Controlling Dengue Using Bacteria

Why in News

Researchers from the **World Mosquito Program** have used **mosquitoes infected with Wolbachia bacteria** to successfully control dengue in Yogyakarta city of **Indonesia.**

> The World Mosquito Program is an Australia-based not-for-profit initiative that exists to protect the global community from mosquito-borne diseases.

Wolbachia

- Wolbachia are natural bacteria present in up to 60% of insect species, including some mosquitoes.
- However, Wolbachia is **not** usually found in the *Aedes aegypti* mosquito, the primary species responsible for transmitting human viruses such as Zika, dengue, chikungunya and yellow fever.
- Wolbachia is **safe** for humans, animals and the environment.

Key Points

- **About:** The Aedes aegypti mosquito, that spreads **Dengue** and other diseases such as **chikungunya, Zika** and **yellow fever** cannot do so when they are artificially infected with a bacterium, Wolbachia.
  > The bacteria Wolbachia **"inhibits" viral infection,** that is, even if people encounter mosquito bite, they will not be infected. This happens because bacteria does not allow the virus to **replicate** in the mosquito thereby minimising its number within the mosquito.
- **Method:** The scientists **infected some mosquitoes with Wolbachia** and then **released** these in the city where they **bred with local mosquitoes,** until nearly all mosquitoes in the area were carrying Wolbachia bacteria. This is called the **Population Replacement Strategy.**

- **Results:** At the end of 27 months, the researchers found that the **incidence of dengue was 77% lower** in areas where Wolbachia-infected mosquitoes had been released, as compared to areas without such deployments.
    - This method does not only block Dengue Virus but also **many other viruses** present in mosquitoes.
- **Mass Production:** A French company InnovaFeed, which produces insects to feed livestock, is partnering with WMP to develop the first industrial-level production of Dengue- controlling mosquitoes.
- **Other Developments: Indian Council of Medical Research (ICMR)** also has been working on a similar project developing a strain of Aedes aegypti containing Wolbachia, known as **Puducherry Strain.**
    - The strain was developed at the **Vector Control Research Centre (VCRC),** Puducherry in collaboration with Monash University in Australia.

Dengue

- Dengue is a **mosquito-borne tropical disease** caused by the **dengue virus** (Genus *Flavivirus*), transmitted by several species of mosquito within the genus ***Aedes,*** principally *Aedes aegypti*.
- Symptoms include fever, headache, muscle and joint pains, and a characteristic skin rash.
- There are four strains from Type I-IV, of which **Type-II and IV** are considered more severe.
- Incidence of dengue has **grown dramatically** around the world in recent decades, with a vast majority of cases **under-reported,** according to the **World Health Organization (WHO).**
- WHO estimates 39 crore dengue virus infections per year, of which 9.6 crore show symptoms.
- India registered over 1 lakh dengue cases in 2018 and over 1.5 lakh cases in 2019, according to the **National Vector-Borne Disease Control Programme (NVBDCP).**
    - **NVBDCP** is the central nodal agency for prevention and control of six vector borne diseases i.e. Malaria, Dengue, Lymphatic Filariasis, Kala-azar, Japanese Encephalitis and Chikungunya in India. It works under the **Ministry of Health and Family Welfare.**
- The dengue vaccine **CYD-TDV** or **Dengvaxia** was approved by the **US Food & Drug Administration** in **2019,** the first dengue vaccine to get the regulatory nod in the US.
    - Dengvaxia is basically a **live, attenuated dengue virus** which has to be administered in people of ages 9 to 16 who have laboratory-confirmed previous dengue infection and who live in **endemic areas.**

Source: IE