Abstract of Master's Dissertation

No.1

Course	Master of Science Health Innovation course	Name	Junna Kiriyama
Thesis Title	Association between severity and epidemiological, basic clinical and geographical features of *Plasmodium knowlesi* malaria in Sabah, Malaysia		

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Background:

Plasmodium knowlesi (*P. knowlesi*) is one of the simian malaria parasites and can cause human infections. This infection is a serious healthcare problem in Southeast Asian countries especially in Malaysia. Early detection of risk factors and their avoidance are important to prevent mortalities and morbidities, but the factors responsible for severe *P. knowlesi* malaria are still unclear.

Objective:

The objective of this study is to determine the association between severe *P. knowlesi* malaria and epidemiological, basic clinical and geographical features.

Method:

Data of patients with *P. knowlesi* malaria were extracted from the malaria surveillance database of district health offices of the following districts of Sabah state, Malaysia: Keningau, Kota Marudu, and Ranau. Secondary data from January 2017 to November 2019 were analyzed in this study. Geographical analysis was performed with longitude and latitude geographic information system of infection places from the database. These infection places were given a cluster ID by grouping neighboring 1-2 km by a geographical clustering method. The effects of these epidemiological, basic clinical and geographical variables as fixed effects on the severity of *P. knowlesi* malaria were evaluated using mixed effects logistic regression model, considering the geographical cluster ID as a random effect.

＊ The abstract, containing the objective, method, result and conclusion should not exceed 300-500 words.

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Result:

Of 2,168 patients enrolled in this study, 283 patients (13.1%) were diagnosed as severe. The mean age of these patient was 36.0 years, the mean travel time to the district hospital was 1.62 hours, 90.7% patients received artemisinin-combination therapy (ACT), and all patients survived. The severe case ratio of non-ACT was significantly higher than ACT in total (28.4%), Keningau (30.4%), and Kota Marudu (81.5%), respectively, on the other hand, the ratio of ACT was higher than non-ACT in Ranau (11.2%). As a result of stepwise selection method, age (increase 30 years), household residences (over 5 persons), travel time to the hospital (10 times longer), and geographical elevation (increase 500m) were finally selected as fixed effects of the regression model, the odds ratio (95%CI) were 2.33 (1.85-2.94), 1.28 (0.98-1.67), 1.54 (0.99-1.67), and 0.59 (0.40-0.87) respectively. In addition, some geographical clusters were detected high risk area of severe knowlesi malaria as a relatively high random intercept and were visualized on a map.

Conclusion:

Although further investigations of the treatment details are needed, several demographic and geographical characteristics were associated with severe *P. knowlesi* malaria patients. Patients coming to hospital from the distant areas have increased risk of severity not only for longer travel time but due to other sociodemographic reasons such as educational level or socioeconomic status. Final regression model can be useful to detect high risk areas of severe knowlesi malaria geographically in Sabah.

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