INCUBATION-TIME DISTRIBUTION IN BACK-CALCULATION APPLIED TO HIV/AIDS DATA IN INDIA

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ABSTRACT. In this article, HIV incidence density is estimated from prevalence data and then used together with reported cases of AIDS to estimate incubation-time distribution. We used the deconvolution technique and the maximum-likelihood method to estimate parameters. The effect of truncation in hazard was also examined. The mean and standard deviation obtained with the Weibull assumption were 12.9 and 3.0 years, respectively. The estimation seemed useful to investigate the distribution of time between report of HIV infection and that of AIDS development. If we assume truncation, the optimum truncating point was sensitive to the HIV growth assumed. This procedure was applied to US data for validating the results obtained from the Indian data. The results show that method works well.

1. Introduction. Information on accurate population sizes of HIV-infected persons and AIDS cases and the trend of these figures are requisite to the planning of preventive policies and public-health management. Sophisticated statistical models have been developed to facilitate provision of the information. Among the models, a simple extrapolation method is easy to apply and useful for summarizing the trend of the spread of infection, but it is difficult to clarify how long the obtained trend stays unchanged. By comparison, mathematical models of the spread of sexually transmitted diseases use information on sexual behavior in the population to investigate the effect of behavioral change caused by a preventive program. But mathematical models usually require detailed information on sexual behavior in the population, which is not always available. In contrast, the back-calculation method connects infection with HIV and the development of AIDS to incubation-time. Because of to the long incubation period, this method can provide a very reliable prediction of future AIDS development from present HIV data.

Traditionally, back-calculation method is applied to estimate past HIV trends and to predict future AIDS cases by using reported AIDS cases and the assumed...