

## INTISARI

**Latar Belakang:** Demam Berdarah Dengue (DBD) merupakan *vector-transmitted disease* yang menjadi perhatian di Jawa Timur, khususnya Kab. Malang, dimana Kab. Malang mengalami *outbreak* DBD berkisar lima kali dalam waktu 10 tahun terakhir.

**Tujuan:** Menganalisis hubungan unsur cuaca (curah hujan, suhu, kelembapan, kecepatan angin, dan penyinaran matahari) dan karakteristik demografi (kepadatan penduduk dan rumah tangga) terhadap kejadian DBD tahun 2014-2018 dengan pendekatan spasial dan temporal, serta membuat model prediksi kejadian DBD di Kab. Malang dengan menggunakan data 2014-2015.

**Metode:** Studi ini adalah penelitian kuantitatif dengan desain. Analisis spasial dilakukan dengan spasial deskriptif, sedangkan analisis temporal dilakukan dengan *time-trend*. Uji spearman dilakukan untuk analisis secara statistik, dimana studi ini juga menganalisis *time-lag* hingga tiga bulan. Model kejadian DBD dibentuk dengan menggunakan regresi binomial negatif. Nilai kemaknaan yang digunakan 5% ( $\alpha: 0,05$ ).

**Hasil:** Analisis spasial menunjukkan kasus DBD di Kab. Malang tahun 2014-2018 bersifat kluster di *urban area*, dimana distribusi cuaca ideal terhadap kasus DBD dapat teridentifikasi. Wilayah padat penduduk dan rumah tangga terkonfirmasi memiliki kasus DBD lebih tinggi. Analisis temporal menunjukkan curah hujan, suhu, dan kelembapan pola yang searah dengan kasus DBD. Pola searah juga ditunjukkan karakteristik demografi terhadap DBD. Uji spearman menunjukkan curah hujan ( $r_{lag\ 0}: 0,4865^*$ ,  $r_{lag\ 1}: 0,6695^*$ ,  $r_{lag\ 2}: 0,8440^*$ ,  $r_{lag\ 3}: 0,5168$ ), suhu ( $r_{lag\ 2}: 0,5210^*$ ,  $r_{lag\ 3}: 0,6883^*$ ), kelembapan ( $r_{lag\ 0}: 0,7870^*$ ,  $r_{lag\ 1}: 0,8245^*$ ,  $r_{lag\ 2}: 0,6987^*$ ) dan penyinaran matahari ( $r_{lag\ 1}: -0,5371^*$ ,  $r_{lag\ 2}: -0,5893^*$ ,  $r_{lag\ 3}: -0,4579^*$ ) berhubungan terhadap kasus DBD. Selain itu, kepadatan penduduk ( $r_{2014}: 0,4572^*$ ,  $r_{2015}: 0,5293^*$ ,  $r_{2016}: 0,3729^*$ ,  $r_{2018}: 0,4766^*$ ) dan kepadatan rumah tangga ( $r_{2014}: 0,4246^*$ ,  $r_{2015}: 0,5140^*$ ,  $r_{2016}: 0,3600^*$ ,  $r_{2018}: 0,4537^*$ ) signifikan terhadap DBD. *Fitted model* terbentuk dari variabel curah hujan lag 1 dan 3 bulan, suhu lag 3 bulan, dan kelembapan lag 0-2 bulan. Model mampu memprediksi terjadinya kenaikan kasus (Februari 2015 dan 2016, Januari 2017 dan 2018).

**Kesimpulan:** Unsur cuaca dan karakteristik demografi berhubungan secara spasial dan temporal terhadap kasus DBD di Kab. Malang. *Fitted model* dengan menggunakan data dua tahun mampu memprediksi kejadian DBD. Oleh sebab itu, penulis merekomendasikan perlu adanya pemanfaatan Sistem Informasi Geografis (SIG) dan pemodelan oleh dinas kesehatan maupun puskesmas untuk mendeteksi secara dini kejadian DBD dan wilayah yang berpotensi tinggi terjadinya *outbreak*.

**Kata kunci:** Demam Berdarah Dengue, Spasial, Temporal, *Modelling*

## ABSTRACT

**Background:** Dengue Hemorrhagic Fever (DHF), a vector transmitted disease, becomes public health concern in East Java, particularly Malang Regency, where DHF outbreak are reported five times during 10 latest years in Malang.

**Objective:** To analyze the relationship between local weather (rainfall, temperature, humidity, wind velocity, and sunshine duration) and demography characteristics (population- and household- density) toward DHF during 2014-2018 based on spatial and temporal approach, and also to create prediction model by using two years data (2014-2015).

**Method:** Employing quantitative method, the study design was ecological. Spatial analysis was conducted by descriptive, in which time trend was used to assess temporal analysis. In this study, spearman was performed to examine the relationship between independent- to dependent- variable, where time lag correlation was also conducted (lag 0-3 month). In addition, model was created by negatif binomial regression. The significant error was set 5% ( $\alpha = 0,05$ ). All statistikal analysis was performed in STATA (College Tx, USA).

**Result:** Based on spatial analysis, DHF case in Malang is cluster-distributed, where ideal local weather condition toward DHF is detected. This study also confirmed that dense area more likely have high DHF case. Temporal analysis showed that rainfall, temperature, and humidity is in line toward DHF case. A similar result is also found in demography characteristics. The spearman test showed that rainfall ( $r_{lag\ 0}: 0,4865^*$ ,  $r_{lag\ 1}: 0,6695^*$ ,  $r_{lag\ 2}: 0,8440^*$ ,  $r_{lag\ 3}: 0,5168$ ), temperature ( $r_{lag\ 2}: 0,5210^*$ ,  $r_{lag\ 3}: 0,6883^*$ ), humidity ( $r_{lag\ 0}: 0,7870^*$ ,  $r_{lag\ 1}: 0,8245^*$ ,  $r_{lag\ 2}: 0,6987^*$ ), and sunshine duration ( $r_{lag\ 1}: -0,5371^*$ ,  $r_{lag\ 2}: -0,5893^*$ ,  $r_{lag\ 3}: -0,4579^*$ ) is significant toward DHF. Besides, population- ( $r_{2014}: 0,4572^*$ ,  $r_{2015}: 0,5293^*$ ,  $r_{2016}: 0,3729^*$ ,  $r_{2018}: 0,4766^*$ ) and household- ( $r_{2014}: 0,4246^*$ ,  $r_{2015}: 0,5140^*$ ,  $r_{2016}: 0,3600^*$ ,  $r_{2018}: 0,4537^*$ ) density also showed significant. The fitted model is created by rainfall lag 1 and 3 month, temperature lag 3 month, and humidity lag 0-2 month. Futhermore, model can predict an increasing of DHF case (February 2015 and 2016, January 2017 and 2018).

**Conclusion:** Both local weather and demography characteristics are found spatially and temporally significant toward DHF cases in Malang. The fitted model could predict the DHF case by using two years data. Therefore, authors recommend the utilization of Geographical Information System and modelling for Health Office or Primary Health Care to mark high risk area of DHF, and also to predict the DHF case as early warning.

**Keyword:** Dengue Hemorrhagic Fever, Spatial, Temporal, Modelling