



## Artificial Light to Fight Against Malaria

**For Prelims:** Malaria, Malaria Vaccine, World Health Organization, Artificial Light, Light Emitting Diode (LED) light

**For Mains:** Measures and Strategies to Prevent the Spread of Malaria

### Why in News?

Recently, a study demonstrated that [artificial lights](#) can be used as a weapon to fight against [malaria](#).

### What are the key highlights?

- Light plays a crucial role in the **regulation of [biological clocks](#)** such as timing of breeding among birds, hunting by lions and sleeping patterns of humans.
- The timing of day and night has **remained relatively constant** owing to the earth's rotation, life on the planet has evolved with such regular day-night cycles.
- **Melatonin** hormone is a gene responsible for **regulating the sleep-awake cycles**.
  - It is found **in plants as well as animals**.
- **A rapid change in the natural sleep cycles** has been observed on account of increased use of artificial light.
- Currently, around **80%** of the world's population is living under **artificially lit skies**.

### What can be the Impact of Artificial Light on Malaria?

- Artificial light can **alter mosquito biology**.
- Malaria-transmitting **mosquito** species "*Anopheles*" **feeds at night**.
- Using artificial light, the mosquitoes **can be tricked to behave as if it's daytime**.
- A short pulse of **[Light Emitting Diode \(LED\)](#) light**, commonly can **delay the onset of biting by hours in the mosquito "Anopheles"**.
- Therefore, it **reduces biting rates and malaria transfer**.

### What are the Challenges?

- The first challenge is that it is still unclear **how artificial lights might be used to lessen the risk of malaria infections**.
- Demonstration of the effects of artificial light in controlled laboratory settings is one thing, but **rolling out their use as an effective vector control strategy** is quite another.
- Moreover, **LED light can have negative impacts on human health like disrupted sleep**.

### What is Malaria?

- **About:**
  - **[Malaria](#)** is a **life-threatening mosquito borne blood disease caused by plasmodium**

**parasites.** It is predominantly found in the **tropical and subtropical areas of Africa, South America as well as Asia.**

- The parasites spread through the **bites of infected female Anopheles mosquitoes.**
- After entering the human body, parasites initially multiply within the liver cells and then **attack the [Red Blood Cells \(RBCs\)](#) resulting in their rupture.**
- There are **5 parasite species** that cause malaria in humans, and **2 of these species - *Plasmodium falciparum* and *Plasmodium vivax* - pose the greatest threat.**
- **Symptoms** of malaria include **fever and flu-like illness, including shaking chills, headache, muscle aches, and tiredness.**
- It is **preventable as well as curable.**

▪ **Malaria Vaccine:**

- Known by its lab initials as **[RTS, S but branded as Mosquirix](#)**, the vaccine has passed lengthy scientific trials that found it to be **safe and reducing the risk of malaria by nearly 40%**, the best recorded.
- It was developed by **GlaxoSmithKline (GSK)** company and **approved by the European Medicines Agency in 2015.**
- The RTS, S vaccine **trains the immune system to attack the malaria parasite (*Plasmodium (P.) falciparum*, the deadliest species of the malaria parasite).**

▪ **Global Scenario:**

- Although a **decline** in total no. of cases from about **81.1 cases per 1,000 population to 59 per 1,000 since 2000**, the world has not yet won the war against Malaria.
- Globally, **around 240 million cases and 6,00,000 deaths** were reported in 2020.
- **Africa carries the world's largest disease burden for Malaria.**
- In Africa, **94% of global cases and 96% of global deaths** have been recorded. It is alarming that **children aged five or younger** account for **80% of these deaths.**

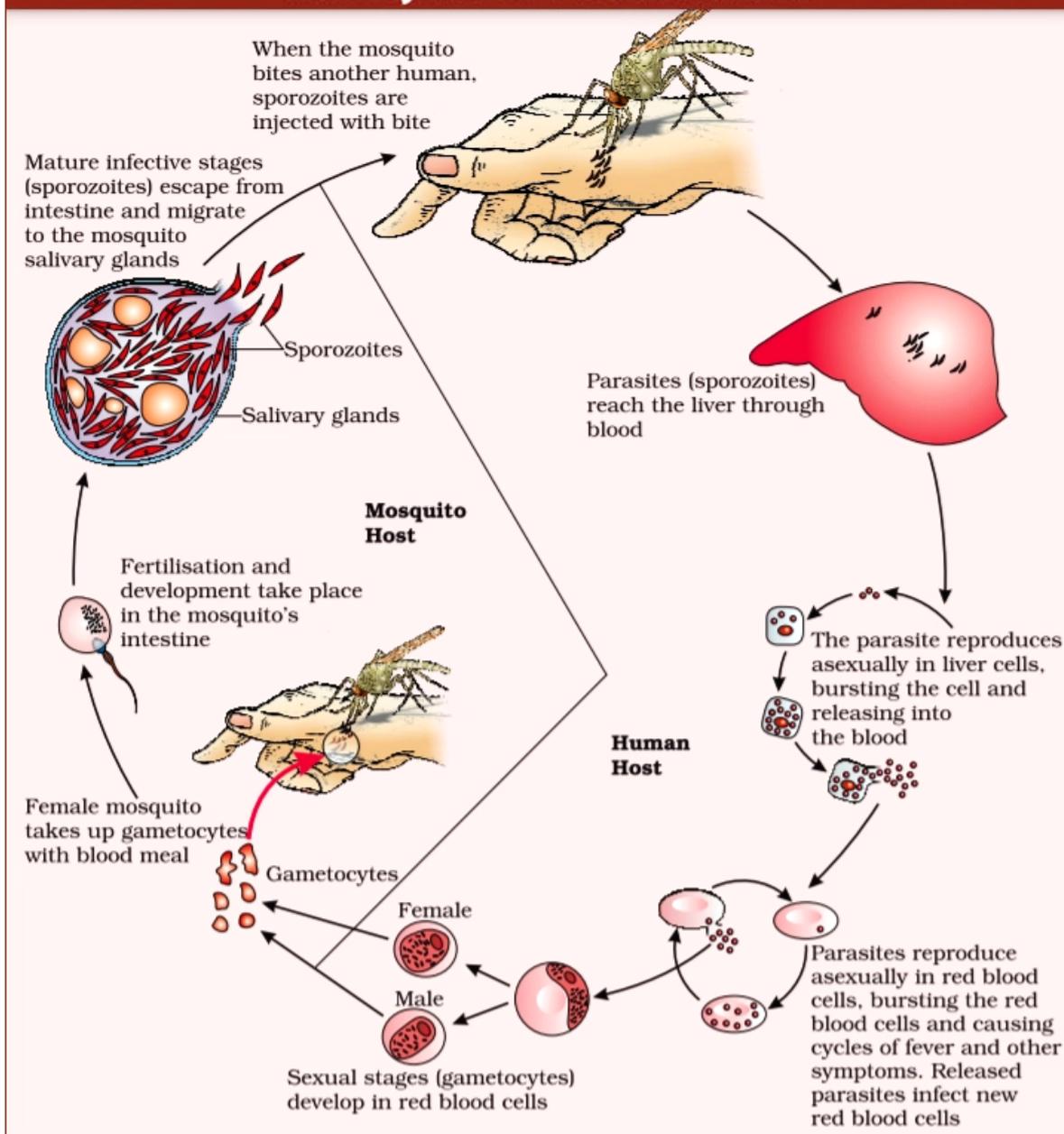
▪ **Challenges**

- Though vaccines look promising, **antimalarial drug resistance** specifically in East Africa is rising.
- **Genetic mutations in the parasite** enables them to **escape routine diagnosis.**
- **Increased resistance to insecticides** has been evolving in the mosquitoes.

▪ **Need of the hour**

- This situation undermines the **requirement for sharpening the vector control options, and exploring new strategies.**

# Life Cycle of Plasmodium



## Way Forward

- **Impacts of artificial light use needs to be fully understood** before thinking about the implementation strategy.
- The growing body of work on this issue suggests that this definitely **needs more attention from the [World Health Organization \(WHO\)](#) and other relevant bodies.**

## UPSC Civil Services Examination, Previous Year Question

**Q. Widespread resistance of malarial parasite to drugs like chloroquine has prompted attempts to develop a malarial vaccine to combat malaria. Why is it difficult to develop an effective malaria vaccine? (2010)**

- (a) Malaria is caused by several species of Plasmodium
- (b) Man does not develop immunity to malaria during natural infection
- (c) Vaccines can be developed only against bacteria
- (d) Man is only an intermediate host and not the definitive host

**Ans: (b)**

**Exp:**

- **Malaria is a life-threatening disease caused by Plasmodium parasites** that are transmitted to people through infected **female Anopheles mosquitoes**.
- The malarial parasite has an extraordinary ability to evade the immune system, which explains the difficulty in developing an effective malaria vaccine.
- **RTS,S/AS01 (RTS,S) is the first and, to date, the only vaccine to show partial protection against malaria in young children.**
- **Therefore, option (b) is the correct answer.**

**[Source: DTE](#)**

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