Our team members are from Singapore and Malaysia. Singapore's COVID-19 lockdown measures (named Circuit Breaker) happened to coincide with an outbreak of the dengue virus (which causes dengue fever). We thus wanted to investigate if the current dengue fever outbreak could be attributed to the Circuit Breaker, or alternatively if the Circuit Breaker had worsened the dengue fever outbreak.

Local news articles[1] attributed the severity of this dengue outbreak to three main reasons. Firstly, the peak timing for mosquito feedings is during the day, and more people are staying home during the day because of Circuit Breaker. Secondly, this outbreak has DENV-3 as the dominant serotype. Dengue has 4 serotypes - DENV-1 through 4, and DENV-3 has not been the dominant strain in over 30 years, meaning community immunity to DENV-3 is low. Lastly, with the temperature increasing[1][2], we are approaching "dengue season" which historically is from June to October.

We started our investigation by testing for a correlation between the average weekly temperature and the number of dengue cases per week, which was when we found our first issue. We started with a simple linear regression test between the average weekly temperature and the weekly number of cases. However, the results of the significance tests between years conflicted.Some years showed a correlation, but others didn't. Some years showed a direct relationship, but others showed an inverse. We decided to do more tests to get more information to help us analyze our previous results. We tested the average weekly rainfall versus number of dengue cases as well; prior studies indicated that an optimal rainfall level range exists for dengue breeding[3], since an environment too dry would not give the mosquitos any stagnant water to breed in, while too much rainfall would cause too much agitation in the water, since mosquitos require stagnant water to breed. However, since our p-values were greater than 5%, we lacked sufficient evidence to reject the null hypothesis, in this case that there was no correlation between rainfall and dengue cases.

Lastly, we wanted to investigate the effects of a change in dominant dengue serotype, in order to see if the current outbreak was due to the change, and how great of an effect it had. Dengue has four serotypes, named DENV-1, DENV-2, DENV-3, and DENV-4. If any serotype does not have any dominance over an extended period of time, community resistance to it lowers. Recent years have been alternating between DENV-1 & DENV-2 as the dominant serotype, meaning that this outbreak's dominant DENV-3 theoretically had reduced community resistance. The only outbreaks which we could find with a serotype dominance trend matching recent years' were in 2013-2014 and in 2004-2005 (which we were unable to obtain the data for). Thus, we performed a chi-squared test comparing the 2013 outbreak with the current 2020 outbreak. The test yielded promising results, indicating a correlation between the two. These results however, were similar to those between other outbreak years and 2020.

Thus, with datafest coming to an end, we unfortunately were unable to truly draw any meaningful conclusions from our tests, despite the high chance that the circuit breaker has contributed to the current outbreak.

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