# The Role of Inter-Provincial Mobility in the Dynamics of COVID-19 Epidemic in Mozambique: Insights from a data-driven metapopulation model

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**Abstract**

**Background**

The spread of COVID-19 is strongly influenced by human mobilities and interactions within and across different geographical regions. Understanding the impact of mobility on the spread of SARS-CoV-2 is paramount for devising effective intervention measures and shaping public health policies.

**Methods**

Utilizing a computational metapopulation model with stochastic dynamics, we simulated the transmission of SARS-CoV-2 and mobility patterns across Mozambique's 11 provinces. The movement of individuals from one province to another is determined by a transition matrix obtained through the simulation of a radiation model. We calibrated the model for effective population and active cases during the first wave of infections from March 2020 to March 2021. Simulated scenarios include the presence and absence of mobility to assess its impact on the trajectory of the epidemic.

**Results**

Our analysis reveals a significant contribution of mobility between provinces to the rapid escalation of the COVID-19 epidemic which was first reported in Maputo City. In scenarios incorporating mobility, the calculated $\mathcal{R}_0$ value was 1.153131, reflecting a 4.85% increase compared to scenarios without mobility ($\mathcal{R}_0$ of 1.097174). Reported cases exhibited a 16.35% rise in mobility scenarios compared to scenarios without mobility, and the epidemic peak occurred 22 days earlier in scenarios with mobility.

**Conclusions**

These findings emphasize the critical role of incorporating mobility patterns into targeted intervention strategies aimed at curtailing COVID-19 transmission.

## References


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