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Scrub Typhus in Sri Lanka: Assessing the Burden and Spatial Distribution Using National Surveillance Data, 2020–2024

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ABSTRACT

Background and aim: Scrub typhus is an acute zoonotic infection caused by Orientis tsutsugamushi and transmitted through the bite of infected chigger mites. It is increasingly recognized as a major cause of acute undifferentiated febrile illness across the Asia–Pacific region. In Sri Lanka, scrub typhus has re-emerged as an important public health concern, yet comprehensive national-level analyses describing its epidemiological trends and distribution remain limited. This study aims to assess the burden, geographical distribution, and temporal trends of scrub typhus in Sri Lanka over a five-year period from 2020 to 2024.

Method: A retrospective descriptive study was conducted using secondary surveillance data obtained from the Weekly Return of Communicable Diseases (WRCD) published by the Epidemiology Unit of the Ministry of Health, Sri Lanka. Reported scrub typhus cases from January 2020 to December 2024 were extracted and analyzed. Data were summarized using frequencies and percentages to describe annual trends and district-wise distribution of cases.

Results: A total of 5,947 scrub typhus cases were reported nationally during the five-year study period. The annual trend demonstrated fluctuations, with a temporary decline in reported cases in 2021, likely influenced by disruptions to healthcare services and disease surveillance during the COVID-19 pandemic. However, case numbers increased again in the subsequent years, indicating a persistent endemic presence. The geographical distribution of cases showed marked heterogeneity, with the northern district of Jaffna accounting for more than 53% of the total national burden. Other districts reported relatively lower case numbers, suggesting possible variations in ecological exposure, diagnostic capacity, and clinical awareness.

Conclusion: Scrub typhus remains an important public health concern in Sri Lanka with a sustained burden and notable geographical clustering. Strengthening laboratory diagnostic capacity, enhancing clinician awareness, improving surveillance systems, and implementing targeted preventive measures for high-risk occupational groups are essential to improve early detection and reduce the disease burden. Geographically stratified surveillance and focused interventions in high-risk districts are recommended to strengthen control efforts.

KEYWORDS: Disease surveillance, Epidemiology, Scrub Typhus in Sri Lanka, Zoonotic infection

INTRODUCTION

Scrub typhus is an acute zoonotic infection caused by the obligate intracellular bacterium Orientia tsutsugamushi and transmitted to humans through the bite of infected larval mites (chiggers) belonging to the family Trombiculidae. The disease is widely recognized as an important cause of acute undifferentiated febrile illness in many tropical and subtropical regions of the world, particularly in Asia. Humans acquire infection when they are exposed to mite-infested environments such as scrub vegetation, forest clearings, agricultural fields, and grassy terrains where vector populations thrive. Clinical manifestations are often nonspecific and may include fever, headache, myalgia, rash, and lymphadenopathy, while the presence of an eschar at the site of the chigger bite is considered a characteristic clinical sign in some patients. If left untreated, scrub typhus can lead to serious complications including pneumonitis, meningoencephalitis, acute kidney injury, and multi-organ failure, which may result in significant morbidity and mortality. However, early diagnosis and timely treatment with appropriate antibiotics such as doxycycline can substantially reduce disease severity and fatal outcomes (1,2).

Scrub typhus is historically endemic within a geographical region commonly referred to as the “Tsutsugamushi Triangle,” which extends from northern Japan and far-eastern Russia in the north to northern Australia in the south and westward to Pakistan and Afghanistan. This region encompasses many countries in South and Southeast Asia where ecological conditions favor the survival

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of vector mites and their small mammalian hosts. It is estimated that nearly one billion people are at risk of infection globally, with approximately one million cases occurring annually across endemic regions. In many Asian countries, scrub typhus has been identified as a leading cause of acute undifferentiated febrile illness among hospitalized patients (3).
In recent decades, scrub typhus has re-emerged as a significant public health concern in several parts of Asia. Increased awareness among clinicians, improved surveillance systems, and the availability of better diagnostic techniques have contributed to the rise in reported cases. Nevertheless, the disease continues to be underdiagnosed and underreported in many low- and middle-income countries due to limited laboratory diagnostic capacity and the nonspecific clinical presentation of the illness (4).

Sri Lanka, located within the Tsutsugamushi Triangle, has reported cases of scrub typhus for several decades. In recent years, the disease has gained increasing recognition as an important cause of febrile illness in several regions of the country. Environmental conditions such as dense vegetation, scrubland, and agricultural activities provide suitable habitats for vector mites, thereby facilitating transmission. Occupational groups such as farmers, plantation workers, military personnel, and individuals involved in outdoor activities are considered to be at higher risk of exposure (5).

The national communicable disease surveillance system in Sri Lanka, coordinated by the Epidemiology Unit of the Ministry of Health, collects routine data on notifiable diseases through the Weekly Return of Communicable Diseases (WRCD). These surveillance data play a crucial role in monitoring disease trends, identifying high-risk areas, and guiding public health responses. However, comprehensive analyses examining the national burden and geographical distribution of scrub typhus over extended periods remain limited (6).

Therefore, this study aims to analyze the burden, temporal trends, and geographical distribution of scrub typhus in Sri Lanka over a five-year period from 2020 to 2024 using national surveillance data. The findings are expected to provide valuable insights to strengthen disease surveillance, improve early detection, and inform targeted prevention and control strategies

Justification

Despite increasing recognition of scrub typhus as a significant cause of febrile illness in many countries within the Asia–Pacific region, the disease remains under-recognized and underreported in several endemic settings. The nonspecific clinical presentation of scrub typhus often makes early diagnosis difficult, particularly in areas where laboratory diagnostic facilities are limited. As a result, many cases may be misdiagnosed as other febrile illnesses such as dengue, leptospirosis, or viral infections. Previous studies have highlighted that delayed diagnosis and treatment can lead to severe complications and increased mortality, emphasizing the importance of strengthening surveillance and improving early detection mechanisms. In endemic countries, systematic analysis of surveillance data is essential to better understand disease patterns, identify high-risk areas, and guide effective public health interventions (7,8).
In Sri Lanka, although scrub typhus has been increasingly reported through the national communicable disease surveillance system, comprehensive analyses examining its long-term trends and spatial distribution at the national level remain limited. Existing studies have largely focused on hospital-based or regional investigations, which may not fully capture the overall national burden of the disease. Furthermore, variations in ecological conditions, occupational exposures, and diagnostic practices across districts may influence the reported distribution of cases. Therefore, analyzing national surveillance data over an extended period is important to generate evidence on the burden and geographical patterns of scrub typhus in the country. Such evidence will be valuable for strengthening surveillance systems, improving clinical awareness, and guiding targeted prevention and control strategies in high-risk areas

Objectives

To assess the burden, geographical distribution, and temporal trends of scrub typhus in Sri Lanka over a five-year period from 2020 to 2024.

METHODS

Study Design and Data Source:

This descriptive epidemiological study is based on a retrospective analysis of secondary surveillance data. The primary data source was the Weekly Return of Communicable Diseases (WRCD), systematically compiled and published by the Epidemiology Unit of

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the Ministry of Health, Sri Lanka. The WRCD aggregates notifications of communicable diseases from Medical Officers of Health (MOH) areas across the entire island, representing a robust, nationwide passive surveillance network.

Data Collection:

Data were explicitly extracted concerning notifications classified under "Typhus Fever." In the Sri Lankan routine notification system, scrub typhus is currently reported under the broader umbrella of typhus fever, without strictly distinguishing between different rickettsial types (like murine typhus or spotted fever) in the preliminary notification tallies. However, extensive clinical and epidemiological research confirms that scrub typhus constitutes the overwhelming majority of these cases, particularly in the northern and dry zones of the country. Data were extracted from the central database of the e-surveillence system for a continuous five-year period spanning from January 2020 to December 2024.

Variables and Analysis:

The variables analyzed included the total annual number of reported cases, yielding the national temporal trend over the five-year period. Furthermore, the data were stratified by the 25 administrative districts of Sri Lanka to determine the geographical distribution and identify high-burden localities. Descriptive statistics were employed, with case counts tabulated and aggregated. Trend analyses were conducted to observe year-on-year fluctuations, and mean annual cases were calculated for the highest-burden districts to appropriately contextualize regional disparities.

Ethical considerations

This analysis used aggregated, non-identifiable routine health information system outputs for descriptive public health reporting; no individual-level patient data were accessed. The administrative clearnce was obtained.

RESULTS

Table 1: National Temporal Trends (2020–2024)

Year	Number of Reported Cases	Annual Change (%)
2020	1,391	-
2021	940	-32.4%
2022	1,155	+22.9%
2023	1,292	+11.9%
2024	1,169	-9.5%
Total	**5,947**	
Average	**1,189.4**	

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Over the five-year surveillance period from 2020 to 2024, a total of 5,947 cases of typhus fever were officially reported to the Epidemiology Unit across Sri Lanka. The temporal trend exhibited significant fluctuations, largely influenced by broader socio-epidemiological events occurring during this timeframe.

In 2020, the country recorded a substantial burden of 1,391 cases. However, the year 2021 witnessed a sharp and anomalous decline, with total notifications plummeting to 940 cases. This 32.4% drop represents the lowest incidence recorded in recent history. Following this nadir, the disease demonstrated a steady, persistent resurgence. In 2022, the reported cases climbed back to 1,155. The upward trajectory continued firmly into 2023, which recorded a five-year peak of 1,292 cases. In the final year of the analysis, 2024, the numbers stabilized slightly but remained high, with 1,169 cases reported. The average annual burden over this half-decade stands at approximately 1,189 cases, underscoring typhus fever as a persistent, endemic threat rather than a sporadic outbreak phenomenon (Table 1).

Geographical Distribution and High-Burden Districts:

The spatial distribution of scrub typhus in Sri Lanka is strikingly heterogeneous, exhibiting a strong predilection for specific geographic, vegetative, and climatic zones. The analysis of district-level data from 2020 to 2024 reveals a massive, disproportionate concentration of cases in the Northern Province, specifically within the Jaffna district. .

Jaffna emerged as the undisputed epicenter of the disease, accounting for a staggering 3,206 cases over the five years. This translates to an average of 641.2 cases annually in this single district. To put this sheer volume into perspective, Jaffna alone contributed to over 59.51 of the entire national case burden during the study period.

While Jaffna's burden dwarfs all other regions, several other districts consistently reported notable case numbers, forming secondary hotspots primarily situated in the dry and intermediate climatic zones, as well as specific highland areas. The top ten highest-burden districts (cumulative cases 2020–2024) are as follows (Table 2).

Table 2: Top ten highest-burden districts

District	Number of Cases	Percentage of Total (%)
Jaffna	3,206	59.51%
Badulla	309	5.74%
Hambantota	308	5.72%
Kandy	285	5.29%
Galle	265	4.92%
Nuwara Eliya	245	4.55%
Kilinochchi	158	2.93%

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District	Number of Cases	Percentage of Total (%)
Ratnapura	157	2.91%
Kegalle	153	2.84%
Kurunegala	151	2.80%
Total	**5,387**	**100.00%**

Districts such as Badulla and Hambantota represent significant endemic pockets in the Uva and Southern provinces, respectively. Interestingly, districts located in the central hilly regions, such as Kandy and Nuwara Eliya, also feature prominently in the top tier. Conversely, the heavily urbanized Western Province (including Colombo and Gampaha) reported minimal cases, confirming the rural and occupational etiology of the disease.

DISCUSSION

This study highlights that scrub typhus remains a persistent and endemic public health concern in Sri Lanka, with a cumulative burden of 5,947 cases reported over the five-year period from 2020 to 2024. The observed temporal trend demonstrates a fluctuating yet sustained pattern, with a notable decline in 2021 followed by a gradual resurgence in subsequent years. The sharp reduction in reported cases in 2021 is most plausibly attributable to the indirect effects of the COVID-19 pandemic, which disrupted routine healthcare services, reduced healthcare-seeking behavior, and affected disease surveillance systems globally (9,10). Similar declines in reported communicable diseases during this period have been documented in several countries, reflecting under-detection rather than a true reduction in incidence. The subsequent increase in cases from 2022 onwards likely represents a restoration of surveillance activities and healthcare access, combined with the underlying endemicity of the disease.

The marked geographical heterogeneity observed in this study, particularly the overwhelming concentration of cases in the Jaffna District, is a striking finding. Jaffna alone accounted for more than half of the national burden, suggesting the presence of highly favorable ecological and environmental conditions for transmission. Previous studies have indicated that scrub typhus transmission is closely associated with specific ecological niches characterized by scrub vegetation, presence of small mammalian hosts, and suitable climatic conditions that support chigger mite populations (11,12). The dry zone climate and agricultural practices prevalent in Jaffna may contribute to increased human exposure to vector habitats. In addition, heightened clinical awareness and a higher index of suspicion among healthcare providers in this district may also contribute to increased case detection compared to other regions.

Beyond Jaffna, several districts such as Badulla District, Hambantota District, and Kandy District emerged as secondary hotspots. These areas span diverse ecological zones, including dry, intermediate, and central highland regions, indicating that scrub typhus transmission in Sri Lanka is not confined to a single ecological setting. The presence of cases in highland districts such as Nuwara Eliya District suggests that altitude alone may not be a limiting factor, and micro-environmental conditions likely play a critical role. Similar findings have been reported in other endemic countries, where variations in vegetation, land use, and climate significantly influence the spatial distribution of the disease (13).

Conversely, the relatively low number of reported cases from urbanized districts in the Western Province, including Colombo District and Gampaha District, supports the well-established association between scrub typhus and rural or peri-urban environments.

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The disease is strongly linked to occupational exposure, particularly among farmers, plantation workers, and individuals engaged in outdoor activities, which increases the likelihood of contact with infected chiggers (14). However, it is also important to consider the possibility of under-diagnosis in urban settings due to lower clinical suspicion or limited routine testing for rickettsial infections.

The findings of this study also underscore the importance of strengthening diagnostic capacity and surveillance systems across the country. The reliance on passive surveillance data may underestimate the true burden of disease, particularly in districts with limited access to laboratory diagnostics. Studies have shown that the introduction of improved diagnostic tools, such as serological assays and molecular techniques, can significantly enhance case detection and provide a more accurate picture of disease burden (15). Therefore, expanding access to diagnostic facilities and improving clinician awareness are critical steps toward addressing the current gaps in detection and reporting.

Overall, the persistence of scrub typhus as an endemic disease in Sri Lanka, coupled with its uneven geographical distribution, highlights the need for targeted, evidence-based public health interventions. Strengthening surveillance, enhancing diagnostic capacity, and implementing region-specific preventive strategies will be essential to reduce the burden of this neglected tropical disease.

LIMITATIONS

This study is based on secondary data obtained from the national communicable disease surveillance system (WRCD), which relies on passive reporting and is therefore subject to underreporting, reporting delays, and variability in data completeness across districts. The true burden of scrub typhus in Sri Lanka is likely underestimated, particularly in areas with limited access to healthcare or weaker surveillance infrastructure. In addition, differences in clinical awareness and diagnostic capacity may have introduced detection bias, where districts with better diagnostic facilities and higher index of suspicion report more cases, while others may misclassify cases as other febrile illnesses such as dengue or leptospirosis.

Furthermore, the study utilized aggregated data, which limited the ability to assess individual-level risk factors such as age, sex, occupation, and clinical outcomes. Important environmental and ecological determinants of disease transmission, including land use patterns, rainfall, and vector distribution, were also not incorporated into the analysis. The observed temporal trends, particularly the decline in 2021, may have been influenced by external factors such as disruptions to healthcare utilization and surveillance during the COVID-19 pandemic, and therefore may not fully reflect true changes in disease incidence. Despite these limitations, the findings provide important insights into the epidemiology of scrub typhus in Sri Lanka and highlight key gaps in surveillance and diagnosis

CONCLUSION AND RECOMMENDATIONS

This study demonstrates that scrub typhus remains a persistent and endemic public health concern in Sri Lanka, with a substantial burden of 5,947 reported cases over the five-year period from 2020 to 2024. Although temporal trends showed fluctuations, including a notable decline in 2021, the overall pattern indicates sustained transmission with a resurgence in subsequent years. The findings also highlight a marked geographical disparity, with a disproportionately high concentration of cases in specific districts such as Jaffna, while other regions reported comparatively low numbers. This uneven distribution suggests the influence of ecological, occupational, and health system factors, including variations in exposure risk, diagnostic capacity, and clinical awareness.

Strengthening the national surveillance system is essential to improve the completeness and accuracy of scrub typhus reporting across all districts. Expanding laboratory diagnostic capacity, including access to reliable serological and molecular testing, will help reduce under-diagnosis and ensure timely case detection. Enhancing clinician awareness through continuous medical education and training on early recognition and management of scrub typhus is also critical. Targeted public health interventions should be implemented in high-risk districts, focusing on occupational safety measures for vulnerable groups such as farmers and outdoor workers. In addition, integrating environmental and ecological data into surveillance systems and promoting further research on transmission dynamics will support more effective, evidence-based control strategies to reduce the burden of this neglected tropical disease in Sri Lanka.

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