

Publication

A methodological framework for the improved use of routine health system data to evaluate national malaria control programs : evidence from Zambia

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Author(s) Bennett, Adam; Yukich, Joshua; Miller, John M.; Vounatsou, Penelope; Hamainza, Busiku; Ingwe, Mercy M.; Moonga, Hawela B.; Kamuliwo, Mulakwo; Keating, Joseph; Smith, Thomas A.; Steketee, Richard W.; Eisele, Thomas P.

Author(s) at UniBasel [Vounatsou, Penelope](#) ; [Smith, Thomas A.](#) ;

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Due to challenges in laboratory confirmation, reporting completeness, timeliness, and health access, routine incidence data from health management information systems (HMIS) have rarely been used for the rigorous evaluation of malaria control program scale-up in Africa.; We used data from the Zambia HMIS for 2009-2011, a period of rapid diagnostic and reporting scale-up, to evaluate the association between insecticide-treated net (ITN) program intensity and district-level monthly confirmed outpatient malaria incidence using a dose-response national platform approach with district-time units as the unit of analysis. A Bayesian geostatistical model was employed to estimate longitudinal district-level ITN coverage from household survey and programmatic data, and a conditional autoregressive model (CAR) was used to impute missing HMIS data. The association between confirmed malaria case incidence and ITN program intensity was modeled while controlling for known confounding factors, including climate variability, reporting, testing, treatment-seeking, and access to health care, and additionally accounting for spatial and temporal autocorrelation.; An increase in district level ITN coverage of one ITN per household was associated with an estimated 27% reduction in confirmed case incidence overall (incidence rate ratio (IRR): 0.73, 95% Bayesian Credible Interval (BCI): 0.65-0.81), and a 41% reduction in areas of lower malaria burden.; When improved through comprehensive parasitologically confirmed case reporting, HMIS data can become a valuable tool for evaluating malaria program scale-up. Using this approach we provide further evidence that increased ITN coverage is associated with decreased malaria morbidity and use of health services for malaria illness in Zambia. These methods and results are broadly relevant for malaria program evaluations currently ongoing in sub-Saharan Africa, especially as routine confirmed case data improve.

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