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ORIGINAL RESEARCH

Epidemiological Trends and Public Health Implications of Dengue Fever in Zhejiang Province, China: A Decadal Analysis from National to Cangnan Perspectives

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Objective: To analyze dengue fever outbreaks in China, Zhejiang Province, and a local region to provide a scientific basis for early warning surveillance and the prevention and control of dengue epidemics.

Methods: This retrospective study examines dengue fever data from China and Zhejiang Province over the past decade, including incidence, mortality, seasonal distribution, age characteristics, and regional distribution. Local data from the past decade were also analyzed.

Results: Over the last ten years, the average annual incidence rate of dengue fever in China has been 0.7764 per 100,000 individuals, with a mortality rate of 0.000945 per 100,000. In the same period, the incidence rate in Zhejiang Province was 0.4546 per 100,000, with no fatalities reported. Dengue fever cases in both China and Zhejiang Province are primarily seen during the summer and autumn seasons. Between 2014 and 2020, cases were documented across all age groups in China, demonstrating an age-specific pattern in the annual average incidence rate, with rates initially increasing to peak in young adults and subsequently declining with advancing age. The highest rates were noted in the 20–29.9 and 30–39.9 age brackets. With the exception of Tibet, all regions in China have recorded cases, with Guangdong, Yunnan, Fujian and Zhejiang in the southern part of the country being the main high-incidence areas. In Cangnan County, 30 cases of dengue fever were reported over the past decade, predominantly affecting imported cases, males, and young to middle-aged adults.

Conclusion: Dengue fever cases are rising in China, particularly in southern regions. 15 to 50 years old people are most affected. There is a pressing need for region-specific strategies to mitigate the impact of dengue fever, particularly in high-incidence areas.

Keywords: dengue, epidemiology, incidence, mortality rate, imported cases

Introduction

Dengue fever is a kind of acute mosquito-borne infectious disease caused by dengue virus through Aedes. It is a class b infectious disease, as stipulated by the law of prevention and treatment of infectious diseases in China.[1,2] There are four distinct serotypes of the dengue virus: Dengue Virus 1, 2, 3, and 4. Cross-immunity does not exist among these serotypes, indicating that being infected with one serotype does not offer protection against infections by other serotypes.[3] The population is generally susceptible, with dengue patients and asymptomatic carriers being the main sources of infection. The virus is primarily spread through the bites of Aedes aegypti and Aedes albopictus mosquitoes.[4] These symptoms generally appear within 1–14 days following exposure to the dengue virus, which include a sudden onset of high fever, severe headache, eye pain, muscle pain, joint pain, rash, and a tendency for bleeding

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manifestations.[5,6] While the majority of dengue fever cases exhibit a self-limiting course and patients achieve recovery without targeted interventions, severe presentations mandate expeditious medical intervention, entailing the regulation of fluid balance, continuous monitoring of blood pressure, and the provision of blood transfusions as indicated.[7] Currently, there is a lack of specific antiviral treatment for dengue fever. Therefore, early diagnosis and effective prevention are crucial measures to prevent severe dengue fever.[8]

In recent years, the global incidence of dengue fever has markedly risen, attributed to various factors such as climate change, rapid economic globalization, and substantial population mobility.[2] Presently, an estimated 50% of the world's population is susceptible to dengue infection, with annual infections ranging from 100 million to 400 million individuals. Dengue fever is widespread in tropical and subtropical regions worldwide, serving as the broadest distribution, most incident, and greatest harm detrimental mosquito-borne viral illness. Consequently, it has emerged as a critical global public health issue.[9] The Pan American Health Organization (PAHO) has reported that 2023 has witnessed the highest number of dengue cases ever documented, with over 4.1 million new infections, surpassing the 3.1 million cases recorded in 2019. Additionally, the World Health Organization (WHO) has observed a significant increase in cases and fatalities in dengue-endemic regions since the start of 2023, with the disease spreading to previously unaffected areas. All six WHO regions have reported over 5 million dengue cases and more than 5000 dengue-related deaths.[10]

Historically, dengue fever in China was sporadic, with few cases reported in the 1970s; however, significant outbreaks were observed during the 1980s and 1990s.[11] In recent years, particularly in southern regions, there has been an upward trend in dengue fever cases, with the disease pattern shifting from intermittent outbreaks to more frequent epidemics. This trend underscores the need for updated epidemiological analyses. In 2023, China documented 19,627 cases of dengue fever, with our province reporting 361 cases, marking the second highest in nearly 5 years, only surpassed by 2019 when national cases reached 22,188 and our province reported 894 cases. Dengue fever persists as a significant public health concern that demands attention. Zhejiang Province, a rapidly developing coastal region, has become crucial for dengue fever surveillance and management due to increased international trade and population mobility. The rise in dengue cases, especially in Wenzhou a major port city with strong international ties and suitable conditions for Aedes mosquitoes highlights the need for comprehensive epidemiological studies. This research examines the epidemiological characteristics and trends of dengue fever in China, focusing on Zhejiang Province and Wenzhou from 2014 to 2023, to analyze changes in disease distribution and transmission dynamics. Understanding these patterns is vital for developing targeted prevention strategies and improving disease control measures in the region.

Methods and Subjects

Study Design and Subjects

The study adopted a retrospective observational study design, and the study flow can be found in Figure 1. From January 2014 to December 2020, national and provincial data on dengue fever incidence and mortality were sourced from the Public Health Science Data Center of the Chinese Center for Disease Control and Prevention. Incidence and mortality rates across various regions, along with age distribution variations, are directly obtained from the aforementioned public databases. It is important to note that the Chinese Center for Disease Control and Prevention's Public Health Science Data Center provides data only up to the year 2020. Thus, between January 2021 and December 2023, data pertaining to national and provincial disease statistics were sourced from the General Situation of National Statutory Infectious Diseases by the Disease Control and Prevention Bureau of the National Health Commission and Zhejiang Provincial Health Commission. Population data is based on the previous year's data from the annual statistical yearbooks published by the National Bureau of Statistics and the Zhejiang Provincial Bureau of Statistics. Furthermore, this study has compiled clinical data from all 30 cases of dengue fever diagnosed at Cangnan People's Hospital between 2014 and 2023.

Cangnan Dengue Fever Case Definition

(1) Clinically diagnosed condition: The patient has visited a dengue-endemic area within 14 days before the onset of symptoms, or has a history of epidemiological and clinical factors consistent with dengue infection, such as symptoms of

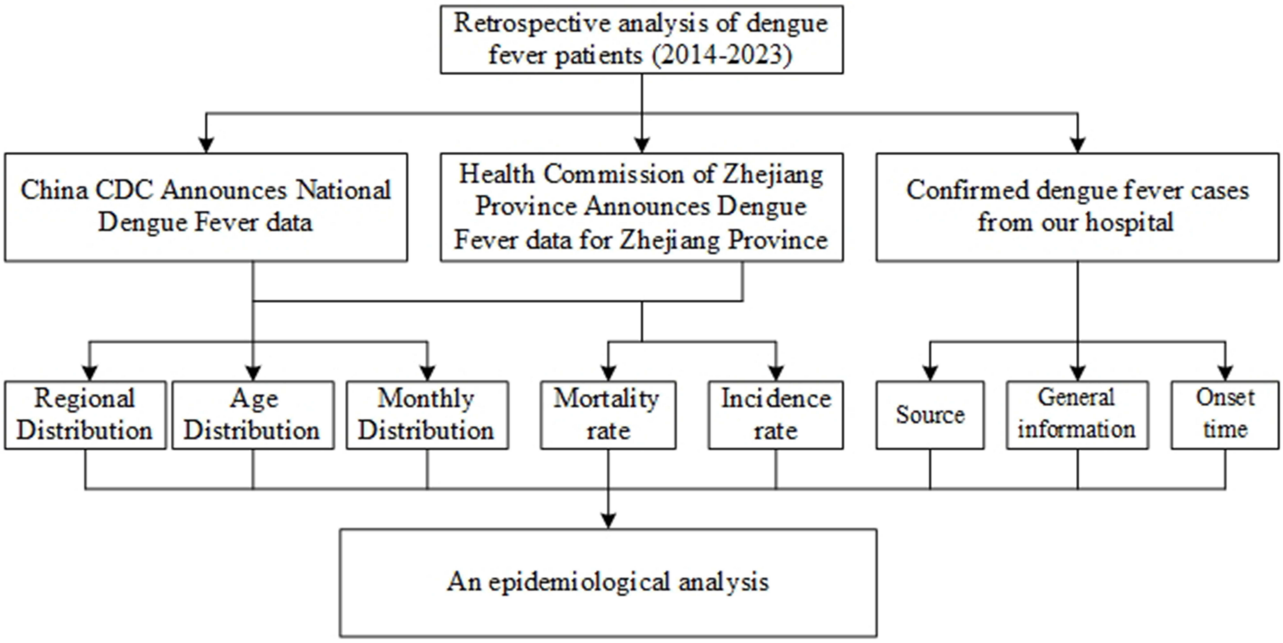

Figure 1 Flow diagram of the study.
Abbreviation: CDC, Center for Disease Control and Prevention.

fever, muscle and joint pain, rash, and bleeding, accompanied by laboratory evidence of decreased white blood cells and/or platelets, or positive results for dengue virus non-structural protein 1 (NS1) antigen or Immunoglobulin M (IgM) antibodies. (2) Confirmed case: Fulfills the clinical diagnostic criteria and has a positive dengue virus nucleic acid test. (3) Imported case: Confirmed dengue patient has visited a country, region, or city within China with dengue outbreaks within 14 days before illness onset and has a history of mosquito bites. (4) Local case: Confirmed dengue patient has not left the county or visited a country or region with reported dengue outbreaks within 14 days before onset of illness.

Data Completeness

Throughout the analytical process, data completeness was meticulously evaluated. No significant missing data were detected in the national and provincial surveillance datasets. For the hospital cases, complete records were available for all 30 patients, thereby obviating the need for imputation methods or the exclusion of cases due to incomplete information.

Data Analysis

The dengue data was compiled and organized using Excel, resulting in the creation of a data file. The calculation of epidemiological measures encompassed annual incidence rates, defined as the number of cases per 100,000 population, and mortality rates, defined as the number of deaths per 100,000 population. Temporal trends were examined on both a monthly and yearly basis to discern seasonal patterns and long-term changes in dengue fever incidence. For the analysis of geographic distribution, maps were generated using Adobe Illustrator 2023. Descriptive analysis of pertinent information, including the time of onset of dengue cases, age of patients, and affected regions, was conducted using SPSS 26.0 statistical software. Age and Time from onset to diagnosis were assessed for normality of distribution using the Shapiro–Wilk test and expressed as mean±SD. Counting data were expressed as n (%). The dengue fever data from the local area was summarized and consolidated.

Results

Profile of Dengue Fever

Between 2014 and 2023, China documented a cumulative total of 106,990 instances of dengue fever, yielding an average annual incidence rate of 0.7764 per 100,000 individuals. There were 13 deaths, resulting in an average annual mortality

rate of 0.000945 per 100,000 individuals. The years 2014, 2019, and 2023 displayed elevated incidence rates, with 2014 registering the highest incidence rate, while 2021 exhibited the lowest. Within Zhejiang Province, there were 2897 confirmed cases of dengue fever during the same timeframe, corresponding to an average annual incidence rate of 0.4546 per 100,000 individuals, with no reported fatalities. The years 2017, 2019, and 2023 exhibited higher incidence rates, with 2017 exhibiting the highest incidence rate, and 2021 had the lowest incidence rate (Table 1 and Figure 2).

Seasonal Distribution of Dengue Cases

From 2014 to 2023, China reported dengue fever cases every month, with the fewest cases in March and the most in October. The majority of cases were observed between the months of July and November. Similarly, during this timeframe, Zhejiang province also reported monthly cases of dengue fever, with the lowest incidence in March and the highest in September. Patients in this region were predominantly concentrated between July and October, as depicted in Figure 3.

Age Distribution of Dengue Cases

From 2014 to 2020, instances of dengue fever were reported across all age demographics in China, demonstrating an age-specific pattern in the annual average incidence rate, with rates initially increasing to peak in young adults and subsequently declining with advancing age. The majority of cases were found in individuals aged 10 and above, with the highest annual incidence rates recorded in the 20–29.9 and 30–39.9 age brackets, both at 1.2614 per 100,000 individuals. A total of 12 fatalities were reported among dengue fever patients, all of whom were over the age of 25. The mortality rate demonstrated an increase with advancing age, as illustrated in Table 2 and Figure 4.

Distribution Characteristics of Dengue Fever

From 2014 to 2020, all provinces with the exception of Tibet documented cases of dengue fever, with a higher overall incidence observed in southern regions compared to northern regions, and a greater frequency in eastern areas compared to western areas. The majority of cases were concentrated in the southeastern coastal regions and Yunnan province, with Guangdong and Yunnan reporting the highest number of cases and Qinghai reporting the lowest. During the period of 2014 to 2020, there were a total of 12 dengue-related fatalities nationwide, with 11 occurring in Guangdong Province and 1 in Hunan Province; no deaths were reported in other provinces (Table 3 and Figure 5).

Table 1 Dengue Fever Incidence and Mortality, 2014–2023

Year	China				Zhejiang Province			
	Reported Cases	Incidence (/100000)	Deaths	Mortality Rate (/100000)	Reported Cased	Incidence Rate (/100000)	Deaths	Mortality Rate (/100000)
2014	46,864	3.458167	6	0.000443	37	0.067297	0	0
2015	3858	0.283163	0	0	60	0.108932	0	0
2016	2050	0.149549	0	0	58	0.104712	0	0
2017	5893	0.427079	2	0.000145	1229	2.198569	0	0
2018	5136	0.369737	1	0.000072	237	0.41895	0	0
2019	22,188	1.588787	3	0.000215	894	1.558306	0	0
2020	778	0.055419	0	0	20	0.034188	0	0
2021	48	0.003399	0	0	0	0	0	0
2022	548	0.038794	0	0	1	0.000153	0	0
2023	19,627	1.390260	1	0.000071	361	0.54888	0	0

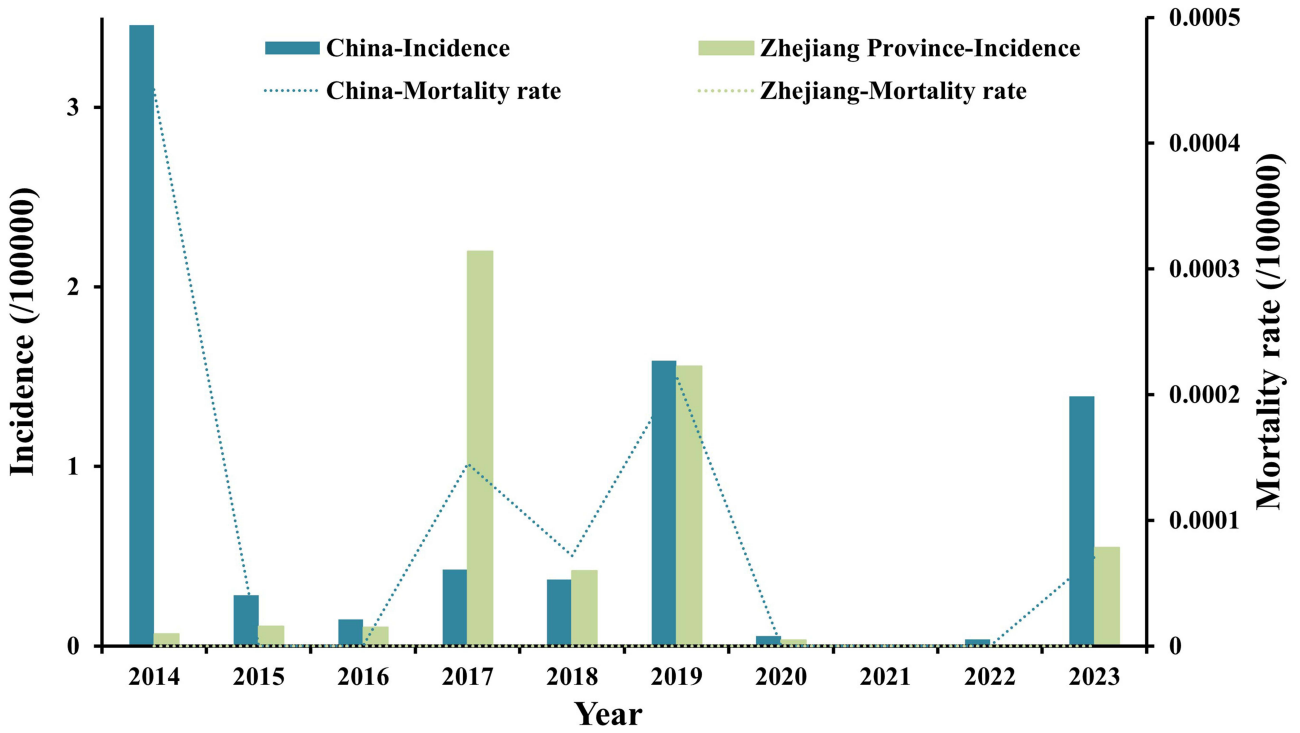

Figure 2 The incidence and mortality rates of Dengue fever from 2014 to 2023.

Data From Patients with Cangnan Dengue

Between the years 2014 and 2023, a total of 30 cases of dengue fever were documented in this region. Among these cases, one was recorded in 2017, 27 in 2019, and 2 in 2023. Of the total cases, 26 were classified as imported, with 1 originating domestically, 1 from Africa, and the remaining 24 from Southeast Asian nations. The remaining four cases were deemed local transmissions. The demographic breakdown of the 30 dengue fever patients revealed that 22 were male and 8 were female, with a median age of 43 years, ranging from 21 to 71 years. The median duration from symptom onset to diagnosis among the cohort of 30 patients was 5 days, ranging from 1 to 11 days. Among the patients diagnosed with dengue fever, the majority (26 individuals) were employed as labourer, while 3 individuals had unspecified occupations and 1 individual worked in an office worker (refer to Table 4).

Discussion

Dengue fever, attributable to four distinct serotypes of the dengue virus (DENV-1 to DENV-4), manifests a complex array of clinical symptoms. Upon the bite of an infected Aedes mosquito, the virus enters the bloodstream, initiating a brief viremic phase lasting 3 to 7 days, during which it can be transmitted to other susceptible hosts through subsequent mosquito bites. Clinically, the disease typically commences with an acute febrile phase, marked by high fever (≥38.5°C), severe headache, retro-orbital pain, myalgia, arthralgia, and a maculopapular rash.[12] Although infection with one serotype confers temporary cross-protection against other serotypes, subsequent infections with different serotypes may lead to more severe manifestations due to antibody-dependent enhancement (ADE).[13] Importantly, there are no prolonged asymptomatic carriers; however, infected mosquitoes are capable of transmitting the virus throughout their lifespan.

The critical phase of severe dengue is predominantly characterized by increased vascular permeability, rather than hemorrhaging, as was previously misunderstood. This pathological process is mediated by the dengue virus NS1 protein, which induces endothelial dysfunction and tissue-specific disruption of intercellular junctions.[13,14] Clinical manifestations during this phase may include severe abdominal pain, persistent vomiting, mucosal bleeding, lethargy, and hepatomegaly. The World Health Organization's 2009 Technical Guide underscores the importance of monitoring for

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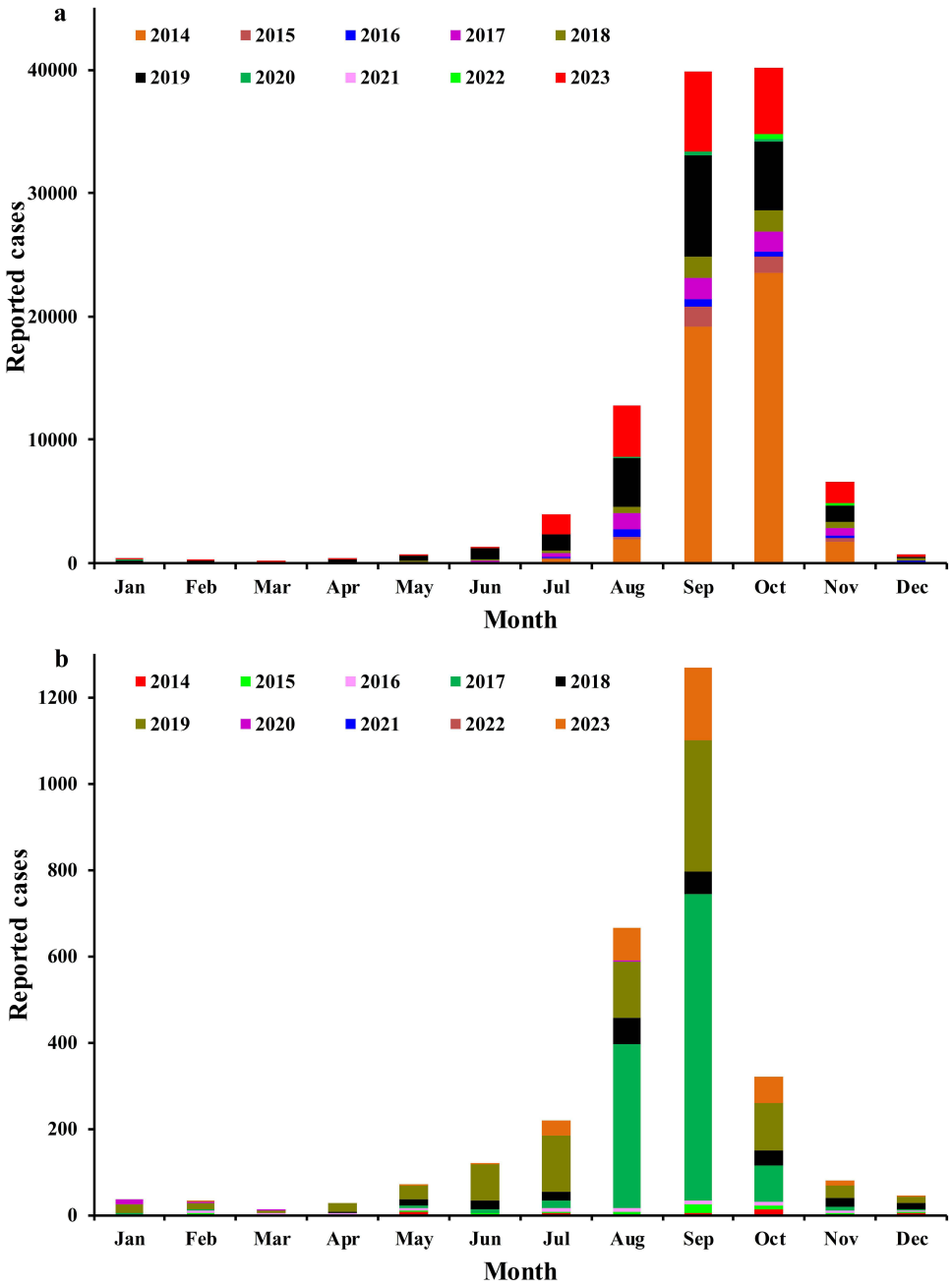

Figure 3 Dengue cases by month in China and Zhejiang Province, 2014–2023.
Note: (**a**) China, (**b**) Zhejiang Province.

warning signs such as a rapid decrease in platelet count, hemoconcentration, and evidence of plasma leakage observed through imaging studies.[15] These complications can escalate to dengue shock syndrome (DSS), which is characterized by severe plasma leakage, hemorrhagic manifestations, and organ impairment, necessitating immediate medical intervention and meticulous fluid management.

In recent years, the global incidence of dengue fever has increased markedly, particularly in tropical and subtropical regions. Nations such as Thailand, the Philippines, and Indonesia continue to endure recurrent outbreaks, which impose significant economic and public health burdens.[16] China, owing to its geographical proximity to Southeast Asia and its growing international interactions, has encountered escalating challenges from both imported cases and local transmission.[17,18] Dengue outbreaks in China are extending to more northern latitudes, with Zhejiang Province

Table 2 Dengue Fever Incidence and Mortality by Age Group in China, 2014–2020

Age Group (Year)	Numbers of Total Incidence	Total Death Cases	Mean Annual Incidence (/100000)	Average Annual Mortality (/100000)
0~	200	0	0.18646	0
1~	247	0	0.200334	0
2~	323	0	0.270679	0
3~	335	0	0.303933	0
4~	338	0	0.329488	0
5~	378	0	0.376617	0
6~	382	0	0.399358	0
7~	394	0	0.332352	0
8~	413	0	0.300801	0
9~	418	0	0.39208	0
10~	2249	0	0.476902	0
15~	3704	0	0.660453	0
20~	7562	0	0.919968	0
25~	10,172	1	1.327511	0.000134
30~	9488	0	1.438905	0
35~	7910	0	1.083972	0
40~	8132	1	1.021219	0.00012
45~	7735	2	0.848105	0.000222
50~	6717	0	1.090638	0
55~	5461	1	0.897405	0.000173
60~	4751	1	0.964964	0.000173
65~	3393	2	0.990631	0.000721
70~	2350	2	0.941864	0.00087
75~	1886	0	1.005904	0
80~	1226	2	1.061852	0.001837
85~	603	0	0.964558	0

experiencing increasingly severe outbreaks.[2,19,20] Given the complexity of dengue epidemiology and its severe clinical outcomes, it is imperative to undertake comprehensive epidemiological analyses and consolidate local data to inform effective prevention and control strategies. Moreover, enhancing awareness of the full clinical spectrum of dengue, including both mild and severe manifestations, as well as its immunobiological mechanisms, is crucial for improving public health responses and mitigating the disease burden.

The study indicates that China encountered three spikes in dengue fever over the last ten years, notably in 2014, 2019, and 2023, with 2014 being notably severe and leading to six fatalities. Zhejiang Province also witnessed two peaks in 2017 and 2019, with 2019 standing out as one of the years with the higher nationwide prevalence of dengue fever. Over

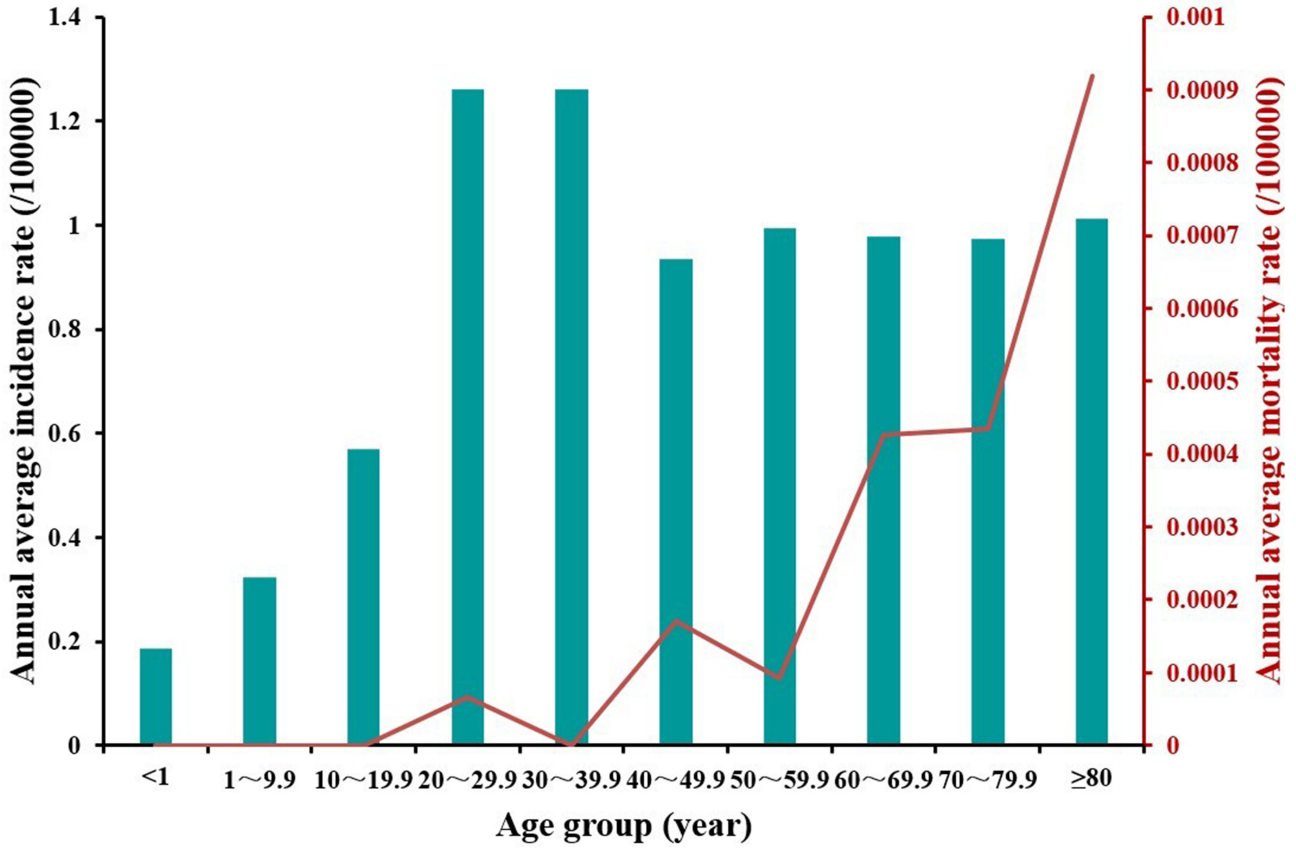

Figure 4 Dengue Fever Incidence and Mortality Rates, 2014–2020.

the course of the subsequent three years, there was a notable decrease in the prevalence of the dengue epidemic in both China and Zhejiang Province, followed by a significant increase in 2023. The results are consistent with the research of Sheng et al.[21] This trend may be attributed to the impact of the COVID-19 pandemic, which led to substantial shifts in public attitudes and behaviors towards infectious disease prevention and control, thereby fostering advancements in pathogen detection technologies. During the COVID-19 pandemic, a decline in reported dengue cases was observed; however, it is crucial to recognize that this reduction may partially reflect underreporting due to various factors. The reallocation of healthcare resources towards managing COVID-19 likely diminished the capacity for dengue surveillance and diagnosis. Moreover, movement restrictions and patients' hesitancy to seek medical attention for non-COVID-19 conditions may have led to an underdocumentation of dengue cases. These factors suggest that our data might underestimate the actual dengue burden during this period.

Additionally, diseases caused by respiratory infections were also effectively prevented due to the implementation of a series of stringent non-pharmaceutical interventions, such as lockdowns, mask-wearing, and social distancing.[22,23] Although dengue fever is not a respiratory illness, the non-pharmaceutical interventions implemented during the COVID-19 pandemic likely curtailed human mobility and outdoor activities, thereby reducing exposure to the mosquito vectors responsible for dengue transmission. Additionally, the increased public health awareness and preventive behaviors adopted during the pandemic may have indirectly contributed to a decrease in dengue transmission. These findings underscore how comprehensive public health measures can exert cross-protective effects against multiple infectious diseases through diverse mechanisms.

In the last two decades, the prevalence of dengue fever has markedly risen on a global scale, posing a substantial public health concern. As per the World Health Organization (WHO), the documented cases of dengue fever worldwide surged from 500,000 in 2000 to 5.2 million in 2019, representing a tenfold increase. Despite a decrease in cases during the COVID-19 pandemic, there was a notable rise in global dengue cases in 2023, resulting in an escalation in both the

Table 3 Dengue Fever Incidence and Mortality by Province Group in China, 2014–2020

Province	Numbers of Total Incidence	Total Death Cases	Mean Annual Incidence (/100000)	Average Annual Mortality (/100000)
Beijing	130	0	0.0856	0.0000
Hebei	95	0	0.0181	0.0000
Shanxi	15	0	0.0058	0.0000
Xinjiang Uyghur Autonomous Region	4	0	0.0023	0.0000
Liaoning	74	0	0.0242	0.0000
Jilin	16	0	0.0084	0.0000
Heilongjiang	41	0	0.0170	0.0000
Shanghai	171	0	0.0967	0.0000
Jiangsu	344	0	0.0625	0.0000
Zhejiang	2519	0	0.6376	0.0000
Anhui	169	0	0.0411	0.0000
Fujian	3179	0	1.1681	0.0000
Jiangxi	1341	0	0.4116	0.0000
Shandong	237	0	0.0341	0.0000
Henan	389	0	0.0582	0.0000
Hubei	327	0	0.0792	0.0000
Hunan	1121	1	0.2282	0.0002
Guangdong	58808	11	7.8689	0.0014
Guangxi Zhuang Autonomous Region	2666	0	0.7879	0.0000
Hainan	427	0	0.6447	0.0000
Chongqing	1516	0	0.6974	0.0000
Sichuan	500	0	0.0860	0.0000
Guizhou	323	0	0.1026	0.0000
Yunnan	12242	0	3.6487	0.0000
Shaanxi	62	0	0.0231	0.0000
Gansu	21	0	0.0114	0.0000
Xinjiang Uyghur Autonomous Region	5	0	0.0037	0.0000
Tianjin	16	0	0.0147	0.0000
Ningxia Hui Autonomous Region	8	0	0.0167	0.0000
Qinghai	1	0	0.0024	0.0000

quantity and scope of cases, causing multiple outbreaks to occur simultaneously and spreading to regions previously unaffected. The global transmission pattern typically experiences a significant outbreak every 3–4 years, and the upsurge in 2023 has garnered considerable attention from the World Health Organization.[24] The trend in dengue fever incidence in China and Zhejiang Province aligns generally with the global dengue epidemic data reported by the WHO.

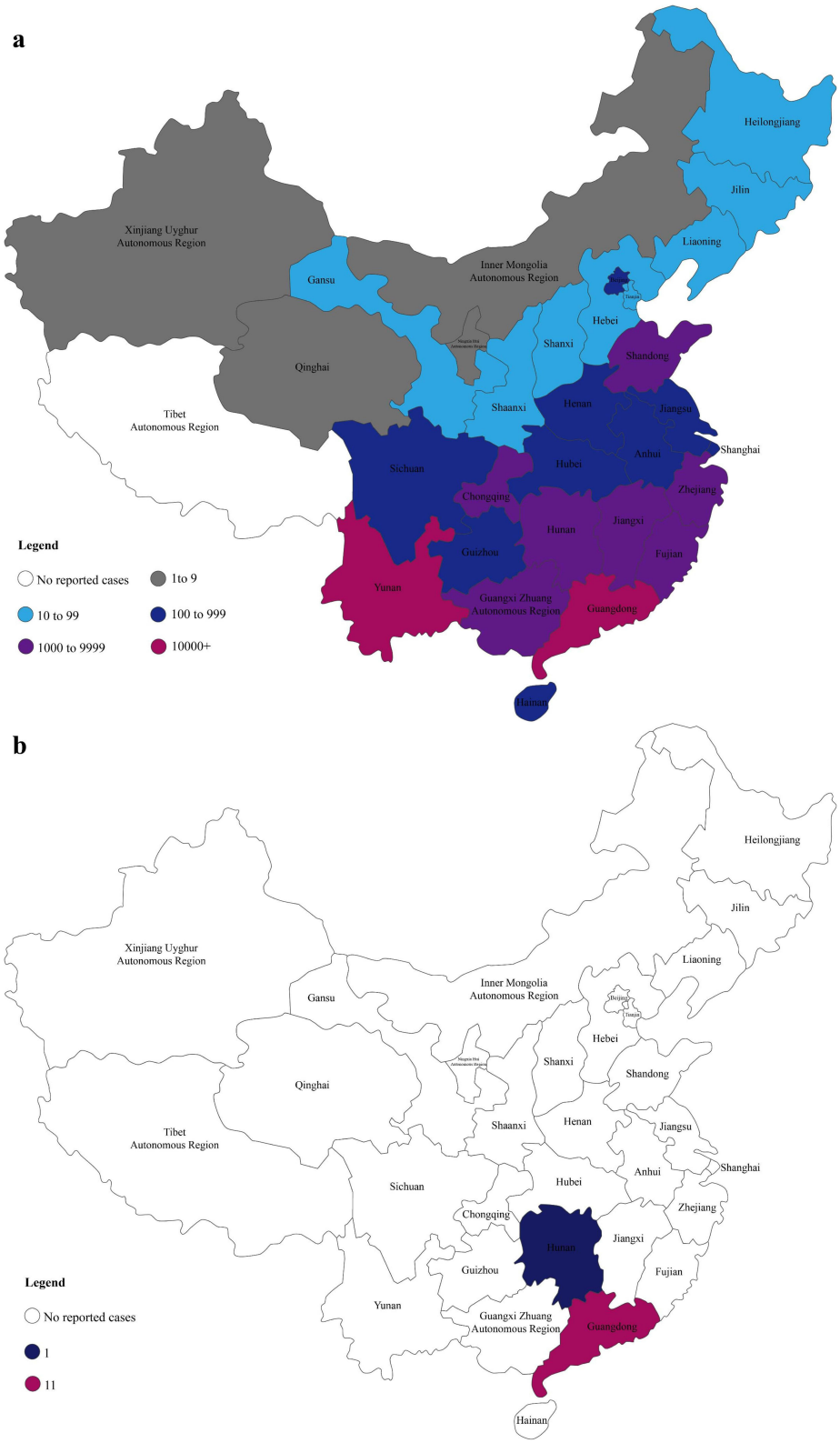

Figure 5 Distribution of dengue fever cases in China, 2014–2020.
Note: (**a**) Number of incident cases, (**b**) Number of death cases.

Table 4 Dengue Fever Patient Data in Cangnan County, Zhejiang Province, 2014–2023

Characteristics	n (%) or Mean ± SD
Age (years)	42.9 ± 13.4
Gender	
- Male	22 (73.3)
- Female	8 (26.7)
Occupation	
Farmer	16 (53.3)
Business Services	5 (16.7)
Worker	3 (10.0)
Other*	6 (20.0)
Source Region	
Cambodia	15 (50.0)
Vietnam	3 (10.0)
Local Cases	4 (13.3)
Other Countries†	8 (26.7)
Time from onset to diagnosis (days)	5.4 ± 3.5

Notes: *Other includes: Unknown (3), Student (1), Officer Staff (1), Not specified (1). †Other Places include: Indonesia (2), Thailand (1), Sri Lanka (1), Laos (1), Bangladesh (1), Africa (1), Xishuangbanna (1).

Analysis of dengue fever occurrences in China and Zhejiang Province over the past decade reveals a seasonal pattern, with a higher prevalence during the summer and fall months. This trend can be attributed to the transmission of the virus by Aedes aegypti and Aedes albopictus mosquitoes, which are most active and abundant during these seasons.[25] Furthermore, dengue fever affects individuals of all age groups in China, with the incidence rate peaking between 20 and 45 years of age. This phenomenon could potentially be attributed to the prevalence of imported dengue cases in China, particularly among young to middle-aged workers. Furthermore, the heightened likelihood of outdoor activities among young adults may contribute to their increased exposure to mosquitoes.[2] Despite the generally stronger immune system in adult populations is stronger than in pediatric, adults remain vulnerable to dengue infection in the absence of prior exposure and immune memory to the virus. In 2023, China reported 19,627 dengue fever cases with only one death, significantly lower than the WHO's global report of over 6.5 million cases and more than 7300 deaths.[9] The study also found that the mortality rate among elderly dengue patients is relatively high, possibly due to their general health and underlying diseases.

An examination of the geographical distribution of dengue fever cases between 2014 and 2020 revealed that, with the exception of Tibet, cases were documented across the entire nation, predominantly in tropical and subtropical zones, occasionally extending to temperate regions. Southern regions such as Guangdong, Yunnan, Fujian and Zhejiang were identified as the primary areas impacted by dengue fever. Specifically, Zhejiang province recorded a total of 2897 cases of dengue fever with no fatalities during the period spanning from 2014 to 2023. A comprehensive examination of 30 instances of dengue fever within this geographical area from 2014 to 2023 revealed that the majority of cases were imported, with a higher incidence among males compared to females, and a higher susceptibility among young to middle-aged adults. The median duration from symptom onset to diagnosis was determined to be five days. These results align with previous analyses of national and Zhejiang provincial dengue data, as well as corroborate the findings reported by

Wang et al.[19] Due to the comparatively low incidence of dengue cases in the local region, its epidemic profile closely mirrors that of the national and provincial levels. It is advisable for this region to actively study and adopt the successful prevention and control measures implemented in high-incidence areas, while also considering local circumstances in order to devise novel strategies for dengue prevention and control that are tailored to effectively mitigate the risk of local outbreaks.

Despite the importance of this study, several limitations must be acknowledged. Firstly, the data utilized is sourced from national health records and local surveillance systems, which may not comprehensively include all instances of dengue. The potential for underdiagnosis and underreporting, particularly in mild or asymptomatic cases, poses a limitation that could introduce bias into the study's findings. The COVID-19 pandemic may have further intensified these issues by altering healthcare resource allocation. Additionally, dengue-related mortality rates might be underestimated, as cases could be misclassified due to comorbidities or diagnostic challenges, especially among elderly patients. Secondly, the study's relatively small sample size of 30 local cases over a decade constrains the statistical power and limits the generalizability of the findings to a wider population. Moreover, the predominance of imported cases (26 out of 30) in our local analysis suggests that the observed disease patterns may be more indicative of national transmission dynamics than of local ecological characteristics. Furthermore, the findings of this study, which concentrate on Wenzhou, particularly Cangnan County, may not be applicable to other regions in China or internationally, as the results are likely shaped by the distinctive environmental, social, and public health conditions of the area. Despite these limitations, this study offers valuable insights into the epidemiological trends of dengue at national, provincial, and local levels, thereby contributing essential information to the understanding of China's dengue burden and informing strategies for its prevention and control.

Conclusions

The incidence of dengue fever in our country and province is closely related to the global dengue fever situation, especially in Southeast Asian countries. Our research indicates that the patterns of imported dengue cases from Southeast Asia consistently precede local transmission events. This finding suggests that implementing enhanced screening protocols at entry points and conducting targeted surveillance of travelers from endemic regions could function as an early warning system. The intervention models developed in China may be applicable to other regions with similar geographical proximity to dengue-endemic areas. In our country, dengue fever is more common in tropical and subtropical regions, with young and middle-aged adults being the main affected group, while elderly patients have a higher risk of severe disease. The significantly elevated mortality rates observed among elderly populations underscore the necessity for age-specific clinical management protocols, with a particular emphasis on early diagnosis and aggressive supportive care for patients over 60 years of age. The epidemiological features of the dengue fever outbreak in our locality exhibit a high degree of similarity to those observed at the national and provincial levels. Based on the decadal trends identified in this study, we anticipate a continued cyclical pattern of dengue outbreaks, with peaks likely to occur every 3–4 years. These outbreaks may increase in intensity due to climate change and growing international travel. The persistent concentration of cases from July to November highlights a critical window for implementing seasonal preventive strategies, including enhanced vector control measures and public awareness campaigns. As such, it is imperative to maintain vigilant surveillance of the global dengue fever landscape, particularly in neighboring nations, in order to pinpoint critical temporal, spatial, and demographic factors for the implementation of tailored prevention and control strategies. Such an approach will facilitate evidence-based interventions for the effective management of dengue fever.

Data Sharing Statement

The publicly available data can be accessed through the official website, while non-public data can be obtained by contacting the corresponding author (Zuo Jie Li, 15088908102@163.com).

Ethics Approval and Consent to Participate

This study was conducted with approval from the Ethics Committee of the People's Hospital of Cangnan Zhejiang (No.2025002). This study was conducted in accordance with the declaration of Helsinki. Written informed consent was obtained from all participants.

Consent for Publication

The study described is original research that has not been published previously, and is not under consideration for publication elsewhere, in whole or in part.

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Disclosure

The authors declare that they have no competing interests in this work.

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