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Optimal dengue vaccination to mitigate Zika cases

Zika and dengue viruses belong to the same Flavivirus family and are primarily transmitted by a common mosquito species *Aedes aegypti*. Zika outbreaks have commonly occurred in dengue-endemic areas, and cocirculation and coinfection of both viruses have been reported. As recent studies on immunological cross-reactivity have confirmed that convalescent plasma following dengue infection can enhance Zika infection, it is important to examine whether and how dengue vaccination in a large population may affect Zika infection dynamics due to antibody-dependent enhancement. In this study, we evaluate the impact of dengue vaccination on Zika infection dynamics through a mathematical coinfection dynamics model. We show that an appropriately designed and optimized dengue immunization program can not only help control the dengue spread but also, counter-intuitively, reduce Zika infections. We estimate that the optimal and critical dengue effective vaccine coverage rates in Mexico, Brazil, and French Polynesia to be (73.6% Xi Huo, Yanni Xiao, Shigui Ruan, and Jianhong Wu).