

## Modelling the HIV/AIDS epidemic among injecting drug users and sex workers in Kunming, China

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### ABSTRACT

A model is presented for the HIV/AIDS epidemic in Kunming, the provincial capital of Yunnan, China. It divides the population in several groups, allows individuals to change group, considers two transmission ways of HIV—needle sharing between injecting drug users (IDUs) and sex between female sex workers (FSWs) and clients—and takes into account the variability of the incubation period from HIV to AIDS. Parameters are chosen to fit data from a behavioural surveillance survey made during the year 2001. The model, a system of partial differential equations of the kind introduced by Kermack and McKendrick, is then simulated starting in 1990 until the end of 2004. Some mathematical properties— in particular the epidemic threshold  $R_0$  which determines the goal of public-health interventions— are also presented. Though the model couples two ways of transmission of HIV by including a risky group of clients who are also IDUs, the approximation for the basic reproduction number  $R_0 \simeq \max\{R_0^{IDU}, R_0^{sex}\}$  appears to be quite good.

**Key Words:** HIV/AIDS, Kermack-McKendrick epidemic model, threshold, China

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