Reassessing the use of Microscopy-based Techniques in Integrated Zoonotic Parasitic Disease Surveillance

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Abstract

Introduction: Essential to achieving the 2030 World Health Organization targets related to the elimination of parasitic diseases, schistosomiasis and soil-transmitted helminthiasis, the detection and surveillance of outbreaks is integral to assess and monitor the progress of elimination timelines.

Methods: This study determined the sensitivity and specificity of microscopy-based techniques for soil-transmitted helminths (STH) and schistosomes from field data gathered in the Philippines. In humans, 748 fecal samples were processed using Kato-Katz and formalin ethyl-acetate concentration technique (FEACT). In animals, 489 fecal samples were processed using modified McMaster, sucrose flotation and simple sedimentation techniques across an animal population consisting of dogs, cats, pigs, water buffalo, and cattle. Across humans and animals, we investigated several intestinal helminth infections such as *Ascaris*, *Trichuris* and hookworm and *Schistosoma japonicum*. A Bayesian latent-class analysis Monte-Carlo Markov Chain (MCMC) model was used to evaluate the different diagnostic techniques in the absence of a gold standard.

Results: Our results suggest that Kato-Katz has higher sensitivity in detecting infection than FEACT in humans. Across the animal population, simple sedimentation had the highest sensitivity in the detection of infection across the range of intestinal helminths and *Schistosoma japonicum*.

Discussion: Kato-Katz remains the recommended diagnostic for surveillance in humans, with simple sedimentation showing promise in animal surveillance. However, both techniques have limitations that may lead to untreated populations and persistence of schistosomiasis and soil-transmitted helminthiasis. Results indicate the need for more sensitive techniques to further the control and elimination of these infections to achieve the 2030 WHO targets.