Integrated vector management to control malaria and lymphatic filariasis

World Health Organization

WHO position statement

Introduction

The World Health Organization (WHO) promotes integrated vector management (IVM) to improve the cost effectiveness of vector-control operations, and to strengthen the capacity of programmes, partnerships and intersectoral collaboration in their efforts to control vector-borne diseases.[1] IVM is a system of rational decision-making developed to optimize the use of resources for vector control (Box 1). The IVM approach aims to contribute to achieving the global targets set for vector-borne disease control by making vector control more efficacious, cost-effective, ecologically sound and sustainable.

This document addresses the use of IVM for two of the most important vector-borne diseases: malaria and lymphatic filariasis. The IVM approach is useful and appropriate for jointly managing control activities against malaria and lymphatic filariasis in terms of planning, implementation and monitoring, particularly in areas where both infections are transmitted by the same species of mosquito vectors. IVM may concurrently reduce the incidence of both diseases so that control efforts have synergistic effects. In this way, IVM enables resources to be used more efficiently to control multiple vector-borne diseases and thus they have a greater impact on public health than would be the case with control programmes aimed at a single disease.

The multidisease strategy can be applied to other vector-borne diseases within the framework of IVM and an integrated approach to controlling neglected tropical diseases.

To be successful, IVM requires an inventory of essential functions and organizational structures that prioritize the use of financial, human and technical resources for controlling vector-borne diseases.[2] The five key elements are summarized in Box 1.

Box 1. The five key elements of integrated vector management

- Integrated approach – ensures the rational use of resources through implementation of a disease-control approach that targets multiple diseases; integrates the use of evidence-based nonchemical and chemical methods of vector control; and integrates a multidisease approach with other disease-control measures.
- Evidence-based decision-making – adapts strategies and interventions to local vector ecology, epidemiology and resources; adaptations are guided by operational research and by data from routine monitoring and evaluation.
- Collaboration within the health sector and with other sectors – considers all options for collaboration within and among the public and private sectors; applies the principles of subsidiarity in planning and decision-making; strengthens channels of communication among policy-makers, programme managers for vector-borne disease control and other IVM partners.
- Capacity building – strengthens physical infrastructure and financial resources; ensures adequate human resources are available at national and local levels to manage IVM programmes based on analyses of the local situation.
- Advocacy, social mobilization and legislation – promotes and embeds IVM principles in development of policies by all relevant agencies, organizations, and in civil society; establishes or strengthens regulatory and legislative controls for public health; empowers communities.

[1] WHO position statement on integrated vector management. Weekly Epidemiological Record, No. 20, 2008, 83:177–181.

[2] *Global strategic framework for integrated vector management*. Geneva, World Health Organization, 2004 (WHO/CDS/CPE/PVC/2004.10).

IVM targeting multiple diseases

Two important vector-borne diseases: malaria and lymphatic filariasis

Malaria and lymphatic filariasis are the two vector-borne diseases that account for the largest global burdens of mortality and morbidity, respectively. More than half the world's population is at risk of at least one of these diseases.

There is overlapping geographical distribution of these diseases in large areas of Africa, Asia and the Americas. Historically, there is evidence that efforts to control malaria have inadvertently resulted in the interruption of transmission of lymphatic filariasis in some areas, such as the Solomon Islands.[3]

Anopheles mosquitoes transmit both malaria and lymphatic filariasis and many other types of mosquitoes also transmit lymphatic filariasis. Vector-control methods can effectively reduce transmission of these infections.

In Africa, where *Anopheles* mosquitoes transmit both the malarial and lymphatic filariasis parasites, scaling up coverage of insecticide-treated mosquito nets and implementing indoor residual spraying will reduce the transmission of both these diseases.

The domestic *Culex* mosquito is the most widespread and important vector of lymphatic filariasis in Asia, eastern Africa and the Americas. This mosquito can be readily controlled by improved sanitation. In addition, malaria vector control activities using insecticide-treated mosquito nets and indoor residual spraying will impact *Culex* mosquitoes and reduce transmission of both lymphatic filariasis and malaria.

WHO's Global Malaria Programme

The short-term goal of WHO's Global Malaria Programme is to reduce the burden of malaria until it is no longer a public-health problem; the long-term goal is to reduce the global incidence to zero by progressively eliminating the disease in endemic countries. The three main programmatic components are: (i) preventing the disease through

[3] Webber RH. The natural decline of *Wuchereria bancrofti* infection in a vector control situation in the Solomon Islands. *Royal Society of Tropical Medicine and Hygiene*, 1977, 71:396–400.

vector-control efforts; (ii) implementing appropriate case-management through diagnostic testing and treatment; and (iii) ensuring timely and accurate surveillance for malaria.

The objective of controlling malaria vectors is to protect all people at risk for malaria, generally with an insecticide-treated mosquito net or indoor residual spraying. This is done to protect against infective mosquito bites and to reduce the intensity of local malaria transmission in communities, thus reducing the incidence and prevalence of infection and disease.

Between 2008 and 2010, nearly 289 million insecticide-treated mosquito nets were delivered to sub-Saharan Africa; these could protect as many as 578 million people. In Africa during 2009, 75 million people, or 10% of the population considered to be at risk, were also protected by indoor residual spraying. During this period, substantial reductions in the burden of malaria were reported by a number of countries.

In order to ensure continued progress in controlling malaria, the Global Malaria Programme is addressing some of the major challenges, including maintaining high levels of coverage with insecticide-treated mosquito nets and coordinating action to promote the judicious use of insecticides.

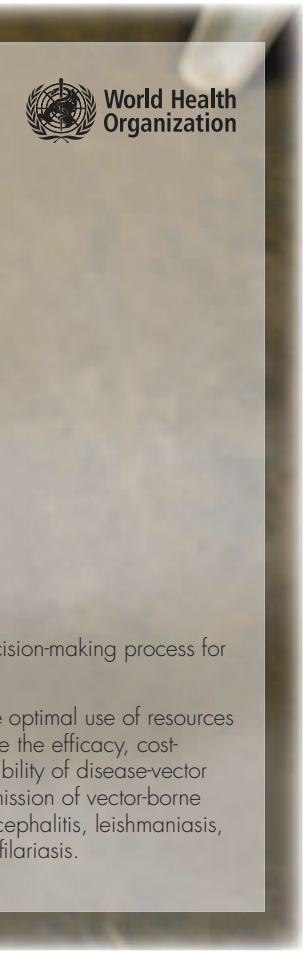
WHO's Global Programme to Eliminate Lymphatic Filariasis

The goal of WHO's Global Programme to Eliminate Lymphatic Filariasis is to eliminate the disease as a public-health problem by 2020. The programme has two main components: (i) interrupting transmission and (ii) reducing morbidity and preventing disability.

To interrupt transmission, mass drug administration and other interventions target all eligible individuals in all endemic areas. Mass drug administration is defined as delivering annual treatment with a single dose of two medicines given together for at least 5 years.

The Global Programme to Eliminate Lymphatic Filariasis has scaled up more rapidly than almost any other global public-health programme. By the end of 2010, 53 endemic countries were implementing mass drug administration, and 3.4 billion treatments to a targeted population of 897 million people.

However some challenges must be faced in order to meet the goal of eliminating the disease. Vector control is recommended as a possible strategy for meeting challenges: (i) in some countries in central Africa where mass drug administration has not started because Loa loa is co-endemic and thus the use of mass drug administration is precluded; (ii) in countries where the burden is heaviest – such as Bangladesh, Democratic Republic of the Congo, India, Indonesia and Nigeria – which need to rapidly scale up mass drug administration; and (iii) in Pacific Island countries, where interruption of local transmission has been achieved but there is limited experience in preventing recurrence.



Added value of joint vector-control interventions

For the Global Malaria Programme, IVM could mean using the infrastructure developed for mass drug administration for lymphatic filariasis in order to expand the delivery and coverage of insecticide-treated mosquito nets in hard-to-reach areas. One of the medicines used in mass drug administration for lymphatic filariasis is albendazole, which also improves anaemia by reducing the burden of soil-transmitted helminthiases.[4]

For the Global Programme to Eliminate Lymphatic Filariasis, the Global Malaria Programme's goal of reaching universal coverage of at-risk populations with insecticide-treated mosquito nets could enhance opportunities for interrupting the transmission of lymphatic filariasis. For this reason, malaria vector-control programmes in countries where lymphatic filariasis is endemic are encouraged to acknowledge the additional public-health benefits that may be achieved through their effects on transmission of lymphatic filariasis. Recognizing and carefully quantifying these benefits could help to mobilize additional resources and community support.

Planning could be improved through the IVM process by harmonizing national plans to address these two diseases, and by sharing vector-control resources where appropriate. In addition, there are potential efficiency gains by integrating the delivery of insecticide-treated mosquito nets with mass drug administration for lymphatic filariasis. Implementation could be streamlined further by combining similar activities – for example, by providing training on vector control for staff in both malaria control programmes and lymphatic filariasis control programmes. Finally, blood specimens collected during monitoring and evaluation surveys could be analysed for both malaria and lymphatic filariasis, and the data could be sent to both programmes.

[4] Molyneux D, Nantulya V. Linking disease control programmes in rural Africa: a pro-poor strategy to reach Abuja targets and millennium development goals. *BMJ*, 2004, 328:1129–1132.

Conclusions

There is much in common between WHO's Global Malaria Programme and WHO's Global Programme to Eliminate Lymphatic Filariasis: they share a large proportion of their target population, and they have similar goals and strategies (Table 1).

Table 1. Comparison of disease epidemiological and elimination programmes, WHO's global Malaria Programme and Global Programme to Eliminate Lymphatic Filariasis

Characteristic	Global Malaria Programme	Global Programme to Eliminate Lymphatic Filariasis
Epidemiology		
Disease and organism	Malaria	Lymphatic filariasis
	Plasmodium falciparum	*Wuchereria bancrofti*
	P. vivax	*Brugia malayi*
	P. ovale	*B. timori*
	P. malariae	
Vectors	*Anopheles* mosquitoes	*Anopheles, Culex, Aedes* and other mosquitoes
Population at risk	3.3 billion	1.39 billion
No. of endemic countries	106	72
Endemic areas	Tropical and sub-tropical regions	Tropical and sub-tropical regions where adequate sanitation is lacking and poverty prevails
Programme		
Vision	A world free from the burden of malaria	A world free of lymphatic filariasis
Goal	To eradicate malaria worldwide by reducing the global incidence to 0 through progressive elimination in endemic countries	To eliminate lymphatic filariasis as a public health problem by 2020
Approach	Strengthen health systems in endemic countries	Strengthen health systems in endemic countries
Strategy	**1.Prevention**	**1.Prevention (transmission control)**
	Vector control to reach all people considered to be at risk with insecticide-treated mosquito nets or indoor residual spraying	Mass drug administration delivered to everyone living in endemic areas Vector control
	2.Morbidity management	**2.Morbidity management**
	Prompt diagnostic testing of all suspected cases	Effective treatment of all confirmed cases
	Morbidity management and disability prevention	

Using an IVM approach allows programmes to control malaria and lymphatic filariasis to coordinate and benefit from each programme's activities, thus enhancing their overall impact on public health. In particular, the recent and unprecedented scaling up of coverage of malaria vector-control activities that has occurred since 2006, especially in Africa, is likely to have substantial additional public-health benefits in sustaining the elimination of lymphatic filariasis. These benefits must be taken into account in assessing the cost effectiveness of interventions that are jointly targeted against the vectors of both diseases.

The strategies of all vector-control programmes should be based on IVM. Vector control implemented as a multidisease approach through IVM is recommended for malaria and lymphatic filariasis in:

- areas co-endemic for malaria and lymphatic filariasis;
- areas where the vectors of malaria and lymphatic filariasis are both affected by the same vector-control interventions (insecticide-treated mosquito nets, indoor residual spraying, and larval control).

As part of their integrated strategy to control multiple diseases, WHO's Member States are urged to adopt an IVM approach. Likewise, donors, partners, international organizations and the private sector are encouraged to support the use of IVM for control programmes targeting malaria and lymphatic filariasis.

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