





CORE STRUCTURE FOR TRAINING CURRICULA ON INTEGRATED VECTOR MANAGEMENT





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PRFFACE

The purpose of this document is to provide guidance for WHO regions preparing their own training curriculum for integrated vector management (IVM); it should be adapted to the requirements and conditions of each region. As agreed at a recent technical workshop in Washington DC, USA,¹ the curriculum for IVM should not duplicate but be compatible with existing specialized courses on medical entomology and vector control, by concentrating on the management aspects of IVM. Consequently, little attention is paid in this document to general entomology, epidemiology or methods of vector and disease control. Separate documents on these issues are available or will be prepared as reference materials.

In preparing this document, care was taken to ensure consistency with the operational framework presented in the IVM *Handbook*, to ensure clarity about IVM. Thus, the titles of the modules correspond to the chapters of the *Handbook*, and cross-references are made

The aim of the IVM strategy is to involve stakeholders in health and other sectors at different levels of administration as well as community representatives in joint planning and implementation of vector control. Therefore, the targets audience for the core curriculum ranges from people with no background in vector-borne disease control to specialists. Modules can be selected according to the target group, as explained in the Introduction.

The first draft was prepared by Dr Henk van den Berg (Wageningen University, The Netherlands) and was field-tested at two regional training workshops, in Nairobi, Kenya, and in Manila, Philippines, in 2010. The draft was peer-reviewed during the second IVM Working Group meeting on capacity-building and training, held on 20–22 October 2010 in Washington DC (Annex 1). Using the comments of the working group, Dr van den Berg revised and finalized the document, in consultation with Dr K. Ichimori (WHO) and Dr R. Velayudhan (WHO).

The principle source of financial support for the preparation and publication of this training package was the Government of Japan, which is gratefully acknowledged. WHO also wishes to thank the United States Agency for International Development and RTI International Ltd (Research Triangle Park, North Carolina, USA) for continued support and collaboration throughout preparation of this document.

¹ Workshop on capacity strengthening and development of an IVM handbook, 28–30 May 2009, Washington DC. World Health Organization, RTI International Ltd, United States Agency for International Development.

INTRODUCTION

Vector control is an important component of the prevention of vector-borne diseases. No effective vaccine or medication is available for some diseases, so that vector control is the only option. Although vector control methods have several weaknesses, which are outlined in the Handbook, they could be made more efficient, effective and ecologically sound, through a combination of approaches: basing decisions increasingly on local evidence, using a range of interventions, covering several diseases and using existing systems and local human resources. These approaches are central to integrated vector management (IVM), which is defined as rational decision-making for optimal use of resources for vector control.

The basic principles of IVM are outlined in the Global Strategic Framework.² In 2008, WHO issued a position statement on IVM to support its use in vector-borne disease control. The global strategic plan emphasizes the urgent need for capacity-building, while the global action plan proposes preparation of a comprehensive modular training package on IVM.

On the basis of examples and lessons from the regions and the framework in the IVM Handbook, six modules were designed: a basic introduction to vectors of human disease, planning and implementation, organization and management, policy and institutional arrangements, advocacy and communication, and monitoring and evaluation. Each module contains several learning units. Except for the first introductory module, all the others are covered by corresponding chapters in the IVM Handbook.

A problem-solving approach is used in the modules, in which course participants are encouraged to work in small groups (four to six people) on practical exercises to stimulate active learning in relation to a field situation. In each module, methods of analysis and decision-making are used with observations, available data and case studies. Formal presentations are kept to a minimum, e.g. to introduce a subject or to provide information that complements the outcomes of the working groups.

The core structure will serve as a basis for a multi-tier curriculum aimed at various target groups, to be determined later. Learner and tutor manuals should be prepared by each country. Three broad target groups, corresponding to three training levels, have provisionally been identified: nonspecialists (basic level), public health professionals (intermediate level) and academics and students (advanced level). The core curriculum was prepared for the intermediate level; the requirements for the basic and advanced levels are outlined in each learning unit.

The complete curriculum is intended for training courses of no longer than 2 weeks. Longer courses, which have been conducted in several regions, have limitations, because, in general, it is difficult for staff in the public and private sectors and for representatives of civil society to take time for long training. Shorter training of more people should be the aim, especially in decentralized areas. The aim of the IVM programme is to involve and

² Global strategic framework for integrated vector management. Geneva, World Health Organization, 2004.

train people from various backgrounds at various levels of administration. Courses for nonspecialists could last for 1–2 weeks, with modules selected in accordance with the participants' background and roles. Courses for academic students could be conducted over one semester, so that more time can be spent on medical entomology and vector control methods.

The relative weight given to each module is shown in Table 1.

Table 1. Relative weight given to each module according to the target training group

Module	Weight (%)	Target group		
		Nonspecialists	Public health professionals	Academics
1. Introduction to vectors and disease	15	+	+	+
2. Planning and implementation	30	+	+	+
3. Organization and management	20	±	+	+
4. Policy and institutional framework	10	-	+	+
5. Advocacy and communication	10	±	+	+
6. Monitoring and evaluation	15	±	+	+

^{+,} required; ±, optional; -, not required

A basic introduction on vectors of human disease (module 1) is required for all target groups, but this should be brief and based on simple, practical methods, covering vector identification, life-cycles, ecology and disease transmission. This background knowledge will help nonspecialists to participate in IVM and provide refreshment training for public health professionals. Module 2 (Planning and implementation) is the most important, both in terms of training time and because units 2.4–2.7 are a standard requirement for all target groups. For most of the learning units, a description of the existing situation or case examples will be made available or brought by the participants.

The intended uses of the modules and units for each target group are indicated in *Table 2*. The core functions and competences required for IVM, as outlined in the *Handbook*, are shown in *Table 3*. Most of the functions are covered in individual modules; however, training, supervision and emergency response must be addressed by countries.

Table 2. Intended uses of the modules and units for each target group

Target group	Module and units			Duration			
	1	2	3	4	5	6	(days)
Nonspecialists, communities	1.1-1.4	2.4-2.7	-	_	-	6.2	4-8
Nonspecialists, villages, districts	1.1-1.4	2.4-2.7	3.1-3.3	-	5.2-5.3	6.1-6.3	6–8
Public health professionals	1.1-1.4	2.1-2.7	3.1-3.3	4.1-4.3	5.1-5.3	6.1-6.3	8-10
Academics and students	1.1-1.4	2.1-2.7	3.1–3.3	4.1-4.3	5.1-5.3	6.1-6.3	>15

Table 3 Core functions and competences required for integrated vector management

Core function	Field of competence	Module
Basic understanding of vector biology	Technical knowledge	1
Epidemiology and vector assessment, stratification	Technical knowledge	2
Local planning and implementation	Analysis and decision-making	2
Implementing health interventions	Operational skills	2
Local vector surveillance	Technical knowledge	2
Organization and management	Management	3
Establishment of intersectoral partnerships and networking	Access, communication	3
Setting strategic direction	Planning	4
Advising on policy and institutional arrangements	Policy analysis	4
Advocacy	Access, communication	5
Education and awareness-raising	Communication	5
Monitoring and evaluation	Technical knowledge	6
Other requirements, not covered in the modules		
Curriculum preparation and training of trainers	Training	
Supervision of decentralized planning and implementation	Supervision and facilitation	
Supervision of decentralized monitoring and evaluation	Supervision and facilitation	
Supervision of decentralized organization and management	Supervision and facilitation	
Coordination of emergency response	Technical knowledge, management	

Core structure for training curricula on IVM

MODULE 1. BASIC INTRODUCTION TO VECTORS OF HUMAN DISEASE

BACKGROUND

Basic knowledge of locally prevalent vectors of human disease is a prerequisite for people's involvement in vector control, personal protection and vector surveillance. The four units in this module are presented as examples for improving knowledge in four areas important for people involved in IVM: identifying vectors, understanding their life-cycle, identifying vector breeding sites and understanding the role of vectors in transmitting disease. The examples refer to mosquito vectors and should be adapted to local vectors and situations. Live materials and actual field situations should be used in these learning units when possible. The exercises are meant to generate interest and motivation in communities, civil society organizations and staff of public and private sectors for participating in IVM.

If the country intends to combine the curriculum on IVM with an existing curriculum on medical entomology or vector control, the basic learning units may be redundant. More complex topics, such as vector incrimination, vectorial capacity and methods for detecting infectivity, are not covered in this module and should be taught in specialized courses on medical entomology or vector control.

UNIT 1.1 VECTOR IDENTIFICATION

The aim of this exercise is to present and teach simple methods of identification of mosquitoes that can be reproduced in the field by nonspecialists, without special equipment. Laboratory techniques for identification are beyond the scope of this exercise. In most contexts, simple identification will be possible at genus but not at species level.

Identification, even at genus level, is a basic requirement for vector control and surveillance. Moreover, being able to recognize and differentiate vectors and non-vectors generates interest among nonspecialists. Methods of identification should be developed in accordance with the prevailing vector-borne diseases, local vectors (including non-mosquito vectors) and related organisms.

Training objective

• Participants will learn to distinguish between the larvae and adults of the main groups of vectors and related non-vector groups by observation of morphological and behavioural characteristics with the naked eye

Levels

Basic: as indicated

Intermediate: as indicated

Advanced: more detailed observations

Requirements

- The trainer should collect sufficient larvae and adults of the main vector species
 and related organisms that occur locally (for example, Culex, Aedes and Anopheles
 mosquitoes) as live material for observation of morphological and behavioural
 characteristics.
- The trainer should provide expert knowledge to support the observations and prepare reference materials, with drawings of the three mosquito genera clearly showing visible differences (adults and larvae).
- Time required: 3 h

Assignment

- 1. Divide participants into small groups and distribute the material collected in the field.
- 2. Ask the participants to observe the larvae or aquatic stage of each organism (for example, larvae of Culex, Aedes and Anopheles) and identify their morphological and behavioural characteristics (e.g. differences in movements or resting position). Ask the participants to make drawings.
- 3. Do the same for the adult stage of each organism. If possible, differentiate between males and females.
- 4. Towards the end of the exercise, show reference materials.

Points for discussion

- How can the larvae of different vectors (and non-vectors) be distinguished? How can the adults of different vectors (and non-vectors) be distinguished?
- Which characteristics can be used most easily on the field for reliable identification by nonspecialists?
- Why is identification important?

Table 4 gives an example of simple characteristics for differentiating three mosquito genera, which could be adapted to locally prevalent vectors.

Table 4. Simple characteristics for differentiating three mosquito genera

Form	Characteristic	Aedes	Culex	Anopheles
Larva	Air tube (siphon)	Medium	Long	Absent
	Position in water	At an angle	At an angle	Horizontal, at surface
	Behaviour	Swift zig-zag movement	Zig-zag movement	Stiff, static
	Other	Curved body	Curved body	White collar
Adult	Resting stance	Bent	Bent	At an angle to surface
	Body	Small	Stout	Slender
	Body markings	White	Dull colour	Dull colour
	Abdomen	Pointed at end	Blunt, rounded at end	Blunt, rounded at end

UNIT 1.2 VECTOR LIFE-CYCLE

Understanding the life-cycle of a vector is central to vector control and surveillance. Certain developmental stages might be particularly vulnerable to vector control.

Studying the life-cycle by regular observation of the vector's developmental stages in artificial containers provides insight into their biology and generates interest in communities in participating in IVM. For example, people might not be aware that larvae breeding inside water jars near their houses develop into adult vectors of human disease.

Training objective

 Participants will learn to rear vectors from larval to adult stages in order to understand their life-cycle and recognize their development stages.

Levels

- Basic: as indicated
- Intermediate: as indicated
- Advanced: more detailed observations.

Requirements

- The trainer will collect vectors at various developmental stages, including eggs if
 possible, and keep them in transparent jars with nutrients provided by an infusion of
 grasses. Pre-testing the materials and methods is important to ensure the success of
 the exercise.
- Prepare reference materials, showing drawings of each vector life stage.
- Time required: 3 h

Assignment

- 1. Two types of observation can be made: a 2-h observation during the session itself, or daily observations over about 1 week (depending on the development cycle of the organism). For example, during a 2-h observation, the emergence of mosquito pupae to the adult stage can be demonstrated; however, 1 week is needed to observe other stages of a life-cycle.
- 2. Ask participants to prepare transparent jars (with grass infusion for mosquito vectors) and to add one stage of the vector (e.g. several eggs, several young larvae of the same age or several pupae). Make sure there is space above the water surface for emerging adults and that the jar is covered with mesh to keep the emerging adults captive.
- 3. Daily observations will include size and morphological and behavioural aspects, with drawings. At the end, the life-cycle, with individual stages and times, will be drawn. To calculate the egg-to-egg period, fill in any missing information (e.g. pre-oviposition period).

Points for discussion

- How long does the complete life-cycle take?
- What conditions in the environment are essential for the vector to complete its lifecycle?
- At which times in the life-cycle can the vector be attacked?

UNIT 1.3 VECTOR ECOLOGY

Vectors thrive in ecosystems that provide suitable habitats for breeding and appropriate conditions for feeding on human or animal hosts. The vectors of many diseases require water bodies to complete their life-cycle, and some vectors are selective in the types of water bodies they choose for laying their eggs. It is important to understand the breeding preferences of targeted vectors in planning vector control interventions, so that limited resources are used efficiently.

The development stages of most vectors are vulnerable to attack by predatory insects or small fish. Therefore, predators are beneficial organisms that should be conserved. Broad-spectrum insecticides used to kill the vector (e.g. in larviciding) also destroy most of the predators that normally feed on the vectors when left undisturbed. After spraying, vectors can re-colonize relatively quickly, but most predators recover only slowly, giving the vector an advantage.

Training objective

• Participants will learn to determine the preference of vectors for particular water bodies and learn to appreciate the role of predators.

Levels

Basic: as indicated

• Intermediate: as indicated

Advanced: more detailed observations

Requirements

- The trainer should survey an area within easy reach of the training venue to determine the presence of different types of water bodies, some of which may harbour vectors.
- Time required: 3-4 h

Assignment

1. Guide the participants to a number of water bodies or other known vector-breeding sites, both favourable and unfavourable for vector breeding. Ask the participants to record the presence of vectors and predators (e.g. insects, fish) and to describe

- the characteristics of each breeding habitat. For example, water bodies can be characterized by criteria such as size, turbidity, vegetation, flow, shadiness, depth and presence of predators.
- 2. After making observations at a number of habitats, ask participants to analyse and present their results

Points for discussion

- Which type of breeding site does each prevalent vector prefer?
- Which types of breeding site are easily controlled or removed, and which are not?

Table 5 gives examples of the characteristics of breeding sites for three types of mosquito vector; it could be adapted to locally prevalent vectors.

Table 5. Characteristics of breeding sites for three types of mosquito vector

Characteristic	Aedes	Culex	Anopheles
Type of water body	Plastic containers, tyres, tree holes, leaf axils, puddles, rockpools	Blocked drains, puddles, shaded pools	Rooftops, sunlit pools, tire tracks, hoofprints, seepage pools
Permanent or temporary	Temporary	Mainly temporary	Mainly temporary
Large or small	Small	Small or large	Small or large
Flowing or stagnant	Stagnant	Stagnant or slightly flowing	Stagnant or slightly flowing
Clear or turbid	Clear or turbid	Turbid	Clear
Sunlit or shady	Shady	Shady	Sunlit
Deep or shallow	Shallow	Shallow	Shallow
Predators	Rarely found in presence of predators	Rarely found in presence of predators	Rarely found in presence of predators

UNIT 1.4 DISEASE TRANSMISSION

The cycle of vector-borne diseases involves parasites, vectors, humans and the environment. If communities understand the disease cycle, they can play a more effective role in interrupting it.

The disease cycle cannot be demonstrated to communities as a real-life observation, because disease pathogens can be observed only through a microscope. Alternative methods must therefore be used.

Training objective

 Participants will learn to understand the cycle of vector-borne disease and the role of the vector.

Levels

• Basic: as indicated

• Intermediate: as indicated

Advanced: more detailed observations

Requirements

• Time required: 1 h

Assignment

- Posters and leaflets could be used to illustrate the disease cycle and the role of the vector
- 2. Depending on the target group, role-play could be used to illustrate the disease cycle, with one person playing the role of humans and another the role of the vector, taking the parasite from one person and transmitting it to others.

Points for discussion

- How does the disease parasite spread?
- What happens if the vector is removed?
- In which season do you expect the highest risk for the disease? Why?
- How can people protect themselves against transmission of the disease parasite?

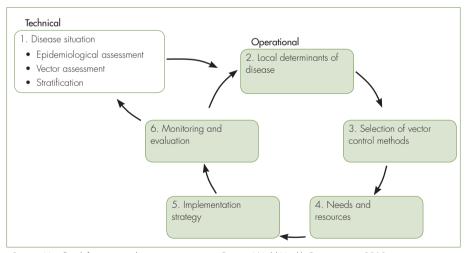
MODULE 2. PLANNING AND IMPLEMENTATION

BACKGROUND

In this module, planning tools are introduced for ensuring efficient, effective, ecologically sound implementation of vector control at both central and decentralized levels. In planning for implementation, decisions must be taken on, e.g. the types of intervention, their targeting and timing, management of resources and stakeholder participation. All decisions should be based on valid, accurate observations (or data) and a proper analysis. Moreover, decision-making should be appropriate for the location.

Planning should follow the steps presented in sequence in the learning units below and as shown in *Figure 1*. Planning starts with a technical component: assessing the epidemiology and vector situation and conducting stratification for setting priorities. The outcome of this component forms the basis for the operational steps to be conducted at district or village level, which are analysis and mapping of local determinants of disease, selection of vector control methods, assessment of needs and available resources, preparation of a local IVM strategy, monitoring and evaluation.

Figure 1. Decision-making in integrated vector management, with a technical component and operational steps (the cycle suggests continuous decision-making in response to changes in local conditions of disease)^a



^a Source: Handbook for integrated vector management. Geneva World Health Organization, 2012.

The planning tools are designed to encourage decentralization and participation. Moreover, they allow a comprehensive approach to disease prevention, by involving all the determinants of disease. Each learning unit is based on a model with three elements: observations (or use of available data or case studies), an analysis and decision-making.

UNIT 2.1. EPIDEMIOLOGICAL ASSESSMENT

The first step is to conduct an epidemiological assessment in order to determine the actual burden of disease. The purpose is twofold: to assist in decision-making on resource allocation and to allow evaluation of the impact of the intervention strategy. Without a solid epidemiological assessment, it will be difficult to plan effectively, and it will be impossible to assess whether any impact has been made after the interventions have been completed.

The burden of disease is measured from data on disease incidence, prevalence and mortality, supplemented with information on work days lost, school days lost, seasonal variation, sub-populations affected and the proportion of outpatients affected. Data on the incidence and prevalence of disease are the most common. In IVM, data are needed for each vector-borne disease.

Data can be collected during passive case detection, active case detection, sentinel surveillance or special studies (e.g. in an outbreak). Passive incidence data, in the form of reports on diagnoses at clinics and hospitals, are the commonest type of data. Passive data give an indication of incidence rates but, because not all patients report to health facilities, these data commonly result in an underestimate of disease incidence.

Active data collection consists of recording disease symptoms or evidence of pathogens in target populations. Active surveillance is not common because it requires additional resources. Health management information systems have been set up in certain countries, and these have improved the frequency and coverage of data on disease data.

Training objective

 Participants will learn to evaluate the available data on vector-borne disease epidemiology and suggest steps to improve the assessment.

Levels

- Data on the incidence, prevalence and mortality of the disease, supplemented (when possible) with data on work days lost, school days lost, seasonal variation, subpopulations affected, and proportion of outpatients. The data sources should include records of passive and active surveillance of all relevant vector-borne diseases.
- Time required: 3 h

Requirements

Time required: 1 h

Assignment

- Construct a matrix with data types (horizontally) and prevalent vector-borne diseases (vertically) to determine systematically the presence or absence of data for each cell of the matrix.
- 2. Indicate in each cell the year of the most recent data.
- 3. Highlight the data obtained by active surveillance or special studies, which are expected to be the most accurate.
- 4. Evaluate the reliability of the data in the matrix.
- On the basis of the available data, assess the overall situation of vector-borne diseases.

Points for discussion

- What are the gaps and shortcomings in the epidemiological assessment?
- What is needed to improve the assessment?
- What are the advantages of combining all vector-borne diseases into a single assessment?
- What are the advantages and disadvantages of passive case detection?
- What are the advantages and disadvantages of active case detection?

UNIT 2.2. VECTOR ASSESSMENT

For vector control to be effective, a thorough understanding of the vectors is needed. Which species can be expected to occur in a certain ecosystem? Are the suspected vectors actually responsible for transmitting disease? Where and when do the vectors breed? Where and when do they bite and rest? Are the vectors tolerant or resistant to the available insecticides? These five questions are addressed sequentially (see section 3.3 of the IVM Handbook for further information).

The importance of the type of ecosystem must be understood, because each type provides unique conditions for breeding, resting and host-finding of vectors. Examples of ecosystem types are urban, agriculture (irrigated, unirrigated), forested, coastal, riverine, savannah and plantations.

Vector incrimination consists of determining whether a species acts as a vector of disease in real-life circumstances. It involves studying the association of the species with humans in space and time, its direct contact with humans and evidence of pathogens inside the vector

Vectors have preferences for breeding in certain microhabitats (*Table 5*). The seasonal fluctuations of vector species should also be known. The time of biting and whether biting occurs indoors or outdoors have important implications for selecting an intervention method. A preference for feeding on humans rather than animals is a factor in the transmission of disease. It is also critical to determine where the adult vectors rest, particularly for mosquito vectors.

Where insecticides are used to for vector control, the susceptibility of vectors to the insecticides used should be ascertained by the standard methods recommended by WHO.

Training objective

 Participants will learn the basic requirements and methods for vector assessment.

Levels

- Basic: analysis of local information
- Intermediate: analysis of information available at national level (as indicated)
- Advanced: planning for generating new data

Requirements

- Map showing zones and major ecosystems
- Data on the vector species, with locations, of each prevalent vector-borne disease (refer to diseases listed under unit 2.1)
- Information on vector incrimination, microhabitat preference, seasonality and biting and resting behaviour of vectors (national and regional data)
- Most recent results of tests for susceptibility of the vectors to the insecticides used
- Time required: 4 h (intermediate level)

Assignment

- 1. Ecosystems: Determine the major types of ecosystem (e.g. coastal, riverine, savannah, urban, forest, agriculture, high altitude, plantation), and construct a matrix with the ecosystem types horizontally and the prevalent vector-borne diseases (e.g. malaria, dengue) vertically.
- 2. Into each cell of the matrix, list the potential vectors for each disease and ecosystem (in brackets when the occurrence of a vector is uncertain); put a question mark when no information is available.
- 3. Vector incrimination: List the potential vectors for each prevalent disease, and determine for each vector whether there is evidence of the species' occurrence near human habitation, its direct contact with humans, and evidence of disease pathogens inside the vector (within the country or in the region).
- 4. Microhabitats and seasonality: List the potential vectors of disease and determine their preferred microhabitat for breeding (e.g. type and characteristics of water bodies). Indicate gaps in knowledge.
- Seasonality: Indicate in a graph seasonal fluctuations over 1 year in the population of each vector.
- 6. Biting and resting: Prepare a matrix of the potential vectors, and, for each vector, list the available information on biting and resting behaviour (indicating missing information with a question mark). List the vectors vertically in the first column. In the second column, list the time of biting during the day or night (or contact with the vector). In the third column, state whether biting occurs indoors or outdoors. In the fourth column, enter whether the vector rests indoors or outdoors (when applicable). In the fifth column, state whether the vector prefers to feed on humans rather than animals. Indicate gaps in knowledge.

7. Susceptibility to insecticides: List the vectors against which insecticides are being used for control purposes. Indicate the insecticides used against each vector. Specify the susceptibility status in each category, indicating the year of the most recent test. Indicate gaps in knowledge.

Points for discussion

- Recapitulate the vector assessment, pointing out its strengths and weaknesses.
- What are the priorities for further study?

UNIT 2.3. STRATIFICATION

Disease and disease risks are never uniformly distributed but are more concentrated in certain areas than others. Stratification refers to classification of disease-endemic areas for identifying the approaches required for disease control. In this unit, a simple form of stratification is proposed.

The main purpose of stratification is to differentiate between areas according to the incidence and prevalence rates of a disease. It is conducted for each vector-borne disease. Overlay maps of the different diseases help in identifying areas in which several diseases are prevalent.

Stratification is usually conducted on the basis of administrative units, such as districts; for example, district A has a low incidence of a disease and district B a medium incidence. Stratification at administrative level is logical, as data on disease incidence are usually collected at this level, even if the incidence within an area is not uniform. Furthermore, budgets for disease control are usually allocated and activities organized by administrative unit. Alternatively, disease incidence could be stratified according to strongly associated variables, such as altitude, rainfall or ecosystem.

The main function of stratification is to permit allocation of the national budget to lower levels of the administration according to the endemicity of vector-borne diseases. The implementation strategy for districts where the disease is highly endemic might be different from the strategy for those with a risk for epidemics.

More complex forms of stratification are beyond the scope of this manual. Stratification can, for instance, be used to "layer" different types of information, such as altitude, ecosystems and socioeconomic conditions, e.g. to differentiate between disease incidence in highland and lowland areas. The purpose of a complex analysis would be to determine more precisely the causes and location of disease and to design locally tailored control strategies. Multivariable stratifications are, however, difficult to achieve at country level in the absence of local data, and, multiple variables are more appropriately mapped at lower levels of administration, in a decentralized approach. This topic is discussed in more detail in unit 2.4, on Local determinants of disease.

Training objective

 Participants at national level will learn to stratify the incidence of vector-borne diseases.

Levels

• Basic: not required

Intermediate: as indicated

Advanced: more complex version

Requirements

- Outputs of unit 2.1, with details of locations, country maps with administrative limits, (semi-) transparent sheets, coloured marker pens
- Time required: 3 h

Assignment

- 1. Examine the available data to determine the average disease incidence in each administrative unit (e.g. district).
- 2. Define the prevalence of each vector-borne disease as low, medium or high.
- 3. Draw a country map with administrative borders.
- 4. Draw transparent overlays for each disease, and indicate low, medium or high prevalence with a different pattern.
- Overlay the map with the transparent sheets to determine areas where several diseases occur.
- 6. Recommend the percentage of the national budget for vector-borne diseases that should be allocated to each administrative unit on the basis of the stratification.

Points for discussion

- What are the implications of stratification?
- What are the gaps in information, and what is needed to fill those gaps?
- What are the benefits of covering several diseases with an IVM strategy as compared with having a separate programme for each disease?

UNIT 2.4. LOCAL DETERMINANTS OF DISEASE

The epidemiology of vector-borne disease is complex and depends on a variety of local factors. Those that determine the spread of vector-borne disease are the determinants of disease. It is important to understand all the determinants of disease, so that appropriate actions can be taken to reduce risk. This will lead to a comprehensive approach to disease prevention.

Determinants of disease can be divided into four categories: those related to the parasite, to the vector, to human activities and to the environment. The human determinants are behaviour and activities that affect the risk for transmission, and environmental determinants are factors in the environment that influence transmission. These factors strongly affect the risk for disease (see section 4.2 of the IVM Handbook for further information).

Vector-borne disease control programmes usually address only two categories of determinant: the parasite and the vector. In contrast, the aim of an IVM strategy is to address all determinants of disease, when possible. If the human and environmental determinants are ignored, people will continue to be at risk for infection, and the vectors will continue to proliferate in the environment.

"Participatory mapping" is useful for understanding the spatial dimension of the determinants, i.e. where the vectors breed and where people or other hosts live. As the risk for disease can vary over a small area, local mapping improves the targeting and efficiency of vector control.

Training objectives

- Units 2.4–2.7 are best used locally, at district or village level, as group activities with the participation of local stakeholders and community members.
- Participants will learn to understand the importance of identifying and mapping the determinants of disease.
- Participants will be able to facilitate participatory mapping

Levels

- Basic: analysis at village level
- Intermediate: analysis at district level (as indicated)
- Advanced: same as for intermediate level

Requirements

- Summaries of the epidemiological and vector assessments of the local situation
- Maps, census data and the results of surveillance and local surveys, if available. For training purposes, data from a hypothetical or case study could be used.
- Background information on the determinants of disease, from chapter 4 of the Handbook
- Time required: 4 h

Assignment

- 1. In order to be well informed about the local situation with regard to vector-borne diseases, first examine the epidemiological and vector assessments.
- Identifying the determinants: Make a list of the possible determinants of vector-borne disease. Indicate those related to the parasite, the vector, humans and the environment (e.g. which aspects of the vector or human behaviour determine the incidence of disease?).
- 3. Identify those determinants that could be influenced by human intervention, and indicate the type of interventions or actions that would affect them.

- 4. Mapping and timing: On a large sheet, draw the boundaries of the selected administrative unit. Identify relevant elements (e.g. roads, residential areas, location of aggregations, wastelands, agriculture and other ecosystems), and add them to the map, using symbols, patterns and a legend.
- 5. Identify the locations at which the risks for vector breeding and disease transmission are expected to be highest. If possible, identify the locations of transmission of disease.
- 6. To construct a calendar, draw a horizontal bar representing 1 year. Add further horizontal bars to indicate the seasonal determinants of vector-borne disease (e.g. weather, agriculture, social events), and identify the period of highest risk for disease³.

Points for discussion

- Why is it important to understand all the determinants of disease?
- Which of the suggested actions or interventions are outside the scope of the health sector?
- What might be the role of other sectors and local communities?
- How could the results of mapping and the calendar be used?

UNIT 2.5. SELECTION OF VECTOR CONTROL METHODS

Vector control methods can be environmental, mechanical, biological or chemical and can control disease by reducing vector populations or by reducing human-vector contact (see section 4.3 of the IVM Handbook and its bibliography for further references). To ensure appropriate selection of vector control methods, the advantages and disadvantages of each method in the local context should be appraised, taking into account effectiveness, safety, sustainability and affordability. If possible, non-chemical methods and methods that prevent vector breeding should be used, leaving chemical methods as the last resort. Insecticide resistance is an increasing problem in vector control, especially as the choice of insecticides for use in public health is limited.

Many control methods are effective against the vectors of more than one disease. Consequently, the complementary effects of vector control methods on several diseases should be used and monitored.

Training objectives

- Participants will be able to select locally appropriate vector control methods.
- Units 2.4–2.7 are best used locally at district or village level, as group activities with the participation of local stakeholders and community members.

³ The critical period for vector control might be during peak population levels, in order to reduce the transmission rate, but it might be during the lowest population level, to interrupt the transmission cycle when the vector population is most vulnerable.

Levels

• Same for all levels, with more detail at intermediate and advanced levels

Requirements

- Background information on the range of vector control methods
- Time required: 3 h

Assignment

- 1. Prepare a matrix, and list the possible vector control methods (column 1), drawing on reference materials listed in "Recommended reading".
- 2. Determine against which vector-borne diseases each method could be used (column 2), considering only the locally prevalent vector-borne diseases identified in unit 2.1
- 3. Repeat the local risks for each disease identified in unit 2.4, in order to indicate the potential efficacy of each control method. Estimate each method's effectiveness for controlling local risks as low, medium or high (column 3).
- 4. Determine the advantages (column 4) and disadvantages (column 5) of each method. Possible advantages are low cost, safety, opportunity for communities to participate and use for several diseases; possible disadvantages are requirements for special equipment or major investment, adverse effects on the environment and human health, risk for insecticide resistance and poor acceptability by communities.
- 5. Assess the information in columns 1–5, and select those methods that would be appropriate locally. Pay particular attention to the methods that could be used against more than one vector-borne disease.

Points for discussion

- How do the vector control methods selected differ from those used currently?
- Which vector control methods could be used against more than one disease?
- What is the role of other sectors and communities in using the vector control methods selected?
- What level of vector control is needed if the objective is to control a disease locally or to eliminate it?

UNIT 2.6. REQUIREMENTS AND RESOURCES

Certain resources will be required to implement the locally appropriate vector control methods identified in unit 2.5 on a meaningful scale. Those resources might not be available in the health sector, and other sectors and communities should contribute and take part in the activities.

This unit helps participants to determine the available human, financial and technical resources at district or village level. Human resources include skilled and general staff in the health and other public and private sectors, schools, civil society organizations and community representatives. Financial resources are the government health budgets, vector-borne disease control programmes, support from other sectors (agriculture, local

government, education, construction, private sector, nongovernmental organizations) and in-kind contributions from communities. Technical resources include expertise, skills, materials and equipment.

Determination of requirements and resources requires the participation of many sectors, local stakeholders and community representatives. Links should be made with other local programmes or government services in order to coordinate activities, ensure consistency and avoid duplication.

As planning and implementation of IVM require knowledgeable, skilled people, local capacity-strengthening requirements must be identified.

Training objectives

- Participants will learn to identify the resources available for implementing vector control methods at district or village level.
- Units 2.4–2.7 are best carried out locally at district or village level, as group activities with the participation of local stakeholders and community members.

Levels

- Basic: analysis at village level
- Intermediate: analysis at district level (as indicated)
- Advanced: same as for intermediate level

Requirements

- Information on human, financial and technical resources and on similar programmes in the target area
- Outputs from units 2.4 and 2.5
- Time required: 3 h

Assignment

- 1. Review the outputs of unit 2.4, and, on the basis of the identified risks and locations of vector-borne diseases, determine the need for participation of other sectors and communities in vector control at district (or village) level.
- 2. List possible partners in vector control activities (e.g. the health sector, local government, agriculture department, other local programmes, community organizations, women's clubs, farmers' associations, plantation personnel).
- 3. Indicate the potential contribution of each partner (e.g. leadership; cleaning up farmland, wastelands, pools and the peri-domestic environment; providing technical support or equipment).
- 4. Determine whether each possible partner will need training in IVM.
- 5. Determine whether financial and technical resources (equipment, materials, transport, communication) will be required, and suggest how they could be provided.

Points for discussion

- Which of the possible partners have never been involved in vector control?
- Why do local partners and communities require training in IVM?

UNIT 2.7. IMPLEMENTATION STRATEGY

In units 2.1–2.6, disease risks were analysed and options and resources identified. The implementation strategy will bring the pieces together in the form of an action plan for the district or village.

The strategy is based on the vector control methods selected, with decisions about when and where to implement, what to target and who to involve in implementation and evaluation. For further information, see section 4.5 of the IVM Handbook.

The outputs of units 2.1–2.6 will serve as the evidence base for making decisions about the strategy. As in previous units, the participation of stakeholders in preparing the strategy is essential. The strategy should be regularly adapted to changes in local eco-epidemiological or socioeconomic conditions.

In order for the strategy to be evaluated, targets must be set, with a schedule and interim goals. There are two types of target: operational and impact. Operational targets represent the achievements to be made in implementing the interventions (e.g. 50% of people trained or covered by bednets). They can be monitored separately for each vector control method. Impact targets are specific reductions to be achieved in the impact indicators (e.g. human behaviour, vector density, transmission rate, parasite prevalence, disease morbidity). They are used to evaluate the effectiveness of the IVM strategy as a whole.

Table 6. Example of a strategy for integrated vector management in a hypothetical village

Item	Vector control methods selected					
	Source reduction	Management of wasteland and drains	Insecticide-treated bednets	Irrigation management		
When to implement	All year round but intensified during rainy season	According to cropping season	Continuous	According to periods of rainfall; frequently		
Where to implement	Residential areas, streets, markets, woodlands	High-risk areas, wastelands and drains around the village	Areas endemic with malaria	All irrigated agricultural fields in area of village		
Target of vector	Aedes, Anopheles, Culex	Aedes, Anopheles, Culex	Anopheles, Culex	Anopheles		
Target of intervention	Part of residential areas managed	All wastelands managed	80% of houses	50% of rice field with intermittent irrigation		
Participants	Communities, local government, ministry of the environment, community health workers, schools	Ministry of the environment, local government, community health workers, schools	NGOs, health officers	Farmers' Associations, extension officers, local government, community health workers		
Responsibility	Health office	Local government	Health office	Agriculture office		
External monitoring & evaluation	Local government	Health office	University	Health office		

Training objectives

- Participants will be able jointly to prepare a strategy on IVM for the target area (district or village)
- Units 2.4–2.7 are best carried out locally at district or village level, as group activities with the participation of local stakeholders and community members.
- A hypothetical example of a strategy matrix is presented in Table 6.

Levels

- Basic: analysis at village level
- Intermediate: analysis at district level (as indicated)
- Advanced: same as for intermediate level

Requirements

- Outputs from units 2.1-2.6
- Time required: 3 h

Assignment

- 1. Prepare a matrix, and assign one column to each of the vector control methods, with the items of the strategy in the rows.
- 2. As the first item, indicate for each method when it should be implemented for maximum effect, i.e. which period of the year. Refer to the seasonal calendar prepared under unit 2.4. Also indicate the frequency of use of the methods.
- 3. As the second item, indicate for each method where it should be implemented, i.e. the locations or vulnerable groups in the administrative boundaries. Refer to the map prepared under unit 2.4.
- 4. As the third item, indicate the vectors and diseases targeted by each method.
- 5. As the fourth item, set realistic operational targets to be reached within 1 and 2 years (e.g. percentage of houses covered by an intervention). If the impact is to be studied, also set targets for the IVM strategy as a whole (e.g. reduction in vector density).
- 6. As the fifth item, determine possible partners in implementation of each vector control method. Refer to the output from unit 2.6.
- 7. As the sixth item, identify the entity that will be responsible for implementation of each intervention.
- 8. As the seventh item, identify the entity that will monitor and evaluate each intervention. This entity should not be the same as that responsible for implementation.

Points for discussion

- How does the strategy differ from existing vector control efforts? Is it an improvement?
- Why should the entity responsible for implementation not monitor and evaluate the intervention?
- Discuss the need for a local organizational structure for IVM. Suggest options (note that this issue will be addressed in more detail in module 6).

MODULE 3. ORGANIZATION AND MANAGEMENT

BACKGROUND

IVM is a management strategy. It involves the integration of many vector control methods covering many diseases, with many partners in order to attain its objectives by efficient, safe use of resources. The management of field implementation is addressed in module 2. IVM, however, involves more than field implementation: to become established and functional, an IVM approach also requires new organizational structures and new roles and responsibilities both within the health sector and in partnership with other sectors and the participation of communities. This module addresses the organizational aspects of management.

To improve the organizational structure of vector control according to the principles of IVM, the existing structures, roles and responsibilities should be understood. A comprehensive "vector control needs assessment" is a prerequisite for systematic improvement of a national system of vector control, as described elsewhere. Although such an assessment is beyond the scope of this training manual, a rapid assessment of organizational structures and resources is covered in the next unit.

UNIT 3.1 INTEGRATION WITHIN THE HEALTH SECTOR

Most disease-endemic countries are reforming their health sectors, with decentralization and privatization of health services. This has led to changes and redistribution of resources to districts, but it has generally been difficult to decentralize the capacity for analysis and decision-making to that level. The IVM strategy is based on the principle that analysis and decision-making should be done at the lowest possible administrative level in order to respond better to local needs. Consequently, IVM promotes the integration of vector control and surveillance services into a decentralized health system.

Integration should not compromise but rather benefit the health system, by increasing the motivation and status of district staff. Moreover, new structures and partnerships created through IVM will extend service provision well beyond the district, potentially leading to synergy and cost savings for services covering the same areas. In turn, integration within the health system will help ensure the sustainability of IVM, which will become embedded in health services, receive regular budget allocations and have the flexibility to adapt to locally changing circumstances.

To establish IVM within the health sector, staff must be trained, the managerial and technical capacities of decentralized institutions must be strengthened, and career opportunities in IVM should be created. Central capacity should be maintained, or even enhanced, in order to facilitate, support and evaluate decentralized IVM programmes.

⁴ Guidelines for vector control needs assessment. Brazzaville, WHO Regional Office for Africa 2003; Guidelines for vector control needs assessment. Cairo, WHO Regional Office for the Eastern Mediterranean, 2009.

Certain vector control interventions have been operated as vertical programmes. A classic example is indoor residual spraying for malaria control. The logistics of such an intervention make it difficult to decentralize to the district level. Where vertical programmes continue to exist in parallel to a decentralized health system, effective coordination between the two is essential.

Training objectives

 Participants will be able to analyse the system of vector control and suggest improvements.

Levels

• Basic: not required

Intermediate: as indicated

Advanced: more detailed assessment

Requirements

- Information on the existing structure and resources for vector control in the health sector
- Time required: 3 h

Assignment

- 1. Situation: Determine how control activities for vector-borne diseases are currently arranged and coordinated (e.g. in one unit or separated by programme).
- 2. Identify the available human and technical resources for vector control and vector surveillance at central and decentralized levels of the health sector (number of personnel, expertise).
- 3. Evaluate how decisions about vector control implementation are made at central and decentralized levels (what types of decision are made at central and at district level; what types of data are used; how often decisions are updated).
- 4. Identify gaps and shortcomings in the current system of vector control.
- Needs: Determine the changes and additions needed to human and technical capacity for IVM at the district health office and at central level. Identify the organizational and structural changes required within the health sector to allow integration of IVM.
- Characterize how integration of IVM at district level could benefit other health services (e.g. in terms of added capacity, collaboration or participation). Give one or more examples.

Points for discussion

- Which of the changes are priorities?
- What are the possible difficulties in integrating IVM into the health system?
- How could those difficulties be overcome?

UNIT 3.2 PARTNERSHIPS WITH OTHER SECTORS

A common problem in the conventional system of vector control is that other, relevant sectors are not actively involved. Thus, sectors such as agriculture, local government, environment, construction and tourism are often insufficiently aware that their programmes and initiatives can favour vector proliferation or put people at risk of infection. These harmful side-effects could be avoided if the health impact of their programmes were considered. Therefore, other sectors should be made partners in a common IVM strategy, so that the risks for vector breeding and disease transmission are addressed in each sector's sphere of influence.

Partnerships between relevant sectors should be facilitated and coordinated by the health sector. They should be initiated at the national level by establishing a policy framework and then an intersectoral steering committee on IVM, with high-level participation and ministerial support (module 4).

Active partnerships are needed in particular at local level, as IVM requires decentralized implementation. Partners should undertake analysis, decision-making and resource allocation jointly (units 2.4–2.7), dividing their tasks to ensure coverage and avoid duplication, and should convene regularly to discuss progress.

The partnership could establish coordinating committees, with representation from each sector, local authorities and civil society. Monitoring and evaluation of each partner's activities will be necessary in order to assess overall progress and ensure accountability. Before becoming involved in IVM activities, however, most partners will require training in the basics of vectors and diseases (module 1).

The health sector should have overall responsibility for coordination and facilitation of the partnership and for training, monitoring and evaluation. Other sectors, civil society organizations and communities would have roles and responsibilities in their assigned areas of implementation, monitoring and evaluation.

Training objectives

 Participants will learn about the organizational structure of IVM, with roles and responsibilities.

Levels

- Basic: analysis at village level
- Intermediate: analysis at district level (as indicated)
- Advanced: same as for intermediate level

Requirements

Required time: 3 h

Assignment

- 1. For a selected district (or village), identify all the partners that could contribute to vector control; determine how each partner currently influences the risk for vector-borne disease and their potential role in vector control.
- 2. Identify a suitable organizational structure for IVM: a new or existing body, representation, coordination and frequency of meetings.
- 3. Determine the potential roles and responsibilities of each partner, e.g. facilitation, coordination, role in implementation, awareness-raising, technical support, monitoring, evaluation, vector surveillance, training and education.
- Identify factors that could obstruct effective collaboration, and give possible solutions.
- 5. Determine which partners need training and on what subjects.

Points for discussion

- How would vector control contribute (directly or indirectly) to achievements in each sector?
- How could IVM become a priority in sectors other than health?
- How can the IVM partnership be sustained?
- Are there any examples of successful intersectoral collaboration in the country?

UNIT 3.3 MOBILIZATION OF RESOURCES

Inevitably, transformation from a conventional system of vector control to an IVM approach will require significant investment for establishing and maintaining the new structures, capacities and activities. Therefore, appropriate allocations or reallocations of resources will be required. Financial planning is needed in order to determine the funds needed to transform the existing system to IVM, in terms of both initial and recurrent costs.

Financial resources for the health sector in disease-endemic countries are limited. It should be remembered, however, that IVM will not be a separate programme but will be embedded in the existing health system, and IVM would be incorporated as a means for improving the efficiency of resource use. Furthermore, the synergy of IVM with other health services at decentralized levels will result in reduced costs. Quantification of such synergies and cost savings improves the prospects for establishing and sustaining IVM.

After establishing a policy framework for IVM at national level, lobbying should be undertaken for support from the national budget and for allocations from sectors other than health, which often have more financial resources. Such resources might become available for IVM, for example, when the added value of vector control for the performance of the sector is demonstrated or when each sector becomes aware of its role in reducing the risk for vector-borne disease. Collaboration among sectors could result in wider, more efficient delivery of vector control.

Support is also needed from the private sector and civil society organizations. In special economic zones, such as business zones, tourist areas, plantations and mining zones, vector control should be presented as making economic sense. The health status of people – employees, labourers and clients – determines progress and success: lost

work days, school absenteeism and medical costs drain the system and reduce profits. Hence, drawing attention to the links between vector control and economic progress should help to raise funding.

Additional funds for IVM will be needed from external donors and funding agencies in many disease-endemic countries, particularly during the period of transition from conventional vector control to an IVM strategy. An initial investment is critical, for example, for assessing requirements and establishing technical resources and training at decentralized levels. International networking, e.g. through the global network on IVM or through the "international business plan on developing alternatives to DDT", could help improve a country's access to external funding.

Training objectives

• Participants will learn to identify existing and additional resources needed for IVM.

Levels

- Basic: not required
- Intermediate: as indicated
- Advanced: same as for intermediate level

Requirements

- Annual reports or other technical documents that summarize the activities in each relevant sector, preferably with budgets
- Time required: 3 h

Assignment

- List the steps to be taken at national and district level to mobilize financial resources for IVM.
- 2. Identify existing human, financial and technical resources in the health sector that might be used for IVM, such as those available for conventional vector control operations. Determine how IVM could save costs in other health services.
- 3. Identify the additional resources required to establish and maintain IVM. Differentiate between initial and recurrent costs (needed to sustain IVM).
- 4. For each relevant sector (other than health), identify the existing human, technical and financial resources that could be used for IVM without compromising current activities.
- 5. Identify options for IVM in special economic zones, when applicable.
- Determine how civil society organizations could contribute financially or in kind to IVM.

Points for discussion

- What barriers do you foresee in mobilizing national resources for IVM? How could those barriers be removed?
- What should be the role of external funding? How could dependence on external funds be minimized?
- How could international networks be used?

MODULE 4. POLICY AND INSTITUTIONAL FRAMEWORK

BACKGROUND

The aim of IVM is to improve the efficiency, cost-effectiveness and ecological soundness of vector control. As discussed in the IVM Handbook, several approaches are used to achieve this aim: evidence-based decision-making, use of a range of vector control interventions, collaboration within the health sector and with other sectors, engagement of communities, and a public health regulatory and legislative framework. Setting up these approaches demands substantial changes to the existing system of vector control in most disease-endemic countries, with implications for political, institutional, managerial, technical and social structures.

Policy-setting for IVM should be an early step in any strategy. Without favourable policies, legislation and enforcement and without harmonized institutional arrangements, an IVM approach will be almost impossible to establish and maintain. The following units give methods for analysing problems experienced in a national system of vector control, assessing the policy environment and examining institutional arrangements. The units draw on the information that is available in a country in order to reflect the actual situation and propose suitable policy options and institutional arrangements. For further information, see Chapter 2 of the IVM Handbook.

UNIT 4.1 ANALYSING PROBLEMS IN VECTOR CONTROL

Before setting policy for IVM, the existing problems in a country's system of vector control should be understood. Such problems might reduce the efficiency of vector control, have undesirable side-effects or compromise any achievements.

Problem analysis is used to identify constraints and their causes, by scrutinizing all aspects of vector control. Problem analysis is a component of a "vector control needs assessment", which is a separate exercise to be conducted in disease-endemic countries⁵.

Training objectives

- Participants will understand the need for and methods of analysing problems in a vector control system.
- Participants will conduct a rapid analysis on the basis of national data.

Levels

• Basic: not required

• Intermediate: as indicated

Advanced: more detailed analysis

⁵ Guidelines for vector control needs assessment. Brazzaville, WHO Regional Office for Africa, 2003; Guidelines for vector control needs assessment. Cairo, WHO Regional Office for the Eastern Mediterranean, 2009.

Requirements

- All information from the country relevant to the actual situation
- Time required: 3 h

Assignment

- 1. Determine the main constraints to vector control in the country; consider political, managerial, financial, technical, ecological, organizational and sociocultural issues. As a guide, consider the following questions, which are not exhaustive:
 - Which vector control methods are used and on what scale?
 - Which diseases are taraeted?
 - What expertise on vector control exists?
 - How and at what level are decisions made on interventions and targeting?
 - What evidence base is used?
 - Is decision-making flexible in order to respond to changing circumstances?
 - How do the activities of other sectors influence vector breeding or disease transmission?
 - How do communities comply or participate?
 - Are there signs of resistance to insecticides?
- 2. After identifying the main constraints, determine the causes of each.
- 3. Determine the means for removing or alleviating each problem, and identify what is needed to achieve this.

Points for discussion

- Which of the identified problems require a policy change?
- Which of the problems require a change in institutional arrangements?

UNIT 4.2 POLICY ENVIRONMENT FOR INTEGRATED VECTOR MANAGEMENT

To be effective, IVM must be embedded within the health sector and integrated with other sectors. IVM will therefore not thrive without a favourable policy environment. Public policy is required to decentralize the planning and implementation of IVM, to establish governing bodies, to oversee collaboration among sectors and to ensure transparency in strategic planning. Policy is also required to regulate the products used in vector control, to oversee training and research directions and to guide budget allocation.

Analysis of the existing public policy environment is a means for strengthening the policy and legal framework for IVM, by identifying gaps and inconsistencies. The policy environment for IVM includes the national health policy, guidelines on vector control and relevant policies and activities in sectors such as the environment, agriculture and local government that influence vector-borne disease.

Policy instruments are the tools that a government uses to set and implement a policy. Such instruments include legislation, regulations, persuasion, programmes and health impact assessments.

Significant advances have been made in some countries in policy analysis for public health pesticide management, a component of IVM. A similar approach could be used for IVM as a whole.

WHO has elaborated policy guidelines for IVM, which could assist countries in policy reform. These guidelines include a global strategic framework, a position statement on IVM and regional resolutions on IVM. Moreover, World Health Assembly resolution 50.13 advocates an integrated approach to vector control in order to reduce reliance on chemical pesticides.

Policies must be based on contemporary evidence. Observation of the coexistence of several vector-borne diseases could encourage support for a multi-disease control strategy. Likewise, evidence that the programmes and actions of other sectors and communities influence the risk for, and incidence of, vector-borne diseases could initiate reform of policies on intersectoral collaboration and community participation. Health impact assessments could be used to examine the impact of other sectors on vector-borne disease. Hence, other sectors could be required to cover IVM in their budgets. Good policies do not necessarily result in good outcomes. To be effective, a policy must be translated into strategies and action plans, with budgets, activities and indicators. Furthermore, laws and regulations must be enforced appropriately. Gaps between policy and actual practice should be made apparent in order to be filled.

Training objectives

Participants will learn to analyse the policy environment and identify gaps and
inconsistencies with regard to IVM. The training would benefit from the presence of
staff from sectors other than health, either as participants or as resource persons.

Levels

Basic: not required

Intermediate: as indicated

Advanced: more detailed analysis

Requirements

- Information on health policies, legal instruments and national guidelines on vector control; level of priority of vector-borne disease control; information on relevant programmes in other sectors; other relevant documents
- Time required: 3 h

Assignment

- 1. Identify the policies, laws and regulations applicable to the health sector that are relevant to vector-borne diseases. Identify the policy on taxes and subsidies on the import, manufacture and sale of vector control products, such as insecticide-treated nets. Specify how each policy supports or impedes vector control.
- 2. Identify the policies and policy instruments in sectors other than health (particularly in agriculture and the environment) that support or impede vector control. Specifically, identify policies on pesticide management and integrated pest management and policies on health impact assessments in the context of development projects.

- 3. Identify policies and policy instruments on intersectoral collaboration (e.g. on avian influenza) and suggest how they could be used to support IVM.
- 4. Describe the presence or absence of procedures to enforce the policies, laws and regulations relevant to IVM.
- 5. On the basis of the national policies identified and WHO's guidance on IVM, determine the major shortcomings of the current policy framework and its enforcement with regard to IVM.
- Describe how policies in the health and other sectors could be adjusted to support IVM.

- What are the priorities for policy change in your country?
- What are the possible barriers to policy change?

UNIT 4.3 INSTITUTIONAL ARRANGEMENTS

Institutional arrangements can be defined as the set of rules for who does what, when and how. Usually, elements of the public sector work more or less independently, with little coordination with other elements and with linear internal accountability. This separation poses problems when the rules for different organizations conflict.

Poor coordination among sectors manifests as conflicting policies, inconsistent development activities and research that cannot be applied. Coordination and collaboration among sectors and with research institutes could be improved by promoting policy integration, common goals and synergy; e.g. intermittent irrigation promotes both rice production and vector control. Furthermore, joint decision-making requires collaboration.

An IVM approach might require partnerships among stakeholders, including the public and private sectors, research and training agencies and civil organizations. They should all participate in making decisions about vector control, but incompatible standards or conflicting rules might hinder such collaboration. For example, sectors other than health might not have rules related to vector proliferation or environmental sanitation. Tools such as health impact assessments can help in resolving such inconsistencies.

When institutions join a strategy, they might have to adopt new rules and standards, impose sanctions, share responsibility and accountability and make budgetary allocations for vector control. In order to do so, they will need appropriate strengthening in the managerial and technical aspects of vector control, e.g. through training or exchanges.

At central level, coordination could be promoted by establishing an interministerial steering committee on IVM, which will provide oversight, assign partner roles, coordinate resource mobilization, and review and adjust policies, strategies and workplans on IVM. Under this body, technical working groups could be set up, for example on monitoring and evaluation, policy review and prioritization of operational research.

Evidence-based IVM requires the technical expertise of public health entomologists specialized in IVM, but such people are likely to be in short supply. Opportunities for higher education and professions and careers in IVM should be fostered or created.

Training objectives

 Participants will learn to analyse existing institutional arrangements and propose adjustments for IVM. Training would benefit from the presence of staff from sectors other than health, either as participants or as resources.

Levels

• Basic: not required

• Intermediate: as indicated

Advanced: same as for intermediate level

Requirements

- If not represented by the participants, human resources from other sectors should be consulted.
- Time required: 3 h

Assignment

- 1. Identify the people concerned with IVM in the country, concentrating on the health and one other sector.
- 2. For these two sectors, identify the institutional conditions that support collaboration with other sectors and participation in vector control; e.g. level of decentralized decision-making, experience in community participation, organizational arrangements, any existing collaboration and any existing vector control or ecological standards.
- 3. Identify a common goal for the two sectors.
- 4. For each sector, identify the institutional barriers to collaboration with other sectors and to participation in vector control, at both central and district level; e.g. a policy on irrigation that conflicts with vector control; difference in geographical area, e.g. administrative unit versus irrigation scheme; low priority given to intersectoral issues; operations that do not take into account vector breeding or vector contact; no history of collaboration; organizational structure; different staff arrangements; and different accountability.
- 5. Examine how each problem could be resolved; e.g. at what level, with which tools; the need for training, forums or workshops; adoption of new rules or new responsibilities; budget revision; imposition of sanctions.
- 6. Explore other examples of intersectoral collaboration, preferably involving the health sector; e.g. for avian influenza, other zoonotic diseases or pesticide management. Analyse one example to determine how the experience could be used for IVM; e.g. with similar forums, coordination or structures.
- 7. Determine existing links or collaboration between vector control programmes and research agencies. In particular, consider whether current research addresses real field problems related to IVM, who determines the research agenda, how research results are used and whether meetings and exchange visits take place in the field.

- What valid reasons could be put forward for the agriculture sector or local government to assume responsibility for vector control in their areas?
- How could the links between research and implementation be strengthened? What are the barriers?

MODULE 5. ADVOCACY AND COMMUNICATION

BACKGROUND

The objective of advocacy is to communicate the objectives of IVM effectively both at policy level and at field level. The IVM strategy involves significant changes in the system of vector control, in the health sector, in partnerships with other sectors and in the participation of communities. To achieve these changes, the concept of IVM must be advocated and communicated at all levels (see *IVM Handbook, Chapter 5*).

The IVM concept should be formulated clearly and unambiguously for advocacy to policy-makers and decision-makers. Furthermore, communication strategies for social mobilization and community empowerment should be adopted.

UNIT 5.1 ADVOCACY TO POLICY-MAKERS

A strong case must be made for IVM by pointing out the problems with the existing system of vector control, such as lack of evidence-based decision-making, development of insecticide resistance, poor integration within the health sector, lack of involvement of other sectors, lack of community participation and lack of adaptation to changing circumstances (see also the outcome of unit 2.1). The purpose of IVM is to solve these problems in one integrated, intelligently targeted strategy.

The IVM concept is, however, intangible and must be described in plain terms. It consists basically of four principles: decisions based on evidence; a multi-disease approach; combined vector control interventions but with judicious use of insecticides; and involvement of other sectors and communities. All four principles must be taken into account. For example, if a vector control strategy is concentrated on malaria and not on other locally prevalent vector-borne diseases that could have been covered in the same strategy, it fails to abide by the multi-disease principle.

To convince policy-makers and decision-makers, they must be given evidence that IVM works. Although evidence for implementation of a full IVM strategy is still scarce, as IVM is a new concept, there is evidence for the benefits of components on IVM within countries or within a region. New evidence, in the form of case studies, should be collected.

IVM could also play an important role during elimination of a disease, by sustaining and consolidating the achievements. In the elimination phase, advocacy is essential for continued attention to and investment in IVM to achieve elimination and subsequently to reduce the risk for re-emergence of the disease.

Training objectives

• Participants will learn to design "advocacy packages" and advocate for IVM.

Levels

• Basic: not required

• Intermediate: as indicated

• Advanced: same as for intermediate level

Requirements

Case studies on components of IVM

• Time required: 3 h

Assignment

- Formulate concise statements describing the problems in the existing system of vector control in the country, including: available capacity, how decisions are made, the use of surveillance data, disease focus, linkage with the health system, whether it is centralized or decentralized, monitoring for insecticide resistance, collaboration with other sectors and participation of communities. Explain why each aspect is a problem.
- 2. Explain clearly how IVM would solve each problem or contribute to elimination of disease in your country.
- 3. Examine case studies to determine the evidence for and experience with IVM.
- 4. Make a case for IVM by designing an "advocacy package", specifying the need for IVM, what IVM is and the evidence that IVM will be beneficial.
- 5. Prepare an advocacy plan with: the target audience, calendar, data required, advocacy materials required, schedule of activities, expected outcomes and evaluation of results.

Points for discussion

- For what reasons would policy-makers and decision-makers adopt IVM?
- What reservations might policy-makers and decision-makers have about changing to IVM?
- What could be done to overcome those reservations?

UNIT 5.2 COMMUNICATION STRATEGIES

Communities play an important role in the transmission or propagation of vector-borne disease, and their actions and behaviour are major determinants of disease. Most disease vectors are closely associated with human habitation, and the way people manage their peri-domestic environments influences vector breeding and disease transmission. The protective and treatment-seeking behaviour of people also affects the transmission and incidence of disease in the community. Therefore, helping communities to improve their activities and behaviour in relation to vector control and self-protection is an important component of an IVM strategy. For example, responsibility for vector breeding in the peri-domestic environment could be transferred from the health sector to communities.

The challenge is how to change people's behaviour. Communities must become interested in vector-borne disease and learn about it, and they might need more motivation or incentives to comply with existing or new measures. A number of communication strategies have been used; four are discussed in this unit.

The mass media are usually used to distributing simple messages to a wide audience. In the "information, education and communication" approach, a combination of informational, educational and motivational interventions is used, which are designed to change people's attitudes and behaviour. The approach is based on the use of mass media in combination with group and interpersonal communication: messages are used in mass media, and education and communication are used to teach people certain behaviour and to form community-based networks. Information, education and communication have a positive impact on knowledge and attitudes, but the impact on behaviour has been questioned.

"Communication for behavioural impact" can bring about desired behaviour in relation to vector-borne disease (dengue, lymphatic filariasis and malaria) in a campaign-style approach based on the principles of marketing used in the private sector to change consumer behaviour. It starts by analysing people's barriers to adopting a certain behaviour and identification of several desired behaviours. Subsequently, a targeted strategy is designed to bring about those behaviours through a combination of tools, such as public relations, advertising and interpersonal communication.

The empowerment of communities requires significant investment in practical education. A common example with demonstrated effects on empowerment is the "farmer field school" designed by the Food and Agriculture Organization of the United Nations to train farmers in integrated pest management in agriculture. It is essentially "a school in the field", whereby a group of people meet once a week throughout a season. This educational model is based on hands-on learning to discover biological principles, with systematic observation and analysis as the basis for decision-making in agro-ecosystem management. Its group approach stimulates communication and collaboration. The farmer field school curriculum has been adapted for use in vector control in several countries (see IVM Handbook).

Training objectives

 Participants will learn the different types of outcome of different types of communication strategy.

Levels

Basic: as indicated

• Intermediate: as indicated

Advanced: more detailed analysis

⁶ Information, education and communication: lessons from the past; perspectives for the future. Geneva, World Health Organization, 2001 (WHO/RHR/01.22).

Planning social mobilization and communication for dengue fever prevention and control: a step-by-step guide. Geneva, World Health Organization, 2004 (also available at: http://www.who.int/tdr/publications/publications/planificacion_dengue.htm).

⁸ Pontius JC, Dilts DR, Bartlett A. Ten years of IPM training in Asia: from farmer field school to community IPM. Bangkok, Food and Agriculture Organization of the United Nations, 2002 (also available at: http://www.fao.org/docrep/005/ac834e/ac834e00.htm).

Requirements

- If not present among the participants, invite a person with experience in communication strategies and empowering communities to introduce the four communication strategies.
- Reference materials or case studies on four communication strategies: use of the mass media; information, education and communication; communication for behavioural impact; and community empowerment, e.g. in "farmer field schools".
- Time required: 3 h

Assignment

- 1. On the basis of typical conditions at community level, identify the desired behavioural outcomes for self-protection and vector control, i.e. the aspects that communities should change in their behaviour and activities.
- 2. Construct a matrix, listing in the first column the four communication strategies: use of the mass media; information, education and communication; communication for behavioural impact; and farmer field schools.
- 3. In the second and third columns of the matrix, indicate the strengths and weaknesses of each method, e.g. in terms of time and effort required, coverage, impact, cost, active community participation and sustainability.
- 4. In the fourth column, list which of the desired behavioural outcomes could be achieved

Points for discussion

- Which communication strategies would be most suitable for an IVM strategy?
 Why?
- Which strategy would be preferred by centralized agencies? Which one would communities prefer? Explain the difference.
- What would be the role of the media, and how could the media be involved?

UNIT 5.3 COMMUNITY EMPOWERMENT

The word "participation" has a number of interpretations, ranging from passive participation, in which people are given only a brief idea what is to happen, to self-mobilization, in which people take the initiative. How and in what ways should communities participate in IVM?

As many of the risk factors for vector-borne disease are under people's control and when public services cannot easily reach them, people have to assume responsibility for themselves. They could, for example, clear their gutters as part of the control of dengue vectors, rather than expecting health teams to climb onto their roofs and do the job for them. But how can people be empowered, not just to understand the risks but also to take appropriate action for self-protection and vector control as needed?

In general terms, "empowerment" means enabling people to take more control over their lives. People need to be empowered in order to improve their situation and to rely less on scarce external services, for example from the health sector. Two basic preconditions to empowerment have been suggested: 10 first, the necessary means or enabling factors must be in place, including the responsibilities, opportunities for meetings, resources and capabilities; second, analysis and decision-making must be undertaken for subsequent action. While the means cover capacity-building and a group approach, analysis and decision-making imply active involvement in planning and implementing IVM at local level.

How can community empowerment be achieved for IVM? Capacity-building, analysis and decision-making are inherent to existing models of empowerment, such as the farmer field schools, and the IVM strategy includes the same ingredients (see methods for local analysis and decision-making in units 2.4–2.7). When used at community level, they will allow communities to take charge of vector control in their own environment, provided that the burden of vector-borne disease is sufficiently high.

Achievements in empowerment must be evaluated, although empowerment is difficult to measure. As the participants themselves are probably in the best position to describe the level of empowerment they have experienced, participatory evaluation, or self-assessment, is a useful method.

Training objectives

- Participants will learn to understand the essential conditions for community empowerment and to plan how to achieve this.
- This learning unit should be given high priority in the context of IVM.

Levels

• Basic: as indicated

Intermediate: as indicatedAdvanced: as indicated

Requirements

- Reference material or a case study of a successful approach to community empowerment (e.g. a farmer field school)
- Invite a person with experience in community empowerment.
- Time required: 4 h

Assignment

- 1. Study a documented case relevant to IVM.
- Identify the means for empowerment in the context of IVM, i.e. the enabling factors
 that should be in place locally, such as the responsibilities people should assume,
 the forum and frequency of meetings, the number and representation of group
 members, who should facilitate meetings, required capability-building and training

Ochambers R. Challenging the professions: frontiers for rural development. London, Intermediate Technology Development Group. 1993.

¹⁰ Bartlett A. No more adoption rates! Looking for empowerment in agricultural development programmes. Development in Practice, 2008, 18:524–538.

- curriculum, how often people should meet, the involvement of local authorities and advisers; and the opportunities for vector control.
- 3. Determine how analysis and decision-making should be implemented at community level. The plan could include which vectors or diseases to address, the type of observations to be made, how they should be analysed and used for decision-making and the role of the facilitator.
- 4. Establish how community empowerment would be monitored and evaluated and the role of participatory and external evaluation.

- What are the barriers to empowering communities? How could they be overcome?
- What is the role of the health sector in facilitating community participation?
- What options exist at community level for combining IVM with development programmes or income-generating activities (e.g. combining training, analysis and decision-making with development programmes)? Would this increase the incentive or motivation of people to participate?

MODULE 6. MONITORING AND EVALUATION

BACKGROUND

Monitoring and evaluation are essential in managing a programme because they reveal its achievements and effects. In IVM, these are not limited to the interventions but also include the management aspects. Monitoring and evaluation have separate but overlapping functions. Monitoring refers to measurement of a programme's performance, which is done by observing and reporting the activities and their immediate outcomes. Evaluation is the assessment of outcomes and impacts that can be attributed to a programme's activities. Hence, monitoring addresses cause and evaluation addresses effect.

Taken together, monitoring and evaluation relate a programme's performance to its outcomes in order to identify gaps and weaknesses, leading to corrective actions or adjustment to changing circumstances. Monitoring and evaluation serve advocacy; moreover, they strengthen the participation and learning of a programme's stakeholders, especially when conducted at decentralized levels.

UNIT 6.1 INDICATORS

IVM is a complete system of vector control, including policy, an institutional framework, organization and management, planning and implementation, capacity-building and advocacy and communication. These components correspond to the chapters of the IVM Handbook. Therefore, monitoring and evaluation of IVM should not be restricted to implementation but should also address achievements in policy development, organization, capacity-building and advocacy. Some aspects of IVM are difficult to capture in simple indicators or as quantitative observations; many require interview surveys and qualitative descriptions of processes and interactions between people. Evaluation of such data requires new skills and tools.

Three types of indicator have been distinguished: process, outcome and impact. Process indicators are used to describe the performance of a programme, whether the planned activities were adequately conducted in a timely manner. Outcome indicators are used to describe the direct outcomes of the activities, whereas impact indicators are used to describe the indirect effects that can be attributed to the programme. For example, field implementation starts with analysis and decision-making in districts and villages, which results in vector control, which affects the vector population, which in turn affects disease transmission and thus the prevalence and morbidity of disease (Figure 2).

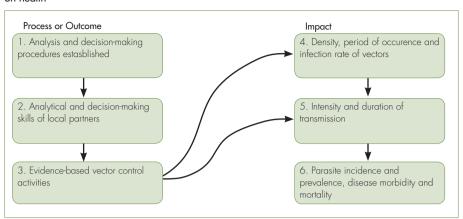


Figure 2. Processes and outcomes in planning and field implementation resulting in an impact on health

Indicators should be selected to correspond to the requirements of stakeholders. WHO lists examples of indicators for specific vector control methods. Studies of impact on disease morbidity require careful design and large samples. Costs must be monitored in order to determine the efficiency and cost effectiveness of an IVM strategy.

Training objectives

Participants will learn to select indicators and identify what data are needed.

Levels

Basic: not required

• Intermediate: as indicated

Advanced: More detailed qualitative and quantitative studies

Requirements

- Material from the existing monitoring system for vector control, with data collection methods and record sheets; relevant literature
- Time required: 2-3 h

Assignment

- 1. Consider the components of an IVM strategy: policy and institutional framework, organization and management, planning and implementation, capacity-building, advocacy and communication. For each of these components, discuss the aspects that require to be monitored or evaluated. Try to prepare an exhaustive list.
- 2. Formulate clear, concise indicators that can be observed, measured and verified.
- 3. Determine whether each indicator is a process, outcome or impact indicator.

^a Source: Handbook for integrated vector management. Geneva, World Health Organization, 2012.

4. Construct the following matrix as a framework for monitoring and evaluating IVM:

Component	Process indicators	Outcome indicators	Impact indicators
Policy and institutional framework			
Organization and management			
Planning and implementation			
Capacity-building			
Advocacy and communication			

 Establish the type of data (descriptive, numerical or logical) needed for measuring each indicator.

Points for discussion

- Which institutions or organizations might be involved in monitoring and evaluation at central, district and village levels?
- For what purposes should the data collected during monitoring and evaluation be used?
- Which data could be obtained from surveillance and other routine data collection systems?

UNIT 6.2 METHODS OF EVALUATION

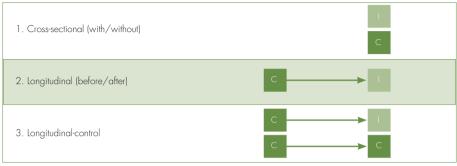
The purpose of evaluation is to attribute an observed effect to a programme or intervention. As discussed in unit 6.1, evaluation of management aspects requires qualitative methods, with interview surveys and descriptions of processes and interactions between people. Evaluation of the impact of implementation in the field on vectors and health requires a quantitative approach based on scientific principles. In practice, it is difficult to demonstrate convincingly that the observed pattern is an effect (e.g. reduced vector density) or is due to natural variation in the data (e.g. between locations or times). The challenge is to filter out natural variation and show a clear effect that is attributable to the intervention or strategy.

In experimental method, treatment and control status (e.g. villages with and without IVM) is assigned randomly at the beginning of the experiment in order to filter out natural variation. This method is feasible only when the evaluators have full control over the planning of IVM implementation. Often, evaluators are called in to study the impact of a programme that was not designed as an experiment, resulting in bias in the selection of villages. For example, villages with high disease risks, good motivation or easy access might have been selected. It will be a challenge to find control sites with characteristics similar to those of the intervention sites, and there will therefore probably be differences between the intervention and control sites, even before the intervention is implemented.

In a longitudinal evaluation, measurements taken before the intervention (called "baseline") and after the intervention are compared. The difference is the effect attributable to the intervention. In this case, other factors might also have changed during the same period (e.g. season, socioeconomic conditions), and thus the observed effect might not be attributable to the intervention alone.

A combination of cross-sectional (with or without) and longitudinal (before and after) designs is the most robust under programmatic conditions. In such a study, measurements (e.g. of vector density) are made at the intervention and control sites before and after the intervention. This design is called "longitudinal-control" (Figure 3).

Figure 3. Schematic representation of cross-sectional, longitudinal and longitudinal-control study designs



I. intervention: C. control

Additional methodological aspects to be considered include the size of area used as the experimental unit, which must be large enough to overcome border effects from the surrounding area (e.g. an influx of vectors from untreated neighbouring communities or villages). The number of experimental units should be sufficient to allow statistical analysis of the results. Evaluation becomes progressively more difficult at each step in the health impact model (see Figure 2), because at each step additional sources of variation are added, so that strong results are increasingly rare. Nevertheless, the results obtained at each level help explain the results at the next level.

Training objectives

Participants will learn to design a quantitative evaluation.

Levels

Basic: not required

Intermediate: as indicated

• Advanced: more sophisticated methods

Requirements

Time required: 3 h

Assignment

 In groups, make a comprehensive plan for evaluating the impact of IVM on people's behaviour and on vector populations. Select experimental units with controls. Estimate the number of units required for replication. Determine the observations to be made, when and where.

- 2. Examine the adjustments that would be needed to the plan if the impact on disease is to be studied.
- 3. Present the plans to the whole group, and discuss the results.

- What criteria are usually used for selecting a village for vector control? What implications do these have for selecting control villages?
- How many replications are appropriate? What does the number depend on?

UNIT 6.3 VECTOR SURVEILLANCE

Vector surveillance is an important aspect of an IVM strategy. (Disease surveillance is also essential but is beyond the scope of this manual.) Vector surveillance serves two purposes: to provide evidence for decision-making in IVM and for evaluating a programme's impact on vector populations. Vector surveillance can be used for monitoring and evaluation if the surveillance sites are located in or near the implementation sites. Vector surveillance involves regular measurement of vector population density with any type of sampling method. Surveillance can also include species composition, vector behaviour (e.g. resting, biting), infectivity rate, parous rate and insecticide susceptibility, although these activities may require special expertise and equipment. The information collected serves as an evidence base for decision-making in IVM.

There is a risk that a surveillance system can become an activity on its own, detached from vector control activities, each with its own mandate and personnel. Direct links between vector surveillance and vector control must therefore be established so that the results of surveillance are constantly fed into decision-making on vector control.

In order to reduce natural variation in the data collected, vector surveillance should be conducted at fixed locations, or sentinel sites. These sites should represent the populations at risk for disease. For the purpose of evaluating local effects of IVM, new sentinel sites might have to be selected in the intervention and control areas.

Vector surveillance systems are often concentrated on one disease. In an IVM strategy, vector surveillance covers the vectors of all prevalent diseases, which improves the efficiency of resource use.

Training objectives

• Participants will learn to design a vector surveillance system.

Levels

• Basic: as indicated, at local level

• Intermediate: as indicated

Advanced: more sophisticated methods

Requirements

- Documents outlining the existing national system of vector surveillance and (if possible) the systems of surveillance for each prevalent vector-borne disease
- Time required: 3 h

Assignment

- 1. To plan an appropriate vector surveillance system at country level, select the sentinel sites and disease vectors to be included.
- 2. Prepare a matrix, and, in the first column, list the types of data to be collected. In the second column, indicate why each type of data is needed. In the third column, indicate how frequently the data should be collected. In the fourth column, indicate whether specialists or locally trained people should be involved in collecting each type of data.
- 3. Determine which measures and structures should be in place to ensure that vector surveillance data are used for vector control or evaluation.

Points for discussion

- What adjustments would be needed to the existing vector surveillance system?
- What might be the role of trained community members in vector surveillance?
- What are the barriers to establishing vector surveillance for several diseases? How could these be overcome?
- How could the link between vector surveillance and vector control be strengthened?

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Core structure for training curricula on IVM

Integrated vector management (IVM) is a rational decision-making process to optimize the use of resources for vector control. The aim of the IVM approach is to contribute to achievement of the global targets set for vector-borne disease control, by making vector control more efficient, cost effective, ecologically sound and sustainable. The purpose of this document is to provide guidance for WHO regions, countries and partners preparing their own training curriculum for integrated vector management (IVM); it should be adapted to the requirements and conditions of each region.



