

PROJECT WOLBACHIA

A buzzing innovation to stop dengue

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Introduction

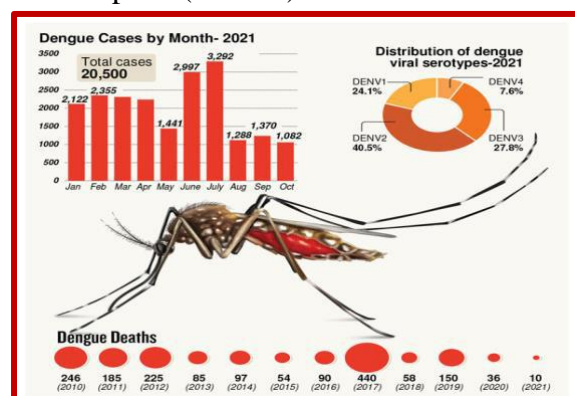
The *Wolbachia pipentis*, a common bacterium that stops the virus from multiplying inside the mosquitoes that spread the disease. Thus, it has been proven to reduce the spread of the dengue virus. Although this bacterium is commonly seen in insects, it does not infect *Aedes aegypti*, a species of mosquito that is a major carrier of dengue. Instead, researchers infect the mosquito with *Wolbachia* in the laboratory

and then release *A. aegypti* into the wild. The goal is to minimize infections in humans by making *Wolbachia*-infected mosquitoes to mate and transfer the bacterium to future generations. If the method works, vast numbers of wild mosquitoes will eventually carry *Wolbachia* and thus be unable to transmit dengue.

What is Dengue?

According to World Health Organisation (WHO), dengue is a viral infection transmitted to humans upon the bite of infected mosquitoes. It is caused by the dengue virus (Genus Flavivirus). The primary vectors transmitting the disease are *Aedes aegypti* mosquitoes (recognizable by the white stripes on its legs and the lyre pattern on its thorax) and to a lesser extent, *A. Albopictus* can breed in any pool of

standing water. It is severe in tropical and sub-tropical (climate) disease.



Impact of dengue

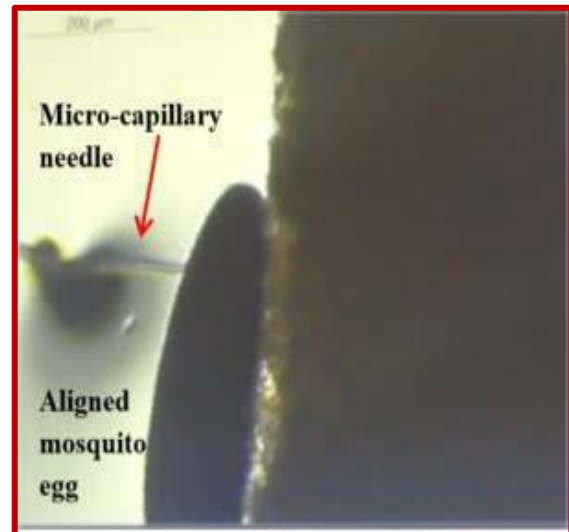
a) Around the globe

The factors such as urbanization coupled with climate change and population growth, has provided a escalating breeding ground for this vector, contributing 100 - 400 million dengue infections globally each year-a 30 fold increase in global incidence for the past 50 years-leaving more than half of the world's population at risk and over 80% are mild and asymptomatic. Around 3.9 billion people are at risk of dengue infection in 129 countries where 70% of the actual burden is in Asia.

b) In India

The Union Health Ministry said in a Rajya Sabha reply that India reported 1,64,103

dengue cases in 2021 and the death rate (deaths per 100 cases) has been sustained at less than 1% since 2008.



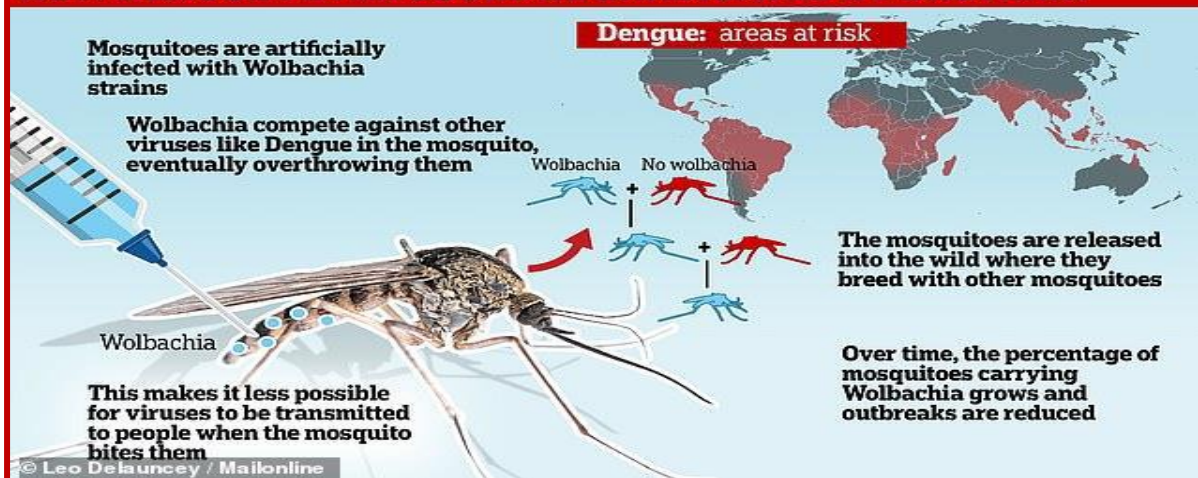
How to infect mosquito with *Wolbachia*?

In the laboratory, microscopic needles were used to take the microbe (*Wolbachia*) from the fruit fly and inject it directly into young mosquito eggs. *Wolbachia* would often disappear in one or two generations of mosquito breeding. Conditioning the microbes before injecting them into mosquitoes was important to get these bacteria, which were used to live in fruit flies, accustomed to their new hosts. To do

so, extract *Wolbachia* from fruit flies and then grew it in mosquito cell lines.

Then, the *Wolbachia*-infected mosquitoes breed with their wild counterparts which result in a growing percentage of the bacterium in those mosquitoes (Population Replacement Strategy). Researchers said that this method does not suppress mosquito populations or involve genetic modifications.

HOW DENGUE FEVER COULD BE ERADICATED BY BACTERIA



Effectiveness of *Wolbachia* method

Researchers noticed that the dengue virus has trouble growing in *Wolbachia*-infected

mosquitoes by blocking the replication of dengue virus. To firmly establish the

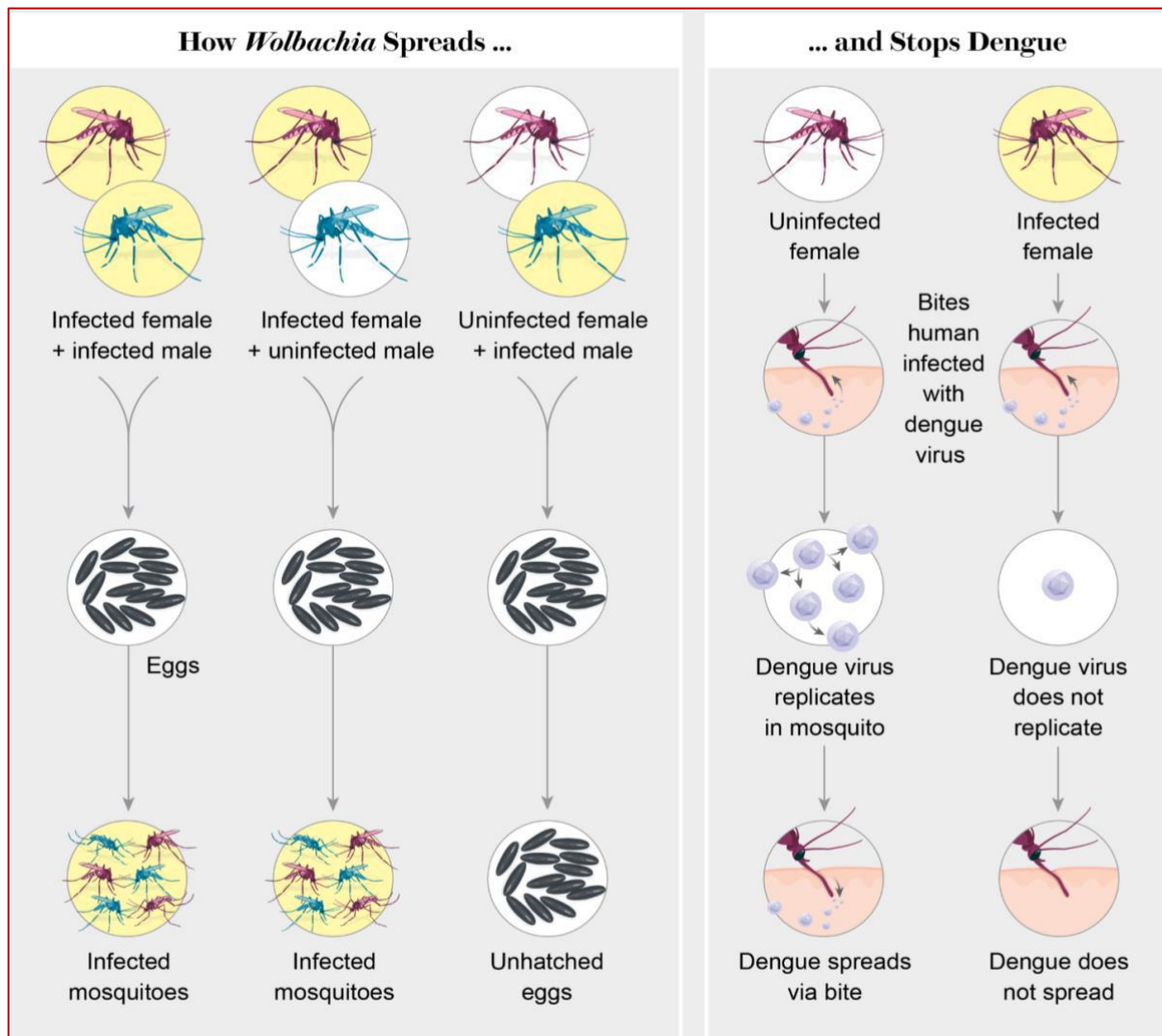
effectiveness of *Wolbachia* method, compare the dengue rates in areas where *Wolbachia* mosquitoes were released against those where they were not. A recent research in Yogyakarta City, Indonesia,

Does *Wolbachia* harm humans?

Researchers said that *Wolbachia* poses no apparent threat to humans. Laboratory experiments have found that the bacterium cannot be passed on to humans, because it is too big to travel down the mosquitoes’

where *Wolbachia* was successfully implemented resulted a 77% decrease in dengue incidence and an 86% decrease in hospitalizations in areas.

salivary duct and into the human bloodstream. There has been no sign that *Wolbachia* harms the environment, either.



Conclusion

The *Wolbachia* mediated biological method of the dengue control strategy has been successfully trialed in many areas of dengue-prone countries of the world resulting in significant reductions in dengue

incidence. This new observation is fascinating. One day, we hope, a mosquito bite will leave nothing more consequential than an itchy bump.

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