The SaniPath + MapSan collaboration:

Assessment of Exposure to Fecal Contamination in a Low-Income Neighborhood before (and after) a Shared Latrine Intervention

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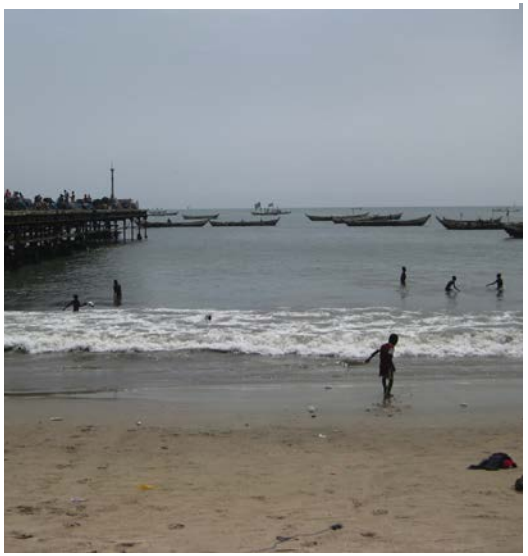
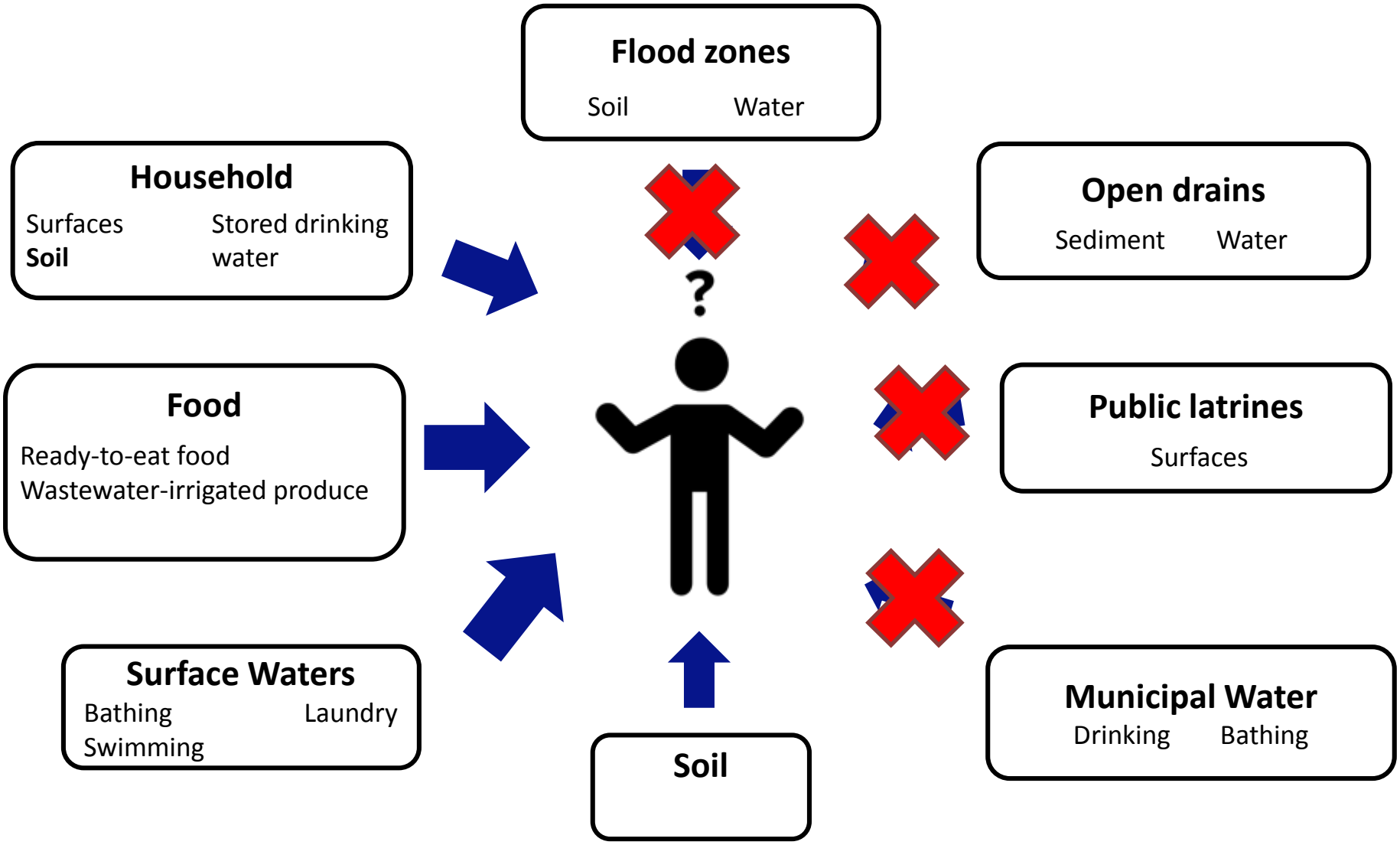
Given complex exposure routes with **different levels of contamination** and **types of exposure contact**, it has been difficult to determine **what kind of interventions might have the biggest impact on reduction in exposure**.



Which pathways pose the greatest risk of exposure? What is driving the risk? (behavior or contamination)

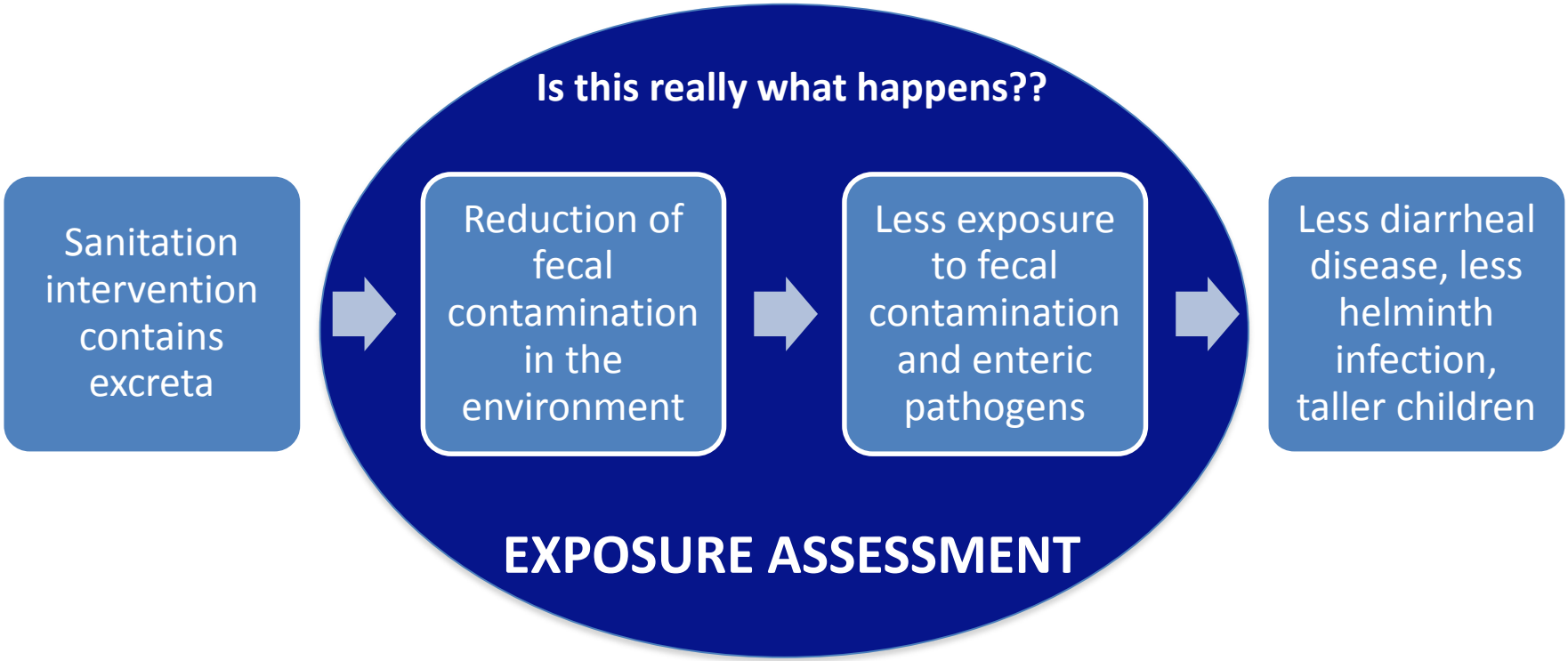


Confused designed by Jessica Look for The Noun Project

The SANIPATH Tool

The SaniPath Tool is designed to **assess public health risks** related to poor sanitation and to help **prioritize sanitation investments** based on the **exposures** that have the greatest public health impact.

Expected Impact of Sanitation Interventions



Study Objective

Will improved shared latrines reduce exposure to fecal contamination in the environment within low-income urban neighborhoods?

Pathways of Exposure to Fecal Contamination in Maputo

Floodwater

Shared latrines

Open drains

Surface water

Drinking water

Bathing water

Wastewater irrigated produce

Soil

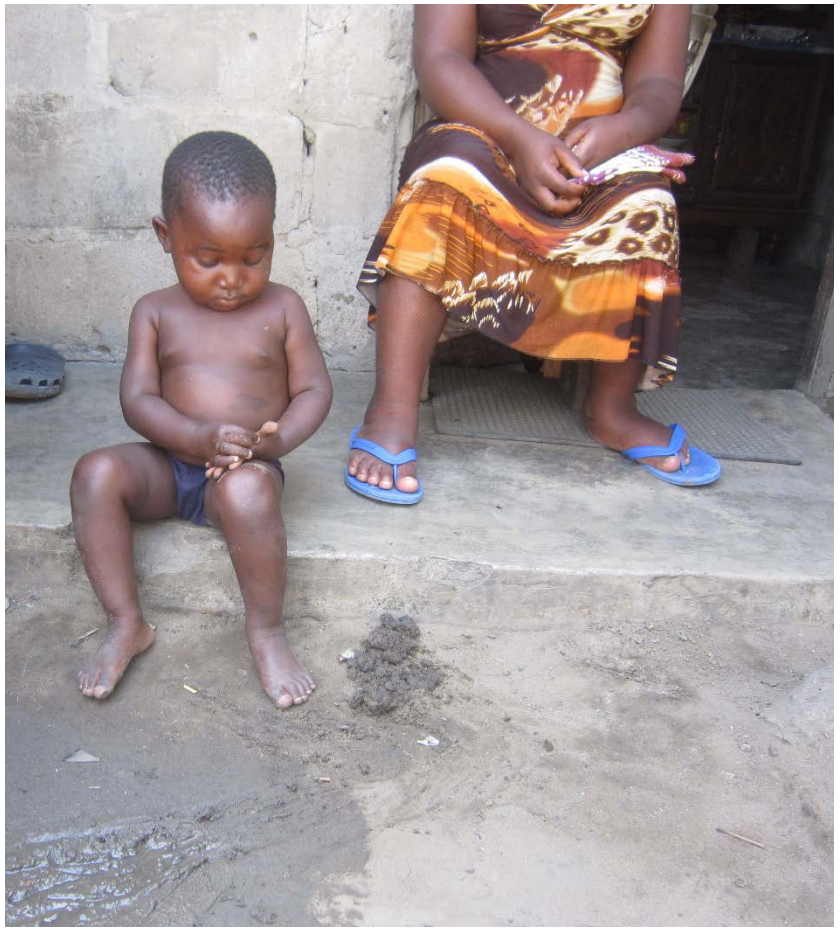
Data Collection Methods

- **Behavioral Exposure Data**
  - reported frequency of behavior of adults and children that leads to exposure to fecal contamination
- **Environmental Microbiology Data**
  - Collect environmental samples from relevant exposure pathways
  - Analyze for *E. coli*

Collecting drain water samples

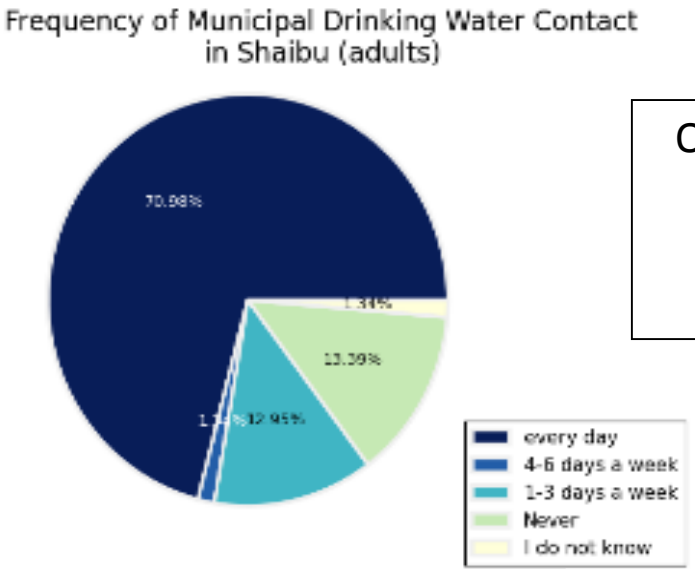
Adapting Methods for MapSan

- **Data collected over 6 weeks (March-April 2015) near end of rainy season**
- **15 intervention compounds, 10 control compounds**
  - mean 26 people per compound
- **Environmental Samples per compound**
  - **Private Domain**
    - 2 latrine swabs (if two latrines)
    - 2 soil samples (1 and 3m from latrine)
    - 1 drain water
    - 1 flood water
    - 1 bathing water
  - **Public Domain**
    - 2 soil (1 and 3m from entrance)
    - 1 drain
    - 1 flood
- **Behavioral Surveys per compound**
  - 3 adult
  - 2 child



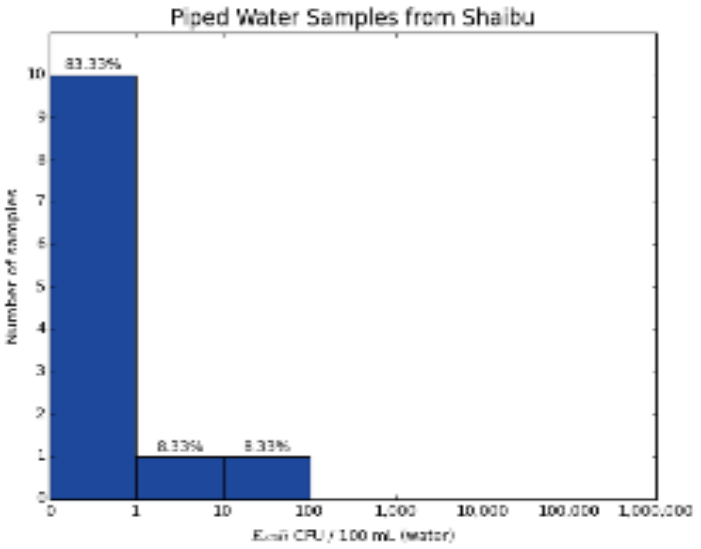
Estimating Exposure to Fecal Contamination

Behavior Frequency



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

Environmental Contamination



Drinking Water (Adult)
Percent Exposed = 89%
Log10 Dose 3.1

Tool uses Bayesian analysis to estimate the distribution of environmental contamination and frequency of exposure.

The mean dose and proportion of the population exposed are summarized from simulated distributions and displayed in risk profiles (left).

SaniPath Risk Profiles Example

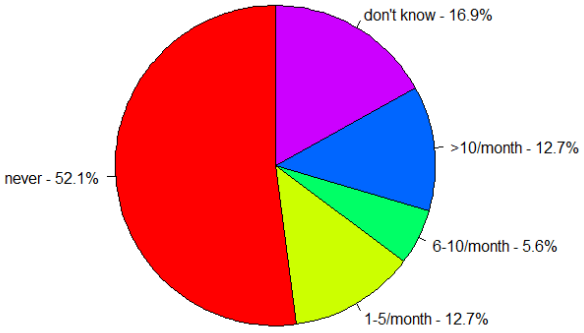
Neighborhood in Accra, Ghana
Drinking Water (Adult)
Percent Exposed = 89%
Log10 Dose 3.1

Neighborhood in Vellore, India
Drinking Water (Adult)
Percent Exposed = 97%
Log10 Dose 4.95

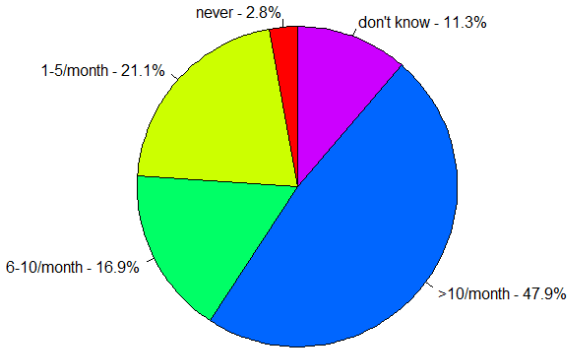
Risk profiles show % of population exposed per month (in red) and the average dose of fecal contamination ingested per month (darker red = higher dose).

Pre-Intervention Behaviors

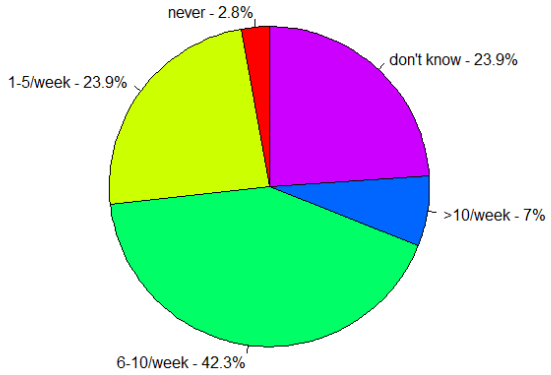
Adult Drain Water Contact



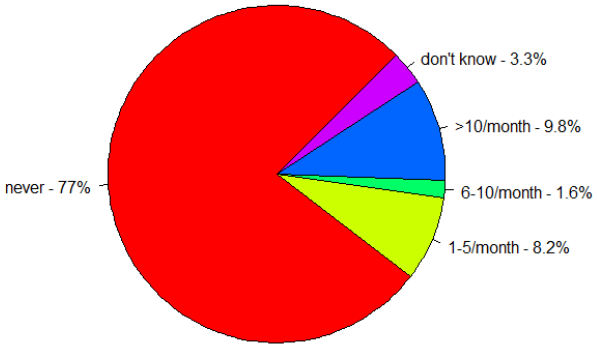
Adult Flood Water Contact



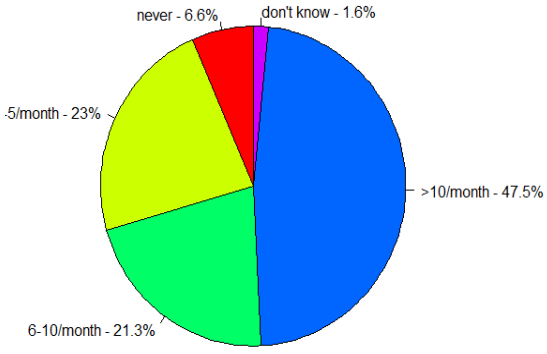
Adult Shared Latrine Contact



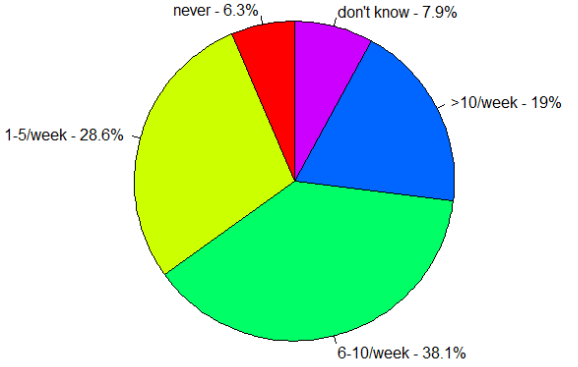
Child Drain Water Contact



Child Flood Water Contact



Child Shared Latrine Contact

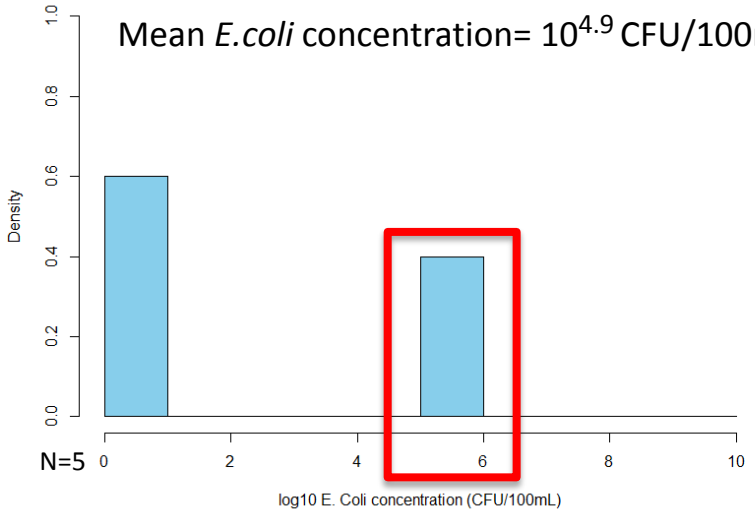


LOW CONTACT → **HIGH CONTACT**

Pre-Intervention Environmental Contamination

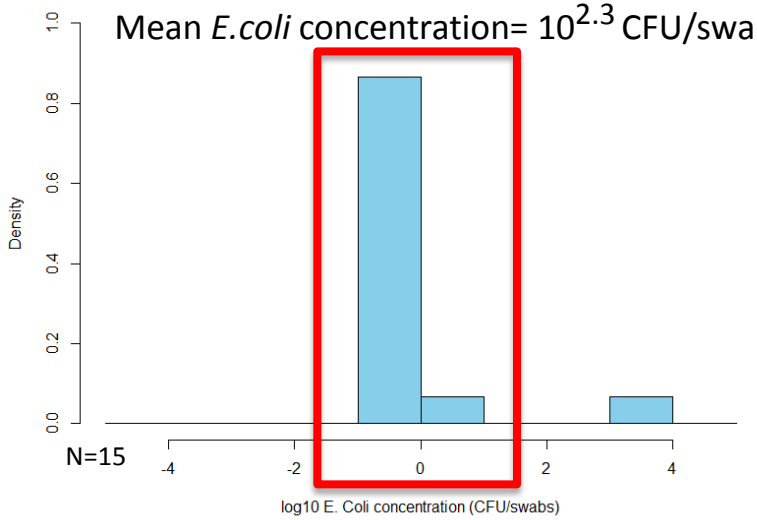
Flood Water

Mean *E.coli* concentration= $10^{4.9}$ CFU/100mL



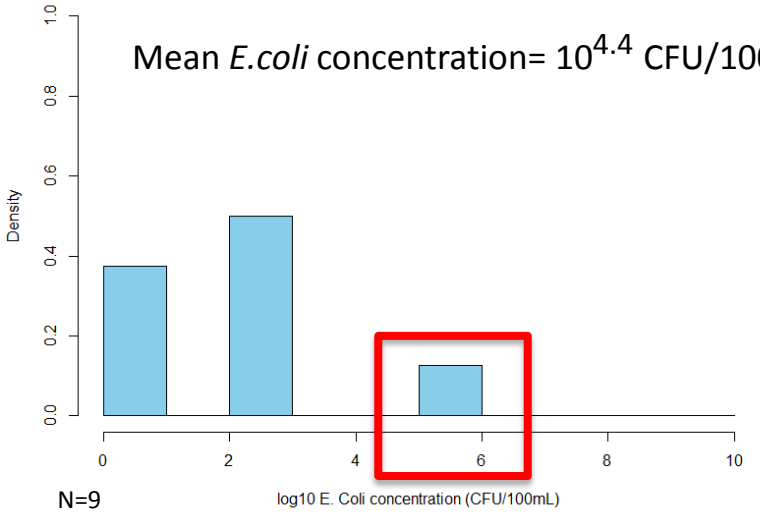
Latrine Swabs

Mean *E.coli* concentration= $10^{2.3}$ CFU/swab



Drain Water

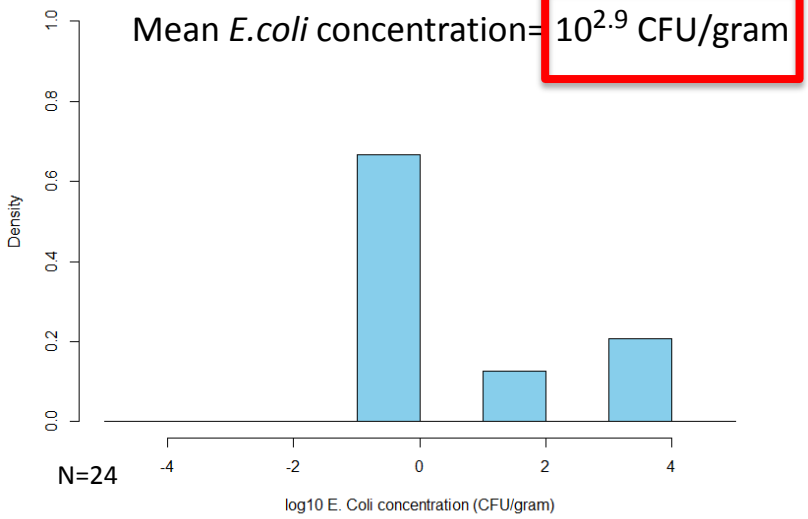
Mean *E.coli* concentration= $10^{4.4}$ CFU/100mL



Pre-Intervention Environmental Contamination

Public Domain Soil

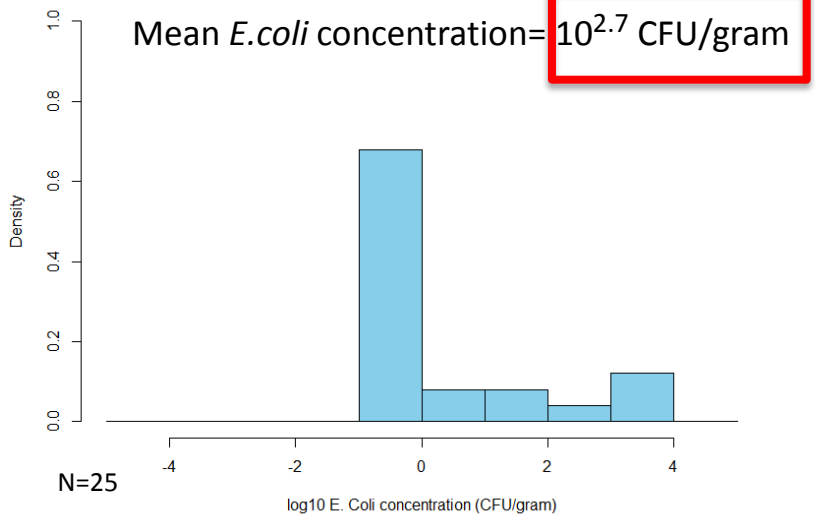
Mean *E.coli* concentration= $10^{2.9}$ CFU/gram



N=24

Compound Soil

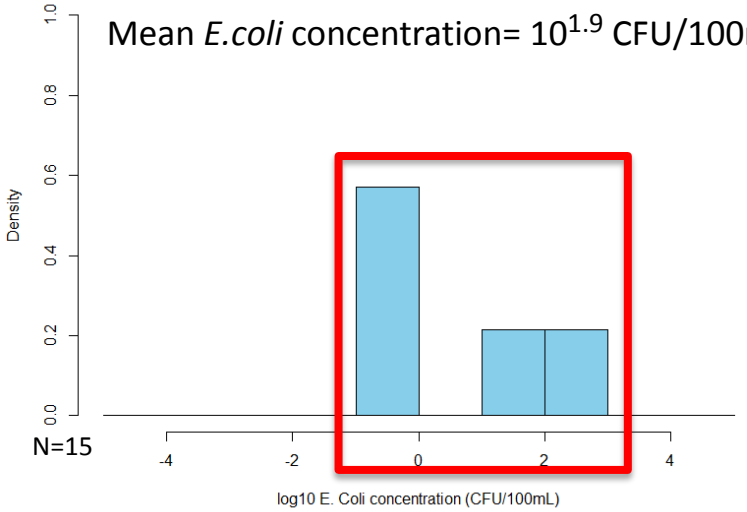
Mean *E.coli* concentration= $10^{2.7}$ CFU/gram



N=25

Bathing Water

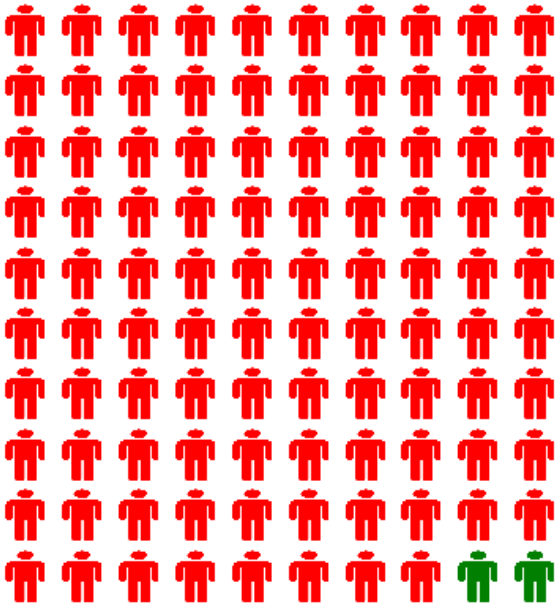
Mean *E.coli* concentration= $10^{1.9}$ CFU/100mL



N=15

Pre-Intervention Adult Exposure Assessment

Flood Water (Adult)
Percent Exposed=98%
Log10Dose=10.2



Drain Water (Adult)
Percent Exposed=38%
Log10Dose=3.97

Shared Latrines (Adult)
Percent Exposed=100%
Log10Dose=12.4

Pre-Intervention Child Exposure Assessment

Flood Water (Child)
Percent Exposed= 96%
Log10Dose=12.1

Drain Water (Child)
Percent Exposed=23%
Log10Dose=4.58

Shared Latrines (Child)
Percent Exposed=100%
Log10 Dose=11.8

Summary & Next Steps

- Variations in exposure to pathways- (high/high; low/high)
- Post-intervention data collection in Maputo March 2016
- Comparison/analysis of pre-intervention and post-intervention data collection summer 2016

Acknowledgements

Bill & Melinda Gates Foundation

Erica Coppel, Radu Ban

Georgia Tech (MapSan study)

Joe Brown, Jackie Knee, Olimpio Zavale

WeConsult

Wouter Rhebergen, Ellen de Bruijn, Ivo Van Haren, Bacelar Muneme, Field Enumerators

Laboratório Nacional de Higiene de Águas e Alimentos (LNHAA)

Nivalda Lazaro, Maria Isabel, Laurinda, Salma Xavier, Marcio Amos

Center for Global Safe Water, Sanitation and Hygiene at Emory University

Christine Moe, Amy Kirby, Yuke Wang, Kate Robb, Suraja Raj, Habib Yakubu, David Berendes, James Michiel, Eddy Perez

Thank You

For more information visit
SaniPath.org

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