The presence of *Plasmodium malariae* and *Plasmodium knowlesi* in near malaria elimination setting in western Indonesia

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Abstract

Background: Indonesia is progressing towards malaria elimination. To achieve this goal, intervention measures must be addressed to cover all *Plasmodium* species. Comprehensive control measures and surveillance programmes must be intensified. This study aims to determine the prevalence of microscopic and submicroscopic malaria in Langkat district, North Sumatera Province, Indonesia.

Methods: A cross-sectional survey was conducted in six villages in Langkat district, North Sumatera Province in June 2019. Data were recorded using a standardized questionnaire. Finger pricked blood samples were obtained for malaria examination using rapid diagnostic test, thick and thin blood smears, and polymerase chain reaction.

Results: A total of 342 individuals were included in the study. Of them, one (0.3%) had a microscopic *Plasmodium malariae* infection, no positive RDT examination, and three (0.9%) were positive for *P. malariae* (n = 1) and *Plasmodium knowlesi* (n = 2). The distribution of bed net ownership was owned by 40% of the study participants. The participants had a house within a radius of 100–500 m from the forest (86.3%) and had the housing material of cement floor (56.1%), a tin roof (82.2%), wooden wall (35.7%), bamboo wall (28.1%), and brick wall (21.6%).

Conclusion: Malaria incidence has substantially decreased in Langkat, North Sumatera, Indonesia. However, submicroscopic infection remains in the population and may contribute to further transmission. Surveillance should include the detection of microscopic undetected parasites, to enable the achievement of malaria elimination.

Keywords: Malaria, Indonesia, North Sumatera, Elimination, *P. knowlesi*, *P. malariae*

Background

Indonesia has shown significant progress towards a malaria-free zone within the last decade with a reduction in 50% of cases and 66% of deaths due to malaria [1]. Aggressive efforts in scaling up diagnostic and treatment measures with a tailored intervention for each district of the country are essential to achieve malaria-free by 2030 [2, 3]. Nevertheless, despite the effort to scale up control measures by the government, there were still an estimated 784,854 cases and 1443 deaths due to malaria in 2020 [4]. Furthermore, in 2020, Indonesia is one of two countries in Southeast Asia failing to achieve the WHO Global Technical Strategy with 40% reduction of cases and deaths compared to 2015 [5].

Microscopic examination is currently the gold standard for malaria diagnosis, however, misdiagnosis occurs in cases of low parasitaemia as well as incorrect species

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