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RESEARCH ARTICLE

CORRÉLATION ENTRE LA PERFORMANCE AU SAUT EN LONGUEUR SANS ÉLAN ET LA PERFORMANCE AU SPRINT: CAS DES SPRINTEURS DE L'UNIVERSITYSPORTING CLUB (USC)

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ABSTRACT

Borrelia duttonii is the classic agent of tick-borne relapsing fever (TBRF) in several African countries, transmitted by *Ornithodoros* ticks. TBRF is endemic in Tanzania, with evidence of ongoing transmission and disease significance, particularly in rural and traditional houses that support tick habitats. More general literature reviews of tick-borne febrile disease in Africa highlight that the geographic distribution of relapsing fever spirochetes is in regions where malaria is also endemic, and there is cross-talk between disease criteria and surveillance for febrile diseases. Our argument is that programs for malaria elimination in Africa should consider a broader focus on febrile diseases, especially in regions of co-endemicity. Possible action steps could include targeted education of healthcare providers.

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INTRODUCTION

Despite the success in the efforts to eliminate malaria globally over the last two decades (WHO, 2025b), there has been a stagnation or reversal of progress in some African countries (WHO, 2025a). Although challenges such as resistance to insecticides, disruptions in health systems, and climate change have been identified as major causes of this stagnation or reversal of progress (WHO, 2025a), there has been little emphasis on the role of neglected febrile diseases that affect the surveillance, management, and elimination of malaria (Elven *et al*., 2020). For instance, the development of resistance to the main anti-malarial drugs such as chloroquine and artemisinin-based combination therapies (ACTs) (Ursos & Roepe, 2002)(Henrici *et al*., 2019) in particular in sub-Saharan Africa where both malaria and tick-borne relapsing fever are endemic, makes the treatment of malaria a major challenge by reducing the effectiveness of the main treatment options hence increasing the cost of treatment and thus posing a major setback to the efforts aimed at the elimination of malaria (Klein, 2013). Tick-borne relapsing fever (TBRF), which is a disease caused by the Borrelia species and transmitted by the *Ornithodoros* tick, is a major neglected disease in Africa where malaria is also a major public health problem (Vial, 2009)(Pereira De Oliveira *et al*., 2020). TBRF is still endemic in most of Africa, including Tanzania, Ethiopia, and Kenya, but under-recognized (Vial *et al*., 2006) or misdiagnosed (Ndiaye *et al*., 2021).

Borrelia duttonii is a proven cause of recurrent febrile disease (Levine *et al*., 2023)(Levine *et al*., 2024). These areas also overlap with regions in which there is malaria elimination or residual transmission (Trevisan *et al*., 2021). Malaria and TBRF share several biological and clinical manifestations, including recurring high fevers, vector transmission, and erythrocyte resetting, causing complications in diagnosis and treatment (Lundqvist *et al*., 2010)(Reyburn *et al*., 2004)(Elven *et al*., 2020). Both diseases are distinguished by recurring fevers, although in TBRF, fever is characterized by relapsing episodes lasting 3–7 days and recurring after periods of remission (Walker & Olman, 1984). In malaria, fever is paroxysmal, with episodes recurring cyclically, usually every 48 hours (for *Plasmodium falciparum*, *P. vivax*, and *P. ovale*) or every 72 hours (*P. malariae*) (WHO, 2023). These provide evidence that malaria and TBRF complicates identification, resulting in under-recognition in clinical practice (Bankole *et al*., 2023)(Diallo *et al*., 2017). However, in most high-burden areas, there is a lack of development in surveillance systems, and co-infections remain unrecorded. The absence of credible data slows the understanding of the extent of malaria and TBRF co-infections, making the formulation and implementation of specific public health interventions difficult.

Malaria and TBRF co-infections diagnosis and implications for malaria elimination: Malaria and TBRF co-infections also create distinct and intersecting challenges, particularly in regions where the two diseases are co-endemic,

due to their overlapping clinical manifestations. In such settings, simultaneous diagnosis of both conditions remains difficult in many health facilities because clear clinical and treatment guidelines for managing co-infections are lacking. This often results in diagnostic delays and suboptimal case management. In areas where *Plasmodium falciparum* malaria is prevalent and delays in diagnosis or treatment can be fatal, clinicians frequently make a presumptive diagnosis of malaria based on symptoms such as fever and initiate antimalarial therapy. However, when TBRF co-infection is present but remains undiagnosed or untreated, patients may deteriorate clinically, leading to prolonged illness and delayed recovery. Several factors contribute to these challenges, most notably the absence of standardized treatment approaches for patients co-infected with malaria and TBRF. Current malaria treatment practices, largely informed by the World Health Organization's consolidated malaria guidelines, emphasize the use of malaria rapid diagnostic tests (mRDTs) for rapid detection and microscopy for confirmation (Cunningham *et al*., 2019)(WHO, 2024). However, mRDTs detect only *Plasmodium* species and not *Borrelia*, leaving TBRF undiagnosed in co-infected patients (Diallo *et al*., 2017). As a result, additional diagnostic tests are required to accurately identify both infections, which is often impractical in resource-limited settings.

Another complicating factor is the occurrence of false-negative results when only one infection is tested for, as reported in multiple studies (Diallo *et al*., 2017). For example, in *Borrelia–Plasmodium* co-infections, high *Plasmodium* parasitemia may mask the presence of *Borrelia* spirochetes in both thick and thin blood smears, further hindering accurate diagnosis (Hovette *et al*., 2001) (Nordstrand *et al*., 2007). Consequently, undiagnosed TBRF may contribute substantially to apparent malaria treatment failure, persistent febrile illness, and the misclassification of malaria-related morbidity and mortality (WHO, 2025a). At the programmatic level, this diagnostic gap can distort malaria surveillance data, obscure progress toward elimination targets, and undermine community confidence in malaria interventions. Despite this, malaria control programmes continue to focus almost exclusively on *Anopheles* vector control, while soft tick vectors that persist in domestic and peri-domestic environments remain largely unaddressed by current strategies.

What should be done in terms of addressing malaria and TBRF co-infections: We propose that malaria elimination programmes in Africa should adopt a broader febrile illness perspective in co-endemic settings. Practical actions could include targeted training of clinicians in primary health care facilities particularly in rural endemic areas on the recognition and management of relapsing fever. In addition, the development and dissemination of standardized treatment guidelines that explicitly integrate TBRF into diagnostic algorithms are essential. Clear diagnostic and treatment guidelines are critical for the early detection and timely management of both infections, especially in regions where they co-exist, and would enable better assessment of disease burden as well as the design and implementation of targeted public health interventions (Lourenço *et al*., 2019). Strengthening basic microscopy capacity for spirochete detection at primary health facilities could enhance both laboratory and clinical practices to better recognize relapsing fever patterns. The use of accessible and improved diagnostic tools can further support the early and simultaneous detection of *Plasmodium falciparum* and *Borrelia* spirochetes. For example, advanced microscopy techniques such as the Quantitative Buffy Coat (QBC) method have demonstrated high sensitivity and effectiveness in detecting both P. falciparum and Borrelia spirochetes, even at low levels of parasitemia (Pinto *et al*., 2001)(Diallo *et al*., 2017). Such approaches could reduce treatment delays and help minimize the risk of drug resistance developing in co-infected patients (Klein, 2013). Addressing tick-infested housing through environmental improvements and community-based interventions would further strengthen malaria surveillance and improve patient outcomes. This can be achieved by understanding the geographic distribution and ecological overlap of Anopheles mosquitoes (malaria vectors) and *Ornithodoros* ticks (TBRF vectors), thereby informing the development of integrated vector control strategies that simultaneously target both vectors and reduce transmission risks (Pereira De Oliveira *et al*., 2020)(Krishnavajhala *et al*., 2018). Such integrated approaches are essential for sustaining elimination gains and align with calls for more resilient and people-centred health systems.

Conclusion

Although malaria remains a major public health priority, expanding the focus beyond Plasmodium alone is essential for sustaining elimination gains and accurately interpreting febrile disease trends in Africa. Neglecting malaria and TBRF co-infections risks perpetuates setbacks to malaria elimination efforts across the continent. It is therefore imperative that governments and funding agencies prioritize investments in surveillance infrastructure and capacity-building in endemic areas to improve the generation of accurate and reliable data on the prevalence of co-infections.

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