ABSTRAK

Penyakit Tuberkulosis (TBC) merupakan salah satu masalah kesehatan masyarakat di Indonesia yang jumlah kasusnya cenderung berfluktuasi dan dipengaruhi oleh berbagai faktor sehingga diperlukan metode peramalan yang mampu menghasilkan prediksi secara akurat. Penelitian ini bertujuan membangun serta membandingkan kinerja metode *Generalized Additive Model* (GAM) dan *Long Short-Term Memory* (LSTM) dalam meramalkan jumlah kasus TBC. Data yang digunakan berupa data deret waktu bulanan kasus TBC beserta variabel pendukung yang meliputi kepadatan penduduk, curah hujan, suhu, kelembapan, dan kecepatan angin. Model GAM dibangun menggunakan fungsi pemulus (*smoothing spline*), sedangkan model LSTM dikembangkan melalui tahapan normalisasi data, pelatihan model, dan proses prediksi. Kinerja kedua model dievaluasi menggunakan *Mean Absolute Error* (MAE), *Root Mean Squared Error* (RMSE), dan *Mean Absolute Percentage Error* (MAPE) pada data uji tahun 2025. Hasil penelitian menunjukkan bahwa model LSTM memberikan performa terbaik dengan nilai MAE sebesar 0,75, RMSE sebesar 0,96, dan MAPE sebesar 0,98%, sehingga termasuk kategori sangat akurat. Sebaliknya, model GAM menghasilkan nilai MAE sebesar 22,41, RMSE sebesar 25,99, dan MAPE sebesar 25,80%, yang menunjukkan tingkat akurasi lebih rendah dibandingkan LSTM. Hasil peramalan menggunakan model LSTM untuk periode Januari - Desember 2026 menunjukkan tren jumlah kasus TBC yang cenderung menurun secara bertahap, dari 51 kasus pada Januari menjadi 44 kasus pada Desember. Berdasarkan hasil tersebut, dapat disimpulkan bahwa metode LSTM lebih efektif dibandingkan GAM dalam meramalkan jumlah kasus TBC dan berpotensi menjadi dasar pendukung pengambilan keputusan berbasis data bagi instansi kesehatan dalam penyusunan strategi pengendalian Tuberkulosis.

Kata Kunci : Tuberkulosis, Peramalan, *Generalized Additive Model, Long Short-Term Memory*, Deret Waktu

ABSTRACT

Tuberculosis (TB) remains one of the major public health problems in Indonesia, with the number of reported cases fluctuating over time due to various influencing factors. Therefore, an accurate forecasting method is required to support disease control planning. This study aims to develop and compare the performance of the Generalized Additive Model (GAM) and Long Short-Term Memory (LSTM) methods for forecasting the number of TB cases. The dataset consisted of monthly time-series data on TB cases and supporting variables, including population density, rainfall, temperature, humidity, and wind speed. The GAM model was developed using smoothing spline functions, while the LSTM model was constructed through data normalization, model training, and prediction processes. The performance of both models was evaluated using Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and Mean Absolute Percentage Error (MAPE) on the 2025 testing dataset. The results indicate that the LSTM model achieved the best forecasting performance, with an MAE of 0.75, an RMSE of 0.96, and a MAPE of 0.98%, which is classified as highly accurate. In contrast, the GAM model produced an MAE of 22.41, an RMSE of 25.99, and a MAPE of 25.80%, indicating lower forecasting accuracy than the LSTM model. Forecasts generated by the LSTM model for the January–December 2026 period show a gradual decline in TB cases, from 51 cases in January to 44 cases in December. Based on these findings, it can be concluded that the LSTM method outperforms the GAM method in forecasting TB cases and has strong potential to support data-driven decision-making for health authorities in developing more effective tuberculosis control strategies.

***Keywords** : Tuberculosis, Forecasting, Generalized Additive Model, Long Short-Term Memory, Time Series.*