Case Studies in Applied Epidemiology
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Designing an HIV Surveillance System

Student's Guide

Learning Objectives
After completing this case study, the participant should be able to:

- Describe the steps and procedures involved in designing a comprehensive integrated HIV surveillance system,
- Identify appropriate sentinel sites and populations that reflect different geographic sub- groups (urban/rural),
- Select appropriate laboratory tests and algorithms for the HIV serosurveillance, and
- Design a data collection form for a HIV serosurveillance system.

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PART I

Eburnea is a country in West Africa with a population of 16,000,000 inhabitants and an estimated HIV prevalence in the general population of 10%. In 2001, the government decided to strengthen its national HIV/AIDS detection and control strategies. Since 1997, it had conducted surveillance through an annual HIV sentinel serosurveillance program, in which women attending antenatal clinics in the capital cities of all 10 regions of the country underwent anonymous unlinked HIV testing.

Question 1: What is sentinel surveillance? What is an HIV sentinel serosurveillance system?

Question 2: What are the main advantages and disadvantages of sentinel surveillance?

A new ministry devoted to HIV/AIDS control has recently been established. One department in the new ministry has primary responsibility for revising the existing surveillance system or establishing a new one to better estimate the prevalence of HIV and sexually transmitted infections (STI) throughout the country, to identify appropriate target areas for focused intervention efforts, and to better assess the impact of prevention programs on behavior change. One obvious aspect of the system that will need improvement and expansion is surveillance in rural areas.

Question 3: Summarize the steps in designing a comprehensive HIV/AIDS surveillance system

Question 4: List some of the objectives of a new, improved HIV/AIDS surveillance system.

Some colleagues in the department suggest that a population-based serosurvey might make more sense than sentinel serosurveillance in rural areas.

Question 5: Discuss the advantages and disadvantages of population-based serosurveys and sentinel serosurveillance in a rural setting.

Question 6: Which method would you select?

PART II

The department decided to use a sentinel surveillance system in the rural areas because it is easier to implement and less costly than a population-based serosurvey, and because it would build the local capacity for further decentralization of this activity. One decision that needs to be made is which sentinel sites to use, and how to select those sites.

Question 7: Define the criteria you would use to select sentinel sites and populations reflective of urban and rural areas.

Question 8: Identify the key persons that you would involve in
a. The planning phase
b. The operational phase

Eburnea has 15 regions and 61 health districts. After consultation with your colleagues, you decide to develop and pilot test the serosurveillance system in one district in a randomly selected region. The selected region has a total population of 2 million in five districts. The selected district has a health care system with one district general hospital, one big mission hospital and three rural health centers. The district has no private midwives and no organized system of traditional birth attendants. One antenatal care clinic (ANC) runs daily at the district general hospital. None of the other health facilities provides ANC or delivery services. The rural health center has one tuberculosis treatment center, and the district general hospital operates a STI clinic and blood transfusion services.

Question 9: What sentinel populations might you use for the serosurveillance system?

Question 10: What sampling strategy might you use in selecting the sentinel sites and populations for the pilot district?

Question 11: What factors influence the sample size you will need? What levels of these factors would you use in the sample size calculations?

Laboratory facilities for the serological diagnosis of HIV using EIA are available in each regional capital city and in the national capital. The current ("standard") algorithm uses two ELISA tests from different manufacturers performed in parallel, and a monospecific ELISA test for serotyping. HIV seropositivity and type- specific diagnosis for HIV-1 and HIV-2 are determined by reactivity in ELISA tests; indeterminate ELISA tests undergo Western Blot testing. This algorithm has high sensitivity and specificity. It can be implemented in all the regional hospitals but not in the district health centers. The standard algorithm provides results in one to two weeks.

An alternative algorithm using rapid tests has been evaluated in the national capital. This algorithm also has high sensitivity and specificity, and a similar cost ($2 per sample tested) as the standard ELISA algorithm, but a turnaround time of one hour.

Question 12: Would you use the same or different tests for urban versus rural geographic areas? Why or why not?

You have recently attended a workshop on second-generation HIV surveillance. This emphasizes the use of behavioral as well as biological surveillance indicators. In designing your surveillance system, you wish to include the concepts that you learned in this workshop.

Question 13: What information would you collect?

Conclusion

[Need]

Additional Reading

[Need some suggestions]