TBE in China

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E-CDC risk status: endemic (no new data available as of May 2023)

History and current situation

The first TBE patients in China were reported in 1943, and the TBEV was isolated from the brain tissues of 2 patients in 1944 by Japanese military scientists,[1] and from patients and ticks (*Ixodes persulcatus* and *Haemaphysalis concinna*) in 1952 by Chinese researchers.[2] The Far Eastern viral subtype (TBEV-FE) is the endemic subtype that has been isolated from all 3 known natural foci (northeastern China, western China, and southwestern China).[14] Recently a new "Himalayan subtype" of the TBEV (TBEV-HIM) was isolated from wild rodent *Marmoata himalayana* in the Qinghai-Tibet Plateau.[15] One recent report suggests that the TBEV-SIB is prevalent in the Uygur region (North West China).[13] The main vector of the TBEV in China is *I. persulcatus*.[3] Epidemiological modelling indicates that the TBEV may occur even widely all over China (Figure 3).[4] Likely, the disease is often missed by clinicians due to a lack of the availability of specific diagnostic assays.[16]

Serological research has demonstrated that there are high numbers of human TBEV-infections in the 3 foci mentioned above. However, TBE patients are mainly reported from northeastern China, including Inner Mongolia Autonomous Region (Daxing'an Mountains), Heilongjiang Province (Xiaoxing'an Mountains), and Jilin Province (Changbai Mountains). In a recent report 803 cases including 4 deaths were reported from the Jilin Province with most cases from the Changbai Mountains and neighboring areas.[17] Interestingly, 61.5% of patients were farmers and this is different from previous reports where soldiers and forest workers made up the majority of patients. The most recent publication of the Chinese CDC[18] reports 3,364 TBE cases in China between 2007 and 2018 (incidence 0.09 – 0.44/10^5). Overall only 14%–84% of cases were laboratory confirmed. Given the extremely high percentage of TBE-infected ticks as well as the high seroprevalence in humans (Table 1), TBE numbers may be hugely underreported. Patients also were reported from another important epidemic area: the Tianshan Mountains and Altai Mountains of the Xinjiang Autonomous Region.[4]

Despite the small geographic distribution, the whole belt that connects the 3 above-mentioned foci is considered to be at risk (E-CDC status: predisposed) for occurrence of TBE if the virus is imported, including a few densely populated regions such as Beijing, Shaanxi, and Sichuan provinces, where the environment could be suitable for circulation of TBEV (see Figure 3). In addition, cases may be missed in regions with lower TBE incidences due to low rates of serological testing and lack of awareness among both physicians and the general population.[15]

The incidence of TBE decreased in China during the 1980s, but has been rising in recent years, as noted by disease control and prevention authorities and local hospitals.[4] TBE patients were mainly forest workers before the 1980s, however, it has been reported that changes in the occupation / type of "exposure risk" occurred among TBE patients since the 1980s and in particular since the late 1990s, with 70%–95% of the most recent patients being non-forest working farmers, housewives, domestic workers, students, or anyone with any occupation who entered endemic forest areas.[5]

Table 1: Virus, vector, transmission of TBE in China

Viral subtypes, distribution	Far Eastern TBEV subtype (TBEV-FE)
Reservoir animals	Mice and insectivorous animals; migratory birds; lagomorphs, goats[6]
Infected tick species (%)	*I. persulcatus*; however, TBEV has also been isolated from *Haemaphysalis concinna*, *Haemaphysalis japonica*, *Dermacentor silvarum*, and *Ixodes ovatus*[5]
Infection rate among the ticks	13.0%–14.3%, 0.79%–6.45%, and 0%–37.5% in northeastern China; 14.3%–47.7% in northwestern China; 8.3% in southwestern China[4]
Dairy product transmission	Not known
Serological infection rate in healthy people	19.7% in southwestern China,[6] 35.4% in northwestern China,[7] 0%–10.9%,[8] 0%–9.8%,[9] 7.6% in northeastern China[10]

Table 2: TBE reporting and vaccine prevention in China	
Mandatory TBE reporting	Heilongjiang Province only
Other TBE Surveillance	No
Special clinical features	Biphasic disease not reported in China Different symptoms among patients with different disease severities In the early 1950s, case fatality rate (CFR) of TBE in the northeastern forest areas was over 25%, but since the 1980s it has decreased to around 8%.[1,2,11] Long-lasting sequelae of TBE are common, almost one-third of the patients in the 1952 outbreak had paralysis in the neck muscles or the shoulder muscles.[2] Recently, the complications of TBE over a 10-year period reported to be 16.6% (90/542.)[12]
Available vaccines	TaiSenBao produced in China with Sen-Zhang strain as seed strain in primary hamster kidney (PHK) cells
Vaccination recommendations and reimbursement	No
Vaccine uptake by age group/risk group/general population	No information available, estimated to be low
CFR	25% in 1950s, and decreased to <10% after 1980s[1,2,11]
Name, address/website of TBE National Reference Center	Chinese Center for Disease Prevention and Control: http://ivdc.chinacdc.cn/

Figure 1: Reported TBE cases in China 2007–2018[18]

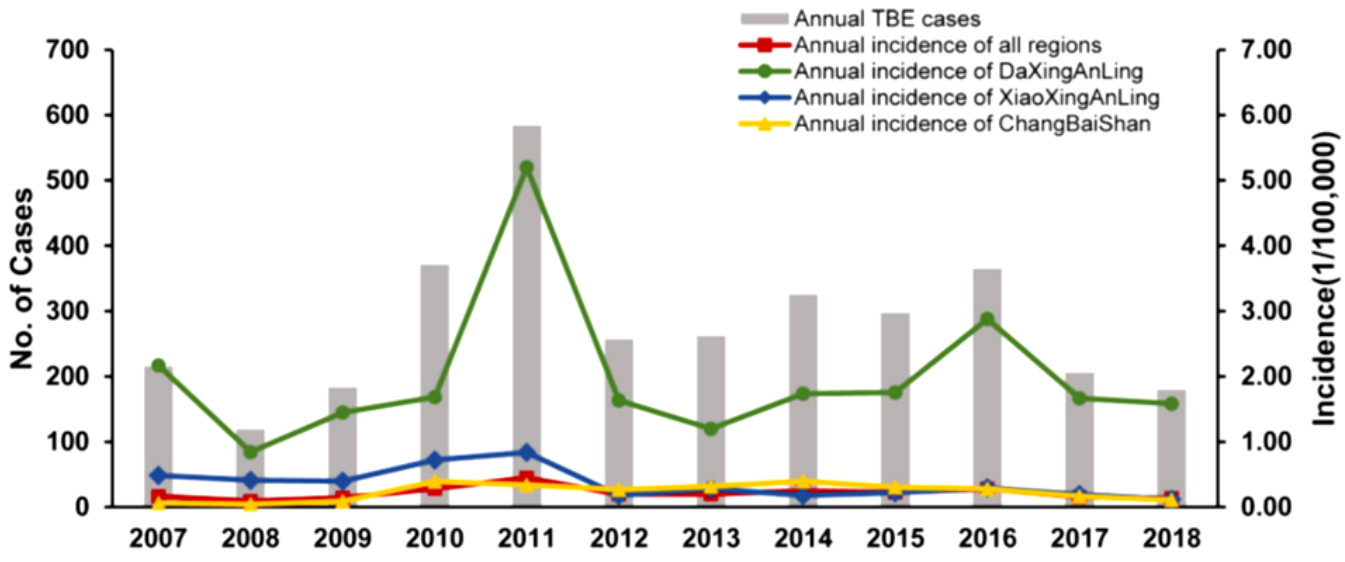


Figure 2: Gender-related distribution of TBE cases in China, 2007–2018[18]

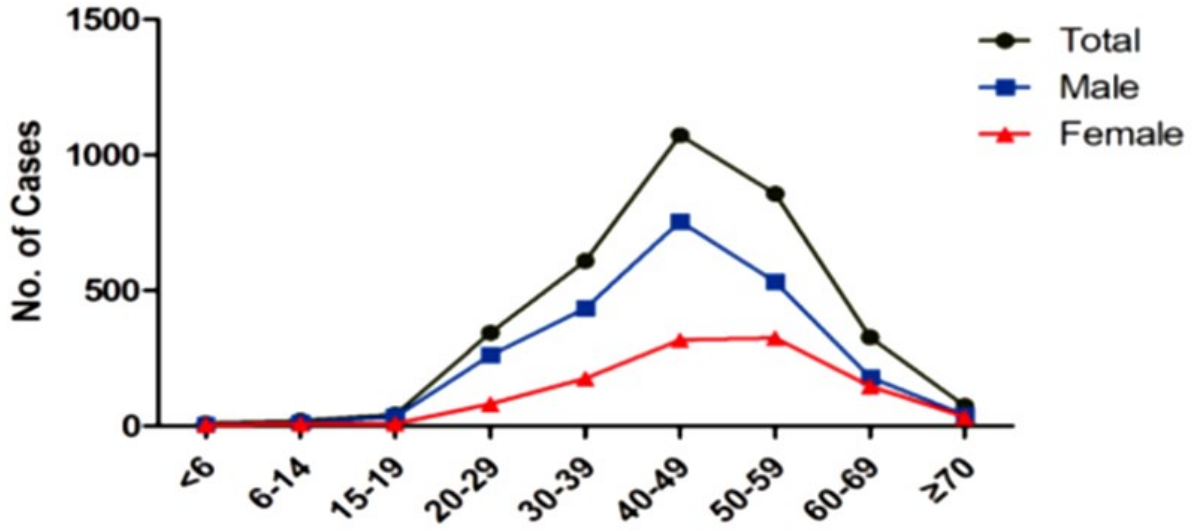


Figure 3: Distribution of the occupation of TBE patients over time in China, 2007–2018[18]

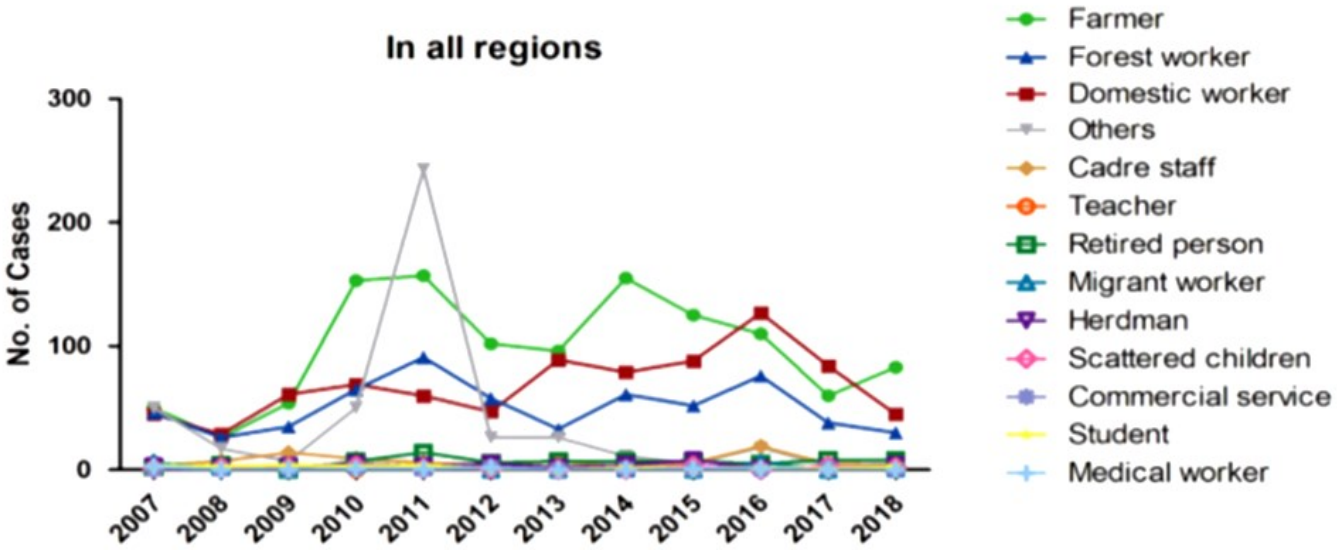
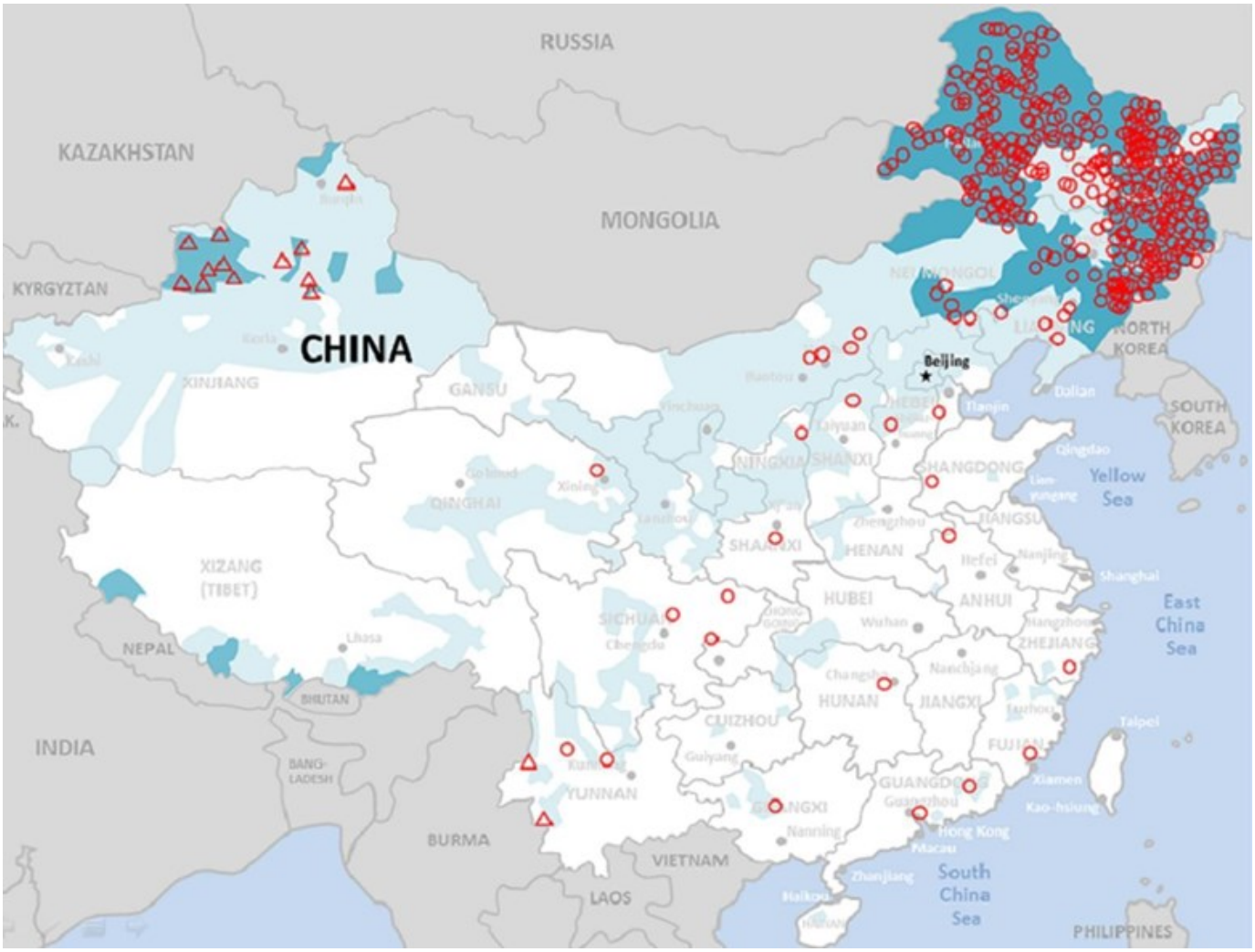


Figure 3. Geographic distribution of TBE in China as reported in published literature[4,5]



○ *Reported TBE cases 2006–2013*
△ *Confirmed TBEV foci in Xinjiang and Yunnan*

***Intensity of blue color**: Reflects the probability of an area to be endemic for TBEV, dark blue = 100%, light blue= lower probabilities based on various criteria as published by Sun et al. 2017*[4]

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