**Can we eradicate malaria?** Many countries have achieved malaria-free status, but stopping it globally will be difficult, particularly in places where the parasite is endemic, finds **Jason Arunn Murugesu**

FORTY-TWO countries or territories have been certified as malaria-free by the World Health Organization (WHO). This has largely been credited to the use of bed nets, insecticides and efficient diagnoses and treatments for the parasitic condition.

But with climate change creating new breeding grounds for malaria-carrying mosquitoes and the roll-out of an effective vaccine being too expensive for many countries, malaria elimination worldwide isn't straightforward.

An estimated 247 million cases and 619,000 deaths from malaria occurred in 2021, of which at least 95 per cent were in Africa, where children under 5 are the most at risk. In 2020, malaria transmission was occurring in 85 countries.

The WHO certifies a country as malaria-free if no cases have been contracted there for at least three years and it shows it has the capacity to react quickly if malaria starts spreading again.

Azerbaijan and Tajikistan are the two most recent countries to be added to the malaria-free list. They used traditional methods of controlling malaria – such as insecticides, mosquito nets and removing pools of water that the insects use to breed – but they also had relatively few cases. This makes the parasite easier to eradicate than in many parts of Africa, where it is endemic, says Estrella Lasry at The Global Fund.

For example, during this century, Azerbaijan's cases peaked at 8 cases per 1000 people in 2000, compared with Ghana's 431 cases per 1000 people in the same year.

Katie Ewer at the University of Oxford hopes a new vaccine that she was involved in developing – called R21 – will help control malaria in endemic regions.

The WHO is coordinating a programme that delivers the first malaria vaccine – RTS,S – to the most at-risk countries, providing doses in Ghana, Kenya and Malawi. RTS,S is about 36 per cent effective at preventing people from developing malaria symptoms and costs around €37.20 ($41) for a four-dose regimen.

In contrast, R21 was 77 per cent effective at preventing malaria in trials. But Ewer says it is difficult to compare the efficacy of the two vaccines as the trials testing their effectiveness had different designs and they haven't been analysed in a head-to-head study.

In recent weeks, Ghana and Nigeria became the first countries to approve R21 for children aged between 5 and 36 months. The WHO wants more data before deciding whether to recommend it. The four-dose regimen will cost about $12, says Ewer.

The Serum Institute of India, the world's largest vaccine manufacturer, has said it could potentially produce 200 million doses of R21 a year. That would probably meet the global demand "if cost was no issue", says Ewer.

Unfortunately, that isn't the case. Global funding for malaria control and elimination was estimated at $3.5 billion in 2021, less than half of the $7.3 billion required annually to achieve the goal of cutting cases and deaths by at least 90 per cent by 2030, according to a WHO report. At this rate, global eradication could take decades, says Lasry.

**77%**

**Effectiveness of new malaria vaccine R21 in trials**

Vaccines aside, climate change will also probably slow these efforts, says Lasry. Mosquitoes live longer in hotter temperatures and this increased lifespan could push up malaria transmission.

Hotter temperatures may also move malaria-carrying mosquitoes to non-endemic regions, leading to cases among people without immunity, says Lasry.

Extreme weather events, such as flooding, can also hamper interventions. "If you've recently launched a bed net campaign and then there's flooding or a cyclone, you will lose those nets," says Lasry. These can also lead to stagnant pools of water, increasing mosquito breeding sites, she says.

Insecticide resistance is another worry, says Charles Wondji at the Liverpool School of Tropical Medicine, UK. It took about 10 years for mosquitoes to develop resistance to the leading insecticide pyrethroid, with a larger – and more expensive – dose now being required to kill the insects, he says.

For now, there are still effective options, with the WHO recently recommending nets containing pyrethroid and the newer insecticide pyrrole. "These could last a decade or so before resistance is a massive issue," says Wondji.

In a trial published earlier this year, people in Benin who slept under these nets were 40 per cent less likely to be infected with malaria over the next 18 months compared with those who slept under nets with just pyrethroid.

Insecticides can always be developed, says Brian Greenwood at the London School of Hygiene and Tropical Medicine. This, along with R21, makes him optimistic that we will see advances towards eliminating malaria. "It's likely there will be steady progress in the number of countries that achieve malaria elimination in the coming decade," he says. But funding is a real issue, says Greenwood.

There also isn't one approach to success. For example, Azerbaijan and Tajikistan partly achieved their malaria-free status by introducing mosquito-eating fish, but these countries have far fewer insect breeding sites than sub-Saharan Africa, where such an approach would be a much bigger task, says Greenwood.

"I don't think we have or will find a silver bullet," he says. ▮

**Insecticide is used in Odumase, Ghana, to kill mosquitoes**

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