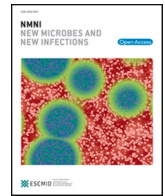


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New Microbes and New Infections

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Upsurge in cases of travellers' malaria ex Zanzibar indicates that malaria is on the rebound in the archipelago

Zanzibar, an archipelago with two main islands, Unguja and Pemba, is situated about 30 km from Tanzania, East Africa and is readily accessible by plane or ship. Zanzibar has a population of approximately 1.9 million and was among the first areas in sub-Saharan Africa to roll out intensive malaria control anti-mosquito measures such as long-lasting insecticide treated nets and indoor residual spraying (IRS). For case detection and treatment, rapid diagnostic tests (RDTs) and targeted treatment with artemisinin combination therapy (ACT) were widely used. These measures, initiated in 2003, proved successful and in 2018, Zanzibar developed a national malaria strategic plan with the goal of elimination of malaria by 2023 [1]. Despite the early promise of success there appears to be a distinct “rebound” in the malaria situation in Zanzibar and this has been attributed to changes in malaria epidemiology and also to malaria being imported to Zanzibar from highly endemic areas of mainland Tanzania visited by local residents [2,3]. Flaws and challenges in recent and past eradication programmes have also been highlighted [4]. In Europe, there have been anecdotal reports of increasing number of travellers returning with malaria after mainly short sojourns on Zanzibar and we have recently been made aware of several cases in the past two months December 2023 and January 2024 (Table 1). Travellers can be perceived as useful sentinels for emerging infections or for detecting epidemiological changes. In this editorial we look at recent cases of malaria diagnosed in travellers returning to Europe from Zanzibar reported informally to EuroTravNet <https://geosentinel.org/sites/eurotravnet> and to our affiliate contacts. We look at the literature to understand the reasons for increasing case numbers of malaria on Zanzibar despite the control measures that have been instigated several decades ago [1,3,4] and highlight the role of travellers as sentinels for malaria and the need for awareness among travel health advisors about the changing and increasing risk of *Plasmodium falciparum* for visitors to this popular tourist destination.

Malaria transmission on Zanzibar is perennial with peak transmission during the rainy months in March–June and October–November. When the new interventions started in 2003, *Plasmodium falciparum* was the pre-dominant malaria species and *Anopheles gambiae sensu lato*, *An. funestus* and *An. coustani* were the main vectors. More recent entomological studies show that *An. Arabiensis*, an outdoor biter, became increasingly predominant in the period 2007–2014 supporting the increasing relative importance of outdoor biting/resting mosquitoes for malaria transmission [5]. This is important for Zanzibar as many social activities are early evening activities as are occupational activities related to tourism. Several studies [2–5] have highlighted factors that

explain the rebound in malaria on Zanzibar and these include: a shift to mosquito outdoor biting activities, a shift in peak mosquito biting times to early evening, a rise in pyrethroid-resistant *Anopheles* mosquitoes-reducing the effectiveness of currently used treated nets. Another study [6] highlighted the role of local travel from the residents of Zanzibar to mainland Tanzania, where malaria risk is high, as one of the main factors for continued and increased malaria transmission in the archipelago. Travel outside Zanzibar (to the mainland) was associated with increased adjusted ORs of malaria of between 60 and 85 while travel within Zanzibar was not associated with any increased risk. Not sleeping under a bed net was also associated with increased risk of malaria RDT positivity, but with a low adjusted OR 4.4 (95 % CI 3.9–6.0), whereas indoor residual spraying did not affect malaria risk.

With regard to foreign travellers visiting Zanzibar and their risk of malaria, our case series (Table 1) show that travellers often visit Zanzibar without pre-travel consultations. They are often unaware of malaria risk and even those who seek advice are often misled regarding the need for chemoprophylaxis and meticulous anti-mosquito measures. Table 1 shows the life-threatening clinical consequences of *P. falciparum* malaria in non-immune travellers who acquired malaria in Zanzibar particularly in those with delayed diagnoses (up to 18 days). From these eight cases reported here, one patient has died. This avoidable death must have consequences for travellers and travel medicine. This situation of poor awareness may have evolved with the premise of malaria being on the cusp of elimination in Zanzibar but this is clearly no longer the case. The Statens Serum Institut in Denmark has alerted EU countries about the high number of malaria cases from Zanzibar through the European warning system for infectious diseases, EWRS, and has asked whether other countries have experienced something similar. At the time of writing this editorial, on January 31st, 2024, some 20 countries have so far responded to the inquiry, of which 13 countries report having seen cases of malaria imported from Zanzibar and/or Tanzania in 2023/2024, particularly in the past few months [7]. We urge travel medicine advisors, general practitioners, travel agencies and the travel industry in general to highlight the significant risk of malaria for travellers to Zanzibar. Travellers need to be alerted to malaria, guided regarding chemoprophylaxis and prevention and to be aware that prompt medical attention is required if malaria symptoms occur following travel to Zanzibar. The travel industry should also be obliged to highlight this risk to their clients so that appropriate anti-mosquito protection and malaria chemoprophylaxis are used.

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Table 1

Case series of malaria, most likely acquired in Zanzibar, in travellers presenting in Romania and Denmark (December 2023–January 2024).

Case* Gender, age (years) Travel reason	Areas visited	Pre-travel advice?	Month of travel and number of days on Zanzibar	Malaria prophylaxis?	Days from departure from Zanzibar to onset of symptoms	Days from departure from Zanzibar to diagnosis	Diagnostic tests	Clinical details
1 F, 35–39 Tourist	Only Zanzibar (Unguja)	None	Dec 2023, 9 days	None	4	5	Malaria antigen (HRP2/ pLDH): +/+ LAMP: positive Blood smear: <i>p. falciparum</i> <0,1 %	Fever, body aches, headache
2 M, 30–34, Tourist	Only Zanzibar (Unguja) (East coast, Nungwi, Stone Town)	GP recommended against chemoprophylaxis	Dec 2023, 14 days	None	12	18	Malaria antigen (HRP2/ pLDH): +/+ LAMP: positive Blood smear: <i>p. falciparum</i> 4 %	Cerebral malaria Hypotension Kidney failure Severe thrombocytopenia
3 F, 25–29, Tourist	Only Zanzibar (Unguja) (East coast, Nungwi, Stone Town)	GP recommended against chemoprophylaxis	Dec 2023, 14 days	None	11	18	Malaria antigen (HRP2/ pLDH): +/+ LAMP: positive Blood smear: <i>p. falciparum</i> 12 %	Hypotension Jaundice ARDS Severe thrombocytopenia
4 M, 50–54, business traveler	Only Zanzibar (Unguja, Stone Town)	None	Nov 2023, 5 days	None	10	15	Malaria antigen (HRP2/ pLDH): +/+ LAMP: positive Blood smear: <i>p. falciparum</i> 0,8 %	Cerebral malaria Kidney failure Jaundice Severe thrombocytopenia
5 F, 40–44, tourist	Zanzibar(Unguja, Matemwe and Nungwi) and Tanzania (only one day)	From travel agency, no need for chemoprophylaxis	Dec 2023, 13 days	None	13	18	Malaria antigen (HRP2/ pLDH): +/+ LAMP: positive Blood smear: <i>p. falciparum</i> 13.2 %	Hypotension Kidney failure Jaundice Severe thrombocytopenia
6 F, 20–24	Malawi (2 months), Zambia (Lusaka 3 days), Tanzania (Dar es-Salaam 3 days), Zanzibar (Stone Town, Paje)	Yes Travel specialist	Dec 2023, 7 days	Doxycycline, but stopped taking malaria prophylaxis on Zanzibar	7	8	LAMP: positive Blood smear: <i>P. falciparum</i> 0,2 %	Fever, myalgia Thrombocytopenia (69/ μ l) ALAT \uparrow (48 U/l)
7 F, 50–54, tourist	Zanzibar (Unguja)	From travel agency, no need for chemoprophylaxis	Jan 2024 8 days	None	6	11	Malaria antigen (HRP2/ pLDH): +/+ LAMP: positive Blood smear: <i>P. falciparum</i> 23.5 %	Cerebral malaria Hypotension Jaundice ARDS Severe thrombocytopenia Kidney failure Died
8 M, 35–39, tourist	Zanzibar (Unguja, Paje, Jozani Forest, Stone Town, Nungwi)	None	Jan 2024 14 days	None	4	10	Malaria antigen (HRP2/ pLDH): +/+ LAMP: positive Blood smear: <i>P. falciparum</i> 8 %	Hypotension Jaundice Severe thrombocytopenia Kidney failure

All cases were reported in Romania (4 cases) and Denmark (4 cases). Many cases presented initially at regional centres or to general practice physicians.

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Dr Victor Babes Clinical Hospital of Infectious and Tropical Diseases,
Bucharest, Romania

Carsten Schade Larsen¹
Aarhus University Hospital, Skejby, Denmark

Marie Helleberg
Department of Infectious Diseases, Copenhagen University Hospital,
Rigshospitalet, Denmark
Center of Excellence for Health, Immunity and Infections, Copenhagen
University Hospital, Rigshospitalet, Denmark

Alexandru Marin
Dr Victor Babes Clinical Hospital of Infectious and Tropical Diseases,
Bucharest, Romania

Corneliu Petru Popescu
Carol Davila University of Medicine and Pharmacy, Bucharest, Romania
Dr Victor Babes Clinical Hospital of Infectious and Tropical Diseases,
Bucharest, Romania

Patricia Schlagenhauf^{*}
WHO Collaborating Centre for Travellers' Health, Institute for
Epidemiology, Biostatistics and Prevention, University of Zürich Centre for
Travel Medicine, MilMedBiol Competence Centre, University of Zürich,
Switzerland

* Corresponding author.

E-mail address: patricia.schlagenhauf@uzh.ch (P. Schlagenhauf).

Simin Aysel Florescu¹

Carol Davila University of Medicine and Pharmacy, Bucharest, Romania

¹ Joint first authors.