Introductory module

Strengthening surveillance of and response to foodborne diseases

World Health Organization

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Strengthening surveillance of and response to foodborne diseases: a practical manual. Introductory module

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An informal consultation on strengthening the surveillance of foodborne diseases in the Western Pacific was held in Manila in February 2014. The participants at the informal consultation developed the framework for strengthening the surveillance of and response to foodborne diseases and defined the scope, guiding principles and purpose of this manual. The participants in the meeting are listed below.

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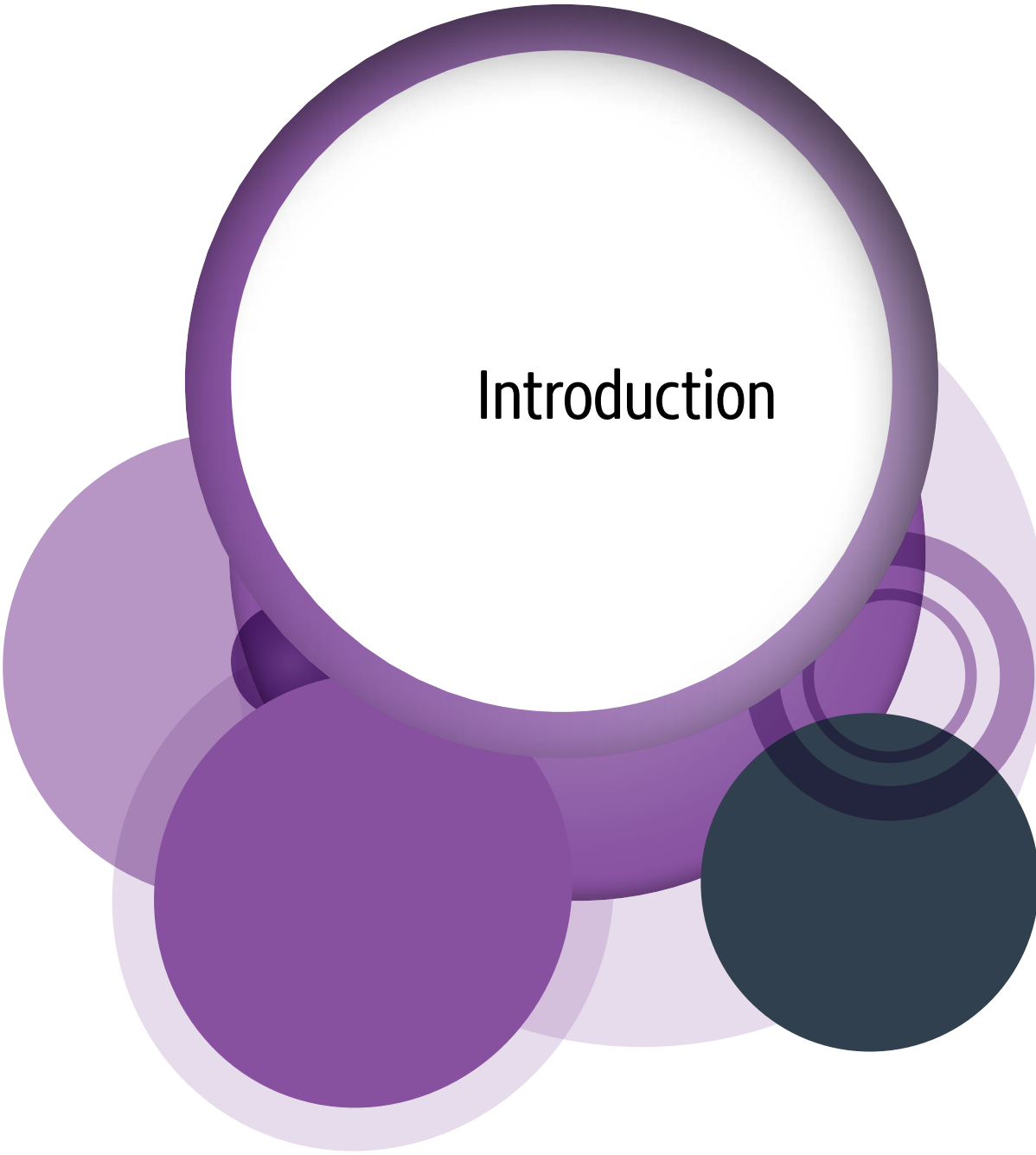
Acronyms used in this module

CDC	Centers for Disease Control and Prevention (of the United States of America)
EBS	event-based surveillance
FAO	Food and Agriculture Organization of the United Nations
GFN	Global Foodborne Infections Network
GLEWS+	Global Early Warning System for health threats and emerging risks at the human–animal–ecosystems interface
IBS	indicator-based surveillance
IHR	International Health Regulations
INFOSAN	International Food Safety Authorities Network
UI	uncertainty interval
WHO	World Health Organization

Introduction



What are foodborne diseases?

Foodborne diseases comprise a wide spectrum of illnesses that result from ingestion of foodstuffs contaminated with microorganisms or chemicals. Food may become contaminated at any stage in the process from production to consumption, and contamination may be the result of environmental contamination, such as pollution of water, soil or air.

Foodborne diseases are a growing public health problem throughout the world and cause a considerable burden of disability and mortality. WHO studies of the global burden of foodborne diseases in 2010 estimated that 31 hazards (including viruses, bacteria, protozoa, helminths and chemicals) caused 600 million foodborne illnesses globally (95% uncertainty interval (UI) 420–960 million) and 420 000 deaths (95% UI 310 000–600 000) (WHO, 2015). The most common clinical presentation of foodborne disease is gastrointestinal symptoms. Other serious consequences include kidney and liver failure, brain and neurological disorders, reactive arthritis and cancer.

Why are surveillance of and response to foodborne diseases important?

Surveillance of and response to foodborne diseases are important for a number of reasons.

- Foodborne diseases are preventable and can be controlled through an effective food safety system that takes account of hazards from the place of production to the point of consumption.
- The international food trade has expanded and will continue to grow. Food is often exported from one country to another, which means that food contaminated in one country can cause disease in other countries.

- Changes in trade, food choices, and eating habits mean that large-scale, geographically dispersed and – often – multicountry outbreaks are becoming more common.

- Foodborne disease can have a large impact on trade. Trade restrictions are often applied to countries identified as a source of contaminated food. The travel and tourism industries are particularly vulnerable to health, safety and environmental concerns, including foodborne disease (Ashley et al., 2004; Steffen et al., 2004).

- The International Health Regulations (IHR) require countries to notify the World Health Organization (WHO) of public health events that may be of international concern, including those caused by contaminated food (WHO, 2008a).

- Ensuring that the food we eat is safe and protected from contamination is an essential element of health security, as is ensuring that people are protected from diseases that can be transmitted from animals to humans.

Purpose of this manual

This manual describes how countries can strengthen their current surveillance and response activities for foodborne diseases, and integrate them in an existing national surveillance and response system. It will enable countries to:

- ☑ assess the stage of development of their surveillance and response system in relation to foodborne diseases;
- ☑ identify the priorities for developing the surveillance and response system;
- ☑ make appropriate decisions about resource allocation for foodborne disease surveillance and response activities;
- ☑ facilitate multisectoral collaboration between all the stakeholders involved in disease surveillance and food safety.

Scope of the manual

All aspects of surveillance, rapid risk assessment, response, investigation, and multisectoral collaboration related to foodborne hazards (microbial, chemical and radiological) that can affect human health are included in this manual.

The following topics are outside the scope of the manual.

- **Strengthening food safety systems.** There are already guidance documents on:
  - strengthening national food control systems (FAO/WHO, 2003; FAO, 2006),
  - building a national food recall system (FAO/WHO, 2012),
  - risk-based food inspection (FAO, 2008),
  - applying risk analysis principles and procedures during food safety emergencies (FAO/WHO, 2011).

- **Chronic diseases related to food.** The causes of these diseases often extend beyond food choices and are monitored through different data collection systems (e.g. hospital admissions, death registers, cancer registries) and population-based surveys. They include:
  - chemical contaminants, such as lead and methylmercury, that can lead to cancer or intellectual disabilities, and prions, which can cause new variant Creutzfeldt–Jakob disease;
  - nutrition-related diseases, including diabetes, cancer and cardiovascular disease.

- **Control and prevention of, and response to, diseases in animals.**

Target audience

The primary audience for this manual is public health professionals, such as surveillance and response staff, laboratory staff and food safety staff, who are usually located within the Ministry of Health or health sector.

Other important audiences include:

- competent authorities with a role in food safety, including those responsible for the health of animals and plants or with a role in inspection, trade and commerce;
- consumer groups;
- industries involved in the production and distribution of food;
- development partners, donors and international organizations.

Guiding principles and requirements

The following guiding principles and requirements should be borne in mind when working through the steps for strengthening surveillance of and response to foodborne diseases.

Every country has a national surveillance and response system covering a variety of diseases and syndromes. This manual focuses on building on existing systems that are part of the core capacity requirements of the IHR (WHO, 2008a), to include foodborne diseases, and seeks to avoid the development of a vertical programme for foodborne diseases. Establishing surveillance activities within a vertical programme allows the surveillance function to remain close to the control function. However, it can result in the overall surveillance function in a country becoming badly disjointed and inefficient, with field workers participating in multiple complicated systems, using different surveillance methods, terminology and reporting forms and schedules. This entails extra costs and training requirements and often leads to work overload and lack of motivation among health workers (WHO, 1999).

Surveillance and response are needed in order to respond effectively to acute public health events in a timely manner, so as to minimize the adverse impact on public health, disease burden and the economy.

Surveillance and response systems in countries are at different levels of development and complexity and have different requirements and priorities for future development and capacity-building.

- Developments outside the health sector (e.g. free trade agreements) can also motivate the strengthening of food safety systems.
- It is vital that senior policy- and decision-makers are committed to improving surveillance and response to address foodborne diseases.
- Sufficient resources, both human and financial, are required to support development of the system.
- Countries should draw on the resources of existing international networks to strengthen national surveillance and response systems. These networks include the Global Foodborne Infections Network (GFN), the International Food Safety Authorities Network (INFOSAN) and the Global Early Warning System for health threats and emerging risks at the human–animal–ecosystems interface (GLEWS+).

Terminology

Some of the terms used in this manual can have different meanings in different settings. A glossary of terms, as they are used here, is given in Annex 1. The use of these terms is discussed in more detail in Annex 2, including the different approaches to risk in the different sectors with a stake in foodborne diseases.

Throughout the manual, the term "case" has been used to refer to any person who meets a case definition, either for surveillance purposes or during an outbreak investigation. The term case is used because:

- case is a standard way to describe a person counted as part of an outbreak investigation; a case can be further identified as a suspect case, a probable case or a confirmed case;
- not all suspect and confirmed cases are patients (patient refers to someone who receives medical care or is registered with a medical service);
- ill people or persons does not cover all cases: in some situations asymptomatic cases may be included, as well as people who are well at the time of the investigation but had symptoms in the past;
- case-finding and case definition are standard epidemiological terms.

Framework for strengthening surveillance of and response to foodborne diseases

The approach to strengthening the surveillance of and response to foodborne diseases builds on the systems countries are required to develop under the IHR. Such systems have four key components: indicator-based surveillance, event-based surveillance, rapid risk assessment and response. For foodborne diseases, additional targeted ad hoc studies may be needed to answer specific questions that surveillance and response data alone cannot answer. In addition, the control of foodborne diseases requires strong multisectoral collaboration, involving the surveillance and response, food safety, and agriculture sectors.

Definitions of these various components, together with a discussion of their role in strengthening surveillance and response for foodborne diseases, are given below.

1

Indicator-based surveillance (IBS)

The regular systematic collection, monitoring, analysis and interpretation of structured data related to a case or syndrome definition (WHO, 2014). Data about illness in individuals (either syndromes or laboratory results) should be recorded systematically, analysed, interpreted and disseminated. Thresholds can be applied to the data to detect outbreaks and the data can be used to monitor trends and evaluate interventions.

2

Event-based surveillance (EBS)

The organized collection, monitoring, assessment and interpretation of unstructured information about health events that may represent a risk to public health (WHO, 2014). Rumours or reports of foodborne events that pose a threat to public health may come through official networks or from informal sources, such as the media or the community.

3

Rapid risk assessment of acute public health events

A systematic process for gathering, assessing and documenting information about acute public health events with the aim of assigning a level of risk (WHO, 2012). It provides the basis for action to manage and reduce the negative consequences of acute public health risks. In the context of this manual, an acute public health event is any outbreak or rapidly evolving situation that may have negative consequences for human health and requires immediate assessment and action. The term includes events that have not yet led to disease in humans but have the potential to cause disease through exposure to infected or contaminated food, water, animals, manufactured products or environments.

4

Response

Action taken once a foodborne event has been detected (using EBS or IBS) to rapidly investigate the event, identify its causes, prevent further spread and strengthen future prevention efforts.

5

Ad hoc studies

Targeted public health studies designed to answer specific questions relating to foodborne diseases, e.g. total diet studies, burden of disease studies, source attribution studies.

6

Multisectoral collaboration

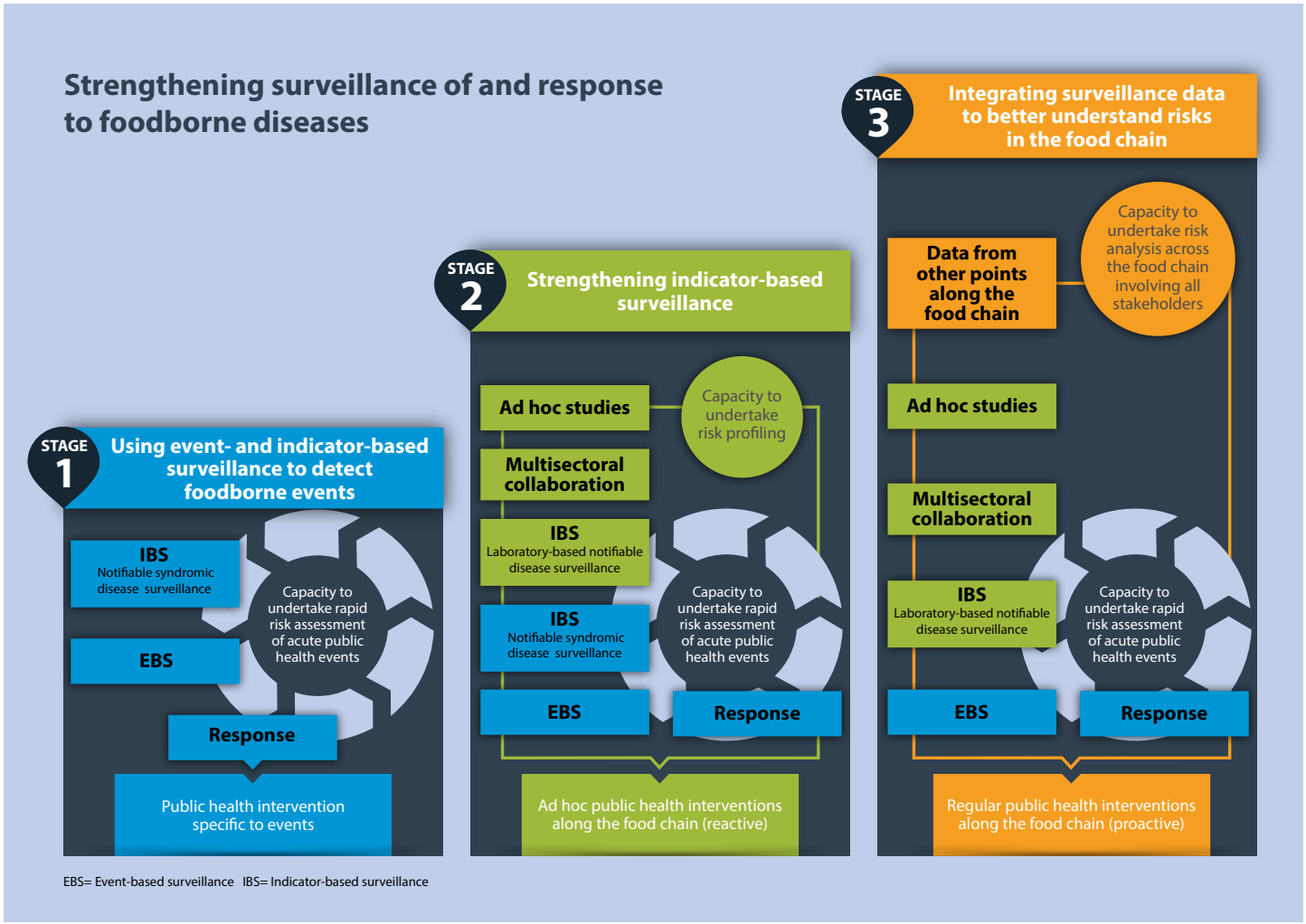
Staff from surveillance and response, food safety, animal health, environmental health and other relevant sectors working together to reduce the burden of foodborne diseases in the community.

Most multisectoral collaboration occurs within risk-based processes designed to understand why there is a foodborne problem, assess the extent of the problem and manage the risks to keep future illness to a minimum. The main risk-based processes of relevance to foodborne diseases are the rapid risk assessment of acute foodborne events, risk profiling and risk analysis. These risk-based processes are described in more detail in Annex 2.

To support countries in strengthening the surveillance and response system for foodborne diseases, this manual describes three stages of development. Each stage builds on the previous one in a stepwise manner, as shown in Figure 1. Table 1 outlines how the stages evolve as the system is progressively strengthened. A country does not need to have developed all of the components of one stage before moving on to the next.

FIGURE 1.

Stepwise approach to strengthening surveillance of and response to foodborne diseases



EBS= Event-based surveillance IBS= Indicator-based surveillance

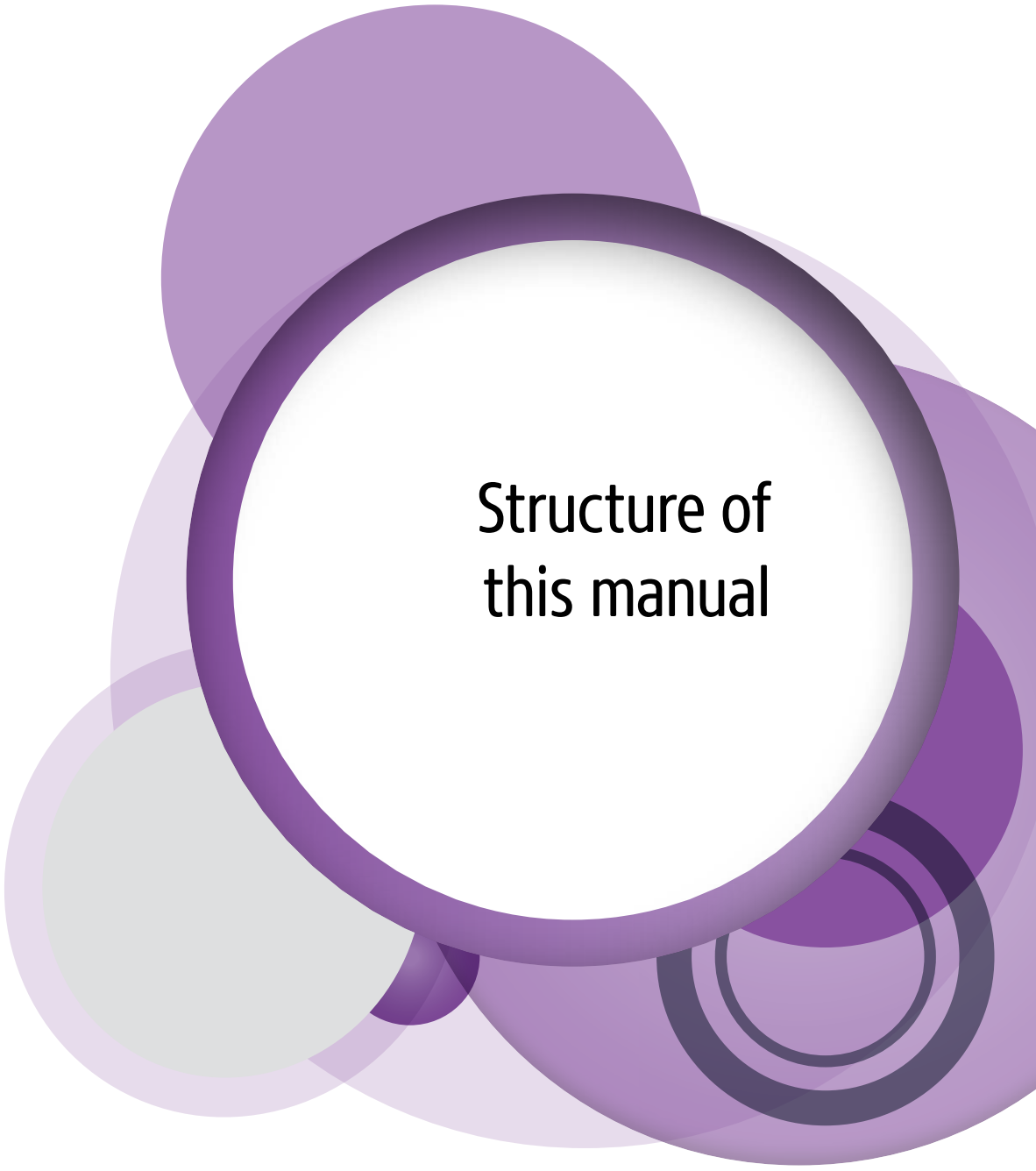
TABLE 1.

The three stages of strengthening surveillance of and response to foodborne diseases

	Stage 1	Stage 2	Stage 3
Key components of the surveillance and response system	• IBS: notifiable conditions (syndromes/diseases) • EBS • Rapid risk assessment • Response • Multisectoral collaboration • Public health interventions for specific foodborne disease events	• IBS: notifiable diseases • IBS: laboratory-based surveillance • EBS • Rapid risk assessment • Response • Targeted ad hoc studies • Multisectoral collaboration • Ad hoc public health interventions along the food chain	• IBS: notifiable diseases • IBS: laboratory-based surveillance • EBS • Rapid risk assessment • Response • Targeted ad hoc studies • Multisectoral collaboration • Integrating surveillance data from points along the food chain • Regular public health interventions along the food chain
Focus of development at each stage			
Surveillance and response	Strengthen: • IBS to detect outbreaks of priority foodborne diseases • EBS to detect foodborne events, including outbreaks • Databases to ensure they capture relevant data from the IBS and EBS • epidemiological evidence gathered during investigations of foodborne outbreaks • laboratory evidence gathered during investigations of foodborne outbreaks	Strengthen: • IBS to include laboratory analysis for priority foodborne diseases • notifiable disease surveillance system to detect outbreaks and monitor trends • Databases to ensure that they can capture date from the expanding IBS and EBS systems • sensitivity and specificity of EBS to detect more foodborne events • subnational response capacity to carry out analytical epidemiology during foodborne outbreak investigations • capacity to undertake targeted ad hoc studies	• Surveillance and response are fully functional, but mechanisms need to be created for sharing data on foodborne disease with other sectors across the food chain • A database to house the data coming from across the food chain

(TABLE 1. Continue)

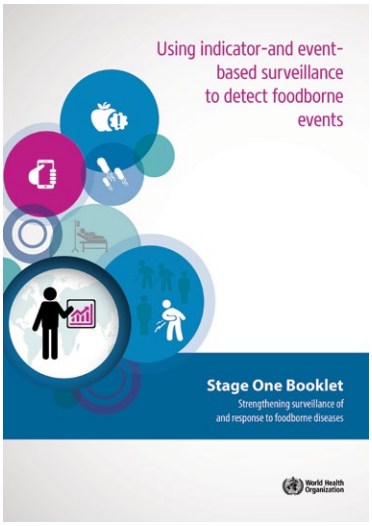
	Stage 1	Stage 2	Stage 3
Risk-based processes	Rapid risk assessment of acute public health events	• Rapid risk assessment of acute public health events • Risk profiling	• Rapid risk assessment of acute public health events • Risk analysis across the food chain
Identifying priority diseases for surveillance	Desktop review, based on available data	Strategy grids and/or Delphi panel	Multisectoral consideration of available data from across the food chain that can be shared
Multisectoral collaboration	Operational links established between surveillance and response, food safety, animal health and laboratories	Surveillance and response, food safety, laboratories and agriculture staff work together to consider the risks and interventions	Multisectoral collaboration is at its peak, with all sectors regularly considering data and risks across the food chain
Public health interventions to minimize the impact of foodborne diseases	Interventions occur at the local level in response to events, including foodborne outbreaks	• Interventions occur at the local level in response to events, including foodborne outbreaks • Interventions are reactive, based on risk profiles • Interventions occur through national policy (e.g. food standards and regulations)	• Interventions occur at the local level in response to events, including foodborne outbreaks • Ongoing interventions are proactive across the food chain based on risk analysis • Interventions occur through national policy (e.g. food standards and regulations)
Sectors responsible	Mainly surveillance and response sector	• Surveillance and response for strengthening IBS • Risk profiling involves the surveillance and response, food safety, animal health and other relevant sectors • Interventions are largely the mandate of the agriculture and food safety sectors	• Surveillance and response system provides data from illness in humans to the integrated food chain surveillance system • Interventions are largely the mandate of agriculture and food safety sectors



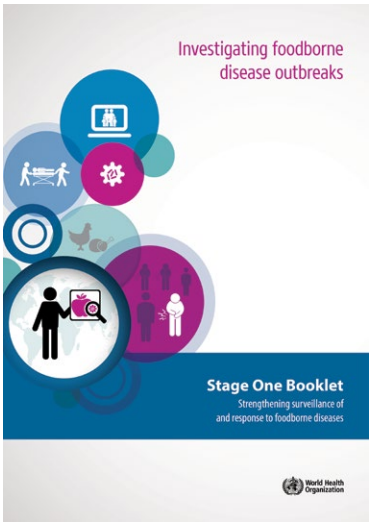
Structure of this manual

The manual comprises five modules:

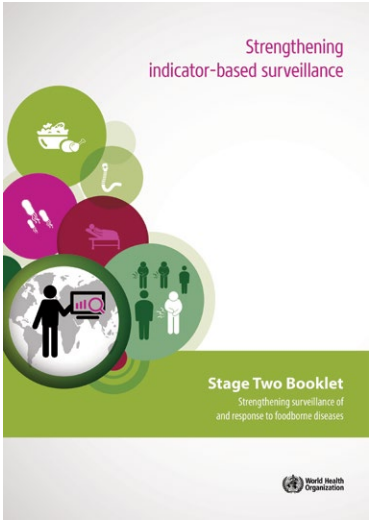
1. Introductory module



2. Stage 1:
Using indicator- and event-based surveillance to detect foodborne events



3. Stage 1:
Investigating foodborne disease outbreaks



4. Stage 2:
Strengthening indicator-based surveillance

5. Stage 3:
Integrating surveillance data to better understand risks across the food chain

Each module includes the following information.

Minimum requirements

the capacities required for a country to enter the stage being described

Objectives

the objectives of the surveillance and response system for foodborne diseases at the stage being described.

Vision

a statement about how the surveillance and response system should perform when all the capacities needed for the stage are in place. A diagram shows the capacities to be strengthened in the stage.

Components and risk-based processes

A description of the key components and the risk-based processes: the text sets out a series of logical steps to be taken to develop capacities in each component and process, and includes tools for use by countries.

Case studies

these are used throughout to provide examples of actions taken in different countries to strengthen surveillance and response for foodborne diseases.

Managing implementation

a template allows countries to document their current capacities and helps identify priorities for strengthening surveillance and response to foodborne diseases. The completed template could be attached to existing strategic plans for strengthening the national surveillance and response system.

Monitoring and evaluation

examples are provided of monitoring indicators and attributes that can be evaluated to assess the performance of the surveillance and response system in relation to foodborne diseases.

How to use this manual

The steps involved in using this manual are shown in Figure 2.

Step 1. Self-assessment

Each country needs to start by assessing the stage of development of the surveillance and response system for foodborne diseases. Some components of the system may be in stage 1 while others may be in stage 2. For example, the notifiable disease surveillance system may include some laboratory-confirmed diseases (stage 2), but there may be limited capacity to conduct analytical epidemiology as part of the response to foodborne disease outbreaks (stage 1).

Annex 3 contains a self-assessment tool, with a list of indicators describing the capacities required to conduct the surveillance of and response to foodborne diseases in each of the three stages. The tool can be used to assess the capacities that currently exist in a country and to identify areas where further development is required.

Step 2. Identifying the relevant tools and guidance

Using the outcome of the self-assessment

The structure of the country self-assessment tool in Annex 3 matches the structure of the manual. Each of the strategic goals and indicators is dealt with in the manual.

For example, strategic goal 1 is an indicator-based surveillance system that can monitor trends of disease syndromes and identify outbreaks of foodborne diseases. This corresponds directly to section 3 of the stage 1 module. The indicators listed under strategic goal 1 in the tool correspond directly to the minimum requirements outlined in the text and highlighted in the coloured box at the start of the section.

If the self-assessment shows that a country does not possess the necessary capacities for a particular activity, the manual provides specific advice on how to build capacity. For example, if the self-assessment shows that there are no capacities for EBS, countries should refer to the stage 1 module on EBS.

Step 3. Using the decision-trees

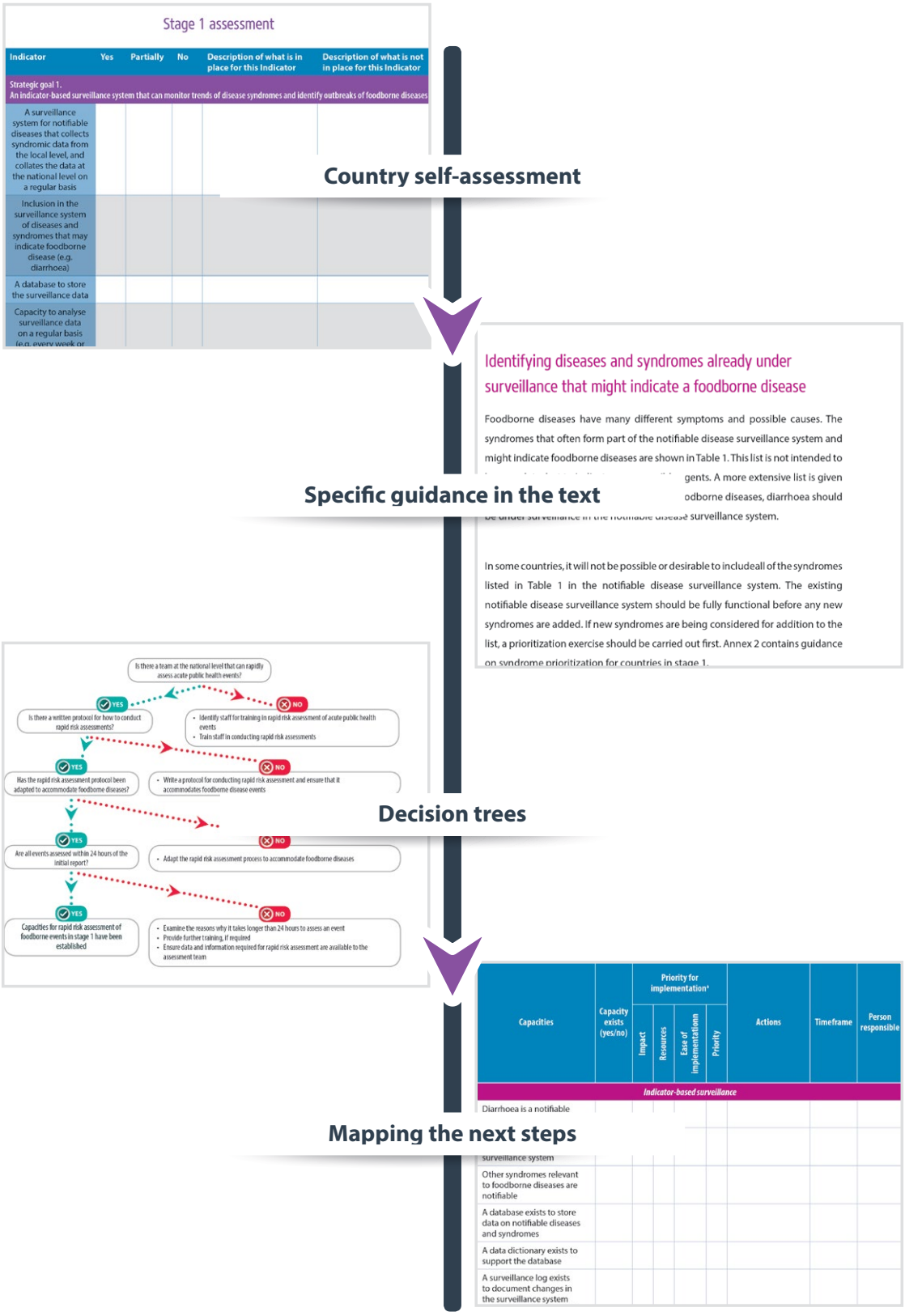
In most of the sections of the manual, a decision-tree provides a step-by-step guide to the capacities required for logical and sustainable development of the surveillance and response system in relation to foodborne diseases. Some of the branches in the decision-trees correspond to rows in the self-assessment tool. Once the self-assessment is completed, a country can refer to the decision-trees and the relevant sections in the manual to determine the steps needed to strengthen the surveillance and response system. Accompanying the decision-trees is specific guidance in the text or supporting tools that countries can use in strengthening activities.

Step 4. Mapping the next steps

The "Managing implementation" section of each stage module contains a tool that can help countries map the next steps needed to develop their system. Each branch of the relevant decision-tree corresponds to a row in the template table for managing implementation. Countries can identify specific areas to focus on by prioritizing actions. It is not necessary to follow up on every identified action. Through the prioritization process, country can identify specific tasks that can be completed within a 2–3 year timeframe, as well as look at some of the capacities that need to be developed in the longer term.

FIGURE 2.

How to use this manual



Annex 1.

Glossary of terms used in this manual

The definitions provided here apply to the terms as used in the five modules of this manual and may differ from those given in other documents.

Active surveillance.

Surveillance initiated by a health authority to search systematically for cases of disease or events (adapted from Thacker & Birkhead, 2002). It includes reaching out to health care workers, laboratories and members of the community to actively search for cases of specific diseases or syndromes.

Acute public health event.

Any event that represents an immediate threat to human health and requires prompt action, i.e. implementation of control or mitigation measures to protect the health of the public. It includes events that have not yet led to disease in humans but that have the potential to cause such disease through exposure to infected or contaminated food, water, animals, manufactured products or environments, or as a result of direct or indirect consequences of natural events, conflicts or other disruptions of critical infrastructure (WHO, 2014).

Ad hoc studies.

Targeted public health studies designed to answer specific questions relating to foodborne diseases, e.g. total diet studies, burden of disease studies, source attribution studies.

Agent.

A factor, e.g. microorganism, chemical substance or radiation, whose presence or excessive presence is essential for the occurrence of disease (adapted from Porta, 2014).

All-hazards approach.

An approach that takes into consideration all possible hazards, including biological, chemical, and radionuclear hazards (WHO, 2012).

Analytical epidemiology.

The study of hypothesized causal relationships to make causal inferences. An analytical study is usually concerned with identifying or measuring the effects of risk factors or the health effects of specific exposures or interventions. This is in contrast to descriptive studies, which do not test causal hypotheses. Cohort studies and case–control studies are examples of analytical epidemiological studies (Porta, 2014).

Case.

Any person who meets a case definition, either for surveillance purposes or during an outbreak investigation.

Case definition.

A set of criteria (not necessarily diagnostic) that must be fulfilled in order to identify a person as having a particular disease or condition. Case definitions can be based on geographical, clinical, laboratory, or combined clinical and laboratory criteria (Porta, 2014).

Capacity.

The ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner (UNDP, 2009)

Cluster-based surveillance.

A type of indicator-based surveillance in which specimens are collected from patients in whom clinicians have recognized a clustering of a particular clinical syndrome, by time, place or person.

Competent authority.

The authority officially charged by the government to control food hygiene and manage the official systems of inspection and certification (may be a government department) (EDES, 2012).

Context assessment.

Assessment of the environment in which an event takes place (WHO, 2012).

Delphi method.

Iterative circulation to a panel of experts of questions and responses; the questions are progressively refined in light of the responses to each round of questions. The aim is to arrive at a consensus on an issue or problem without allowing any one participant to dominate the process (Porta, 2014).

Descriptive epidemiology.

The organization and summarization of health-related data according to time, place and person characteristics (WHO, 2008b). A case series investigation is an example of a descriptive epidemiological study.

Desktop review.

An assessment of existing documentation and published scientific literature in order to make informed decisions about priorities for the surveillance and response system.

Exposure assessment.

Evaluation of the potential exposure of individuals and populations to hazards identified in a hazard assessment (WHO, 2012).

Evaluation.

The periodic assessment of the relevance, effectiveness and impact of activities in relation to the objectives of the surveillance and response system (WHO, 2006).

Event.

A manifestation of disease or an occurrence that creates a potential for disease. Events may be related to infections, zoonoses, breaches of food safety, or chemical, radiological or nuclear contamination, and transmission may be from person to person or via vectors, animals, goods, food or the environment (WHO, 2014).

Event-based surveillance.

The organized collection, monitoring, assessment and interpretation of unstructured information about health events that may represent a risk to public health (WHO, 2014).

Field Epidemiology Training Programme (FETP).

FETPs are two-year work-based training programmes designed to increase epidemiological and public health capacity. Trainees are based in a public health organization, such as a ministry of health. During their placements, the trainees acquire the knowledge, skills and competencies required to be an epidemiologist and public health practitioner through learning-by-doing.

Focal point.

A person who is nominated as the point of contact for an activity or process.

Food.

Any substance, whether processed, semi-processed or raw, that is intended for human consumption; it includes drink, chewing gum and any substance used in the manufacture, preparation or treatment of food, but does not include cosmetics, tobacco or substances used only as drugs (FAO/WHO, 2014).

Food chain.

The series of processes that food goes through; it includes primary production (including feeds, agricultural practices and environmental conditions), product design and processing, transport, storage, distribution, marketing, preparation and consumption (FAO/WHO, 2007).

Foodborne disease.

Any disease of an infectious or toxic nature caused by the consumption of food (WHO, 2008b).

Foodborne event.

Any event related to the occurrence of disease in humans that is caused by contaminated food (e.g. an outbreak of salmonellosis caused by improperly handled eggs) or that has the potential to expose humans to known or suspected hazards through food (e.g. accidental or intentional contamination of food with chemicals) (adapted from WHO, 2008c).

Foodborne disease outbreak.

For common diseases (such as salmonellosis), the occurrence of two or more cases resulting from ingestion of the same food. For rare diseases, e.g. botulism, one case may be considered an outbreak (WHO, 2008b).

Food safety.

Actions taken to ensure that food will not cause harm to the consumer when it is prepared and eaten according to its intended use (FAO, 2006).

Hazard.

An agent that has the potential to cause adverse health effects in exposed populations (WHO, 2012).

Hazard assessment.

Identification of the hazard (or potential hazards) causing a foodborne disease event and of the associated adverse health effects (WHO, 2012).

Indicator-based surveillance.

The regular, systematic collection, monitoring, analysis and interpretation of structured data, i.e. of indicators produced by a number of well identified, mostly health-based, formal sources (WHO, 2014).

Integrated food chain surveillance.

The routine sharing of data and information between the public health, food safety and animal health sectors in order to direct control measures to minimize the burden of foodborne diseases.

Laboratory-based surveillance.

A form of indicator-based surveillance of cases that have been confirmed by a laboratory test. The laboratories that perform the testing report the results to the surveillance system, as well as informing the clinicians who requested the tests.

Modified Field Epidemiology Training Programme.

A shortened version of the Field Epidemiology Training Programme (i.e. of less than 2 years' duration), which targets basic knowledge and competencies in surveillance and outbreak investigation that are specifically designed for resource-limited settings.

Monitoring.

The routine and continuous tracking of the implementation of planned surveillance activities and of the overall performance of the surveillance and response system (WHO, 2006).

Multisectoral collaboration.

Multiple sectors working together to achieve common objectives, goals and tasks with shared responsibility. In the context of foodborne diseases, this will include staff from the public health surveillance and response sector, food safety sector, animal health sector, environmental health and other relevant sectors.

Notifiable disease.

A disease that, because of its public health importance, must be reported to the public health authority under legislation or decree, in the pertinent jurisdiction when a diagnosis is made (Porta, 2014).

Outbreak Response Team (ORT).

A team of people tasked with investigating and controlling the outbreak.

Passive surveillance.

Surveillance for diseases or events that is initiated by the source of the data, such as a health care provider or laboratory (adapted from Thacker & Birkhead, 2002).

Predictive value, positive.

The proportion of reported cases that actually have the health-related event under surveillance (CDC, 2001).

Public health surveillance.

The systematic continuous collection, collation and analysis of data for public health purposes and the timely dissemination of public health information for assessment and public health response as necessary (WHO, 2008a).

Rapid response team.

The team responsible for investigating public health events.

Response.

Any public health action (e.g. event monitoring, providing information to the public, field investigations and control or mitigation measures) triggered by the detection of a public health risk (WHO, 2014).

Risk.

The likelihood that an adverse event will occur during a specified period and the likely magnitude of its consequences (WHO, 2012).

Annex 2 gives more detailed definitions of risk-related terms and describes how the definitions differ between the disciplines of food safety and surveillance and response.

Rapid risk assessment.

A systematic process for gathering, assessing and documenting information to assign to an event a level of risk to human health. Rapid risk assessment includes three components: hazard assessment, exposure assessment and context assessment. The rapid risk assessment provides the basis for deciding on action to be taken to manage and reduce the negative consequences of acute public health events (WHO, 2014).

Sensitivity.

The proportion of actual cases in a population that is detected and reported through the surveillance system (WHO, 2006).

Sentinel surveillance.

Surveillance based on a selected population, with samples chosen to represent the relevant experience of particular groups. Standard case definitions and protocols are used to ensure that comparisons across time and sites are valid (Porta, 2014). Examples of sentinel surveillance include data collected from a subset of doctors or laboratories, or from sentinel geographical locations.

Severity-based surveillance.

A type of indicator-based surveillance in which specimens are collected from patients with severe illness (e.g. those admitted to hospital) or who have died from a suspected foodborne illness.

Specificity.

The proportion of persons without the disease in a population that are considered by the surveillance system as not having the disease. A surveillance system with low specificity would pick up false outbreaks, resulting in a waste of resources for their investigation (WHO, 2006).

Strategy grid.

A 2 x 2 grid that shows the relationship between two criteria being evaluated. It can be used when deciding on priorities for surveillance and response.

Surveillance and response system.

The existing infrastructure, staff and processes used for surveillance of and response to communicable diseases.

Surveillance and response for foodborne diseases.

Use of existing surveillance and response systems for foodborne diseases.

Syndrome.

A group of clinical signs and symptoms that consistently occur together, or a condition characterized by a set of associated clinical signs and symptoms (WHO, 2012).

Syndromic surveillance.

A method of surveillance that uses health-related data based on clinical observations rather than laboratory confirmation of diagnoses (WHO, 2008d).

Timeliness.

Refers to an acceptable length of time between steps in a public health surveillance system (CDC, 2001). For example, the time between onset of illness and specimen collection or between laboratory confirmation of disease and notification needs to be within certain limits.

Vertical programme.

A programme in which interventions are provided through delivery systems that typically have separate administration and budgets, with different levels of structural, funding and operational integration in the wider health system (Atun, Bennett & Duran, 2008).

Annex 2.

Explanation of risk-related terms used in this manual

A number of key risk-related terms are used throughout this manual. This annex discusses the terms used and describes how risk is considered differently in the different sectors with a stake in foodborne diseases.

How risk is considered differently between sectors

Figure A2.1 describes how the emphasis on risk-related terms changes as the surveillance and response system evolves. In stage 1, the focus is mainly on detecting events and the risk terminology is largely in the realm of the surveillance and response sector. In stage 3, with integrated food chain surveillance, the terminology is focused on the Codex Alimentarius risk definitions (FAO/WHO, 2014). A comparison of risk-related definitions is given in Table A2.1.

FIGURE A2.1.

How risk-related terms are used in each of the three stages of surveillance of and response to foodborne diseases

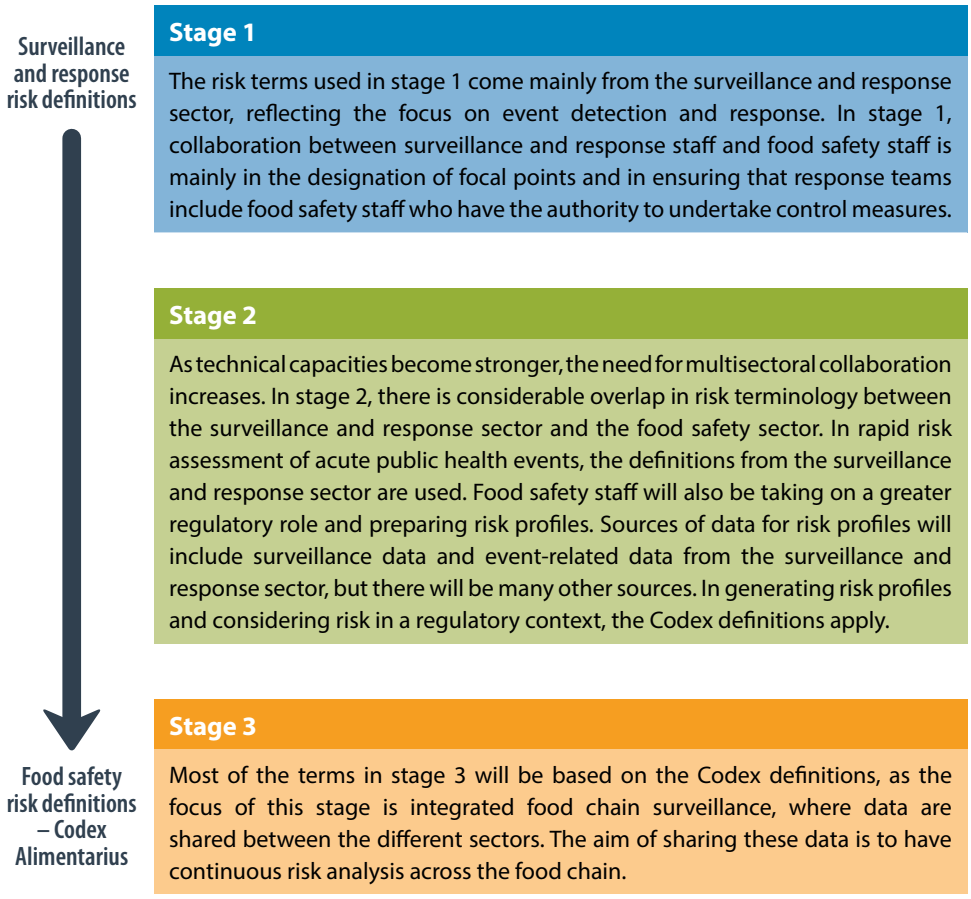


TABLE A2.1.

Definitions of risk-related terms in the surveillance and response sector and the food safety sector

Term	Surveillance and response sector[1]	Food safety sector[2]
Context assessment	Assessment of the environment in which an event is taking place.	No definition
Exposure assessment	Evaluation of the potential exposure of individuals and populations to the hazards identified in a hazard assessment.	The qualitative or quantitative evaluation of the likely intake of biological, chemical, and physical agents via food, as well as exposures from other sources if relevant.
Hazard	An agent that has the potential to cause adverse health effects in exposed populations.	A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.
Hazard assessment	Identification of the hazard (or potential hazards) causing an event and of the associated adverse health effects.	No definition
Risk	The likelihood that an adverse event will occur during a specified period and the likely magnitude of the consequences.	A function of the probability of an adverse health effect and the severity of that effect, as a consequence of one or more hazards in food.
Risk analysis	No definition	A process consisting of three components: risk assessment, risk management and risk communication.
Risk assessment	A systematic process for gathering, assessing and documenting information in order to assign a level of risk. Risk assessment includes three components — hazard assessment, exposure assessment and context assessment.	A scientifically based process consisting of the following steps: (i) hazard identification, (ii) hazard characterization, (iii) exposure assessment, and (iv) risk characterization.
Risk characterization	A process of assigning a level of risk to an event based on assessment of the hazard, exposure and context. If no quantitative model or comparison with a guidance value (e.g. in food safety risk assessments) is available, the process is based on the expert opinion of the team.	The qualitative or quantitative estimation, including attendant uncertainties, of the probability of occurrence and severity of known or potential adverse health effects in a given population, based on hazard identification, hazard characterization and exposure assessment.

(TABLE A2.1. Continue)

Term	Surveillance and response sector1	Food safety sector2
Risk communication	The range of communication principles and activities, and exchange of information, required throughout the preparedness, response and recovery phases of a serious public health event between responsible authorities, partner organizations and communities at risk to encourage informed decision-making, positive behaviour change and the maintenance of trust.	The interactive exchange of information and opinions throughout the risk analysis process concerning risk, risk-related factors and risk perceptions among risk assessors, risk managers, consumers, industry, the academic community and other interested parties, including the explanation of risk assessment findings and the basis of risk management decisions.
Risk management	The process of weighing policy options in the light of a risk assessment and, if required, selecting and implementing appropriate intervention options, including regulatory measures. With respect to acute public health events, risk management is the process by which appropriate actions are taken to manage and reduce the negative consequences of acute public health risks.	The process, distinct from risk assessment, of weighing policy alternatives, in consultation with all interested parties, considering risk assessment and other factors relevant for the health protection of consumers and for the promotion of fair trade practices, and, if needed, selecting appropriate prevention and control options.
Risk profile	No definition	The description of the food safety problem and its context.

[1] Definitions from the *Rapid risk assessment of acute public health events*, Geneva, World Health Organization, 2012.
[2] Definitions from *Codex Alimentarius procedural manual,* 22nd edition, Rome, Food and Agriculture Organization of the United Nations, 2014.

Annex 3.

Country self-assessment

This self-assessment tool helps determine the capacities that exist in a country and identify areas where further development is required. The results can be used to tailor a workplan to meet the needs of the country, based on the existing surveillance and response system.

Instructions

How To

1. Convene a small group of three or four key people. The people completing the form will vary from country to country, but should always involve surveillance and response staff from the Ministry of Health. It would also be useful to include food safety staff in the process, if possible.
2. Allocate approximately half a day to complete the self-assessment.
3. Be honest in your evaluation of each indicator. There is no right or wrong answer. The self-assessment will be used to develop a 2–3 year workplan.
4. Mark a response for each indicator, even if it appears to be beyond the capacity in your country.
5. Some indicators are repeated in each stage, because it is important to ensure that the capacity exists, regardless of the stage a country might be in. Where you have already given a response for a particular indicator, you may subsequently put simply "as above", when it appears again.

Stage 1 assessment

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Strategic goal 1. An indicator-based surveillance system that can monitor trends of disease syndromes and identify outbreaks of foodborne diseases					
A surveillance system for notifiable diseases that collects syndromic data from the local level, and collates the data at the national level on a regular basis					
Inclusion in the surveillance system of diseases and syndromes that may indicate foodborne disease (e.g. diarrhoea)					
A database to store the surveillance data					
Capacity to analyse surveillance data on a regular basis (e.g. every week or every two weeks) to monitor trends and detect outbreaks					
Regular publication of surveillance bulletins, showing the trends in syndromic data that may indicate foodborne disease					
A protocol that documents the functioning of the surveillance system					
Strategic goal 2. An event-based surveillance system capable of detecting foodborne events					
A national focal point to receive reports about events					
An event report form to capture information about an event					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
An event database to store information about reported events					
Health care workers and sanitary or food inspectors have been trained on reporting foodborne events to EBS					
Strategic goal 3. Capacity to undertake rapid risk assessments of acute public health events such as foodborne disease outbreaks					
A team at the national level that can rapidly assess acute public health events					
A rapid risk assessment protocol adapted to deal with suspected foodborne disease events					
Capacity to assess all suspected foodborne events within 24 hours of the initial report					
Strategic goal 4. Outbreak response teams (at national level, as a minimum) can gather epidemiological evidence during foodborne outbreaks					
Appropriate people have been nominated at the national level to take part in outbreak response teams					
The people identified to take part in the outbreak response teams are trained to carry out investigations of foodborne diseases					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
During the response to an outbreak, the outbreak response team undertakes the following: • interviews people with the disease using a standard questionnaire; • develops and applies a case definition; • describes the number of cases using a line list; • conducts a descriptive analysis of the data by time, place and person;					
A response protocol, which documents each step the outbreak response team should take when investigating a suspected foodborne disease outbreak					
At least one epidemiologist in the country who can conduct analytical studies, where appropriate					
Foodborne disease outbreaks are summarized in outbreak reports					
Key information about each event and outbreak is logged in an event database					
The event database is regularly analysed and the results are published in the surveillance bulletin.					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Strategic goal 5. **Outbreak response teams have the capacity to collect and transport appropriate specimens to a laboratory for identification of the etiological agent during foodborne outbreaks**					
The people identified to take part in outbreak response teams have been trained to collect the appropriate clinical specimens during an outbreak investigation					
Clinical specimens are being regularly collected in foodborne disease outbreak investigations					
Sample collection and transportation are included in the response protocol					
There is an up-to-date list of laboratories that can perform the necessary testing					
If laboratory capacity does not exist in the country, referral pathways for specimens to be tested at regional laboratories have been documented					
Strategic goal 6. **Multisectoral collaboration that facilitates rapid information exchange and support during foodborne disease outbreaks**					
The surveillance and response staff know who the focal points are for food safety, animal health and the key laboratories that would be required to test clinical or food samples collected during an event					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
There is an effective (formal or informal) mechanism for rapid information exchange during suspected foodborne outbreak investigations between all the stakeholders and relevant sectors					
Strategic goal 7. Monitoring and evaluating the surveillance and response system for foodborne diseases					
Monitoring indicators for each component of the system (e.g. IBS, EBS, rapid risk assessment of acute foodborne events, response and multisectoral collaboration)					
A process for measuring the monitoring indicators (e.g. define when system will be monitored, how it will be monitored and by whom)					
A log of system performance					
Regular evaluation of the surveillance and response system in relation to foodborne diseases					

Stage 2 assessment

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Strategic goal 8. **An indicator-based surveillance system that includes laboratory analysis, to allow better understanding of trends in foodborne diseases and to increase the sensitivity and specificity of outbreak detection**					
A list of priority foodborne diseases for surveillance selected through a formal process					
Laboratory-based surveillance for priority foodborne diseases, in which cases detected through the surveillance system are confirmed and further characterized in the laboratory					
Protocols for collecting clinical specimens for all priority foodborne diseases that include: • objectives of the surveillance system, • which specimens will be collected (e.g. stool), • when specimens will be collected (e.g. every 20th patient meeting the case definition of diarrhoea), • how specimens will be collected, • how specimens will be stored before being transported to the laboratory, • where and how the specimens will be transported to.					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Protocols for testing clinical specimens for all priority foodborne diseases that includes: • a description of how laboratory testing is organized e.g. identifying what samples from which reporting sites go to which laboratories, • instructions for the further characterization of priority foodborne pathogens, • instructions for antimicrobial susceptibility testing of foodborne pathogens and how this links to the broader antimicrobial surveillance system.					
A database to house the laboratory-based surveillance data, with a data dictionary					
Data reporting protocols for all priority foodborne diseases that include: • who will send/ enter the data to the surveillance system, • what data will be sent, • how often the data will be sent, and					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
• what actions will be taken on the basis of the information sent to the surveillance system					
Antimicrobial susceptibility testing as a routine part of the surveillance system for relevant foodborne diseases					
Strategic goal 9. There is a fully functional notifiable disease surveillance system that can successfully monitor trends and detect outbreaks of foodborne diseases					
Existing laws and decrees governing the national notifiable disease surveillance system are up to date and include priority foodborne diseases					
There are case definitions for each of the notifiable foodborne diseases					
There are notification forms and a clear mechanism for reporting (e.g. fax number, telephone notification, web-based system)					
Laboratories and health care workers: • are aware of their obligations to report positive and any relevant or unusual test results to the surveillance system, • have specific forms for notification of cases,					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
• have clear instructions for reporting that fits within the existing surveillance system					
There is a notifiable disease surveillance system database that: • can record all the information required under the minimum data requirements, • allows data to be entered easily, • allows data to be extracted easily for analysis, • can be accessed at any time, • is relatively stable over time to enable trends to be monitored.					
To support the surveillance process there is a: • data dictionary, • surveillance system log, • disease-specific surveillance log					
Surveillance data from both the notifiable disease surveillance system and the laboratories are analysed and interpreted regularly					
Data analyses are included in a regular surveillance bulletin that is available to all stakeholders					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Surveillance protocols include the list of notifiable diseases with, for each disease: • a case definition, • the reason for surveillance, • a data analysis plan for monitoring trends and the thresholds used for cluster detection, • the public health action required (e.g. response triggered by one case or a cluster of cases).					
Strategic goal 10. A fully functional event-based surveillance system capable of detecting foodborne events					
There is a 24-hour telephone hotline, fax or email to receive reports at national level					
The sensitivity of EBS has been strengthened through training of people outside the health system (e.g. media, village leaders, etc.)					
There is active scanning of the media at national and international level for information about possible foodborne events					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Strategic goal 11. The capacity for rapid risk assessment of foodborne events is strengthened at the subnational level					
Staff at the subnational level have been designated responsibility for conducting rapid risk assessments					
These staff at the subnational level have been trained in rapid risk assessment and the training included examples of foodborne disease events that have occurred					
A mechanism is in place that allows the national level to provide technical support and advice to the subnational level, as required					
Laboratory data are routinely used in the rapid risk assessment of foodborne disease events.					
Strategic goal 12. Capacity exists at subnational level to carry out analytical epidemiological studies during foodborne disease outbreak investigations					
Specific questionnaires are available for each priority foodborne pathogen					
Capacity to conduct analytical epidemiological studies during outbreak investigations exists at the national and subnational levels					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Representatives from food safety and public health laboratories (and animal health, where applicable) are routinely part of the outbreak response team					
Strategic goal 13. **Ad hoc research studies are conducted to gain a better understanding of foodborne diseases and their sources**					
A mechanism exists for discussing, agreeing, planning and undertaking ad hoc research studies					
Strategic goal 14. **Multisectoral collaboration facilitates the sharing of data for risk profiling**					
There is a functioning communication mechanism between all stakeholders in food safety in the country; this requires agreement on: • what information is to be shared, • when information needs to be shared, • who needs to know the information, and • how information is to be shared					
There is evidence that the communication mechanism is in operation, e.g. a written communications plan, report from an outbreak debriefing about how the teams will work together better, etc.					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
There is multisectoral involvement in risk profiling of food safety problems, to help identify appropriate risk management strategies					
Strategic goal 15. Monitoring and evaluation of the surveillance and response system for foodborne diseases					
Adjust monitoring indicators for each component of the system to include: • laboratory-confirmed foodborne diseases for IBS; • increased sensitivity and specificity of EBS; • subnational capacity for rapid risk assessment and response; • increased multisectoral collaboration					
Regular evaluation of the surveillance and response system in relation to foodborne diseases					

Stage 3 assessment

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
Strategic goal 16. Integrated food chain surveillance system that allows a better understanding of risks across the food chain					
The existence of a team with members from each of the relevant sectors who are routinely sharing data on a regular basis					
A governance structure that allows data to be shared, and that includes a coordination and a communication mechanism					
The team can: • identify available data sources in each sector; • identify the appropriate pathogens for integrated food chain surveillance; • determine the animal species and foods to include					
A database that houses the integrated food chain surveillance data, with a data dictionary					
A data transfer mechanism extracts data from existing surveillance databases and other data sources to send to the integrated food chain surveillance database; the mechanism specifies:					

Indicator	Yes	Partially	No	Description of what is in place for this Indicator	Description of what is not in place for this Indicator
• the type of electronic transfer (e.g. automatic feed, manually sending spreadsheets); • the frequency of data transmission; • the data fields to be sent to the database					
A surveillance log is used to document changes in the integrated food chain surveillance system					
Multisectoral analysis and interpretation of the integrated data including: • a data quality review process; • source attribution					
Data analyses are included in a regular surveillance bulletin that is available to all stakeholders					
Outputs from the integrated food chain surveillance system are routinely used in risk analysis					
Performance of the integrated food chain surveillance system is monitored using indicators					
Regular evaluation of the integrated food chain surveillance system					

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