Background: The global decline of malaria incidence over the past decade has led to the though that elimination could be obtained. This has resulted to an increased interest in designing strategies to target the silent reservoir of asymptomatic infections among populations and interrupt on-going residual local malaria transmission. This study globally explored the reservoir of asymptomatic Plasmodium infections and its relationship with subsequent clinical malaria infections in low transmission areas in Senegal.

Methods: Cross-sectional surveys were carried out in 2013, 2014, 2015, and 2016 and were combined with longitudinal follow-up determine and geo-localised both asymptomatic and clinical malaria episodes in Dielmo and Ndiop, Senegal. The prevalence of asymptomatic Plasmodium carriage in the community was investigated by Real Time PCR while clinical malaria attacks were identified at health facilities during the transmission season. All households were geo-referenced to spatially map asymptomatic and clinical infections.

Results: The study revealed substantial asymptomatic infections with average parasite carriage of 8.11% and 7%, respectively in Dielmo and Ndiop. P. falciparum accounted for the majority of asymptomatic infections (more than 90% of infections). In Dielmo, 95% of asymptomatic infections clustered within the same geographical areas while infections were disparate in Ndiop. Preliminary fine-scale mapping of asymptomatic and clinical malaria infections identified clusters of higher malaria incidence interpreted as foci of transmission across the four years study period with 95-98% of clinical infections occurring in households where an asymptomatic malaria infection existed.

Conclusions: This study revealed substantial asymptomatic Plasmodium infections in both settings throughout the 4 years study period and spatial clusters of malaria infections at the microepidemiological level. Together, these findings could offer a feasible approach for a rational targeting of malaria control interventions to achieve elimination.