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Individual, Host–Vector Interactions, and Environmental Risk Factors for Plasmodium knowlesi Malaria Among At-Risk Communities in Peninsular Malaysia: A Case–Control Study

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Abstract
Background: Highlighting the individual, host–vector interactions, and environmental risk factors for knowlesi malaria were consequential toward more focused and effective prevention and control strategies. This study aims to identify the individual, host–vector interactions, and environmental risk factors for Plasmodium knowlesi malaria among at-risk communities in Peninsular Malaysia. Materials and Methods: A case–control study was conducted involving laboratory-confirmed cases of P. knowlesi malaria, while a locality-matched individual with no history of fever and tested negative for malaria was taken as control. Univariate and multiple logistic regression were applied to evaluate the potential risk factors among respondents using IBM SPSS Statistics for Windows, Version 26.0. Results: Results showed higher cases among males as compared to females (76.1% vs. 23.9%). Multiple logistic regression analysis showed being male is 3.51 higher risk ($p < 0.001$) to become a case. Respondents whose place of work or study is near the forest edge have 44.0% lower risk ($p = 0.030$), while those living in the Orang Asli village were 56.0% lower risk as compared to the organized village to become a case ($p = 0.035$). Conclusion: These findings demonstrated that gender emerges as an independent individual risk factor while residing near a forest edge, in an Orang Asli village, or occupying workers' longhouses situated in hilly areas lowered the environmental risk among respondents. These findings attested that alternative directions must be considered in addressing the known risk factors associated with this type of malaria and the design of prevention and control programs should be tailored to the unique characteristics of each population. © Mary Ann Liebert, Inc.

Author Keywords
at-risk communities; environmental; host–vector interaction; individual; knowlesi malaria; risk factor

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