

Assessing risks and benefits of indoor residual spraying for malaria control in Limpopo: A mathematical modelling approach.

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Malaria is an infectious disease that is transmitted by female mosquitoes of the genus *Anopheles* [1]. Typical symptoms include fatigue, vomiting, headaches and fever with severe cases resulting in seizures, coma, yellow skin or death [21]. Prevention of mosquito bites and mosquito control measures can reduce the risk of disease. Preventative measures mainly consist of the use of insect repellents, mosquito nets, draining standing water and insecticides. A vector control intervention that resulted in a substantial reduction in the number of malaria notification cases is the use of indoor residual spraying (IRS).

IRS is used for malaria control in the low altitude parts of the Limpopo Province in South Africa. Recent studies have pointed out various health risks to those with prolonged exposure to IRS. These include cancer, male infertility, miscarriage, developmental delay, nervous system and liver damage.

We aim to assess the long-term effects of IRS on malaria spread in Limpopo along the matter of health risks posed by exposure to IRS. We propose an SEIR model for the transmission dynamics of malaria in the Limpopo province. The model consists of a system of ordinary differential equations including the intervention IRS. We analyze this model to show its quantitative and qualitative behaviour. The model is further fitted to data to estimate some key parameters related to malaria transmission and health risks.

References

- [1] University of Pretoria Institute for Sustainable Malaria Control — University of Pretoria. <http://www.up.ac.za/up-centre-for-sustainable-malaria-control>. (Accessed on 02/12/2017).