Resurgence of malaria after discontinuation of indoor residual spraying of insecticide in a previously high transmission intensity area of Uganda

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Abstract

Background In 2009, Uganda implemented a programme of indoor residual spraying of insecticide (IRS) in ten districts in the Northern Region with historically high malaria transmission intensity. This programme was successful in reducing the burden of malaria; however, in May, 2014, IRS was discontinued, to be replaced by universal distribution of long-lasting insecticide-treated bednets. The aim of this study was to assess changes in malaria morbidity during and after IRS discontinuation in one district in Uganda.

Methods We gathered individual-level malaria surveillance data from one outpatient department and one paediatric inpatient setting in Apac District. Data collected included whether malaria was suspected and the results of laboratory testing. Primary outcome was the test positivity rate (TPR), defined as the proportion of people tested who had laboratory-confirmed malaria. We evaluated temporal changes in TPR as a categorical variable, taking in to account baseline, initial period of effective IRS, sustained IRS, and discontinuation of IRS and using an interrupted time series analysis controlling for method of testing, seasonality, and autocorrelation with calendar time.

Findings Outpatient visits were recorded over a 77-month period and included 126 260 patient encounters: 67 634 patients (53·6%) had suspected malaria and 65 421 (96·7%) of patients with suspected malaria underwent laboratory testing. In children under 5 years, baseline TPR was 60–80% with an initial decrease of 5·95% per month (CI –8·46 to –3·44%, p<0·0001) after implementation of effective IRS followed by a sustained decrease of 0·42% per month (CI –0·70 to –0·14%, p=0·004). From month 4 to month 18 after discontinuation of IRS, TPR increased by an average of 3·30% per month (CI 1·88–4·73%, p<0·0001), eventually returning to baseline levels. Similar trends were seen in patients older than 5 years. For the 14 595 inpatient admissions, TPR increased by an average of 6·5% per month (CI 4·34–8·66%, p<0·0001) between month 4 and month 18 after discontinuation of IRS, reaching a point where almost 100% of children tested positive for malaria.

Interpretation The discontinuation of IRS in an area with historically high transmission intensity was associated with a significant increase in malaria morbidity, reaching pre-IRS levels within 18 months, despite universal distribution of long-lasting insecticide-treated bednets. These findings have important policy implications for sustaining reductions in the burden of malaria in high transmission settings.

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Declaration of interests
We declare no competing interests.

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