	–	137
Shaanxi	2 (15.38)	11 (84.62)	0 (0)	13
Gansu	132 (52.17)	17 (6.72)	104 (41.11)	253
Qinghai	276 (46.08)	24 (4.01)	299 (49.92)	599
Ningxia	83 (61.03)	2 (1.47)	51 (37.50)	136
Xinjiang	654 (85.83)	43 (5.64)	65 (8.53)	762
XPCC	66 (95.65)	0 (0)	3 (4.35)	69
Total	1,467 (54.90)	154 (5.76)	1,051 (39.33)	2,672

Note: “–”=The prevalence of echinococcosis is endemic in all counties within Xizang; however, due to various limitations, it is not feasible to ascertain the precise number of re-diagnosed cases among those reported.

Abbreviation: XPCC=Xinjiang Production and Construction Corps; PLADs=provincial-level administrative divisions.

authorized physicians during the screening. Additionally, the available data does not specify whether the patient has cystic or alveolar echinococcosis, which is essential information. The non-standard reporting practices adopted by clinical medical institutions have significantly hindered the subsequent investigation efforts of the CDCs.

Echinococcosis, a parasitic disease that poses a significant threat to human health, requires increased attention and support through the implementation of the One Health approach. It is important to prioritize the standardization of the “Infectious Disease Report Card” filling process in primary medical institutions. The next step would be to plan a training course on relevant policies, or alternatively, prepare a work specification promptly and ensure its distribution among the relevant clinicians in order to enhance the quality of reporting. In addition, there is a need to intensify the dissemination of epidemic prevention and control measures, enhance public awareness of preventive practices, and guide individuals in adopting scientifically recommended personal hygiene habits, such as frequent handwashing and avoiding close contact with dogs. Moreover, it is crucial to discourage the consumption of undercooked animal meat or contaminated water sources and to avoid contact with marmots and other wild animals to minimize the risk of infection.

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