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SEMINÁRIO DE BIOMATEMÁTICA E ESTATÍSTICA

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Vector borne diseases on an urban environment - a multi-group model approach

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Abstract:

Starting from a class of meta-population models for the dynamics of a vector-borne disease, we will show how different mathematical tools lead to very complete analysis of the system. The underlying dynamics will be reduced to a coupled SIR (human)/SI (mosquito) system; notification districts are taken for patches. We focus on the role of human movement in sustaining the epidemics. It turns out that considering different aspects of urban districts leads to very heterogeneous networks, which might lead to very distinctive dynamics.

In a worst case scenario, one might have local basic reproduction numbers all less than unity, but with the network basic reproduction number (R_0) larger than one. In particular, we can obtain a correction to the uniform R_0 (aggregating data as a single region) which is given by the principal singular value of a certain interaction matrix. We also completely analyse the model with respect to global stability. This is joint work with Abderrahman Iggidr, Jair Koiller, Maria Lúcia Penna, Gauthier Sallet and Moacyr Silva.

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