

## Publication

Applications and limitations of centers for disease control and prevention miniature light traps for measuring biting densities of African malaria vector populations : a pooled-analysis of 13 comparisons with human landing catches

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Measurement of densities of host-seeking malaria vectors is important for estimating levels of disease transmission, for appropriately allocating interventions, and for quantifying their impact. The gold standard for estimating mosquito-human contact rates is the human landing catch (HLC), where human volunteers catch mosquitoes that land on their exposed body parts. This approach necessitates exposure to potentially infectious mosquitoes, and is very labour intensive. There are several safer and less labour-intensive methods, with Centers for Disease Control light traps (LT) placed indoors near occupied bed nets being the most widely used.; This paper presents analyses of 13 studies with paired mosquito collections of LT and HLC to evaluate these methods for their consistency in sampling indoor-feeding mosquitoes belonging to the two major taxa of malaria vectors across Africa, the Anopheles gambiae sensu lato complex and the Anopheles funestus s.l. group. Both overall and study-specific sampling efficiencies of LT compared with HLC were computed, and regression methods that allow for the substantial variations in mosquito counts made by either method were used to test whether the sampling efficacy varies with mosquito density.; Generally, LT were able to collect similar numbers of mosquitoes to the HLC indoors, although the relative sampling efficacy, measured by the ratio of LT:HLC varied considerably between studies. The overall best estimate for An. gambiae s.l. was 1.06 (95% credible interval: 0.68-1.64) and for An. funestus s.l. was 1.37 (0.70-2.68). Local calibration exercises are not reproducible, since only in a few studies did LT sample proportionally to HLC, and there was no geographical pattern or consistent trend with average density in the tendency for LT to either under- or over-sample.; LT are a crude tool at best, but are relatively easy to deploy on a large scale. Spatial and temporal variation in mosquito densities and human malaria transmission exposure span several orders of magnitude, compared to which the inconsistencies of LT are relatively small. LT, therefore, remain an invaluable and safe alternative to HLC for measuring indoor malaria transmission exposure in Africa.

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