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Urban-rural differentials in the determinants of malaria transmission in Nigeria

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Urban-rural differentials in the determinants of malaria transmission in Nigeria accounted for roughly a quarter of global malaria cases and deaths in 2018. However, malaria transmission is heterogeneous at lower spatial scales, and understanding the drivers of transmission can inform decisions on where interventions should be prioritized. As such, we aimed to identify factors associated with high levels of malaria transmission within urban and rural areas.

We merged and analyzed cluster-level data collected in Nigeria in 2010, 2015, and 2018 by the Demographic Health Survey (DHS) program. The outcome variable was formulated by categorizing cluster-level estimates of malaria parasite prevalence into a low prevalence (0% â€“ < 10%) and high prevalence group (10% - 100%). Nine potential explanatory variables were identified. These included the proportions of individuals with high educational attainment levels, and in the higher wealth quintiles, and the proportion of children under the age of five years that use artemisinin-based combination therapy (ACT) in individual clusters. Clusters were stratified by urban (778 clusters) and rural (1,143 clusters) place of residence, and a multivariable logistic model was used to evaluate each explanatory variable's effect on malaria prevalence, separately for urban and rural clusters. Statistical significance was pegged at the 0.05 level, and odds ratios were estimated. Overall, parasite prevalence was highest in rural clusters (mean: 0.309; SD = 0.267) compared to urban cluster (mean: 0.139; SD = 0.195). Clusters with higher educational attainment levels were associated with 98% (95% CI: 0.002, 0.096) and 97% (95% CI: 0.009, 0.095) lower odds of being a high prevalence cluster in rural and urban areas, respectively. Increases in the proportion of children that use ACT in urban clusters were negatively associated with high parasite prevalence (0.53 OR, 95% CI: 0.30, 0.90). Lastly, the analysis showed that population density was positively associated with high parasite prevalence (1.12 OR, 95% CI: 1.00, 1.35) in rural clusters.

Our analysis highlight similarities and differences in the determinants of transmission in urban and rural areas. Additional studies are warranted to understand the mechanisms that relate educational attainment with parasite prevalence in both urban and rural areas and to unveil the reasons underlying the observed positive association between population density and parasite prevalence in rural areas. However, our findings provide supporting evidence for the positive impact of increased access to ACTs and suggest the need for greater intervention distribution in highly populated rural areas.

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