

Integrated Zika surveillance in Singapore

EPI-WIN Webinar
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A perfect storm

Warm and wet climate, set to change

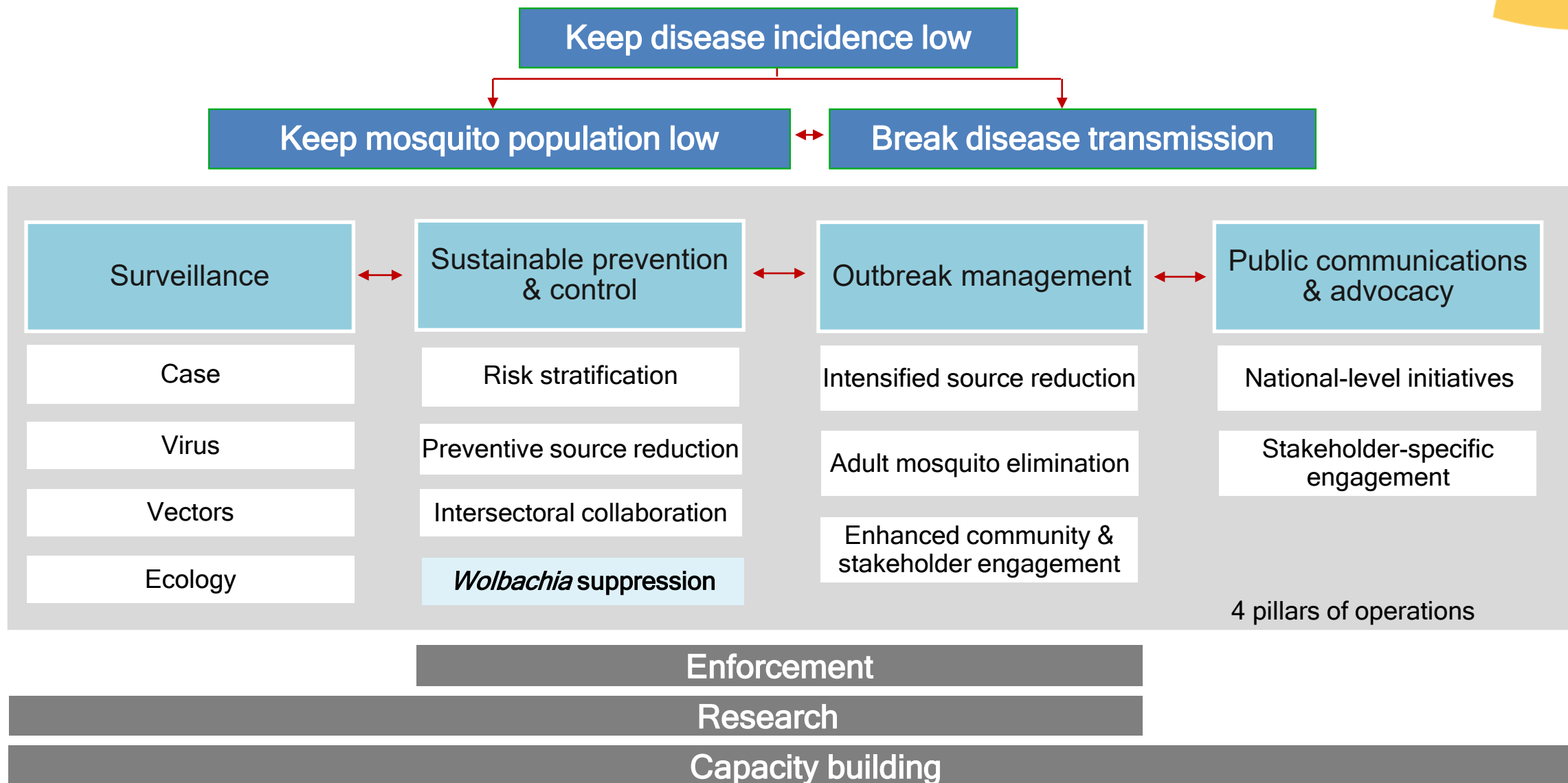
Aedes aegypti: efficient vector, urban dweller

Aging buildings, construction sites



Aedes albopictus:
Managed vegetation

Integrated, evidence-based surveillance and control of *Aedes*-borne diseases



Integrated approach to tackle Zika transmission, 2016

Outbreak of Zika virus infection in Singapore: an epidemiological, entomological, virological, and clinical analysis

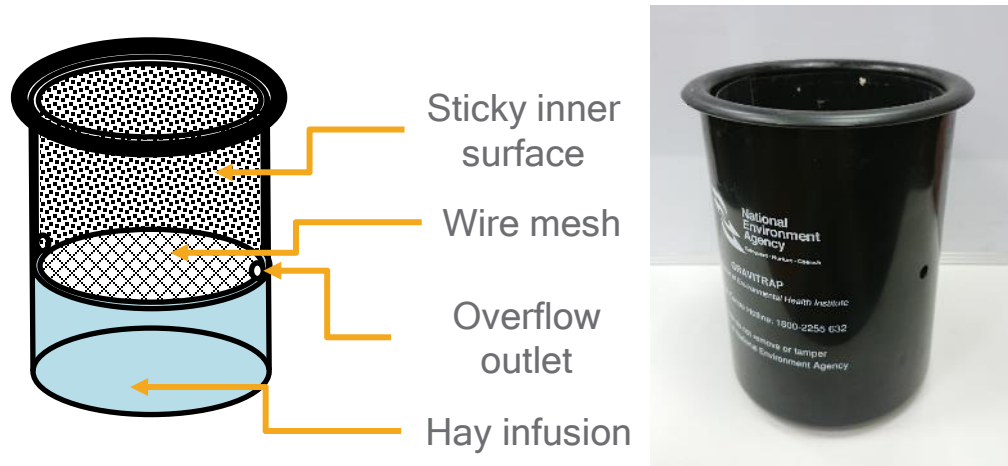
*The Singapore Zika Study Group**

Summary

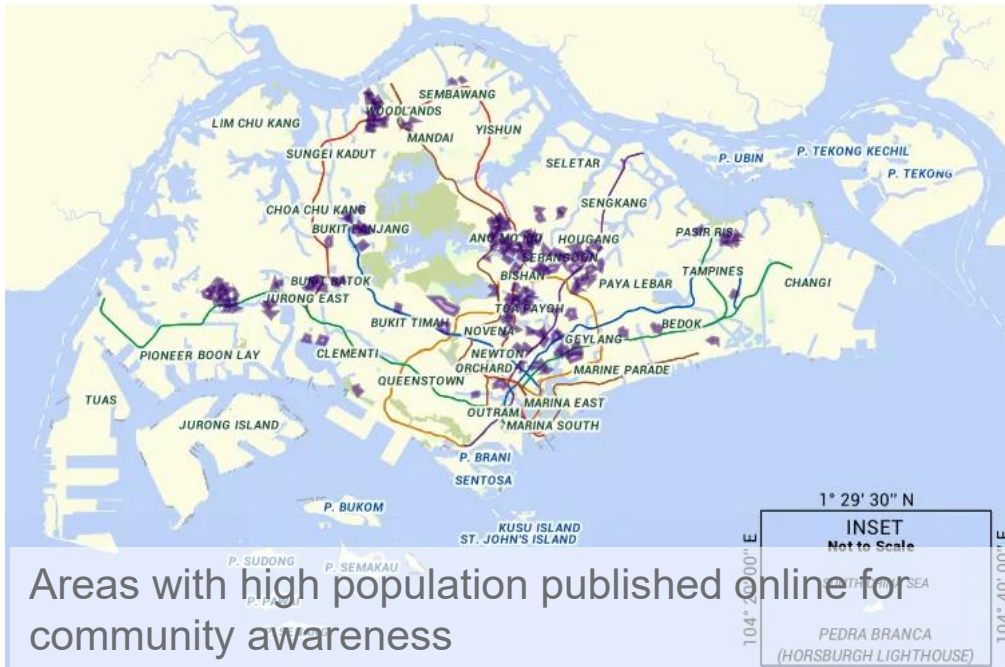
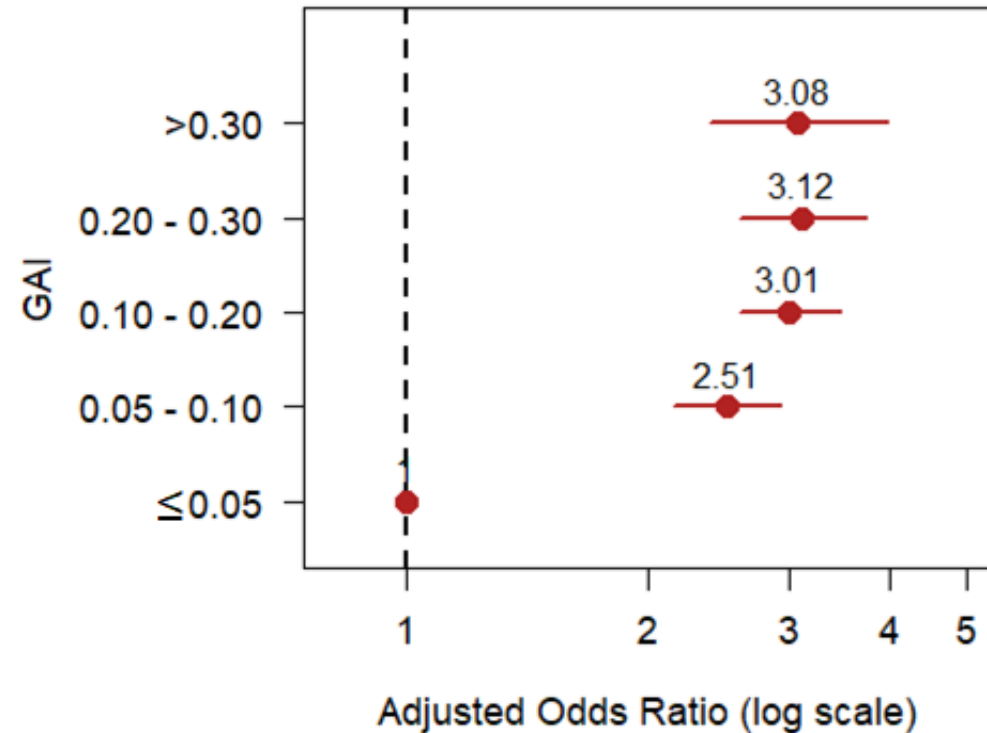
Background An outbreak of Zika virus infection was detected in Singapore in August, 2016. We report the first comprehensive analysis of a national response to an outbreak of Zika virus infection in Asia.

Lancet Infect Dis 2017; 17: 813-21

Adult *Aedes* surveillance: 70,000 Gravitrap nationwide

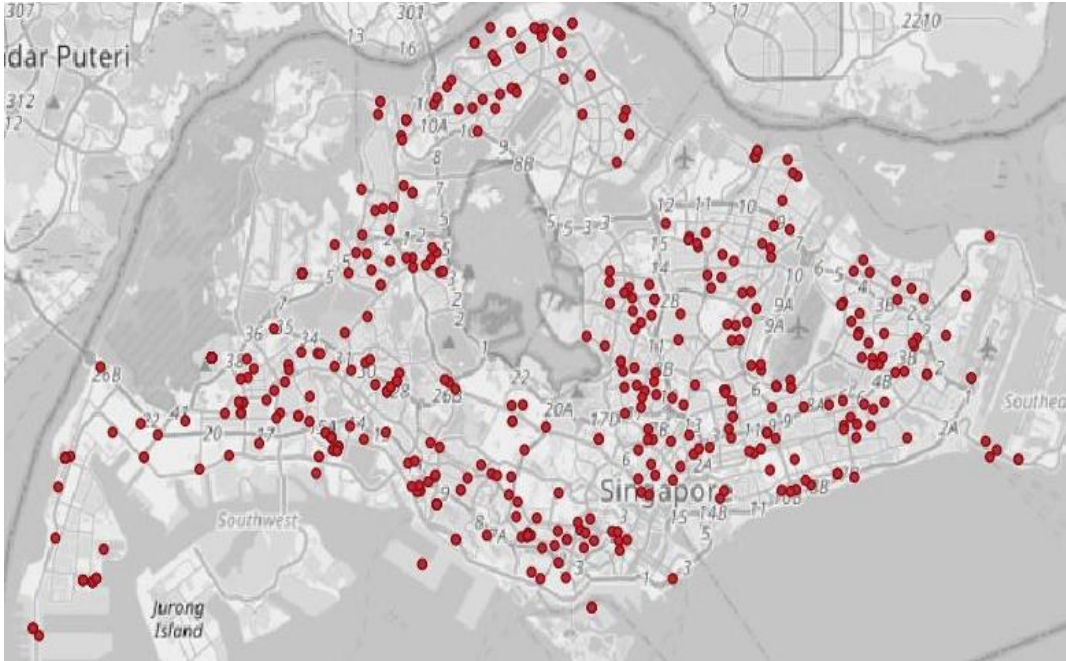


Adult *Ae. aegypti* activity positively associated with dengue clusters



Wastewater surveillance in Singapore

Network of >500 sites



Case Investigations

- Monitoring to facilitate early case detection

Community Situational Awareness

- Provides indication of COVID-19 transmission
- Monitoring dense living premises & residences
- Variant monitoring

Aircraft Wastewater Surveillance

- Feasibility for global pathogen surveillance

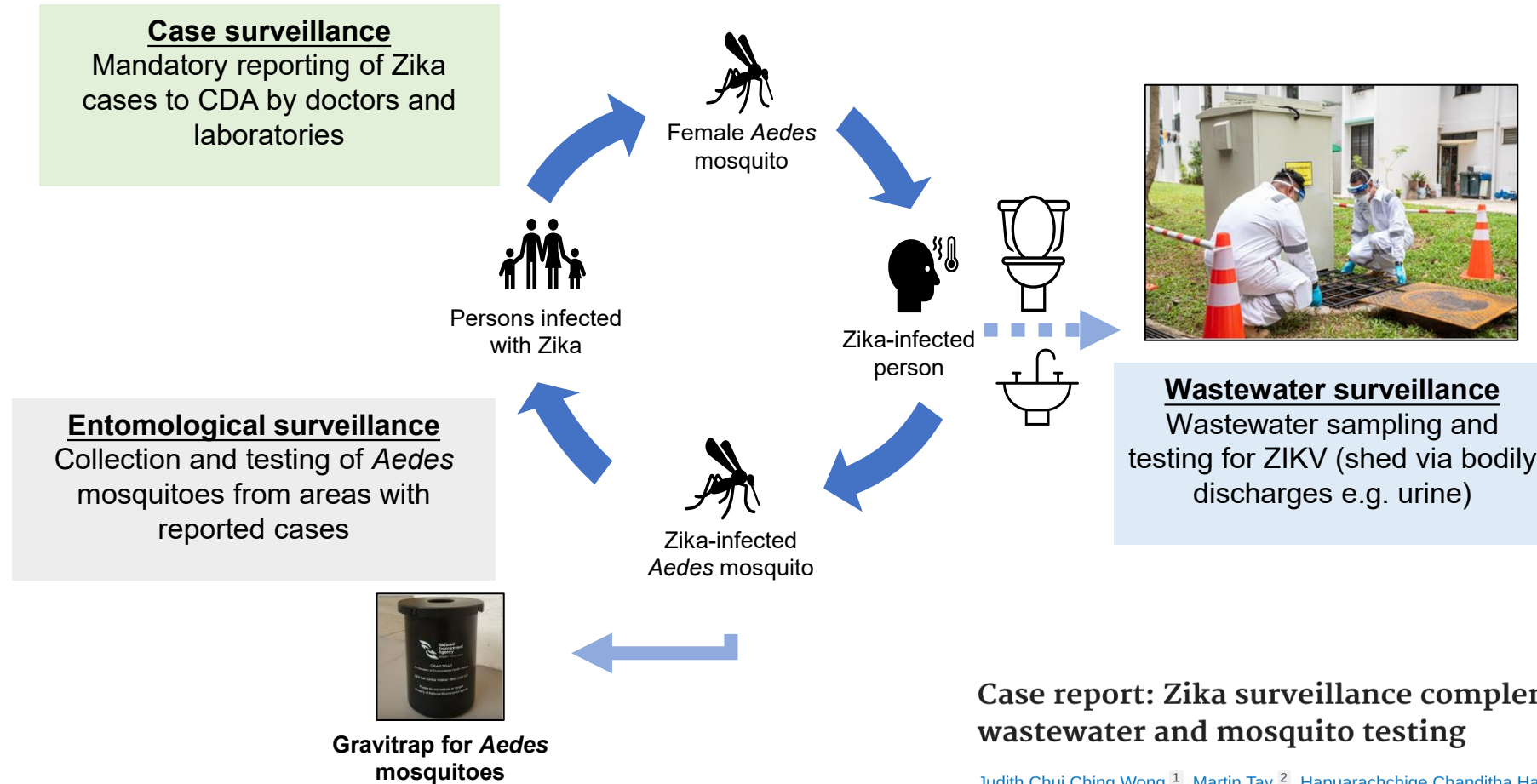
Monitoring other Pathogens

- Zika, Mpox, respiratory viruses, etc

Pandemic to Endemic

Enhanced Zika surveillance through case, wastewater, and mosquito testing

CDA (Health) / NEA (Environment) surveillance programme for early warning



Case report: Zika surveillance complemented with wastewater and mosquito testing

Judith Chui Ching Wong ¹, Martin Tay ², Hapuarachchige Chanditha Hapuarachchi ², Benjamin Lee ², Gladys Yeo ², Dzulkhairul Maliki ², Winston Lee ², Nur-Afidah Mohamed Suhaimi ³, Kaiyun Chio ⁴, Wilson Cheong Huat Tan ², Lee Ching Ng ⁵

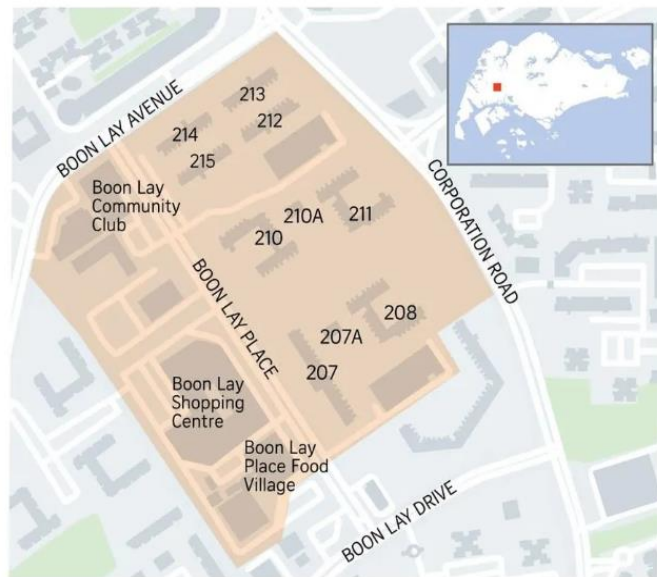


Enhanced Zika surveillance: case + environmental data prompts public alerts

Lack of ZIKV signals beyond neighbourhood suggests limited transmission

Zika possibly being transmitted in Boon Lay Place; residents urged to protect themselves

Area with likely Zika transmission



SOURCES: MINISTRY OF HEALTH, NATIONAL ENVIRONMENT AGENCY

SINGAPORE - The authorities are on the lookout for Zika transmission in Boon Lay Place after mosquito and wastewater testing in the area found signs of the virus.

The Straits Times
22 February 2024

2 Zika cases in Woodlands, NEA detects persistent virus signals in the area

Area with likely Zika transmission

Two Zika cases were confirmed in Woodlands Street 11 and Street 32. NEA said surveillance revealed persistent Zika virus signals in the area.



NOTE: As at June 17, 2025

Source: NATIONAL ENVIRONMENT AGENCY STRAITS TIMES GRAPHICS

The Straits Times
19 June 2025

National Environment Agency (NEA)'s post

National Environment Agency (NEA) 19 June

The Communicable Diseases Agency - CDA and NEA have confirmed two local Zika cases at Woodlands Street 11 and Street 32.

Following each case notification, NEA commenced wastewater and mosquito surveillance surrounding the residential areas. This enhanced surveillance has revealed persistent Zika virus signals in the area, which suggests that this is an area with likely Zika transmission.

Similar to the dengue virus, the Zika virus infection is transmitted by the Aedes mosquito.

We advise residents in the area, especially pregnant women, to protect themselves from mosquito bites and to monitor their health closely.

Persons showing symptoms suggestive of Zika infections should see a doctor early, to be diagnosed and managed accordingly.

Protect yourself and your loved ones by carrying out the 'S-A-W' and 'B-L-O-C-K' actions.

Visit go.gov.sg/zikaclusters for information on Zika cases, and CDA's webpage (go.gov.sg/zika) for Zika symptoms, prevention and treatment options.

AREA WITH LIKELY ZIKA TRANSMISSION
WOODLANDS ST 11, 32

Legend: Area with likely Zika transmission

SYMPTOMS OF ZIKA INFECTION

WHEN TO SEE A DOCTOR

Persons showing symptoms suggestive of dengue or Zika infections should see a medical practitioner early to be diagnosed and managed accordingly.

Although rare, Zika virus infection in pregnant women can lead to birth defects such as microcephaly or brain damage. Pregnant women with symptoms of possible Zika virus infection should seek medical attention immediately and consult their Obstetrician and Gynaecologist (OB-GYN) doctor.

FIGHT DENGUE AND ZIKA
PROTECT YOURSELF BY PRACTISING S-A-W

These effective, affordable, and proven interventions help protect you and your loved ones from mosquito bites and subsequently transmitting it to others.

FIGHT DENGUE AND ZIKA
STOP MOSQUITO BREEDING WITH B-L-O-C-K

These effective, affordable, and proven interventions help protect you and your loved ones from mosquito bites and subsequently transmitting it to others.

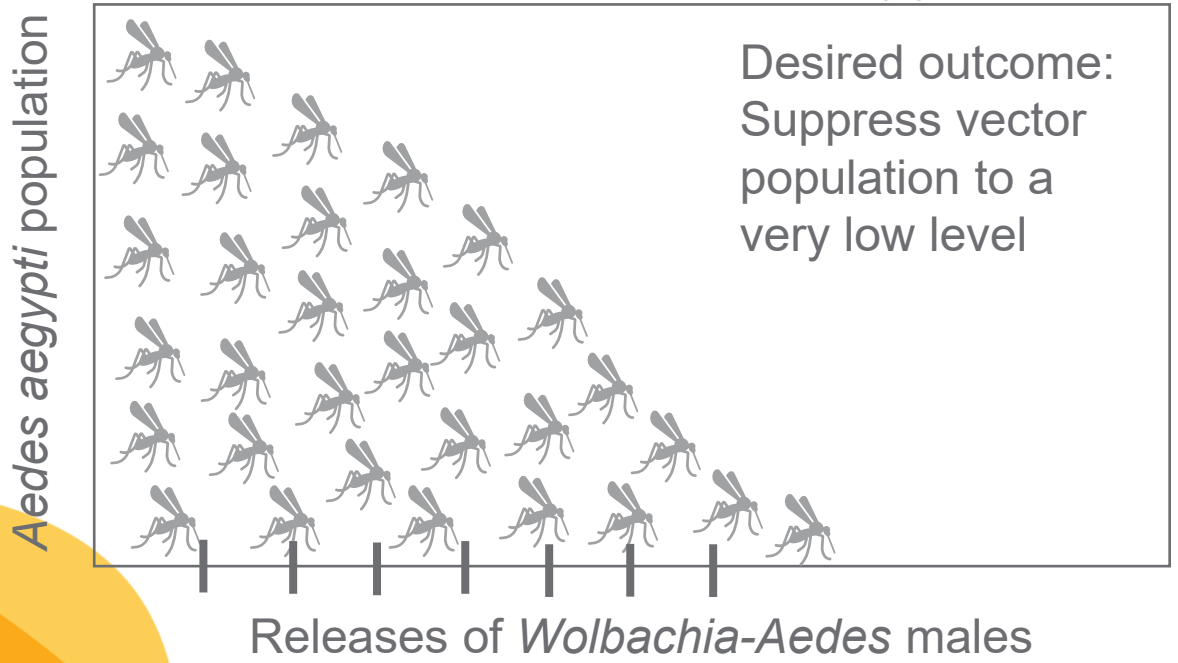
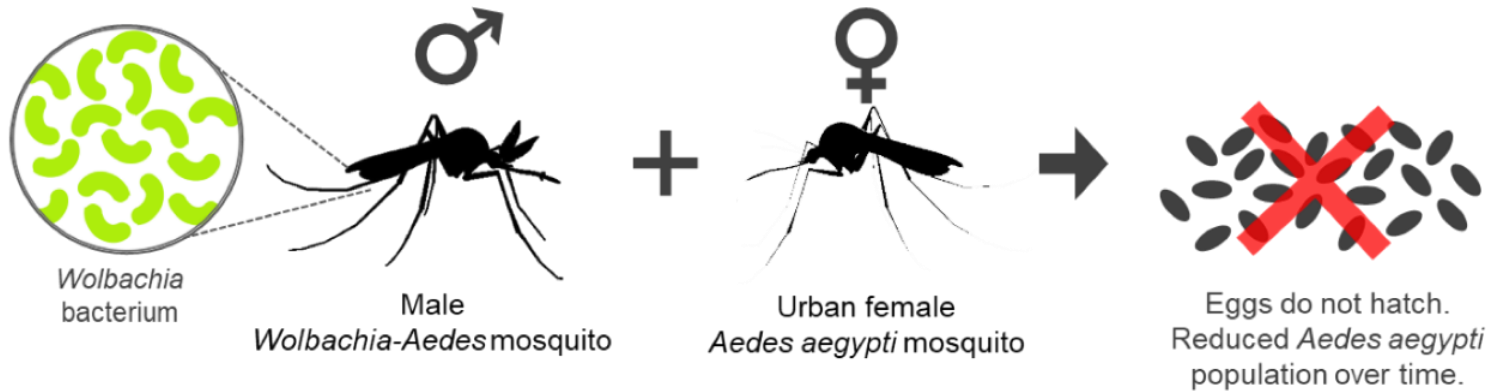
59 3 comments 103 shares

NEA Facebook post
19 June 2025

Project *Wolbachia*: release of male *Wolbachia*-carrying mosquitoes to suppress *Aedes aegypti*



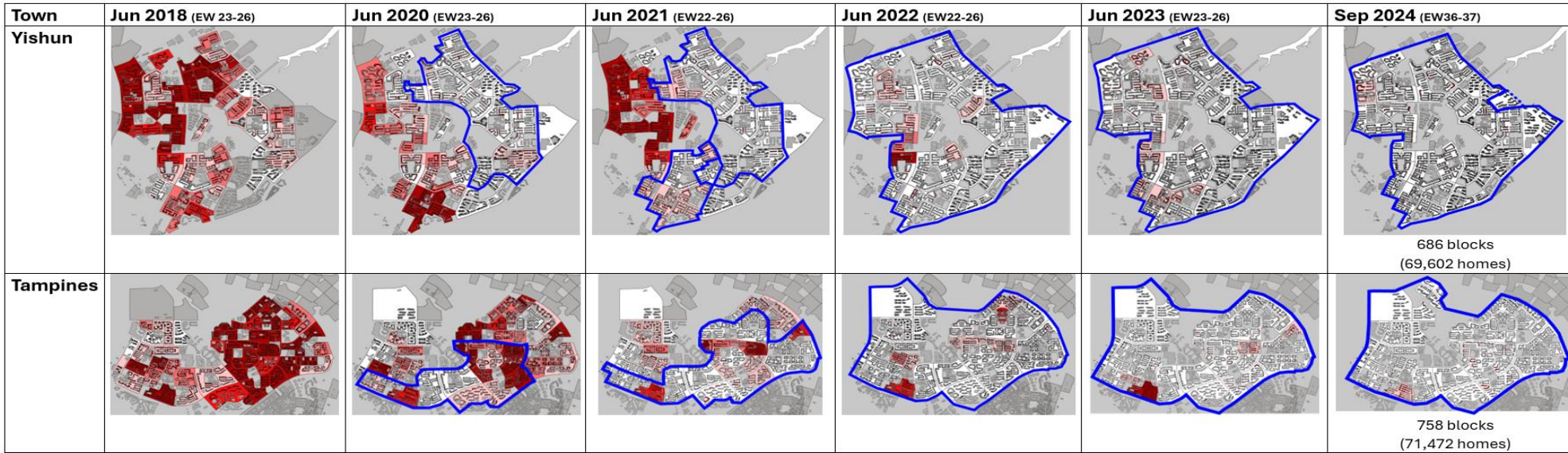
Close to 40% coverage of households in Singapore



Wolbachia suppression decimates *Aedes aegypti* population and reduces dengue risk

Likely contributes to control of other *Aedes aegypti*-borne diseases

NEJM 2025 - in press
 BMC Med. 2025. 23(1):184.
 Lancet Planet Health 2024. 8: e617-28
 Lancet Microbe 2024. 5: e422-32
 J Travel Medicine 2024 taae103
 Sci Rep. 2025. 15(1):2253



Release Areas

Entomological endpoint

Randomised controlled trial - Epidemiological endpoint

Exposure period (Months)	Protective efficacy (95% CI)	Test Positive % (Test Positive/Test Negative)	
		Intervention Arm	Control Arm
0+	65 (47-77)	10% (787/8245)	23% (2402/10344)
3+	71 (58-81)	7% (457/6743)	21% (1717/8125)
6+	72 (58-82)	6% (354/5722)	22% (1519/7080)
9+	71 (55-82)	7% (317/4668)	23% (1403/6118)
12+	71 (51-84)	7% (256/3724)	21% (1037/4986)

90% reduction in *Ae. aegypti* mosquito population
 >70% reduction in risk of dengue in treatment site
 45% reduction in risk in adjacent sites

Summary

- Zika case surveillance complemented by virus surveillance in wastewater and mosquitoes
 - Early warning and public alert in affected neighbourhoods
 - Lack of signals in rest of community suggests limited transmission
- Reduced *Aedes aegypti* population through *Wolbachia* suppression and community vigilance - avoidance of Zika outbreaks despite localised transmission in some neighbourhoods
- Continued prevention and control: multi-source surveillance, community vigilance and environmental management, and integration of *Wolbachia* technology

Thank you!

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