

# A Geographical Study of Risks Associated with Mosquito-Borne Diseases in Japan

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Mosquito-borne disease epidemics are geographical phenomena; therefore, analyzing the spatial links among mosquitoes, humans, and the environment enables the understanding of epidemic risk distribution. This thesis therefore examined risks of mosquito-borne diseases in Japan in terms of spatial distribution of vector mosquitoes, the chances for mosquito bites, and risk-perception and measures of mosquito-borne diseases.

The results are summarized as follows: First, spatial variations in the numbers of captured mosquitoes were related to the pattern of land use around each trap at study sites in the Toyama and Shiga prefectures. The numbers of Japanese encephalitis vector mosquitoes associated with rural-agricultural landscape mainly came from paddy fields. The abundance of malaria vector mosquitoes was determined by the existence of wetland landscapes such as water bodies and areas of reeds. Such landscape characteristics could increase the risks of infectious mosquito-borne diseases when a pathogen is introduced in the region.

Second, questionnaire surveys conducted in Kyoto city for analyzing the perceived frequency of mosquito bites among urban residents and their associations to the number of mosquitoes, residential environments such as housing type, neighborhood conditions (e.g., existence of water body), and individual attributes of residents indicated that certain residential environments increased the chances for mosquito bites, contributing to a spread of disease in that area.

Third, mosquito control measures in areas with historical landscapes were critically assessed using historical material, questionnaire surveys, and interviews in Hikone city in the early 20th century and in Kyoto city at present. The results showed that, when vector control strategies are performed, the need for health protection and historical landscape preservation may be in conflict since these aspects show geographical overlapping in areas of epidemic sources. There is also the risk of loss of landscape and value associated with vector control strategies.

In conclusion, the geographical conditions which show high incidence of mosquito-borne diseases have been established through a combination of the concept of disease ecology and a spatial epidemiological approach. Besides, it has been demonstrated by drawing on the relationship between health and place that while we take vector control strategies, conflict is likely to take place between landscape preservation and health protection and that landscapes and their values could be jeopardized.