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FACHBEREICH 08

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Einladung zum Vortrag
im Oberseminar Analysis

A COVID-19 epidemic model with periodicity in transmission and environmental dynamics

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From the beginning of the outbreak of SARS-CoV-2 (COVID-19), South African data depicted seasonal transmission patterns, with infections rising in summer and winter every year. Seasonality, control measures, and the role of the environment are the most important factors in periodic epidemics. In this paper, a deterministic model incorporating the influences of seasonality, vaccination, and the role of the environment is formulated to determine how these factors impact the epidemic. We analyse the model, demonstrating that when $R_0 < 1$, the disease-free equilibrium is globally symptomatically stable, whereas $R_0 > 1$ indicates that the disease uniformly persists and at least one positive periodic solution exists. We demonstrate its application by using the data reported by the National Institute for Communicable Diseases. We fitted our mathematical model to the data from the third to the fifth wave and used a damping effect due to mandatory vaccination in the fifth wave. Our analytical and numerical results indicate that different efficacies for vaccination have a different influence on epidemic transmission at different seasonal periods. Our findings also indicate that as long as the coronavirus persists in the environment, the epidemic will continue to affect the human population and disease control should be geared toward the environment.

Alle Interessierten sind herzlich eingeladen!

Datum: Freitag, 07.06.2024
Uhrzeit: 10:15 Uhr
Ort: 05-426