CHAPTER 15

Surveillance

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Surveillance

Introduction
This chapter provides recommendations for developing an STD surveillance system, which collects basic information on the frequency and distribution of diseases as well as population patterns. This data is important when planning and monitoring an STD program.

Objectives of STD Surveillance
The main objectives are the following:
- Estimate the STD problem's magnitude; define needed resources, raise awareness and gather support.
- Measure frequency, distribution and antimicrobial sensitivity; define and monitor procedures.
- Monitor trends, reinforce political support, monitor and improve the existing program.

Types of Surveillance
In general, there are three types of disease surveillance:
- Passive surveillance can be useful in reporting STD sequelae, indicating health-care procedural failures, but does not provide information needed to plan and monitor programs; passive systems should be incorporated into more reliable and cost-effective surveillance systems.
- Enhanced surveillance in sentinel sites and populations involves cooperation and systematic data collection from a limited number of facilities, leading to higher quality and more consistent information.
- Specific surveys are the most cost-effective measure for determining prevalence of STDs in specific population subgroups, the distribution of pathogens causing typical syndromes, drug sensitivity patterns of common STD pathogens, and case management practices of health-care providers.

Implementation of STD Surveillance
There are two different types of surveillance data needed to monitor an STD program:
- Data to monitor the magnitude and regional distribution of STDs or STD syndromes
- Data to define and monitor effective diagnostic and therapeutic procedures
The following principles apply to both types:

- **Feasibility.** The STD surveillance has to be adapted to a health system's structure and capacity.
- **Continuity.** Changes in data collection methods should be kept to a minimum to accurately assess trends over time.
- **Standardization.** If the information is to be meaningful, standardized procedures must be used to collect data.
- **Confidentiality.** A breach in confidentiality, a basic principle of medicine, will deter patients from seeking health care.
- **Consistency.** Consistent data collection is critical and requires complete cooperation from health-care workers.
- **Feedback.** It is important that timely feedback (through meetings, newsletters, etc.) be provided to health-care workers.

### Monitoring the Magnitude and Regional Distribution

To obtain meaningful results, only major clinics with a good coverage of the respective catchment population should be selected as sentinel sites. Systematic data collection should be based on syndromes such as discharge or genital ulcers, and clear case definitions have to be developed.

### Data for the Development and Monitoring of Case Management Procedures

The information that is needed to develop and monitor case management procedures includes data about the relative frequency of the different STD pathogens, about their antimicrobial sensitivity and about management of STD patients by health-care providers.

### Data Analysis and Feedback

To control for general changes in health-care-seeking behavior, data analysis should include trends in the number of patients with STDs or specific syndromes, and the rates of these patients compared to the total number of attendances.

### Guidelines for the Interpretation of the Results

As a program's STD services improve, it can be expected that more STD patients will be attracted to it and the number of reports will increase. This, then, would reflect the program's implementation and not an increase in STD incidence in the community. This is one of many factors to be considered when interpreting data, so as not to lead to inaccurate conclusions.
F or several decades, in many developing countries, sexually transmitted infections and diseases (STDs) caused by bacterial mycotic and protozoal agents have ranked among the top five diseases for which adults seek health-care services. STDs and HIV have been found to be the second most important cause for the overall disease burden in young adult women (15 to 44 years of age) in the developing world. The control of STDs pose a serious challenge and create an urgent need for countries to design, implement, monitor and improve public health programs for STD prevention and control.

Basic information on the frequency and distribution of diseases as well as patterns in the population are critical when planning and monitoring an STD program. Such data is collected by a disease surveillance system, which includes both specific studies and ongoing routine surveillance activities.

This chapter provides recommendations for the development of STD surveillance systems as part of national STD control programs. The guidelines discuss the basic strategies of STD surveillance for adaptation to the country-specific situations.
OBJECTIVES OF STD SURVEILLANCE

The main objectives of STD surveillance are:

- Estimating the magnitude of the STD problem: to define the resources needed and raise awareness in decision makers to obtain the necessary support (advocacy)
- Measuring frequency, distribution and antimicrobial sensitivity of STD pathogens: to define and monitor effective diagnostic and therapeutic procedures
- Monitoring trends, to reinforce political support, and to monitor and improve the existing program

In most areas, etiologic diagnosis of STDs is not possible due to limited laboratory resources. Consequently, the management of a patient is usually based on the recognition of the syndrome and other factors such as risk assessment (see Chapter 8). The decision on treatment schemes for the syndromic approach must be based on information about the frequency of the different pathogens in the population served.

Drug resistant strains are an increasing problem in many areas (penicillinase producing *Neisseria gonorhoeae* strains are the cause of up to 80 percent of all gonorrhea cases in some areas). Therefore, resistance patterns and the expected number of cases have to be taken into account when deciding on STD treatment and when planning on drug supplies (see Chapters 7 and 12).

The link between disease distribution and antimicrobial sensitivity data and STD management decisions is obvious and well accepted. However, often health-care providers forget that support by decision makers and, consequently, the availability of resources are critical to the situation's improvement. This includes the strengthening of health-care facilities (staff and diagnostic resources), a consistent supply with effective drugs and training for health-care providers. It is also important to monitor the program in order to reinforce, support and strengthen it.

Additional data are needed to monitor behavior changes and program implementation activities. This might mean periodic surveys on health-care-seeking behavior or monitoring condom distribution or training of health-care providers. This additional data complements surveillance data (see Table 1 on the following page). For example, in many countries a substantial number of patients with an STD seek health care outside the established public sector health facilities. If there is no information about changes in health-care-seeking (e.g., due to the improvement of the services), the collected data on STD cases cannot be interpreted.
### Table 1

**INFORMATION NEEDED FOR STD PROGRAM MANAGEMENT**

<table>
<thead>
<tr>
<th>STD management problem</th>
<th>Information needed</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocacy</td>
<td>☀ Information about the magnitude of the problem</td>
<td>Review of existing data, Rapid assessment studies, Specific surveys</td>
</tr>
<tr>
<td></td>
<td>☀ Magnitude of the problem, regional distribution (epicentres)</td>
<td>Review of existing data, Rapid assessment studies, Behavioral studies</td>
</tr>
<tr>
<td>Case management</td>
<td>☀ Identification of high risk populations</td>
<td>Review of existing data, Specific surveys</td>
</tr>
<tr>
<td></td>
<td>☀ Health care seeking behavior</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
<tr>
<td></td>
<td>☀ Health providers behavior</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
<tr>
<td></td>
<td>☀ Importance of non public sector</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
<tr>
<td></td>
<td>☀ Effective diagnostic and treatment procedures</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
<tr>
<td></td>
<td>☀ Frequency of the different pathogens in the different areas/populations</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
<tr>
<td></td>
<td>☀ Drug resistance patterns</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
<tr>
<td></td>
<td>☀ Information about trends over time (frequency and distribution of STD, health-care-seeking behavior)</td>
<td>Specific surveys, Routine surveillance, Behavioral studies</td>
</tr>
<tr>
<td>Primary prevention/education</td>
<td>☀ Distribution of diseases by sex, age, and region</td>
<td>Review of existing data, Rapid assessment studies, Specific surveys</td>
</tr>
<tr>
<td></td>
<td>☀ Identification of high risk populations</td>
<td>Review of existing data, Specific surveys</td>
</tr>
<tr>
<td></td>
<td>☀ Identification of behavioral determinants</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
<tr>
<td></td>
<td>☀ Information about trends in risk behavior and the frequency of STD</td>
<td>Review of existing data, Behavioral studies</td>
</tr>
</tbody>
</table>

- Information about the frequency and distribution of STD (including distribution of pathogens and drug sensitivity)
- Health services and behavioral studies (health care seeking behavior, risk behavior, behavioral determinants)

Specific surveys/rapid assessment studies include: studies on the distribution and frequency of pathogens, syndromes, drug resistance.

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**TYPES OF SURVEILLANCE**

In general, there are three types of disease surveillance:

- Passive surveillance
- Enhanced surveillance in sentinel sites and populations
- Specific surveys

(Table 2 provides an overview of the methods, advantages and disadvantages of the different surveillance systems.)

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**PASSIVE SURVEILLANCE**

Required by law in many countries, routine case reporting by health facilities of specific STDs is an example of classic surveillance. In theory, such a system yields a precise overview about STD prevalence as well as basic sociodemographic data. However, there are major deficiencies in passive surveillance systems. In countries with limited resources, the proportion of
### Table 2:
**Key Points About the Different Types of STD Surveillance**

<table>
<thead>
<tr>
<th>Study Population</th>
<th>Passive Surveys: Routine Disease Notification</th>
<th>Enhanced Surveillance: Sentinel Sites/Populations</th>
<th>Specific Surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Selected sites such as:</td>
<td>Sero-surveys</td>
<td>Random, or special samples</td>
</tr>
<tr>
<td></td>
<td>- antenatal care units</td>
<td>Studies on drug sensitivity</td>
<td></td>
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<tr>
<td></td>
<td>- family planning centers</td>
<td>Risk assessment studies, Behavioral studies</td>
<td></td>
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<tr>
<td></td>
<td>- blood banks</td>
<td>Outreach</td>
<td></td>
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<td></td>
<td>- military</td>
<td>Health-care-seeking behavior</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- primary health care clinics</td>
<td>Point prevalence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- GYN clinics</td>
<td>Rapid assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- STD clinics</td>
<td>Patterns of pathogens</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Specific laboratories</td>
<td>Drug sensitivity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health care seeking/risk behavior</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Methods</strong></td>
<td><strong>Information obtained</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Case notification</td>
<td><strong>Advantages</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Disadvantages</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Information obtained</strong></td>
<td><strong>Cost-benefit</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Measurement of prevalence and incidence in the entire population</td>
<td>Manageable</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Strategies</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Measurement of magnitude</td>
<td><strong>Recommendations</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Sentinel surveillance is an appropriate tool for the surveillance of STD with a high cost-benefit rate. The sentinel sites with well trained staff and good resources can serve as reference centers in the respective regions.</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Useful for rare diseases with a simple, clear, and unequivocal case definition, if there is a high probability that a person with such a disease would be seen at some point in a health care facility cooperating with the health authorities. First choice if objective is the eradication of a specific disease (rather than decreasing the incidence)</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Useful to obtain an estimate about frequency and distribution of STD in a given population. Can complement and evaluate other surveillance activities.</strong></td>
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<tr>
<td></td>
<td></td>
<td><strong>Useful to obtain an estimate about frequency and distribution of STD in a given population. Can complement and evaluate other surveillance activities.</strong></td>
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<tr>
<td></td>
<td></td>
<td><strong>Instrument to measure prevalence in high risk/core groups. Such studies can also facilitate interventions (e.g. education, condom distribution)</strong></td>
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</tbody>
</table>
STD cases reported to the respective health authorities is low due to underdetection, misclassification and under reporting.

It is estimated that less than 20 percent of the total number of STD cases are reported. Even more important, reporting is not systematic. Quantity and quality of the reports are irregular and the population covered by the system, the denominator, is usually unknown and may change substantially. Therefore, it may be impossible to extrapolate or generalize from the available data, and neither information on the magnitude or trends over time can be derived from it. As such, these surveillance systems do not yield useful managerial data for STD control programs.

Passive disease surveillance is used to monitor relatively rare sequelae of diseases that result from failures of the health-care system (e.g., due to limited resources in diagnostics or drugs). In this situation, passive case reporting is used to detect as many failures as possible to indicate the system's performance rather than to measure the incidence of the underlying disease, serving as a useful tool for improving the program. For example, congenital syphilis is a relatively rare complication of active syphilis in pregnant women. But it can be completely prevented if all pregnant women are screened for syphilis (case detection) and effective treatment is given to those who test positive.

**Passive Surveillance**
- Can be useful for the reporting of sequelae of STDS, indicating failure in health-care procedures (e.g., congenital syphilis)
- Does not yield the information needed for the planning and monitoring of STD control programs
- Existing passive surveillance systems should be incorporated into more reliable and cost-effective surveillance systems

**Enhanced Surveillance in Sentinel Sites and Populations**

In order to plan and monitor a program, reliable estimates of the problem's magnitude and trends over time are needed. It is not necessary to collect data about all cases and all diseases to obtain this information. Sufficiently reliable results can be obtained, assuming that indicator diseases or syndromes and representative facilities or populations can be defined.

There is a major advantage to having an enhanced surveillance system in sentinel sites and populations. Due to active cooperation and systematic data collection from a limited number of facilities, higher quality and more consistent information are obtained. At the same time, the costs of such a system are kept to a minimum because data collection is based on existing resources. However, since a particular site's information only represents the population it serves, sites must be chosen with care and the data must be interpreted with limitations kept in mind.

**Sentinel Sites**

To obtain reliable results, sentinel sites should do the following:
- Represent all geographic areas, both rural and urban
- Include facilities from all sectors that provide STD care
 Sentinel Populations

Another useful source for STD surveillance data are populations that seek health care or visit potential sentinel sites for reasons unrelated to STDs or other specific diseases. One important population group that is both accessible and fairly representative of the general population are pregnant women attending ANC clinics. For the collection of STD surveillance data, this population has the following advantages:

- Most pregnant women attend ANC services at some point during pregnancy (representative sample, little bias).
- STD examinations/testing can be included fairly easily in the routine procedures (costs, consistency).
- Systematic STD screening/case finding and cure have a direct impact on the health of the mothers and their children (elimination of congenital syphilis).
- This population is comparably stable over time (monitoring of trends).

To allow for trend interpretation, the total number of patients seen by a specific facility and the number of diseases or syndromes seen in the same period should be reported. As a rule, this information is collected by sites and is readily available.

Many countries have specialized STD service facilities. Generally well equipped, often they participate in some surveillance activities. These sites can be used to collect information needed for defining diagnostic and treatment schemes, including the distribution of pathogens (etiologic diagnosis) and, in specific surveys, antimicrobial sensitivity. Since the regional variability is limited for the distribution of the common STD pathogens and their antimicrobial sensitivity, the information obtained in a small number of these specialized facilities may be applied to other regions of a country and used for the development of national guidelines. However, these facilities usually cover only a small number of all STD patients. The population covered by these facilities and, thus, the denominators are unknown. Therefore, data collected in these facilities should not be used to estimate the magnitude of the problem or trends over time.

To overcome these problems, facilities delivering general health care such as primary health-care (PHC) centers or general outpatient departments (OPD) should be included in the sentinel system. In countries where many patients seek health care in the private sector, these facilities should be included if possible.

However, including private sector health-care sites/providers in a disease surveillance system may be difficult. In a country with a weak public health system, many patients seek health care in the unaccredited sector. As a result, it may be very difficult to obtain reliable results for the total population. But, if basic information on health-care seeking behavior is available that can assess the underestimation, such a system can still yield meaningful results in interpreting time trends.
SPECIFIC SURVEYS

In addition to disease surveillance from data collected during routine health-care delivery, specific surveys also can be conducted to obtain programmatic information on STD. Such studies are conducted during defined time periods and may be repeated if appropriate.

One way to measure STD prevalence in the general population is by a survey of a random sample of the population that includes STD examinations/testing. Such surveys are extremely difficult to conduct, expensive and may not be acceptable by the population. However, they are increasingly feasible with the availability of urine-based tests and self-administered swabs.

Surveys in specific subgroups of the population may yield useful results for the planning and monitoring of STD control programs. If no reliable information about the magnitude of the problem and the distribution of STDs is available, rapid assessment studies in accessible populations (e.g., pregnant women, PHC clinic attendees) may yield a sufficiently reliable overview within a limited time period and thus the information needed for the planning of an STD program. Such data also can be used to validate existing reporting systems. (Design details for these studies can be found in Appendix 2.)

Besides assessing STDs in the population, specific surveys have to be performed to measure prevalence and incidence in high-risk populations such as CSWs or truck drivers. These populations are usually not seen in general health-care facilities or, if they use the existing facilities, biases in the health-care seeking behavior in these populations are unknown and systematic data collection is not possible. Thus, studies in general health-care facilities will underestimate the overall burden of STD.

Sentinel Surveillance

Surveillance in sentinel sites and populations has the following advantages in STD control programs:

- Cooperation with a limited number of sites allows the systematic and consistent collection of data.
- Flexibility allows for additional studies to be added without changing the basic structure.
- Existing structures (e.g., passive reporting systems, research activities) can be used and strengthened.
- It can be started in a limited number of sites where training, manpower and resources are available.

In order to yield meaningful data, the sentinel sites and populations should do the following:

- Represent the population served by the specific facility
- Be selected thoughtfully
- Represent the different regions and population groups of a country

Special sex workers (CSWs) are underrepresented in this group. In addition, STDs are a major cause of infertility. Since infertile women are not covered by this sample, this also may lead to an underestimation of the real situation. These limitations have to be taken into account when interpreting the results.

Other groups that have been used as sentinel populations are blood donors and military recruits. However, the sociodemographic structure of blood donors is usually not well-known and may vary substantially. Military recruits might not be representative of the larger population due to age, living situation and the recruitment process. The interpretation of the results of STD screening in these populations may be problematic.
Furthermore, intervention strategies that focus on these core groups play an important role in an STD control program. The detection of groups with high prevalence rates and the monitoring of trends may help in defining and evaluating such strategies. However, if there are no structures in place such as special clinics or outreach activities, those structures will have to be developed first and such studies will not be part of regular disease surveillance activities.

In areas where etiologic diagnosis of STDs is difficult due to limited resources and the diagnosis of STDs is made on the basis of typical syndromes, specific studies have to be performed to determine the common pathogens causing the syndromes. This information is critical in developing and monitoring case management recommendations. The same is true for antimicrobial sensitivity of the common pathogens. However, the patterns of pathogens and drug resistance usually do not vary dramatically between neighboring regions or within short periods of time, and it is sufficient if such studies are performed in a limited number of specialized sites once per year or biannually.

In addition to specific studies on STD distribution and the antimicrobial sensitivity of the respective pathogens, behavioral studies may yield important information for interpreting disease surveillance data (health-care seeking) and for the planning and monitoring of primary prevention strategies (risk determinants). However, these studies are usually complex and strongly dependent on the respective societal settings. They will not be discussed in detail in this chapter.

**SPECIFIC SURVEYS**

Specific surveys in limited samples over a limited time period are useful in obtaining a first assessment of the situation. They are the most cost-effective measure for determining the following:

- Prevalence of STDs in specific subgroups of the population
- Distribution of pathogens causing typical syndromes
- Drug sensitivity patterns of common STD pathogens
- Case management practices of health-care providers

These surveys complement ongoing surveillance activities on the frequency of STD in the population.

**IMPLEMENTATION OF STD SURVEILLANCE**

There are two different types of surveillance data needed to monitor an STD program:

- Data to monitor the magnitude and regional distribution of STDs or STD syndromes
- Data to define and monitor effective diagnostic and therapeutic procedures

An STD surveillance system should be an integral part of an STD control program and the data collection should interfere with the routine case management procedures as little as possible. Only essential data should be collected. Ideally, data collected for STD surveillance should be part of the routine case management procedures. In many places, surveillance activities may even be a useful tool to promote and monitor the implementation of standardized case management as part of an STD control program.
RECOMMENDATIONS FOR STD SURVEILLANCE SYSTEMS

- Sentinel surveillance in a limited number of selected sites is the most efficient way to collect the information needed for managerial decisions. Such a system is flexible, and specific surveys can be included if appropriate without interfering with the basic structure. The sentinel sites should represent different regions of sectors that deliver health and STD care.

- The ongoing disease surveillance activities should be complemented by specific surveys, including surveys in target populations such as prostitutes, and surveys for biologic information such as distribution of pathogens and drug sensitivity.

- Existing structures (e.g., cooperation in passive surveillance systems or specific research projects) should be used for the sentinel system if possible.

- STD surveillance should be an integrated part of the STD control program and not stand alone. Only information that can be used for planning and monitoring the program should be collected.

- STD surveillance activities can be used as a tool for training and monitoring the implementation of the STD control program.

Although the type of data and the collection requirements differ for the purposes outlined above, the following principles apply to both:

- **Feasibility.** The STD surveillance has to be adapted to the structure and capacity of the health system in a country, taking into consideration available resources, staff skills and diagnostics. It is better to have a simple system that works than a complex system that does not work. There is often a tendency to increase the volume of data collected on the grounds that the extra information might be useful for some other purpose. This, however, inevitably increases the complexity of reporting forms and the effort required by the reporter. As a result, the chances that reporting will be incomplete because it is considered too cumbersome are increased. Additionally, data management and analysis also may become too complex. If more detailed information is needed, specific studies in selected sites are recommended.

- **Continuity.** To accurately assess trends over time, changes in data collection methods should be kept to a minimum. However, developments in health care might make changes in the surveillance system possible or necessary. Introducing more specific reporting is not a problem. For example, better resources may allow the specific reporting of gonococcal and nongonococcal urethritis instead of urethral discharge. Combining the information on these specific diagnoses will give information on total urethritis patients and allow for comparison to earlier data.

- **Standardization.** It is critical that data be collected using standardized procedures if the information is to be meaningful. Therefore, clear case definitions and training of all data providers are necessary. Procedures should be developed that can be met by all sites and areas in the system, even the weakest ones.

- **Confidentiality.** Everyone involved in health care is bound to the principle of medical confidentiality. A breach in confidentiality will deter patients from seeking health care, and may severely affect the program’s efficacy. The protection of human rights is a critical element of an STD program. Reporting within the surveillance system should be strictly anonymous and can usually be based on aggregated data.

- **Consistency.** Consistent data collection is critical and requires complete cooperation from health-care workers (HCWs). To obtain such cooperation, it is
important that (1) HCWs involved in the reporting system understand the need for the data collection; (2) HCWs are given feedback; (3) the reporting procedures are simple; and (4) responsibilities and lines of communication are clear.

- **Feedback.** Timely feedback to HCWs is critical in any surveillance system. The feedback should include (1) all personnel that are involved in the surveillance system; (2) written material (e.g., a regular newsletter) and (3) personal communication (e.g., regular meetings) to discuss the results and possible problems at all levels.

**MONITORING THE MAGNITUDE AND REGIONAL DISTRIBUTION**

**Site selection**

Specialized STD clinics usually cover only a small proportion of STD patients. Furthermore, the population seen by these facilities, the denominators, is unknown. Thus, data collected there cannot be used to estimate the problem's magnitude and trends over time. To measure STD levels, regional distribution and trends, health-care facilities with a known catchment population should be included in a sentinel surveillance system. These include general outpatient departments (OPDs), primary health-care facilities (PHCs) and, in some countries, general practitioners (GPs). Although it is often quite difficult to include the private sector in sentinel surveillance, the possibility of enrolling such facilities should be explored. In addition, the issue of motivating individuals in this part of the health-care system should be addressed.

Antenatal care clinics (ANCs) are an important source for data collection. Most pregnant women attend ANC services at some point during pregnancy and, consequently, are fairly representative of low-risk sexually active women. Since this population is relatively stable, its surveillance allows for the interpretation of STD incidence trends.

Criteria for selecting the respective sites include location, staff training level, degree of commitment by health-care providers and patient load. To obtain meaningful results, only major clinics with a good coverage of the respective catchment population should be selected as sentinel sites. In general, the total patient load of a selected site should exceed 1,000 patients per month. Since some sites cover much larger patient populations, it might be necessary to follow a predefined sampling scheme for reporting (e.g., every first and third week of the month). However, for consistent results it might be better and easier to collect the data on an ongoing basis.

One of the major advantages of sentinel surveillance is that once the principal procedures have been defined, data collection can begin in a very limited number of sites. Other sites can be added gradually after staff have been adequately trained, the necessary resources have been made available and cooperation with the health authorities have been established.

The selected sites should be located in different areas of the country. At a minimum, they should include at least one primary health-care facility and one antenatal care facility in both an urban and a rural area. With advances in the program, the number of sites can be increased gradually until all major regions of a country are covered, without interfering with the basic structure of the system.

However, the system should only be expanded if the infrastructure at all levels (including data collection and analysis at the central level), channels of communication and feedback are available. Delays in the flow of information due to work overload or a weak structure will discourage the data providers and lead to inconsistencies in the system.
Data collection

In most countries, the diagnostic and laboratory resources are very limited in health-care facilities. Thus, the diagnosis of STDs is usually based on recognizing syndromes such as discharge or genital ulcers. Systematic data collection should be based on these syndromes and clear-case definitions (algorithms for the syndromic approach) have to be developed.

In facilities where more detailed diagnosis is possible (e.g., distinguishing between gonococcal urethritis and nongonococcal urethritis instead of the broad urethral discharge diagnosis), data collection should be performed so that the most basic information can be derived as the common denominator, in this case combining both forms of urethritis into the category of urethral discharge.

In general, basic patterns in disease distribution can be recognized sufficiently through stratification by sex and two age groups. In Appendix I, samples of tally sheets are included that allow the data to be collected by the health-care provider without the need for any additional infrastructure. For each patient with an STD or with the respective syndrome a tick (checkmark in a box on a card) is made in the respective field. To make sure that rates can be calculated accurately, only the first visit of a patient with a specific syndrome should be marked as such. If a patient is diagnosed with more than one syndrome, a tick should be made for each diagnosis. This may lead to a slight overestimation of the problem. However, it will yield a more reliable estimate about the frequency and trends of the different diseases. At the end of a month the respective fields are summed up and the totals are transferred to the summary sheet. To estimate caseload attributable to STDs, the total number of patients seen in the respective period also should be marked. The same tally sheets could be used to collect the information out of patient records at a central point within a specific facility.

The tally sheets are examples of how surveillance data can be collected simply and systematically. The syndrome and age groupings included in the surveillance system may have to be adapted to the specific situation in a country. If more detailed information is required, the data should be collected in specific surveys that do not interfere with routine surveillance procedures.

The systematic collection of syphilis screening results among antenatal clinic women is a useful measure for monitoring syphilis rates in sexually active women. An example of a tally sheet is included in Appendix I. Similar to surveillance in a primary health-care setting, only the first test during a pregnancy should be considered, assuming more than one test is performed during the pregnancy. Since this group is fairly representative of the general female population, routine case findings of other STDs (e.g., gonorrhea, chlamydial infection or trichomoniasis) may yield reliable information about the overall impact of STDs in the population (including asymptomatic infections).

However, routine case findings of these diseases as an ongoing activity is usually not possible due to limited laboratory resources and lack of trained personnel. In such a case it may be useful to perform specific studies on a sample of women once a year or less frequently.

If routine case finding and treatment of syphilis in pregnant women are part of a national program (e.g., STD control program, maternal and child health (MCH) program, control/elimination of congenital syphilis), universal case reporting of congenital syphilis may yield useful information on the performance of health-care procedures and how well the specific program has been implemented. However, these data are not useful in measuring magnitude and trends in active syphilis.

Data for the Development and Monitoring of Case Management Procedures

The information that is needed to develop and monitor case management procedures includes data about the relative frequency of the different STD pathogens, about their antimicrobial sensitivity and
about management of STD patients by health-care providers. It is obvious that biologic data can only be collected in facilities where etiologic diagnosis and drug sensitivity testing are possible. This is usually the case in specialized STD facilities and reference centers.

Site selection

There is limited variability between neighboring regions in the basic distribution patterns of different diseases and antimicrobial sensitivity of the respective pathogens. Therefore, for programmatic decisions (development and monitoring of national diagnostic and treatment guidelines), it is sufficient to conduct the necessary studies in a very limited number of facilities. If possible, one reference center in each major metropolitan area of a country should be included in the surveillance system. The criteria for the selection of the sites for data collection include the resource availability, staff training, health-care worker commitment, and patient workload.

Data collection

Distribution of STD pathogen

If specialized STD centers are in place where etiologic diagnosis of STDs is performed with all patients, the systematic collection of the data can be performed as an ongoing surveillance activity. This is similar to the data collection in primary health-care facilities. An example of a simple tally sheet for etiologic diagnosis and reporting of specific diseases is included in Appendix I. The disease categories included in such a form may have to be adapted to each country’s situation.

Etiologies of various STD syndromes do not change rapidly or vary widely in regions. Consequently, it is sufficient to collect etiologic information with specific surveys once a year or less frequently.

Testing of antimicrobial sensitivity of common STD pathogens

Testing of antimicrobial sensitivity should be performed in Neisseria gonorrhoeae isolates since drug resistance has been reported to be common in this pathogen (see Chapter 12). Drug resistance is also common in Haemophilus ducreyi, but antibiotic susceptibility testing is quite difficult.

DATA ANALYSIS AND FEEDBACK

The data should be communicated monthly to the respective health authority using prepared forms and clearly defined reporting lines. Analysis of the data should be performed in regular intervals at both the local/regional and central levels. To control for general changes in health-care-seeking behavior, data analysis should include trends in the numbers of patients with STDs or specific syndromes and the rates of these patients compared to the total number of attendances. The analysis should be performed separately for each type of facility. To obtain background information that may help in interpreting the results, close cooperation with the data providers is essential. For example, changes in service may be the reason for an increase in the number of attendances. Some examples for data analysis and results interpretation are given below.

To renew motivation and obtain the cooperation of health-care providers, regular feedback is a critical part of any surveillance system. Only if personnel understand the purpose of collecting information can consistent reporting be achieved. In addition to printed materials such as quarterly newsletters, regular meetings with the personnel at all levels to discuss problems should be an integral part of surveillance activities. Such meetings are also a useful tool in monitoring the program implementation. They may further motivate health-care workers and yield information needed to make changes in the program.

In addition to this “center-periphery” feedback, activities within the different sites can help personnel involved in the reporting procedures to become more motivated.
For example, displaying bar charts is a good way to show that data is used and that everybody is working to meet the objective of monitoring the program activities. The bar charts should include the number of STD patients and the distribution of the diseases in the population served. They also may include the number of treatments given or the distribution by sex and age group, etc. The bar charts should be updated monthly (an example is shown below).

GUIDELINES FOR THE INTERPRETATION OF THE RESULTS

Two major objectives of an STD program are to improve STD services and promote health-care seeking behavior in populations at risk for an STD. Therefore, it can be expected that more STD patients will be attracted to the improved STD services, and the number of reports will increase initially. This increase in STD patients would reflect the program's implementation and not an increase in STD incidence in the community.

In the following section, examples of observed trends in STD surveillance data are given for different scenarios. The figures are meant to show typical developments. The scales for the number of STD cases and total number of attendances are chosen arbitrarily and will differ for specific countries.

Scenario 1: Rural primary health-care (PHC) center after introduction of integrated STD care using the syndromic approach.

The data are collected using the STD monthly tally sheet. The number of total attendances per month is depicted in the solid line; the number of initial visits of depicted in the dashed line. The bars "patients (with STD syndromes) per month" is illustrative of the rate of STD patients/total attendances.
As can be seen, the number of attendances increased initially due to an increase in the number of STD patients, followed by a decrease in both lines at different rates. The initial increase could be explained by improved services in the facility (e.g., effective treatment, longer hours) and changes in the health-care seeking of the patients at risk for STDs. The following decrease will first reflect the decrease of STD patients in the community due to the effective cure of patients with an STD, and in the medium term be an indicator for a real decrease in the incidence due to an effective program. The decrease in the prevalence/incidence of STDs in the population served by this facility is shown by a decreasing rate (STD patients/total number of attendances) of STD patients (bars).

**Scenario 2:** Periurban ANC clinic after the introduction of routine syphilis case-finding and treatment.

The data are collected using the respective tally sheet. The lighter solid line reflects the total number of pregnant women per month visiting the facility. The total number of syphilis screening tests and the number of positive tests are depicted in the small-dashed and large-dashed lines, respectively. The number of congenital syphilis cases during the same period is indicated by the dark solid line.

As to be expected for an ANC clinic with high coverage of the population, there was no major change in the total number of attendances over time. Due to the implementation of the STD program, the number of performed RPR/VDRL tests increased initially until a relatively complete coverage had been achieved. The effective case finding and treatment of all women with positive syphilis serology, and the education of the women and their partners (where possible), led to a slow but steady decline in the number of women with active syphilis. The number of congenital syphilis cases declined at the same rate as RPR/VDRL screening was introduced. Little or no decline in the number of congenital syphilis cases with complete coverage of pregnant women with syphilis-screening tests would indicate ineffective treatment (e.g., drugs are unavailable, diagnosis and treatment are not provided during the first visit or the women are not returning for results and treatment).

**Scenario 3a and 3b:** Specialized STD clinic in an urban center after implementing a national STD control program.

Data are collected using the respective tally sheets. Two developments that can occur after an effective STD control program is implemented are depicted. In scenario 3a, the improvement of services (e.g., due to longer clinic hours, better training of personnel and the inclusion of counseling) increased community acceptance of the clinic and led to a clear increase in the number of STD patients per month. In scenario 3b, the decrease of patients could be due to a smaller number of referred patients from a nearby PHC center, whose staff were trained recently to treat STDs using the syndromic approach. Such changes in health-care procedures have to be taken into account when interpreting the results from a specific facility.
Scenario 3a and 3b

Data are collected using the respective tally sheet. As can be seen, the number of patients with an STD syndrome increased, initially for patients with genital ulcers as well as those with discharge. This development may be due to an increase of STD patients following an improvement of services. However, the initial increase is followed by a steady decrease in the number of patients with a genital ulcer, but a second increase in patients with discharge. This development could signal an increase of drug resistant Neisseria gonorrhoeae strains.

Scenario 4: Rural PHC center after introducing integrated STD care using syndromic approach.

The graph shows a typical situation and one that can be seen in other countries. After user fees were introduced in public clinics, the attendance rates for STD patients declined dramatically. Subsequent to resuming free services, the number of patients eventually increased to the original level. Obviously, these trends are "artificial" and not caused by real changes in the prevalence and incidence of STDs in the population.

Scenario 5: STD patients in STD clinic in Nairobi, Kenya, 1988-1991. (This example is taken from a real situation in an urban STD center.)

The graph shows a typical situation and one that can be seen in other countries. After user fees were introduced in public clinics, the attendance rates for STD patients declined dramatically. Subsequent to resuming free services, the number of patients eventually increased to the original level. Obviously, these trends are "artificial" and not caused by real changes in the prevalence and incidence of STDs in the population.


This example is meant to illustrate a variety of complex factors that can influence surveillance data. The graph shows a rapid increase in STD reports from 1967 to 1980. This is followed by a dip in 1982, and then an increase and plateau between 1984 and 1987. After 1987, the number of reports drops dramatically. The major question is whether these trends mirror real changes in STD incidence or whether, and to what degree, other factors may have influenced their development.

To answer this question, additional information has to be considered. The initial increase in STD cases goes along with Thailand's rapid socioeconomic devel-
opment, industrialization with a heavy rural to urban migration and an expansion of the commercial sex industry. All three developments are well-defined factors for the spread of sexually transmitted diseases.

In addition to these socioeconomic factors, the emergence of penicillin-resistant gonorrhea, in the absence of effective and affordable treatment, increased from 7 percent in 1978 to 42 percent in 1981. Thus an increase in STD incidence seems to be quite plausible. However, apart from these socioeconomic, behavioral and biological factors, some of the increase reported after 1974 was artificial, resulting from a growing network of STD clinics and an expanded reporting system. The temporary drop between 1980 and 1984 resulted from major reorganizations in the Ministry of Health and the STD program. Since then, no changes in the system have occurred. Thus, it seems that the trends observed in the reports are based on real changes in the STD incidence. This is also supported by the fact that the dramatic decrease since 1987 parallels massive safer sex campaigns and promotion of condoms in brothels.

Similar decreases have been reported from specific areas where more detailed data collection and analysis were possible. Thus, in all likelihood, the observed decrease in STD reports really reflects a decrease in STD incidence. However, as shown above, trend interpretation must be done very carefully, taking into account a variety of possible factors that can obscure real developments.

Although all the scenarios just outlined show typical situations, other factors also can influence trends in health-care seeking behavior and have some impact on a program's efficacy. Thus, it is important that the results from different sites and studies be seen and interpreted together. However, the collection of additional information (e.g., number of referred patients in an STD clinic compared to patients who were not referred, data on changes in health-care-seeking behavior) might be necessary to accurately interpret observed trends.
**APPENDIX 1**

**Tally Sheets**

**STD Monthly Tally Sheet**

Month: ___________  Year: ___________  Facility: ___________

For each initial visit of a patient with one of the following diagnoses make a tick in the appropriate field: 00000.
Initial visit is defined as the first consultation for an episode in this clinic.

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Age</th>
<th>Initial Visits - Males</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15-24</td>
<td>00000 00000 00000 00000 00000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 25</td>
<td>00000 00000 00000 00000 00000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Age</th>
<th>Initial Visits - Males</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital Ulcer</td>
<td>15-24</td>
<td>00000 00000 00000 00000 00000</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>≥ 25</td>
<td>00000 00000 00000 00000 00000</td>
<td></td>
</tr>
</tbody>
</table>

Total GUD M

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Age</th>
<th>Initial Visits - Males</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal Discharge</td>
<td>15-24</td>
<td>00000 00000 00000 00000 00000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 25</td>
<td>00000 00000 00000 00000 00000</td>
<td></td>
</tr>
</tbody>
</table>

Total Vaginal Discharge

At the beginning of each month sum up the last's month tally sheet(s) and transfer the totals to the monthly summary sheet.
If there has been no patient seen with a specific syndrome, put a zero in the respective total column.

Cut here and send the monthly summary sheet to ________

**STD Monthly Summary Sheet**

Month: ___________  Year: ___________  Facility: ___________

<table>
<thead>
<tr>
<th>Age</th>
<th>Genital Ulcer Males</th>
<th>Urethral Discharge</th>
<th>Genital Ulcer Females</th>
<th>Vaginal Discharge</th>
<th>Total Number of Patients &gt;15 Years Seen in the Clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Males (if possible)</td>
</tr>
<tr>
<td>≥ 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Females (if possible)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

Date: ___________  Signature: ___________
**STD Monthly Tally Sheet (ANC/MCH Facilities)**

Month: _________ Year: _________ Facility: _________

For each initial visit of a patient with one of the following diagnoses make a tick in the appropriate field: 00000. Initial visit is defined as the first consultation for an episode/during pregnancy in this clinic.

<table>
<thead>
<tr>
<th>Age</th>
<th>Initial Visits</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>15-24: 00000 00000 00000 00000 00000 00000 00000 00000</td>
<td></td>
</tr>
<tr>
<td>Syphilis</td>
<td>Serology (RPR/VDRL)</td>
<td></td>
</tr>
<tr>
<td>≥ 25</td>
<td>00000 00000 00000 00000 00000 00000 00000 00000</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total RPR/VDRL positive</strong></td>
<td></td>
</tr>
<tr>
<td>Ophthalmia Neonatorum</td>
<td>00000 00000 00000 00000 00000 00000 00000 00000</td>
<td></td>
</tr>
<tr>
<td>Congenital Syphilis</td>
<td>00000 00000 00000 00000 00000 00000 00000 00000</td>
<td></td>
</tr>
</tbody>
</table>

At the beginning of each month sum up the last’s month tally sheet(s) and transfer the totals to the monthly summary sheet. If there has been no patient seen with a specific disease, put a zero in the respective total column.

Cut here and send the monthly summary sheet to

---

**STD Monthly Tally Sheet (ANC/MCH Facilities)**

Month: _________ Year: _________ Facility: _________

<table>
<thead>
<tr>
<th>Age</th>
<th>Positive RPR/VDRL</th>
<th>Ophthalmia Neonatorum</th>
<th>Congenital Syphilis</th>
<th>Total Number of RPR/VDRL Tests Performed (≥ 15 years)</th>
<th>Total Number of Persons Seen in the Clinic (≥ 15 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date: _________ Signature: _________
STD Monthly Tally Sheet (Etiologic Diagnosis)

Month: ___________  Year: ___________  Facility: ___________

For each initial visit of a patient with one of the following diagnoses make a tick in the appropriate field: 00000.
Initial visit is defined as the first consultation for an episode in this clinic.

<table>
<thead>
<tr>
<th>Syphilis</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Genital 15-24</td>
<td>00000 00000 00000</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Ulcer ≥ 25</td>
<td>00000 00000 00000</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Total Syphilis M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Syphilis F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chancroid</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Males</td>
</tr>
<tr>
<td>Genital 15-24</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Ulcer ≥ 25</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Total Chancroid M</td>
<td></td>
</tr>
<tr>
<td>Total Chancroid F</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herpes genitalis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Males</td>
</tr>
<tr>
<td>Genital 15-24</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Ulcer ≥ 25</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Total Herpes M</td>
<td></td>
</tr>
<tr>
<td>Total Herpes F</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other/Unspecified GUD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Males</td>
</tr>
<tr>
<td>Genital 15-24</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Ulcer ≥ 25</td>
<td>00000 00000 00000</td>
</tr>
<tr>
<td>Total Unspec GUD M</td>
<td></td>
</tr>
<tr>
<td>Total Unspec GUD F</td>
<td></td>
</tr>
</tbody>
</table>

At the beginning of each month sum up the last's month tally sheet(s) and transfer the totals to the monthly summary sheet.
If there has been no patient seen with a specific disease, put a zero in the respective total column.

Cut here and send the monthly summary sheet to ___________

STD Monthly Summary Sheet (Etiologic Diagnosis)

Month: ___________  Year: ___________  Facility: ___________

<table>
<thead>
<tr>
<th>Total Number of Patients ≥ 15 Years Seen in the Clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (if possible)</td>
</tr>
<tr>
<td>Females (if possible)</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Date: ___________  Signature: ___________
APPENDIX 2: ASSESSMENT OF THE EPIDEMIOLOGICAL SITUATION OF STDs

INTRODUCTION

This section outlines methods for collecting over a short time period data on a country’s epidemiological situation in regard to STDs. It does not include methods for assessing STD case management.

For the purpose of developing an STD control program, baseline data on the prevalence and incidence of STDs in a country is necessary. Protocols are outlined here to determine the following:

Protocol 1
- The proportion of adult attendees of health facilities diagnosed with STD or STD syndromes
- The distribution of various STD syndromes among adult attendees of health facilities

Protocol 2
- The proportion of pregnant women attending antenatal clinics with positive serology for syphilis

Protocol 3
- The etiology of common syndromes and the antibiotic sensitivity of N. gonorrhoeae and H. ducreyi, if appropriate

Protocol 4
- The prevalence of gonorrhea, chlamydial infection and trichomoniasis among women seen in health facilities who are not seeking STD care

Protocol 5
- The prevalence of various STDs among high-risk populations

Information obtained using protocols 1, 2, 4 and 5 will show the magnitude of the STD problem and the justification for an STD program. Data obtained using protocols 1 and 2 should have been gathered before the start of the program, but data from protocols 4 and 5 can be obtained as part of the STD program.

Information on the etiology of syndromes and the microbial sensitivity (protocol 3) is needed to establish national guidelines for STD management that will be based on a syndromic approach. This information also can be collected as part of the STD program.

When no data exist and in the absence of the required research capability, data on syndrome prevalence and etiology and antimicrobial sensitivity may be obtained in neighboring countries. Comparisons may be made between similar geographic and social settings. However, as one of the first program implementation steps, every effort should be made to develop the necessary infrastructure for conducting the surveys described in this section.

METHODS

Protocol 1
To determine:
- The proportion of adult attendees of health facilities diagnosed with STD or STD syndromes
- The distribution of various STD syndromes among adult attendees of health facilities
Limitations

There are some limitations to using existing data. First, there is uncertainty about how complete the reporting has been. However, as is the case almost everywhere, it is expected that a surveillance system based on case notification will result in under-reporting.

Second, misclassification may have occurred. For example, there may be reports available on the number of cases of gonorrhea diagnosed in health facilities. As a rule, the diagnosis will have been made clinically and not on gonococcal detection, and the number probably reflects cases of urethral discharge in men. The number of syphilis cases may in fact be the number of patients seen with genital ulceration. Patients presenting with dysuria or vaginal discharge may have been classified as having urinary tract infections or received the diagnosis of “other,” while, in fact, they have an STD.

Furthermore, there is usually under-detection because in most countries there is no case finding for men and women who are not seeking STD care. A severe rate of under-detection occurs due to the fact that many STD patients do not have symptoms or have nonspecific symptoms. However, under-detection also occurs in symptomatic persons seeking STD care due to both the lack of knowledge of STDs among health-care providers and the lack of diagnostic facilities.

Prospective Data Collection

The existing data on the number of persons seeking STD care in health facilities may be insufficient; and/or there may be inadequate data on the prevalence of STD syndromes. For example, there may be data on gonorrhea in males and on urinary tract infection in females, but no data on the total caseload of that health facility.

Even when good data are available, it may be decided that the data needs validation for decision making purposes. Therefore, a survey should be started to collect, prospectively, data on the number of individuals...
who have an STD or an STD syndrome, the total number of patients seen in the health facility and the distribution of syndromes (e.g., genital ulceration in both sexes, urethral discharge in males, vaginal discharge and lower abdominal pain indicating pelvic inflammatory disease in women).

**Results**

Data will provide information on the caseload of patients attending a health facility for STD care, which will represent a percentage of the clinic's total attendances.

\[
\text{PERCENT OF ADULTS DIAGNOSED WITH STD} = \frac{\text{ADULTS DIAGNOSED WITH STD}}{\text{TOTAL NUMBER OF ADULT STD PATIENTS}}
\]

Data will also indicate the distribution of STD syndromes among those seeking STD care. When information is available on other diagnoses made at the facility, it will be possible to assess the rank that STDs have among the diseases for which adults seek treatment (see Example 2).

Data on STD syndrome incidence at the clinic level can be used to estimate the stock of drugs that are required (see Chapter 7). If the study clinics have been representative of the country, the data can be extrapolated into an estimation of the minimum amount of STD drugs needed for the whole public sector.

**EXAMPLE: Assessment of the stock of drugs needed for the treatment of STD syndromes**

In Zimbabwe, STD services are fully integrated at all levels of health-care facilities. It is estimated that nearly 75 percent of all STD patients are managed in the public sector. The estimated drug requirement for this sector is based on the estimated number of STD syndromes which, in turn, stems from the number of...
reported syndromes. (See the Table 1 for the estimated costs of STD drugs in Zimbabwe during 1991.) Based on the figures in Table 1, the reported vaginal discharge cases are much lower than would be expected. This is because a large number of women with vaginal discharge seek help and are treated at primary care and MCH/FP clinics as well as at special gynecology and obstetrics clinics. Most of the time these cases are not reported and therefore not included in the calculations.

Limitations

A limitation of this study is that it may take some time before the health staff is properly trained. Another limitation is that only a small part of the adult population may go to this facility for health care. When most patients seek health care elsewhere (e.g., at non-accredited facilities), the information collected will have a very limited value in describing the magnitude of the STD problem in the country. Therefore, one should choose preferably those clinics with a high coverage of the population and interpret the data in light of the limitations of this type of survey.

Protocol 2

To determine the proportion of pregnant women attending antenatal clinics with positive serology for syphilis

A woman infected with syphilis can transmit the disease to her fetus (see Chapter 9). Without treatment, maternal syphilis may cause abortion, stillbirth, prematurity, the delivery of an infant with clinical signs of congenital syphilis or the delivery of an apparently healthy baby who develops clinical signs of congenital syphilis over the next several months. Congenital syphilis is a serious but totally preventable disease and can be eliminated or reduced to a very low level. If pregnant women are serologically screened and maternal syphilis is adequately treated, the risk to the infant becomes minimal. To determine whether a syphilis case-finding program among pregnant women is justified and affordable, the prevalence of syphilis among pregnant women should be addressed.

Example 2

ASSESSMENT OF STD SYNDROME DISTRIBUTION AND CASELOAD

During a two-month period, 1,500 female and 1,200 male adult attendees were counted.

Women (15 years and older) total number is 1,500

diagnosed with vaginal discharge: 160

diagnosed with genital ulceration: 20

diagnosed with lower abdominal pain: 20

Distribution of STD syndrome among women:

80% vaginal discharge
10% genital ulceration
10% lower abdominal pain

Total STD syndromes diagnosed: 200

The proportion of women having an STD syndrome over the total number of female attendees is 200 divided by 1,500 = 13 percent (for convenience, we neglect here that some women will have more than one syndrome diagnosed during the same attendance).

Other diagnosis:

malaria n = 500 (33%)
upper respiratory disease n = 220 (15%)
lower respiratory disease n = 160 (11%)
tuberculosis n= 15 (1%)
complications of pregnancy n = 100 (7%)
gastroenteritis n = 75 (5%)
skin diseases n = 100 (7%)
ear diseases n = 40 (3%)
dental diseases n = 20 (1%)
other n = 70 (5%)

This means that STDs, which account for 13 percent of the total number of attendances, are among the top three diseases for which adult women seek health care. The main diagnosis made among adult women is malaria; upper respiratory disease is second and STDs third.

Similar calculations can be made for male attendees.
COLLECTION OF EXISTING DATA

First a search should be made for existing data on syphilis serological screening of pregnant women. Potential sources include the Ministry of Health, the Mother and Child Health (MCH) Program, and from multilateral organizations such as the United Nations International Childrens and Education Foundation (UNICEF) and the World Health Organization (WHO), nongovernmental organizations, ANC records and hospital laboratories.

Results

Data collected in this way may give information on the prevalence of reactive syphilis serology among ANC attendees. If ANC records are reviewed, it is also possible to determine the weak points in the current antenatal syphilis screening. For example, the number of tests should be the same as the number of new attendees, assuming all women are screened, and only once during pregnancy. The number of treatments should be the same as the number of seroreactives identified. This sort of analysis was done in Zambia and it identified several areas in their syphilis screening program that needed to be strengthened (see Example 3).

Limitations

There are some limitations to using existing data. First, it is not known how complete or unbiased the syphilis testing has been. In order to conserve test reagents, some health-care providers will only test those women they feel are at risk for syphilis. Some health-care facilities only provide syphilis screening to those women who can pay for the test.

Second, it is sometimes difficult to retrospectively determine if the testing was of good quality and adhered to high standards. If no records were kept, one cannot determine if test controls or quality reagents were used. One should suspect the test quality or a biased sample if the prevalence of reactive syphilis

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Syndromes</th>
<th>Estimated cases</th>
<th>Treatment cost (in USS)</th>
<th>Total cost (in USS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital ulcer</td>
<td>462,270</td>
<td>2.91</td>
<td>1,345,206</td>
</tr>
<tr>
<td>Penicillin allergy</td>
<td>24,330</td>
<td>4.91</td>
<td>119,460</td>
</tr>
<tr>
<td>Urethral discharge</td>
<td>275,000</td>
<td>3.43</td>
<td>943,250</td>
</tr>
<tr>
<td>Vaginal discharge</td>
<td>156,510</td>
<td>4.23</td>
<td>662,037</td>
</tr>
<tr>
<td>Pregnant women with vaginal discharge</td>
<td>17,390</td>
<td>8.69</td>
<td>151,119</td>
</tr>
<tr>
<td>Syphilis seropos. pregnant women</td>
<td>10,500</td>
<td>0.40</td>
<td>4,200</td>
</tr>
<tr>
<td>Neonatal eye prophylaxis</td>
<td>417,800</td>
<td>0.04</td>
<td>16,712</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td>3,241,984</td>
</tr>
</tbody>
</table>

Example 3

SYPHILIS SCREENING IN PREGNANCY, LUSAKA, ZAMBIA

Expected number of pregnant women: 70,000

90 percent attendance

63,000 pregnant women attended ANC at least once. 7,000 pregnant women missed antenatal care.

46 percent were screened: 28,982 women were screened for syphilis and 41,020 missed antenatal care and syphilis screening.

10 percent seroprevalence: 2,398 women were found syphilis seroreactive. In total, 4,102 syphilis positive women missed detection.

25 percent were treated: 724 women were treated. In total, 6,276 syphilis positive women missed treatment.
serology seems too high or too low based on other information. Discussions with clinic nurses and laboratory technicians also may clarify the situation.

**Prospective Data Collection**

If no data are available or if the data are old or seem unreliable, a rapid survey should be started among pregnant women attending antenatal care clinics. In this group of women the proportion of pregnant women with a positive serology for syphilis may be assessed during a short period.

**Study design**

- **Location.** Both urban and rural locations ideally representative of the country, and with a good coverage of the area's pregnant women, should be included in the survey. A minimum of four sites should be included. In order to collect the data in a short time, the study should take place in clinics with a high attendance rate.

- **Study population.** All pregnant women attending these antenatal clinics should be included. Women reattending the clinic during the study period should not be retested as part of this survey.

- **Duration of survey and sample size.** The survey should not take longer than two to three months. During this period a minimum of 300 pregnant women per clinic should be screened. (See Example 4 for the rationale of the sample size.)

- **Data collection.** The serological tests include the *Treponema Pallidum* Haemagglutination Assay (TPHA) test, Rapid Plasma Reagin (RPR) or Venereal Disease Research Laboratory (VDRL) test (see Chapter 12). Since the TPHA stays positive after effective treatment, it provides data on the proportion of women who at some time have been infected with syphilis. The RPR and VDRL tests (nontreponemal screening tests), which become negative alter treatment, provide data on the prevalence of more recent (infectious) syphilis among this population.

Data on the prevalence of treponemal antibodies should be collected by age group (two age groups: 15-24 years and older). The prevalence of a positive TPHA test (with or without positive RPR) in the younger (15-24 yrs.) age group may be regarded as the incidence of syphilis for this reason: Since sexual activity is generally uncommon before adolescence and syphilis is a sexually transmitted disease, it is reasonable to assume that TPHA seropositive women in this age group were recently infected. The prevalence of TPHA seropositive women in this age group therefore reflects the incidence (i.e., new cases) of syphilis.

The RPR and VDRL will only detect a portion of the newly acquired cases, since these tests may have become negative due to previous treatment for syphilis or the use of antibiotics for other reasons. In ages above age 24, a positive TPHA may reflect syphilis acquired in the past that already has been treated effectively. Only in a person with a previously negative TPHA test will it reflect a newly acquired case of syphilis. See Appendix 1 for an example of a surveillance sheet on syphilis screening of pregnant women.

This study will give information on the prevalence of syphilis among the general female population. The number of women with a positive TPHA over the total number of women screened gives the percentage of women who have ever been infected with syphilis. The number of women with a positive RPR over the total number of women screened gives the percentage of women with recent infectious syphilis.

As just explained, the prevalence of TPHA positive women in the age group 15 to 24 years can be regarded as the incidence of syphilis in this age group. Continuation of the screening of pregnant women for recent infectious syphilis by means of the RPR or VDRL tests, and the subsequent treatment of the seropositive women (and their partners) are an essential part of the STD program. They will have an impact on the prevalence and incidence of syphilis in the general population and on the incidence of congenital syphilis.
Example

The Relation Between Sample Size and Prevalence Estimates

Calculation of 95% confidence intervals around a prevalence estimate in ANC attenders who have syphilis serology (TPHA), where a sample of 500 was used, and 50 TPHA positive sera were identified.

The prevalence is 50/500, or 10 percent, therefore \( p = 0.1 \).

The sample size is 500, therefore \( N = 500 \).

For 95% confidence intervals (CI), \( Z = 1.96 \)

\[
CI = p \pm Z \times \left( p \times (1 - p)/N \right)
\]

\[
95\% \ CI = 0.1 \pm 1.96 \times \left( 0.1 \times (1 - 0.1)/500 \right)
\]

\[
= 0.1 \pm 0.26
\]

\[
= 0.074 - 0.126
\]

95% CI = 7.4% - 12.6%

With 95% confidence intervals around a prevalence estimate, the calculated confidence interval is statistically likely in 95 times out of 100 to contain the hypothesized ("true") prevalence of a positive TPHA test in that population at that time.

For surveillance purposes the calculation of confidence intervals around the prevalence estimates can help to determine whether the prevalence at two different moments in time are significantly different (no overlap of the confidence interval of one estimate with a previous estimate), or whether the apparent change in the prevalence estimate is as likely due to the statistical limitations of the study (no real difference). As shown in the table, with a prevalence estimate of 10 percent, the 95 percent CI intervals are larger in smaller samples and smaller in larger sample sizes. In other words, with smaller sample sizes it may be more difficult to show differences in prevalences over time.

<table>
<thead>
<tr>
<th>N Positive</th>
<th>Prevalence</th>
<th>95% CI</th>
<th>Prevalence</th>
<th>95% CI</th>
<th>Prevalence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.0%</td>
<td>0.0 - 3.0</td>
<td>0.2%</td>
<td>0.0 - 0.6</td>
<td>0.1%</td>
<td>0.0 - 0.3</td>
</tr>
<tr>
<td>5</td>
<td>5.0%</td>
<td>0.7 - 9.3</td>
<td>1.0%</td>
<td>0.1 - 1.9</td>
<td>0.5%</td>
<td>0.1 - 0.9</td>
</tr>
<tr>
<td>10</td>
<td>10.0%</td>
<td>4.1 - 14.9</td>
<td>2.0%</td>
<td>0.8 - 3.2</td>
<td>1.0%</td>
<td>0.4 - 1.6</td>
</tr>
<tr>
<td>20</td>
<td>20.0%</td>
<td>12.2 - 27.8</td>
<td>4.0%</td>
<td>2.3 - 5.7</td>
<td>2.0%</td>
<td>1.1 - 2.9</td>
</tr>
<tr>
<td>50</td>
<td>50.0%</td>
<td>40.2 - 59.8</td>
<td>10.0%</td>
<td>7.4 - 12.6</td>
<td>5.0%</td>
<td>3.6 - 6.4</td>
</tr>
<tr>
<td>100</td>
<td>100.0%</td>
<td>100 - 100</td>
<td>20.0%</td>
<td>16.5 - 23.5</td>
<td>10.0%</td>
<td></td>
</tr>
</tbody>
</table>

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Limitations

This survey includes the drawing of a blood sample, which the women may resist. Providing them with good information on the aim of the study may alleviate their concerns. Both the RPR and the VDRL tests can be conducted in the clinic itself, but the TPHA requires a better equipped laboratory, so storing and transportation of the samples will have to be arranged. Training of laboratory staff and quality control of the testing should also be assured prior to starting the survey. When the coverage of pregnant women by this clinic is small, the survey results will have a limited value in estimating the prevalence of syphilis among the general population of pregnant women.

Protocol 3

To determine the aetiology of syndromes and the antibiotic sensitivity of N. gonorrhoeae and H. ducreyi

Collection of Existing Data:

Referral centres: When there are referral centers or special STD clinics, information may be available on: (a) which clinical syndromes are most common, (b) which infectious agents are the most prevalent, and (c) what is the sensitivity of the infectious agents to available antibiotics.

Summary reports may be available in referral centres on the diagnoses. They may include etiologic diagnoses, e.g., syphilis, genital herpes, chancroid or gonorrhea. In that case it is very important to collect information on the diagnostic criteria for such a diagnosis. For example:

- When the diagnosis of gonorrhea is given to every man with to urethral discharge, the number of gonorrhea cases may be equal to the number of cases of urethral discharge.
- When the diagnosis “syphilis” is based on genital ulceration in combination with positive syphilis serology, the diagnoses syphilis, herpes and chancroid may be combined into the syndrome “genital ulceration.”

Also in case of reports on clinical syndromes one should verify the diagnostic criteria used in each facility for those syndromes. When reliable etiologic diagnoses have been made, the relative frequency of etiologic agents causing the syndrome should be assessed: e.g., when all patients with urethral discharge underwent a culture for gonorrhea, The proportion of the urethral discharges that are gonococcal and non-gonococcal can be determined. When cultures for gonorrhea have been taken, there may be some results on the sensitivity of the gonococcal isolates.

Prospective Data Collection:

In existing referral centers, if the sources of information on disease and infection patterns and antibiotic susceptibility of infectious agents are inadequate, the ability of reference centers, when they exist, should be strengthened to monitor (i) syndrome and organism prevalence, and (ii) antibiotic susceptibility of at least N. gonorrhoeae (See Chapter 12).

Study Design

- Location: A referral clinic or STD clinic is best suited for this type of study because they are likely to have the necessary laboratory capabilities.
- Study population: All male and female patients attending the clinic.
- Duration of survey and sample size: The duration of the survey will be 2 to 3 months. The sample size will be the number of patients that visit the clinic during the study period.
- Data collection: The relative frequency of STD syndromes should be registered including genital ulcers (men and women), urethral discharge (men),
vaginal discharge and lower abdominal pain (women). If the patient has been treated previously for the condition for which s/he visits the clinic even if it is self treatment, this should also be recorded.

With regard to study of the etiologic agent(s) of the syndromes the following procedures are suggested. Full details on procedure for obtaining adequate biological specimens are described in detail in the "Benchlevel Laboratory Manual for Sexually Transmitted Diseases" (WHO document WHO/VDI/89). Newer, more sensitive and expensive testing methodologies are rapidly becoming available such as DNA amplification techniques and ELISA based testing. These newer diagnostic methodologies could also be considered for use in this protocol if they are available. (Recommendations for the determination of the sensitivity of N. gonorrhoeae and recommended antibiotics can be found in Chapter 12.)

Specimen collection:

In all genital ulcerations, blood should be drawn by venipuncture for RPR and TPHA test, a specimen of the ulcer should be taken for culture for H. ducreyi and if possible for herpes simplex virus detection, and a dark field microscopic examination should take place of the exudate of the ulcer for the presence of T. pallidum. Tests for LGV and donovanosis will depend on whether these diseases are found in the area.

In case of urethral discharge and/or dysuria specimens should be taken for N. gonorrhoeae culture and for C. trachomatis detection (usually antigen testing).

In case of vaginal discharge speculum examination should take place: wet mount (saline and KOH) examination of a vaginal sample should be done microscopically for the detection of motile trichomonads, yeast cells and clue cells. Subsequently, after removal of any exocervical mucus and exudate, endocervical swab specimens should be taken for N. gonorrhoeae culture and for C. trachomatis detection.

In case of lower abdominal pain, abdominal and vaginal examination should be performed. Subsequently, as described in vaginal discharge, wet mount examination of a vaginal sample should take place and endocervical swab specimens for N. gonorrhoeae culture and C. trachomatis detection should be collected.

See Appendix 1 for examples of surveillance sheets for the etiology of syndromes.

Antibiotic sensitivity testing:

More details on antibiotic susceptibility testing can be found in Chapter 12. The number of strains to be examined must be large enough to permit valid inferences about the population from which the sample was taken. The proportion of resistant strains in the sample should be precise; in other words, the sample estimate must be close to the true proportion of resistant strains in the population under investigation.

Data from a referral site most probably provide the "worst case scenario" with regard to antimicrobial sensitivity as people come or have been referred to the clinic because of failure of previous treatment. For this reason information should be collected whether one has been treated previously or not.

Alternatively, one should try to assess the etiology of syndromes and the microbial resistance in an OPD of a health facility with a well equipped laboratory or within easy reach of a laboratory. This may be an OPD in the public health sector or in the private sector.

As in many areas individual etiologic diagnosis of STD is not possible, treatment guidelines will be based on the diagnosis of syndromes. However, on the basis of the relative frequency of different pathogens causing the syndromes and their susceptibility to (available) drugs, national guidelines for STD case management can be established.
Repetition of this survey on the etiology and sensitivity of the drugs after a certain period (one to two years) will be needed to determine whether the treatment guidelines are still appropriate or whether they should be modified.

Limitations: This survey can only take place in a clinic with a well equipped laboratory nearby. Before starting the survey, health staff must be properly trained how to examine the patients, how to diagnose the syndromes, and on the proper collection of the samples. Additionally, the laboratory methods and quality assurance as well as the training of the laboratory technicians for the proposed tests should be assessed.

Protocol 4

To determine the prevalence of gonorrhea, chlamydial infection and trichomoniasis in women attending health facilities, but not seeking STD care

Prospective Data Collection:

Most women with STD are asymptomatic, and therefore do not seek health care. To estimate the prevalence of STD in women not seeking STD care, one may study women attending antenatal clinics. This population, as mentioned above, is often fairly representative of the general population of women.

Study design:

- Location: The study should take place in both an urban and a rural clinic. The clinics chosen, should have a good coverage of the population of pregnant women. In order to conduct this survey during a short period, the survey should take place in clinics with a high attendance rate (see also duration of survey and sample size). The same antenatal clinics may be included that were chosen for the survey on the proportion of pregnant women with a reactive syphilis serology.

- Study population: All pregnant women attending the clinic during the study period. Women reattending the clinic will not be retested as part of this survey.

- Duration of survey and sample size: The duration of the survey should not take longer than 2 to 3 months. The sample size will be the total number of different women attending the clinic during the survey. During this period a minimum of 500 pregnant women per clinic should have been screened. (See Protocol 2 for rationale of the sample size.)

- Data collection: Data should be collected by age group. In addition information should be collected whether a woman has complaints of genital ulceration, vaginal discharge or lower abdominal pain. Speculum examination should take place: wet mount (saline) examination of a vaginal sample for microscopical detection of motile trichomonads. After removal of any exocervical mucus and exudate, endocervical swab specimens should be collected for N. gonorrhoeae culture and C. trachomatis detection.

Since these women are not seeking STD health care, results of this study will give information on the prevalence of these STD in the general sexually active female population. However, the prevalence may be an underestimate as women who are infertile do not attend the antenatal clinic (the infertility will be for a large part due to STD in the past and part of these women may still be at increased risk for STD. In case of a high prevalence of STD and if affordable, a case finding program among these women (including treatment of infected persons) may be justified as part of the national STD program. This survey can only take

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Example 5
STD PREVALENCE SURVEY OF PREGNANT WOMEN AND PROSTITUTES IN KINSHASA, ZAIRE

<table>
<thead>
<tr>
<th>Finding</th>
<th>Pregnant women (n=1,760)</th>
<th>Prostitutes (n=1,222)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibody to HIV</td>
<td>56 (4.8)</td>
<td>433 (35.4)</td>
</tr>
<tr>
<td>Positive syphilis</td>
<td>13 (1.1)</td>
<td>193 (15.8)</td>
</tr>
<tr>
<td>serology (RPR &amp; TPHA both positive)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N. gonorrhoeae</td>
<td>19 (1.6)</td>
<td>286 (23.4)</td>
</tr>
<tr>
<td>C. trachomatis</td>
<td>60 (5.2)</td>
<td>159 (13.0)</td>
</tr>
<tr>
<td>N. gonorrhoeae and/or</td>
<td>75 (6.5)</td>
<td>379 (31.0)</td>
</tr>
<tr>
<td>C. trachomatis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T. vaginalis</td>
<td>213 (18.4)</td>
<td>267 (21.8)</td>
</tr>
<tr>
<td>Genital ulcer</td>
<td>1 (0.1)</td>
<td>66 (5.4)</td>
</tr>
</tbody>
</table>

place in a clinic with a well equipped laboratory nearby. Before starting the survey, the health staff must be properly trained in speculum examination, microscopic examination of wet mounts and proper collection of samples.

The STD prevalence determined by the survey may be an underestimate for the reasons described above.

Protocol 5

To determine the prevalence of STD in high risk groups who do not seek health care

The first hurdle in this survey is to identify populations at high risk for contracting STD. Data on populations at risk for HIV (and therefore other STD) may already be available through the AIDS program, which may have conducted studies that have identified these populations at risk. If no high risk populations have been identified, do so first. Subsequently, assess the relative importance of the identified high risk populations in the transmission of STD (See Chapter 13). Examples of high risk populations are male truck drivers and CSWs.

Prospective data collection:

STUDY DESIGN:

For a more detailed explanation see also the methods for syphilis screening and the survey to assess the prevalence of gonorrhea, chlamydial infection and trichomoniasis among pregnant women.

- **Location:** Populations at high risk for STD may only be seen in public health-care facilities when they are symptomatic or for legal reasons. But even, being symptomatic, they may decide not to go to public health-care facilities for fear of stigmatization. Therefore, in order to assess the prevalence of STD among various (asymptomatic and symptomatic) high risk populations, look for them outside the health facilities and bring them into a clinic, which may be a clinic established for the purpose of this study only (e.g., a mobile clinic) or into an existing health facility.

- **Study population:** Identified high risk groups (see above) might be chosen based on importance in STD epidemiology or because of access to the population.

- **Duration of the survey and sample size:** The sample size of a high risk population depends on the estimated prevalence of the STD in that population. In general, assume that the prevalence of the various STDs is much higher in, for example, CSWs than in pregnant women and therefore the sample size may be smaller. The data on STD prevalence in pregnant women and CSWs, Kinshasa, Zaire, illustrate this point (see Example 5). Preferably, the duration of the survey should not be longer than two to three months.

- **Data collection:** Minimally, one should collect serum samples for syphilis screening (TPHA and RPR/VDRL). In addition, one should try to screen for *N. gonorrhoea, C. trachomatis, trichomoniasis* (women only) and for the presence of genital ulcerations.
**Results:**

In case of a high prevalence of STD a special STD program for these high risk populations may be justified as part of the national STD program (see Chapter 13). As such a survey can only take place on a voluntary basis, the STD prevalence may be an underestimate or overestimate, depending on the risk behavior of the participants compared to the mean risk behavior of the population under investigation.

Of special note, when one starts special surveys among populations at risk, combine STD assessment with treatment (preferably free of charge) of the infected cases. Persons from the high risk groups may then also be more inclined to participate in such a survey.

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**REFERENCES**


