

Invasive Salmonellosis Among Children Under Four Years at Queen Elizabeth Central Hospital in Blantyre, Malawi

Chisomo Msefula^{1,2}, Franziska Olgemoeller², Ndaru Kaluwa², Dalitso Segula⁴, Tonney Nyirenda^{1,2}, Wilfred Nedi³, Neil Kennedy³, Nick Feasey^{2,3}, Melita Gordon^{2,7}, Robert Heyderman^{2,5}

¹Pathology Department, College of Medicine, University of Malawi; ²Malawi-Liverpool-Wellcome Trust Clinical Research Programme; ³Paediatrics Department, Queen Elizabeth Central Hospital, College of Medicine, University of Malawi; ⁴Medicine Department, Queen Elizabeth Central Hospital, College of Medicine, University of Malawi; ⁵University College London, London, England; ⁶Liverpool School of Tropical Medicine; ⁷University of Liverpool

Background: Reports of invasive nontyphoidal *Salmonella* and typhoid fever in Malawi have largely been derived from blood-culture confirmed cases seeking health care at Queen Elizabeth Central Hospital (QECH) in Blantyre. However blood culture has low sensitivity and likely underestimates reported case numbers. In this study we have used both blood culture and PCR to estimate the level of underreporting, which potentially impacts decision-making processes.

Methods: Blood culture and PCR were performed on blood collected from 646 children with nonspecific febrile illness between August 2014 and July 2016, aged 0-4 years, median 1.3. DNA was extracted from blood after a pre-enrichment step in tryptone soy broth and ox-bile. Pan-salmonella, *S. Typhi* (STY) and *S. Typhimurium* (STM) specific primers were used in the PCR.

Results: Blood culture and PCR simultaneously identified 10 STM (1.5%) and 10 STY (1.5%) cases. Two cases (0.3%) with growth of *S. Enteritidis* and *S. Typhimurium* respectively were detected on PCR with the pan-*Salmonella* primer only. PCR was negative in three cases (0.5%) with growth of *S. Typhi*, and in five cases (0.8%) with growth of *S. Typhimurium*. There was no *Salmonella* growth on culture in six STM PCR confirmed cases, in four STY PCR confirmed cases and in two PCR confirmed cases where only the pan-salmonella primer was positive.

Conclusions: A combination of both methods increased the percentage of reported cases from 4.8% to 6.7% in this cohort of young children. As expected there is underreporting of salmonellosis at Queen Elizabeth Central Hospital in Blantyre.