# Concurrent declines in malaria incidence among children under and over five years of age in Koutiala, Mali: time series analysis of seasonal malaria chemoprevention from 2012-2022

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## Abstract

In 2012, the World Health Organization recommended seasonal malaria chemoprevention (SMC) for children 3–59 months old in areas of highly seasonal malaria transmission. Long-term impact of SMC on malaria incidence is unknown. In Koutiala health district, a random sample of 10 villages were selected surrounding health facilities with 1:3 urban/rural ratio. Cases of uncomplicated and complicated malaria, confirmed by rapid diagnostic test or microscopy, were documented monthly at facilities prior to SMC (2011) and each year of SMC (2012-2022). We used Poisson regression with robust standard errors adjusting for repeated measurements within villages to estimate rates in 2011 and change over time (with interaction terms to compare differences in rates over time across groups as applicable), assuming approximately linear trends of annual rates over time. Overall, 1429 village-level observations were included. In 2011, estimated confirmed uncomplicated malaria was 60 cases (95%CI 16, 218) and 8 cases (95%CI 4, 14)/1000 population among $< 5$-year olds and $\geq 5$-year olds, respectively. From 2012 to 2022, the confirmed uncomplicated incidence among $< 5$ year-olds declined by 8 (95%CI -2, 18) cases/1000 pop, and among $\geq 5$-year olds by 3 (95%CI -4, 8) cases/1000 pop annually, a difference of 5 cases (95%CI 0, 11)/1000 pop (p=0.060). In the general population, confirmed uncomplicated and confirmed complicated malaria declined by 6 cases (95%CI -3, 15, p=0.203) and 4 cases (95%CI -1, 10, p=0.128)/1000 pop annually, respectively. There was little to no evidence of declining rates in rural and urban areas (interaction p=0.083 and p=0.589 for cum and ccm, respectively). There was no evidence of difference in rates of confirmed uncomplicated and confirmed complicated cases between 2011-2022 overall (interaction p=0.617), among $< 5$-year olds (interaction p=0.732), nor $\geq 5$-year olds (interaction p=0.850). SMC was associated with reduced incidence of confirmed uncomplicated and complicated cases among children $< 5$-year olds over 10-year of SMC in Koutiala, Mali. Molecular surveillance is urgently needed to confirm this apparent trend.

**Keywords:** Malaria morbidity, seasonal malaria chemoprevention, long-term, impact, Mali