

Malaria Outbreak Facilitated by Appearance of Vector-Breeding Sites after Heavy Rainfall and Inadequate Preventive Measures: Nwoya District, Uganda, March-May 2018

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Abstract : Background: Malaria is a leading cause of morbidity and mortality in Uganda. In April 2018, malaria cases surged in Nwoya District, northern Uganda, exceeding the action thresholds. We investigated to assess the outbreak's magnitude, identify transmission risk factors, and recommend evidence-based control measures. Methods: We defined a malaria case as onset of fever in a resident of Nwoya District with a positive Rapid Diagnostic Test or microscopy for malaria *P. falciparum* from 1 February to 22 May 2018. We reviewed medical records in all health facilities of affected sub-counties to find cases. In a case-control study, we compared exposure risk factors between 107 case-persons and 107 asymptomatic controls matched by age and village. We conducted entomological assessment on vector-density and behavior. Results: We identified 3,879 case-persons (attack rate [AR]=6.5%) and 2 deaths (case-fatality rate=5.2/10,000). Females (AR=8.1%) were more affected than males (AR=4.7%). Of all age groups, the 5-18 year age group (AR=8.4%) was most affected. Heavy rain started on 4 March; a propagated outbreak began during the week of 2 April. In the case-control study, 55% (59/107) of case-patients and 18% (19/107) of controls had stagnant water around households for several days following rainfall (ORM-H=5.6, 95%CI=3.0-11); 25% (27/107) of case-patients and 51% (55/107) of controls wore long-sleeve cloths during evening hours (ORM-H=0.30, 95%CI=0.20-0.60); 29% (31/107) of case-patients and 15% (16/107) of controls did not sleep under a long-lasting insecticide-treated net (LLIN) (ORM-H=2.3, 95%CI=1.1-4.9); 37% (40/107) of case-patients and 52% (56/107) of controls had ≥ 1 LLIN per 2 household members (ORM-H=0.54, 95%CI=0.30-0.97). Entomological assessment indicated active breeding sites; *Anopheles gambiae* sensu lato species were the predominant vector. Conclusion: Increased vector breeding sites after heavy rainfall, together with inadequate malaria preventive measures caused this outbreak. We recommended increasing coverage for LLINs and larviciding breeding sites.

Keywords : malaria outbreak, *Plasmodium falciparum*, global health security, Uganda

Conference Title : ICEID 2019 : International Conference on Emerging Infectious Diseases

Conference Location : London, United Kingdom

Conference Dates : February 14-15, 2019