Malaria mosquitoes in the Solomon Islands feed mainly on humans in the absence of other hosts

Malaria transmission is governed by the interactions between humans , malaria parasites and the anopheline mosquitoes. A mosquito's tendency to feed on humans has a huge influence on potential for malaria transmission. Crucially, mosquitoes differ in their tendency to feed on human or animal blood by species and also within species across different geographic areas or villages. This study examined which factors influence host choice by the primary malaria mosquito, *Anopheles farauti*, in the Solomon Islands.

Outdoor resting mosquitoes were sampled using a barrier screen which was constructed between village houses (left) and potential resting and/or oviposition sites (right).

Using tent traps, we directly compared if the female mosquitoes had a preference to feed on humans or pigs; and we found that the *An. farauti* were slightly more attracted to humans than pigs at a ratio of 1.31:1.00. We also examined the gut content of female mosquitoes caught resting outdoors on a barrier screen; this information was used to calculate the human blood index (HBI) being the proportion of mosquitoes that had fed on humans under natural conditions. The proportion of outdoor resting *An. farauti* that had recently fed on humans (HBI) was very high at 0.93. However, there were many humans in the village compared with the alternative host, pigs, thus, when the numbers of humans and pigs were considered the figures indicate a slight preference to feed on humans at a ratio of 1.29 (feeding index).

To examine if mosquitoes return to feed on their original hosts, we used mark-release-recapture experiments in which different colour dusts were linked to the host to which the mosquito was first attracted. This experiment found that *An. farauti* were a single population regarding host preference. Meaning that individual mosquitoes did not repeatedly return to feed on humans or pig hosts. Because *An. farauti* is a single population, interventions such as bednets and indoor residual

spraying that protect the human host will target the entire mosquito population as many mosquitoes will eventually seek a blood meal on a human during at least one feeding cycle during the time required to become infectious with malaria parasites.

We conclude that one of the strongest drivers for host species preference was the relative abundance of the different host species. Here, *An. farauti* have a slight preference for humans over pigs as blood meal sources. However, the limited availability of alternative hosts relative to humans in the Solomon Islands ensures a very high proportion of blood meals are obtained from humans, and thus, the transmission potential of malaria remains high.

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