

Older HDB blocks pose higher dengue risk, study finds

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Residents of older Housing Board blocks are more at risk of dengue infections because of aged housing design and wear and tear providing prime breeding grounds for mosquitoes, a study has found.

Between 2014 and 2020, newer HDB residential buildings were found to have half the number of dengue cases compared with buildings that were at least 29 years old.

Scientists from Nanyang Technological University (NTU) and National University of Singapore (NUS) used statistical models to investigate how environmental and man-made factors influenced dengue rates islandwide over the six years. The study determined that the average age of public housing was 29.1 years.

One of the study's lead authors, Assistant Professor Borame Dickens, pointed out that older housing blocks tend to have flatter roofs and bamboo pole holders that can collect water. Older buildings also tend to have crevices and cracks

that can serve as breeding grounds. "Anything with puddles is bad, that is the moral of the story," said Prof Dickens of the NUS' Saw Swee Hock School of Public Health.

But newer housing blocks have additional features to ensure better drainage of water throughout the building. These include sloping roofs and, in place of pole holders, ledges and drying racks, making them less mosquito-friendly.

The height of residential buildings and the distance between a housing estate and drainage networks and water bodies were other infrastructure-related aspects the study looked into.

On building height, the researchers found that people living in low-rise buildings, especially those between 6.5m and 15m high, bore the brunt of dengue cases.

The average height of an HDB block is about 37.5m, or 12 storeys.

Female *Aedes* mosquitoes, which bite, tend to fly at lower heights – just above the top of vegetation – because of their physiology and body size, said the paper, published in September in scientific journal *Viruses*.

The researchers zeroed in on



Water puddles can become mosquito breeding sites. Older housing blocks tend to have crevices and cracks that can collect water, say experts. ST PHOTO: AZMI ATHNI

clusters of 10 to 20 HDB blocks islandwide, but omitted areas covered under Project Wolbachia – where male *Aedes aegypti* mosquitoes infected with Wolbachia bacteria are released to mate with females, producing eggs that do not hatch.

The researchers did a separate analysis for areas with more private housing.

The scientists worked with dengue numbers from the past decade, including 2020, which saw the worst outbreak in a year with 35,315 cases, and 2014, which was part of a two-year dengue resurgence that recorded more than 40,000 cases.

As at Dec 29, 2023, Singapore had recorded more than 9,870 cases for the year.

Speaking to *The Straits Times* in December, the study's lead author, Assistant Professor Lim Jue Tao of the NTU's Lee Kong Chian School of Medicine, said mapping the risk of dengue will allow for more targeted vector control efforts.

"If cases start sprouting in an estate with older HDB blocks, you might want to focus your vector control resources there to halt transmission early. That area could be a potential hot spot for a large outbreak," he added.

Prof Lim said that in terms of building and land use, there are ways to "design out" the virus by improving drainage and having more vegetation cover instead of grass with transient puddles, for instance.

While the study did not identify specific neighbourhoods at higher risk of dengue, the east has been known to face a higher burden owing to its larger population, older estates and denser housing.

Commenting on the research, Professor Hsu Li Yang, an infectious disease specialist at the Saw Swee Hock School of Public Health, said this would be the first time a large amount of environ-

ment, climate and housing data has been combined to determine links with dengue transmission.

He said: "What is missing, however, is the mosquito population data and how this changes over time."

"Most of the different factors such as building height, rainfall, wind speed and air pollution are known to affect the mosquito population, which in turn will affect dengue incidence."

The study was also one of the first that looked at how the level of nitrogen dioxide in the air affects mosquito populations.

The researchers found that higher concentrations led to a fall in dengue cases as harmful gases are toxic to insects.

But while this finding helps infectious disease experts better understand links between environmental drivers and the disease, Prof Dickens stressed that it is not wise to include such pollutants in vector control efforts.

The research team is looking to work on a similar analysis for South-east Asia next.

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