Dengue Trend During COVID-19 Pandemic in Malaysia

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Introduction
Dengue fever is a vector-borne disease that threatens one-third of the world’s population. Malaysia is one of the dengue-endemic countries with outbreaks occurring in a cyclical pattern with different predominant serotypes.1,2 There should be an increase in dengue cases in 2020 and 2021. However, the number of cases reduced dramatically in 2020 (90 304) and 2021 (26 365) compared to the year 2019 (130 101), which coincided with the COVID-19 pandemic.3

The Malaysian government implemented a nationwide lockdown under the movement control order (MCO) on March 18, 2020, with different strategies and regulations had been introduced. The MCO measures included banning the public from going out and attending gatherings and travel restrictions. Academic institutions, public premises, and private premises were all closed.4 The conditional MCO (CMCO) started on May 4, 2020, when most economic sectors resumed operation under strict standard operating procedures (SOPs), and interstate traveling was allowed. Then, the recovery MCO (RMCO) took over with further relaxing of control measures such as the resumption of religious activities, reopening of entertainment, wellness and educational centers, with certain restrictions.4

Reinstatement of MCO to different states (MCO by states) according to the COVID-19 cases was reimposed from January 11, 2021. However, many nonessential sectors remained open.4 This was then replaced with a nationwide total lockdown (FMCO) on June 1, 2021 until June 27, with control measures of similar stringency as the initial MCO but with certain relaxations, such as 40% of office attendance being allowed.4 On June 28, 2021, Malaysia entered a 4-phase national recovery plan (NRP) with further relaxation of SOPs according to the phases.4

This study aims to establish the relationship between dengue and COVID-19 and evaluate the effect of each stage of the MCO on dengue cases.

Methods
The weekly cases and deaths of dengue and COVID-19 from Week 1 of 2020 to Week 6 of 2022 were retrieved from the Ministry of Health (MOH) Malaysia’s official websites.5-7 Any missing values were estimated using the average number of weekly cases or deaths of the particular month. Data were analyzed using SPSS 18.0 software.

Results
Before MCO implementation, the minimum and the maximum number of weekly dengue cases in 2020 were 2219 and 3387. The number of dengue cases then dropped to a range of 1121 to 1874 during MCO. The dengue cases increase dramatically with a range of 717 to 2120 during CMCO/RMCO. Then the number of dengue cases decreased during the MCO by state and FMCO, with the highest weekly dengue cases of 681. The number of dengue cases remained low during NRP compared to the same period of the previous year (Figure 1).

There was a negative correlation ($r = -0.663; P < .001$) between the dengue cases and COVID-19 cases in the year 2020, but the correlation becomes positive ($r = 0.672; P < .001$) in 2021. A similar trend was seen for the correlation between COVID-19 and dengue deaths. However, the result was not statistically significant.

The highest negative correlation was during FMCO ($r = -0.844; P = .156$), followed by CMCO/RMCO ($r = -0.830; P < .001$), pre-MCO ($r = -0.660; P = .027$), and MCO ($r = -0.063$). A significant positive correlation was seen during NRP ($r = .603, P < .001$).

A significant positive correlation was also seen for the number of deaths during MCO ($r = .827; P = .042$). Only CMCO/RMCO indicates a significant negative correlation ($r = -0.471, P = .033$; Table 1).

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Discussion

Human movement behavior has been always suggested as one of the important factors of dengue transmission. The lockdown disrupts dengue transmission by limiting human movement and geographic spread and reducing time spent in dengue hotspots, thereby reducing vector-host interactions. In 2020, the number of dengue cases started to reduce after the implementation of control orders such as MCO, CMCO/RMCO, MCO by states and FMCO by mainly restricting human physical proximity due to the rising of COVID-19 cases. In 2021, although there is an overall decreasing trend of dengue cases, the correlation between dengue and COVID-19 is positive. This trend can be explained by the withdrawal of the control order later in 2021 and replaced by the NRP, where people are free to travel across the state with a higher chance of visiting dengue high-risk zones while the cases of COVID-19 continue to rise.

Many other dengue-endemic countries also reported a similar trend.8 However, Singapore reported an increase of more than 37.2% of dengue cases in 2020.9 High-density residential areas were the most common place of mosquito activity rather than public areas or workplaces. Thus, the stay-at-home situation increases the vector-host interaction and optimizes the biting of the Aedes Mosquito.
Conclusion
The lockdowns had contributed to the reduction of dengue cases. However, the number of dengue cases later rebounded when the lockdown was lifted. The reduction of dengue cases during the stricter control movements highlights the impact of human movement on dengue transmission.

Declaration of Conflicting Interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article:

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References
1. Abubakar S, Shafee N. Outlook of dengue in Malaysia: a century later. *Malays J Pathol*. 2002;24(1):23-27.
2. Bennett SN, Drummond AJ, Kapan DD, et al. Epidemic dynamics revealed in dengue evolution. *Mol Biol Evol*. 2010;27(4):811-818. doi:10.1093/molbev/msp285.
3. Prime Minister’s Office of Malaysia. Prime minister’s office of Malaysia official website. Media statement by the prime minister’s office. Published 2020. Accessed August 15, 2022. https://www.pmo.gov.my/media-statement/.
4. Ministry of Health Malaysia. COVID-19 Malaysia. Published 2020. Accessed August 15, 2022. https://COVID-19.moh.gov.my/.
5. Ministry of Health Malaysia. Ministry of Health official website. Senarai Kenyataan Akhbar. Accessed August 15, 2022. https://www.moh.gov.my/.
6. Ministry of Health Malaysia. iDengue. Accessed August 15, 2022. https://idengue.mysa.gov.my/.
7. Brady O, Wilder-Smith A. What is the impact of lockdowns on dengue? *Curr Infect Dis Rep*. 2021;23(2):2. doi:10.1007/s11908-020-00744-9.
8. Falcón-Lezama JA, Martínez-Vega RA, Kuri-Morales PA, Ramos-Castañeda J, Adams B. Day-to-day population movement and the management of dengue epidemics. *Bull Math Biol*. 2016;78(10):2011-2033. doi:10.1007/s11538-016-0209-6.
9. Lam LTM, Chua YX, Tan DHY. Roles and challenges of primary care physicians facing a dual outbreak of COVID-19 and dengue in Singapore. *Fam Pract*. 2020;37(4):578-579. doi:10.1093/fampra/cmaa047.