

Topic: Health, Morbidity and Mortality: Jon Anson

AIDS in Sub-Saharan Africa: the role of initial conditions in shaping AIDS trajectories

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Abstract

What are the factors that make patterns of HIV/AIDS spread in Sub-Saharan Africa so widely different ? An explaining factor that, comparatively to others, has been less investigated is path-dependency, i.e. the role played by initial conditions in shaping the height of the epidemics trajectories. In this paper we aim to provide new light on this issue by investigating the manner in which the distribution of initial infective seeds that existed at the very early times of the HIV epidemics might have affected the height of the initial exponential phase of the epidemics. The height of the initial exponential phase has a natural counterpart in classical stable population theory, where the concept of stable equivalent denotes the height of Lotka's asymptotic stable trajectory. Under standard assumptions most epidemiological models exhibit indeed, provided a suitable threshold condition is met, an early phase of stable exponential growth, which emerges when transients have disappeared, and has the same features as Lotka's stable growth regime of a population. Several works in the literature have been devoted to the investigation of the features of the "intrinsic rate of growth of HIV". Here we investigate (analytically and numerically) the features of the "stable equivalent of HIV" for a hierarchy of "classical" models for the transmission dynamics of HIV in developing countries including the following factors: a) age since infection, b) heterogeneity in levels of sexual activity, c) chronological age. Our substantive question can be formulated as follows: does it make a serious difference for the height of the early exponential phase if the initial infective seed is a very young and highly sexually active individual or not ? Our preliminary results suggest that initial conditions might have played a prominent role in shaping the various HIV/AIDS epidemics in SSAF.