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capillary vaccination campaign to prevent the emergence and spread of further and more dangerous variants that can evade both natural and vaccine-triggered immune responses and have higher mortality.⁷ The scenario of a variant that is similarly transmissible to the omicron variant and has high mortality would be catastrophic and must be avoided at all costs. However, it is important to consider that even an increase in transmissibility with no change in lethality or hospitalisation rates could lead to the collapse of hospital emergency departments and health-care systems and an exceptionally high number of deaths. Moreover, promising and effective new therapies cannot yet have a substantial effect because they are scarce, expensive, and unlikely to have a measurable effect in the short term.⁸ The fight against the virus must be waged on numerous open fronts: aggressive global vaccination campaigns (while also considering extending mandatory vaccination from some categories to the entire population), nonpharmacological interventions, strengthening emergency and critical care systems, and

finding therapies that are effective at every stage of the disease. The road to normality is still very long.

I declare no competing interests.

Marcello Candelli

marcello.candelli@policlinicogemelli.it

Emergency Department, Fondazione Universitaria Policlinico A Gemelli-IRCCS, Catholic University of Sacred Heart of Rome, 00168 Rome, Italy

- 1 Thompson RN, Hill EM, Gog JR. SARS-CoV-2 incidence and vaccine escape. *Lancet Infect Dis* 2021; **21**: 913–14.
- 2 Corrao G, Franchi M, Cereda D, et al. Persistence of protection against SARS-CoV-2 clinical outcomes up to 9 months since vaccine completion: a retrospective observational analysis in Lombardy, Italy. *Lancet Infect Dis* 2022; published online Jan 27. [https://doi.org/10.1016/S1473-3099\(21\)00813-6](https://doi.org/10.1016/S1473-3099(21)00813-6).
- 3 Barda N, Dagan N, Cohen C, et al. Effectiveness of a third dose of the BNT162b2 mRNA COVID-19 vaccine for preventing severe outcomes in Israel: an observational study. *Lancet* 2021; **398**: 2093–2100.
- 4 Adhikari B, Cheah PY. Vaccine hesitancy in the COVID-19 era. *Lancet Infect Dis* 2021; **21**: 1086.
- 5 Tang JL, Li LM. Importance of public health tools in emerging infectious diseases. *BMJ* 2021; **375**: n2374.
- 6 Kupferschmidt K. Where did “weird” omicron come from? *Science* 2021; **374**: 1179.
- 7 Rae M. Omicron: a failure to act with a global focus will continue the proliferation of new variants of COVID-19. *BMJ* 2021; **375**: n3095.
- 8 Persad G, Peek ME, Shah SK. Fair allocation of scarce therapies for COVID-19. *Clin Infect Dis* 2021; published online Dec 18. <https://doi.org/10.1093/ciab1039>.



Movement dynamics: reduced dengue cases during the COVID-19 pandemic



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Dengue, a systemic viral infection caused by dengue virus, continues to be a public health problem in countries in which it is endemic, such as Indonesia, even during the COVID-19 pandemic, resulting in a double burden of disease.¹ During 2020 and 2021, there appeared to be a decrease from previous years in the total number of dengue cases reported to WHO, although the data for this period are not complete.² COVID-19 was first identified in early 2020, and by the end of that year, there were around 80 million COVID-19 cases across the globe.³ As COVID-19 cases continued to rise, governments in affected countries implemented mobility restrictions to suppress the rate of SARS-CoV-2 transmission, leading to behavioural changes that might also affect transmission of other infectious diseases circulating the community. In *The Lancet Infectious Diseases*, Yuyang Chen and colleagues⁴ compared the annual 2020 incidence of dengue in 23 countries in Latin America and southeast Asia against a Bayesian regression model that projects a predicted incidence of dengue based on the monthly incidence, climatic, and population variables in each

country in 2014–19. Deviations in these incidences were then assessed for any association with specific COVID-19-related public health and societal measures and human movement behaviours.

The intensity levels and forms of mobility restrictions varied geographically across different countries and temporally throughout the months of 2020, providing a unique opportunity to analyse these variables in how they affect transmission in infectious diseases other than COVID-19, such as dengue. In most countries included by Chen and colleagues,⁴ the intensity of public health and societal measures and human movement behaviours were highest in the beginning of the COVID-19 pandemic, and then waned over the months as the epidemic curve flattened and economic pressure to loosen restrictions increased. Indonesia is a dengue endemic country that was heavily affected by COVID-19 in 2020. The government imposed a restriction policy in early March, 2020 that was not a full lockdown, but instead a compromise between transmission control and economic considerations, called large-scale social restriction, which

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was relaxed further in the subsequent months. Due to a decentralised structure, the decision to begin, prolong, or end the large-scale social restriction was made by each district or provincial government based on each region's epidemiological considerations and financial capabilities, leading to differences in the intensity and forms of large-scale social restriction in each region.⁵

Chen and colleagues⁴ found a strong association between COVID-19-related societal disruption and reduced dengue risk after taking climatic, host immunity, and other factors affecting dengue cycles into account, with school closures and reduced time spent in non-residential areas having the strongest evidence of association with reduced risk of dengue. These findings add to the growing body of evidence that dengue is spread through human movement, with transmission occurring in shared areas outside the home.^{6,7} These findings could provide new insights to potential interventions to control various infections, including dengue. Particularly in countries where dengue is endemic, such as those included in Chen and colleagues' study, interventions are often centered around surveillance and vector control is focused around residential areas.⁸ Implementing policies that restrict community mobility in the context of dengue control in non-COVID-19-pandemic conditions might prove to be challenging, but options to focus vector control interventions to more public areas could be potential alternatives.

Chen and colleagues omitted several countries, such as Sri Lanka and Indonesia, from their analysis due to the absence of publicly available monthly data. In Sri Lanka, dengue risk was reduced during the lockdown in the first 6 months of the pandemic.⁹ Indonesia, a dengue-endemic country with high annual incidence rates, observed a reduced annual dengue incidence in 2020 compared with the previous year,¹⁰ which might have been influenced by COVID-19-related mobility restrictions but a formal study is yet to be conducted. The consistent findings and large scope of Chen and colleagues' study that encompass many dengue-endemic countries across Latin America

and Southeast Asia highlight the importance of countries that are proven to be useful for disease modelling and mitigation, and lays down important foundations for more detailed, high-resolution studies in the future.

In 2022, the world continues to face daily reports of COVID-19 cases with the introduction of the COVID-19 Omicron variant into various countries globally amidst scattered mobility restrictions. Continuing to analyse dengue incidence rates during the ongoing COVID-19 pandemic against the (temporally and spatially) varied mobility restrictions between different areas will be beneficial in furthering our understanding of how movement dynamics affect infectious disease transmission.

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*R Tedjo Sasmono, Marsha S Santoso
sasmono@eijkman.go.id

Eijkman Centre for Molecular Biology Research, National Research and Innovation Agency, Jakarta 10430, Indonesia

- 1 Harapan H, Ryan M, Yohan B, Abidin RS, Nainu F, Rakib A, et al. Covid-19 and dengue: double punches for dengue-endemic countries in Asia. *Rev Med Virol* 2021; **31**: e2161.
- 2 WHO. Dengue and severe dengue. 2022. <https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue> (accessed Jan 28, 2022).
- 3 WHO. COVID-19 weekly epidemiological update—29 December 2020. Dec 29, 2020. <https://www.who.int/publications/m/item/weekly-epidemiological-update---29-december-2020> (accessed Jan 17, 2022).
- 4 Chen Y, Li N, Lourenço J, et al. Measuring the effects of COVID-19-related disruption on dengue transmission in southeast Asia and Latin America: a statistical modelling study. *Lancet Infect Dis* 2022; published online March 2. [https://doi.org/10.1016/S1473-3099\(22\)00025-1](https://doi.org/10.1016/S1473-3099(22)00025-1).
- 5 Kurniawan A; SMERU Research Institute. Uncertainty about LSRR Implementation in Handling COVID-19. 2020. <https://smeru.or.id/id/content/ketakpastian-penyelenggaraan-psbb-dalam-penanganan-covid-19> (accessed Jan 17, 2022).
- 6 Liebman KA, Stoddard ST, Morrison AC, et al. Spatial dimensions of dengue virus transmission across interepidemic and epidemic periods in Iquitos, Peru (1999–2003). *PLoS Negl Trop Dis* 2012; **6**: e1472.
- 7 Stoddard ST, Forshey BM, Morrison AC, et al. House-to-house human movement drives dengue virus transmission. *Proc Natl Acad Sci USA* 2013; **110**: 994–99.
- 8 WHO. Global strategy for dengue prevention and control 2012–2020. 2012. <https://apps.who.int/iris/handle/10665/75303> (accessed Jan 17, 2022).
- 9 Liyanage P, Rocklöv J, Tissera HA. The impact of COVID-19 lockdown on dengue transmission in Sri Lanka; a natural experiment for understanding the influence of human mobility. *PLoS Negl Trop Dis* 2021; **15**: e0009420.
- 10 Ministry of Health of the Republic of Indonesia. Indonesia health profile 2020. 2021. <https://www.kemkes.go.id/folder/view/01/structure-publikasi-pusdatin-profil-kesehatan.html> (accessed Jan 17, 2022).

Modelling vaccination to mitigate typhoid fever burden

With data derived from meta-analyses of disease burdens in 73 countries eligible for support from Gavi, the Vaccine Alliance, Birger and colleagues have shown

that introduction of routine immunisation of children from age 9 months with typhoid conjugate vaccines (TCVs), with a catch-up programme up to age 15 years,



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