

# IMPACT OF THE COVID-19 PANDEMIC ON THE GLOBAL DENGUE SITUATION

March 24, 2021

## INTRODUCTION

Due to the ongoing COVID-19 pandemic, 5th Asia Dengue Summit has been postponed to January 2022. In the meantime, the Asia Dengue Voice and Action (ADVA) Group, in collaboration with the Global Dengue and Aedes transmitted Diseases Consortium (GDAC), Fondation Merieux (FMx), International Society for Neglected Tropical Diseases (ISNTD) and Southeast Asian Ministers of Education Tropical Medicine and Public Health Network (SEAMEO) bring a series of online meetings titled "Decimate Dengue: The Pre-Summit Webinars." The third webinar in the series titled "Impact on COVID-19 Pandemic on the Global Dengue Situation" was held on March 24, 2021. Prof. Zulkifli Ismael, Consultant Pediatrician and Pediatric Cardiologist at KPJ Selangor Specialist Hospital, Malaysia and Prof. Emeritus Lulu Bravo, Professor of Infectious and Tropical Diseases, College of Medicine, University of the Philippines Manila, chaired the webinar. The webinar featured talks by Prof. Ng Lee Ching, Director of the National Environment Agency Environmental Health Institute in Singapore and Dr. Hasitha Tissera, Clinical Epidemiologist at the Ministry of Health Sri Lanka, who presented Singaporean and Sri Lankan experience of dengue amid COVID-19 pandemic.

## COVID-19 AND DENGUE IN SINGAPORE



**Prof. Ng Lee Ching**

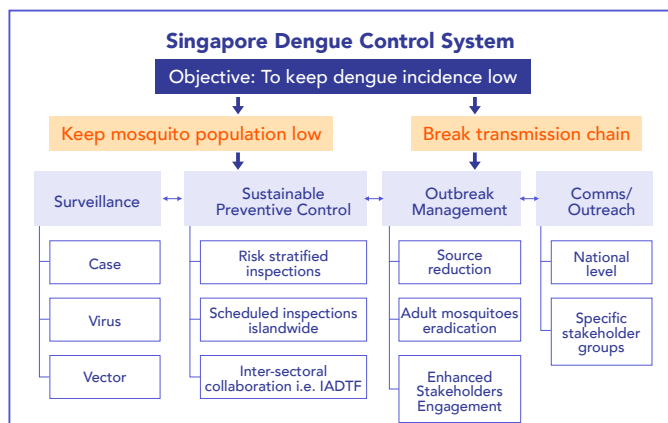
Director, National Environment Agency  
Environmental Health Institute  
Singapore

### Singapore Dengue Control System

The National Environment Agency (NEA) leads dengue control in Singapore.<sup>1</sup> Singapore's greener vision incorporates dengue control programme, which is aligned with Global Vector Control Response developed by the World Health Organization.<sup>1</sup>

Key components of Singapore Dengue Control Programme include:<sup>1</sup>

- Strong sustainable vector control interventions<sup>1</sup>
- Close collaboration between NEA and government ministries, town councils, communities, private sector, and academic and research institutions<sup>1</sup>
- Community engagement to involve residents in dengue prevention<sup>1</sup>
- Publicly available information on number and location of dengue cases through NEA website, mobile Apps and dengue alert system to take necessary action<sup>1</sup>
- Real-time vector surveillance conducted through a system of Gravitrap installed in public housing<sup>1</sup>
- Wolbachia suppression strategy to reduce mosquito population. Wolbachia project in Tampines and Yishun resulted in 65 to 80 per cent fewer dengue cases in 2019.<sup>2</sup>
- Risk models to predict dengue outbreaks utilizing several parameters (e.g. climate, vector density, demographics, number of cases, infrastructure)<sup>1</sup>
- Support from legislation, law enforcement, research and innovation<sup>1</sup>

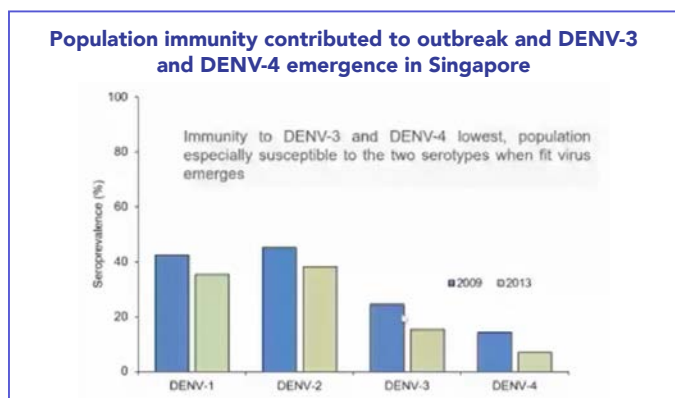


### Singapore Dengue Outbreak 2020

Singapore has experienced periodic dengue outbreaks from late 1980s with 5- to 6-year epidemic cycle. The epidemic patterns during 2004–2007 and 2013–2016 comprised of 2-year DENV-1 epidemic resulting from serotype switch from DENV-2 to DENV-1, a "lull" period in third year with drop in cases, followed by a serotype switch back to DENV-2.<sup>3</sup> Singapore witnessed a historical dengue outbreak in year 2020 with 34,844 cases reported on 17 December 2020. A 20% rise in adult *Aedes aegypti* mosquito population was recorded. DENV-3 and DENV-4 serotypes were dominant, which are usually less common in Singapore.<sup>4</sup> Low herd-immunity due to sustained vector control<sup>3</sup> is considered to be one of the reasons for the 2020 outbreak. Emergence of DENV-3 and DENV-4 serotypes also contributed to the 2020 outbreak. Since DENV-1 and DENV-2 are more common serotypes, Singaporean population

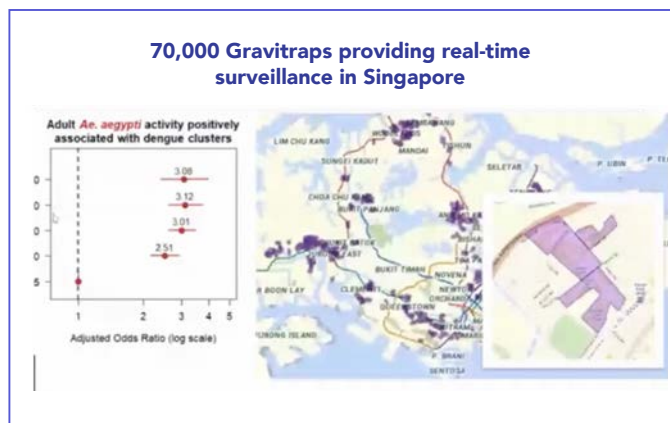
*"During 2020, three major variants of DENV-2 and DENV-3 were reported in Singapore. DENV-2 cosmopolitan virus is the most epidemiologically successful genotype of DENV-2 and has a high epidemic potential" Prof. Ng Lee Ching*

has the lowest immunity against DENV-3 and DENV-4 with lower prevalence of DENV-3 and DENV-4 neutralizing antibodies.<sup>3</sup>



### Dengue Surge and COVID-19

COVID-19 circuit breaker an equivalent to a partial lockdown was in place in Singapore from 7 April to 1 June. It included strict travel bans, contact tracing, compulsory mask wearing, and closure of schools, offices and public places. With increasing number of cases in foreign workers, isolation of workers' dormitories and mass testing and surveillance was increased.<sup>5</sup> Singapore demonstrated a very good control over COVID-19 with fatality rate of 0.05%, which is below global average.<sup>6</sup> However, during the circuit breaker period there was an escalation in dengue cases. A 37.2% increase in dengue cases was reported during implementation of social distancing measures.<sup>7</sup> Increased concentration of breeding sites around



residential areas compared to workplaces was linked to increases in incidence of dengue. Majority of Singaporeans work in air-conditioned environment, which restricts exposure to mosquitoes. However, with people working from home, there was an opportunity for increased contact with day bitter *Aedes Aegypti* contributing to increased dengue incidence in Singapore.<sup>7</sup>

In contrast to general population, there was a 68.5% relative risk reduction of dengue in migrant workers when they were under quarantine in their dormitories. Though the dormitories have a higher population density, they are well ventilated and have common toilets to allow cleaning and prevention of mosquito breeding. Migrant workers appear to be at an increase risk of dengue transmission at working sites compared to dormitories, thus explaining the reduced dengue incidence during the COVID-19 pandemic.<sup>8</sup>

### DENGUE TRANSMISSION DURING COVID-19 LOCKDOWN: THE INFLUENCE OF HUMAN MOBILITY IN SRI LANKA



**Dr. Hasitha Tissera**  
Clinical Epidemiologist, Ministry of Health Sri Lanka

#### Dengue Trend in Sri Lanka

Dengue is a major public health problem in Sri Lanka with frequent occurrence of epidemics. All 4 dengue serotypes have been reported in Sri Lanka over the past years. Sri Lanka records two annual epidemics coinciding with the monsoon rainfall. During the period from 1991–2008 Sri Lanka suffered from dengue epidemics every 2-3 years. The 2009 epidemic, had 35,008 cases with a case fatality rate of 1%. A major epidemic occurred in 2017 with 186,101 cases, however the case fatality came down to 0.24%.<sup>9</sup> During the 2017 epidemic, dengue incidence increased significantly over incidence during the previous 5 years. Clinically symptomatic cases were more in older schoolchildren and young adults and DENV-2 cosmopolitan was the dominant serotype.<sup>10</sup> In January 2020, 11,607 cases were reported due to which higher numbers were expected in the dengue season in 2020. However, the number of cases dropped below the past 5-year national average in April–June 2020.<sup>9</sup>

#### COVID 19 in Sri Lanka

The first local case of COVID-19 was reported in Sri Lanka in March 2020. The government responded by imposing strict mobility restrictions with school closures, quarantine curfew

throughout island, work-from-home and complete international travel restriction. The curfew was completely lifted on 28th June 2020. Even during the curfew all healthcare facilities remained open.<sup>9</sup> The Ministry of Health implemented a care pathway for all fever patients presenting at OPDs during COVID-19 pandemic. All hospital OPDs had a Fever Room established for fever cases. Patients were assessed at Triage nursing desk and COVID risk was determined. Dengue was suspected in those coming from high-risk areas with fever. Further management was instituted depending on the patient's clinical condition (warning signs and vital signs) and investigations.<sup>11</sup>

#### COVID-19 and Dengue in Sri Lanka

A recent study evaluated the impact of COVID-19 lockdown on dengue transmission in Sri Lanka. The study compared epidemiological characteristics of dengue transmission during January to March 2020 and April to June 2020 with preceding 5 years (2015 – 2019). The effect of mobility restriction on dengue transmission was evaluated in wet and dry zones separately. Additionally, the impact of school closure on dengue transmission in children was compared with data in

Year	Incidence		CFR	Mortality (100'pop)
	Island-wide	WP		
2015	142.91	269.82	0.19	0.27
2016	260.10	474.26	0.18	0.46
2017	867.85	1320.61	0.24	2.05
2018	238.39	331.00	0.11	0.27
2019	481.81	784.75	0.15	0.72
<b>5 yr Avg Incidence</b>	<b>398.21</b>	<b>639.09</b>	<b>0.19</b>	<b>0.75</b>
<b>2020 Incidence</b>	<b>149.69</b>	<b>149.82</b>	<b>0.12</b>	<b>0.17</b>

Source: National Surveillance Data, MoH

adults.<sup>9</sup> Sri Lanka reported lowest number of dengue cases in 2020 in comparison with 5-year national average. There was an 88% reduction in risk at national level. Children aged less than 19 years experienced 92% risk reduction. There was a higher impact in dry zone with 91% reduction compared to 73% reduction in wet zone.<sup>9</sup>

Several factors have contributed to the lowest incidence of dengue in 2020. Firstly, milder cases might not have reported to the hospitals amid the COVID-19 infection risk scare thus making under-reporting of cases a possibility. Secondly, closure of schools and offices during the lockdown acted as a major contributing factor. Thirdly, aggressive cleaning up of the city by municipal councils and household cleaning by residents may have reduced the mosquito density thus reducing dengue transmission. Lastly, shutdown of international travel reduced the number of imported cases.<sup>12</sup>

In contrast to dengue, Sri Lanka witnessed an increase in the number of leptospirosis cases during the second quarter of 2020 with a 38.5% increase compared to the previous year.

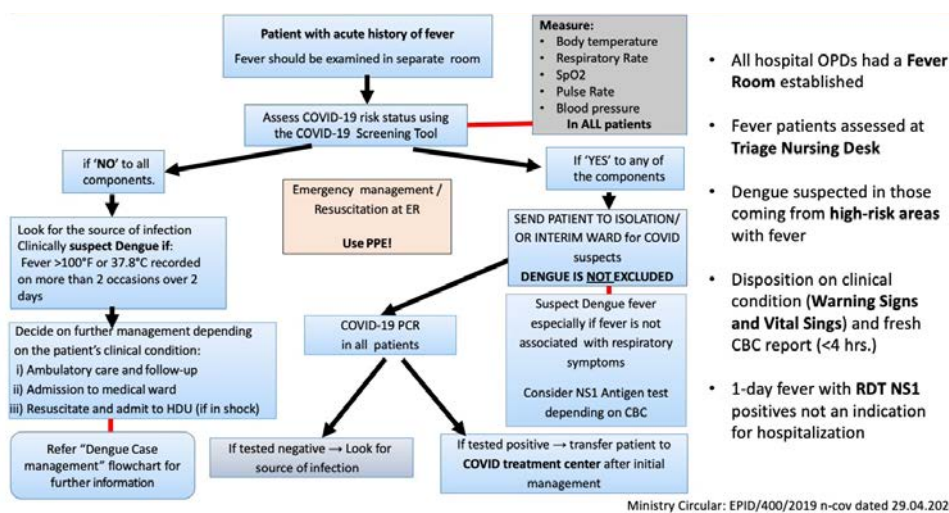
### Comparison between hospital admission due to dengue fever and severe dengue in Sri Lanka

Year	Dengue Fever (DF)	Severe Dengue (DHF)	DF to DHF ratio
2015	437	139	0.32
2016	707	287	0.41
2017	3167	1268	0.40
2018	876	251	0.29
2019	2060	651	0.32
5 yr. average	1,449	519	0.36
2020	305	127	0.42*

\*Significant at p<0.05  
Sensitivity analysis from one major hospital in the Western Province

Leptospirosis is related to agricultural activity, which increased during the lockdown period. Increased farming activity, interruption of state-sponsored doxycycline prophylaxis programme and higher number of people with no prophylaxis participating in agricultural work, might be responsible for increased number of leptospirosis cases.<sup>12</sup>

### Care Pathway for fever patients presenting at OPDs during COVID-19 pandemic in Sri Lanka



- All hospital OPDs had a **Fever Room** established
- Fever patients assessed at **Triage Nursing Desk**
- Dengue suspected in those coming from **high-risk areas** with fever
- Disposition on clinical condition (**Warning Signs and Vital Signs**) and fresh CBC report (<4 hrs.)
- 1-day fever with RDT NS1 positives not an indication for hospitalization

*"It is important to be careful in making inferences about mobility rates from single year analysis. Early identification of clusters and individuals with frequent travel requirements to and from high-risk areas should be targeted for acute febrile illness surveillance and vector control."*  
Dr. Hasitha Tissera

## Q AND A SESSION

### 1. What are risk factors for dengue during COVID-19?

- In Singapore, construction sites are high-risk areas where it is challenging to implement vector control. However, since construction workers were quarantined their exposure to mosquitoes was reduced.
- On the other hand, more breeding sites at homes increased risk in general population during work from home period in Singapore.
- In Sri Lanka, lockdown and restricted travel and leisure activities reduced people movement and reduced transmission of dengue from one locality to another.

### 2. What is serotype prevalence in Sri Lanka?

- Seroprevalence has changed in Sri Lanka similar to Singapore. Predominant serotype is DENV-3, which was not reported for almost 20 years. 2017 epidemic involved DENV-2, which is now replaced by DENV-3.

### 3. Does change in serotype affect severity of dengue?

- There is a possible impact of serotype on severity. DENV-2 and DENV-3 could be more severe.

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