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HDB and Dengue: Friends or Foes

Red, yellow, green; colours of traffic lights? A welcome sign in every neighbourhood these days (Figure 1) seems to be characterised by warning dengue alerts banners in these very colours. Red for severe dengue outbreaks, yellow for mild and green for none. I wonder how many individuals stop to peruse the banners or are they simply ignored and form an obscured fragment of our everyday backgrounds. Looking beyond the cheesy taglines and somewhat comical acronyms (Annex 1), one would discover the immense effort the government has invested to eliminate these pesky Aedes mosquitoes. The issue of dengue is not unique to Singapore, but what is truly unique is the conditions that Singapore possesses which complicate the tackling of dengue. From its hot and humid weather to its high population density, dengue is a pervasive problem deemed almost impossible to eradicate. With climate change resulting in warmer and wetter days, Singapore must look beyond its traditional methods. In the quest to stamp out these itchy and deadly bites, an interesting relationship has appeared- could Singapore's public housing plans influence dengue distributions in Singapore? In particular, are the widely acclaimed Housing & Development Board (HDB)- commonly lauded for their game-changing role in the enablement of quality high-rise living (HDB, 2016), friends or foes in Singapore's fight against dengue?

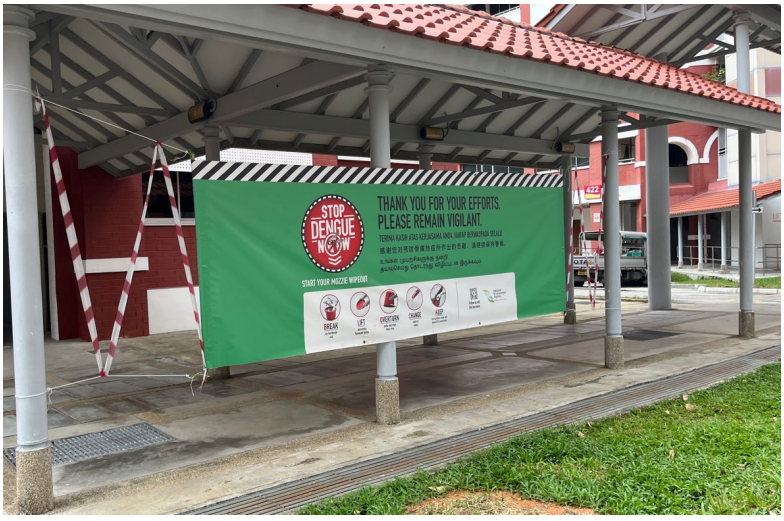

Figure 1: A dengue banner hangs like a welcome sign at the front of my estate

In a mere 720 square kilometres land size, Singapore has successfully squeezed more than 5.4 million residents here. Land scarcity means that the state's intervention in housing spaces is a necessity. HDB housing proved to be an adequate and long-lasting response to the housing shortage crisis that once imperilled the city; where today, nearly 80% of Singaporeans live in state-owned dwellings (Vochelet, 2020). HDB has even been conferred the Special Recognition Award and HDB estates have been touted as exemplary models that could be emulated by other governments worldwide (HDB, 2016).

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Commented [ZK2R1]: (Vochelet, 2020)

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Commented [ZK4R3]: (HDB, 2016)

HDB estates have effectively improved the housing situation in Singapore and unintendedly blossomed a new friendship with dengue. A unique facet of HDB housing is the corridors that are often transformed into living spaces of their own, filled with foliage and beauty (Figure 2). For residents with green fingers, their love for plants spills beyond their personal spaces and into the common corridors (*albeit the fact that the corridors are not legally owned by them*). These corridors are beautifully characterized by the potted plants which unbeknownst to the common eye, lie the myriad of breeding grounds for the Aedes mosquito. Previously, my neighbourhood was deemed to be a red zone, and has been the hotspot for not just the Aedes mosquitoes but also the NEA's dengue inspection officers. While there have been efforts made, with inspectors knocking on doors and flashing their flashlights at the greenery to spot any potential breeding grounds, the effectiveness may be questionable. One of my elderly neighbours candidly shared: "Aiya, they come so often. Just pretend you are not home lah. They cannot do anything also what." His reluctance not only stems from the fear of having his plants removed but also the potential fines he would receive if there were detection of mosquito breeding habitats. The layout of HDB housing, coupled with human activities, has contributed to several spaces where stagnant water resides, from flowerpot plates to the scupper drains (NEA, n.d.). Despite the government's best efforts, some of the HDB dwellers seem to still remain unbothered and nonchalant about sharing their homes with the Aedes mosquitoes. While some may argue that such sentiments are not distinctive and unique to the residents staying in HDB flats, it is certain that the HDB housing layouts and the common outdoor spaces have presented opportunities for Aedes to make these spaces their homes too.

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Commented [ZK6R5]: (NEA, n.d.)

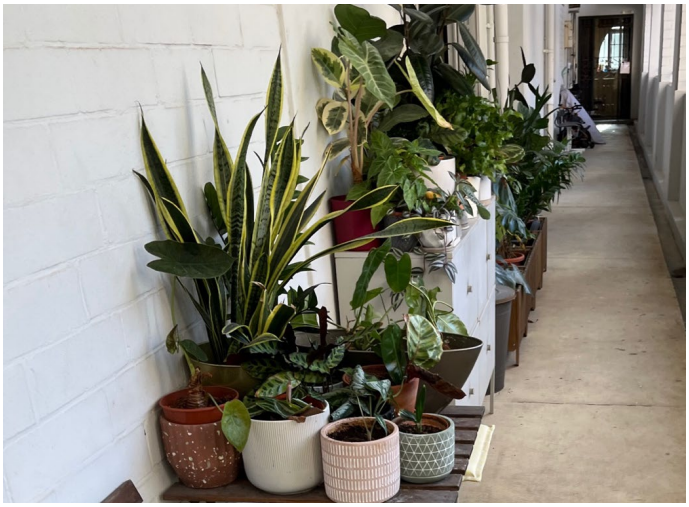

Figure 2: The corridor outside my elderly neighbour's unit is my neighbourhood's version of the 'Botanic Gardens'

During the COVID-19 pandemic, the high-density population living in HDB made lives for the day-sucking Aedes mosquitoes even sweeter. Stringent measures during Singapore's circuit breaker saw the limitations of movements, where most were confined among their own residences. Correspondingly, Singapore saw its largest dengue outbreak in 2020, doubling the number of cases reported in 2019. Articles exploring the resurgence of epidemic dengue during the pandemic have ascertained how the increase in work-from-home activities as part of the safe management measures, increased the risk of bites by dengue-carrying Aedes mosquitoes, which more commonly occurred at home (Teoh, 2023). With more people staying indoors in close proximities and the emergence of a new dengue strain (DENV-3), it is indeed a recipe for an increased outbreak. Staying on the second floor of a HDB housing myself, I recall the warmer days of circuit breaker were characterised by the constant swatting of mosquitoes. My father, who became so fed up with the buzzing mosquitoes, even bought a fly swatter (Figure 3) in a bid to keep them at bay during his work-from-home days (*each successful zap was met with great satisfaction*). It is without a doubt that the success of public housing, where almost 8 in 10 residents live in HDB housing has translated into a negative externality, where the high population density in these close proximate HDB flats has favoured the spread of dengue. The proliferation of HDB housing, with its dense housing population, has inevitably played a hand in the spread of dengue.

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Commented [ZK8R7]: (Teoh, 2023)

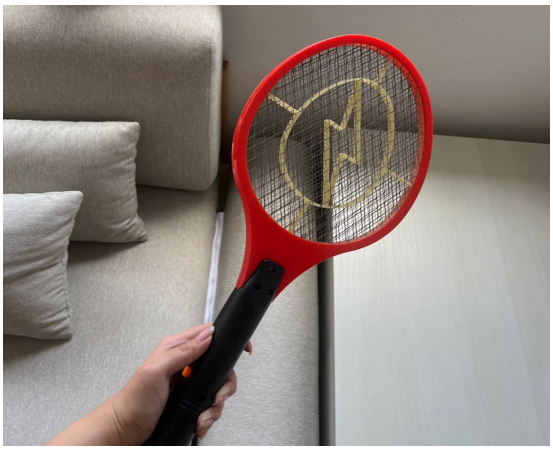

Figure 3: My father's handy-dandy fly swatter

Albeit the favourable conditions HDB housing has provided for the Aedes mosquitoes, to concretely deem the friendship between HDB and dengue as perfect would be an illusion. New studies have revealed that high-rise areas like HDB flats have less dense drainage areas compared to low-rise residential areas, which makes it less conducive for the breeding of dengue vectors. In 2015, the dengue incidence in the Geylang area was higher in a subarea of low-rise housing compared to high-rise one and outdoor breeding drains of Aedes have clustered in the low-rise housing subarea (Seidahmed et al., 2018). The study also conclusively indicated that public housing in agglomerations of high-rise buildings like HDB flats could reduce dengue incidences if these new HDB flats comes at the expense of low-rise housing such as landed private properties. Thus, HDB arguably has elements of enmity for dengue as seen in its less-than-optimal breeding grounds, in terms of drainage areas, as compared to low-rise houses such as bungalows, shophouses, and terraced houses.

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Commented [ZK10R9]: (Seidahmed et al., 2018)

Another element of hostility between the two would be due to the introduction of new technology. The Smart Town Framework is a new initiative implemented at two new HDB estates; HDB Smart Town is designed with a five-pronged approach, 'Smart Planning, Smart Environment, Smart Estate, Smart Living and Smart Community' to develop towns for an improved and more sustainable standard of living (Smart Nation Singapore, n.d.). In particular, the Smart Environment approach involves the use of a network of sensors in estates which allows HDB to capture real-time environmental information, such as temperature and humidity. Dengue's transmission is affected by the duality of temperature

and humidity, where temperature defines a viable range for transmission and humidity amplifies the potential within that range. A study conducted in Thailand found that 80% of severe dengue cases occurred when the mean temperature was 27–29.5°C and the mean humidity was higher than 75% (Campbell et al., 2013). Information collected in these HDB Smart Towns through the sensors can hence allow for preventive and reductive measures to be implemented proactively. When the mean temperature and humidity hit a threshold, proactive measures, like increased fogging or engaging more manpower in the detection of potential breeding grounds, can be implemented. Hence, new technology employed in HDB estates can indeed sour the friendship between HDB and dengue.

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Commented [ZK12R11]: (Campbell et al., 2013)

Understanding the relationship between HDB and dengue can provide new and valuable insights into tackling dengue. We see how the layout of public housing favours the breeding of Aedes and how the high density of public housing favours the spread of dengue. Conversely, we also explored the animosity between HDB and Aedes mosquitoes through less dense drainage systems and the use of technology. Now, how can HDB leverage such information in its fight against 'mozzies'?

There have made considerable improvements to the HDB layouts and designs in recent years upon the discovery of possible breeding grounds that are unique to HDB housing. Remember the tube-shaped bamboo pole holders on the side of HDB flats that are used to hold our bamboo poles filled with wet laundry? Well after the discovery of substantial numbers of Aedes larvae in these holders, they have been redesigned in newer buildings such that the bamboo poles now rest on brackets (Sim et al., 2020). To tackle the issue of green spaces in corridors being large breeding grounds, there is a need to first understand some of the fundamental reasons (beyond general laziness) behind the lack of care. I went back to ask my elderly neighbour if he has the habit of removing the stagnant water in the flower pot trays and he lamented that he does not, as many of the pots are too heavy for him to lift. An easy fix to this would be the use of innovative tools such as a turkey baster which can act as a big pipette to suck up and remove stagnant water. A more drastic method could also be to reduce the width of HDB corridors which would render large pots of plants too much of an obstruction and hassle for the residents to have, which would encourage them to opt for smaller pots that are lighter and easier to manage instead.

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Commented [ZK14R13]: (Sim et al., 2020)

In addition, the points mentioned on how HDB and dengue are foes could be expanded and better leveraged. For instance, The Smart Town Framework could be

implemented across more HDB estates beyond the current two housing estates to allow for more proactive monitoring and increased access to environmental information. Consistently high temperatures recorded in certain estates of Singapore can signal the need for better initiatives to be implemented. One such initiative could be to change the colour schemes of some areas of these HDB estates to white to reduce heat absorption. The implementation of new technology across HDB estates with higher incidences of dengue can hence help with surveillance efforts and management.

As a Business student myself, I would like to share a potential business idea that I have brainstormed on which could complement the initiatives and recommendations mentioned above. Previously, it has been discovered that Alaska yellow-cedar trees contain natural preservatives that work against mosquitoes, more specifically the discovery of compounds like nootkatone that were effective at killing Aedes (Rozell, 2005). Traditionally, Alaska yellow cedar is prized by boat builders due to its exceptional resistance to weather and insects as well as easy workability (Lane, 2016). The potential for building materials of residences to be mosquito repelling is unexplored due to the cost limitations and concerns over its structural integrity. While it is clearly unfeasible to suggest for HDB buildings to be made solely using Alaska yellow cedar (due to constraints on cost and availability of materials), its properties and characteristics can be explored to shed insights on the potential use of mosquito-repelling building materials. If more research and experiments are conducted on the possible fusion of compounds like nootkatone or its derivatives into common building materials, it could possibly lead to unique breakthroughs that can be implemented on a wider scale such as through using it in HDB housing.

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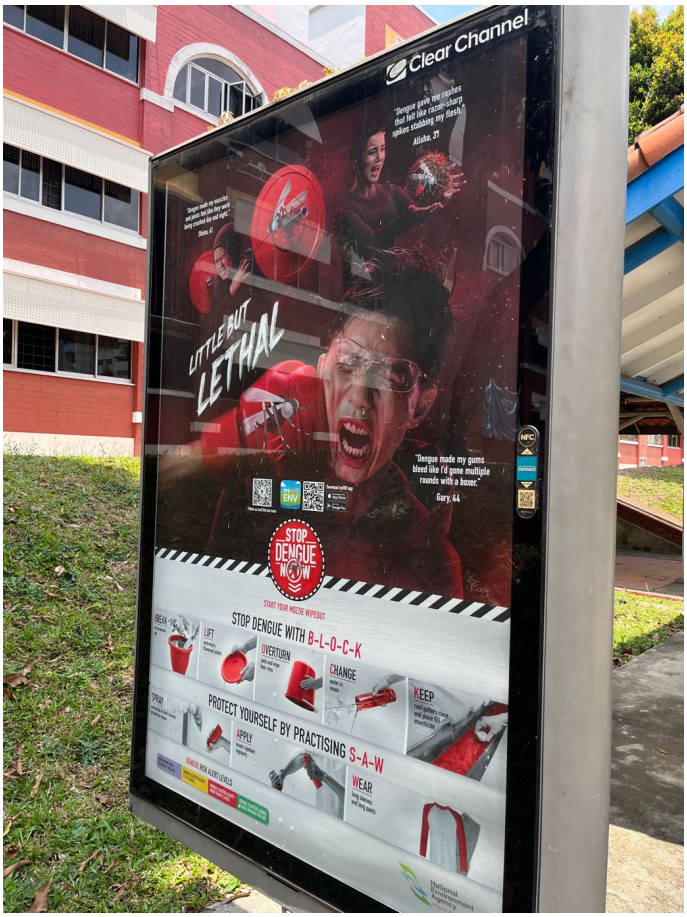
Commented [ZK16]: https://www.biofuelsdigest.com/bdigest/2016/04/05/how-a-tree-so-important-they-made-it-a-post-office-just-might-save-the-world/

In conclusion, the relationship between HDB and dengue has elements of friendship and hostility. Through exploring the ways HDB and dengue are friends and foes, we are able to leverage this information to better improve current public housing to complement the fight against these pesky Aedes mosquitoes. Given the sheer percentage of residents living in HDB housing, improvements made can have significant impacts on dengue distributions and cases in Singapore. Looking beyond traditional lenses of tackling dengue could be the key to turning endemic dengue into a thing of the past for Singapore.

Annexes:



Annex 1: A dengue poster at the bus stop features interesting taglines and acronyms to increase awareness on dengue prevention efforts

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