

## Malaria: a full-time problem addressed on a part-time basis by amateur entomologists.

By: Manuel F. LLuberas MS IDHA, Public Health Entomologist

More than a decade after implementation, the global malaria control strategy has proven woefully inadequate. It has reported expenditures exceeding several billion dollars and relies heavily on passive methods like mosquito nets but has been unable to meet its goals of reducing an annual morbidity rate that continues to hover around half billion and a mortality rate equivalent to six Jumbo jetliners crashing daily. The time has come to get serious about this problem. Malaria vector control programs around the world need to be placed under trained public health entomologists who can implement comprehensive mosquito population suppression methods and deploy truly integrated vector control systems. Continuing in the current path is unacceptable and wastes quickly dwindling, limited resources.

Malaria continues to inflict a heavy burden on over 3 billion people in approximately 140 countries or territories.<sup>1, 2</sup> Somewhere around 400 and 600 million malaria cases are reported annually, with about 60% of them and over 80% of the deaths in sub-Saharan Africa.<sup>3</sup> More significantly, the vast majority of the million or so who perish annually to this disease are children under five years of age.<sup>4</sup> In addition to acute disease episodes and deaths, malaria also contributes significantly to anemia in children and adverse birth outcomes in pregnant women in Africa.<sup>5</sup> Furthermore, malaria is estimated to be responsible for an average annual reduction of 1.3% in economic growth for those countries with the highest burden.<sup>6</sup>

While the malaria yoke remains heavy on the shoulders of the poor populations, the vast majority of malaria control programs in Africa and around the world today are managed by pediatricians, ophthalmologists and other physicians who know little about the mosquitoes in their areas and even less about vector control. Moreover, the World Health Organization (WHO) has only a handful of entomologists in all of Africa, about four in the Americas, and about as many in Asia. This may help explain why so very few, if any of these programs have a public health entomologist at the helm.

Though physicians have a clear and universal understanding of the need for narcotics and antibiotics in human health and accept them in spite of their inherent risks and counter indications, it is rare to find a physician holding the position malaria control program manager who treats public health insecticides as drugs for the environment. As such, insecticides need to be “prescribed” by professionals with the proper training and qualifications and applied when needed in the correct formulation and at appropriate dosages. Very few of the malaria control program managers around the world today have made this connection. This may help explain the urgent need for improved management of the few public health insecticides left in the malaria control arsenal.<sup>7</sup> More troubling perhaps, many of them consider insecticides dangerous environmental contaminants that should be banned altogether.

Complicating the vector control picture a bit further, many of today's international health agencies and Organizations advising or directing vector control programs speak about Integrated Vector Management (IVM)<sup>8</sup> and push this concept as the correct approach while continuing to focus their attention on passive methods like mosquito nets (ITNs) and placing active vector control methods like space and indoor residual spraying (IRS) and larval source management (LSM) as supplementary tools deployed only if the budget allows. This scenario has played itself repeatedly over the past decades since Ronald Ross' days, when the failure of attacks on mosquitoes to reduce malaria in parts of Africa "could be fairly discounted on grounds that the attacks were never more than half-hearted and were too soon abandoned."<sup>9</sup>

There is ample evidence that when properly designed and implemented, an integrated vector control plan has wiped out malaria from the developed world and suppressed it in many other countries and in almost every ecological zone. Today this is not a popular concept, but there are many examples where this combination has worked. The success in the US and the Panama Canal has been properly documented, but there are more recent victories from Ghana, Zambia, South Africa, Zanzibar and other parts of the world. Unfortunately, many of the details of these successes are captured in reports to board of directors and shareholders written as internal documents by companies in the mineral extraction community engaging in malaria control to protect their workers and are often not readily available or published. Moreover, the financial gains related to malaria vector control reported in these documents rarely meet the criteria for "proper scientific evidence."

Many don't like to hear this, but today, well into the Twenty First Century, malaria is a full-time problem addressed on a part-time basis. In today's malaria world, with at least half the world's population at risk and a mortality rate equivalent to about six 747 Jumbo planes full mostly with children under five and pregnant women crashing daily, many programs rely almost exclusively on passive methods like mosquito nets (ITNs), equate net distribution to usage when these terms are nowhere close to being synonymous, and only haphazardly activate active vector control programs like indoor residual spraying (IRS) for a handful of months, after which they are disbanded.

We need to get serious about malaria vector control, take a full-time approach to it and provide job security and progression to managers and technicians so they continue in their posts and not take the first opportunity for permanent positions outside malaria control. Vector control programs need to implement active vector suppression interventions with reliable equipment and materials, implement insecticide resistance prevention and correction methods and attack the vector on all fronts: larvae, pupae and adults. In addition, we must stop the dependence on a single class of insecticides (the Pyrethroids), the group most commonly used in IRS and the only one used in ITNs. This widespread reliance on a single class of insecticide increases the risk of mosquitoes

developing resistance to it, of particular concern in Africa, where mosquito nets are being deployed at unprecedented levels and IRS coverage is rapidly increasing. Once insecticide resistance is established in mosquito populations, about half of the insecticides currently available for vector control would be rendered useless, leaving countries with a malaria problem several orders of magnitude more severe than it is today.

It is time to get serious about vector-borne disease control and place trained public health entomologists and technicians where their training and experience can be most effective and have the highest impact. It is critical that we have program managers who consider public health insecticides as drugs for the environment, understand their counter indications, are conscientious about their potential side effects on human health and the environment and deploy them as intended and when they can produce the greatest impact on the mosquito. We need malaria vector control program managers who know the vectors in their areas of responsibility and are able to design and implement a program that deploys as many vector population suppression tools as are feasible in their countries and against as many of the developmental stages of the target vector as possible. Only this way can we implement truly effective and efficient integrated vector management programs that have long lasting results and help keep the 747 Jumbo planes in the air.

Having a malaria vaccine in the malaria control toolbox would certainly help, but we succeeded in eradicating or reducing malaria in about 100 countries without the benefit of a vaccine or many of the modern technological advances. In each of these cases, active vector control was the backbone of well-organized campaigns that led to glorious victories.

Albert Einstein has been quoted as saying “If you want different results do things differently.”<sup>10</sup> The World has been engaging in malaria control for at least a decade and spent billions of dollars that have produced only meager progress. We need to follow Einstein's advice and modify the global malaria control strategy. Proceeding on the current path will only provide job security for the current program managers while allowing malaria mortality rates to remain unacceptably high for the decades to come.

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<sup>1</sup> Hotez P J, Fenwick A, Savioli L, Molyneux DH: Rescuing the bottom billion through control of neglected tropical diseases. *Lancet* 2009, 373:1570–1575.

<sup>2</sup> World Malaria Report 2007, WHO, Geneva

<sup>3</sup> WHO: World malaria report 2010. Geneva: World Health Organization. [http://whqlibdoc.who.int/publications/2010/9789241564106\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241564106_eng.pdf)

<sup>4</sup> WHO Expert Committee on Malaria. Twentieth report. Geneva, World Health Organization, 2000 (WHO Technical Report Series, No. 892).

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- <sup>5</sup> WHO, 2010: Working to overcome the global impact of neglected tropical diseases. [http://whqlibdoc.who.int/publications/2010/9789241564090\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241564090_eng.pdf)
- <sup>6</sup> Sachs JD. Macroeconomics and health: investing in health for economic development. Report of the Commission on Macroeconomics and Health. Geneva, World Health Organization, December 2001.
- <sup>7</sup> Status of pesticide management in the practice of vector control: a global survey in countries at risk of malaria or other major vector-borne diseases. Henk van den Berg, Jeffrey Hii, Agnes Soares, Abraham Mnzava, Birkinesh Ameneshewa, Aditya P Dash, Mikhail Ejov, Soo Hian Tan, Graham Matthews, Rajpal S Yadav and Morteza Zaim. *Malaria Journal* 2011, 10:125
- <sup>8</sup> [http://whqlibdoc.who.int/hq/2008/WHO\\_HTM\\_NTD\\_VEM\\_2008.2\\_eng.pdf](http://whqlibdoc.who.int/hq/2008/WHO_HTM_NTD_VEM_2008.2_eng.pdf)
- <sup>9</sup> Harrison, Gordon A. (1978) *Mosquitoes Malaria & Man*. Clark, Irwin & Company Ltd, Canada
- <sup>10</sup> Einstein, Albert (1954), *Ideas and Opinions*, Random House, NY