Asymptotic Analysis and Identifiability Checks in Numerical Optimization Models for Epidemic Spread in South Africa

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Abstract

Numerical optimization models are crucial for understanding and predicting epidemic spread in South Africa. The analysis involves the application of asymptotic theory and statistical methods to assess model performance and reliability. A key finding is that the identified parameters exhibit stable convergence over time, indicating reliable model predictions for epidemic spread dynamics in South Africa. The models' identifiability was confirmed through rigorous testing, ensuring robustness against parameter estimation uncertainties. Further research should focus on incorporating real-time data to enhance predictive accuracy and public health interventions planning. epidemic spread, numerical optimization, asymptotic analysis, identifiability checks Model selection is formalised as $\hat{\{\theta\}} = argmin_{\theta in \theta} ¿ L(\theta) + \lambda ¿ \omega(\theta) ¿$ with consistency under mild identifiability assumptions.

Keywords: *Sub-Saharan, Optimal Control, Stability Analysis, Parameter Estimation, Sensitivity Analysis*

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