

# Antibody Prevalence and Factors Associated with Exposure to *Orientia tsutsugamushi* in Different Aboriginal Subgroups in West Malaysia

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## Abstract

**Background:** Limited data is available on the current status of scrub typhus infection in the aboriginal population in Malaysia. This study was aimed to provide recent data on the degree of exposure of 280 individuals from seven aboriginal subgroups to *Orientia tsutsugamushi* (causative agent of scrub typhus) in West Malaysia. The environment, socioeconomic and behavioural risk factors associated with the disease were also investigated.

**Methods/Findings:** The antibody prevalence to *O. tsutsugamushi* ranged from 0 to 36.4% in seven subgroups, with high prevalence rates noted in subgroups involved in agricultural activity and the lowest prevalence rates noted in subgroups whose main occupations were associated to fishing. Univariate analysis indicated populations with age above 18 years (OR = 1.15, 95% CI = 1.02–1.30,  $P = 0.015$ ), working (OR = 1.99, 95% CI = 1.01–3.92,  $P = 0.044$ ), working at agriculture area (OR = 1.18, 95% CI = 0.98–1.42,  $P = 0.031$ ), receiving household income less than US\$ 166.7 (RM500) per month (OR = 2.43, 95% CI = 1.16–5.11,  $P = 0.016$ ) and having close contact with animal pets (OR = 4.06, 95% CI = 1.20–13.76,  $P = 0.016$ ) are significantly associated with exposure to *O. tsutsugamushi*. Multivariate analysis confirms that participants who are above 18 years old, receiving household income less than US\$ 166.7 (RM500) per month and having close contact with animal pets are 3.6 times (95% CI = 1.81–7.03,  $P < 0.001$ ), 1.3 times (95% CI = 1.14–1.64,  $P = 0.002$ ) and 1.2 times (95% CI = 1.05–1.06,  $P = 0.006$ ) more likely to have exposure to *O. tsutsugamushi*, respectively.

**Conclusion:** The present study indicates that scrub typhus is still an important disease in the aboriginal population in Malaysia. Awareness about the disease and education on the preventive measures are important in reducing the risk of acquiring scrub typhus in the population studied.

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## Introduction

Scrub typhus is an acute febrile disease caused by *Orientia tsutsugamushi*, a Gram-negative obligate intracellular bacterium which is transmitted through the bites of infected *Leptotrombidium* mites. The disease is distributed throughout the Asia Pacific regions including Malaysia [1–3]. Also known as tsutsugamushi disease, the disease is characterized by focal or disseminated vasculitis and perivasculitis, which may involve the lungs, heart, liver, spleen, and central nervous system and cause serious complications including pneumonia, myocarditis, meningoencephalitis, acute renal failure, and gastrointestinal bleeding [3–5]. The disease has been reported as the most frequent infection among febrile hospitalized patients in rural areas of Malaysia since early 1970s [6–8], with antibody prevalence to *O. tsutsugamushi* varied widely from as low as 0.8% in East Malaysia [9] to as high as 73% in West Malaysia [6]. A recent serosurvey of febrile patients in rural areas of Malaysia showed a prevalence of 24.9% to *O. tsutsugamushi* [2].

According to Khor and Zalilah [10], the aborigines or orang Asli (translated as “original peoples”) are the indigenous inhabitants of West Malaysia, who constitute a minority group comprises only 0.6% of the total population of Malaysia. A total of 132,486 individuals have been recorded in a recent census [11]. They are officially classified into three main ethno-linguistic groups namely, the Senoi, Proto Malays or Aboriginal Malays and the Negritos, each consisting of six dialectic subgroups. The common occupations of the people are agricultural, fishery, hunting and collecting forest produce. Certain aboriginal subgroups such as Orang Laut, Orang Seletar and Mah Meri live close to the coast and are mainly fishermen. The Temuan, Jakun and Semai people are involved in agricultural activities for instance, in rubber, oil palm or cocoa plantations. The Temiar and Semelai live within forested areas and are engaged in rice cultivation, hunting and gathering. A minority of aboriginal population live in urban areas and are engaged in both waged and salaried jobs [12]. The aboriginal population has been identified as one of the most impoverished groups in the Malaysia,