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GLOBAL DENGUE EPIDEMIOLOGY TRENDS

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Dengue disease is the most rapidly spreading mosquito-borne viral disease. The four dengue virus serotypes (DENV 1, 2, 3, and 4) are transmitted by mosquitoes of the genus Aedes Infection by each serotype is considered to induce serotype-specific lifetime immunity. Any of the serotypes can cause severe dengue and fatal disease.

Worldwide, between 2.5 and 3.6 billion people, over 50% of the population, are at risk, in over 125 endemic countries.

An estimated 50 to 270 million dengue infections occur every year, of which two million cases evolve to severe Dengue Hemorrhagic Fever, and 21 000 would result in death[1,2] .

Determinant factors of dengue global epidemiology trends include, but are not limited to: 1) demographic changes including population growth, economical trends in tropical countries and land use patterns; 2) increased urban population size and density due to rural to urban migration 3) modern transportation with increased movement of people, commodities, animals, vectors and pathogens; and 4) changes in public health policies and infrastructures[3].

The geographic spread of both the mosquito vectors and the viruses has led to a global resurgence of epidemic dengue disease and emergence of severe forms in the past 25 years[4]. From nine dengue-reporting countries in the 1950s, dengue is currently a public health concern in over 100 countries[5]. The four dengue virus serotypes are found in tropical and sub-tropical regions around the world. Dengue is endemic in Asia, the Pacific area, Africa, and Latin America (including the Caribbean)[6].

South-East Asia Region (SEAR) and the Western Pacific Regions bear nearly 75% of the dengue global disease burden. In 2010, 187,333 dengue cases were reported to the WHO SEAR office; and 354,009 cases were reported to the WHO Western Pacific Region, including 1,075 deaths.

An increase in the amplitude and the frequency of epidemics was observed in Latin America in recent years. Brazil, Colombia, Honduras, Mexico, Puerto Rico, and Venezuela are among the countries reporting the highest number of dengue cases to the Pan American Health Organization (PAHO). In 2010, 1,663,276 dengue cases were reported to PAHO including 1,194 deaths[7].

After decades of absence in the US, dengue has recently emerged with dengue cases locally acquired[8] and the establishment of endemicity in US tropical territories (e.g., Puerto Rico)[9].

Dengue does not naturally occur in continental Europe but conditions are suitable for transmission with increasing risk for transmission (e.g., establishment of *Ae. albopictus* mosquito and viremic travelers)[10,11]. In Africa, the incidence of dengue is largely unknown due to sparse surveillance data with cases and outbreaks not reported to WHO[12]. However, epidemic dengue fever caused by all four serotypes has been documented in Africa since 1980, with 22 countries reporting sporadic cases. High prevalence of antibody to dengue virus in limited serologic surveys suggests endemic dengue virus infection in many parts of Africa[13].

While geographical expansion of dengue and its vector are evident, the true burden of disease is underestimated due to constraints inherent to public health surveillance systems and the challenges specific to dengue. Lack of uniformity in dengue case definitions, in diagnosis ascertainment, in laboratory capacity, and the diversity of public health practices in each country, all affect the interpretation of the evidence generated by dengue surveillance systems[14]. Most dengue cases are asymptomatic and go undetected, and Persons with mild illness may not seek medical attention. Consequently the actual number of dengue disease cases is underreported and burden of disease is substantially underestimated[15].

In the absence of an effective vaccine, public health systems focus on the early identification and early response to outbreaks. This is of particular importance given the unpredictability of dengue together with the lack of sustainable prevention or control measures. In such an environment, public health programs often neglect the importance of accurately estimating the burden of disease or the impact of control efforts. However, once a disease becomes vaccine preventable, surveillance systems become key tools to assess the performance of vaccination programs. Ways of improving surveillance of vaccine-preventable diseases include encouraging reporting; ensuring adequate investigation of suspected cases; improving easiness and completeness of reporting mechanisms; strengthening overall surveillance infrastructure (e.g. laboratory capacity) and implementing enhanced surveillance activities (e.g. sentinel surveillance and primary care and hospital levels).

In summary, the global trends of dengue disease epidemiology are characterized by a rapidly expanding geographic distribution of vector infestation, the risk of infection, and disease transmission, despite ongoing

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control efforts. An increased frequency and magnitude of epidemics with significant levels of hospitalization and a marked increased risk for severe forms of dengue are associated with the continual circulation of the four dengue virus serotypes. Dengue is therefore an increasingly global public health concern, characterized by unpredictable epidemics, and for which no sustainable control measures currently exist.

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