



Development and Validation of the SaniPath Rapid Assessment Tool: Characterizing a Complex Problem with a Simple Tool

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Global Safe Water**

BILL & MELINDA
GATES foundation

background: urban sanitation

In **2008**, for the first time in history, the number of people living in cities **outnumbered** the population in rural areas



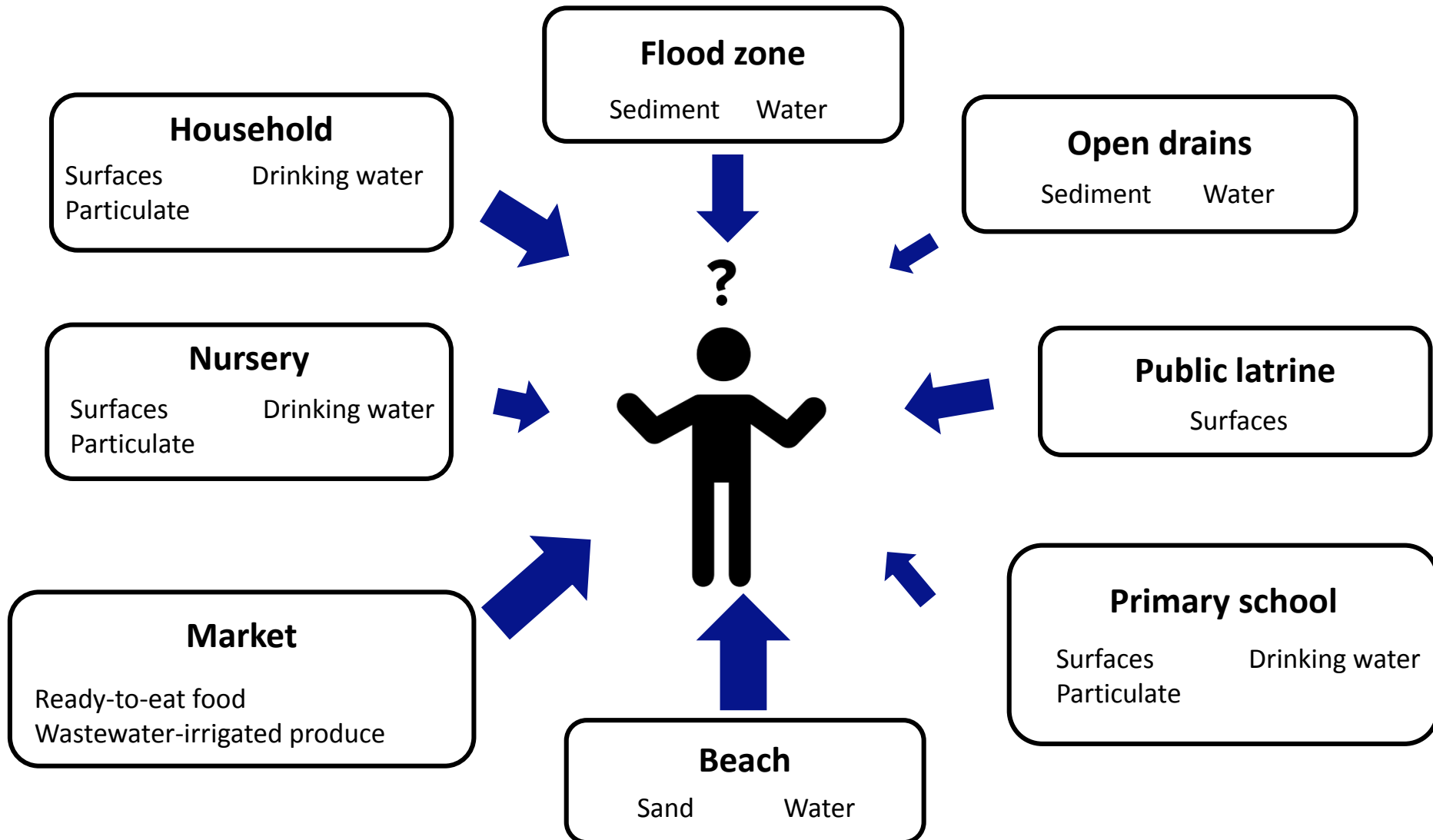
By **2050** the United Nations projects that **65%** of global population will live in cities

Rapid growth **outpaced** ability of government to provide **basic** services



**Crowded Population → Blurring Spaces → Communal Exposure →
Disease Transmission**

background: how should policy makers prioritize sanitation investments?



key goals of rapid assessment tool

Guide users through the collection of relevant data to inform their understanding of risk of exposure

Provide users with easy to use software interface for data entry that can be customized for different contexts

Generate data on relative exposure to fecal contamination in low-income, urban neighborhoods

Synthesize these data to guide community, government, and service providers in their decision-making process

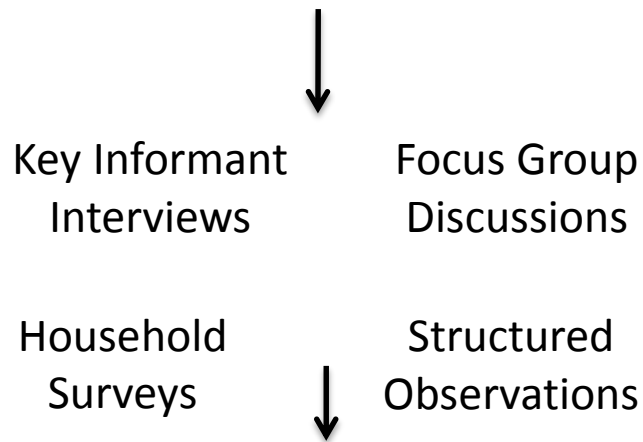
background: in-depth study in Accra, Ghana (phase 1)

We examined a wide range of exposures in both public and private domains and via common vehicles during different seasons in four low-income urban neighborhoods.

PATHWAYS

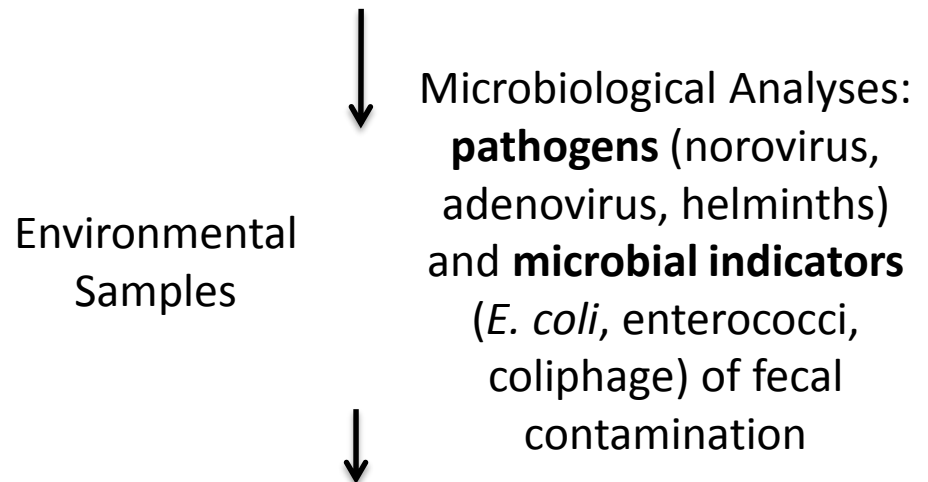
Marine and Surface Waters, sand, Drinking water- piped water, sachet, stored HH water, Open drains and flooding, Urban agriculture (wastewater irrigation), Primary schools and nurseries, Public latrines, Households

Human Behavior



800 Household Surveys
500 hrs. Structured Observations

Environmental Fecal Contamination



Total Environmental Samples: 1855

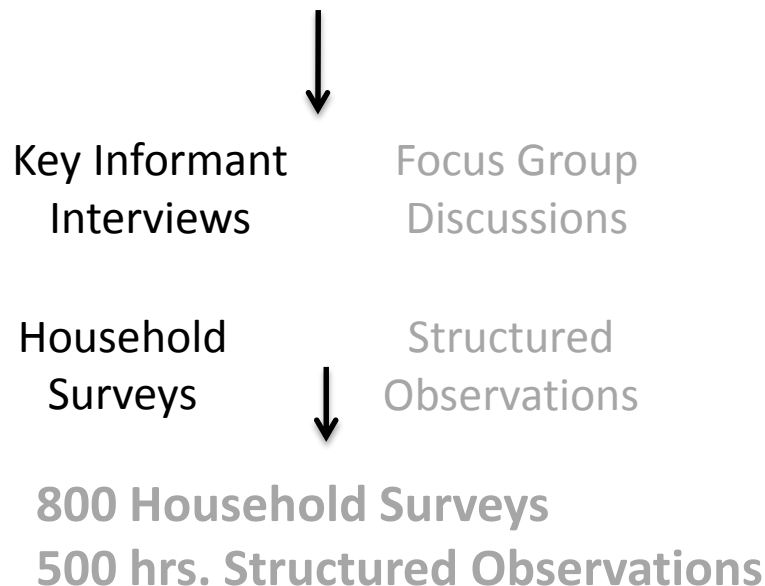
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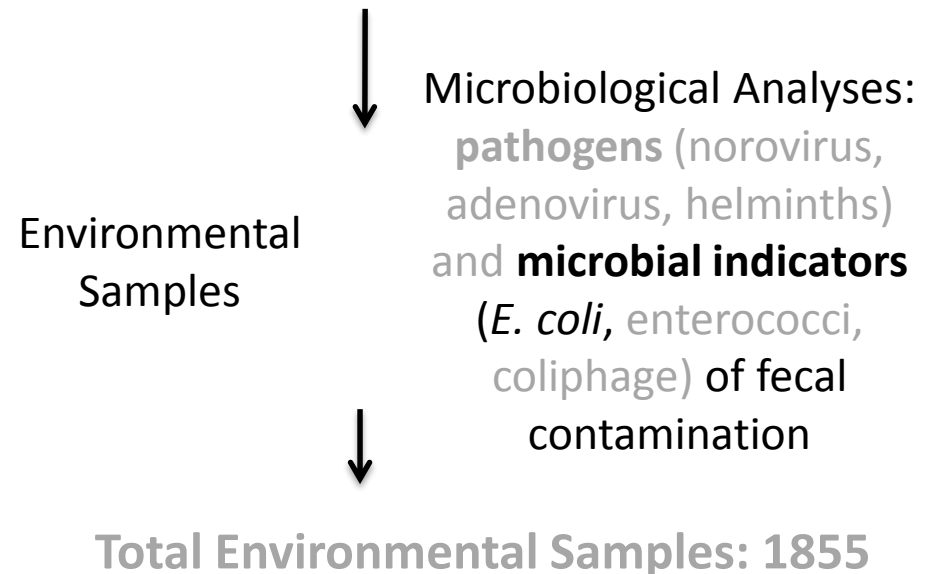
PATHWAYS

Marine and Surface Waters, particulate, Drinking water- piped water, sachet, stored HH water, Open drains and flooding, Urban agriculture (wastewater irrigation), Primary schools and nurseries, Public latrines, Households

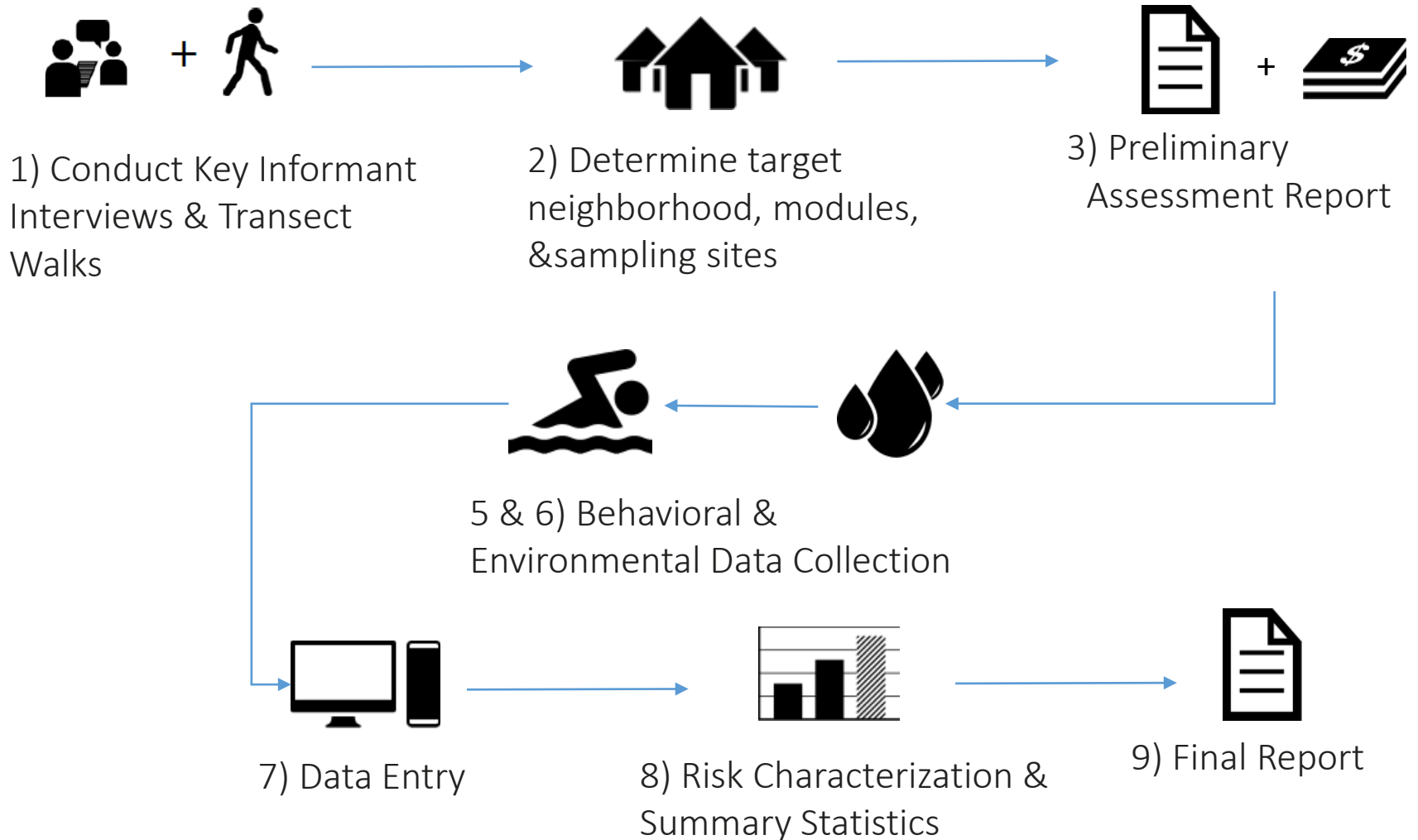
Human Behavior



Environmental Fecal Contamination



methods: the rapid assessment process



methods: data collection on water and sanitation behavior, and environmental contamination

behavior

Household Surveys

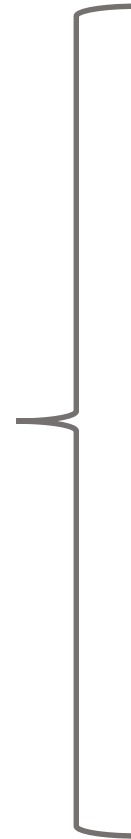
Community Surveys

School Surveys

contamination

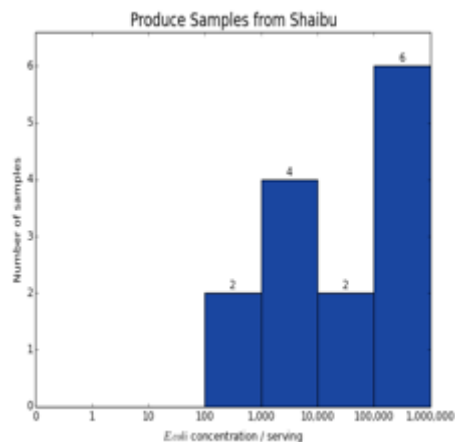
Membrane Filtration

IDEXX Quantitray/2000



methods: environmental and behavioral data are combined to estimate exposure to fecal contamination

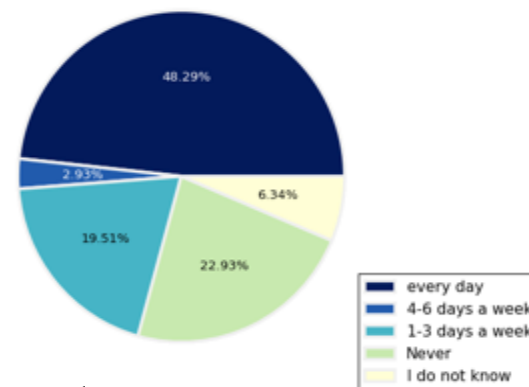
Environmental contamination



Other parameters*:
intake volumes,
duration of
exposure, etc.

Behavior Frequency

Frequency of Fruits/Vegetables Contact in Shaibu (children)

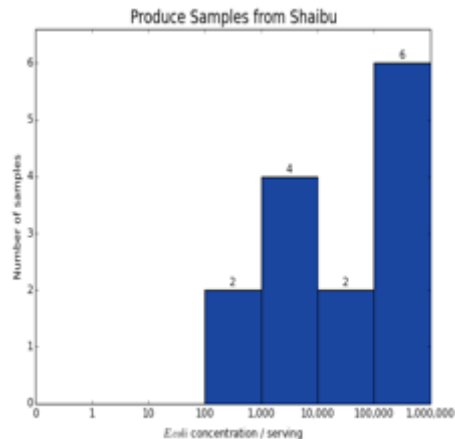


Risk of Exposure

*These values were determined based on a combination of EPA values, literature review and SaniPath Phase 1 data

methods: environmental and behavioral data are combined to estimate exposure to fecal contamination

Environmental contamination



Other parameters: *
intake volumes,
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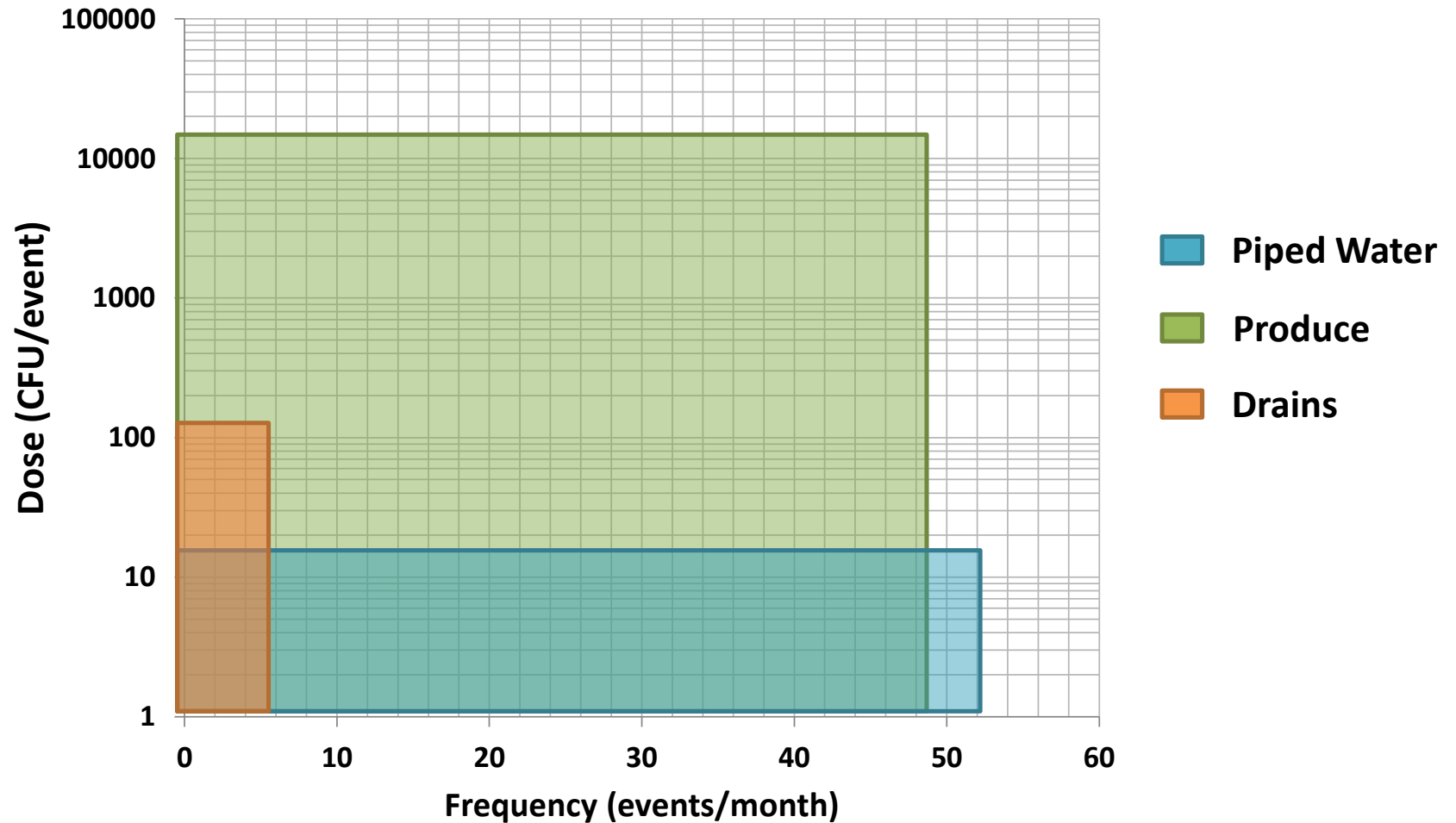


average *E. coli* / mL x mL ingested / event = DOSE (CFU *E. coli* ingested / event)

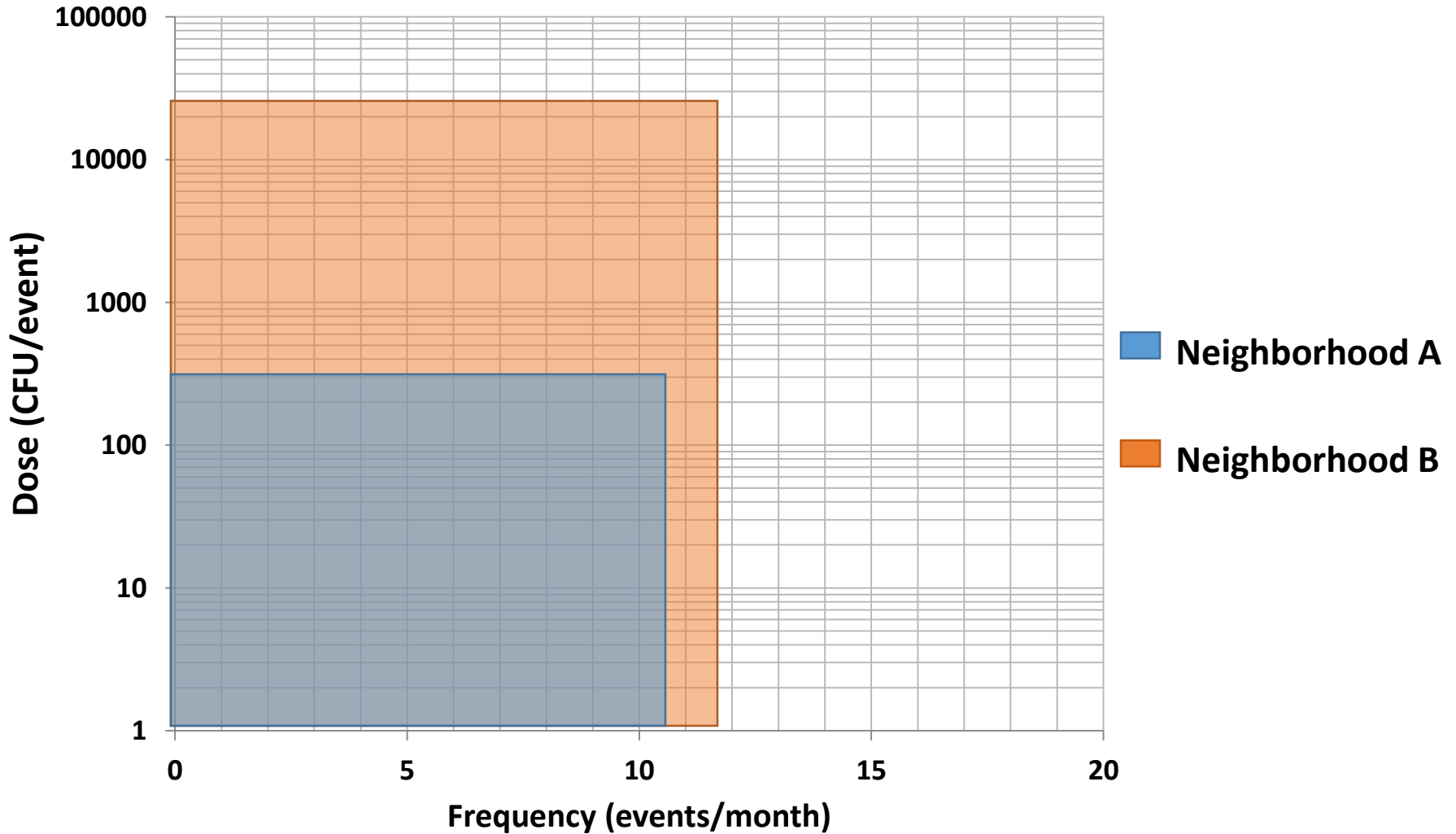
- Oral route only
- Direct ingestion: drinking water, accidental water, and produce
- Indirect ingestion: hand contamination, hand-to-mouth contact behavior

*Volumes were determined based on a combination of EPA values, literature review and SaniPath Phase 1 data

risk of exposure from three pathways in one neighborhood for adults



risk of exposure from **piped water** in two neighborhoods



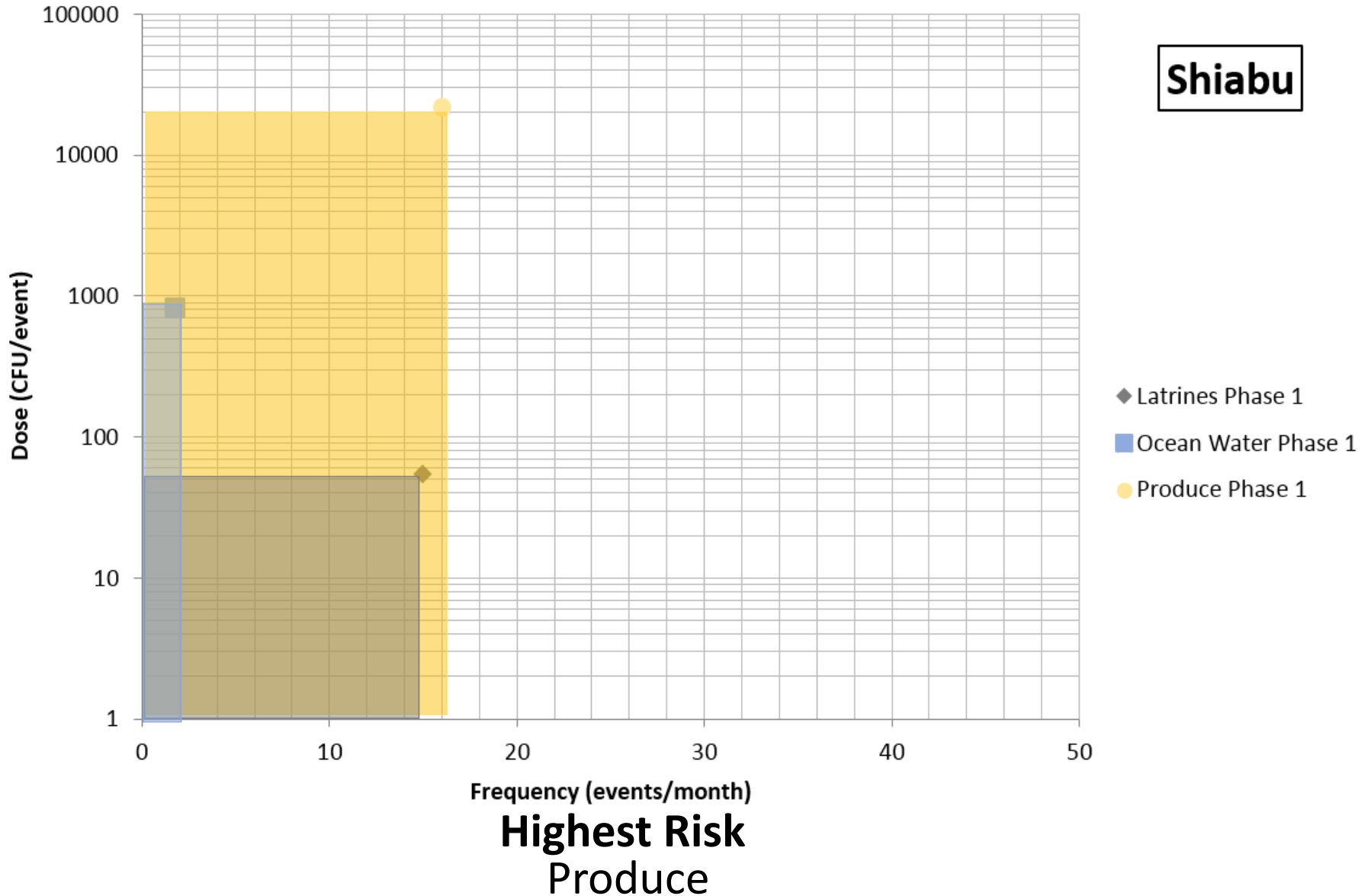
pilot testing in Accra, Ghana



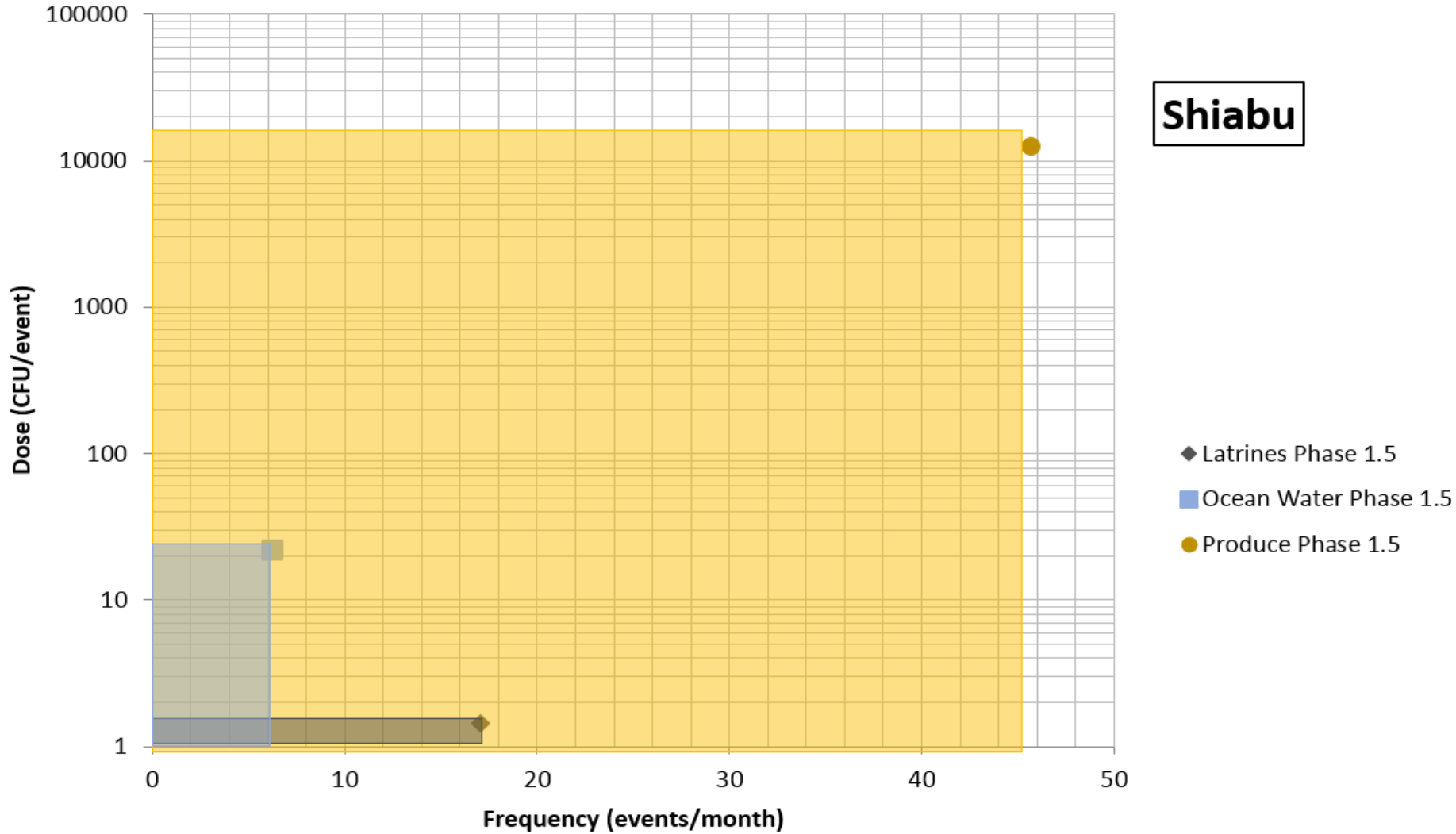
Photo Credit: Suraja Raj

- Piloted tool in same neighborhoods in Ghana as the Phase 1 in-depth study
- Tested the tool for usability & consistency of data collected
- Compare Rapid Tool risk assessment results to results from Phase 1 in Ghana

phase 1 vs. rapid tool pilot: phase 1



phase 1 vs. rapid tool pilot: rapid tool pilot



Highest Risk
Produce

deployment in Vellore, India

- We tested the Rapid Assessment Tool in two neighborhoods in Vellore, India—a completely different context from Accra. Characteristics of Vellore include:
 - Water scarce area
 - Not coastal
 - Lots of animals
 - Lots of open defecation
- We are collaborating with Christian Medical College, Vellore and the MAL-ED study to validate our environmental risk assessment with health outcome data.
 - Stool samples to look at enteric disease outcomes
 - Matched data collection
 - Link to health outcome data from Mal-ED to provide environmental exposure data

next steps in tool development

Incorporate more sophisticated analysis

Create a centralized database

Develop a mobile application

Add pathways or modules

Pilot tool for pre/post sanitation intervention monitoring

Rapid Assessment Tool Development Team

Bill & Melinda Gates Foundation:

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Center for Global Safe Water, Emory University:

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Water Research Institute: Joseph Ampofo

TREND: Nii Wellington

Research Triangle Institute: Matthew Scruggs, Megan Tulloch, Amir Mokhtari, Stephen Beaulieu

Improve International: Susan Davis

Christian Medical College, Vellore: Gagandeep Kang



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Thank You

Please visit
www.sanipath.com

Come to Workshop 1A!
Thursday 9:00am-12:30pm