

Introduction: Mekong Malaria II

As one of the most serious communicable diseases of mankind, malaria is a threat to the health of populations in the tropical and subtropical zones of the world, to their economic development, to alleviation of poverty and to attaining greater equity among the world's peoples. As the global epicenter of multi-drug resistance, the Mekong region of Southeast Asia comprises one of the most challenging foci of malaria in the world and as such is the target of efforts to apply improved strategies to cope with this challenge in the knowledge that global objectives require regionally coordinated planning. Neighboring countries cannot go it alone efficiently or effectively.

It was in this context that the first Mekong Malaria monograph (Kidson *et al*, 1999) was published as a review of regional malaria data with emphasis on the preceding three years, in order to form a starting point for continued evaluation of the epidemiology of malaria in the constituent countries of the Greater Mekong Subregion (GMS) as a basis for concerted action. This second Mekong Malaria monograph (Mekong Malaria II) provides an update of the malaria situation in the subsequent 3 years (1999 - 2001) and at the same time constitutes a review of the 6 years 1996 - 2001 in the 6 component countries: Cambodia, China/Yunnan, Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam, extending the capacity of geographical information systems (GIS) to facilitate interpretation of large data sets. Opportunity is taken of this technology to view disease patterns against geographic, economic and social change, in order to enable both economic planners and health planners to gain from this multi-sectoral overview some usefully coordinated approaches to improvement of disease monitoring and management.

While three years is a relatively short time period in which to expect clear advances, this region embodies a dynamic that demands attention to the changes that are occurring in economic development, population mobility and health status. The population movement in the region by road, rail, water, air reflects the demands of commerce, trade, family reunion, tourism, reflecting both legal and illegal activities, some readily subject to authoritative management, some not. The sum total of population mobility brings with it an accompanying risk of increased transmission of infectious diseases among both the traveling and resident communities.

Malaria is one of a spectrum of communicable diseases that seriously affect and are influenced by the process of developmental change in the region, with resultant impact on social and economic advance; others with high profile include HIV/AIDS and tuberculosis. These diseases and others have the propensity to expand quickly into epidemics that can threaten social structure and economic productivity of the populations involved. Transmission

of such diseases does not stop at international borders: they are multi-country problems that require multi-country and multi-sectoral solutions.

As identified in the first Mekong Malaria monograph, the Greater Mekong subregion (Mekong region) is of special focus in this context: the 6 countries represent a wide spectrum of economic capacity, economic change, population size, health services infrastructure, human and material resources. Diversity aside, there is a degree of interdependence in health planning and management that makes it desirable to enhance collaboration in containing the spread of communicable diseases. Agreement on this principle has led to initiation of greater sharing of epidemiological and policy information, in the context of which improvement of malaria control is one high priority goal.

This region is home to the origins and spread of some of the world's worst antimalarial drug resistance, including multi-drug resistant parasite strains. Within and beyond the region these resistant parasites spread inexorably with population mobility when combined with drug selection pressure, so that Mekong malaria is a focus of intense global attention. Multi-drug resistant malaria poses a serious threat to mankind in terms both of the severity of the illness and its adverse effects on social and economic welfare. Recent advances in *Plasmodium* genomics are now serving to facilitate molecular epidemiologic definition of the pathways of inter-regional dispersion of specific drug resistant mutants, with the potential to improve planning of rational therapeutic management.

The collation and correlation of malaria data from the 6 countries in consort thus represents a positive starting point from which is gradually being built a more effective regional database, despite imperfections that inevitably exist in some inputs. Starting originally with retrospective data, the process of collaborative data recording and analysis has moved on, as confidence is built up. This has been facilitated by the establishment of the WHO Roll Back Malaria Mekong (RBM/Mekong) sub-program of the global RBM program, with a coordinating office and associated dynamic structure.

With the main focus is on the overall picture in relation to the population dynamics in the region, particular attention has been directed towards patterns of malaria in the pertinent international border areas, to assist in cooperative action between countries sharing these borders.

In presenting newly mapped data, where appropriate reference has been provided to earlier data published in the first Mekong Malaria monograph, so to permit an idea of changes that have occurred in the intervening period. This is also true of selected health, economic and environmental information, so to provide context in which dynamics of malaria patterns are taking place. In the first Mekong Malaria monograph we included mapped pictures of regional

economic development activities provided by the Asian Development Bank. Since these maps included forward projections at that time, most of these have not been repeated in Mekong Malaria II, since the broad implications of major structural changes as they affect population dynamics and disease spread still pertain and can be accessed by reference to the first Mekong Malaria monograph (Kidson *et al*, 1999).

The technical focus on GIS representation of the various databases for ready visualization of the principal trends is continued from the first Mekong Malaria monograph to Mekong Malaria II. The GIS operating system employed is MapInfo, with various map data sources integrated using ARC/INFO format. While the primary thrust is on the Mekong countries (including Yunnan Province of China) some reference is also provided for some neighboring and more distant countries to give broader context. Reference to the world-wide flow of antimalaria drug resistance is provided per global and other maps based on WHO data.