



SYMPOSIUM ON RESEARCH ENTERPRISE & IMPACT

Novel dengue surveillance and control strategies developed at UWI, St Augustine, Trinidad

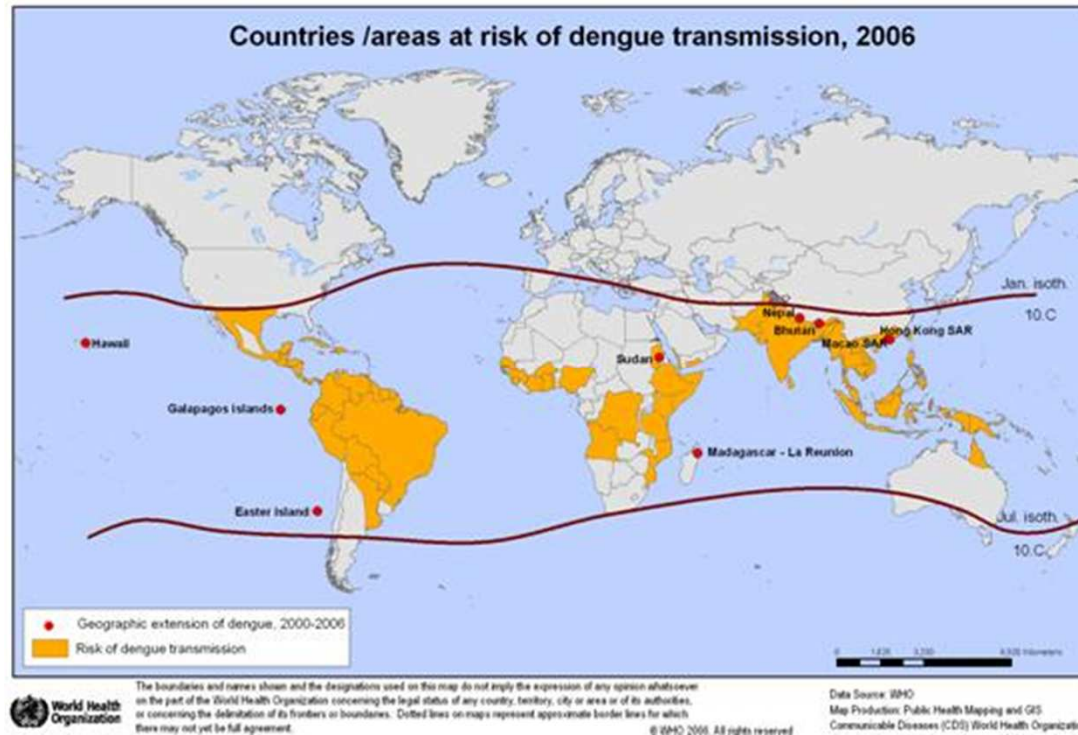
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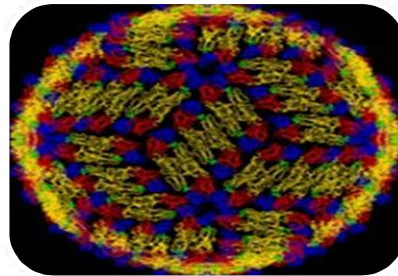
World Distribution



Epidemiology Factors



Mosquitoes



Dengue virus



Environment



Humans

Dengue transmission within the Caribbean Region

- Dengue is caused by any of 4 different serotypes of the arbovirus (Den 1,2,3,& 4)
- An incubation period of 2-8 days after an infective bite by the *Aedes aegypti* mosquito.
- The disease usually begins with onset of fever, headaches followed by chills, retro-orbicular pain, photophobia, backache, severe muscle ache and joint pain
- Maculopapular rash, lymph node enlargement, petechiae and haemorrhagic manifestations like epistaxis and gastrointestinal bleeding (WHO 1997)

Introduction



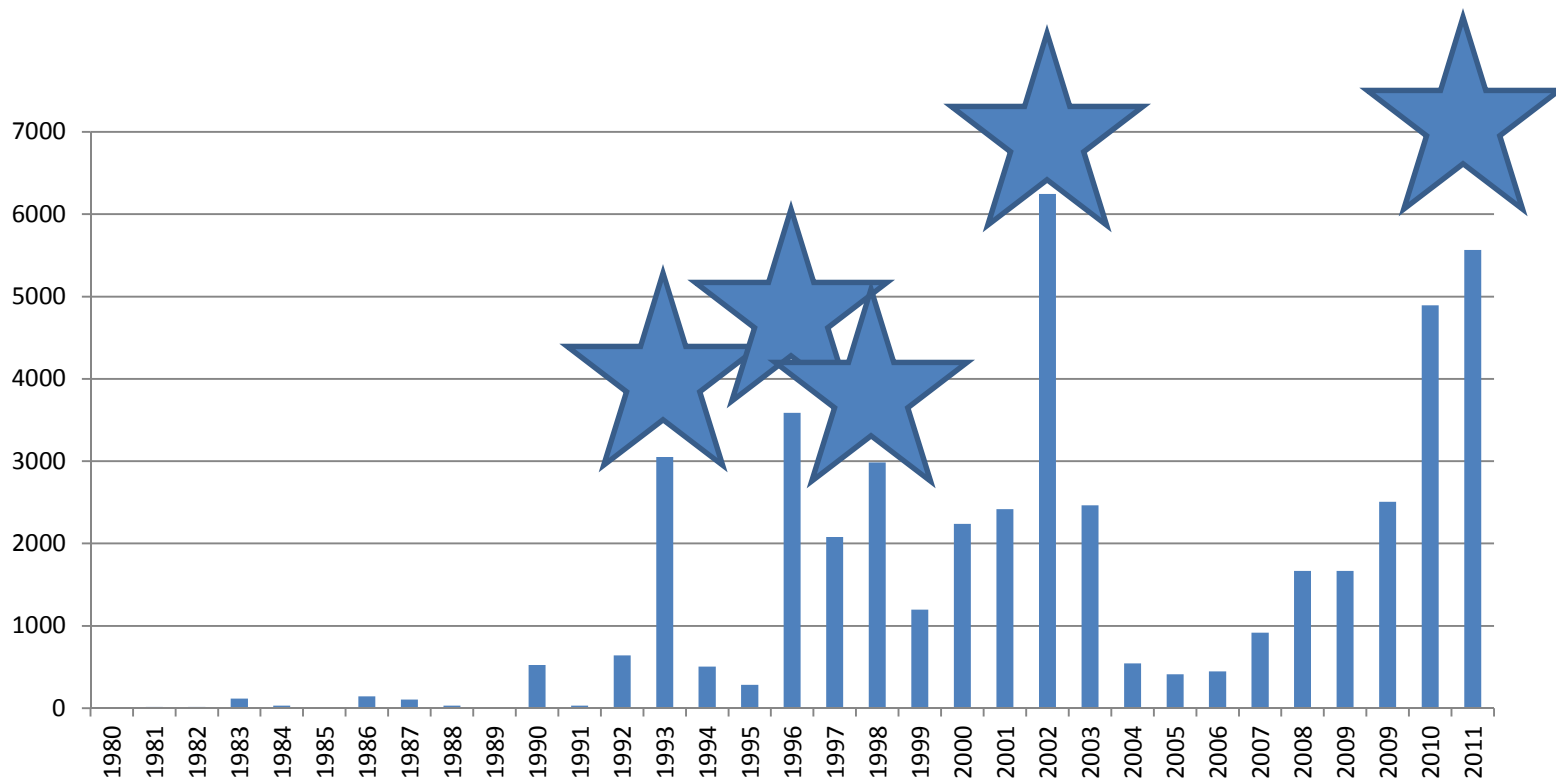
- In 2013 the global incidence of dengue fever was found to be underestimated by 3 times
- The iceberg effect- instead of 100 million cases 390 million cases*

Dengue situation Globally and in the Caribbean Region

Background

- Over 3 billion people live in areas where dengue is endemic (latitude 45°N-35°S)- dengue belt
- Dengue causes more illness and death than any other arbovirus disease in humans
- So each year over 390 million cases of dengue and several thousands cases of DHF occur- 93 M asym.
- DHF is the leading cause of hospitalization and death among children in South East Asia

Reported and Confirmed Cases of Dengue, Trinidad , 1980-2011



The UWI approach and Rationale for Current Strategies in Trinidad

This program was developed based on the scientific approach with respect to :

- (1) the mosquito: genetics (Benedict and Robinson 2003), ecology (Chadee 2010), behavior (Chadee 2010) and vulnerable life stages (Christophers 1960);

UWI rationale

- (2) the anthropogenic factors affecting human population size, housing patterns, behavior, culture and socio-economic conditions (Chadee 2004) and ;
- (3) knowledge of various aspects of the environment (biotic and abiotic factors) which foster the development of the vector (Gubler and Kuno 1997, Chadee 2012) and enhance disease transmission.

Roads as a barrier to mosquito movement and dengue transmission

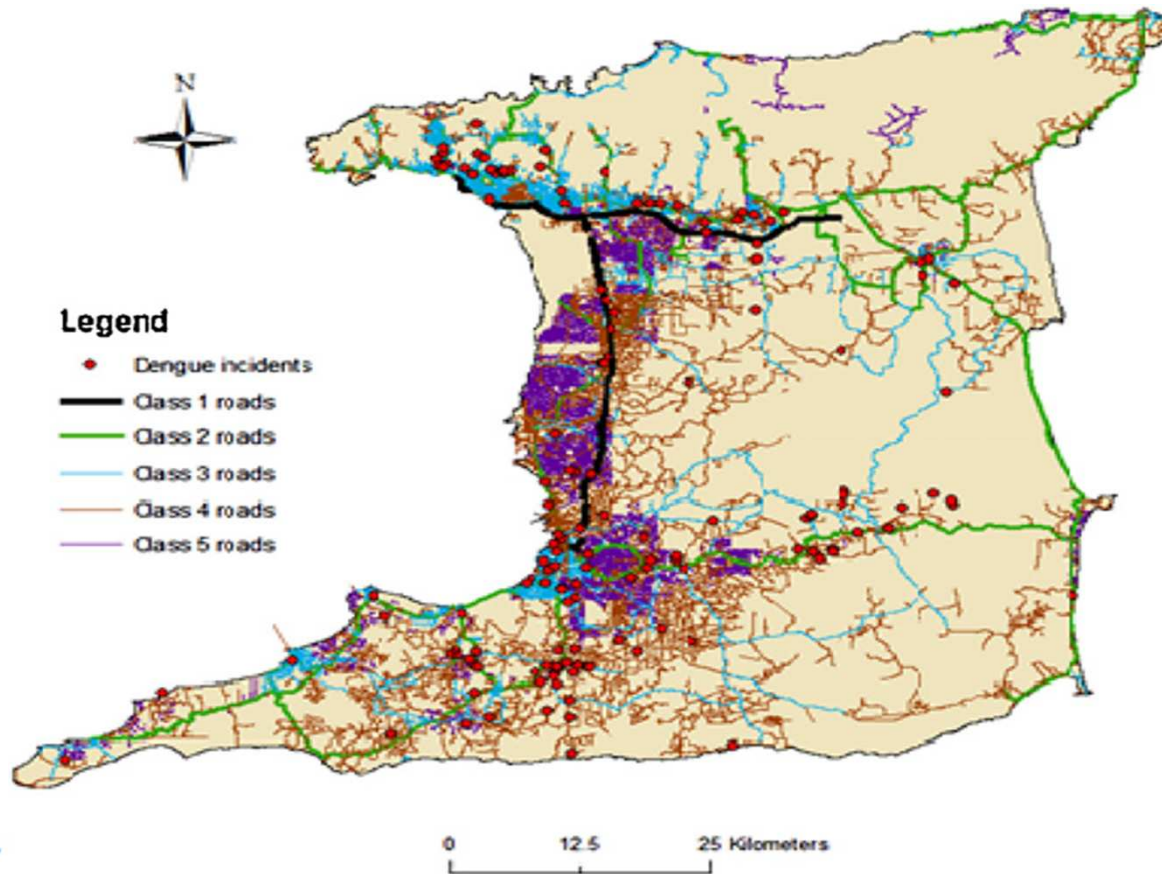


Results: The frequency of DHF cases to different road classes were:

0% (1st Class roads),
7% (2nd Class roads),
32% (3rd class roads),
57% (4th Class roads) and
4% (5th Class road).

The data clearly demonstrated that both class 3 and class 4 roads account for 89% of nearby dengue cases. URBAN PLANNING??

Shows the distance of DHF cases (home addresses) and their proximity to road classes in Trinidad, West Indies (1998).



Cardinal Points Surveillance

Cardinal points approach- Quick, Less Labour intensive, Cheap, More Sensitive and Specific

Casa segura – safe house- IT Curtains

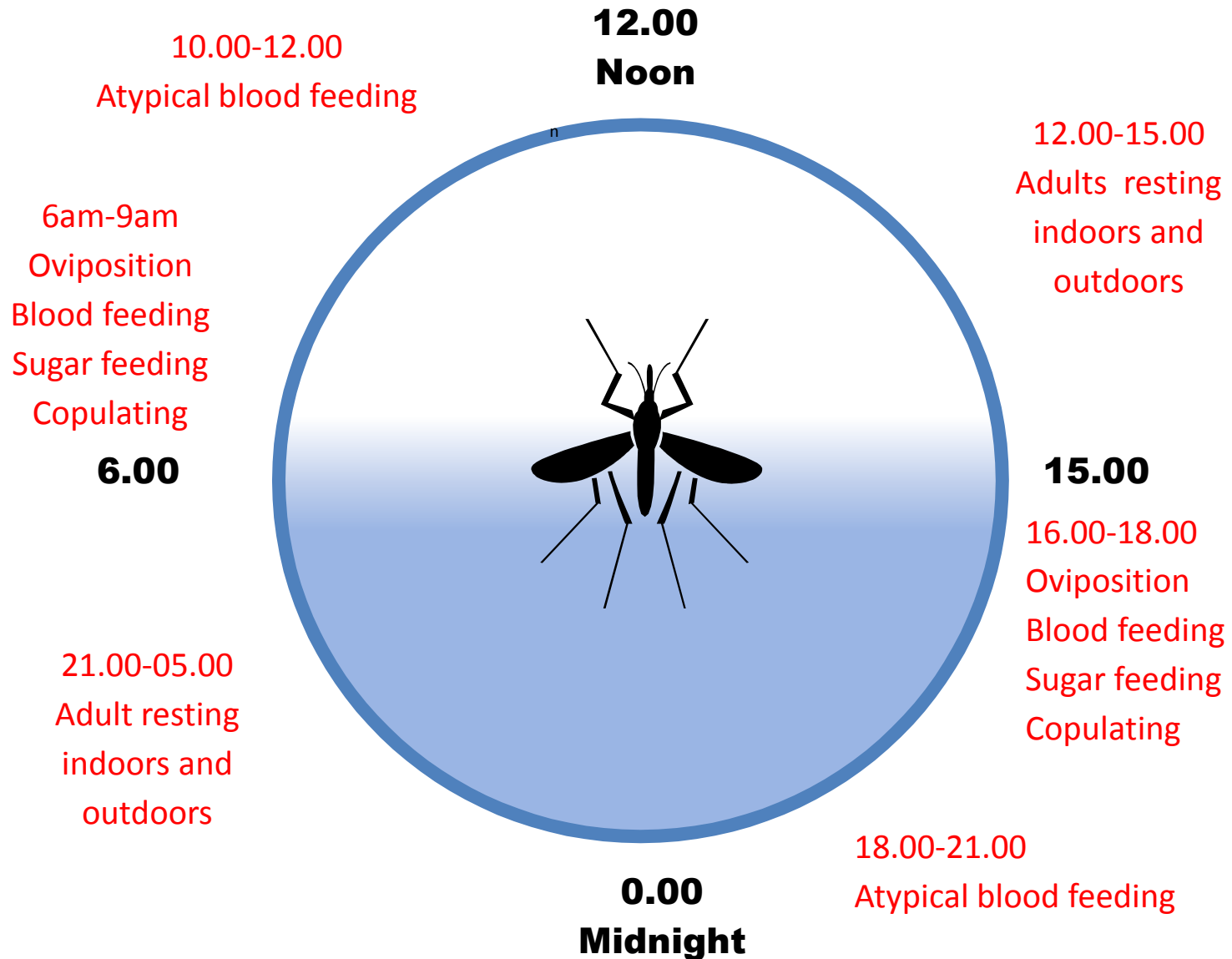
Key Containers

Key Premises

Cardinal Points Surveillance method –micro-investigate (Chadee et al. 2007)



Aedes aegypti Circadian Rhythm



Periods of quiescence among *Aedes aegypti* females.

Physiological Process	Period of inactivity (h)	References
Post adult emergence	24	Bowen, 1991
Post insemination	12	Fuchs & Kang, 1978
Post blood feeding	12	Klowden & Brazil, 1994
Inhibition of host seeking	24	Klowden, 1994
Post oviposition	12	Chadee, 2012

Table 1 Adult *Aedes aegypti* collected from different rooms in houses from St Augustine, Trinidad

Room	Females				Males			
	No. collected	%	Range	No (%) of houses with females	No. collected	%	Range	No (%) of houses with males
Bedroom	968	81.9	0-32	159 (31.8)	493	57.4	0-29	130 (26.0)
Living room	101	8.7	0-10	93 (18.6)	201	23.4	0-25	71 (14.2)
Kitchen	71	6.0	0-6	40 (8.0)	93	10.8	0-22	32 (6.4)
Bathroom	22	1.8	0-5	40 (8.0)	55	6.4	0-19	29 (5.8)
Other rooms	19	1.6	0-12	12 (2.4)	17	2.0	0-13	10 (2.0)
Total	1181	100			858	100		

Two types of effective spraying for Dengue



Curtains



Curtains (Manufacturers????)



Use of the Sticky traps (Chadee and Ritchie 2011)

An alternative adult mosquito collection method:

- Collects adult *Ae. aegypti* mosquitoes and eggs
- Less labour intensive
- Less expensive
- More sensitive in collecting adults

A. Sticky Ovitrap – for Adult Mosquitoes

Attach panels to the bucket with a folding clip (Fig. 1.





Aedes aegypti collections from sticky traps in
Trinidad (Chadee and Ritchie, 2011)

Locations in Trinidad	Sticky traps		Double sticky traps	
	Adults	Immatures	Adults	Immatures
St. Augustine (urban)	1,480	5,900	2,286	7,777
Tamana (rural)	220	1,592	316	1,652
Total	1,700	7,492	2,602	9,421

Home made traps?????

