

INTISARI

Tuberkulosis (TB) merupakan penyakit menular yang disebabkan oleh bakteri *Mycobacterium tuberculosis*. TB merupakan masalah kesehatan masyarakat yang serius di negara-negara berkembang, termasuk di Indonesia. Semua provinsi di Indonesia telah terinfeksi oleh bakteri TB. Di DIY, kejadian Tuberkulosis mengalami peningkatan setiap tahunnya sehingga dibutuhkan cara untuk mengontrolnya. Prediksi awal epidemi TB sangat penting untuk pengendalian di masa mendatang, seperti mengembangkan program intervensi dan mengalokasikan sumber daya secara optimal. Ada beberapa metode peramalan yang dapat digunakan untuk memprediksi kejadian TB seperti peramalan *time series*, peramalan kombinasi *time series*, dan peramalan kausal.

Pola data dari kejadian Tuberkulosis di DIY adalah tren, sehingga dalam penelitian ini, model *Naive*, *Double Moving Average*, *Holt's* dan ARIMA digunakan untuk memilih model peramalan terbaik. Tiga model *time series* terbaik akan dikombinasikan menggunakan metode *simple average*, *inverse MSE*, *odd matrix*, OLS, dan *constrained OLS*. Metode lain untuk meramalkan kejadian Tuberkulosis adalah metode kausal seperti regresi dan *Bayesian Network*. Metode ini mempertimbangkan faktor-faktor yang mempengaruhi terjadinya Tuberkulosis seperti kemiskinan, kepadatan penduduk, dan kejadian HIV. *Bayesian Network* hanya dapat memprediksi kondisi peningkatan atau penurunan kasus Tuberkulosis sehingga harus dikombinasikan dengan model *Holt's* supaya dapat memprediksi jumlah kejadian Tuberkulosis.

Berdasarkan hasil pengujian, *Holt's* memberikan nilai MAPE terkecil dibandingkan model *time series* lainnya yaitu 3,00% dengan tingkat kesesuaian pola 60%. Tiga metode terbaik dari peramalan *time series* adalah *Double Moving Average*, *Holt's* dan ARIMA(1,1,0). Ketiganya digunakan dalam peramalan kombinasi. Hasil peramalan kombinasi menunjukkan bahwa metode peramalan kombinasi *Odd Matrix* 1 dan 2 yang terdiri dari *Double Moving Average* dengan ARIMA(1,1,0) merupakan metode terbaik dengan MAPE 2,15% dan tingkat kesesuaian polanya 80%. Sedangkan hasil dari metode peramalan kausal terbaik adalah model regresi dengan nilai MAPE sebesar 3,51% dan tingkat kesesuaian polanya 50%. Dari keseluruhan metode, model terbaik untuk meramalkan kejadian Tuberkulosis di DIY adalah metode *odd matrix* 1 dan 2 yang terdiri dari kombinasi *Double Moving Average* dengan ARIMA(1,1,0).

Kata Kunci: DIY, Tuberkulosis, Peramalan *Time Series*, Peramalan Kombinasi, *Bayesian Network*, Regresi

ABSTRACT

Tuberculosis (TB) is an infectious disease caused by a bacterium called *Mycobacterium tuberculosis*. TB is a serious public health issue in developing countries, including Indonesia. All provinces in Indonesia are infected by TB. In DIY, TB incidence has increased every year so it is required a method to prevent. Early prediction of TB epidemic are useful for controlling the disease in the future by developing intervention program and allocating resources optimally. There are some methods which can be used to predict TB incidence, such as time series forecasting, time series combination forecasting, and causal forecasting.

The TB incidence in DIY had a trend pattern, so in this study, *Naive*, *Double Moving Average*, *Holt's* and ARIMA were used to select the best fitted model. Three best fitted model from single forecasting will be combined using *simple average*, *inverse MSE*, *odd matrix*, OLS, and *constrained OLS* model. Another forecasting to predict TB incidence is causal forecasting, such as Regression and Bayesian Network. This method is considering factors that causing Tuberculosis such as poverty, population density, and HIV incidence. Bayesian Network only can predict an increasing or decreasing condition of TB incidence, so it must be combined with Holt's model to predict number of TB incidence.

The results show that Holt's model is the best fitted model time series forecasting by having MAPE equal to 3,00% and the rate of conformity was 60%. Three best fitted model from single forecasting are *Double Moving Average* $k=3$, *Holt's* and ARIMA (1,1,0) then the three of them is used in combination forecasting. The results from the combination forecasting show that the odd matrix 1 and 2 method from *Double Moving Average* $k=3$ and ARIMA (1,1,0) is the best method by having MAPE equal to 2,15% and the rate of conformity was 80%, while in causal forecasting, the best fitted model is regression by having MAPE equal to 3,51% which is the rate of conformity was 50%. From all methods, the best fitted model to predict TB incidence in DIY is odd matrix 1 and 2 from *Double Moving Average* $k=3$ and ARIMA (1,1,0).

Keywords: DIY, Tuberculosis, Time Series Forecasting, Combination Forecasting, Bayesian Network, Regression.