



## Alternative vector control methods to manage the Zika virus outbreak: more haste, less speed

### Authors' reply

In response to our Comment<sup>1</sup> promoting the development of novel approaches to controlling *Aedes aegypti*, Christophe Boëte and R Guy Reeves argue for the continued reliance on current techniques—mosquito breeding site management and adulticidal spraying—to contain the current Zika virus outbreak. We agree that inclusion of these more traditional approaches might be justified as part of a wider, integrated, vector management programme. However, current vector control strategies for *A aegypti* do not appear to be stopping the rapid increase in the number of dengue cases in recent decades in Brazil (figure).<sup>2</sup> These techniques have repeatedly proven inadequate in protecting contemporary Latin American populations. Even in well resourced mosquito control programmes, insecticides and breeding site management continue to fail in mitigating outbreaks. In Singapore, for example, a large increase in

dengue incidence has been reported in the past 40 years<sup>3</sup> despite decades of sustained and rigorously enforced national control campaigns.<sup>4</sup> Globally, the number of dengue cases reported to WHO has increased steadily from an average of less than 1000 cases per year in the 1950s to more than 3 million cases per year in 2013.<sup>5</sup>

Therefore, we welcome the support from Jérémy Bouyer and colleagues for novel mosquito control technologies in the context of the current Zika virus outbreak. We appreciate that several technologies exist for the control of *A aegypti* mosquitoes but are at different stages of development and testing. The focus of our Comment<sup>1</sup> was on the only two approaches, to our knowledge, which have undergone preliminary field trials in Latin American countries currently with Zika virus outbreaks: the Release of Insects carrying Dominant Lethal genes (RIDL) and the release of *Wolbachia*-infected mosquitoes. Although both approaches have been reported to yield successful trials in Brazil,<sup>6</sup> further field trials are needed to establish whether they could have an effect on Zika virus transmission. Unpublished results suggest that *Wolbachia* reduces the transmission potential of the Zika virus in *A aegypti* and both of these

novel control strategies have been endorsed by WHO to tackle the current Zika virus outbreak.<sup>7</sup>

RIDL effectiveness might be reduced due to the presence of tetracycline in some natural environments. Further research will be needed to assess the spread and concentrations of tetracycline in natural surface waters. In areas where contamination with this drug is deemed a potential threat to effectiveness of this control method, the release of a higher number of RIDL males might be needed.<sup>8</sup> Bouyer and colleagues suggest that the use of the Sterile Insect Technique (SIT) might provide a safer alternative to RIDL. Unfortunately, because of an absence of empirical data from field trials, theoretical analyses are the only sources to assess SIT for *A aegypti* control. Mathematical models indicate that significantly higher numbers of radiation-sterilised males would need to be released to match RIDL effectiveness.<sup>9</sup> Additionally, such models suggest that SIT releases that are insufficient to collapse wild populations might actually risk inflating wild *A aegypti* populations by alleviating competition pressure at the mosquito's larval stages.<sup>8,9</sup>

No mosquito control approach is likely to provide the perfect standalone solution. Furthermore, with the rapidly expanding global distribution of arboviruses and their vectors,<sup>10</sup> different control tools and combinations are more likely to be more suitable in different ecological and epidemiological settings. An independent body dedicated to impartial assessment of the many up-and-coming technologies alongside the traditional approaches to mosquito control is needed to inform a modernised, integrated vector management approach for the containment and mitigation of public health emergencies, such as the ongoing Zika virus outbreak.

We declare no competing interests.

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For more about the use of *Wolbachia* against dengue see <http://www.eliminatedengue.com>

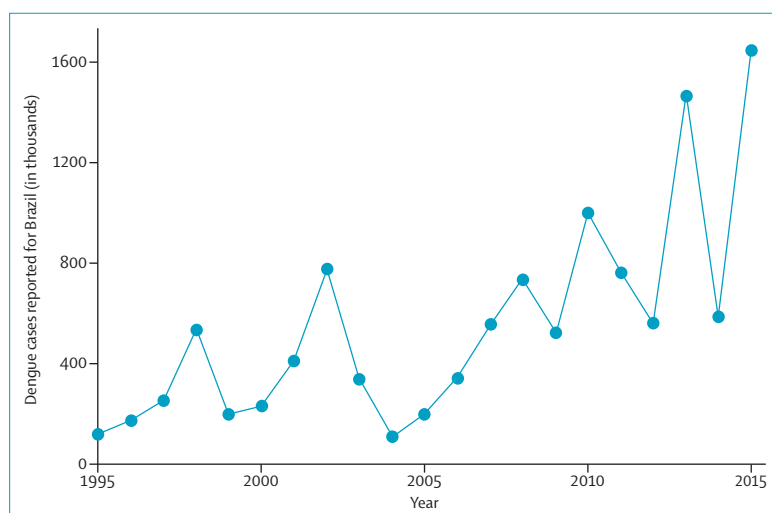


Figure: Increase in dengue cases reported in Brazil during the past 20 years  
Data are from Pan American Health Organization and WHO.<sup>2</sup>

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