

Mosquito collection methods

Entomological research underpins every facet of Target Malaria’s work, and a significant proportion of that research would not be possible without field collections. Field entomology gives Target Malaria the necessary baseline data to evaluate local wild mosquito populations and their behaviours. This knowledge is crucial to help understand *Anopheles* mosquitoes species and to model potential future vector-control interventions using gene drive mosquitoes.

Field entomology teams use several methods to carry out these collections, including indoor spray catches, human landing catches, swarm collections and larval collections. Depending on the purpose of the research, team members may aim to collect male or female mosquitoes, larvae or adults, or different localised subspecies. The technique used will vary in function of the type of mosquitoes being sought and the scientific uses to which specimens will be put. Most of the techniques used by Target Malaria are long-established sampling methodologies for sampling malaria vectors but the project is one of the first to use swarm capture for regular sampling of male mosquitoes.

It is important to note that all collection activities are carried out in collaboration with local communities. Field collection is a labour intensive process, requiring field entomology teams to be on site at the point of collection for several days each month. Large portions of this time are used to engage with local stakeholders to ensure that they understand how and why the collections are being carried out, to share information and feedback between local residents and the collection teams, and to ensure residents have the opportunity to meaningfully give or revoke consent to the collections being undertaken, whether it is individual consent for activities happening in the household of an individual or community-wide agreement for activities taking place at village level.



To guarantee that a representative sample of local mosquito populations is obtained collection sites are spread out in many different areas of the target region or village.

Spray Catches

Spray catching is carried out indoors and involves dispersing a small amount of insecticide in a room in which mosquitoes are resting. In each case, the first step is to explain the process to the occupants of the house in which the spray catch will take place and seek their consent to proceed. The team will only go ahead if that consent is granted. The occupants then leave the house, sheets are draped across all surfaces and furnishings, and the room is sprayed.

After a brief period, the project teams are able to gather up dead mosquito specimens that have dropped on the sheets, which can then be examined, counted and brought back to the laboratory for analysis. Although spray catches may exhibit superficial similarities to pesticide-based vector-control and larvicidal interventions, spray catches are not a vector-control technique and will have no impact on the presence of mosquitoes in the targeted area over the medium and long-term. It will therefore also not affect the incidence of malaria or any other disease transmitted by mosquitoes.

Swarm Collections

Swarm collections are carried out outdoors at dusk with specialised nets, in locations where wild mosquitoes habitually congregate and exhibit swarming behaviours. The knowledge of local communities is often essential in identifying these sites, and so collaborative information sharing is a key part of this activity. Once the swarming sites have been identified and marked, field entomology teams, and occasionally local casual workers, will collect adults using sweeping nets.

Human Landing Catches

Catching live mosquitoes is necessary to be able to study aspects of their physiology and behaviour that cannot be investigated by collections of resting mosquitoes and dead specimens, and to help estimate local population numbers. Once caught, live specimens may be kept in insectaries, and may be used to lay eggs to replenish insectary colonies, to examine the ways and rates at which resistance to insecticides arises in populations, or to be marked with dye and re-released as part of "mark, release, recapture" studies.

Human landing catches are for now the only sufficiently accurate measure of malaria mosquito abundance that can support modelling of local malaria transmission dynamics. Modelling these transmission dynamics is important for planning vector control interventions, such as the ones being researched by Target Malaria.

Human landing catches involve volunteers sitting outdoors, with only the skin of their arms or lower legs exposed. As mosquitoes land on their skin, the volunteers quickly catch them before they bite. This process always takes place overnight, when the biting populations of the mosquito species that Target Malaria is researching are most active. Generally, two teams work together at each location, closely supervised by members of the research team. Volunteers participating in human catches are closely and actively monitored for malaria infections, and if signs of the illness develop within 21 days of the human catch, they are provided with treatment, in line with national malaria policies.

Larval Collections

Juvenile mosquitoes live as larvae in various aquatic habitats. They often share these breeding sites with other mosquito species and sometimes other aquatic insects. To understand larval breeding site preferences and the interactions between the malaria mosquito and other insect species, the field entomology team collects samples as part of their baseline collections.

