New vector control response seen as game-changer

5 June 2017

The call came from the WHO Director-General in May 2016 for a renewed attack on the global spread of vector-borne diseases.

"What we are seeing now looks more and more like a dramatic resurgence of the threat from emerging and re-emerging infectious diseases," Dr Margaret Chan told Member States at the Sixty-ninth World Health Assembly. "The world is not prepared to cope."

Dr Chan noted that the spread of Zika virus disease, the resurgence of dengue, and the emerging threat from chikungunya were the result of weak mosquito control policies from the 1970s. It was during that decade that funding and efforts for vector control were greatly reduced.

'Vector control has not been a priority'

Dr Ana Carolina Silva Santelli has witnessed this first-hand. As former head of the programme for malaria, dengue, Zika and chikungunya with Brazil’s Ministry of Health, she saw vector-control efforts wane over her 13 years there. Equipment such as spraying machines, supplies such as insecticides and personnel such as entomologists were not replaced as needed. “Vector control has not been a priority,” she said.

Today more than 80% of the world’s population is at risk of vector-borne disease, with half at risk of two or more diseases. Mosquitoes can transmit, among other diseases, malaria, lymphatic filariasis, Japanese encephalitis and West Nile; flies can transmit onchocerciasis, leishmaniasis and human African trypanosomiasis (sleeping sickness); and bugs or ticks can transmit Chagas disease, Lyme disease and encephalitis.

Together, the major vector-borne diseases kill more than 700 000 people each year, with populations in poverty-stricken tropical and subtropical areas at highest risk. Other vector-borne diseases, such as tick-borne encephalitis, are of increasing concern in temperate regions.

Rapid unplanned urbanization, massive increases in international travel and trade, altered agricultural practices and other environmental changes are fueling the spread of vectors worldwide, putting more and more people at risk. Malnourished people and those with weakened immunity are especially susceptible.

A new approach

Over the past year, WHO has spearheaded a new strategic approach to reprioritize vector control. The Global Malaria Programme and the Department of Control of Neglected Tropical Diseases – along with the Special Programme for Research and Training in Tropical Diseases, have led a broad consultation tapping into the experience of ministries of health and technical experts. The process was steered by a group of eminent scientists and public health experts led by Dr Santelli and Professor Thomas Scott from the Department of Entomology and Nematology at the University of California, Davis and resulted in the *Global Vector Control Response (GVCR) 2017–2030*.

- Global Vector Control Response (GVCR) 2017–2030

At its Seventieth session, the World Health Assembly unanimously welcomed the proposed response.

The GVCR outlines key areas of activity that will radically change the control of vector-borne diseases:

- Aligning action across sectors, since vector control is more than just spraying insecticides or delivering nets. That might mean ministries of health working with city planners to eradicate breeding sites used by mosquitoes;
- Engaging and mobilizing communities to protect themselves and build resilience against future disease outbreaks;
- Enhancing surveillance to trigger early responses to increases in disease or vector populations, and to identify when and why interventions are not working as expected; and
- Scaling-up vector-control tools and using them in combination to maximize impact on disease while minimizing impact on the environment.

Specifically, the new integrated approach calls for national programmes to be realigned so that public health workers can focus on the complete spectrum of relevant vectors and thereby control all of the diseases they cause.

Recognizing that efforts must be adapted to local needs and sustained, the success of the response will depend on the ability of countries to strengthen their vector-control programmes with financial resources and staff.

A call to pursue novel interventions aggressively

The GVCR also calls for the aggressive pursuit of promising novel interventions such as devising new insecticides; creating spatial repellents and odour-baited traps; improving house screening; pursuing

development of a common bacterium that stops viruses from replicating inside mosquitoes; and modifying the genes of male mosquitoes so that their offspring die early.

Economic development also brings solutions. "If people lived in houses that had solid floors and windows with screens or air conditioning, they wouldn't need a bednet," said Professor Scott. "So, by improving people's standard of living, we would significantly reduce these diseases."

An entomologist inserts live mosquitoes into a standard 'cone bioassay'. After 30 minutes he will see how many have been killed - this will measure if the insecticide was sprayed properly on the walls and constitutes intervention monitoring.
WHO/S. Torfinn

The call for a more coherent and holistic approach to vector control does not diminish the considerable advances made against individual vector-borne diseases.

Malaria is a prime example. Over the past 15 years, its incidence in sub-Saharan Africa has been cut by 45% – primarily due to the massive use of insecticide-treated bed nets and spraying of residual insecticides inside houses.

But that success has had a down side.

"We've been so successful, in some ways, with our control that we reduced the number of public health entomologists – the people who can do this stuff well," said Professor Steve Lindsay, a public health entomologist at Durham University in Britain. "We're a disappearing breed."

The GVCR calls for countries to invest in a vector-control workforce trained in public health entomology and empowered in health care responses.

"We now need more nuanced control – not one-size-fits-all, but to tailor control to local conditions," Professor Lindsay said. This is needed to tackle new and emerging diseases, but also to push towards elimination of others such as malaria, he said.

Dr Lindsay noted that, under the new strategic approach, individual diseases such as Zika, dengue and chikungunya will no longer be considered as separate threats. “What this represents is not three different diseases, but one mosquito – Aedes aegypti,” said Professor Lindsay.

GVCR dovetails with Sustainable Development Goals

The GVCR will also help countries achieve at least 6 of the 17 Sustainable Development Goals. Of direct relevance are goal 3 on good health and well-being, goal 6 on clean water and sanitation, and goal 11 on sustainable cities and communities.

The GVCR goals are ambitious – to reduce mortality from vector-borne diseases by at least 75% and incidence by at least 60% by 2030 – and to prevent epidemics in all countries.

The annual price tag is US$ 330 million globally, or about 5 cents per person – for workforce, coordination and surveillance costs. This is a modest additional investment in relation to insecticide-treated nets, indoor sprays and community-based activities, which usually exceed US$ 1 per person protected per year.

It also represents less than 10% of what is currently spent each year on strategies to control vectors that spread malaria, dengue and Chagas disease alone. Ultimately, the shift in focus to integrated and locally adapted vector control will save money.

'A call for action'

Dr Santelli expressed optimism that the GVCR will help ministries of health around the world gain support from their governments for a renewed focus on vector control.

"Most of all, this document is a call for action," said Dr Santelli, who now serves as deputy director for epidemiology in the Brasilia office of the U.S. Centers for Disease Control and Prevention.

It will not be easy, she predicts. The work to integrate vector-control efforts across different diseases will require more equipment, more people and more money as well as a change in mentality. "The risk of inaction is greater," said Dr Santelli, "given the growing number of emerging disease threats." The potential impact of the GVCR is immense: to put in place new strategies that will reduce overall burden and, in some places, even eliminate these diseases once and for all.