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on Global HIV/AIDS and STI Surveillance

Evaluating a national surveillance system



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UNAIDS/WHO Working Group
on Global HIV/AIDS and STI Surveillance

Evaluating a National Surveillance System

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1. Introduction

1.1. Purpose

This guideline is part of a series of technical guidelines on HIV surveillance produced by the Joint United Nations Programme on HIV/AIDS (UNAIDS)/ World Health Organization (WHO) Working Group on Global HIV/AIDS and STI surveillance.

Second generation surveillance (SGS) is the cornerstone of knowing a country's HIV epidemic and planning an effective response. As the HIV second generation surveillance system is being developed, plans on how to assess the system should be included. The process of reviewing surveillance results and reports, and obtaining feedback from participants at all levels enhances the quality of future surveillance surveys and builds technical capacity.

The main aim of a surveillance assessment is to provide continuous feedback on programme implementation. This guideline provides checklists for assessing surveillance activities in an existing surveillance system within a country. Specifically, it covers:

- the overall design and configuration of the system
- the implementation of data collection
- the analysis and use of surveillance data.

Additional details can be included in the checklists based on the country's surveillance plan and its HIV response. Determine whether the goals of the surveillance system have been met, first by tailoring the assessment to country plans and the specific HIV situation and second, by making the frequency and scope of the assessment dependent on factors such as the level of satisfaction, performance of the system and resources available.

This assessment should reveal which components of the system are strong and which ones need to be strengthened in order to improve the quality of the information.

1.1.1. Why conduct surveillance evaluation?

Ideally, an internal evaluation of surveillance activities is an integral step conducted during analysis and interpretation of surveillance data.

However, a periodic, formal evaluation, conducted by members of an evaluation team who are not direct implementers of the surveillance activity is useful for obtaining an objective, more in-depth evaluation of the design of the system, protocol and procedures, implementation and analysis.

Types of evaluation:

- National experts conduct an internal, annual, rapid assessment.
- External experts conduct an assessment every two to three years.
- External and internal experts do a combined assessment.
- Experts conduct a national review of the country's strategic plan or monitoring and evaluation (M&E) of the national plan.

As for any type of evaluation, the intent is to use the findings to adjust the design, protocol or approach for future surveillance activities. This can be done by setting new targets of achievement for the next round of surveillance activities. The process has been described in other guidelines such as the pre-surveillance assessment and how to implement second generation surveillance for HIV infection (1,2).

This guideline emphasizes how an evaluation can be used to document decisions and support management actions to improve the system. A systemwide assessment gives your national programme the opportunity to consider in a comprehensive fashion how the different pieces work together to answer key surveillance questions.

1.1.2. When to conduct an evaluation

This decision will depend on whether the surveillance activity is a continuous process (such as case reporting) or periodic (such as sentinel surveillance or behavioural surveillance survey).

Evaluation may be conducted:

- retrospectively, to review one or more rounds of data collection and analysis
- prospectively, in combination with actual execution of the current round of activities by assigning assessment team members to conduct field visits, observe and then make an assessment.

1.1.3. What this guideline covers

This is not a comprehensive guide that covers all the aspects of HIV surveillance systems. For instance, issues surrounding HIV testing and laboratory quality assurance are not fully covered.

This guideline aims to provide a framework and a series of checklists of the main issues that national AIDS programmes (NAPs) should review and assess during the evaluation of their countries' HIV surveillance system. It can be used by:

- national HIV programmes
- programme managers
- M&E officers.

1.2. Background

As funding for HIV control programmes has increased, countries have invested in strengthening HIV surveillance systems. Since the introduction of second generation surveillance about 10 years ago (3), there has been a great increase in surveillance activities. Countries have moved beyond seroprevalence measures and HIV advanced infection case reporting toward full second generation surveillance systems. There is now a need to assess and evaluate how well second generation surveillance systems are functioning and to optimize the use of resources available for surveillance activities.

It will be helpful for readers of this guideline to refer to the updated second generation surveillance guidelines (4).

The second generation surveillance approach characterizes a country's HIV epidemic in epidemiological zones (geographical areas) using (i) data from estimates of key populations at higher risk for HIV exposure and risk behaviours, and (ii) seroprevalence trends.

Different types of epidemic settings have different transmission dynamics. Because of this, second generation surveillance employs a wide range of data sources:

- HIV and HIV advanced infection case reporting
- HIV sentinel surveillance
- size estimation of populations at higher risk for HIV
- sexually transmitted infection (STI) case reporting
- integrated biological and behavioural surveillance (IBBS) of populations at higher risk
- national population-based surveys for the general population, and
- morbidity and mortality surveillance.

Second generation surveillance stresses the need for flexibility: surveillance programmes must change based on the needs and evolving status of the country's HIV epidemic.

1.3. Terminology

Terminology is defined in the Glossary, Appendix D. Described here are two key concepts: routine assessment and evaluation.

1.3.1. Routine assessment

Routine evaluation of individual components of the surveillance system is a form of internal assessment. The goal is to manage the system and ensure the quality of the information produced. Conduct routine assessment:

- on an ongoing basis for mid-course corrections
- to review previous activities before the next round of a surveillance activity.

Staff designated to manage the system should be responsible for routine assessment. Local units report to central units; central units report to the government and donor agencies.

1.3.2. Evaluation

Conduct a formal, system-level review at least once every five years or whenever major revisions or updates to the system are being considered. Assess the overall design and implementation of surveillance. For such a review, involve not only those who manage surveillance activities but also external surveillance experts who can assess the system more objectively. It is advisable to have external reviewers who have experience in other countries, and know international standards and recommendations.

In most countries, second generation surveillance activities are documented on a project-by-project basis. Typically, a protocol is developed and approved, which directs how a sentinel surveillance or behavioural surveillance activity will be conducted. That one activity may be routinely reviewed in some way upon completion.

What is not common is to have one document, a national HIV surveillance evaluation, which reviews the overall design of the entire country's HIV surveillance programme and describes how the different pieces work together to answer key surveillance questions. Such an assessment:

- documents what is currently in place
- identifies and documents strengths, weaknesses, gaps and opportunities in the system as a whole.

Developing a whole country surveillance evaluation entails a process of:

- collating and reviewing existing protocols and data
- assessing the system's capability to answer key questions
- documenting your findings.

Conducting an evaluation can potentially result in a clearer understanding of both the country's surveillance system and its HIV epidemic.

Consult Appendix A, Sources, for additional information and guidance.

1.4. Enhancing communications with a participatory approach

Too often, surveillance activities involve a one-way flow of information:

- from a central unit to the field, directing how to collect data
- from the field back to the central unit, reporting collected data.

However, when assessment uses a participatory approach and communications are two-way, implementers at different levels of the national programme are able:

- to share perspectives and give feedback, discuss what works well and what is not working well
- to develop mutually beneficial solutions to issues and difficulties encountered
- to maintain a desired level of quality and rigour
- to share the results with all stakeholders who may be involved in revising and strengthening the system in the future.

Box 1 on *Meeting with stakeholders* provides some questions that need to be clarified before the assessment begins. By answering these questions, a plan for conducting the assessment will begin to take shape. Resource requirements will become clearer. Resources may require the assessment to be scaled back or the scope to be modified to ensure a realistic output.

Box 1. Meeting with stakeholders: key questions for planning an HIV surveillance assessment

What is the scope of the assessment?

- Which types of surveillance activities will be included?
- Are there specific issues or key questions that should be addressed by the assessment?
- What is the time frame for data collection or which rounds of data will be included in the assessment?
- What is the time frame for and what are the methods to be used in the assessment?
- Will the performance of all sites be assessed or only a sample of sites?

Will the assessment be retrospective, based mostly on:

- a review of process documentation and results?
- key informant interviews?

Will it be prospective, including both record reviews and field visits?

Is there a surveillance cycle with a definite time set for planning new activities?

Is there a window during which the assessment findings would be most productive for improving future rounds of the activity?

Where does the HIV surveillance system reside within the national AIDS programme (the political, administrative, geographical or social climate)?

- What is the level of integration with other systems?
- Is there a flowchart of the system?
- What are the populations under surveillance?

What mechanisms should be put in place to ensure that the assessment is objective and standardized?

- What assessment tools are needed?
- How decentralized will the assessment activity be?
- What indicators should be used to assess the surveillance system/activity?
- How are targets or benchmarks set for each indicator?

Who is involved?

- What training is required to orient the assessment team?
- Who has the primary responsibility for conducting the assessment activities? Do they have sufficient resources and experience/training?
- Who are the stakeholders of the assessment results?
- What are the roles and responsibilities of different stakeholders in the process (design, implementation, review and interpretation of results, taking action based on the findings)?

How will the findings be presented or disseminated?

- Is a formal written report being prepared? A power-point presentation?
- Will sites be identified and compared openly?
- How will inputs and feedback about the findings be used in the report?
- Will the preliminary findings be shared in a workshop or meeting of stakeholders?
- How will findings be shared with local implementers at sites that participated in the assessment?
- How will action plans based on the assessment findings be developed and tracked?

Additional questions are provided in Section 3 of this guideline. They include assessing individual HIV surveillance activities and data sources.

1.5. Evaluation process

The process proposed in this guideline will help to assess if the NAP in your country has:

- selected the most appropriate surveillance activities for its epidemic context and allocated resources accordingly
- chosen sites and population groups for each surveillance activity based on epidemiologically sound criteria
- executed surveillance protocols properly
- interpreted data appropriately to answer key surveillance questions
- presented and effectively disseminated surveillance results
- used surveillance information for decision-making at the programme or policy level.

Figure 1.1 illustrates the key surveillance steps from the *Guidelines for second generation HIV surveillance: an update (4)*. Corresponding assessment issues or questions are provided for each step in the surveillance process. These issues and questions will be discussed in this guideline.

Checklists are used in this guideline to help you organize different areas of an HIV surveillance programme assessment. Table 1.1, a Checklist overview, shows all the assessment criteria that will be considered in this guideline. Consider this a starting point. The checklists are not exhaustive or exclusive but they cover the main areas of surveillance and the key concepts. You may add items to the checklists based on your own country's HIV surveillance goals and activities.

Section 5 of this guideline presents two assessment case studies as two different approaches and examples from India and China. Follow their example to get started with assessing your programme.

Figure 1.1. Assessment of second generation surveillance: issues and high-level questions

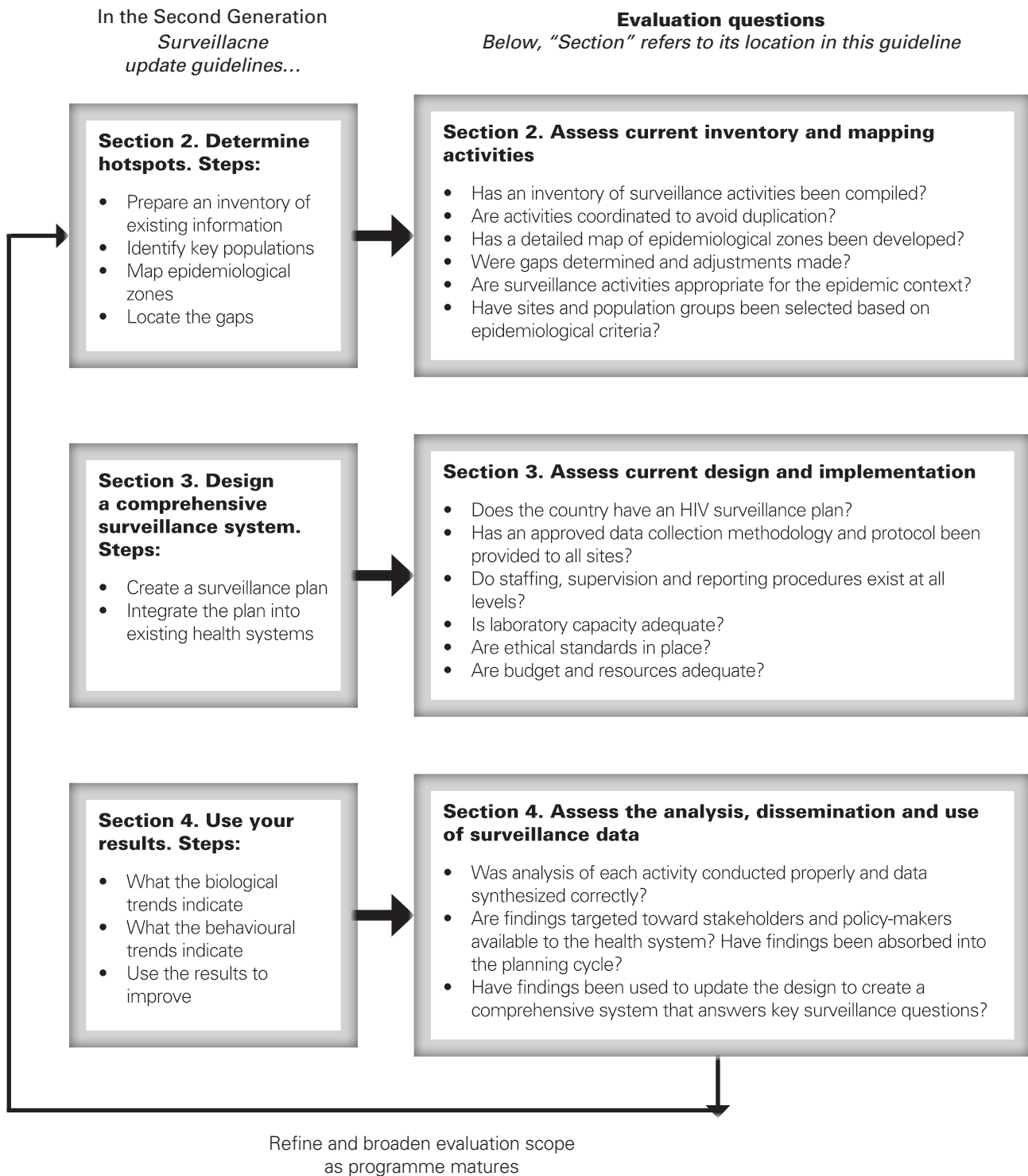
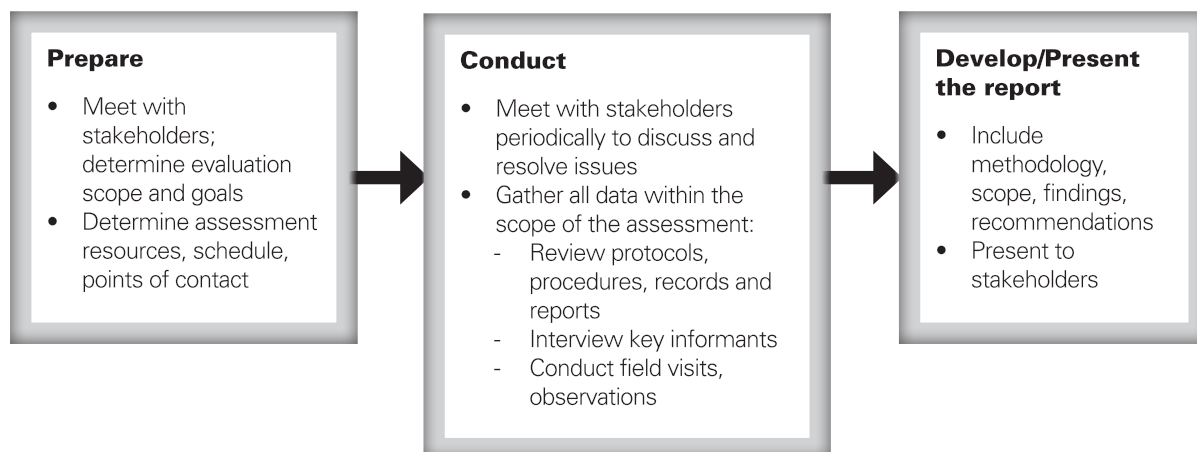


Table 1.1. Conducting an HIV surveillance assessment

Checklist overview: high-level evaluation criteria
Details are provided in each section of this guideline

Assess current inventory and mapping activities (Section 2 of this guideline)

Issue	Description
2.2.1	A complete inventory of past and current surveillance activities exists with a full description of each activity: methodology, location, duration, population considered, results.
2.2.2	Surveillance activities (conducted by all agencies) are coordinated to avoid duplication.
2.2.3	The <i>Know Your Epidemic</i> approach was used to map epidemiological zones based on: <ul style="list-style-type: none"> ■ geographical proximity ■ pattern of transmission ■ stage of the epidemic as defined in the WHO/UNAIDS <i>Guidelines for second generation surveillance: an update</i> ■ gaps in coverage of HIV surveillance have been identified.
2.2.4	Surveillance activities and their frequency are appropriate, based on the current understanding of the stage of the epidemic in different epidemiological zones
2.2.5	Selection of population groups and locations for surveillance activities is based on appropriate epidemiological criteria.

Assess current design and implementation (Section 3 of this guideline)

Issue	Description
3.1	The country has a publicly available second generation surveillance design document (HIV surveillance plan) that describes all aspects of the system.
3.2	A. An approved methodology and protocol for data collection is available at all sites. Quality standards are in place. B. Staffing and supervision are adequate for data collection. Reporting procedures exist at the central, regional and local levels. C. Adequate laboratory capacity is available and sufficient equipment, supplies, trained staff and procedures are in place. D. Ethical standards are in place to protect privacy and all personal identifiers have been removed. E. Sufficient budget and resources are provided for the activity.

Assess analysis, dissemination and use of data (Section 4 of this guideline)

Four separate checklists are provided.

Checklist: Assess data analysis in each surveillance activity

Issue	Description
4.1.2A	Adequate attention is paid to data management and quality of the data.
4.1.2B	Correct analysis techniques are used to generate results.
4.1.2C	Clear reports of basic findings are generated from each surveillance data collection activity.
4.1.2D	Analysis is conducted and data are available within six months of completion of activity.
4.1.2E	Appropriate documentation is recorded during the activity.
4.1.2F	Bias is assessed by the programme.

Checklist: Assess data synthesis (triangulation)

Issue	Description
4.1.3A	Multiple data sources are used to answer key surveillance questions.
4.1.3B	Frequency of data synthesis analysis and interpretation, for instance, using triangulation methods or similar approaches

Checklist: Assess data dissemination

Issue	Description
4.2.2A	Data dissemination activities are well targeted at stakeholders, decision-makers, and programme planners and implementers.
4.2.2B	Datasets and reports from surveillance activities are made available to the public.
4.2.2C	The information is widely distributed and disseminated.

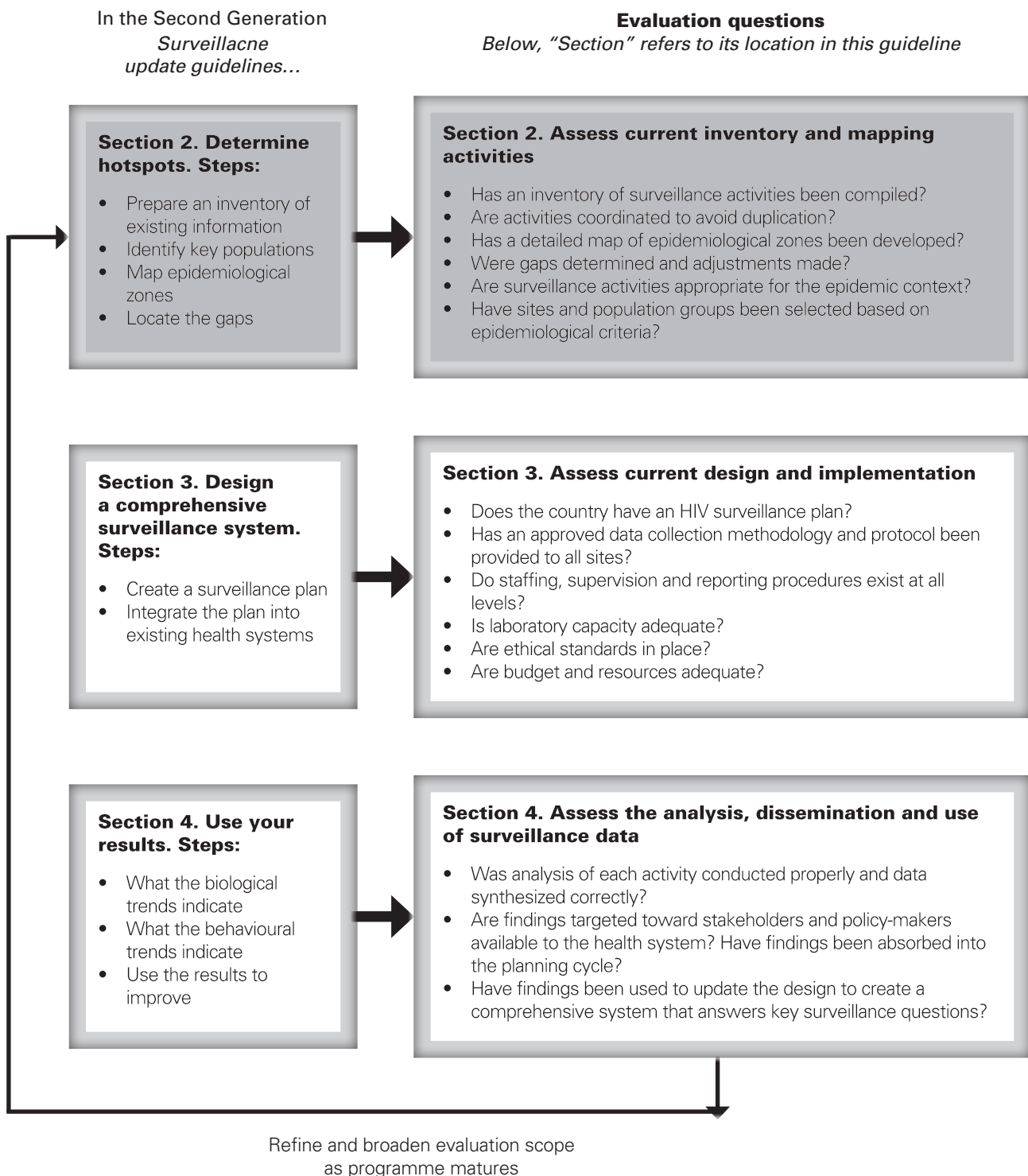
Checklist: Assess data use issues

Issue	Description
4.3.2A	Interventions match the epidemic.
4.3.2B	National HIV advanced infection control strategy cites evidence for programme priorities based on the surveillance data.

2. Assess current inventory and mapping activities

Begin the evaluation process by determining if the national programme has conducted inventory and mapping activities, as described in Section 2 of the *Guidelines for second generation surveillance: an update*.

Figure 2.1. Begin by assessing inventory and mapping activities



2.1. Objectives of HIV surveillance

As explained in the *Guidelines on second generation surveillance: an update*, second generation surveillance has several high-level objectives:

- To stay ahead of the epidemic by using surveillance data to understand where new infections are most likely to occur
- To use surveillance data to understand how and why the epidemic is changing over time
- To quantify the burden of infection (learn how many people are infected with HIV) in different geographical regions of the country.

Assessing the design and implementation of a second generation surveillance system revolves around assessing how well the national programme is addressing these objectives.

2.2. Assess key inventory and mapping issues

The checklist below provides specific issues related to implementation of surveillance. In the pages that follow, each issue is described and discussed to assist you during the assessment process.

Checklist: Assess inventory and mapping activities

Issue	Description
2.2.1	A complete inventory of past and current surveillance activities exists with a full description of each activity: methodology, location, duration, population considered, results.
2.2.2	Surveillance activities (conducted by all agencies) are coordinated to avoid duplication.
2.2.3	The <i>Know Your Epidemic</i> approach was used to map epidemiological zones based on: <ul style="list-style-type: none">■ geographical proximity■ pattern of transmission■ stage of the epidemic as defined in the WHO/UNAIDS <i>Guidelines for second generation surveillance: an update</i>■ gaps in coverage of HIV surveillance have been identified.
2.2.4	Surveillance activities and their frequency are appropriate, based on the current understanding of the stage of the epidemic in different epidemiological zones
2.2.5	Selection of population groups and locations for surveillance activities is based on appropriate epidemiological criteria.

2.2.1 The country has a complete inventory of activities

Begin by reviewing the country's existing information, which should be compiled into an inventory. Ask to see and review past protocols and reports to determine if all activities were included in the inventory. Consider both national activities and regional/local activities.

Some sources may be past national surveys. Other data may be more local. Some surveys may include HIV testing of respondents. Some will not. Here are some available data sources you should expect to see:

- Sentinel surveillance of antenatal clinic (ANC) attendees
- Sentinel surveillance of key populations at higher risk
- Probability surveys of the general population
- Probability surveys of key populations at higher risk
- HIV and HIV advanced (AIDS) case reporting
- STI case reporting
- Geographical mapping of HIV cases or populations at increased risk for HIV
- Programme data
- Secondary data sources (from programmes or non-health sector data).

No one source of surveillance data answers all the questions. See if there is evidence that the programme has tried to pull data together to then triangulate them to interpret the results (5).

The inventory of recent national and regional/local information should:

- identify parts of your country where the epidemic appears to be the most severe
- describe the variation in what seems to be driving new infections in different parts of the country
- list areas where there are few infections and likely to be little transmission
- distinguish between areas with few infections and areas where there is *no information*
- describe what systems are in place to detect areas with emerging epidemics and how sensitive these systems are likely to be.

Two dimensions determine where most new infections are occurring:

- geographical dimension
- risk behaviours and context dimension.

Geographical dimension

Most countries have diverse regions with varying socioeconomic conditions and populations. The surveillance system must describe what is happening in every geographical region across the country to provide information to programme planners for intervention.

Risk behaviours and context dimension

What is fuelling the epidemic in different parts of the country? Is it:

- heterosexual sex?
- sex work?
- persons who inject drugs?
- men who have sex with men?
- other population groups?

2.2.2 Surveillance activities are coordinated to avoid duplication

The country's surveillance system should take into account what data are available from different sources (the inventory will help). This is especially important if you have a decentralized or multilateral system where multiple agencies have commissioned data collection and analysis activities.

In the inventory, check for an up-to-date data catalogue of:

- what data are being collected
- where data are being collected
- who is collecting the data and who is responsible for coordination
- how the data are being collected.

Include all activities that are being conducted, not just those of the Ministry of Health or other internal group. Donors, academic or research institutions, or NGOs are probably conducting activities. Study areas of possible duplication:

- Are the indicators collected similar to international recommended indicators, especially the basic international indicators that countries have agreed to, such as the Millennium Development Goals or United Nations General Assembly Special Session (UNGASS) indicators?
- Is there a national M&E committee which may provide recommendations that would contribute to the national HIV surveillance plan?
- Are methods, protocols and tools standardized across the country for integrated biological and behavioural surveys?
- Is there a clear strategy for laboratory testing for HIV?
- Is there quality assurance of laboratory results?
- Is there duplication in financing mechanisms for HIV surveillance?
- Are there regular meetings and agreements with the main donors on the distribution of work?

Doing this along with the inventory will help you identify gaps, avoid duplication and optimize the use of surveillance resources.

2.2.3 Epidemiological zones are mapped

The “Know Your Epidemic” approach requires all areas of the country:

- to identify populations at higher risk
- to estimate the size of populations at higher risk
- to explore levels of risky behaviour using available information
- to assess HIV levels of prevalence using available information.

The updated guidelines for second generation surveillance recommend using the following stages of the epidemic to help guide surveillance activities and intervention responses (Box 2).

Box 2. Stages of the epidemic

Low-level epidemic: HIV has not spread to significant levels in any of the traditional populations at higher risk – sex workers, men who have sex with men, persons who inject drugs.

Concentrated epidemic: HIV transmission has taken root in one or more population at higher risk (sex workers, men who have sex with men, persons who inject drugs); however, HIV is rarely transmitted to those outside of those key populations at higher risk and their regular sex partners.

Generalized epidemic: HIV is established in the general population due to a high proportion of both males and females in the general population who have sex with multiple partners over a short period of time.

The epidemic stages are most useful when the area categorized has a uniform epidemic pattern. Except for very small countries, it is best to divide a country into meaningful epidemic zones before categorization.

Important: Do not label areas as “low HIV prevalence” if there are no data. If you find areas where:

- the country has not been sufficiently explored with surveillance activities
- there is no specific evidence about epidemic potential

Label those areas: *not enough information*.

2.2.4 Current surveillance activities/frequency are appropriate

Surveillance activities and their frequency should be appropriately based on the current understanding of the stage of the epidemic in different epidemiological zones.

The need for flexibility

The design of a surveillance system should be iterative and dynamic. New information becomes available. Epidemics evolve. The programme may have responded to this by shifting the types and intensity of surveillance activities to identify emerging epidemics in new areas or populations, and track the rate of change in an expanding or maturing epidemic. This need to stay up to date must be carefully balanced against the need to maintain consistency within the system because, without consistency of sites of over time, it is not possible to measure trends.

Country epidemiological zones may be characterized as low level, concentrated or generalized. Each classification requires different activities and frequencies.

While it is always desirable to have more information, it is not necessary or possible to do everything everywhere. The recommended frequency of surveillance data must take into account:

- available human and financial resources
- epidemiological factors (how often different types of new information can be helpful in understanding the situation and guiding the response)
- size of the country
- size of the population.

The recommendations made for HIV second generation surveillance for the different epidemic stages can be the basis for the review of the system. Understand the local situation and be flexible. Recommendations made for HIV surveillance are not definitive and are given in the forthcoming *Guidelines for second generation HIV surveillance: an update (4)*.

2.2.5 The selected population groups and locations are appropriate

Resources for collecting data are limited. It is important to have a system for prioritizing populations and locations for each surveillance activity. Defining the population and site selection criteria is a balancing exercise between what is epidemiologically useful and what is feasible in terms of resources and capacity.

In general, more resource-intensive surveillance activities should use more stringent criteria for selecting sites and groups. Think carefully about activities that are not routine, such as:

- mapping-based size estimation of populations at higher risk
- sentinel surveillance
- behavioural and biological surveillance.

Different surveillance activities use different epidemiological criteria to determine the sites and groups that should be covered.

You may select sites in a fixed pattern. Sometimes combined criteria are used. The criteria may vary among different groups in the same location. For example:

- all sites where the number of sex workers is >1000
- the 10 districts with the highest number of reported HIV advanced infection cases per month.

Reflect surveillance objectives in your criteria

Programme monitoring and assessment systems rely heavily on surveillance activities to supply data for assessing the outcomes and impacts of interventions. Ideally, the same sites will be prioritized for surveillance and for programmes. If the two are not the same, ensure that the mix of surveillance data collection activities reflects surveillance objectives as opposed to programme assessment or service provision objectives.

In terms of assessment, think about:

- the logic of the decision-making process for selecting groups and sites
- the relevance for answering key questions.

Box 3. Two examples of using criteria to select sites and groups

Frequency and distribution of reported HIV cases may also be part of the criteria for selecting groups and locations.

Selecting groups and locations for...	Description	Examples
Mapping-based size estimation of populations at higher risk	Base on population size or density or anecdotal evidence of activity among populations at higher risk	<ul style="list-style-type: none"> ■ For female sex workers and persons who inject drugs, all urban areas (for example, >250 000 population) ■ For men who have sex with men, urban areas (for example, >500 000 population) ■ For persons who inject drugs, areas with large numbers of drug arrests (for example, >1000 drug arrests per year) ■ For female sex workers, areas with transport hubs or destination points of migrant labour

Selecting groups and locations for...	Description	Examples
HIV sentinel surveillance in populations at higher risk	Base on where services or targeted interventions are provided to the group. Cut-off points for selection can be based on either threshold or rank.	<ul style="list-style-type: none"> ■ All sites with more than 1000 female sex workers (threshold) ■ All sites with more than 500 persons who inject drugs (threshold) ■ All sites with population density of >0.5% females selling sex (threshold) ■ 20 sites with the highest number of female sex workers (rank)

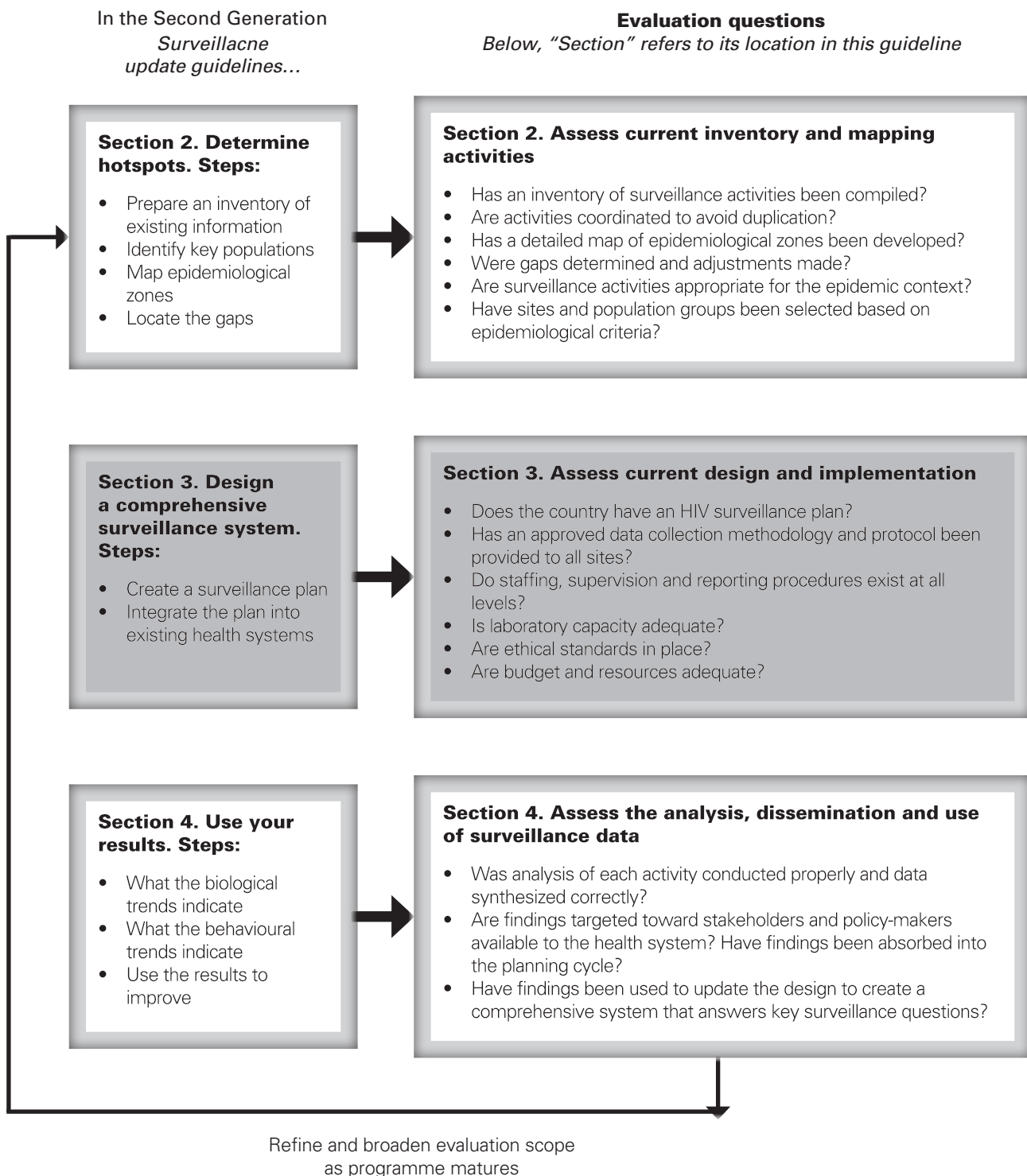
2.3 Resources and guidelines for inventorying and mapping activities

See Appendix A for a complete list of sources. Development of an inventory, preparing a map of epidemiological zones and related items are extensively described in the *Guidelines for second generation HIV surveillance: an update (4)*.

3. Assess current design and implementation

The focus of this section is to assess the system's existing overall design and ability to generate high-quality data using sound methodologies from each data source.

Figure 3.1. Does the design and implementation meet the objectives of second generation surveillance?



Begin by determining if the country has developed a second generation surveillance plan or HIV surveillance design document. Assess whether the design is consistent with the needs of the country.

Now consistently assess each activity that is being conducted or has been conducted in the recent past, say in the past three years, and see whether the activity was part of a plan or not to determine if certain criteria are satisfied or if questions are answered. Assess for each activity:

- the sources of data
- the data collected and how they were collected
- how the system's data are managed (that is, the transfer, entry, editing, storage and back-up of data)
- compliance with applicable standards for data formats and coding schemes; if the system is not compliant, why not
- compliance with an applicable records management programme (proper archiving and/or disposal).

Several cross-cutting dimensions regarding quality issues of HIV surveillance have to be taken in consideration when evaluating HIV surveillance systems. These dimensions are as follows:

- a. **Timeliness:** information collected on various components of the surveillance system throughout the continuum of data collection analysis, dissemination has to be done in a timely manner. Are the data relatively recent or not?
- b. **Completeness of data collection and analysis:** how well are planned activities actually being implemented completed and analysed?
- c. **Accuracy of data:** how precise and accurate are the data being collected? Is there supervision which ensures that forms, reports and data collection tools are adequately completed? For instance, are there any missing values, illegible recordings, and responses that deviate from standard operational procedures? Have the data entered in the database been checked for accuracy by comparing them with hard-copy reports?

Checklist: Assess the design of and activities for HIV surveillance

This is a master checklist; details and additional steps for each assessment area follow.

Area	Description
3.1	A comprehensive second generation surveillance design or plan describes all aspects of the system and is publicly available.
3.2	For each HIV surveillance activity (more details provided in section 3.2), assess if: A. An approved methodology and protocol for data collection is available at all sites. Quality standards are in place. B. Staffing and supervision are adequate for data collection. Reporting procedures exist at the central, regional and local levels. C. Adequate laboratory capacity is available and sufficient equipment, supplies, trained staff and procedures are in place. D. Ethical standards are in place to protect privacy and all personal identifiers have been removed. E. Sufficient budget and resources are provided for the activity.

3.1. Assess the overall design

A second generation surveillance design/planning document should be publicly available. The country's surveillance design document or plan should describe:

- key surveillance questions and corresponding data needs
- the data sources or activities that will contribute to answering each question
- what surveillance activities have been prioritized and why
- overall responsibilities for the various activities
- how capacity development will be addressed
- where data collection will occur by each determined activity
- who will be responsible for collecting the data
- how the data will be collected
- when the data will be collected
- the rationale for site/group selection
- a plan for disseminating the results.

This is an important reference for stakeholders: planners, implementers and consumers of surveillance data.

Schedule

A formal review of the overall surveillance system design should take place:

- at least once every five years or
- before any major update or revision to your second generation surveillance system.

Existing resources and guidelines on second generation surveillance design

See Appendix A for a complete list of resources. The list below provides specific design sources.

- *Guidelines for second generation HIV surveillance: the next decade (3)*. <http://www.who.int/hiv/pub/surveillance/pub3/en/index.html>
- *Initiating second generation HIV surveillance systems: practical guidelines (2)*. <http://www.who.int/hiv/pub/surveillance/guidelines/en/index.html>
- *Practical guidelines for intensifying HIV prevention: toward universal access (6)*. http://data.unaids.org/pub/Manual/2007/20070306_Prevention_Guidelines_Towards_Universal_Access_en.pdf
- *Guidelines for second generation HIV surveillance: an update (4)*.
- *The pre-surveillance assessment guidelines for planning serosurveillance of HIV, prevalence of sexually transmitted infections and the behavioural components of second generation surveillance of HIV (1)*. <http://www.who.int/hiv/pub/surveillance/sti/en/index.html>

3.2. Assess each activity

HIV surveillance activities should be reviewed and assessed individually. In addition, some of the activities have additional issues that must be assessed beyond those provided in area 3.2 of the master checklist.

Table 3.1. HIV surveillance activities covered

Activity	Section
HIV and HIV advanced infection case reporting	3.2.1
Sexually transmitted infection case reporting	3.2.2
Size estimation by mapping of populations at higher risk for HIV	3.2.3
Survey-based size estimation of populations at higher risk for HIV	3.2.4
Morbidity and mortality activities	3.2.5
HIV sentinel surveillance among ANC or other populations	3.2.6
Integrated biological and behavioural surveillance of populations at higher risk and national population-based surveys for general population	3.2.7
Systems that measure incidence	3.2.8

Key questions for assessment of each activity, checklist details

Items 3.2.A through 3.2.E below are the key areas to cover in an assessment of individual activities (3.2 in the master checklist). We have provided some possible questions that should be addressed during the assessment. These questions may be used during meetings with stakeholders to discuss assessment needs. Add more questions that are of interest to the NAP or the stakeholders. The list below is just a starting point.

3.2.A. An approved methodology and protocol for data collection exists at all sites; quality standards are in place

The key areas to be assessed include the following:

- Are protocols updated regularly to reflect best practice and conformity with international guidance?
- Are protocols clearly written to establish standardized practices for implementation?
- Are protocols easily available to implementers (copy available at each site)?
- Are quality assurance (QA) procedures in place for data collection and management activities?

- Do QA procedures check a sample of all activities?
- If specific thresholds of quality are breached, is more comprehensive checking instituted?
- If systematic errors are occurring, do QA measures result in changes in procedure?
- Do QA reports document key deviations from the protocol?
- Are QA reports accessible for use during the analysis process and for influencing training curricula during subsequent rounds of the activity?

3.2.B. Staffing and supervision are adequate for data collection. Reporting procedures exist at the central, regional and local levels

Key issues that must be assessed include the following:

- Are the roles and responsibilities clearly articulated for staff involved in data collection, management/supervision and analysis?
- Is the allocation of staff time and resources (such as travel budget) appropriate for the responsibilities given to each person, taking into account their other responsibilities?
- Do staff assigned for each function have the appropriate technical background, skills or knowledge to do their jobs?
- Is a standard set of training materials/curriculum used at all sites?
- Is the training curriculum consistent with the current protocols and informed by previous experience?
- Does training cover all aspects of the protocol: process documentation, filling in data forms, quality assurance and ethical conduct?
- Is training provided for every round of surveillance and to all involved staff?
- Is training provided immediately before the start of field activities?
- Is time allocated to provide full training even for experienced implementers?
- Are post-training assessment tools provided to identify sites which may need more support/supervision?
- Are standard tools available for conducting supervision/monitoring visits?
- Is a schedule established for external technical monitors to conduct field visits?
- Are monitors and supervisors trained to conduct supervision visits according to a standard protocol?
- Is feedback given to sites following monitoring visits so that site supervisors and staff may make adjustments or improvements?
- Do monitoring reports document key deviations from the protocol?
- Are monitoring reports accessible for use during the analysis process and subsequent rounds of the activity?

3.2.C. Adequate laboratory capacity is available with sufficient equipment, supplies, trained staff and procedures in place

This is a specialized area that should be assessed by someone trained in laboratory issues. WHO Diagnostics and Laboratory Technology produces regular guidelines for quality assurance for HIV testing, provided at http://www.who.int/diagnostics_laboratory/publications/en/index.html

Areas to be assessed include the following:

- Are the required reagents, test kits, equipment and supplies available?
- Is the laboratory staff employed appropriately trained?
- Are appropriate storage, handling, and transport provisions and procedures used at sites where testing is not available?
- Are testing algorithms revised if new HIV tests kits are introduced?
- Is an internal quality assurance mechanism used?
- Is appropriate quality control in place, including a quality control system for HIV testing?

3.2.D. Ethical standards are in place to protect privacy, and all personal identifiers have been removed

Second generation surveillance refers to the strengthened systems put in place in an increasing number of settings to monitor the biological and behavioural indicators of the epidemic. The activities involved in collecting the necessary data raise several questions relating to protecting human subjects and hence underscore the need for attention to ethical issues.

Most of the discussions of the ethics of research involving human subjects focus on the obligation to protect participants from harm and to ensure that those who participate in research share in the benefits that may follow.

HIV surveillance systems should ensure that ethical principles are respected when conducting surveillance activities. This could include informed consent for HIV testing and the removal of all personal identifiers. New guidelines on ethical issues are in preparation (7).

The following key issues must be assessed:

- Is there an ethical clearance for conducting HIV surveillance?
- Is the confidentiality of participants ensured?
- Are participants protected when their data are reported to the health information systems?
- Are services provided to participants?
- Are there informed consent forms?
- Is access to data restricted to persons who are authorized to use the data?

3.2.E. Sufficient budget and resources are provided for the activity

Areas to be assessed include the following:

- Is the budget cost-efficient?
- Is the budget flexible to accommodate follow up on quality issues and changes in methodology?
- Is the budget sufficient to carry out quality surveillance activities?

Suggested frequency and methods for activity assessment

System inputs should be reviewed and assessed:

- prior to every round of data collection
- every time a new data collection activity is planned which is not part of regular reporting
- as part of a systemwide review or assessment.

3.2.1. Assess HIV/HIV advanced infection case reporting systems

Description

HIV/HIV advanced infection and HIV case reporting was traditionally a passive or routine form of surveillance, similar to other reporting systems used for communicable diseases. Under such systems, certain types of health facilities and health-care providers are expected to send reports on a routine basis to a central level.

Objectives of HIV/HIV advanced infection case reporting

HIV and HIV advanced infection case reporting is done for the following reasons:

- To detect unusual spikes or an increase in the number of cases, especially in areas that generally have a low HIV prevalence
- To provide a qualitative sense of how well established the epidemic is, who is affected and how the epidemic is distributed, geographically and by mode of transmission
- To contribute to the estimation of the treatment and care burden, to plan for and assess the effectiveness of care interventions.

Case reporting in higher-prevalence areas

As HIV epidemics have evolved, particularly in more heavily affected areas, HIV/ HIV advanced infection case reporting has gradually shifted to become much more active. Designated M&E staff contact providers and institutions to ensure timely and accurate case reports. In 2006, a new set of guidelines was published, harmonizing HIV case definitions with clinical staging and immunological classifications to support:

- improved HIV case related surveillance
- better tracking of HIV incidence
- better determination of the prevalence of HIV infection and treatment burden
- better planning for public health responses (8).

Case reporting in lower-prevalence areas

In low-prevalence settings, HIV/HIV advanced infection case reporting tends to be done infrequently or at a low volume. Reporting HIV advanced infection cases in such settings should trigger investigation about possible outbreaks that have not been detected through the surveillance system.

HIV/HIV advanced case reporting checklist

Before beginning to work with this checklist, review the detailed questions above (Section 3.2.1) and decide which ones will be included in the assessment. Remember that the detailed questions in this guideline are a starting point. Feel free to add more questions or issues. Specific comments found below pertain specifically to this surveillance activity.

Checklist: HIV case reporting/HIV advanced case reporting

Create your checklist by adding detailed questions to each assessment area below.

Issue	Description
3.2.1A	An approved methodology and protocol for data collection is available at all sites. Quality standards are in place.
3.2.1B	Staffing and supervision are adequate for data collection. Reporting procedures exist at the central, regional and local levels.
3.2.1C	Adequate laboratory capacity is available and sufficient equipment, supplies, trained staff and procedures are in place.
3.2.1D	Ethical standards are in place to protect privacy and all personal identifiers have been removed. <ul style="list-style-type: none">■ Is there an ethical clearance for conducting HIV surveillance?■ Is the confidentiality of participants ensured?■ Are participants protected when their data are reported to the health information systems?■ Are services provided to participants?■ Are there informed consent forms?■ Is access to data restricted to persons who are authorized to use the data?
3.2.1E	Sufficient budget and resources are provided for the activity.

Issue 3.2.1A. An approved data collection methodology and protocol is available

The current trend is to promote universal access to treatment and care. Reliance on regular HIV/HIV advanced infection case reporting is gradually becoming more relevant as more people are coming to the health services for testing.

An approved country protocol should be available at all sites. The protocol should describe in detail:

- standard definitions for HIV advanced infection and HIV cases according to nationally agreed upon guidelines, including definitions of paediatric and adult cases
- the data that will be collected, clearly defined
- appropriate methods for detecting the mode of transmission
- appropriate methods for data collection in different population groups
- questionnaires adapted and validated to the local context and language
- data entry quality control procedures in place
- facility-based data collection
- supervision of data collection.

Issue 3.2.1B. Adequate staffing, supervision and reporting procedures are in place

Reporting procedures exist at the central, regional and local levels. Staff must be able to compile and report data in standard and usable formats. The system should be easy to implement because it will be maintained by individuals with multiple other responsibilities (9).

Documenting key information greatly enhances the value of reporting. Reporting systems tend to reflect patterns of HIV testing or treatment for HIV advanced infection, rather than the actual distribution of disease in the population. It is very important to track information that can help shed light on factors such as:

- pattern of referral of HIV/ HIV advanced infection cases for antiretroviral therapy (ART)
- changes in HIV or HIV advanced infection case definitions
- addition of new sites.

The reporting system must have the following:

- Approved formats for reporting and forms for aggregation of data for reporting at different levels (site, district, regional and national):
 - basic information such as age, sex, mode of transmission and reason for testing for each individual
 - numerators and denominators by key population at increased risk (that is, for each population, total number testing positive and total number tested)
 - correct reporting of new versus cumulative infections at all levels, with cumulative totals for annual reports being equal to the sum of the monthly/quarterly reports.
- Adequate training and supervision of staff (monitoring and assessment officers and others) who are responsible for preparing data submissions and reports
- A process, schedule and clear lines of responsibility for conveying by telephone, fax, mail or Internet:
 - local data/reports to the regional level
 - from the regional to the national level. Sometimes countries do not have adequate infrastructure to support electronic reporting. Electronic reporting should not be mandatory if this is the case.
- On-time reporting of data (monthly/quarterly), even if there are no new cases.

Issue 3.2.1C. Laboratory capacity is adequate

Adequate laboratory capacity is available with sufficient equipment, supplies, trained staff, and procedures are in place. This is a specialized area for people trained in laboratory issues. WHO Diagnostics and Laboratory Technology produces regular guidelines on quality assurance for HIV testing, provided at http://www.who.int/diagnostics_laboratory/publications/en/index.html.

A trained specialist would assess:

- availability of reagents, test kits, equipment and supplies for HIV case reporting and CD4 estimation machines (for ART initiation and HIV advanced infection case reporting)
- availability of appropriately trained laboratory staff for HIV testing
- appropriate storage, handling, and transport provisions and procedures at sites where testing is not available
- use of testing algorithms that have been appropriately revised if new HIV tests kits have been introduced
- use of an internal quality assurance methodology
- appropriate procedures for quality control, including a quality control system for HIV testing.

Issue 3.2.1D. Appropriate ethical standards are in place at all sites

HIV surveillance systems should ensure that ethical principles are respected when conducting surveillance activities. This could include ensuring informed consent for HIV testing and the removal of all personal identifiers. New guidelines on ethical issues are in preparation (7).

Assess the key issues in this area:

- Is there an ethical clearance for conducting HIV surveillance?
- Is the confidentiality of participants ensured?
- Are participants protected when their data are reported to the health information systems?
- Are services provided to participants?
- Are there informed consent forms?
- Is access to data restricted to persons who are authorized to use the data?

Issue 3.2.1E. Sufficient budget and resources are available

Smooth functioning of the system will depend on sufficient national allocation of resources for HIV surveillance and disbursement of funds. These include:

- Are salaries for staff, supervision and monitoring, and budget allocation adequate for HIV surveillance activities?
- training budget
- resources for reporting information between levels and procurement of materials (e.g. laboratory equipment and reagents for HIV testing and CD4 testing).

Suggested frequency of assessment and existing resources

Periodic higher-level or external assessment every three to five years will examine the issues described above and will rely on discussion with key informants as well as reviews of logbooks, process documentation and reports.

Existing resources and guidelines for HIV case reporting activities

See Appendix A for a complete list of sources. The list below provides specific sources for case reporting activities and assessments.

- *Protocol for the evaluation of epidemiological surveillance systems (9)*. http://whqlibdoc.who.int/hq/1997/WHO EMC DIS_97.2.pdf
- *WHO case definitions of HIV for surveillance and revised clinical staging and immunological classification of HIV-related disease in adults and children (8)*. www.who.int/hiv/pub/vct/hivstaging/en/index.html
- *Three interlinked patient monitoring systems for HIV care/ART, MCH/PMTCT, and TB/HIV: standardized minimum dataset and illustrative tools (10)*. http://www.who.int/hiv/pub/imai/three_patient_monitor/en/

3.2.2. Assess sexually transmitted infection case reporting systems

Description

The five components of surveillance necessary for effective control programmes for STI are as follows:

- Case reporting
- Prevalence assessment and monitoring
- Assessment of the etiology of STI syndromes
- Antimicrobial resistance monitoring
- Special studies.

Objectives

Surveillance of STIs has many different purposes and is a system that should be implemented in its own right. In the context of second generation surveillance:

- STI case reporting is relevant for detecting unusual spikes or an increase in the numbers of STI cases, especially in low HIV prevalence areas. These spikes may be indicative of a potential risk for HIV transmission.
- STI case reporting may be one of the most powerful early warning tools in environments where there may be little other information available.
- Data from STI case reporting systems may be used to assess the effectiveness of HIV prevention interventions. Therefore, strengthening local detection, monitoring and reporting of STI cases can make a strong contribution to a country's ability to stay ahead of an HIV epidemic.

Syndromic and etiological STI case reporting

In countries that rely on *syndromic STI case reporting* (making a diagnosis on the basis of symptoms), male urethral discharge is the most useful syndrome to monitor since urethral discharge is highly suggestive of recent unprotected sexual intercourse.

When available, *etiological STI case reporting* (making a diagnosis on the basis of laboratory tests) should focus on primary and secondary syphilis and gonorrhoea, since these are acute conditions that are also suggestive of unprotected sexual intercourse.

STI case reporting checklist

Before beginning to work with this checklist, review the checklist and detailed questions given earlier in this section. Remember that this guideline is a starting point. Feel free to add more questions or issues.

Comments below pertain specifically to this surveillance activity.

The issues to be assessed are very similar to those for HIV/HIV advanced infection case reporting, so we suggest that you read Section 3.2.1 before this section.

Checklist: HIV case reporting/HIV advanced case reporting

Create your checklist by adding detailed questions to each assessment area below.

Issue	Description
3.2.2A	An approved methodology and protocol for data collection is available at all sites. Quality standards are in place.
3.2.2B	Staffing and supervision are adequate for data collection. Reporting procedures exist at the central, regional and local levels.
3.2.2C	Adequate laboratory capacity is available and sufficient equipment, supplies, trained staff and procedures are in place.
3.2.2D	Ethical standards are in place to protect privacy and all personal identifiers have been removed. <ul style="list-style-type: none"> ■ Is there an ethical clearance for conducting HIV surveillance? ■ Is the confidentiality of participants ensured? ■ Are participants protected when their data are reported to the health information systems? ■ Are services provided to participants? ■ Are there informed consent forms? ■ Is access to data restricted to persons who are authorized to use the data?
3.2.2E	Sufficient budget and resources are provided for the activity.

Issue 3.2.2A. A approved methodology and protocol for data collection is available

- Make sure clear case definitions for each syndrome or disease are available, with clearly defined criteria.
- Each syndrome or disease can be accurately detected and reported.
- Core data elements are recorded, which can provide more systematic detail on patient demographics and risk characteristics (these are comparable to those used for HIV/HIV advanced infection case reporting), including knowledge of HIV coinfection, where possible.
- Data are complete.
- Periodic assessment is done of the etiology of each STI syndrome by laboratory diagnosis, as there are newer, faster and cheaper diagnostic tools for STI.

Issue 3.2.2B. Adequate staffing, supervision and reporting procedures are in place

Adequate documentation of changes in the STI programme or health-care system which might influence trends is extremely important. Some examples of changes that should be documented include:

- modifications to case definitions
- changes in screening policies or practices
- increases or decreases in service provision (e.g. number of facilities, providers, hours of operation).

Without such information, it is difficult to interpret fluctuations. Documentation can help in identifying the difference between spurious trends and true changes in disease burden that should trigger investigation. Look for:

- well-structured reporting procedures in place between health-care providers, laboratories and public health authorities
- hand-tabulated (or computerized) line-listed data that provide maximum flexibility for interpretation and can be easily manipulated to perform rapid analyses
- timeliness of reporting.

Issue 3.2.2C. Adequate laboratory capacity is available

Specifically for assessing STI activities, look for the availability of:

- reagents, test kits, equipment and supplies for syphilis serology (e.g. rapid plasma reagin [RPR] or Venereal Disease Research Laboratory [VDRL]) or rapid testing for syphilis
- laboratory capacity if using etiological diagnosis, which should include capacity for *Treponema*-specific serology for syphilis (e.g. *Treponema pallidum* particle agglutination assay [TPPA] or *Treponema pallidum* haemagglutination assay [TPHA]), gonococcal culture and nucleic acid amplification testing (NAAT) for gonorrhoea and chlamydial infection.
- use of testing algorithms that have been appropriately revised if rapid syphilis test kits are introduced
- appropriately trained laboratory personnel
- appropriate storage, handling and transport provisions
- internal quality assurance
- quality control.

- Issue 3.2.2D. Appropriate ethical standards are in place at all sites

These include the following:

- Protection of the privacy of patients
- Provision of services to participants
- Respect for confidentiality of the data.

Issue 3.2.2E. Sufficient budget and resources are provided

Smooth functioning of the system will depend on sufficient allocation and disbursement of funds. These include funds for

- staff and supervisor salaries
- training
- resources for reporting information between levels
- procurement of materials (e.g. laboratory equipment and reagents for STI testing).

Suggested frequency of assessment

Internal assessment must be ongoing. Periodic higher-level or external assessment will examine the issues described above every three to five years and will rely on discussions with key informants, as well as reviews of logbooks, process documentation and reports.

Existing resources and guidelines for implementation

See Appendix A for a complete list of sources. The list below provides specific sources for STI surveillance activities and assessments.

- *Module 4: Surveillance for sexually transmitted infections: participant manual (11)*. http://www.searo.who.int/LinkFiles/Publications_Module-4.pdf
- *Guidelines for sexually transmitted infections surveillance (12)*. <http://www.who.int/hiv/pub/sti/pubstigidelines/en/>. An update is in preparation.

3.2.3. Assess size estimation mapping activities

Description

Size estimates of key populations at higher risk for HIV play a central role in determining risk potential and are a key criterion for guiding the prevention response.

Objectives of size estimation by mapping activities

Routine mapping of key populations at higher risk to identify hotspots and obtain broad measures of size is increasingly becoming a routine part of HIV surveillance.

Mapping is used for:

- local programme planning
- national prioritization
- surveillance planning
- national estimates and projections.

How mapping is used

Mapping can involve an initial assessment in all areas of the country. More in-depth mapping is used in circumscribed geographical areas if large numbers of key populations at higher risk are found.

Mapping for the purposes of size estimation entails systematic estimation of the number of members from key populations at higher risk at identified hotspots (i.e. spots where such populations congregate). The estimates are done through a combination of observation and talking to key informants who are familiar with the area and the patterns of behaviour of the population being mapped. The reliability of such mapping exercises for size estimation depends on a number of factors, including the ability to comprehensively identify all spots where such population members congregate; the ability to correct for double counting within and across spots, and for variability at different times of the day or week for highly mobile populations.

Before beginning to work with this checklist, review the master checklist and the detailed questions provided for each issue. Remember that this guideline is a starting point. Feel free to add more questions or issues.

Comments below pertain specifically to this surveillance activity.

Checklist: Mapping activities for size estimation

Issue	Description
3.2.3A	An approved methodology and protocol for data collection is available at all sites. Quality standards are in place.
3.2.3B	Results are adequately validated.
3.2.3C	Staffing and supervision are adequate for data collection. Reporting procedures are in place at the central, regional and local levels. <ul style="list-style-type: none"> ■ Adequate training and supervision of staff (monitoring and assessment officers and others) is conducted. ■ Approved formats and forms for aggregation of data for reporting at different levels (site, district, regional and national) are in place. ■ A process, schedule and clear lines of responsibility have been defined for conveying information by telephone, fax, mail or Internet.
3.2.3D	Ethical standards are in place to protect privacy and all personal identifiers have been removed. <ul style="list-style-type: none"> ■ Ethical clearance has been taken for conducting HIV surveillance. ■ Confidentiality of the participants is ensured. ■ Participants are protected when their data are reported to the health information systems. ■ Services are provided to participants. ■ Informed consent forms are available. ■ Data access is restricted to persons who are authorized to use the data.
3.2.3E	Sufficient budget and resources are available.

Issue 3.2.3A. An approved methodology and protocol for data collection is available

- Use clear population definitions with delineation of subtypes where appropriate.
- Clearly define the boundaries of mapping areas.
- Clearly define the method of calculating site-specific population size estimates.

Issue 3.2.3B. Results are adequately validated

Determining the sizes of key populations at higher risk in local areas using mapping-based methods is challenging. The hidden and stigmatized nature of the behaviours that qualify individuals as part of a key population at increased risk often means that these populations are not easily accessible. Members are not always easily identifiable. Membership in such a population can be very fluid, which is why it is so important to have clear inclusion criteria. For example, is a man who has sex with men someone who has had anal sex with more than five different partners in the past month? Or is it someone who has exchanged sex for money? Be clear about this in your protocol.

In addition, validate your estimates by having a different team of investigators repeat the mapping activities in at least a subset of sites using the same methodology. This type of repeat exercise can be used to help develop uncertainty bounds around the mapping-based estimates.

Issues 3.2.3C, 3.2.3D

Refer to Sections 3.2.1 and 3.2.2 for examples.

Issue 3.2.3E. Appropriate ethical standards are in place at all sites

- Appropriate data security procedures are in place and adhered to.
- Personal identifiers are not included.
- Data are not shared with the police or other authorities.
- Security and confidentiality of the data are assured.

Issue 3.2.3F. Sufficient budget and resources are available

Refer to Sections 3.2.1 and 3.2.2.

Suggested frequency

Given its importance, mapping efforts should be routinely assessed, for example, annually or bi-annually, to make sure the country has up-to-date information to guide the response.

Mapping is usually done as a one-off activity (that is, it is not part of a routine system); therefore, assessing mapping activities would probably be more periodic than routine. The assessment might involve a team to review documentation, interview project staff, review results and, if possible, validate and compare results with other size estimates, as described above.

Conduct initial mapping in all areas of the country with sufficient frequency to make sure that the country has information to guide the HIV response. Typically, this would be every two to three years if small numbers were found previously. If large numbers are found, consider conducting more in-depth mapping annually.

Existing resources and guidelines for mapping-based size estimation activities and assessment

See Appendix A for a complete list of sources. The list below provides specific sources for mapping-based size estimation activities and assessments.

- *Guidelines on estimating the size of populations most at risk to HIV (13)*. http://www.who.int/hiv/pub/surveillance/final_estimating_populations_en.pdf
- *Mapping and situation assessment of key populations at high risk of HIV in three cities in Afghanistan (14)*. <http://go.worldbank.org/0UFIMSZD40>

3.2.4. Assess activities for survey-based size estimates

Description and objectives

In addition to mapping, more in-depth size estimates in certain areas can be obtained by using survey-based multipliers from probability surveys among key populations at increased risk. These methods rely on the ability to measure the overlap of individuals captured by two different data sources. Both sources could be surveys or one could be a survey and one a list or count of individuals.

Capture–recapture

Capture–recapture is a type of multiplier involving two or more surveys that involve “tagging” members of key populations at higher risk in locations where they congregate. The principle is to estimate the overlap between the two sources with respect to a group of people defined in a specific way (e.g. women who have sold sex in the past one month). The ability for survey-based multipliers to provide accurate estimates depends on the appropriateness of the design of the measurement tools (e.g. survey questionnaires, lists) and the quality of the data.

Checklist for survey-based size estimate

Before beginning to work with this checklist, review the master checklist and the questions provided for each issue. Remember that this guideline is a starting point. Feel free to add more questions or issues.

Comments below pertain specifically to this surveillance activity.

Checklist: Survey-based size estimate of populations at higher risk for HIV

Issue	Description
3.2.4A	An approved methodology and protocol for data collection is available at all sites. Quality standards are in place.
3.2.4B	Results are adequately validated.
3.2.4C	Staffing and supervision are adequate for data collection. Reporting procedures are in place at the central, regional and local levels.
3.2.4D	Ethical standards are in place to protect privacy and all personal identifiers have been removed. <ul style="list-style-type: none"> ■ Ethical clearance has been taken for conducting HIV surveillance. ■ Confidentiality of the participants is ensured. ■ Participants are protected when their data are reported to the health information systems. ■ Services are provided to participants. ■ Informed consent forms are available. ■ Data access is restricted to persons who are authorized to use the data.
3.2.3E	Sufficient budget and resources are available.

Issue 3.2.4A. An approved methodology and protocol for data collection is available

- The two data sources must define the population in the same way.
- At least one (or both) of the surveys must be random – that is, it should be a probability survey of the group being counted (note: a “capture” where everyone is tagged is conceptually the same as a “take-all” survey, which is a type of probability survey)
- Respondents must correctly answer questions related to overlap between the data sources, for example:
 - accurately report having been “tagged” if using capture–recapture
 - accurately report having had contact with a service/institution, if using an institution-based multiplier
- Questions related to the overlap must be correctly formulated to provide an accurate link between the two data sources.
- Violation of assumptions must be thoroughly assessed during analysis, for example:
 - independence of the two data sources
 - correspondence between the two data sources
 - minimal population movement between the time of the two measurements.

3.2.4B to 3.2.4E are similar to those in the last checklist on mapping.

Please refer to that and previous checklists and comments.

Suggested frequency of and methods for assessment

As is the case with mapping-based size estimates, estimates derived from survey-based multipliers are a type of one-off activity. Thus, assessment would possibly be on a more ad-hoc basis, whenever such methods are used to help establish size estimates for populations whose behaviour puts them at higher risk. Assessment would include reviewing documents, interviewing project staff and comparing with other size estimates to help assess potential biases.

Existing resources and guidelines for survey-based size estimation activities

See Appendix A for a complete list of sources. The resource below provides specific sources for estimates derived from activities and assessments of survey-based multipliers.

Guidelines on estimating the size of populations most at risk to HIV (13).

http://www.who.int/hiv/pub/surveillance/final_estimating_populations_en.pdf

3.2.5. Assess morbidity and mortality surveillance activities

Description

HIV morbidity and mortality data can each be estimated using direct or indirect methods. Each method has its limitations and is highly dependent on the quality of the available data. In the case of HIV-related morbidity (that is, HIV advanced infection case reporting), HIV burden is commonly estimated (indirectly) using the UNAIDS Estimates and Projection Package (EPP) and Spectrum (15). However, direct estimates may also be obtained if good-quality information is available through counselling and testing, and ART delivery systems.

Objectives of morbidity and mortality surveillance activities

HIV morbidity and mortality sources are used primarily for the following reasons:

- Use morbidity data to anticipate treatment needs and assess the success of prevention interventions in the case of paediatric AIDS.
- Use mortality data as an indicator of survival among HIV-infected individuals. These data also contribute to the interpretation of changes in HIV incidence.

Areas with a high burden of HIV infection

In areas with a high burden of HIV infection and a large proportion of cases on ART, the reporting systems for care and combined ART monitoring have become much more sophisticated. They are dependent on testing patterns that can change over time, affecting the interpretation of the data. Methods for estimating mortality can also use EPP as well as the ART reporting system.

Areas with a lower prevalence of HIV infection

In lower-prevalence countries or countries without strong ART delivery systems, it may be necessary to rely on hospital records or vital registration. These data are likely to underestimate mortality due to HIV advanced infection but might help with establishing trends or understanding locations and populations that are affected.

Morbidity and mortality surveillance checklist

Before beginning to work with this checklist, review the master checklist and the questions provided for each issue. Remember that this guideline is a starting point. Feel free to add more questions or issues.

The comments below pertain specifically to this surveillance activity.

Checklist: Morbidity and mortality surveillance

Issue	Description
3.2.5A	An approved methodology and protocol for data collection is available at all sites. Quality standards are in place.
3.2.5B	Staffing and supervision are adequate for data collection. Reporting procedures are in place at the central, regional and local levels.
3.2.5C	Adequate laboratory capacity is available with sufficient equipment, supplies, trained staff and procedures in place.
3.2.5D	Ethical standards are in place to protect privacy and all personal identifiers have been removed. <ul style="list-style-type: none">■ Ethical clearance has been obtained for conducting HIV surveillance.■ Confidentiality of participants is ensured.■ Participants are protected when their data are reported to the health information systems.■ Services are provided to participants.■ Informed consent forms are available.■ Data access is restricted to persons who are authorized to use the data
3.2.5E	Sufficient budget and resources are provided for the activity.

Issue 3.2.5A. An approved methodology and protocol for data collection is available

For direct estimates:

- Strong reporting systems should be in place.
- Definitions used for HIV-related morbidity and need for ART should reflect the most up-to-date thinking.

For indirect estimates, such as estimates prepared with EPP:

- Key populations at increased risk for HIV should be adequately described.
- Information should be provided about the size of key populations.
- Trends in HIV prevalence should be provided.

Issue 3.2.5B. Adequate staffing, supervision and reporting procedures are in place

Reporting and interpreting morbidity and mortality trends should account for any change in the patterns of HIV testing (for example, people getting tested earlier as treatment is more widely available).

Issues 3.2.5C–3.2.5E

Refer to the master checklist and the detailed sample questions that follow it.

Suggested frequency and methods for assessment

Periodic higher-level or external assessment every three to five years will examine the issues described above and will rely on discussion with key informants as well as reviews of logbooks, process documentation and reports.

Existing resources and guidelines for activities related to morbidity and mortality trends

See Appendix A for a complete list of sources. The list below provides specific sources for activities related to morbidity and mortality trends.

- *WHO case definitions of HIV for surveillance and revised clinical staging and immunological classification of HIV-related disease in adults and children (8)*. www.who.int/hiv/pub/vct/hivstaging/en/index.html
- *Three interlinked patient monitoring systems for HIV care/ART, MCH/PMTCT, and TB/HIV: standardized minimum data set and illustrative tools (10)*. http://www.who.int/hiv/pub/imai/three_patient_monitor/en/
- *Epidemiological tools for HIV estimates: Spectrum/EPP 2011 (16)*. <http://www.unaids.org/en/dataanalysis/tools/spectrumep2011/>
- *MEASURE Evaluation. SAVVY: Sample Vital Registration with Verbal Autopsy (17)*. <http://www.cpc.unc.edu/measure/tools/monitoring-assessment-systems/savvy>
- *A new method to estimate mortality in crisis-affected populations: validation and feasibility study (18)*. http://www.fantaproject.org/publications/EM_method.shtml

3.2.6. Assess HIV sentinel surveillance**Description**

HIV sentinel surveillance systems are designed to collect HIV data on a regular basis at specific facilities. These sites are, for the most part, health-facility based. Often, pregnant women or STI patients are targeted for sentinel surveillance.

Objectives of HIV sentinel surveillance activities

HIV sentinel surveillance is used primarily for the following reasons:

- To detect HIV prevalence trends
- To identify epidemic hotspots using disaggregation data by age and location.

Areas with a high burden of HIV infection

In areas with a high burden of HIV infection, HIV sentinel surveillance is mostly conducted among pregnant women attending ANC clinics. The results are dependent on testing patterns and expansion of programmes for prevention of mother-to-child transmission (PMTCT), which can change over time, affecting the interpretation of the data. With the increase in coverage of PMTCT services, countries are moving to replace ANC surveillance by PMTCT data. However, criteria and quality standards have to be taken into account before this transfer of information is done. A new guide is being developed to address those issues.

Methods for estimating HIV trends can also use the EPP/Spectrum software in addition to the more traditional statistical packages.

Areas with a lower prevalence of HIV infection

In lower-prevalence countries, HIV sentinel surveillance is often based in STI clinics or centres attending to key populations at increased risk.

HIV sentinel surveillance checklist

Before beginning to work with this checklist, review the master checklist and the detailed questions provided for each issue. Remember that this guideline is a starting point. Feel free to add more questions or issues.

The comments below pertain specifically to this surveillance activity.

Checklist: Morbidity and mortality surveillance

Issue	Description
3.2.6A	An approved methodology and protocol for data collection exists at all sites. Quality standards are in place.
3.2.6B	<p>Sentinel sites and quality of data are appropriate</p> <ul style="list-style-type: none"> ■ Timeliness; the data are collected on a regular basis. ■ Sentinel sites are consistent. ■ The coverage of sentinel sites is adequate. ■ Completeness of data collection is ensured. ■ Accuracy of the data collected is ensured.
3.2.6C	<p>Adequate laboratory capacity is available with sufficient equipment, supplies, trained staff and procedures in place.</p> <ul style="list-style-type: none"> ■ Is there a clear HIV testing algorithm for HIV testing for surveillance? ■ Has a new HIV test been introduced? ■ Are blood aliquots or dried blood spot specimens kept under the prescribed conditions before transport?
3.2.6D	<p>Ethical standards are in place to protect privacy and all personal identifiers have been removed.</p> <ul style="list-style-type: none"> ■ Ethical clearance has been obtained for conducting HIV surveillance. ■ Confidentiality of participants is ensured. ■ Participants are protected when their data are reported to the health information systems. ■ Services are provided to participants. ■ Informed consent forms are available. ■ Data access is restricted to persons who are authorized to use the data.
3.2.6E	Sufficient budget and resources are provided for the activity.

Issues 3.2.6A. An approved methodology and protocols for data collection is available

Sentinel sites should be provided with the necessary tools to proceed with data collection. If blood is collected in the form of dried blood spots, have the sites been provided with adequate material for drying and keeping the samples in a safe place? Supervisory visits should be conducted to ensure that the protocol is implemented correctly.

3.2.6B. Sentinel sites and quality of data are appropriate

Sentinel sites should be consistent over time in order to assess trends. Data collection should be done in a timely manner and during the same time periods, not changing seasons or months over the years.

Do the sentinel sites cover rural and urban areas? How these have been defined? Are the data collection forms filled up correctly and clearly? Are there enough data collection forms at the sites according to the protocol?

3.2.6C. Adequate laboratory capacity is available with sufficient equipment

Sentinel sites should be provided with enough materials to be able to collect samples, and should respect safety procedures with regard to patients and disposal of materials. If venous blood is collected, the site should have an adequate cold chain to ensure that the quality of the sample is not compromised. If rapid tests are being used at the site, health personnel collecting the sample should have been trained in performing these. If new HIV testing kits have been introduced, health personnel should be familiar with the new testing procedures and the new algorithm should have been validated.

3.2.6D. Ethical standards are in place to protect privacy and all personal identifiers have been removed

Regular supervision of sentinel sites should be conducted to ensure that the ethical standards described in the surveillance protocol and confidentiality issues are respected.

3.2.6E. Sufficient budget and resources are provided

Adequate human and financial resources should have been allocated to HIV surveillance in order to adequately implement the surveillance protocols.

3.2.7. Assess integrated biological and behavioural surveillance activities for key populations and national population-based surveys for the general population**Description**

Integrated biological and behavioural surveillance (IBSS) surveys may be conducted in the general population and/or key populations at increased risk.

These surveys are designed to collect HIV data on a regular basis in the community or at the national level. A specific guideline has been developed which describes the types of sites and populations: http://www.who.int/hiv/pub/surveillance/most_at_risk/en/index.html (19).

Objectives of IBSS survey activities

Integrated biological and behavioural surveillance surveys are used primarily for the following reasons:

- To detect HIV prevalence trends and risk factors among different key populations
- To identify epidemic hotspots using disaggregated data by age and location
- To identify the level of HIV prevalence and its distribution among the sexes and rural or urban settings in generalized epidemics.

Areas with a high burden of HIV infection

In areas with high burden of HIV infection, an integrated biological and behavioural surveillance survey could be implemented in the whole population through a demographic and health survey with HIV testing or AIDS indicator survey, or in specific key populations in some areas of the country.

There are different methods for and approaches to sampling in these populations. All have their own advantages and disadvantages. Appropriate methods should be context specific. More detailed information is available in the specific guides for key populations at increased risk listed in the references section (19) or in the guide in how to conduct national population-based surveys (20). <http://www.who.int/hiv/pub/surveillance/measuring/en/index.html>

Areas with a lower prevalence of HIV infection

In lower-prevalence countries, integrated biological and behavioural surveillance surveys are often directed at key populations at increased risk.

Integrated biological and behavioural surveillance survey checklist

Before beginning to work with this checklist, review the master checklist and the detailed questions provided for each issue. Remember that this guideline is a starting point. Feel free to add more questions or issues.

Checklist: Morbidity and mortality surveillance

Issue	Description
3.2.7A	An approved methodology and protocol for data collection exists at all sites. Quality standards are in place. <ul style="list-style-type: none"> ■ Is time–location sampling used? ■ Is respondent-driven sampling used? ■ Is snowball or facility-based sampling used? ■ Is a national population survey used such as the demographic and health survey (DHS) or AIDS indicator survey (AIS) or other random sampling household surveys? ■ What is the frequency of the surveys? ■ Is there proper coverage and timeliness of the surveys?
3.2.7B	Staffing and supervision are adequate for data collection. Reporting procedures exist at the central, regional and local levels. <ul style="list-style-type: none"> ■ Are blood aliquots or dried blood spots kept under the prescribed conditions? ■ Is regular supervision done for data collection and quality issues? ■ Are questionnaires adequately coded? ■ Are questionnaires completed?
3.2.7C	Adequate laboratory capacity is available with sufficient equipment, supplies, trained staff and procedures in place. <ul style="list-style-type: none"> ■ Is there a clear HIV testing algorithm for HIV testing for surveillance? ■ Has a new HIV test been introduced? ■ Is sample collection, storage and transport adequate?
3.2.7D	Ethical standards are in place to protect privacy and all personal identifiers have been removed. <ul style="list-style-type: none"> ■ Ethical clearance has been obtained for conducting HIV surveillance. ■ Confidentiality of participants is ensured. ■ Participants are protected when their data are reported to the health information systems. ■ Services are provided to participants. ■ Informed consent forms are available. ■ Data access is restricted to persons who are authorized to use the data.
3.2.7E	Sufficient budget and resources are provided for the activity.

Issues 3.2.7A. An approved methodology and protocol for data collection is available

Integrated biological and behavioural surveillance surveys or national population-based surveys are complex and expensive. Standard protocols should be written, and all the procedures for data collection, behavioural and biological methods, sampling and other issues should be reflected in these protocols.

If more than one survey has been conducted, are these surveys using the same methods for sampling and HIV testing? Are the same populations being covered? Are the same geographical areas?

3.2.7B. Staffing and supervision are adequate for data collection

One of the key factors for successful completion of an integrated biological and behavioural surveillance survey or national population survey is to have adequate staffing and supervision of data collection activities. Are there any reports which reflect that supervision has been done and that the issues or problems encountered have been addressed? How frequently was supervision done and who conducted these?

3.2.7C. Adequate laboratory capacity is available

The quality of samples, storage and transportation are key features of a good integrated biological and behavioural surveillance survey or national population-based survey. The training of staff in collecting blood samples and storing them will determine if the laboratory can perform adequately. HIV testing strategies for surveillance have to be described and, if new HIV tests kits are introduced, those have to be validated.

Laboratory personnel have to be trained and supervised when they perform HIV testing and quality assurance. Either internal or external quality assurance programmes for HIV testing need to be in place.

3.2.7D. Ethical standards are in place to protect privacy and all personal identifiers have been removed

HIV surveillance protocols need to be approved by ethics review committees. Confidentiality and ethical standards should ensure the safety of all participants in the surveys. Health personnel as well as data collectors need to be trained in this area as well.

3.2.8. Assess systems that measure incidence***Description and approaches to estimation of HIV incidence***

HIV incidence is the rate at which HIV infection is acquired in a population. It is a quantitative index that measures the extent of ongoing HIV transmission in the population. Estimation of HIV incidence may be undertaken for three distinct purposes:

- Population surveillance
- Evaluation of the impact of preventive interventions
- Selection of a population for recruitment to a clinical trial on the efficacy of a new preventive intervention or early treatment.

A variety of approaches have been used for the estimation of HIV incidence but all have limitations in terms of their accuracy, their feasibility or their cost. The main approaches are as follows:

- Direct measurement of incidence: in a longitudinal study
- Indirect estimation of incidence:
 - Model-derived estimation of incidence from HIV prevalence in serial prevalence surveys
 - Model-derived estimation of incidence using assumptions of risk behaviour and HIV-1 transmission such as EPP/Spectrum
- Indirect estimation from HIV prevalence in young, recently exposed populations. Focusing on populations in whom the time since first exposure to HIV infection is believed to be short is a good way to estimate incidence.
- Estimation using laboratory tests for recent HIV infection; new HIV incidence tests, available at: http://www.who.int/hiv/pub/surveillance/sti_surveillance/en/index.html (21).

Objectives of estimating HIV incidence

The main objectives of measuring HIV incidence are:

- to estimate the level of HIV incidence at the population level, in different population groups or geographical locations
- to monitor the impact of interventions.

Areas with a high burden of HIV infection

In areas with high burden of HIV infection where good data using two or more national population surveys are available, it is advisable to use two or three methods and compare the results.

Areas with a lower prevalence of HIV infection

In lower-prevalence countries, it is very difficult to measure HIV incidence at the national level. However, using new HIV testing technology, new infections can be identified in reported cases.

Surveillance checklist for activities to measure incidence

Before beginning to work with this checklist, review the master checklist and the detailed questions provided for each issue. Remember that this guideline is a starting point. Feel free to add more questions or issues.

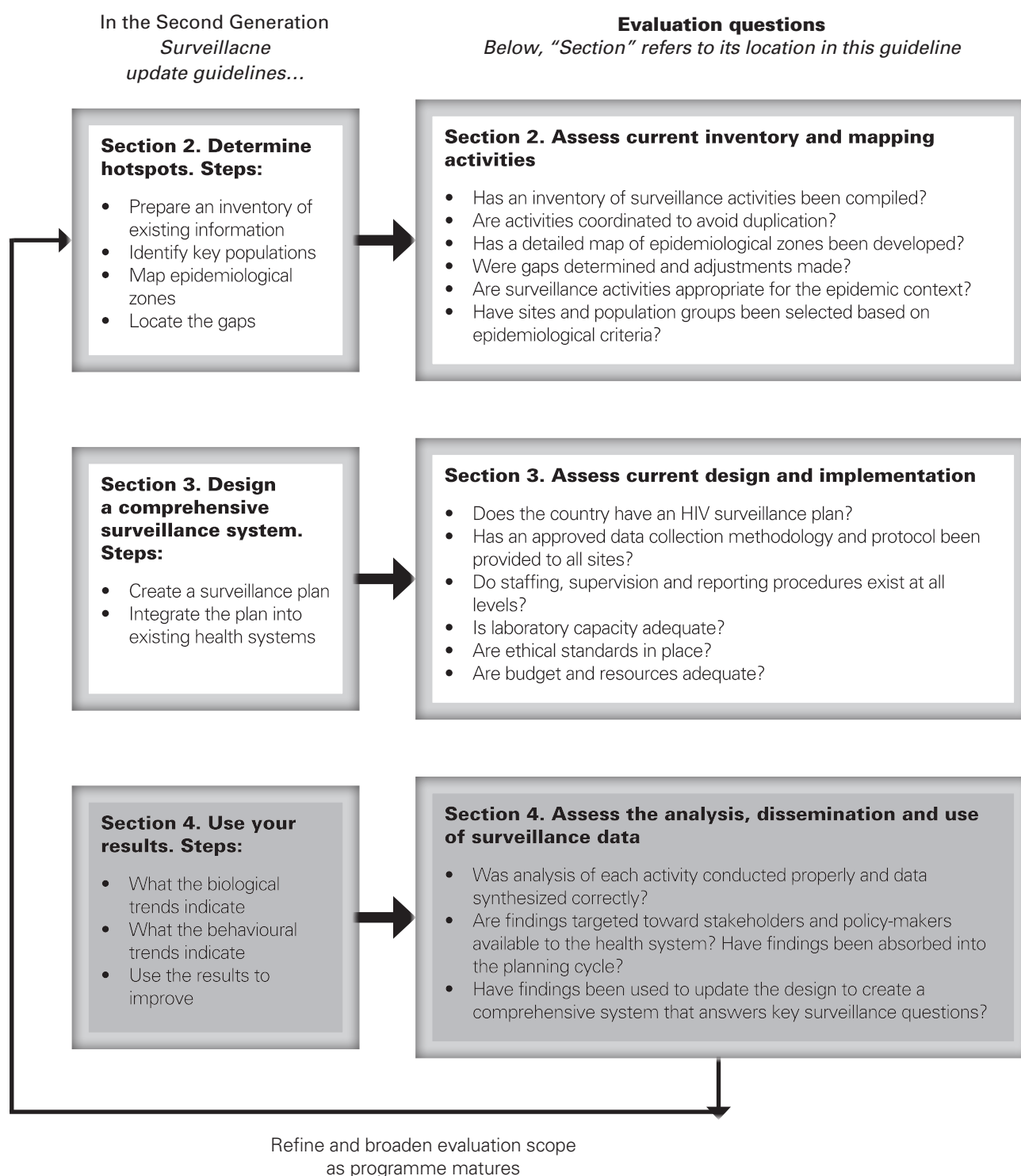
Checklist: Assess systems to measure HIV incidence

Issue	Description
3.2.8A	An approved data collection methodology and protocol for measuring HIV incidence has been developed. Quality standards are in place. If modelling has been used: review if international standards or assumptions and methods are clearly defined.
3.2.8B	Staffing and supervision are adequate for data collection. Reporting procedures exist at the central, regional and local levels.
3.2.8C	Adequate laboratory capacity is available with sufficient equipment, supplies, trained staff and procedures in place. Is there a clear algorithm for HIV testing for HIV surveillance? Has a new HIV incidence test been introduced?
3.2.8D	Ethical standards are in place to protect privacy and all personal identifiers have been removed. <ul style="list-style-type: none">■ Ethical clearance has been obtained for conducting HIV surveillance.■ Confidentiality of participants is ensured.■ Participants are protected when their data are reported to the health information systems.■ Services are provided to participants.■ Informed consent forms are available.■ Data access is restricted to persons who are authorized to use the data.
3.2.8E	Sufficient budget and resources are provided for the activity.

4. Assess the analysis and use of surveillance data

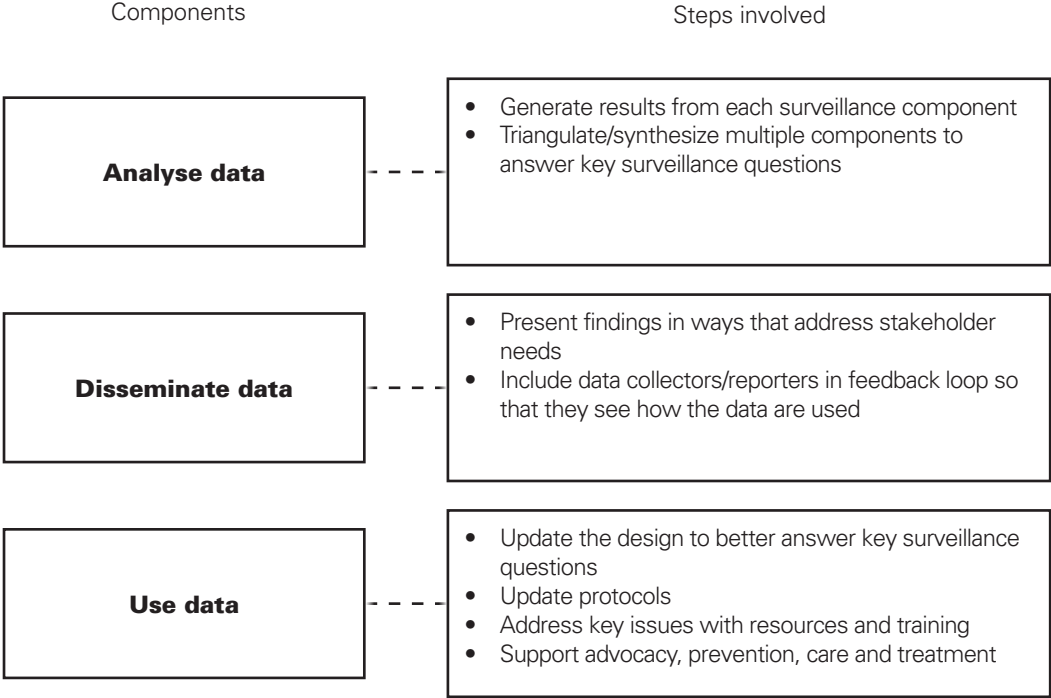
The last major step in the *Guidelines for second generation surveillance: an update*, shown on the left bottom square in Figure 4.1, is to use the information generated by the system to influence decisions related to HIV prevention and care.

Figure 4.1. Assess the analysis, dissemination and use of data



Effective use of data is a continuum that starts from the time data collection is complete until the time information is successfully incorporated into decision-making. The data analysis and use process is broken down into several components. Figure 4.2 illustrates the major components of data analysis and use. The sections that follow provide checklists for each component.

Figure 4.2. How a programme moves from data collection to data use



4.1. Assess data analysis and synthesis

4.1.1. Objectives of data analysis

- Generate basic results from each surveillance activity undertaken by the programme.
- Use data from the different surveillance data sources to answer key surveillance questions.

Answering key surveillance questions requires a complex data analysis process involving multiple data sources from the various components of surveillance. The programme should begin with a comprehensive set of high-quality descriptive data from the various data collection systems.

4.1.2. Assess data analysis in each surveillance activity

Use the checklist below to assess the data analysis of each surveillance activity. Later you will assess how the programme handled data synthesis (triangulation) from several activities.

Checklist: Assess data analysis in each surveillance activity

Issue	Description
4.1.2A	Adequate attention is paid to data management and quality of the data.
4.1.2B	Correct analysis techniques are used to generate results.
4.1.2C	Clear reports of basic findings are generated from each surveillance data collection activity.
4.1.2D	Analysis is conducted and data are available within six months of completion of activity.
4.1.2E	Appropriate documentation is recorded during the activity.
4.1.2F	Bias is assessed by the programme.

Issues**Issue 4.1.2A. Adequate attention is paid to data management**

Data from each surveillance activity has undergone:

- Cleaning: have the data been cleaned for mistakes or errors?
- Coding: is there an appropriate coding for questionnaires?
- Data labelling: are data labelled correctly to avoid mistakes?

Issue 4.1.2B. Correct analysis techniques are used to generate results

- The analysis accounts for sampling design if reporting statistics.
 - Weighting: has the analysis taken weighting into account?
 - Cluster analysis: has data analysis taken cluster sampling into account?
- Statistical precision and power issues are considered before disaggregating.
- Appropriate weighting techniques are used when aggregating data across sampling domains.

Issue 4.1.2C. Clear reports are generated from each surveillance activity**Table 4.1. Check these specific areas of the report for each activity**

Activity	Report should include...
HIV case reporting	<ul style="list-style-type: none"> ■ Both numerators and denominators (i.e. #of people testing positive, and total # of people tested) reported by age, sex, risk category and reason for being tested ■ Information reported by month, quarter and year ■ Information reported by site and aggregated at the district, regional and national levels ■ New cases clearly differentiated from cumulative cases
HIV advanced infection case reporting	<ul style="list-style-type: none"> ■ Number of people diagnosed with HIV advanced infection reported by age, sex, mode of transmission and reason for testing ■ Adult and paediatric HIV advanced infection are reported separately ■ Information reported by month, quarter and year ■ Information reported by site and aggregated at the district, regional and national levels ■ New cases clearly differentiated from cumulative cases
STI case reporting	<ul style="list-style-type: none"> ■ Number of cases reported by syndrome or etiology separately, stratified by age, sex and risk category (with a focus on urethral discharge and/or primary and secondary syphilis and gonorrhoea) ■ Information reported by month, quarter and year ■ Information reported by facility and aggregated at the district, regional and national levels ■ New cases clearly differentiated from cumulative cases
Size estimation by mapping	<ul style="list-style-type: none"> ■ Boundaries of mapped areas ■ Definitions of populations being estimated ■ Estimated numbers of hotspots ■ Estimated and/or average number of populations at higher risk per hotspot, delineated by clearly defined subtypes, for example: <ul style="list-style-type: none"> • Female sex workers: brothel-based, street-based, residence-based, etc. • Men who have sex with men: male sex workers, men with multiple male partners (excluding male sex workers)

Survey-based size estimate	<ul style="list-style-type: none"> ■ Definitions of populations being estimated ■ Description of methodology <ul style="list-style-type: none"> • Sampling strategy • Sample size • Refusal rates • Eligibility criteria • Size estimate method, calculation ■ Estimated number of populations at higher risk ■ Potential limitations and biases
Morbidity and mortality activities	<ul style="list-style-type: none"> ■ Description of HIV/HIV advanced infection case reporting systems ■ Disaggregated reports on the age, sex and geographical distribution of HIV/ HIV advanced infection cases ■ Studies on subnotification of HIV/AIDS reporting ■ Are data available on inpatients in the hospital systems? On discharged patients? ■ Are data available on mortality due to HIV infection in hospitals? In the general population? Are age and sex distribution data available for mortality reports?
HIV sentinel surveillance	<ul style="list-style-type: none"> ■ Point prevalence <ul style="list-style-type: none"> • By facility, with both numerators and denominators (total number testing positive and total number tested) • Caution used when aggregating data at district, regional and national levels (limited to sites with similar level of epidemic maturity) ■ Prevalence trends <ul style="list-style-type: none"> • By facility • Caution used when aggregating data at district, regional and national level; ■ Limited to consistently participating sites using consistent methods ■ Limited to sites representing areas with similar stage of epidemic maturity (or using models that account for the differences) ■ Specifying the testing technology used for surveillance is important because of different test performance characteristics
Integrated biological and behavioural surveillance	<ul style="list-style-type: none"> ■ Which behavioural indicators have been used? ■ Which biological indicators have been collected? ■ Which methods for sampling have been used? ■ Is it possible to built trends over the years with different surveys? ■ Which location or geographical areas are covered by the IBBSS? ■ Descriptive analysis of important variables, for example: <ul style="list-style-type: none"> • Number of different sexual partners by type of partner within given time period • Last time condom use by type of partner • Consistent condom use by type of partner in given time frame • Average # of sex acts by type of partner in given time frame • Prevalence of HIV • Prevalence of STIs (e.g. syphilis, and gonorrhoea and chlamydia where feasible) • Exposure to interventions • Awareness of HIV status • Frequency of injecting drug use • Frequency of sharing injecting equipment ■ Correctly labelled denominators for each variable ■ Confidence intervals provided
Systems that measure incidence	<ul style="list-style-type: none"> ■ Is there any study on HIV incidence? ■ What methods have been used? ■ In which populations have the incidence studies been done?

Issue 4.1.2D. Analysis is conducted in a timely manner

Results of descriptive/crude analysis were available within 3–6 months of data collection.

Issue 4.1.2E. Appropriate documentation is recorded during the activity

Field notes and process documentation records should include:

- Deviations from methodology during fieldwork
- Contextual information that could explain anomalies in the data such as:
 - Changes in testing patterns (such as the profile of people being tested) at HIV testing centres, ANC sentinel sites, sentinel sites for populations at higher risk
 - Changes in eligibility criteria over successive rounds of data collection (e.g. for sentinel surveillance and/or community-based sample surveys).

Issue 4.1.2F. Bias is assessed by the programme

Look out for the following points while trying to account for bias:

- Reasons for implausible results have been assessed.
- Consistency in population definitions, sites over time, survey coverage areas and sampling methods were verified before the programme began trend analysis.
- Sources of selection bias were considered.

4.1.3. Assess data synthesis (triangulation)

Interpreting data to answer key surveillance questions is one of the more challenging aspects of surveillance. The right data may be collected from several activities in a well-designed surveillance system in a valid and reliable way. Making the best use of the data is still not assured. Data from each source must be analysed in the light of data from other activities to gain meaningful insights into key questions. This type of analysis is done through a process known as data synthesis or triangulation.

Key surveillance questions to be answered through the triangulation process include the following:

- Where are the majority of new infections likely to come from in the future?
- How is the epidemic changing over time in different high-risk populations, in different geographical locations or at the national level?
- How many people are currently infected with HIV and who are they?

Stakeholders in the country programme being assessed may have other important questions to answer. Meet with the stakeholders before beginning the assessment to determine their concerns.

Use the checklist below to assess the methodology for data synthesis.

Checklist: Assess the methodology for data synthesis

Issue	Description
4.1.3A	Multiple data sources have been used to answer key surveillance questions.
4.1.3B	Frequency at which data synthesis (triangulation) is conducted
	What are the main conclusions of the report? Are they clear and do they have any implications? Was triangulation a participatory process? Was the report prepared on time? Has the report triggered any policy changes? How has the report been used?

Issues

Issue 4.1.3A. Multiple data sources have been used to answer key surveillance questions

- Data on population size, risk profile and HIV prevalence were used to understand where new infections are likely to come from.
- EPP or other modelling tools were used to establish epidemic trends.
- Reasons for changes in the direction of epidemic trends were established through systematic review of all possible explanations. Multiple data sources were used to explore the evidence for and against different explanations.

Issue 4.1.3B. Frequency at which triangulation is conducted

Triangulation of different data sources to update the understanding of the epidemic is done every 2–3 years.

4.2. Assess data dissemination

4.2.1. Objectives of data dissemination

Data dissemination makes the results of analysis and triangulation available and accessible to decision-makers. Assessing the dissemination of surveillance information is important because it relates to the effectiveness and timeliness of communications to decision-makers and programme planners, which may influence decisions about prevention, care and treatment programming.

4.2.2. Assess data dissemination

Checklist: Assess data dissemination

Issue	Description
4.2.2.A	Data dissemination activities are well targeted at stakeholders, decision-makers and programme implementers.
4.2.2.B	Datasets and reports from surveillance activities are made publicly available.
4.2.2.C	The information is widely distributed and disseminated. <ul style="list-style-type: none">■ Are leaflets available for the general public?■ Have policy briefs been developed for policy-makers?■ Are there any press releases?■ Are the data used for applications to the Global Fund to fight AIDS, Tuberculosis and Malaria (Global Fund) or other grants?■ Are the technical reports sound and well prepared?■ Have the reports been sent to international organizations and donors?■ Were the reports disseminated on time or was there too long a period between the surveys and dissemination of data?■ Were the data well and clearly presented?

Issues

Issue 4.2.2A. Data dissemination activities are well targeted at stakeholders, decision-makers and programme implementers

- Efforts to map the needs of different users of surveillance data have taken place, including articulation of triangulation questions as well as those mentioned in Checklist 4.1.2.
- Materials have been developed to address the needs of different users.
- Materials are presented in the appropriate ways, using appropriate media (such as reports, slide presentations, policy briefs) and targeted to the background and level of the audience.

Issue 4.2.2B. Datasets and reports from surveillance activities are made publicly available

- An up-to-date central repository for datasets and reports describing which data are available for each key population by geographical area has been made available with requisite approvals for sensitive data.
- Documentation about the methodology and the field experience is included with the datasets and reports in the repository.

Issue 4.2.2.C. The information is widely distributed and disseminated

Review the materials for dissemination that have been published or created for dissemination.

4.3. Assess data use

The ultimate measure of effectiveness is the degree to which the information that gets disseminated is used in decision-making.

4.3.1. Objectives of data use

- Influence decisions and actions that impact prevention and care
- Advocate for programme resources.

4.3.2. Assess data use**Checklist: Assess data use**

Issue	Description
4.3.2A	Interventions match the epidemic and target priority populations. Interventions are intensive and have high coverage.
4.3.2B	National HIV advanced infection control strategy cites evidence for programme priorities based on surveillance data.
4.3.2C	Information generated by HIV surveillance systems has been disseminated. <ul style="list-style-type: none"> ■ Have policy-makers used the data in public? ■ Were the data used for planning national AIDS programme activities? ■ Has there been any policy change based on the data? ■ Are the status and trends of the HIV epidemic clearer now? ■ Has the press or media used the data? ■ Have the data been disseminated and feedback sent to participants, NGOs or health staff?

Issues**Issue 4.3.2A. Interventions match the epidemic**

- Key populations in geographical locations that have been identified as having the highest epidemic potential have intervention coverage.
- Budget allocations for HIV programming reflect the relative size/severity of the epidemic.
- Testing and counselling centres are in place in areas identified as having the greatest epidemic potential.
- Care and treatment programmes are distributed geographically according to surveillance estimates of the number of people infected with HIV.

Issue 4.3.2B. National HIV advanced infection control strategy cites evidence for programme priorities based on surveillance data

- HIV surveillance data are used to justify priorities for interventions, for instance, geographical location, populations or health services for specific populations.
- HIV surveillance data have been used for preparing proposals for grants from bilateral or multilateral donors.

Issue 4.3.2C. Information generated by HIV surveillance systems has been disseminated

- Adequate policy briefs have been developed for informing policy-makers.
- HIV surveillance results are distributed in reports or leaflets or other summary documents to the press, NGOs and civil society.
- There is clear evidence that new information has been used for planning.

4.4. Suggested frequency and methods of assessment

HIV surveillance systems should be evaluated regularly. Internal evaluation and self-assessment should take place every year or two. However, this should not replace the monitoring of surveillance activities that should continue on a regular basis. A more rigorous evaluation of the system can take place every five years. However, these recommendations are not written in stone. Evaluation should be done in an integrated manner and in coordination with other reviews of the NAP, such as evaluations of strategic plans or programme reviews done by bilateral or multilateral donors such as the Global Fund. When these large activities take place, it could be an opportunity to evaluate surveillance systems. It would maximize resources, improve standards, involve more partners and the results would have more overall impact.

The team evaluating HIV surveillance systems should be multidisciplinary. One of the first tasks is to describe the evaluation questions that need to be addressed. Developing a standard approach and tools is essential in order to compile and analyse the information that would be collected during the process. While an internal evaluation can be undertaken by professionals involved in implementation, for more rigorous evaluations, it is advisable to have external advisers or consultants. Such advisers need not be international experts but rather experts in the field, who are not involved in the day-to-day activities.

4.5. Existing resources

- *Guidelines for effective use of data from HIV surveillance systems (22)*. http://data.unaids.org/publications/IRC-pub06/jc1010-usingdata_en.pdf
- *First things first: guideline on management and coding of behavioural surveillance data (23)*. <http://www.fhi.org/en/HIVAIDS/pub/survreports/firstthingsfirst.htm>

5. Case studies

The following surveillance assessment methodologies were used in India and China.

5.1. HIV surveillance system review in India

5.1.1. Background

The HIV surveillance system in India has evolved over the years and fulfilled several important programme needs. These range from estimating the number of people infected with HIV, tracking the course of the epidemic in highly affected areas and among vulnerable populations, and providing data to assess the impact of interventions. With the launch of the third phase of implementation of the National AIDS Control Programme, a review of the current surveillance system was conducted to enhance and update the design and implementation of second generation surveillance in the country.

5.1.2. Scope of the review

Because the surveillance system in India is so large, technical advisors identified six key issues to focus on during the review. One of these topics was to assess the design and implementation of surveillance conducted among populations with high-risk behaviours (i.e. female sex workers and clients, men who have sex with men and people who inject drugs).

For each topic, a white paper was prepared and circulated. The paper summarized the current design of the system and introduced a number of issues/questions about improving the system, which would be addressed by the working group during the review meeting.

5.1.3. Current design of surveillance for key populations at higher risk for HIV infection

District-level sentinel surveillance sites for female sex workers, people who inject drugs, men who have sex with men and sexually transmitted disease (STD) clinic populations collect data annually from the State AIDS Control Societies, partner district laboratories, and at NGOs drop-in centres implementing targeted interventions (TI) for key populations at higher risk.

Two rounds of behavioural surveillance surveys (in 2001 and 2006) have been conducted among these key populations in 25 states/multistate zones using time–location cluster sampling methods.

5.1.4. Key questions to be addressed by the technical working group

Questions on design issues

- How can the representativeness and quality of surveillance among populations with high-risk behaviours be improved?
- What is the ideal geographical unit for surveillance of each group (i.e. state or district level)?
- How can the urban/rural differences be captured?
- How to better capture data from the bridge populations, namely, clients of sex workers and mobile populations?
- Do we need to set up surveillance among new groups, e.g. prisoners?
- What is the utility/relevance of HIV surveillance among STI clinic populations?
- Does it add value to monitor HIV trends in key populations with high-risk behaviours?
- Should we consider replacing HIV sentinel surveillance among populations with high-risk behaviours with integrated biobehavioural surveillance (IBBS)?
- Are there any simpler models of IBBS that can be used?
- What should be the minimal essential behavioural and biological markers for surveillance in each key population at increased risk?
- Is it possible to use routine programme data, such as counselling and testing data, for surveillance among key populations at higher risk?

Questions on implementation issues

- What are the biases in surveillance data collected from TI sites and how should this be considered when interpreting the data?
- Is it ethical to continue unlinked anonymous testing in TI-based surveillance?

5.1.5. Process

Technical experts on specific topics were invited to the meeting. The participants were given an update about the HIV surveillance system and oriented about the objectives and format of the workshop. The participants were then grouped into their respective technical areas to respond to the specific questions asked of their group. Each group developed recommendations which were presented in a plenary session and further discussed, leading to a final resolution of the meeting.

5.1.6. Key recommendations

- Introduce mapping of key populations at higher risk as a routine surveillance activity that is conducted in all parts of the country. Develop guidelines for analysing mapping and programme data to systematically detect areas where the epidemic may be emerging.
- Regularly conduct mapping of key populations at increased risk and match these against the location of TI intervention sites and where current TI-based sentinel surveillance sites are located to ensure coverage of areas with the greatest epidemic potential.
- Adopt informed consent as part of the protocol for TI sentinel surveillance. Informed consent is considered compatible with voluntary unlinked anonymous approaches to testing.
- Revise sentinel surveillance protocols to include the issue of informed consent and to clarify approaches to obtaining systematic sequential samples of key populations at increased risk who come to NGO drop-in centres/clinics, thus enhancing the representativeness and reproducibility of the sampling.
- Enhance the quality of information collected at sites implementing sentinel surveillance by increasing resources for monitoring, supervision and training to ensure adherence to the protocol.
- Replace behavioural surveillance surveys with a lighter version of the IBBS.
- Discontinue sentinel surveillance in STI clinics due to the difficulty in interpreting who these data represent. The phasing out of sites should begin in areas where TI surveillance is already ongoing. In low-prevalence areas with no TI sites, STI sites should be discontinued as routine HIV testing of STI patients is scaled up.
- Develop more guidance for collecting data among bridge populations such as truckers, migrants, etc.
- Develop guidance on the design of the second generation surveillance system, clarifying the use of different surveillance activities among key populations at increased risk in answering key surveillance objectives.
- Explore the importance of military and prison populations as potential contributors to the HIV epidemic.

5.2. Review of the Guangdong HIV/AIDS surveillance system, China

5.2.1. Purpose

The goal of this assessment was to evaluate whether the surveillance system was meeting its objectives, which included: (1) providing an accurate characterization of the HIV/AIDS epidemic, and (2) using data to guide HIV/AIDS prevention and control efforts. In addition, this evaluation attempted to identify areas in need of improvement or strengthening.

External consultants from the CDC/USA and national experts from CDC/China participated in the evaluation.

5.2.2. How the review was conducted

The evaluation encompassed the current surveillance systems which include case-based reporting, surveys conducted at national and provincial sentinel sites, special surveys and behavioural surveillance surveys. The evaluation included: (1) review of the current protocols, (2) consultations with stakeholders including health-care professionals, laboratory staff and government officers, (3) review of the current database, (4) visits to sentinel sites, and (5) direct observation of data entry.

5.2.3. Structure of the surveillance system

HIV case surveillance began in Guangdong province in 1986. At present, the surveillance system includes sentinel and behavioural surveillance, and special studies. Sentinel surveillance was piloted in the province in 1992 with pregnant women and blood donors. The national sentinel surveillance system was created in 1995, and incorporated in Guangdong in 1997. The four main parts of the surveillance system were as follows.

Sentinel surveillance

In Guangdong province, sentinel surveillance was piloted in 1992, with national protocols having been instituted in 1995. There are 17 national sites and 48 provincial sites that capture different population groups.

Special surveys

These surveys have used a different sampling methodology from that of sentinel surveillance. Special surveys are not conducted annually, but on an as-needed basis, and data from these surveys have been used to improve surveillance programmes.

Comprehensive behavioural surveillance survey

Behavioural surveillance in Guangdong province was implemented in 2004 at three national sites and expanded to six national sites in 2006. Similar to sentinel surveillance, behavioural surveillance surveys are conducted annually among STD clinic patients and sex workers.

Case-based reporting

The case-based reporting system has been in existence since the mid-1980s and became completely web-based in Guangdong in 2004 and nationally in 2005.

Each specific component of case reporting is described, taking into account the sample size, period of data collection, data quality and study design.

5.2.4. Elements common to all four surveillance activities

For each HIV surveillance system activity, all of these elements were described:

- Data flow into the case-based reporting system
- Specimen collection
- HIV testing strategy
- Data dissemination
- Ethical considerations
- Funding.

5.2.5. Summary of performance of the surveillance system

Table 5.1. Summary of the performance of the surveillance system by attribute

Attribute	Sentinel surveillance	Case-based reporting system
Usefulness	√	+/-
Simplicity	+/-	+/-
Flexibility	√	√
Data quality	-	-
Acceptability	+/-	+/-
Sensitivity	√	√
Representativeness	+/-	+/-
Timeliness	√	√
Stability	√	√

5.2.6. Recommendations for Guangdong Province

To improve data quality

- Increase training and human resources.
- Revise and update the software to include internal data checks to limit inconsistencies in data entry. Also, simplify and shorten data collection forms.
- Create standard operating procedures to standardize dual data entry and laboratory testing. Include an inference guide for transmission categories to decrease the percentage of cases with an unknown transmission route.

To improve simplicity

- Create an alternate algorithm for data flow.
- Enforce national laboratory testing guidelines.

To improve usefulness

- Create an algorithm for addressing cases within the migrant population to notify the migrant's province of residence for initiation of medical care (these persons can only receive care in their province of residence).
- Develop a feedback mechanism to notify sites when cases are deleted and why they have been deleted.

Appendix A: Sources

Title	Year	Topic
<i>HIV surveillance in hard-to-reach populations</i>	2011	Update on methodologies for conducting HIV surveillance among key populations at higher risk for HIV exposure http://www.who.int/hiv/pub/surveillance/most_at_risk/en/index.html
Evaluation guidelines for HIV second generation surveillance system	2011	How to assess and evaluate HIV surveillance systems and adapt them to the needs of countries (forthcoming)
Ethical guidance in HIV surveillance	2011	Ethical principles to be followed when conducting HIV surveillance activities (forthcoming)
<i>Guidelines on estimating the size of populations most at risk to HIV</i>	2010	Update on methodologies for estimating the size of key populations at higher risk for HIV exposure http://www.who.int/hiv/pub/surveillance/final_estimating_populations_en.pdf
<i>When and how to use assays for recent infection to estimate HIV incidence at a population level</i>	2010	How to use HIV incidence assays to estimate HIV incidence at the population level http://www.who.int/diagnostics_laboratory/hiv_incidence_may13_final.pdf
<i>Guidelines for using testing technologies in surveillance: selection, evaluation, and implementation: 2009 update</i>	2009	An update in guidance on selecting and utilizing appropriate HIV tests for surveillance purposes http://www.who.int/hiv/pub/surveillance/hiv_testing_technologies/en/index.html
<i>Sampling strategies and design tool</i>	2009	Tool for determining the most appropriate sampling tool, developed for CDC by Design and Learning Interactive, Inc. (designandlearning.com), hosted at http://globalhealthsciences.ucsf.edu/PPHG/surveillance/CDC-MARPs/sampling_selection.htm
<i>HIV triangulation guide: synthesis of results from multiple data sources for evaluation and decision-making</i>	2009	Guidelines on conducting triangulation, users' manual developed with examples based on experiences in Africa. http://www.who.int/hiv/pub/surveillance/hiv_trianguation_guide.pdf
<i>The pre-surveillance assessment: guidelines for planning serosurveillance of HIV, prevalence of sexually transmitted infections and the behavioural components of second generation surveillance of HIV</i>	2005	Tools for preparing to implement second generation surveillance including defining and selecting risk groups, sites and feasibility of methods http://www.who.int/hiv/pub/surveillance/sti/en/index.html
<i>Guidelines for measuring national HIV prevalence in population-based surveys</i>	2005	Guidelines for national population-based surveys with HIV testing http://data.unaids.org/pub/Manual/2005/20050101_GS_GuideMeasuringPopulation_en.pdf
<i>Guidelines for HIV surveillance among TB patients</i>	2004	Guidance on how to conduct HIV surveillance among TB patients http://data.unaids.org/pub/Manual/2005/20050101_GS_GuideMeasuringPopulation_en.pdf
<i>Guidelines for effective use of data from HIV surveillance systems</i>	2004	Guidance on how to analyse, interpret and present surveillance data http://data.unaids.org/Publications/IRC-pub06/JC1010-UsingData_en.pdf

<i>Ethical issues to be considered for second generation surveillance</i>	2004	Ethical issues for conducting second generation surveillance (draft) http://www.who.int/hiv/pub/surveillance/sgs_ethical/en/index.html
<i>Estimating the size of populations at risk for HIV: issues and methods</i>	2003	Guidance on different methods for estimating key populations at higher risk for HIV http://data.unaids.org/Publications/External-Documents/EstimatingPopSizes_en.pdf
<i>Guidelines to HIV sentinel serosurveys among pregnant women and other groups</i>	2003	Protocols for implementing ANC sentinel surveillance http://data.unaids.org/Publications/IRC-pub06/JC954-ANC-Serosurveys_Guidelines_en.pdf
<i>Initiating second generation HIV surveillance systems: practical guidelines</i>	2002	Suggested process for planning and getting consensus on the design of a national second generation surveillance system http://www.who.int/hiv/pub/surveillance/en/isbn9291732192.pdf
<i>Guidelines for using testing technologies in surveillance: selection, evaluation, and implementation</i>	2001	Guidance on selecting and utilizing appropriate HIV tests for surveillance purposes http://data.unaids.org/Publications/IRC-pub02/JC602-HIVSurvGuide1_en.pdf
<i>Behavioral surveillance surveys: guidelines for repeated behavioural surveys in populations at risk of HIV</i>	2000	Detailed guidance for planning and implementing behavioural surveillance surveys http://www.fhi.org/en/hiv/aids/pub/guide/bssguidelines.htm
<i>Guidelines for second generation HIV surveillance</i>	2000	Overview of principles of second generation surveillance http://www.who.int/hiv/pub/surveillance/en/cds_edc_2000_5.pdf
<i>Guidelines for sexually transmitted infections surveillance</i>	1999	Principles of STI surveillance with review of data collection methods and designs http://www.who.int/hiv/pub/sti/pubstguidelines/en/
<i>Sexually transmitted infections prevalence study methodology: guidelines for the implementation of STI prevalence surveys</i>	1999	Framework for conducting an STI prevalence study targeting population subgroups with different behavioural and risk profiles http://www.wpro.who.int/NR/rdonlyres/E6C98579-643F-485D-93B9-2AAAD1FABA9B/0/STI_Prevalence_Study_Methodology.pdf

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Appendix C: Workflow for the assessment of surveillance activities

The following flow outlines a typical scenario for evaluating surveillance activities.

Table C.1. Typical assessment of surveillance activities

Step	Do this...
1. Organize the work of the assessment.	<ul style="list-style-type: none"> Form a steering committee of key stakeholders to oversee the design and progress of the assessment. Form a working group and/or assign a manager to be responsible for conducting the assessment on a day-to-day basis. Agree on a mechanism for communicating regularly about the progress and results of the assessment.
2. Define the purpose and scope of the assessment.	<ul style="list-style-type: none"> Convene a steering committee meeting to define the purpose and scope of the assessment, informed by the surveillance questions of greatest importance for the country. Develop terms of reference outlining the key questions, major activities to be carried out, and the expected results of the assessment.
3. Develop a detailed action plan for the assessment.	<ul style="list-style-type: none"> Convene a working group meeting to discuss the key steps and assign responsibilities and timelines. Develop a working budget and identify staff availability to carry out activities. Agree on a mechanism for tracking progress and ensuring that resources are available to support these activities.
4. Conduct a desk review of available data sources.	<ul style="list-style-type: none"> Collate available documents and datasets related to the surveillance system. Develop a document that describes the second generation surveillance system relevant to the purpose of the assessment, noting the data sources available and used, and for what time periods and in which geographical areas each type of data is available. Develop a similar document that describes the organizational structure for each data collection/analysis activity, indicating who is involved and the training/supervisory support they receive. Assess the de facto second generation surveillance system in terms of its ability to answer the key surveillance questions of interest.
5. Conduct field visits to talk with key informants and observe data collection and analysis activities.	<ul style="list-style-type: none"> Prepare a set of data collection tools to assist in collecting objective and complete information about each site visit/key informant. Schedule a series of site visits to a sample of sites/geographical areas to interview people involved with the operational components of second generation surveillance, and observe activities at these sites. Collate the data from different working group members and develop a report of the findings.
6. Prepare an assessment report based on the findings of the desk review and field visits.	<ul style="list-style-type: none"> Collate data and draft a report based on the findings, and identify key next steps for follow up. Circulate the draft report to the steering committee and key informants for comments on the key findings.
7. Plan next steps for addressing the findings and key recommendations with stakeholders.	<ul style="list-style-type: none"> Convene a meeting or series of meetings with stakeholders involved with the recommendations to agree on a set of activities. Agree on a mechanism for following up progress and providing technical support to achieve the stated goals.

Appendix D. Glossary and acronyms

Accuracy	In the context of surveillance and point estimates, it refers to how close an estimate is to the true value.
Asian Epidemic Model	An epidemic modelling software package for projecting the trajectory of an HIV epidemic. The software is customized for the type of concentrated epidemics found in Asia. (Brown T, Peerapatanapokin W. The Asian Epidemic Model: a process model for exploring HIV policy and programme alternatives in Asia. <i>Sexually Transmitted Infections</i> , 2004, 80 (Suppl 1):i19–i24.)
BSS/IBBSS behavioural surveillance surveys/ integrated biological and behavioural surveys	Repeated cross-sectional probability surveys of a specified population. Both types of surveys include behavioural risk factor data. IBBSS also include biological markers of HIV or sexually transmitted infections.
Case reporting	A type of surveillance activity in which new cases of a disease or health condition are counted over a specified period of time
Concentrated epidemic	A type of HIV epidemic in which most transmission of HIV occurs in the context or because of sex work, anal sex between men, or among persons who inject drugs. There is insufficient high-risk sexual activity occurring among the general population to sustain HIV transmission on its own.
Epidemic potential	The likelihood of an epidemic to expand greatly or quickly due to the presence of large numbers of individuals with behaviours that put them at high risk for acquiring or transmitting HIV
Epidemiological zone	A geographically defined area with very similar epidemic characteristics throughout the bounded area
Expanding epidemic	An epidemic that is increasing in terms of the number of people infected with the disease or health condition
Generalized epidemic	An HIV epidemic in which most transmission of HIV is sustained among the general population through high-risk sexual behaviour, such as having multiple and concurrent sexual partners coupled with low condom use
Hyperendemic	A type of very advanced generalized HIV epidemic with very high HIV prevalence among the general population (for example, higher than 15%)
Impact	The ability of an intervention or environmental factor to change the direction or rate of change in an epidemic cumulatively over a long period of time
Incidence	The number of new infections of a disease or health condition occurring over a specified period of time
Key populations	Populations distinguished by behaviours associated with higher levels of acquiring and transmitting HIV. Traditional high-risk groups include female sex workers and their clients, men who have sex with men and persons who inject drugs.
Know your epidemic	A concept for collecting and analysing information about the HIV epidemic that enables appropriate planning and design of a response which will efficiently prevent new infections and serve those needing care and treatment. (<i>Lancet</i> , 2008, 372 (9637):423–426.)
Low-level epidemic	An HIV epidemic in which the level of HIV prevalence even among key populations at higher risk for HIV remains low (for example, less than 5%) and prevalence among the general population is even lower
Mapping (geographical, social)	A method for understanding the size or characteristics of a specific population by systematically going to and collecting data about venues/sites where the population gathers
Mature epidemic	In the context of HIV, the period in an epidemic when infections in a population have been transmitted for a long period of time (for example, more than 10 years). At this point, the natural death rate among infected persons is approximately constant.
Men who have sex with men (MSM, venue-based)	Venue-based refers to men who have sex with men who come to specific locations known to other MSM for the purpose of meeting sexual partners. These types of MSM are likely to have a large number of sexual partners over a short period of time. They are at higher risk for acquiring HIV.

Networks (social, sexual)	The set of relationships among members of a defined population over a specified period of time. The relationships can be defined in multiple ways: <ul style="list-style-type: none"> • social networks refer generally to the relationships among those who know each other through friendship or acquaintanceship • sexual networks refer to the linkages between members of a group based on who has/had a sexual relationship
Outcome	The behavioural changes among individuals or organizations/institutions related to changing the likelihood of transmitting disease or for utilizing care and treatment services
Persons who inject drugs	Those who inject drugs for recreational purposes, that is, for non-medical purposes
Precision	In the context of surveillance and estimates, refers to how close an estimate is to other estimates made using the same methodology; that is, when a method is repeated, the degree to which a result is consistent
Prevalence	The proportion of people who currently have a disease or health condition in a defined population
Probability sample	A group of methods in sampling in which the probability of a respondent being selected for the sample is known and can be used in the analysis of survey data. This results in data that are representative of the larger population.
Proxy groups	A group with a large proportion of members who engage in a risk behaviour associated with acquiring or transmitting HIV. Surveillance activities may be conducted among proxy groups when it is not feasible to sample specifically defined key populations at higher risk for HIV exposure.
Rapid situation analysis (RSA)	A method for characterizing groups in a geographical unit which can be conducted quickly and with limited resources. Most rapid situation analyses are used during planning for an intervention.
Reliability	The degree to which an operational method provides consistent results if repeated multiple times
Risk factor	A behavioural, biological or environmental factor associated with a higher likelihood of acquiring or transmitting a disease
Risk intensity	The degree to which a key population practises behaviours associated with a high risk of acquiring or transmitting HIV
Saturation	When the epidemic is no longer increasing, a level of HIV prevalence is reached among a population. A majority of persons who are susceptible to infection have already been infected.
Second generation surveillance	The process of data collection and analyses used to track the course of an HIV epidemic, identifying where the most new infections are likely to be occurring and assessing the current burden of disease. Methods include size estimation of key populations at higher risk, biological and behavioural probability surveys, facility-based sentinel surveillance, case reporting and routine monitoring data.
Sex worker (SW) <ul style="list-style-type: none"> • Direct • Indirect 	Person who sells sex for money or gifts <ul style="list-style-type: none"> • Direct sex workers derive their primary income from selling sex. This group includes brothel-based and street-based sex workers. • Indirect sex workers work in establishments other than those purely meant for sex work. For example, they may work as waitresses, bartenders, dancers, masseuses and then sell sex to clients they meet through their place of work.
Surveillance group	A defined group among whom a surveillance-related data collection activity is conducted, to make an estimate about the level of disease, behaviour or other risk characteristic of that group
Targeted interventions	HIV prevention interventions that are focused on key populations at higher risk for HIV exposure. These often include a peer education strategy to deliver behaviour change communication and commodities such as condoms, lubricants and needles/syringes.
Transmission dynamics	The mechanism by which a communicable disease occurs within a population. It defines the size and direction of an epidemic.
Triangulation	A data analysis process in which multiple sources of data are considered together to come to a conclusion on a question related to an epidemic or intervention

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