

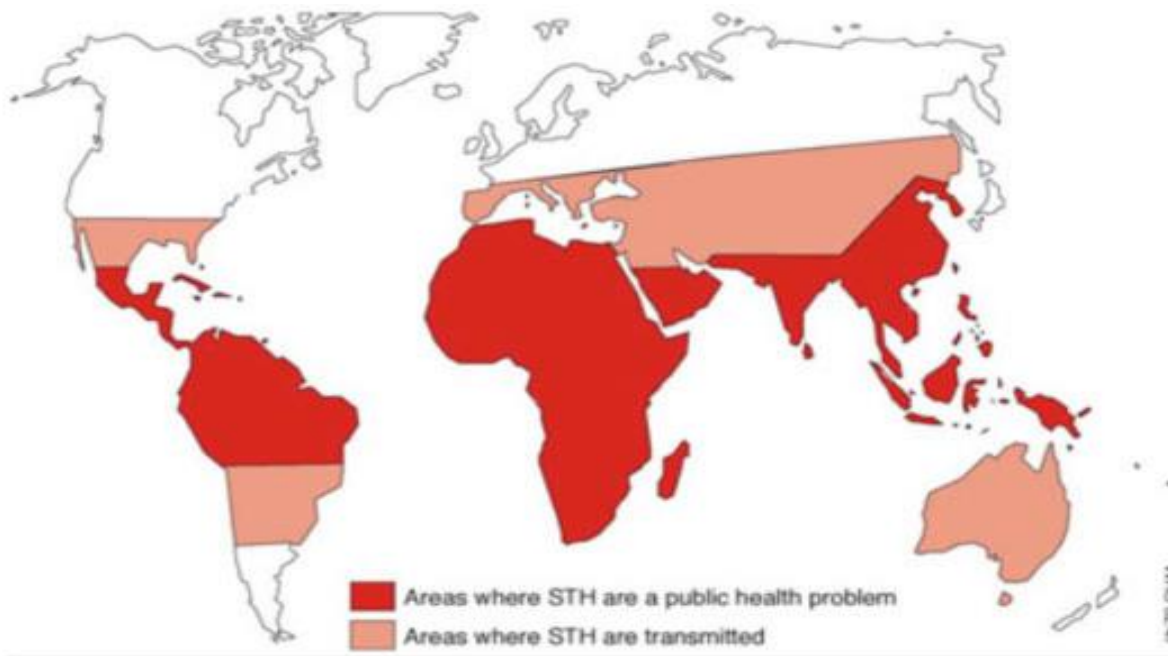


METHOD FOR THE DETECTION AND QUANTIFICATION OF SOIL TRANSMITTED HELMINTH EGGS IN ENVIRONMENTAL SAMPLES (FAECAL SLUDGE)

**Isaac Dennis Amoah
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BACKGROUND

- **Soil-transmitted helminths** refer to the intestinal worms **transmitted** through contaminated **soil**
- Over **one billion people** are infected with at least one of the STHs (WHO, 2006)



BACKGROUND contd.....

- Approximately **5 million years** lived with disability (YLDs) are attributable to STHs (Pullan *et al.*, 2014).
 - 65% attributable to hookworm
 - 22% to *A. lumbricoides*
 - 13% to *T. trichiura* (Pullan *et al.*, 2014)
- Daily egg output per STHs in faeces ranges from
- **30 000 eggs** for *Ancylostoma duodenale* to **200 000 eggs** for *Ascaris* (Raso *et al.*, 2004)



BACKGROUND contd.....

- Epidemiological link



RESEARCH ARTICLE

Contribution of Wastewater Irrigation to Soil Transmitted Helminths Infection among Vegetable Farmers in Kumasi, Ghana

Isaac Dennis Amoah^{1,3*}, Amina Abubakari³, Thor Axel Stenström¹, Robert Clement Abaidoo³, Razak Seidu²



A CASE FOR APPROPRIATE OVA DETECTION METHODOLOGIES

- Methods used for ova detection in environmental samples is important in determining associations between exposure and infection
- Several methods are being used globally
 - **Conventional methods:** flotation, sedimentation, combination of both etc
 - Molecular methods: dPCR, q-PCR,
 - Advanced methods: BacLight Dead/Live technique, LAMP, Flow cytometry



METHOD DEVELOPMENT

1. What is out there?

Literature review

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Detection and quantification of soil-transmitted helminths in environmental samples:
A review of current state-of-the-art and future perspectives

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WHAT LITERATURE HAD TO SAY

Conventional methods

- Sample types and quantity
- Egg Recovery
 - Separation of eggs from particles
 - Filtration of samples
- Concentration
 - Sedimentation
 - Flotation
 - Phase extraction



- Viability Determination
 - Incubation: Sulphuric acid, formalin, distilled water
 - BacLight Dead/Live Method

WHAT ELSE?

Nucleic acid based methods

New and emerging methods



WORKSHOP OF PRACTITIONERS

Workshop in August 2015, Durban, South Africa

- Institute for Water and Wastewater Technology- Durban University of Technology, Durban, South Africa
- Pollution Research Group-UKZN, Durban, South Africa
- Institute of Engineering-Autonomous University of Mexico
- Laboratory of Wastewater Treatment and Water Pollution-University Cheikh Anta Diop. Dakar, Senegal



NEW REVISED METHOD

- Apparatus needed:



NEW REVISED METHOD Contd.....

- **Reagents**

- 0.1% Tween80

- Saturated ammonium bicarbonate solution

- Zinc Sulphate (specific gravity 1.3)

- H_2SO_4 for Incubation (0.1N)



NEW REVISED METHOD Contd.....

- **Sample volume:**
 - 1/5 liter (s) for water, wastewater etc
 - 50g for sludge/UD waste/compost etc
- **Blending/homogenization**
- **Filtration: 100 μ m and 20 μ m**
- **Flotation: Zinc sulphate (S.G: 1.30)**
- **Centrifugation**
- **Microscopy**



FIELD TESTING

Dakar, Senegal



PERFORMANCE

	SLUDGE (eggs/g)			RAW SEWAGE* (eggs/L)		
	<i>Ascaris</i> spp	<i>Trichuris</i> spp	Hookworm	<i>Ascaris</i> spp	<i>Trichuris</i> spp	Hookworm
1	1250	19500	340	570	1080	90
2	1065	17600	160	570	1500	120
3	1180	18500	280	3780	1950	30

The split-spike technique showed that over **80 %** of *Ascaris* spp eggs were recovered from raw sewage



WHAT NEXT?

- More laboratory and field testing
- Quality Assurance/Quality Control
- Training of personnel

- **Molecular techniques**
 - **LAMP**: Possible molecular approach for low resource areas or field application.

- **Flow cytometry**



WORKSHOP 9

Title: FSM Education/FSM Characterization

Venue: Kaveri 1-3



THANK YOU

