Exposure to Aedes mosquito bites and multiple arboviruses among hospital workers in Unguja, Zanzibar: a cross-sectional serosurvey

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Aim

To assess IgG responses to markers of *Aedes* mosquito bites and regionally circulating arboviruses among hospital workers of Unguja, Zanzibar, serving as a proxy for occupational risk.

Introduction

Mosquito-borne arboviruses pose a significant public health threat in tropical and subtropical regions, where conditions favour vector proliferation (Marchi et al. 2018). In Zanzibar, *Aedes aegypti* mosquitoes are abundant within hospital settings, increasing the risk of human-vector contact and transmission of arboviruses among people spending extended time in hospital settings, including hospital workers. However, this risk remains poorly understood due to limited surveillance.

Methods

A cross-sectional serosurvey was conducted in September 2024 among 362 hospital workers from Jitimai (n=93), Chumbuni (n=82), Kivunge (n=92) and Mwerapongwe (n=95) District Hospitals in Unguja, Zanzibar. Blood samples were collected along with demographic information on age, sex and areas of residence (Shehia). Blood samples were processed to obtain plasma and screened for IgG antibodies against the *Aedes* salivary peptide Nterm-34kDa and multiple arboviruses using Luminex® multiplex immunoassay with recombinant viral antigens derived from envelope and non-structural proteins, following a protocol described by Raulino et al. 2021.

Multivariable logistic regression was used to identify factors associated with seropositivity to the *Aedes* salivary peptide and individual arboviruses

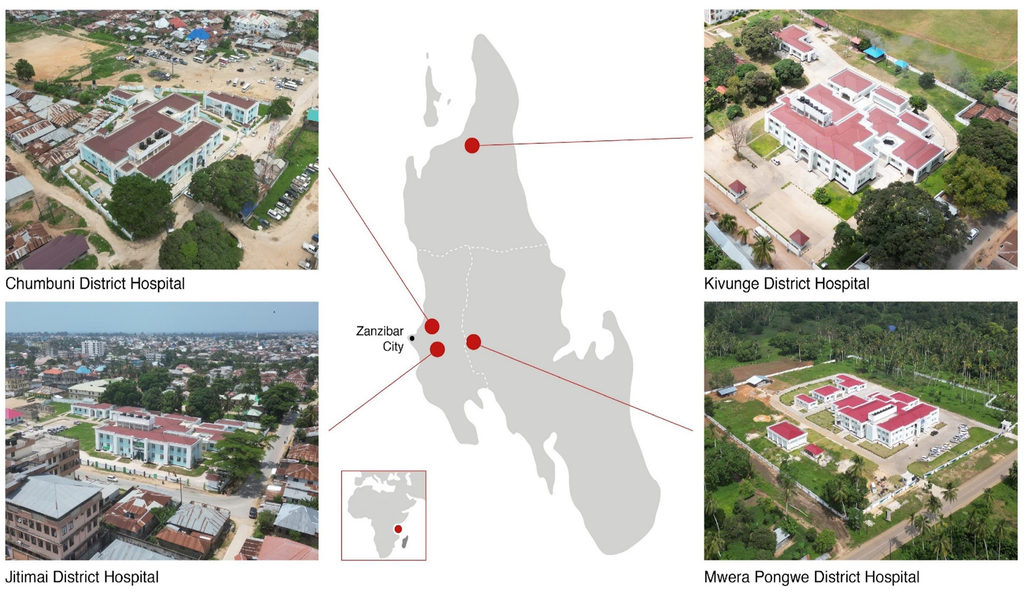

Fig 1: Study sites: map of Unguja Island, Zanzibar, showing the geographical locations and aerial view of the four district Hospitals where study participants were recruited (Source: Sloan Wood, Lupenza et al. 2025)

Results

- Exposure to *Aedes* mosquito bites among was 23.8%
- High seroprevalence of multiple arboviruses (as shown in Figure 2)

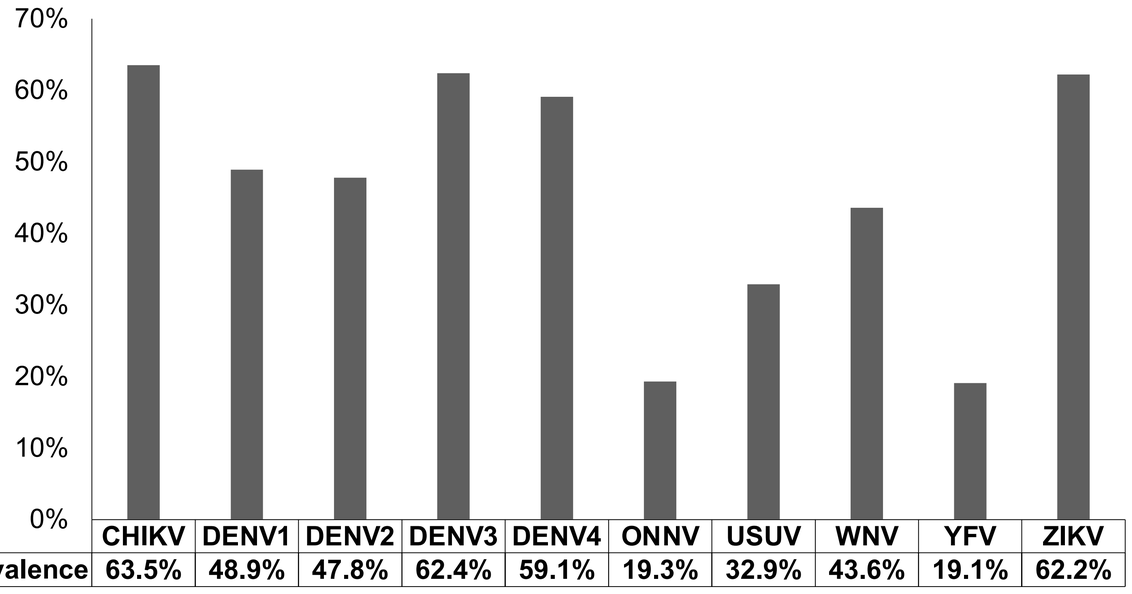

Fig 2: Seroprevalence of IgG antibodies against multiple arboviruses among hospital workers

Factors associated with seropositivity varied by age, hospital site and residence category, as shown in Table 1, which summarises adjusted odds ratios (AORs) with 95% confidence intervals. Each additional year of age was associated with DENV1, DENV3, DENV4 and ZIKV seropositivity. Participants from rural Kivunge hospital had lower odds of CHIKV and seropositivity, while participants residing in urban shehias had higher odds of DENV3, DENV4, and WNV seropositivity

Table 1: Association between participant characteristics and anti-*Aedes* Nterm-34kDa positivity and arbovirus seropositivity

Factors	Viruses							
	CHIKV AOR (95% CI)	**ZIKV AOR (95% CI)**	**DENV1 AOR (95% CI)**	**DENV2 AOR (95% CI)**	**DENV3 AOR (95% CI)**	**DENV4 AOR (95% CI)**	**WNV AOR (95% CI)**	**NTERM 34KDa AOR (95% CI)**
Paticipant's Age	1 (0.97–1.03)	**1.03 (1–1.07)**	**1.04 (1.01–1.08)**	1.03 (1–1.06)	**1.04 (1–1.07)**	**1.04 (1–1.07)**	1.02 (0.99–1.05)	0.98 (0.94–1.01)
Hospital site								
Kivunge Ref (Jitimai)	**0.34 (0.16–0.69)**	**0.46 (0.22–0.93)**	0.71 (0.36–1.42)	1.06 (0.54–2.08)	0.51 (0.25–1.05)	0.56 (0.28–1.13)	0.59 (0.29–1.19)	**0.4 (0.16–0.98)**
Residence category								
Urban Ref (Rural)	0.59 (0.27–1.3)	1.84 (0.8–4.27)	1.22 (0.57–2.6)	1.31 (0.62–2.78)	**2.61 (1.13–6.02)**	**2.29 (1.03–5.12)**	**2.73 (1.25–5.95)**	0.98 (0.39–2.48)

Conclusion

- There is recent *Aedes* mosquito bite exposure among hospital workers and ongoing human-vector contact
- Widespread exposure to mosquito-borne arboviruses
- Detection of antibodies to WNV, USUV & ONNV suggests exposure to a broader range of arboviruses than the routinely recognised ones
- Aedes mosquito exposure and infections cannot be attributed specifically to the hospital setting
- Our findings highlight the need for strengthened arboviral surveillance and *Aedes* control in Unguja, Zanzibar

Limitation: Cross-reactivity, especially between *Orthoflaviviruses*

MBD-Free Project

This research is part of the Danida funded MBD-Free Project. This inniative brings together researchers from the global north and south to explore the key role hospitals may play in the initiation and spread of mosquito-borne diseases (MBDs), and their prevention and monitoring through co-created control interventions and sentinel surveillance in Zanzibar district hospitals.

MBD-FREE

Collaborating entities

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