

# DENGUE FEVER IN PAKISTAN: CURRENT UPDATES

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# Dengue?



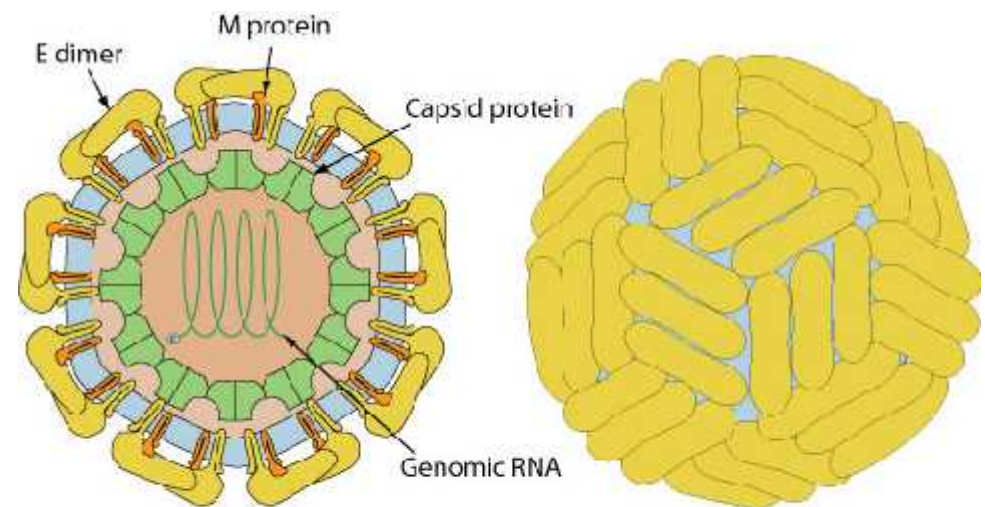
- Arthropod borne viral infection
  - ▣ Dengue fever (**DF**)
  - ▣ Dengue hemorrhagic fever (**DHF**)
  - ▣ Dengue shock syndrome (**DSS**)
- Transmitted through bite of mosquito (*Aedes*)
- Without proper treatment death rate is above 20 %
- With proper treatment can be reduced to less than 1 %





# Virion Morphology

- *Flavivirus*
  - ▣ Other members (Yellow Fever, West Nile, Japanese encephalitis)
- 40-50 nm in diameter
- Icosahedral symmetry
- Positive sense ss RNA
- Enveloped
- Proteins
  - ▣ 3 Structural
  - ▣ 7 Non-structural



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Swiss Institute of Bioinformatics

T=3-like organization  
of surface dimers

# Dengue-Serotypes



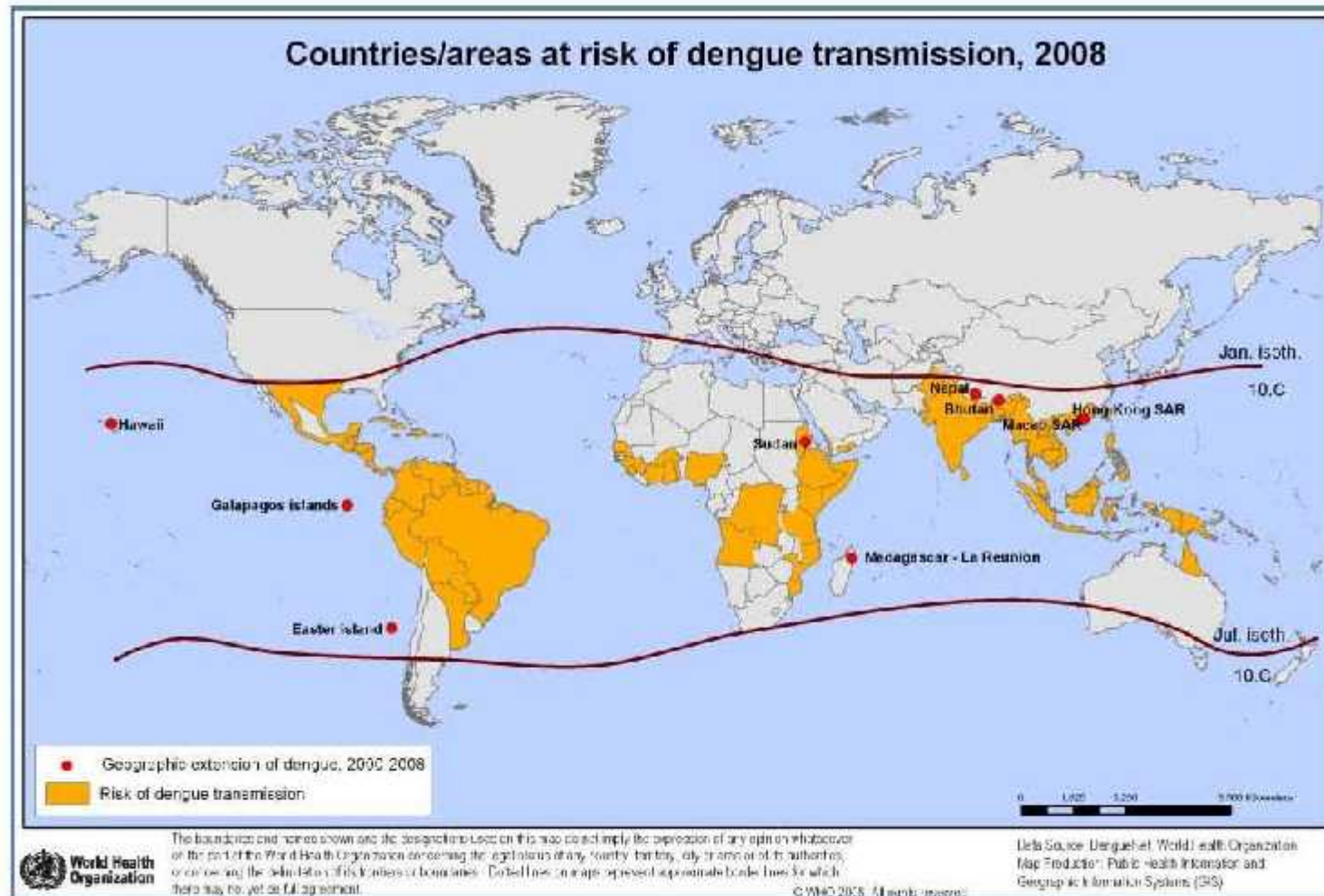
- 4 known serotypes
  - ▣ DEN 1 – DEN 4
- Serotypes have 65 % genome homology
- No cross protection against each other
- Short term (2-3 months) cross protection against remaining serotypes
- Subsequent infection with other serotypes can be more lethal
- Antibody Dependent Enhancement (ADE)

# Dengue-Epidemiology



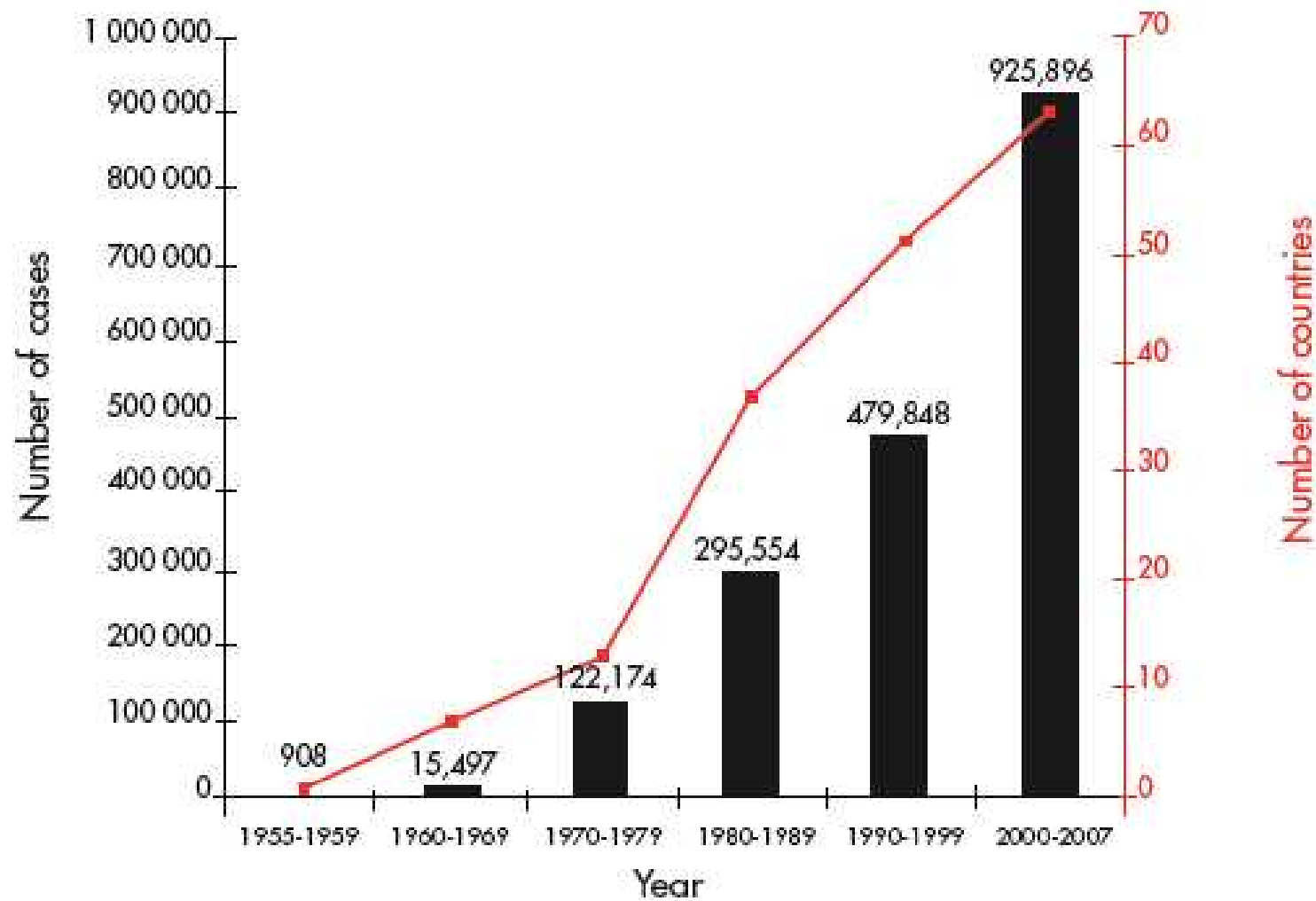
- Highly emerging disease
- 30 fold increase in last 50 years
- Endemic in more than 100 countries
- Before 1970 only 9 countries experienced DHF epidemics
- Since 2000 rapidly spread in South East Asia
- 2/5 (2.5 billion) world population is at risk

# Global Scenario



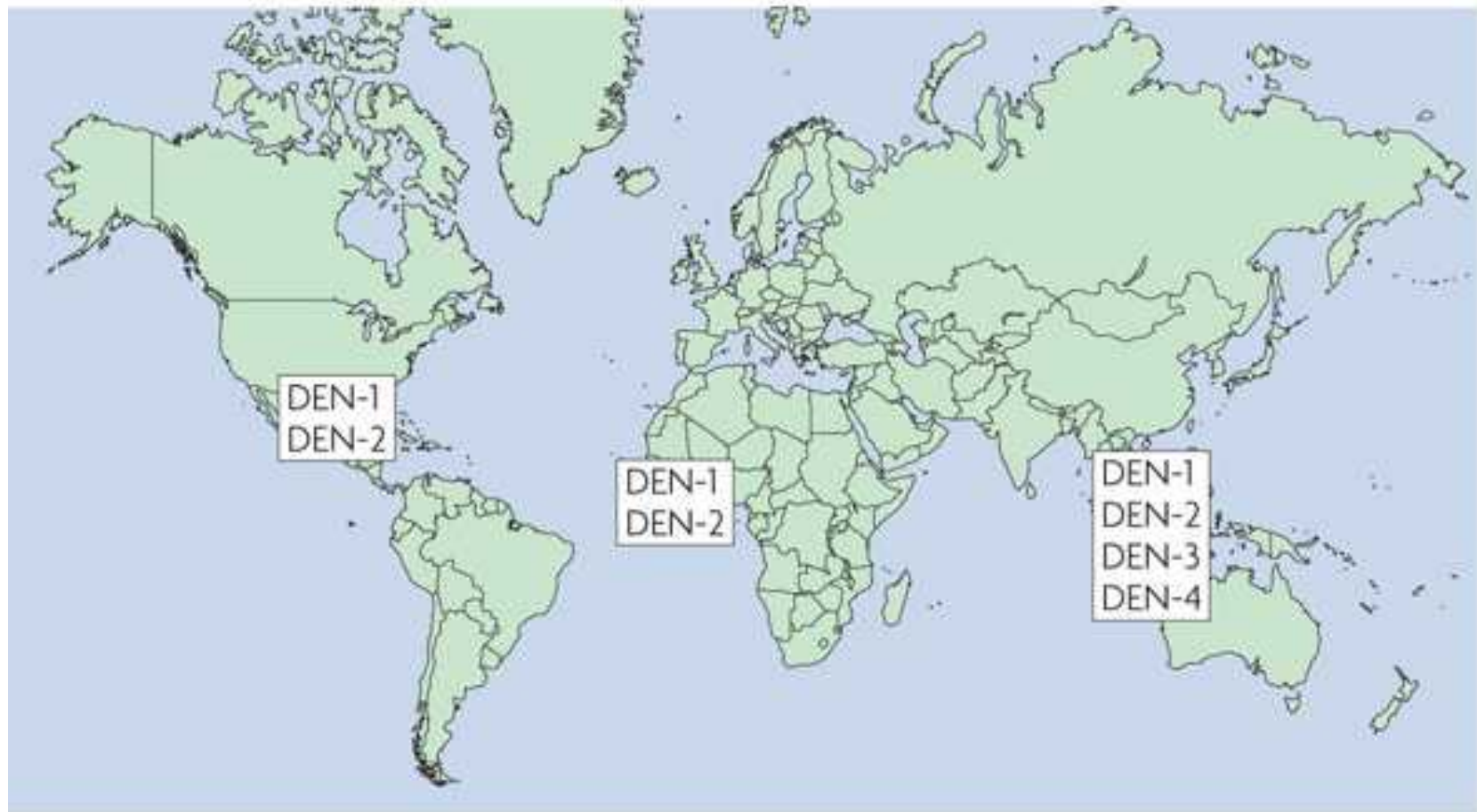
**Map of Countries/Areas at Risk of Dengue Transmission, 2008**

# Average number of DF & DHF reported to WHO, 1955-2007





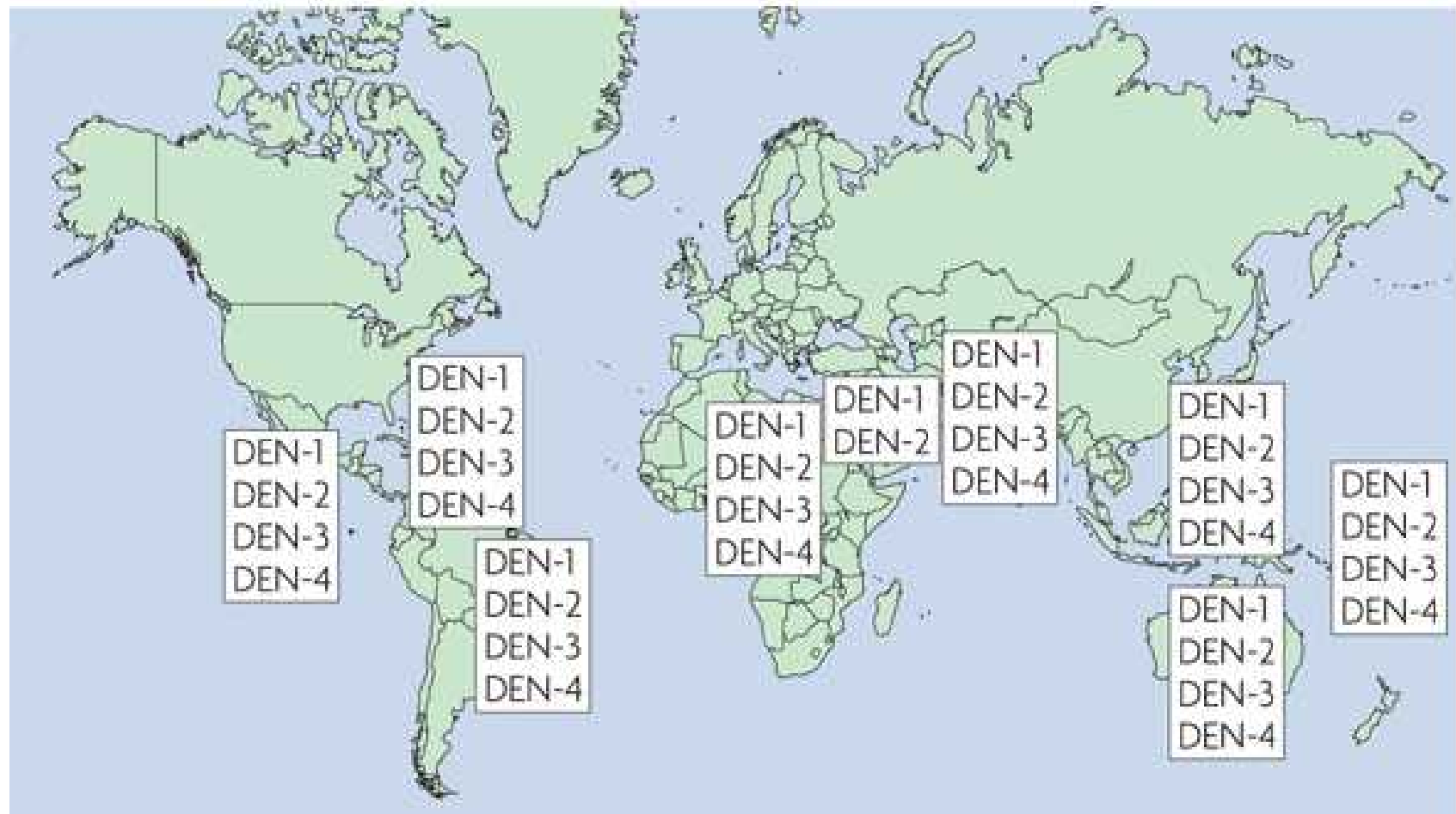
# Distribution of Dengue serotypes 1970



Guzman et al, 2010, *Nature Reviews Microbiology*



# Distribution of Dengue serotypes 2004



Guzman et al, 2010, *Nature Reviews Microbiology*

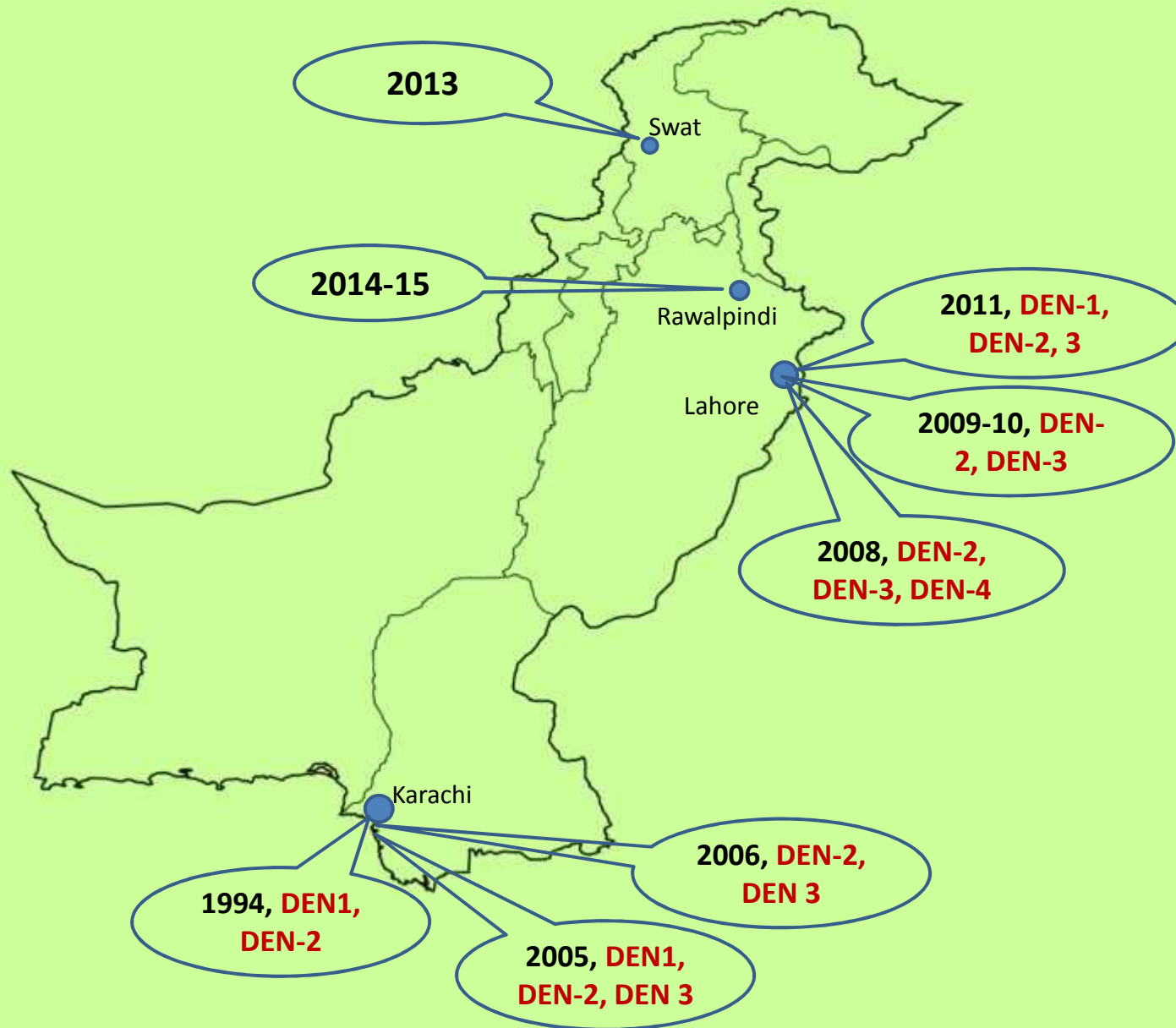
# PAKISTAN GEOGRAPHY



Total Area of the Country: **803,940 Sq Km**

Total Population (2011): **187,342, 721**

# Spread of Dengue Virus infection in Pakistan 1994-2015



# Dengue Cases Reported from Pakistan



Year	Suspected	Confirmed	Deaths
2006	4961	1931	41
2007	2304	1226	18
2008	2792	2469	17
2009	1940	1085	13
2010	15901	11024	40
2011	252935	17057	219
2013 (Aug-Oct)	8546	-	33

WHO, Country office, Pakistan

# Health Structure in Pakistan



- ❑ Pakistan has a federal ministry of health and five other provincial health ministries
- ❑ Health is provincial matter solely
- ❑ Policy guidelines are rarely issued by federal government and provinces enjoy autonomy in health matters
- ❑ Overall health structure is fragmented with poor coordination among provinces
- ❑ Major funding in preventive health comes from WHO and other international health agencies and

# Transmission



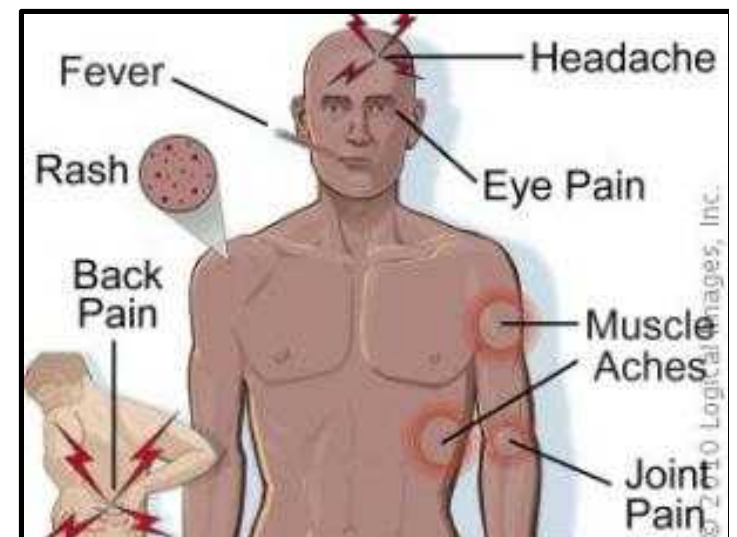
- Aedes Species
  - ▣ *Aedes aegypti*, *Aedes albopictus*
- Virus entry through skin following mosquito bite
- Human amplifying host
- Viremia within 5 days
- Female mosquito acquires virus during blood meal
- Virus enters mid-gut and spread systematically within 8-12 days
- Mosquito remain infectious during life



# Dengue-Clinical Signs



- ❑ High grade fever
- ❑ Severe headache, muscle pain
- ❑ Extreme weakness and general depression
- ❑ Severe abdominal pain, loss of appetite and taste
- ❑ Rash on face, neck, legs, chest and arms
- ❑ In severe cases bleeding from
  - ▣ Nose and throat
  - ▣ Hematemesis





# DENGUE-CLINICAL SIGNS



# Laboratory Diagnosis



## □ Detection of virus

- Isolation on cell culture
- RT-PCR
- Detection of NS-1 Glycoprotein

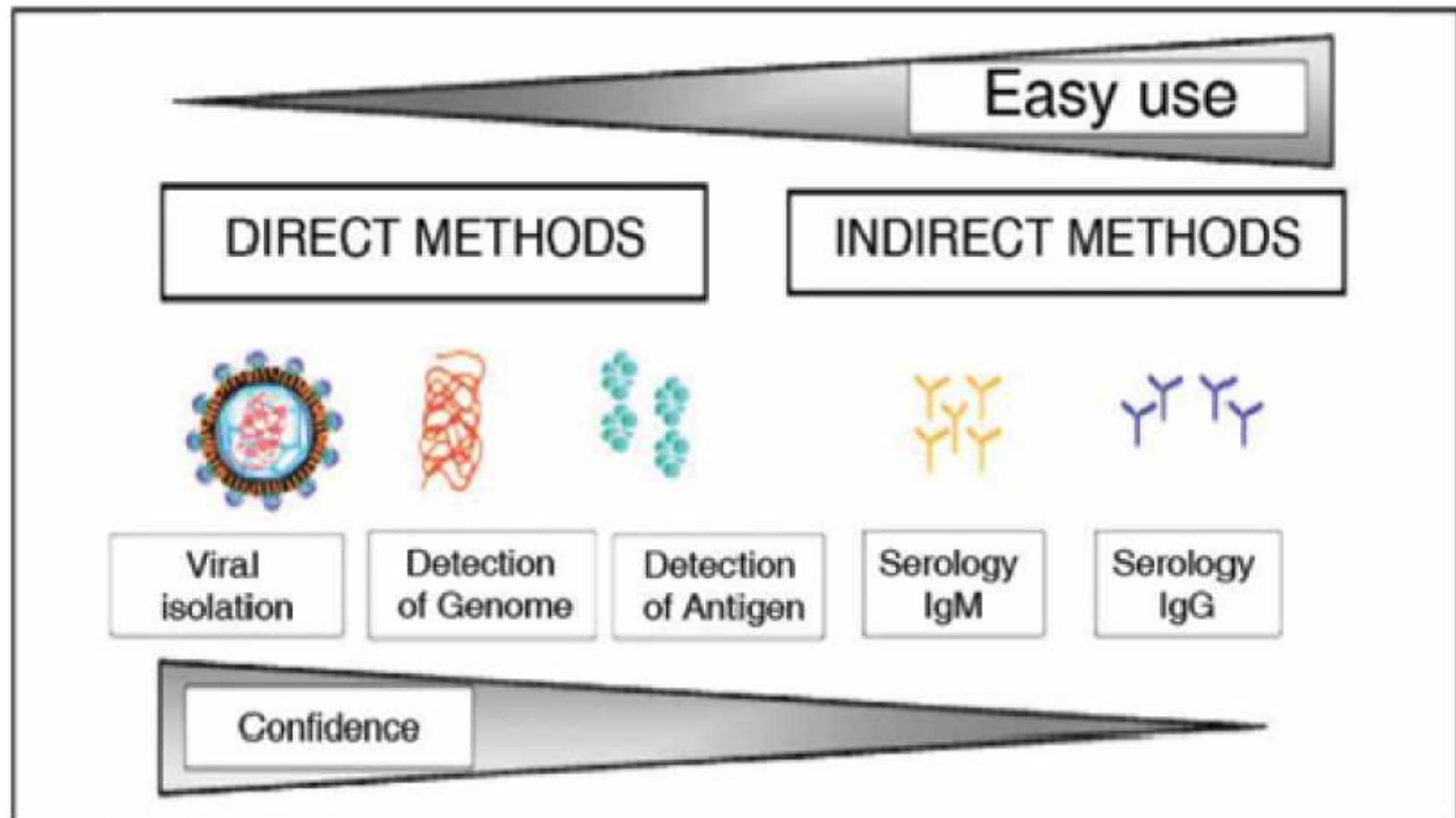
## □ Serodiagnostic tests

- ELISA to detect IgM or IgG
- Haemagglutination inhibition (HI) test

## □ Hematological tests

- Platelets count (Thrombocytopenia)
- Haemoconcentration (Increase in haematocrit by 20 %)

# Comparison of diagnostic methods



# Measures taken to control Dengue



- Enhanced health facilities
  - ▣ Dengue wards
  - ▣ Free of cost treatment
- Low cost for diagnostic tests
  - ▣ All private labs (PKR 90) < \$





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## ڈینگلی بخار

### سے بچاؤ کے لیے احتیاطی تدابیر اپنائیں

**ڈینگلی کے مچھر کی افزائش صرف پانی میں ہوتی ہے**  
**لھاندا، مچھر کا ذیل، خستہ پانی، تھوہر، پھریڑ، پانی میں۔**

  - پانی کا ٹانگو، دھانی، باغیچہ، چمن میں صاف پانی ہے اور چھوٹا، کھلے سے بچنے کے ہوئے برتن، دیکھیں، مچھر کے لگنے پر پانی کا ٹانگی طرے، ڈھانچہ، کڑی، کھنٹیا، کھجور، ان میں اضافہ نہ کریں۔
  - پھرجھروں سے بچنے کے لیے کڑی کریں اور دروازوں پر جالی لگا کر رکھیں۔
  - سونے وقت دھانگی پھرجھری یا کاکا استعمال نہ کریں۔
  - شراب اور غروب آفتاب کے لمحات میں جسم سے کھلے حصوں کو انگی طرے، ڈھانچہ، کڑی، کھنٹیا، کھجور، مچھر کا ذیل (repellent) لگائیں۔
  - گھروں میں چھوڑ دیے ہوئے مچھر بگڑنے کے لیے ان کی کاکا استعمال نہ کریں۔



# Measures taken to control Dengue



## Chemicals

- ❑ Insecticides / Larvicides
- ❑ Fogging
- ❑ WHO approved products



# Pre Moonsoon Activities



- June and July cleanliness months in all cities / towns.
- Checking of over head tanks, underground cisterns and water containments to prevent mosquitoes breeding.
- Inspection of construction sites, nurseries, graveyards, junkyards, abandoned plots & locations with discarded or stored tires to identified mosquito breeding
- Cleanliness of schools/colleges/university campuses by involving students & volunteers.
- Wide publicity of this campaign through electronic and print media



# Treatment



- ❑ No specific treatment
- ❑ Control of fever by antipyretics
  - ▣ Use of Aspirin or Brufen is avoided that may cause thinning of blood)
- ❑ Prevention of dehydration by
  - ▣ Fluid therapy
- ❑ Blood / Platelets transfusion

# Prevention



- Mosquito control
- Avoid mosquito bite

## Biting Times

- Early morning under bed, tables, and chairs
- Behind the curtains
- Near car doors

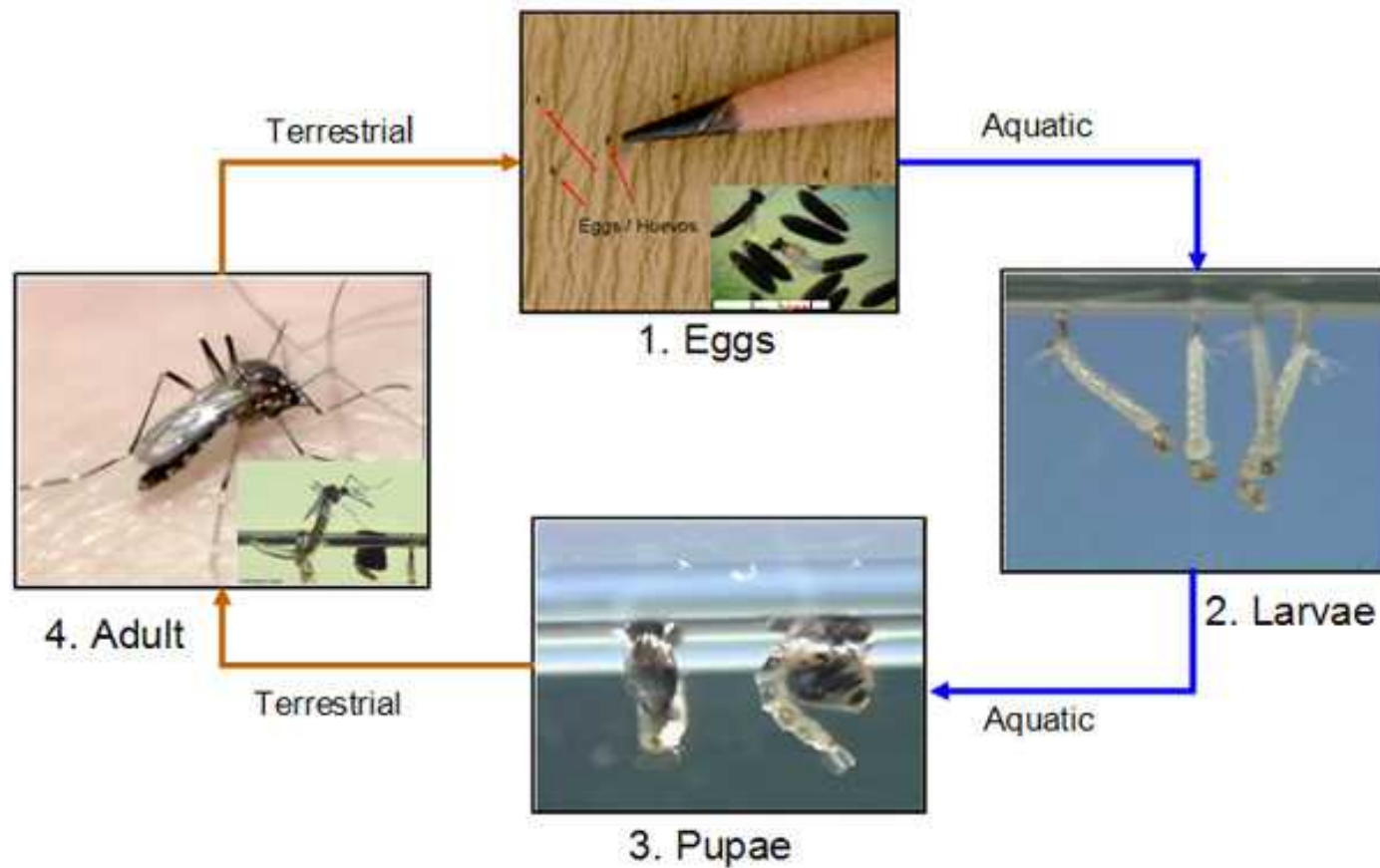


# *Aedes*-Life cycle



- ❑ A female mosquito lays 300 eggs during life
- ❑ Life span is 3-6 weeks
- ❑ It needs 8-10 days to develop young ones from eggs
- ❑ Eggs can withstand desiccation for several months
- ❑ It is the human not mosquito who carry infection to remote places
- ❑ 134 species of mosquitos in Pakistan  
(M. Aslam Khan, 1972 Mosquito systematics Vol 4)

# Life cycle of *Aedes*



CDC, [http://www.cdc.gov/Dengue/entomologyEcology/m\\_lifecycle.html](http://www.cdc.gov/Dengue/entomologyEcology/m_lifecycle.html)

# Dengue Vaccines



- Tetraivalent vaccines containing four immunogens with balanced immune response
  - Heterotypic infection
- Vaccines underway
  - Live attenuated
  - Chimeric live attenuated
  - Inactivated
  - Subunit
- Vaccines development advanced stage and first generation vaccines might be made available within next few years

# TAKE HOME MESSAGE



- ❑ Dengue is vector born viral disease
- ❑ Can be easily prevented by avoiding mosquito bite
- ❑ Vector management is vital in the control of disease
- ❑ Public awareness and education of community can be helpful to overcome the disease
- ❑ No specific treatment or vaccine is available

# Further readings



- World Health Organization (2009). Dengue: Guidelines for diagnosis, treatment and control
- [Centre for disease control and prevention \(CDC\) http://www.cdc.gov/dengue/](http://www.cdc.gov/dengue/)
- <http://www.who.int/topics/dengue/en/>





thank  
you!