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Risk of mosquito-borne diseases in pilgrims to the grand Magal de Touba in Senegal

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The largest Muslim religious gathering in West Africa is celebrated every year in Senegal. The event, known as the 'Grand Magal de Touba' (GMT), marks the departure into exile of Cheikh Ahmadou Bamba Mbacké, the founder of the Mouridism, a Sufi Muslim order and attracts between four and five million pilgrims from all over the world to the holy city of Touba, located in the medical district of Diourbel. Like all mass gatherings, the GMT carries the risk of transmitting infectious diseases. An epidemiological surveillance programme aimed at assessing the burden of infectious diseases during the GMT has been set up by our team in recent years. As part of this programme, we analysed the clinical and microbiological data of patients with febrile illnesses, consulting during the GMT at the health centre in Mbacké, close to Touba.[1] A total of 175 samples were collected from 2018 to 2022 from febrile patients (axillary temperature of at least 37.5°C), consulting spontaneously during the GMT week of free medical coverage. The medical team completed a demographic and clinically standardized questionnaire and obtained patient informed signed consent. Patients were actively proposed to be tested, free of charge, for blood pathogens by PCR. Blood was collected by vein puncture into an EDTA tube (BD vacutainer® K2E EDTA 18.0 mg, UK). After manual DNA extraction with the OMEGA kit and RNA with EZ1, according to the manufacturer's recommendations, identification of *Plasmodium falciparum* and dengue virus was conducted by RT-qPCR, as previously described.[1] Most febrile patients were living in Mbacké (73.1%) and Dakar (13.1%) or Thiès (3.4%), Kaolock (2.3%), Tabacounda (1.7%), Louga (1.7%), Kaffrine (1.1%), Casamance (0.6%), Fatick (0.6%), Kédougou (0.5%) or in other countries in Guinea-Bissau (1.1%) and Gambia (0.6%). Their mean age was 17 years (0–79 years), and 52.0% were male. A total of 33 (18.8%) patients were positive for *P. falciparum* and 9 (5.1%) for dengue virus (Table 1). The majority of malaria patients were living in Mbacké (51.7%) and Dakar (27.3%), followed by Tabacounda (6.1%), Casamance (3.0%), Louga (3.0%), Kédougou (3.0%) and Kaolack (3.0%) or Guinea-Bissau (3.0%). Given the short (9–14 days) *falciparum* malaria incubation time, infections were likely acquired a few days before the GMT took place. Their mean age was 16 years 7–79 years), and 69.6% were male. In Senegal, malaria is essentially due to *P. falciparum* and, to a lesser extent, to *P. malariae* and *P. ovale*,[2] and its transmission is closely linked to rainfall from July to November. The major vectors predominant in Touba are *An. funestus*, *An. gambiae*, *An. coluzzii* and *An. arabiensis*.[3] In 2021, 37 190 cases of malaria were confirmed in the Diourbel region, all due to *P. falciparum*.[2] Despite a considerable decline over the years as a result of anti-vector control implemented by the relevant authorities, malaria still remains a threat during the GMT, which can promote its spread to the rest of the country and even beyond. Unlike at other religious mass gatherings where malaria is an imported disease, it is mostly an autochthonous disease at the GMT. In 2018, a DENV-3 dengue outbreak occurred in Touba during the GMT.[4,5] We detected dengue virus once again during the GMT period in 2022, which suggests that epidemics could occur during future GMT events.

Local participants should be recommended to use impregnated mosquito nets and to wear covering clothes. From a travel medicine perspective, non-immune participants living in countries that are not endemic for malaria should consider using malaria chemoprophylaxis active against *P. falciparum*, including doxycycline, mefloquine or atovaquone-proguanil, depending on their travel profile. In addition, protection against mosquito bites, including the use of an impregnated bed net, wearing

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Table 1 Malaria and dengue PCR results in Mbacké health care centre febrile patients during the Grand Magal de Touba week (2018–2022)

	2019 (26–30 October) $N = 26$	2019 (15–19 October) $N = 51$	2020 (02–06 October) $N = 36$	2021 (24–28 September) $N = 28$	2022 (13–17 September) $N = 34$	Total $N = 175$
Plasmodium falciparum	5 (19.2%)	18 (35.2%)	4 (11.1%)	3 (10.7%)	3 (8.8%)	33 (18.8%)
Dengue virus	7 (26.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (5.8%)	9 (5.1%)

covering clothes and the use of mosquito repellent, should be considered for all travellers. In cases of febrile illness upon returning from the GMT, testing for malaria and dengue should be performed.

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Author contributions

Coumba Diouf (Investigation [equal], Methodology [equal], Validation [equal], Writing—original draft [equal], Writing—review & editing [equal]), Ihssane Ouaddane (Investigation [equal], Methodology [equal]), Ndiaw Goumballa (Investigation [equal], Methodology [equal], Supervision [equal], Validation [equal]), Masse Sambou (Supervision [equal], Validation [equal]), Hubert Bassène (Supervision [equal], Validation [equal]), Philippe Gautret (Investigation [equal], Project administration [equal], Supervision [equal], Validation [equal], Visualization [equal], Writing—review & editing [equal]), and Cheikh Sokhna (Funding acquisition [equal], Project administration [equal], Supervision [equal], Validation [equal])

Ethics approval

The protocol was approved by the National Ethics Committee for Health Research in Senegal (SEN17/62).

Conflict of interest: The authors certify that they have no conflict of interest in relation to this paper.

References

1. Goumballa N, Sambou M, Samba DF *et al.* PCR investigation of infections in patients consulting at a healthcare Centre over a four-year period during the grand Magal of Touba. *Travel Med Infect Dis* 2022; **52**:102515.
2. Ministère de la Santé et de l'Action Sociale. *République du Sénégal. Plan National de Lutte contre le Paludisme. Plan stratégique national de lutte contre le paludisme au Sénégal, 2021–2025*. 2020. Available from https://senegal-cocreation.com/wp-content/uploads/2021/02/PSN_PNLP_Senegal_Version-finale_-Fevrier-2021.pdf (23 April 2024, date last accessed).
3. Faye O, Konate L, Diop A. Profil entomologique du paludisme au Sénégal. *Ministère Santé et de la Prévention Médicale* 2011; **1**:47.
4. Diagne CT, Barry MA, Ba Y, Faye O, Sall AA. Dengue epidemic in Touba, Senegal: implications for the grand Magal pilgrimage for travellers. *J Travel Med* 2019; **26**:tay123.
5. Dieng I, Fall C, Barry MA *et al.* Re-emergence of dengue serotype 3 in the context of a large religious gathering event in Touba, Senegal. *Int J Environ Res Public Health* 2022; **19**:16912.