



10 Things to know about the GM mosquito release in Burkina Faso

4 July 2019

On 1st July, genetically modified (GM) “male-sterile” mosquitoes were released in Burkina Faso, in the village of Bana, part of District 7 of the Municipality of Bobo Dioulasso. This release was conducted by the Target Malaria research consortium, whose ultimate aim is to make open releases of “gene drive” mosquitoes, with the goal of reducing the population of *Anopheles* mosquitoes, which can transmit the parasite that causes malaria. Their claim is that reducing the mosquito population could reduce the risk of malaria transmission and hence disease incidence. This release has been widely denounced by civil society organisations from Africa and around the world. Some scientists have also raised concerns regarding the use of GM mosquitoes and potential health and environmental risks.

1. These are the first releases of GM mosquitoes in Africa

To date, no GM mosquitoes or any other GM animal species have been released anywhere in Africa. Globally, no GM mosquitoes have ever been commercialised. There have been limited trial releases in a few countries (Cayman Islands, UK – a Caribbean overseas territory, Panama, Brazil and Malaysia) but the projects were dropped, except in Brazil, due to failures and costliness of the technologies.

2. What type of GM mosquitoes are these?

These mosquitoes are designed to be “male sterile”, where the genetic modification causes the male mosquitoes to be sexually sterile and thus not able to reproduce. This particular GM mosquito has never been released anywhere in the world, even for trial experiments. The modified species is *Anopheles coluzzii*.

3. What is the purpose of this experiment?

The release was conducted for various purposes. The stated objective is to estimate the daily survival rate and movement of the GM mosquito. Further, Target Malaria also views this phase of the research in the following terms:

- First, as a training exercise for researchers.
- Second, as a ‘governance experiment’ to test the national biosafety regulatory infrastructure.
- Third, as a ‘trust’ experiment to gain public acceptance for the project and future larger-scale releases.

Target Malaria acknowledges that there are no direct benefits to the local population from this release, in terms of malaria control. This is not an early stage trial of the GM mosquitoes intended to be tested later for their impact on malaria, but a release of an entirely different GM mosquito. Thus, it is an entirely unethical experiment to conduct on the people of Bana.

4. Who is conducting the experiment?

The release was conducted as part of the Target Malaria project by the Institute for Research in Health Sciences (IRSS) of Burkina Faso. Target Malaria is an international research consortium, led by Imperial College, UK. It includes additional institutions in the US, UK, Burkina Faso, Uganda, and

Mali. The project receives core funding from the Bill and Melinda Gates Foundation, as well as the Open Philanthropy Project, awarding an estimated US\$ 75 million and US\$ 17 million respectively. Some researchers have also received funding from the United States Military research arm, the Defence Advanced Research Projects Agency (DARPA), which is the largest funder of genetically engineered “gene drive” organisms (see below).

5. Potential risks of these GM mosquitoes to human health

Target Malaria acknowledges that while the experiment is supposed to release only male GM mosquitoes, which do not bite and are thus assumed to pose less risk to humans, incidental releases of a small number of biting female GM mosquitoes is bound to occur. Previous GM mosquito trials conducted elsewhere resulted in larger numbers of female GM mosquitoes being released than expected. Since female mosquitoes transmit disease through biting, the release of females poses some risk to humans. The release of GM females also raises the potential for the GM mosquitoes to persist in the environment, as they can mate with wild type males.

There are also uncertainties surrounding whether or not the GM mosquito release can have an impact on the abundance of other mosquito species that transmit disease. Further, there are no published data on:

- potential unintended effects of the genetic modification on the mosquito, such as increased capacity to transmit mosquito-borne disease, or
- whether there are toxic or allergenic properties in the saliva that will be transmitted by biting.

Question marks also remain over the stability of the genetic material introduced into the mosquitoes and whether or not it is likely to mutate, with potentially unpredictable effects. As such, claims of safety by Target Malaria remain independently unverifiable.

6. Potential risks of these GM mosquitoes to environment

Potential effects, such as toxicity to non-target organisms including mosquito predators, have not been assessed. In Spain, authorities rejected the release of a GM fly because the company did not provide data on this. The ecological role of mosquitoes is also not completely understood, raising uncertainties regarding the effects of the genetic modification on non-target species.

7. Will the mosquitoes be contained within the area of the trial site?

Target Malaria research claims that mosquitoes travel a limited distance of a few hundred metres. However, independent studies show that mosquitoes in Africa can be transported large distances, such as across the Sahel, carried by winds. This raises concerns for the potential spread of GM mosquitoes elsewhere in Burkina Faso, as well as to other nations that, additionally, have not given authorisation for GM mosquito releases. Target Malaria claim they will monitor the dispersal of GM mosquitoes within the trial site, leaving concerns regarding the lack of monitoring beyond this site.

8. What are the limitations of the risk assessment published by Target Malaria?

There has been no published risk assessment of the potential risks of this GM mosquito to the environment and human health, apart from the environmental risk assessment published by Target Malaria. This was limited in that it did not assess all the human health and environmental risks raised in points 5 and 6. Further, it relies on unpublished data from Target Malaria to assert safety. Target Malaria’s risk assessment acknowledges that it is an incomplete evaluation of all potential risks, including social endpoints, as identified in Burkina Faso’s legislation.

9. Have the communities concerned given their prior informed consent to these experiments?

There has been no genuine public consultation apart from “public engagement” activities conducted by Target Malaria. The lack of a comprehensive, published environmental risk assessment, which has been subject to open and transparent public consultation, makes it impossible to implement requirements for fully informed consent. According to the World Medical Association’s Declaration of Helsinki, which is based on the Nuremberg Code and outlines the internationally agreed ethical principles for medical research involving human subjects, it is required that research participants are adequately informed about the risks and anticipated benefits of the study, as part of the process of informed consent. Unfortunately, testimonies from a range of people from villages in the areas where Target Malaria is operating explain that they have not been properly informed about the project or its potential risks.

10. Future releases of riskier GM mosquitoes planned for Burkina Faso

This GM release is considered Phase I of the Target Malaria project. Phase II will involve trial releases of a different type of GM mosquito. Though there is limited information, it is expected that these mosquitoes will be modified to bias the offspring to produce mainly males. This GM mosquito is likely to persist for longer in the environment, increasing safety concerns. The ultimate aim, in Phase III, is the release of “gene drive” mosquitoes. Gene drive organisms are a new, extreme type of GM organism designed to spread a genetically modified trait through an entire population, with the potential to eradicate a whole population and species.

Gene drive organisms are still in developmental stages, and have never been commercialised. Target Malaria’s gene drive mosquitoes may be the first such gene drive application anywhere in the world. Due to the extreme nature of gene drives and their ability to spread and persist, they present unprecedented concerns for human health and the environment, which will be extremely difficult to assess or predict.

As such, more than 170 civil society organisations have called for a moratorium on any environmental release. Their potential release in Burkina Faso raises concerns for turning a nation into an outside laboratory. Further, there remains limited evidence to show that they will be effective in contributing to reducing malaria.