

Challenges and prospects for dengue and malaria control in Thailand, Southeast Asia

Vincent Corbel^{1,2}, Francois Nosten^{3,4}, Kanutcharee Thanispong⁵, Christine Luxemburger⁶, Monthathip Kongmee⁷, and Theeraphap Chareonviriyaphap²

¹ Institut de Recherche pour le Développement (IRD), Maladies Infectieuses et Vecteurs, Ecologie, Génétique, Evolution et Contrôle (IRD 224-CNRS 5290 UM1-UM2), Montpellier Cedex 5, France

² Department of Entomology, Faculty of Agriculture, Kasetsart University, 50 Ngam Wong Wan Rd, Ladyaow Chatuchak, Bangkok 10900, Thailand

³ Shoklo Malaria Research Unit, Mahidol-Oxford Tropical Medicine Research Unit, Faculty of Tropical Medicine, Mahidol University, Mae Sot, Thailand

⁴ Centre for Tropical Medicine, Nuffield Department of Medicine, University of Oxford, Oxford, UK

⁵ Bureau of Vector Borne Diseases, Department of Disease Control, Ministry of Public Health, Tiwanon Road, Mueang, Nonthaburi 11000, Thailand

⁶ Sanofi Pasteur, 2 av du pont Pasteur, 69007 Lyon, France

⁷ Department of Entomology, Faculty of Agriculture at Kamphaeng Saen, Kamphaeng Saen Campus, Kasetsart University, Nakhon Pathom 73140, Thailand

Despite significant advances in the search for potential dengue vaccines and new therapeutic schemes for malaria, the control of these diseases remains difficult. In Thailand, malaria incidence is falling whereas that of dengue is rising, with an increase in the proportion of reported severe cases. In the absence of antiviral therapeutic options for acute dengue, appropriate case management reduces mortality. However, the interruption of transmission still relies on vector control measures that are currently insufficient to curtail the cycle of epidemics. Drug resistance in malaria parasites is increasing, compromising malaria control and elimination. Deficiencies in our knowledge of vector biology and vectorial capacity also hinder public health efforts for vector control. Challenges to dengue and malaria control are discussed, and research priorities identified.

Dengue and malaria burden in Southeast Asia

Despite recent advances in the understanding of vectorial systems (see [Glossary](#)), development of potential vaccines, and new therapeutic schemes, the control of dengue and malaria remains extremely difficult [1,2]. Dengue fever is the fastest emerging arboviral infection transmitted by *Aedes* mosquitoes. This has major public health consequences in over 100 tropical and subtropical countries in

Southeast Asia (SEA), the Western Pacific (WP), and South and Central America [3]. The four antigenically distinct dengue viruses (DENV-1 to -4) cause a broad spectrum of clinical manifestations comprising asymptomatic infection, undifferentiated fever (UF), dengue fever (DF), dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS). The World Health Organization (WHO)–SEA region together with the WP region bears nearly 75% (approximately 40 million cases) of the current global disease burden. The incidence of dengue fluctuates periodically but is globally increasing both in terms of the number of reported cases (63 672 reported cases in the SEA region in 2000 to 355 314 cases in 2010) (<http://www.searo.who.int/en/>) and the number of countries in which the disease is emerging or re-emerging [4]. The reason for the increase in reported cases is multifactorial, with global trade (transport of the mosquitoes), increasing international travel (movement of viremic people), urban crowding (favoring human vector contact), and ineffective vector control strategies all supporting the spread of the disease [2]. Modeling exercises also suggest that climate change may lead to an expansion in the area of land with a climate suitable for dengue transmission, hence increasing the proportion of the human population at risk [5,6].

Malaria remains a public health problem in the SEA region with approximately 22 million cases reported per year, accounting for 14% of the total malaria burden [7]. According to the WHO, approximately 93% of those who are at a moderate to high risk of malaria infection are living in Bangladesh, India, Indonesia, Myanmar, Thailand, and Timor Leste, and are contributing more than 95% of confirmed malaria cases and deaths (<http://www.searo.who.int/en/>). Human malaria is caused by five

Corresponding author: Corbel, V. (vincent.corbel@ird.fr).

Keywords: dengue; malaria; vectors; drugs; insecticides; resistance; control; Thailand.

1471-4922/\$ – see front matter

© 2013 Published by Elsevier Ltd. <http://dx.doi.org/10.1016/j.pt.2013.09.007>

