INVITATION PUBLIC DEFENSE

Optimizing monitoring and evaluation of neglected tropical diseases: soil-transmitted helminthiasis as a case study

Adama Kazienga

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PROMOTORS

Prof. dr. Bruno Levecke
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Curriculum Vitae

Adama Kazienga was born on 1st January 1984 in Poessi (Burkina Faso). He obtained a BSc in computer science at the Polytechnic University of Bobo-Dioulasso (Burkina Faso) in 2007 and an MSc in the same field in March 2010. Adama joined the Clinical Research Unit of Nanoro (CRUN) in June 2010 as a clinical data manager and data analyst until December 2015, focusing on malaria research. He later moved to the Public Health Pests Laboratory in Jeddah (Saudi Arabia), working on the dengue control program. In July 2020, he completed an MSc in Biostatistics at Hasselt University (Belgium), and since October 2020, he started a PhD at Ghent University on optimizing monitoring and evaluation of neglected tropical diseases in collaboration with Erasmus MC (the Netherlands). Adama has (co-)authored more than 40 peer-reviewed papers.

Where?

The defense will take place on
Friday 10th October 2025, 5.00 pm
Auditorium D

Faculty of Veterinary Medicine
Ghent University, Campus Merelbeke
Salisburylaan 133, Merelbeke

After the defense (7 pm) there will be a reception with drinks and bites.

How to attend?

If you would like to attend the defence online or the reception, please register before October 3 via Isabelle.Despeghel@UGent.be.

Members of the Jury

Prof. dr. Luc Duchateau
Chairman of the Jury
Faculty of Veterinary Medicine, Ghent University

Prof. dr. Sarah Gabriel
Faculty of Veterinary Medicine, Ghent University

Prof. dr. Piet Cools
Faculty of Medicine and Health Sciences, Ghent University

Prof. dr. Rachel Pullan
London School of Hygiene and Tropical Medicine, United Kingdom

Prof. dr. Wilma Stolk
Erasmus MC, The Netherlands

Summary

Neglected tropical diseases (NTDs) are a group of 21 parasitic, bacterial, viral diseases and toxin-mediated diseases, which are widespread in tropical and subtropical regions. To fight against the NTD-attributable morbidity, the World Health Organization (WHO) recommends several control strategies. To assess the impact of these control strategies, monitoring and evaluation (M&E) remain crucial for informing decision-making regarding whether WHO targets for 2030 have been achieved. Several sampling frameworks have been developed to support M&E through the proposed recommended survey designs. Yet, it remains unclear whether these recommended survey designs are cost-efficient enough to ensure the correctness of the program decision while minimizing the total operational cost and accounting for the deployment of imperfect diagnostics. In this thesis, different frameworks were developed based on a lot-quality assurance sampling (LQAS) approach, with the aim to improve the M&E of NTD control programs.

To start, we developed a generic 2-stage LQAS framework for decision-making that allows for both imperfect diagnostics and spatial heterogeneity of infections. We applied the framework to M&E of soil-transmitted helminthiasis (STH) control programs as a case study. Our results highlighted that the survey design currently recommended by WHO may lead to incorrect program decisions, and that higher cost and lower throughput of improved diagnostic tests are compensated by lower required sample sizes.

Subsequently, we used the same framework to investigate a range of potential diagnostic target product profiles (TPPs) for new diagnostics used to inform control programs against another STH (strongyloidiasis). Our findings highlighted that (i) specificity rather than sensitivity is a critical parameter to consider for research and development (R&D) of new diagnostic methods; (ii) the requirements for diagnostic performance became less stringent with increasing sample size and when higher risks of incorrect decision-making were accepted. When focusing on the assay formats (iii), the lateral flow assay resulted in lower survey costs compared to the currently recommended Baermann method. Antibody ELISA was cost-efficient only if the diagnostic performance was nearly perfect, combined with low cost per test and high sample throughput.

To better reflect the imperfect performance of the WHO recommended Kato-Katz (KK) thick smear, we developed another LQAS framework that captured the variation in egg counts across STHs, across schools, between and within individuals, and between repeated smears. Finally, we further expanded this egg-count-based framework to make the interpretation of risks of incorrect decision-making more intuitive and to allow for prior information. We found that the required sample size increased when the allowable risk of incorrect decision reduced and when the mean prior approached the program prevalence threshold. For the decision to switch to an event-based deworming, we found that duplicate KK thick smears on a single stool sample was the most cost-efficient survey design, while for the decision to declare elimination as a public health problem, screening one stool sample with a single KK thick smear was more cost-efficient. The required sample size for these survey designs varied between program targets and STH species.

We conclude that the developed frameworks enable the evaluation and refinement of integrated M&E guidelines for NTD control programs. Additionally, they also support R&D efforts by informing TPPs for novel diagnostic tools.