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🌐 Standard Operating Procedure for human baited tent traps to sample host-seeking mosquitoes

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The purpose of this SOP is to outline the materials and processes required to deploy human baited traps to collect host-seeking adult mosquitoes.

Description: The principal behind human baited tent traps is to utilise one person as a bait to attract mosquitoes, which are then trapped by the tent structure. There are two components: the net to protect the human bait from mosquito bites, and the outer tent that retains the mosquitoes. The traps are termed both tent traps or double net traps.

Target species and physiological states: Captures host-seeking females of many species.

Entomological surveillance indicators: Adult vector occurrence and density as well as adult vector behaviour (human biting rate, biting time).

Advantage: This method uses cheap materials and can be easily constructed.

Disadvantage: This method is labour intensive, requiring two staff per tent, one to act as the bait while the second collects mosquitoes at regular intervals.

Sampling period: The human baited tent traps are often deployed overnight for 12 h periods.

Data: Total number of host-seeking females per sampling effort (by species). When necessary, field data is merged with the results of subsequent laboratory analyses.

PacMOSSI SOP_Human
baited tent.pdf

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Anopheles, Vector surveillance, Mosquito, Human baited tent trap

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Product description

Human baited tent traps can be constructed in various configurations (Table 1; Figure 1). The trapping method is adaptable with configurations that vary as to the outer and inner size and the collection methods. Essentially, the trap consists of a human acting as the lure sitting or lying inside the innermost net and so is protected from mosquito bites. Mosquitoes become trapped in the space between the two nets and can then be collected.

Usually the trap is operated by two staff: one as bait and the other to periodically collect mosquitoes. Alternatively, a CDC miniature light trap has been used to collect mosquitoes between the nets (Degefa et al. 2020), or the person acting as bait, may routinely raise the inner net to aspirate the mosquitoes caught between nets (Tangena et al. 2015).

Authors	Outer net length X width X height (cm)	Inner net length X width X height (cm)	Height of outer net above ground (cm)	Host position	Roof
Russell et al. 2016	457 X 396 X 457	200 X 100 X 97	0 cm (doors open)	Resting on bed	Tent
Tangena et al. 2015	250 X 150 X 100	200 X 100 X 97	30 cm	Resting on bed	Plastic sheeting
Goa et al. 2018	200 X 170 X 200	140 X 140 X 210	30 cm	Sitting on chair	Nil
Degefa et al. 2020	250 X 150 X 100	200 X 100 X 97	30 cm	Resting on bed	Canvas

Table 1. Various configurations of human baited tent traps

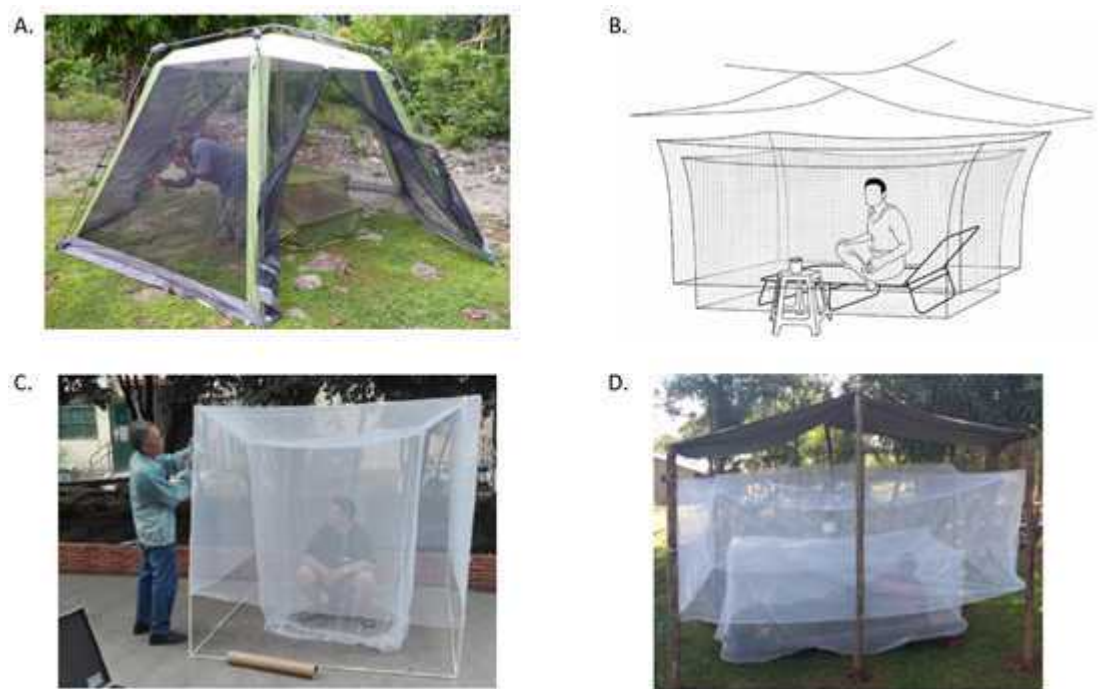


Figure 1. Different configurations of human baited tent traps. Figures sourced from A) Russell et al. (2016), B) Tangena et al. (2015), C) Goa et al. (2018) and D) Degefa et al. (2020).

Location of sampling stations

1. The site where the human-baited tent trap will be deployed must have enough flat open ground space to set up the mesh tent and to walk around the tent before, during and after mosquito collections.
2. Select a spot with low vegetation which is at least 0.5 meter longer and wider than the mesh tent; for the advised tent size that means an open space of at least 2.5 meters long and 3.5 meters wide.
3. Whenever possible, avoid clearing vegetation to set up the tent
4. The location of sampling is always negotiated with the owner of the property. Ensure that the owner is happy with the location of where sampling will be conducted.

References

Degefa, T., Yewhalaw, D., Zhou, G., Atieli, H., Githeko, A. K., & Yan, G. (2020) 'Evaluation of human-baited double net trap and human-odour-baited CDC light trap for outdoor host-seeking malaria vector surveillance in Kenya and Ethiopia.' *Malaria Journal*.

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<https://doi.org/10.1371/journal.pone.0138735>

- Inner bed net
- Outer tent structure
- Stretcher or chair
- Oral aspirator (1 per collector + spares)
- Collection cups
- Cotton wool
- Rubber bands
- Mesh for cups
- Scissors
- Pens/pencils/markers
- Consent forms
- Clip boards
- Chloroform
- Insect repellent
- Torches
- Batteries for torches
- Data collection forms/digital device
- Labels
- Microcentrifuge tubes
- Microcentrifuge tube storage boxes

Your workplace may require you to complete a risk assessment prior to conducting field work. There are a range of risks to which field workers could be exposed, and when sampling with human baited tents may include:

- Mosquito transmitted infections
- Chloroform
- Dog bites

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Human ethics

Where human ethics approval is required and granted, village residents will be recruited following standard informed consent procedures. The potential risks and benefits of mosquito sampling will be discussed verbally in the local language with the aid of a participant information sheet detailing these issues in writing.

Sampling procedure

- 1 Erect the outer mesh structure in the middle of the selected sampling site.

The specific instructions to set up the structure will vary for different configurations. It is essential that the walls of the outer structure are taut, without loose folds in the fabric where mosquitoes can hide.



- 2 Construct an inner enclosure where the human bait can be entirely protected from mosquitoes.

The inner enclosure may be constructed so that the human lure can either sit or lay down.



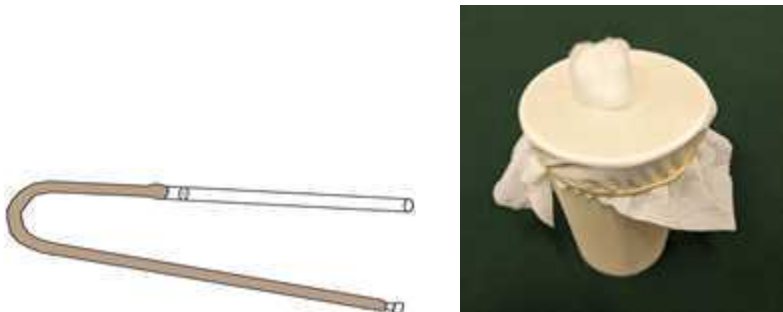
- 3 The human bait should enter the inner structure at the start of the sampling period.

Ensure the outer structure has an opening for mosquitoes to enter (either tent doors apart or outer net raised off the ground).



- 4 Ensure collectors have equipment required for collecting mosquitoes.

At the start of the night, set up sufficient paper cups for the work. Generally, each collector will have 12 paper cups per night in total if collections occur hourly from 18.00 to 06.00. Ensure that the cups are used in the correct order for time.



- 5 To collect mosquitoes visually search inside the outer structure and catch any trapped mosquitoes with an oral aspirator.

Resting mosquitoes are generally passive and can be collected with careful visual inspections and an oral aspirator. Place mosquitoes directly into the labelled collection cups.

Start searches at a designated point in the tent and carefully walk around the entire structure back to the starting point, this should take about 10 – 20 minutes.

After entering the structure, the openings can be closed to prevent mosquitoes escaping (i.e. doors closed or edges lowered to the ground).




- 6 Temporarily store the mosquitoes in labelled collection cups until processing and long-term storage.

For details on processing and storage see Tanya Russell, Kyran Staunton, Amanda Murphy, Thomas Burkot 2022. Standard operating procedures for mosquito vector surveillance, processing and storage. protocols.io

<https://dx.doi.org/10.17504/protocols.io.eq2lyn13qvx9/v3>

Additional notes

- 7 Mosquito collections for anopheline will be recorded for each hour between sunset and dawn but the hours of collection may be changed based on knowledge of the biting behaviours. Generally, it is good that collections start before the time of earliest biting and end after host seeking has stopped. Sometimes, partial night collections may be sufficient to monitor mosquito densities, particularly if most host biting occurs during only part of the night for anophelines.
- 8 Individuals collecting mosquitoes from the outer structure need to avoid acting as a lure that attracts mosquitoes to the barrier screen. This risk can be minimized by the collectors wearing repellent, and the collectors moving at least 10 m away from the human-baited tent in between collection periods.
- 9 Do not collect more than five mosquitoes in one sucking tube before transferring them to the paper cup.
- 10 The catches for each hourly interval should be stored in separate collection cups labeled with date, location and hour of collection.
- 11 Head torches are very useful as they provide a hands-free solution. People have used red lens



(~680 nm) which is considered invisible to mosquitoes and therefore does not impact behavior.