Vector control: Where are we and where are we heading?

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ABSTRACT

Summary: Malaria remains our priority vector-borne disease, resulting in an estimated 241 million cases and 627,000 deaths in 2020. Interestingly, it is only a little more than a century since we discovered what causes malaria and that Anopheles mosquitoes are the vectors. Since that discovery, mosquito control has been our primary strategy in combating malaria, initially through larval control and house-screening, later through spraying of insecticides such as DDT, and more recently by way of Insecticide-Treated Nets, but also Indoor Residual Spraying. Long-Lasting Insectide Nets were highly effective in reducing malaria incidence between the years 2000 and 2015, but effectiveness in vector control has declined largely due to a rise in resistance against synthetic pyrethroids and also a shift in biting behaviour, with more outdoor and early-evening biting. New vector control tools and approaches are necessary to address outdoor transmission and residual malaria. Arboviruses are on the rise globally, with an estimated 400 million cases of dengue alone occurring each year. In large parts of Asia and elsewhere in the world, arboviruses are escalating in numbers and geographic spread, and this increase in arboviral diseases such as dengue, Zika, Chikungunya and others will almost certainly continue due to expanding trade, tourism, urbanization, but also Global Warming. There is no effective vaccine yet for dengue, Zika or Chikungunya, and no drugs to cure people, which means vector control is our primary strategy to control such Aedes-borne arboviruses. Our tools to combat Aedes are also inadequate or poorly applied. We are also experiencing a global shortage of medical entomologists, and there are widespread shortfalls in capacity within national agencies to conduct optimal vector surveillance and control. This presentation reflects on the major role that vector control has had over the past century, the challenges facing vector control, and new tools and approaches that are now under development or being implemented.