Global Strategic Framework for Integrated Vector Management

World Health Organization

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Preface

Malaria and other vector-borne diseases are major contributors to the total global burden of disease and a significant impediment to socioeconomic development in resource-poor countries. Although vector control has a proven record of saving lives by preventing, reducing or eliminating transmission, its benefits are far from being fully realized.

The Global Strategic Framework for Integrated Vector Management (IVM) provides a basis for strengthening vector control in a manner that is compatible with national health systems. Through evidence-based decision-making, IVM rationalizes the use of human and financial resources and organizational structures for the control of vector-borne disease and emphasizes the engagement of communities to ensure sustainability. It encourages a multi-disease control approach, integration with other disease control measures and the considered and systematic application of a range of interventions, often in combination and synergistically.

A guiding principle is that effective control is not the sole preserve of the health sector but requires collaboration with various other sectors together with public and private agencies and institutions. Implementation of this strategy will require effective public health regulation and legislation, allied to a strong commitment and concerted action by the World Health Organization, working in coordination with the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme, other United Nations agencies and donors, and Member States.

1. Purpose

The Global Strategic Framework on Integrated Vector Management (IVM) sets out new and broad principles and approaches to vector control that are applicable to all vector-borne diseases. Integrated vector management seeks to improve the efficacy, cost-effectiveness, ecological soundness and sustainability of disease vector control. This Framework is intended to provide orientation to policy-makers within WHO and Member States on the development and implementation of IVM, and to strengthen collaboration with donors and other United Nations agencies, notably the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Environment Programme (UNEP).

2. Why a Global Strategic Framework?

In its 2001 report, the Commission on Macroeconomics and Health[1] documented the enormous benefits for health and socioeconomic development that flow from effective control of vector-borne diseases. It recognized that the fight against disease requires not only financial resources, appropriate technology and political commitment, but also a strategy, operational lines of responsibility and adaptive management systems, able to learn from and correct mistakes. IVM seeks to apply such principles to the control of vectors of disease.

Vector-borne diseases are responsible for a significant fraction of the global disease burden and have profound effects not only on health but also on the socioeconomic development of affected nations. Thus, an econometric model for malaria — which is responsible for more than 1 million deaths every year — suggests that countries with intensive malaria have income levels only 33% of those without malaria.

Vector control has a proven record in the prevention and control of vector-borne disease. The distribution and incidence of

[1] Commission on Macroeconomics and Health. *Macroeconomics and health: investing in health for economic development*. Geneva, World Health Organization, 2001.

vector-borne disease are strongly determined by the ecological conditions that favour different species of disease vector. Knowledge and understanding of these characteristics provide a unique opportunity to prevent and control such diseases, by reducing vector–human contact and vector population density and survival.

IVM is based on the premise that effective control is not the sole preserve of the health sector but requires the collaboration of various public and private agencies and community participation. The engagement of communities is a key factor in assuring sustainability. IVM entails the use of a range of interventions of proven efficacy, separately or in combination, in order to implement more cost-effective control and reduce reliance on any single intervention. This strategy also serves to extend the useful life of insecticides and drugs by reducing the selection pressure for resistance development.

IVM includes organization at the local level and the establishment of effective and broadly based local partnerships. At the other end of the scale, countries and donors should be encouraged to develop partnerships and operate within adaptive management systems. Major funding initiatives should include adequate provision for IVM to speed progress in the control of vector-borne disease.

The success of programmes such as the integrated control of malaria in the Zambian Copper Belt in the 1930s and 1940s, the current initiative against Chagas disease vectors in Latin America, and the West African Onchocerciasis Control Programme since the 1970s demonstrate that strategically sound, well-coordinated and sustained initiatives can bring enormous benefits in improved health and socioeconomic development. A key feature contributing to their success has been effective management based on the use of robust systems for monitoring, evaluation and reporting, and procedures for the rapid identification and correction of problems. The adoption of a strategy for IVM provides new opportunities for effective action against vector-borne disease, using the lessons learned from these and other successful initiatives.

For many vector-borne diseases there are no vaccines, and drug resistance — or the threat of resistance — is an increasing problem. In such circumstances vector control often plays a vital role. In some cases, and dengue is one example, effective vector control is the primary or even sole measure for preventing disease outbreaks.

Vector control programmes have relied heavily on the use of residual insecticides and the selective use of such compounds is likely to continue, as a part of IVM. For example, insecticide-treated nets are currently used in the control of malaria and other vector-borne diseases, with minimal impact on ecosystems and the environment. The Onchocerciasis Control Programme eliminated the disease from much of the programme area using various insecticides in rotation, and the Southern Cone Initiative for the control of Chagas disease in South America has relied primarily on spraying inside houses with residual insecticides to achieve its objectives of elimination. However, the environmental and health concerns over persistent organic pollutants identified in the Stockholm Convention, together with the increasing problem of insecticide resistance, emphasize the need for alternative strategies for sustainable vector control and management. Such considerations led to World Health Assembly resolution WHA 50.13, which called on Member States to support the development and adoption of viable alternative methods of controlling vector-borne diseases and thereby reduce reliance on insecticides. IVM provides a management framework within which such changes can be effected.

Although many vector-borne disease control programmes continue to rely heavily on vector control, the benefits are far from being fully realized. Reasons for this include the following:

- The skills to both manage and implement vector control programmes remain scarce, particularly in the resource-poor countries that are in most need of effective vector-borne disease control. This has led to control measures that are unsuitable or poorly targeted, with insufficient coverage and consequent wastage of resources and sometimes avoidable insecticide contamination of the environment.

- The use of insecticides in agriculture and poor management of insecticides in public health programmes have contributed to resistance in disease vectors.
- Development programmes, including irrigated agriculture, hydroelectric dam construction, road building, forest clearance, housing development and industrial expansion, all influence vector-borne diseases but opportunities for cooperation between sectors and for adoption of strategies other than those based on insecticides are seldom grasped.

In addition, health sector reform, with its emphasis on decentralization of operational control, poses new challenges but also affords significant new opportunities for delivering vector control.

This Global Strategic Framework for integrated vector management has been developed both to address deficiencies in vector control and to improve the efficacy, cost-effectiveness, ecological soundness and sustainability of that control. More effective disease vector control will make a significant contribution to the attainment of the Millennium Development Goals.

3. Integrated vector management

Integrated vector management is a process for managing vector populations in such a way as to reduce or interrupt transmission of disease. Characteristic features of IVM include:

- methods based on knowledge of factors influencing local vector biology, disease transmission and morbidity;
- use of a range of interventions, often in combination and synergistically;
- collaboration within the health sector and with other public and private sectors that impact on vectors;
- engagement with local communities and other stakeholders;
- a public health regulatory and legislative framework.

An IVM-based process should be cost-effective, should have indicators for monitoring efficacy with respect to impact on vector populations and disease transmission, and should employ sustainable approaches compatible with local health systems. It should also allow effective planning and decision-making to take place at the lowest possible administrative levels (subsidiarity).

IVM has benefited from experience with integrated pest management (IPM) systems used in agriculture. Although insecticides have proved effective in protecting increased crop yields, their adverse environmental and health effects and the development of insecticide resistance have required the introduction of pest management systems encompassing all methods that have an impact on the pest problem. Such integrated approaches help to preserve ecosystem integrity and encourage the propagation of natural enemies of pest species, such as pathogens and predators. Making better use of environmental, biological and other measures can extend the useful life of insecticides so that they are available when and where the need is greatest. Crucially, economic analysis has shown that IPM systems are ultimately more cost-effective than heavy reliance on insecticides, even without considering the economic impacts of environmental contamination and unwanted side-effects.

Similar principles apply to the control of insect disease vectors for which evidence-based, cost-effective and sustainable approaches are needed. However, it should be recognized that the success of IPM systems is due, in part, to the fact that farmers see direct results in the form of increased crop yields and better management of irrigation water, and are able to enjoy the economic benefits. In contrast, the improvements in health resulting from control of vector-borne disease can be more difficult to measure and the associated economic benefits for the community are less obvious.

An additional and key impetus to the adoption of IVM arises out of the need to ensure the sound management and judicious use of insecticides, as requested by the World Health Assembly

and the Stockholm Convention on Persistent Organic Pollutants. This has led to a reappraisal of the strategy for vector control and a commitment to the development of effective measures that reduce risk and are compatible with protection of the environment and sustainable development. Such a commitment requires an approach that effectively integrates the roles of the various sectors, including health, within a strategic management framework.

An IVM approach takes into account the available health infrastructure and resources and integrates all available and effective measures, whether chemical, biological or environmental. IVM also encourages effective coordination of the control activities of all sectors that have an impact on vector-borne diseases, including health, water, solid waste and sewage disposal, housing and agriculture. Commensurate benefits for non-health-sector partners make it more likely that IVM approaches will be effective. For example, alternate wet/dry (intermittent) irrigation, combined with other vector control methods, has been effective in controlling the vectors of malaria and Japanese encephalitis in China, India, Indonesia and Sri Lanka. It also allows a more economic usage of irrigation water, thereby reducing farmers' costs.

An IVM approach is evidence-based and an essential feature is development of the capacity to generate local data on disease epidemiology and vector ecology. IVM integrates all available resources to achieve a maximum impact on vector-borne disease.

Integration at the level required for IVM is not a simple task — national leadership and adequate local capacity are essential. Commitment is needed from central government to integrate IVM within national policies and from municipal and local health authorities to coordinate their work in a manner not yet seen in most Member States. As was recognized more than 20 years ago by the joint WHO/FAO/UNEP/UNCHS Panel of Experts on Environmental Management for Vector Control (PEEM), ministries of health do not have a strong voice in decisions on financing and the planning of development.

This means that the governments and international bodies that fund development projects should respect the principles inherent in IVM and ensure that recipient countries have the funds for human resource development and training in all aspects of IVM. Existing bodies outside the health sector, such as national economic planning councils, environmental protection agencies and national councils for science and technology, should be explored as vehicles by which the funding of IVM could be embedded in national policy.

While IVM emphasizes effective systems and action at the local level, the support of nationwide programmes is essential for major diseases such as malaria, dengue and filariasis. These programmes will be required to provide technical advice on vector-borne disease epidemiology, surveillance and control technologies, and to provide adequate systems for programme monitoring and quality control. However, successful vector control programmes need more than just expertise in vector control technologies — they also need expertise in planning and programme management. The requisite skills remain scarce, particularly in the resource-poor countries that are most in need of effective vector-borne disease control. A massive effort will be required to build the capacity to address these various facets of IVM.

4. Key elements of an IVM strategy

Effective IVM requires the establishment of principles, decision-making criteria and procedures, together with time frames and targets. These principles need to be incorporated into national health policies and supported by legislation and regulation. To be successful, IVM requires an inventory of essential functions and organizational structures that optimize the use of financial, human and technical resources for vector-borne disease control. The key elements are:

- ***Advocacy, social mobilization and legislation***
  Promotion and embedding of IVM principles in development policies of all relevant agencies, organizations and civil

society; establishment or strengthening of regulatory and legislative controls for public health; empowerment of communities.

- ***Collaboration within the health sector and with other sectors***
  Consideration of all options for collaboration within and between public and private sectors; application of the principles of subsidiarity in planning and decision-making; strengthening channels of communication among policy-makers, vector-borne disease control programme managers and other IVM partners.

- ***Integrated approach***
  Ensure rational use of available resources through application of a multi-disease control approach, integration of non-chemical and chemical vector control methods, and integration with other disease control measures.

- ***Evidence-based decision-making***
  Adaptation of strategies and interventions to local vector ecology, epidemiology and resources, guided by operational research and subject to routine monitoring and evaluation.

- ***Capacity-building***
  Development of essential physical infrastructure, financial resources and adequate human resources at national and local level to manage IVM programmes based on a situation analysis.

5. Next steps

This Strategic Framework is merely a first step in the process leading to implementation of IVM. The effective control of vector-borne diseases cannot be achieved by the health sector alone. The adoption of IVM affords WHO and Member States an opportunity to work with international agencies, non-governmental organizations, donors and the private sector to optimize the use of financial, human and technical resources for vector-borne disease control.

To achieve these goals and create strong and effective advocacy for IVM, WHO should strengthen the existing linkages and coordination with FAO, UNEP and other agencies, many of which already support programmes based on IVM . A strategic plan for the implementation of IVM should be developed. WHO should also take the actions necessary to formally endorse the IVM approach to vector-borne disease control.

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