FOREWORD

The disease that came to be called acquired immunodeficiency syndrome (AIDS) was first identified in the summer of 1981. By that time, nearly 100,000 persons in the United States may have been infected with human immunodeficiency virus (HIV). By the time the routes of transmission were clearly identified and HIV was established as the cause of AIDS in 1983, over 300,000 people may have been infected. That number has continued to increase, with approximately 1,000,000 Americans believed to be infected in 1991. The epidemic is of great public health concern because HIV is infectious, causes severe morbidity and death in most if not all of those infected, and often occurs in relatively young persons. In addition, the cost of medical care for a person with HIV disease is high, and the medical care needs of HIV–infected persons place a severe burden on the medical care systems in many areas.

Understanding and controlling the HIV epidemic is a particularly difficult challenge. The long and variable period between HIV infection and clinical disease makes it difficult both to forecast the future magnitude of the epidemic, which is important for health care planning, and to estimate the number infected in the last several years, which is important for monitoring the current status of the epidemic. Furthermore, because the common routes of HIV transmission (nonmonogamous sexual contact (both homosexual and heterosexual), and needle–sharing by injecting drug users) evoke controversy, it has been difficult to gather information about the prevalence of behaviors that result in high risk for HIV transmission. In such a situation, mathematical and statistical modeling are especially important.

The work in this monograph represents a major contribution to the mathematical modeling of the HIV epidemic. The authors have carefully organized and used the known relevant information. They draw important qualitative conclusions, including identifying factors that affect the spread of HIV in a population and emphasizing the importance of social structure in that spread. These conclusions provide guidance on what data are most important for understanding the spread of HIV. The authors also demonstrate that, if enough reliable data are available (such as in San Francisco), mathematical models can help us understand the historical dynamics of the HIV epidemic and the factors affecting it. Appropriate modifications of this model could help public health officials decide which behavior modifications are most promising in controlling the epidemic.

Our discussions with the authors during their work on this project emphasized to us how hard it is to formulate, implement and evaluate a good mathematical model for HIV transmission and disease. A great deal of information must be incorporated, and reliable estimates are still needed for some important parameters. Model predictions need to be validated with external information, such as the results of seroprevalence surveys, before quantitative results can be regarded as reliable. We thank the authors for their contribution to our understanding of the HIV epidemic and for the many discussions that helped clarify our understanding of this epidemic.

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