

## **Title: The impact of demography in a model of malaria with Transmission Blocking Drugs**

**Abstract:** In this work, we develop and analyze a mathematical model for spreading malaria, including treatment with Transmission-blocking Blocking Drugs (TBDs). The paper's main aim is to demonstrate the impact the chosen model for demographic growth has on the disease's transmission and the effect of its treatment with TBDs. We calculate the model's control reproduction number, equilibria and perform a global stability analysis of the disease-free equilibrium point. The mathematical analysis reveals that, depending on the model's demography, the model can exhibit forward, backward, and even some unconventional types of bifurcation, where disease elimination can occur for both small and large values of the reproduction number. We also conduct a numerical analysis to explore the short-term behavior of the model. A key finding is that for one type of demographic growth, the population experienced a significantly higher disease burden than the others, and when exposed to high levels of treatment with TBDs, only this population succeeded in effectively eliminating the disease within a reasonable timeframe.

**Keywords:** Transmission-blocking drugs, mathematical modeling, demography, malaria, simulation.