EDITORIAL

The emergence of dengue fever in Ethiopia

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Dengue is one of the arbo-viral diseases considered or suspected to be endemic in Ethiopia. The disease is caused by viruses belonging to the family Flaviviridae (formerly group B) and belonging to the same family with yellow fever and West Nile fever. Although dengue was first reported from Wollo, Harrarghe and Addis Ababa during the 1940s by Italian physicians; the identification of the viruses causing denge fever syndromes in human was done during and since 1960-62, yellow fever epidemic. Viruses such as Zika, West Nile, Chikungunya, Wesselsbron, Talaguine and Sindbis were identified and all are causing febrile illness with rash. Those viruses were found during serological surveys in human populations in Gamo Gofa and Wollega as well as in wild animals (1). It was in the past, from 1975 to 1996 that Ethiopia was considered dengue endemic with other countries, including Comoros, Kenya, the Seychelles, Somalia, Tanzania, Mauritius, and Mozambique (2).

Dengue is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas, which is putting more than 40% of the world's population at risk. Thus, it is estimated that 2.5 billion people are at risk from dengue infection (3). The disease has been widely expanded to many countries in Africa. Over the past 5 decades, cases of epidemic or sporadic dengue have been reported in many countries in sub-Saharan Africa (4). Recent reports showed that outbreaks of dengue occurred in eastern Ethiopia[*]. Thus, since 2013, Ethiopia has reported more than 12 000 dengue fever cases to the World Health Organization (5).

Despite the overlapping of factors identified, various studies hypothesized general factors to explain the reasons for the emergence of dengue (6). Firstly, rapid population growth, unplanned urbanization, and increased international travel in combination with vector distribution were assumed to result in extensive transmission of dengue virus in Africa (6; 7). Secondly, urban poverty and minimal capacities for surveillance and control measures remain important precipitating factors of dengue transmission in regions with favorable climate (8). Thirdly, increases in poor, urban populations, break down in public health measures, especially vector control programs, trade, and environmental disturbances (6, 9-11).

Adequate evidences are as well available to show the effect of climate change on the global trends of vector borne diseases (12). Similar to other vector-borne diseases, transmission of the dengue virus is sensitive to climate. For instance, temperature, rainfall and humidity affect the breeding cycle, survival and biting rate of the mosquito vectors (principally *Aedes aegypti*). Higher ambient temperatures favor rapid development of the vector, increase the frequency of blood meals, and reduce the extrinsic incubation period (13). A short incubation period increases the opportunities for virus transmission during the life time of an infected mosquito. If the ambient temperature is too low, mosquitoes are unlikely to survive long enough to become infectious and pass on dengue (9). During the past century, surface temperatures have increased by a global average of 0.75°C. Temperature increases of this magnitude may be associated with substantial increases in dengue epidemic potential (8).

In order to guide treatment and determine the disease burden accurate diagnosis of dengue is vital. However, accurate diagnosis of dengue is compromised due to many factors. The overlapping of dengue and malaria endemicity is one of the important issues. For example, in regions where malaria is endemic, >70% of febrile illnesses are treated as presumptive malaria often without proper medical

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examination and laboratory diagnosis (14,15). However, as per same authors, over-diagnosis of malaria in areas of low transmission are well documented, and overestimation by clinical diagnosis is ≈61%. Many patients in Africa with fever are designated as having fever of unknown origin or malaria and remain without a diagnosis even if they fail to respond to anti-malarial drugs.

Under these prevailing practices, there is a real potential of misdiagnosing dengue as malaria.

In summary, dengue is one of the vector-borne diseases that occur in the form of outbreak. There is a need to strengthen human resource and laboratory capacity to generate accurate data. The Government of Ethiopia targets to improve prevention and control of dengue. Thus, the 2014 consultative workshop culminated in generating key recommendations believed to guide facilitating the capacity building and improving the surveillance system.

References

1. Mekonnen M, Kloos H. *Yellow fever and Otherarboviral diseases*. In Berhane Y, Haile Mariam D, and Kloos H (Eds.): Epidemiology and ecology of health and disease in Ethiopia. 635-645.
2. Gratz NG, Knudsen AB. The rise and spread of dengue, dengue haemorrhagic fever and its vectors: A historical overview. Geneva; World Health Organization, 1996.
3. World Health Organization (WHO). Dengue and dengue haemorrhagic fever. Geneva; WHO, 2008.
4. World Health Organization (WHO). Dengue in Africa: Emergence of DENV-3, Côte d'Ivoire, 2008. *Weekly Epidemiol Rec* 2009; 84:85-8.
5. World Health Organization (WHO). Ethiopia steps up actions for dengue prevention and control. International Consultative Workshop on Dengue Prevention and Control Strategies. Addis Ababa, 21-22 July 2014.
6. Gubler DJ. The changing epidemiology of yellow fever and dengue, 1900 to 2003: full circle? Comp *Immunol Microbiol Infect Dis* 2004; 27: 319–30.
7. United Nations. Demographic year book, 1950–2007. United Nation Statistics Division. Demographic and Social Statistics [cited 23 Dec 2009]; Available at: URL:http://unstats.un.org/unsd/demographic/products/dyb/ dyb2.htm.
8. van Kleef E, Hilary B, Hales S. Review: The geographic distribution of dengue fever and the potential influence of global climate change [cited Dec 2009]; Available at: URL:TropIKA.net http://journal.tropika.net.
9. Patz JA, Martens WJ, Focks DA, Jetten TH. Dengue fever epidemic potential as projected by general circulation models of global climate change. *Environ Health. Perspect* 1998;106:147-153.
10. Rigau-Perez JG, ClarknG, Gubler DJ. Dengue and dengue haemorrhagic fever. *Lancet* 1998; 352:971-977.
11. Pinheiro F, Corber S. Global situation of dengue and dengue haemorrhagic fever, and its emergence in the Americas. *World Health Stat Q* 1997;50:161-169.
12. McMichael AJ, Woodruff RE, Hales S. Climate change and human health: present and future risks. *Lancet* 2006;367:859–69.
13. Morin CW, Andrew C. Comrie AC, and Ernst K. Climate and dengue transmission: Evidence and implications. *Environ Health Perspect*; DOI:10.1289/ehp.1306556.
14. Amexo M, Tolhurst R, Branish G, Bates I. Malaria misdiagnosis: effects on the poor and vulnerable. *Lancet* 2004; 364: 1896-8.
15. Ndyomugyenyi R, Magnussen P, Clarke S. Diagnosis and treatment of malaria in peripheral health facilities in Uganda: findings from an area of low transmission in south-western Uganda. *Malar J* 2007; 6:39.