



SANOFI PASTEUR, A KEY LEADER IN THE FIGHT AGAINST YELLOW FEVER

- Yellow fever is a serious acute viral hemorrhagic disease transmitted by infected mosquitos. There is no cure for yellow fever. Treatment is symptomatic and aims at reducing symptoms for the comfort of the patient, but it does not stop the evolution of the disease, which can be lethal.
- According to the World Health Organization (WHO), vaccination is the single most important measure for preventing yellow fever⁽¹⁾. Large-scale vaccination has been very effective. However, where vaccination campaigns have ceased and vaccination coverage has not been sustained, the disease has recurred, leading to major outbreaks in countries where the disease was considered to have all but disappeared⁽²⁾.
- The Sanofi Pasteur vaccine against yellow fever produced in France:
 - is registered in more than 100 countries with more than half a billion doses distributed to residents and travelers to endemic areas since vaccine launch in 1983
 - requires a single injection, making it practical and easy to use
 - confers sustained immunity and life-long protection with a single dose ⁽³⁾
 - was prequalified by the WHO for purchase by the United Nations in 1987. It is the only yellow fever vaccine to have succeeded in maintaining an uninterrupted WHO prequalification status.
- Sanofi Pasteur's longstanding commitment to the fight against yellow fever is reflected in significant investments to:
 - increase production capacity to better meet the needs of endemic regions
 - provide an uninterrupted supply of yellow fever vaccine.
- Every year since 2003 Sanofi Pasteur has been a major contributor to the emergency yellow fever vaccine stockpile funded by Gavi, the Vaccine Alliance.
- In 2018, an all-time record of 27.5 million yellow fever vaccine doses were delivered to Africa in response to outbreaks on the continent.
- Sanofi Pasteur is one of the key partners of Eliminate Yellow fever Epidemics (EYE), a global strategy to Eliminate Yellow fever Epidemics^(3, 4).

ABOUT YELLOW FEVER

- Yellow fever is transmitted by mosquitoes belonging to the *Aedes* and *Haemagogus* species. The term "yellow" refers to the jaundice that affects some patients⁽¹⁾.
- There are three types of disease transmission cycles: sylvatic (or jungle), urban, and intermediate. Once someone has contracted the virus, the incubation period lasts from 3 to 6 days and is followed by the development of the disease, which may have one or two phases^(1, 2):

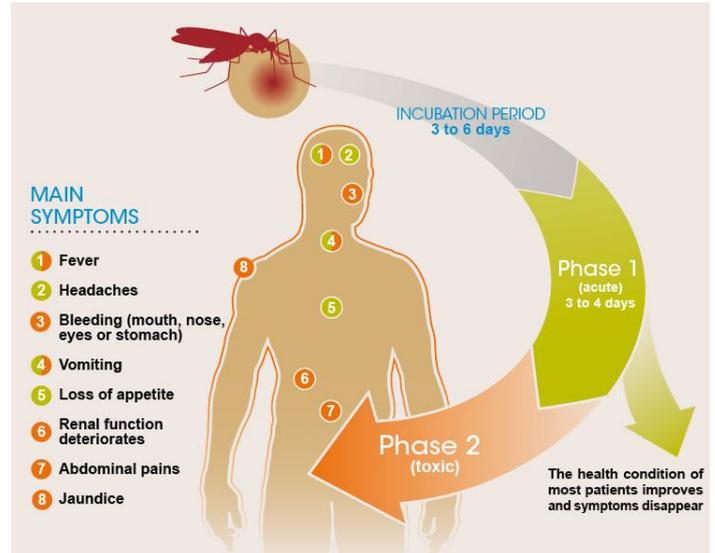
THE ACUTE PHASE:

- Fever, muscle aches (back pain, headache), chills, loss of appetite, nausea or vomiting.
- Most patients see their state of health improve and their symptoms disappear after 3 to 4 days.

THE "TOXIC" PHASE:

- 15% of patients have a second phase following the initial remission.
- High fever comes back and several body systems are affected. The patient quickly shows signs of jaundice and complains of pain appearing in the mouth, nose, eyes and stomach. When this is the case, blood can be found in vomit and feces. The renal function also deteriorates.
- Half of the patients who enter the toxic phase die within 7 to 10 days
- Patients surviving yellow fever experience prolonged weakness and fatigue but recover without significant liver or kidney damage.

HUMAN YELLOW FEVER SYMPTOMS



PUBLIC HEALTH TOOLS FOR PREVENTION AND CONTROL

- According to WHO, four measures are essential to eliminating yellow fever outbreaks in the long term⁽⁴⁾:
 - Strong disease surveillance and diagnostic capacities that allow early detection of outbreaks and rapid implementation of control measures.
 - Vector surveillance and control targeting *Aedes aegypti* and other *Aedes* species to inform where there is a risk of urban outbreak so that appropriate measures can be taken.
 - Vaccination in at-risk areas, with coverage rate > 80%.
 - Vaccination of travelers and improving adherence to International Health Regulations.

Safe, efficient and cost-effective insecticides exist, but they cannot be used in wild areas, and they have limited impact in cities. Insecticide-treated bed nets have limited impact as well because *Aedes* mosquitoes bite during daytime⁽⁴⁾.

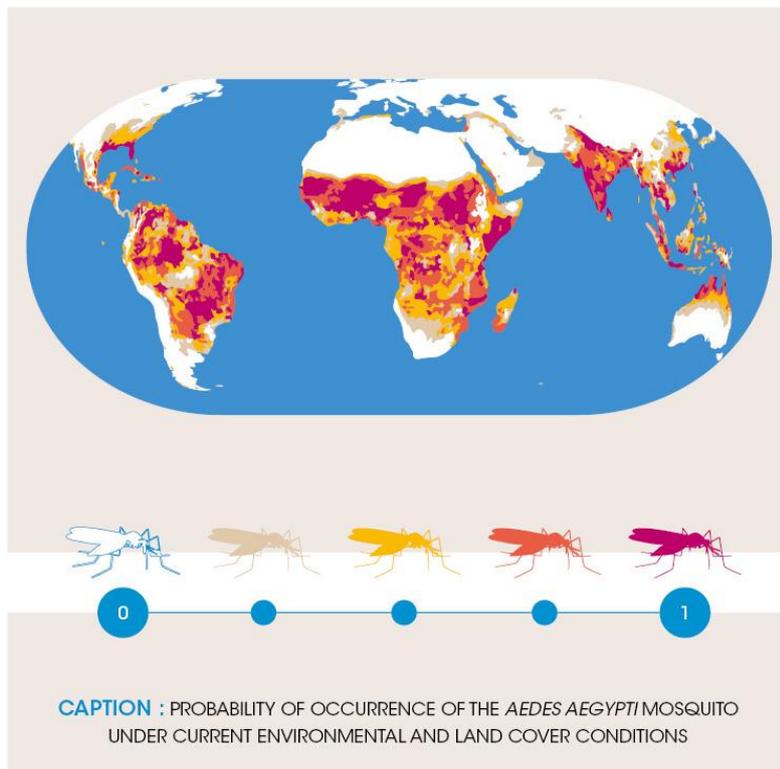
KEY FIGURES OF YELLOW FEVER



VACCINATION: THE SINGLE MOST IMPORTANT MEANS OF PREVENTION

- To support vaccination against yellow fever, several international initiatives have been established, including⁽⁴⁾:
 - The creation of an emergency stockpile of yellow fever vaccine to ensure rapid response to outbreaks reported in high-risk countries. Up to 2016, the 6-million doses stockpile had been sufficient to control outbreaks in a one-year period. In 2016, the stockpile was replenished twice for a total of 18 million doses.
 - The eliminate Yellow Fever Epidemics (EYE) Strategy partnership, steered by WHO, UNICEF and Gavi, the Vaccine Alliance, has three strategic objectives:
 1. Protect at-risk populations through preventive mass vaccination campaigns, catch-up campaigns, introduction of yellow fever vaccination in routine immunization schedules, and improvement of routine immunization coverage → **No epidemics**
 2. Prevent international spread by vaccinating high-risk workers, applying the International Health Regulations, and building resilient urban centers with readiness plans that make it possible to quickly implement an emergency vaccination campaign or launch vector control activities in cities → **No exportation**
 3. Contain outbreaks rapidly via early detection, adequate stockpile replenishment, and the identification of additional options to cope with an increasing demand for yellow fever vaccines → **No sustained transmission**

MOSQUITOES BELONGING TO THE *Aedes* AND *Haemagogus* SPECIES



SOURCE: World Health Organization. A global strategy to Eliminate Yellow fever Epidemics (EYE), 2017-2026. Available at <https://apps.who.int/iris/handle/10665/272408>.

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- 3 **World Health Organization (WHO)**. Weekly epidemiological record, 2017, 16, 193-204. Available at <https://www.who.int/wer/2017/wer9216/en/>.
- 4 **World Health Organization (WHO)**. A global strategy to Eliminate Yellow fever Epidemics (EYE), 2017-2026. Available at <https://apps.who.int/iris/handle/10665/272408>.
- 5 Brent SE, Watts A, Cetron M, et al. International travel between global urban centres vulnerable to yellow fever transmission. Bull World Health Organ. 2018;96(5):343–354B. doi:10.2471/BLT.17.205658.



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