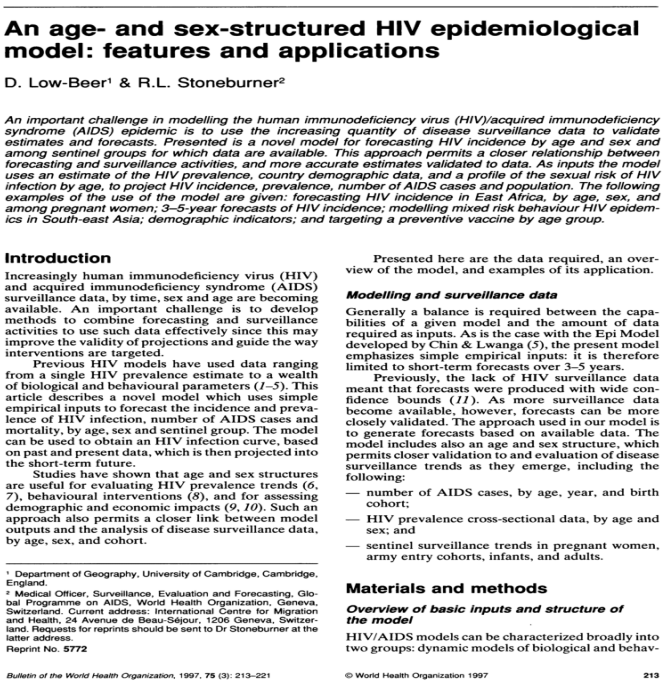
HIV Epidemiology: Models And Methods



An age- and sex-structured HIV epidemiological model: features and applications

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An important challenge in modelling the human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) epidemic is to use the increasing quantity of disease surveillance data to validate estimates and forecasts. Presented is a novel model for forecasting HIV incidence by age and sex and among sentinel groups for which data are available. This approach permits a closer relationship between forecasting and surveillance activities, and more accurate estimates validated to data. As inputs the model uses an estimate of the HIV prevalence, country demographic data, and a profile of the sexual risk of HIV infection by age, to project HIV incidence, prevalence, number of AIDS cases and population. The following examples of the use of the model are given: forecasting HIV incidence in East Africa, by age, sex, and among pregnant women; 3–5-year forecasts of HIV incidence; modelling mixed risk behaviour HIV epidemics in South-east Asia; demographic indicators; and targeting a preventive vaccine by age group.

Introduction

Increasingly human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) surveillance data, by time, sex and age are becoming available. An important challenge is to develop methods to combine forecasting and surveillance activities to use such data effectively since this may improve the validity of projections and guide the way interventions are targeted.

Previous HIV models have used data ranging from a single HIV prevalence estimate to a wealth of biological and behavioural parameters (*1–5*). This article describes a novel model which uses simple empirical inputs to forecast the incidence and prevalence of HIV infection, number of AIDS cases and mortality, by age, sex and sentinel group. The model can be used to obtain an HIV infection curve, based on past and present data, which is then projected into the short-term future.

Studies have shown that age and sex structures are useful for evaluating HIV prevalence trends (*6, 7*), behavioural interventions (*8*), and for assessing demographic and economic impacts (*9, 10*). Such an approach also permits a closer link between model outputs and the analysis of disease surveillance data, by age, sex, and cohort.

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Reprint No. 5772

Bulletin of the World Health Organization, 1997, **75** (3): 213–221

Presented here are the data required, an overview of the model, and examples of its application.

Modelling and surveillance data

Generally a balance is required between the capabilities of a given model and the amount of data required as inputs. As is the case with the Epi Model developed by Chin & Lwanga (*5*), the present model emphasizes simple empirical inputs: it is therefore limited to short-term forecasts over 3–5 years.

Previously, the lack of HIV surveillance data meant that forecasts were produced with wide confidence bounds (*11*). As more surveillance data become available, however, forecasts can be more closely validated. The approach used in our model is to generate forecasts based on available data. The model includes also an age and sex structure, which permits closer validation to and evaluation of disease surveillance trends as they emerge, including the following:

— number of AIDS cases, by age, year, and birth cohort;
— HIV prevalence cross-sectional data, by age and sex; and
— sentinel surveillance trends in pregnant women, army entry cohorts, infants, and adults.

Materials and methods

Overview of basic inputs and structure of the model

HIV/AIDS models can be characterized broadly into two groups: dynamic models of biological and behav-

HIV Epidemiology: Models and Methods. Soto Julio C. Epidemiology: May - Volume 7 - Issue 3 - ppg Book Review: PDF Only.HIV Epidemiology: Models and Methods [Alfredo Nicolosi] on sofoperations.com * FREE* shipping on qualifying offers. This volume provides an overview of the major.Full text. Full text is available as a scanned copy of the original print version. Get a printable copy (PDF file) of the complete article (K), or click on a page.Mike U. Smith, "HIV Epidemiology: Models and Methods. Alfredo Nicolosi," The Quarterly Review of Biology 70, no. 1 (Mar.,): sofoperations.comMETHODS FOR MODELING THE HIV/AIDS EPIDEMIC. IN SUB-SAHARAN AFRICA. Joshua A. Salomon. Emmanuela E. Gakidou. Christopher J.L. Murray.uses an estimate of the HIV prevalence, country demographic data, and a profile and methods. Overview of basic inputs and structure of the model. HIVI AIDS.A brief overview of current trends in the HIV epidemic is followed by a discussion of the HIV Epidemiology: Models and Methods, ed. A Nicolosi, pp. HIV epidemiology: models and methods / editor, Alfredo Nicolosi. Other Creators. Nicolosi, Alfredo. Consiglio nazionale delle ricerche (Italy). Published.Their third model, whose method they called back calculation, used the number of known AIDS cases and an.Statistical models of the HIV infection epidemic in the U.S. which account for the A second method is to develop deterministic models3y4 which take into.Tracking the Epidemic by AIDS Diagnoses and by HIV Test Results .. The third method of projecting AIDS cases is to build dynamic mathematical models that.reliable HIV prevalence data and on assumptions about survival after infection. These methods include, for example, dynamical models, demographic models.An interpolated map of HIV prevalence taken from DHS surveys (conducted which oversees the development of methods to compute the global AIDS statistics. Further validation exercises are being planned for the models and a paper is.In this paper, we review the statistical methods and mathematical models for HIV . Mathematical and Statistical Approaches to AIDS Epidemiology, Volume The equations of the model are delayed differential equations. The method of steps is used in obtaining the bounding functions for the HIV prevalence.Methods. We compared ten model projections of HIV prevalence, HIV incidence, and antiretroviral therapy (ART) coverage for South Africa with estimates from.Contact tracing has been used as a method to control endemic contagious A model of the HIV epidemic allowing for contact tracing would help evaluate the.This book is the first to introduce state space models for the HIV epidemic. Statistical Modeling of the HIV Epidemic; The Backcalculation Method for the HIV .the current state of HIV/AIDS epidemic and prediction of its future. path throughout modeling the transmission processes for short. -. term and.1 2 Methods of estimating and projecting HIV/AIDS. 5. 1 3 The Irish situation. 9. 1 4 The history of mathematical modelling/epidemiology. 1 5 Scope of thesis.Much of our knowledge of the epidemiology and demography of HIV Methods: We adapt an epidemographic model of a population affected.Another set of assumptions in a model Examples of parameters include the probability of

HIV transmission per sex act for an standard robust biostatistical methods.One of the salient features of these methods is that they preserve positivity of the solution which is very essential while studying epidemiological models. We also .