Biting time of day in malaria mosquitoes is modulated by nutritional status

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Transmission of vector-borne pathogens follows daily rhythms, occurring at the time of day that vectors forage for blood. Control measures, such as insecticide-treated bed nets (ITNs), have been particularly successful for reducing malaria transmission, because they exploit the nocturnal biting behaviour of the *Anopheles* spp. that vector malaria. However, shifts in biting behaviour to earlier or later hours when people are unprotected can undermine the efficacy of ITNs. Despite the implications for malaria transmission, the mechanisms underlying these shifts remain poorly understood. Because food availability mediates activity and foraging rhythms, and ITNs block access to human blood as a food source, we hypothesised that nutritional deprivation could cause mosquitoes to shift their biting behaviour to earlier or later in the diel cycle. We provided female *Anopheles gambiae s.l.* mosquitoes with access to one of three feeding treatments that varied in nutritional resources, and then released them into a semi-field system with human-mimic traps, to investigate how food availability impacted the time of day that mosquitoes host seek. Our results reveal that mosquito nutritional condition determines both the likelihood and time of day that host seeking occurs, suggesting it is an underappreciated contributor to residual malaria transmission. Furthermore, our findings suggest that targeting mosquito nutrition (e.g. sugar-baited traps) could influence mosquito behaviour in ways that affect the success of ITNs. More broadly, understanding the drivers of biting time of day variation is crucial for the future success of vector control tools and controlling malaria transmission.