Seismic vulnerability assessment of residential buildings using probabilistic model of logistic regression and geographic information system (GIS) in Pleret Sub District, southeast part of the Yogyakarta City.

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A strong earthquake of 6.3 Mw shook the 15 km southeast part of Yogyakarta City. This event caused more than 5,700 people dead; 37,927 people were wounded due to the failure of more than 240,396 residential buildings. Moreover, the earthquake also struck the infrastructure and local economic activities. The total damages and losses were 29.1 trillion rupiahs or around 3.1 million US dollar. Two significant factors that caused the severe damages were a dense population and the lack of seismic design of residential buildings. After reconstruction and rehabilitation, the study area grew into a densely populated area. This urbanistic change is feared to be potentially the lead to a great disaster if an earthquake occurs again. Hence, a comprehensive study about building vulnerability based on the statistic approach was conducted in Pleret Sub-District, 15 km southeast part of Yogyakarta City.

The purpose of this study is to generate the probabilistic model of seismic building vulnerability based on the damage data of the Yogyakarta earthquake 2006. By examining the relationship between building characteristics, site conditions, and the damage level based on probabilistic analysis, this study can offer a better knowledge of earthquake damage prediction for residential building in Java.

Based on the statistic model, the most vulnerable building type is the reinforced masonry structure with clay tile roof, it is settled between 8.1-10 km of the epicentre, and it is built on young Merapi volcanic deposits. On the contrary, the safest building type is the houses which have characteristics of reinforced masonry structure, asbestos or zinc roof type and being located in Semilir Formation. The results showed that the building damage probability provided a high accuracy of prediction about 75.81%.

Keywords: Earthquake, Damage pattern, Building vulnerability

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