

**Mathematical modelling of co-application of long lasting insecticidal nets and insecticides
zooprophylaxis against the resilience of anopheles arabiensis for effective malaria
prevention**

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Insecticides zooprophylaxis have been suggested as a suitable method of eliminating malaria transmission in areas dominated by zoophagic vectors. A mathematical model which considers a co-application of Long Lasting Insecticidal Nets (LLINs) and Insecticides zooprophylaxis in presence of *Anopheles cirabiensis* as malaria transmission vector has been discussed. This was done by extending a published malaria transmission model to include insecticides zooprophylaxis as a parameterisable intervention option. This study has demonstrated the role of cattle sprayed with insecticides in the reduction of zoophagic vectors density and control of malaria. It showed that in areas with pre-existing LLINs and a predominant *An arabiensis*, cattle treated with insecticides should be chosen as an effective method. The stability of the disease has been analyzed for existence of the basic reproduction number which is less than unity at levels of coverage that can be achieved by sustainable nets and insecticides distribution system. Also from the analysis of the model, there is a substantial reduction of human biting rate, vectorial capacity and Entomological Inoculation Rate (EIR) when there is high intervention coverage of all blood sources for zoophagy malaria vectors. Furthermore, achieving and maintaining > 80% of the number of people and cattle using LLINs and insecticides respectively in a community might in some parts of sub-Saharan Africa locally eliminate malaria transmission.

