

Dengue virus infection Epidemiology

INTRODUCTION

- Records of dengue-like illness date back more than 200 years and the viral etiology of dengue virus (DENV) was established in the 1940s
- Major changes in the epidemiology of dengue virus infections began after World War II, and geographic expansion of transmission has continued to date
- estimates of 390 million infections worldwide each year and over 2.5 billion individuals at risk for infection

CLASSIFICATION

- Dengue viruses are members of the family Flaviviridae, genus *Flavivirus*
- Both epidemic and endemic transmission of the DENVs are maintained through a human-mosquito-human cycle involving mosquitoes of the genus *Aedes*

MOSQUITO VECTORS

- *Aedes (Stegomyia) aegypti* mosquitoes
- *Ae. albopictus* mosquitoes are also a competent vector for the transmission of the DENVs under both experimental and natural conditions



OTHER ROUTES OF TRANSMISSION

- **Nosocomial transmission**

- needle stick injury
- mucocutaneous exposure
- Blood transfusion

- **Vertical transmission**

- Delivery
- Breastfeeding
- Sexual transmission

DISTRIBUTION OF AE. AEGYPTI MOSQUITOES



Dengue, countries or areas at risk, 2008*



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Data Source: World Health Organization
Map Production: Public Health Information
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World Health Organization



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Asia and Pacific

- **Southeast Asia**

- southern China
- south of the island of Taiwan
- Thailand, Vietnam, and Indonesia
- Malaysia
- Philippines
- Japan

- **South Asia**

- India, Pakistan, and Sri Lanka

- **Western Pacific islands**

- American Samoa, Cook Islands, French Polynesia, New Caledonia, and Tonga

- **Australia**

- north Queensland

Africa and Eastern Mediterranean

- sub-Saharan Africa
- Central Africa, East Africa, and the Middle East

Europe

- southern France and Croatia
- Madeira Island (Portugal)
- Spain
- northeast Italy

Americas

- **North America**

- Mexico
- southern United States

- **Central America**

- Nicaragua and Honduras

- **Caribbean**

- Dominican Republic
- Jamaica
- Guadeloupe
- Cuba
- Martinique

- **South America**

- Brazil and Venezuela
- Colombia

PATTERNS OF TRANSMISSION

- Epidemic dengue
- Hyper endemic dengue

FACTORS INFLUENCING TRANSMISSION

- population growth
- poor urban planning with overcrowding and poor sanitation
- modern transportation
 - Increased movement of mosquito vectors
- global climate change
 - (El Niño/Southern Oscillation events)
 - Increased vector density
 - Shorter mosquito incubation
 - increase the length of time that a mosquito remains infective

Zika virus infection Epidemiology

INTRODUCTION

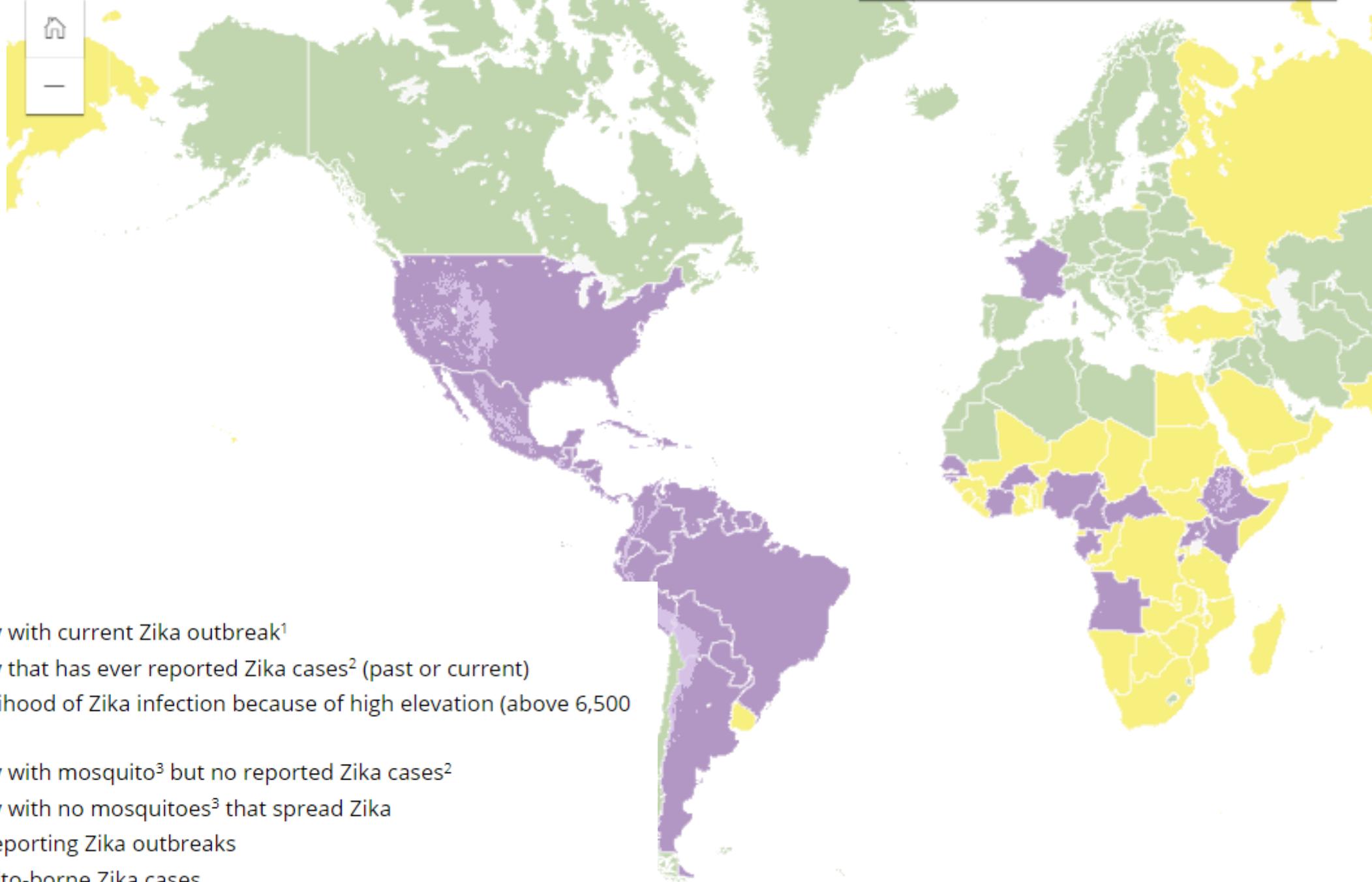
- Zika virus is an :

arthropod-borne flavivirus transmitted by mosquitoes

- Zika virus is named after the Ugandan forest where it was first isolated from a rhesus monkey in 1947
- The first human cases were detected in 1952 in Uganda and Tanzania.

Geographic distribution

- Outbreaks of Zika virus infection have occurred in :
 - Africa
 - Southeast Asia
 - The Pacific Islands
 - The Americas
 - The Caribbean.



Map Legend

-  Country or territory with current Zika outbreak¹
-  Country or territory that has ever reported Zika cases² (past or current)
-  Areas with low likelihood of Zika infection because of high elevation (above 6,500 feet/2,000 meters)
-  Country or territory with mosquito³ but no reported Zika cases²
-  Country or territory with no mosquitoes³ that spread Zika

¹ No areas are currently reporting Zika outbreaks

² Locally acquired, mosquito-borne Zika cases

³ *Aedes aegypti*

Transmission

- Zika virus is carried by the :
 - *Aedes aegypti*
 - *Aedes albopictus*
- Zika virus may be transmitted to humans via the following
 - Bite of an infected mosquito
 - Maternal-fetal transmission
 - Sex
 - Blood product transfusion
 - Organ transplantation
 - Laboratory exposure
- Zika virus RNA has been detected in blood, urine, semen, saliva, female genital tract secretions, cerebrospinal fluid, amniotic fluid, and breast milk

Chikungunya fever: Epidemiology

INTRODUCTION

- Chikungunya virus is an arthropod-borne alphavirus transmitted by mosquitoes

Geographic distribution

- Chikungunya virus is endemic in parts of West Africa; human serosurveys have identified antibodies to chikungunya virus in 35 to 50 percent of the population in some areas
- Outbreaks in Africa, Asia, Europe, islands in the Indian and Pacific Oceans, and subsequently in the Americas
- Chikungunya can cause large outbreaks with high attack rates, affecting one-third to three-quarters of the population in areas where the virus is circulating

Transmission

- Mosquito bites
 - *Ae. aegypti*
 - *Ae. albopictus*
- Rarely via maternal-fetal transmission
- Rarely via blood products

Yellow fever: Epidemiology

INTRODUCTION

- Yellow fever is a mosquito-borne viral hemorrhagic fever with a high case-fatality rate
- 1 percent of individuals with severe hepatitis in endemic areas of Africa may be caused by yellow fever
- there were 130,000 cases with viscerotropic disease and 78,000 deaths in Africa in 2013

Geographic distribution

- tropical regions of sub-Saharan Africa and South America
- Angola
- Democratic Republic of the Congo
- South/central Africa
- West Africa
- Fewer cases occur in South America than in Africa

Transmission

Aedes aegypti and *Aedes simpsoni*

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