The SaniPath Tool:

Assessing Public Health Risks from Unsafe Fecal Sludge Management in Poor Urban Neighborhoods

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CGSW Center for Global Safe WASH | Leading and Learning in WASH

Pathways of Exposure to Fecal Contamination

Floodwater

Public latrines

Open drains

Surface water

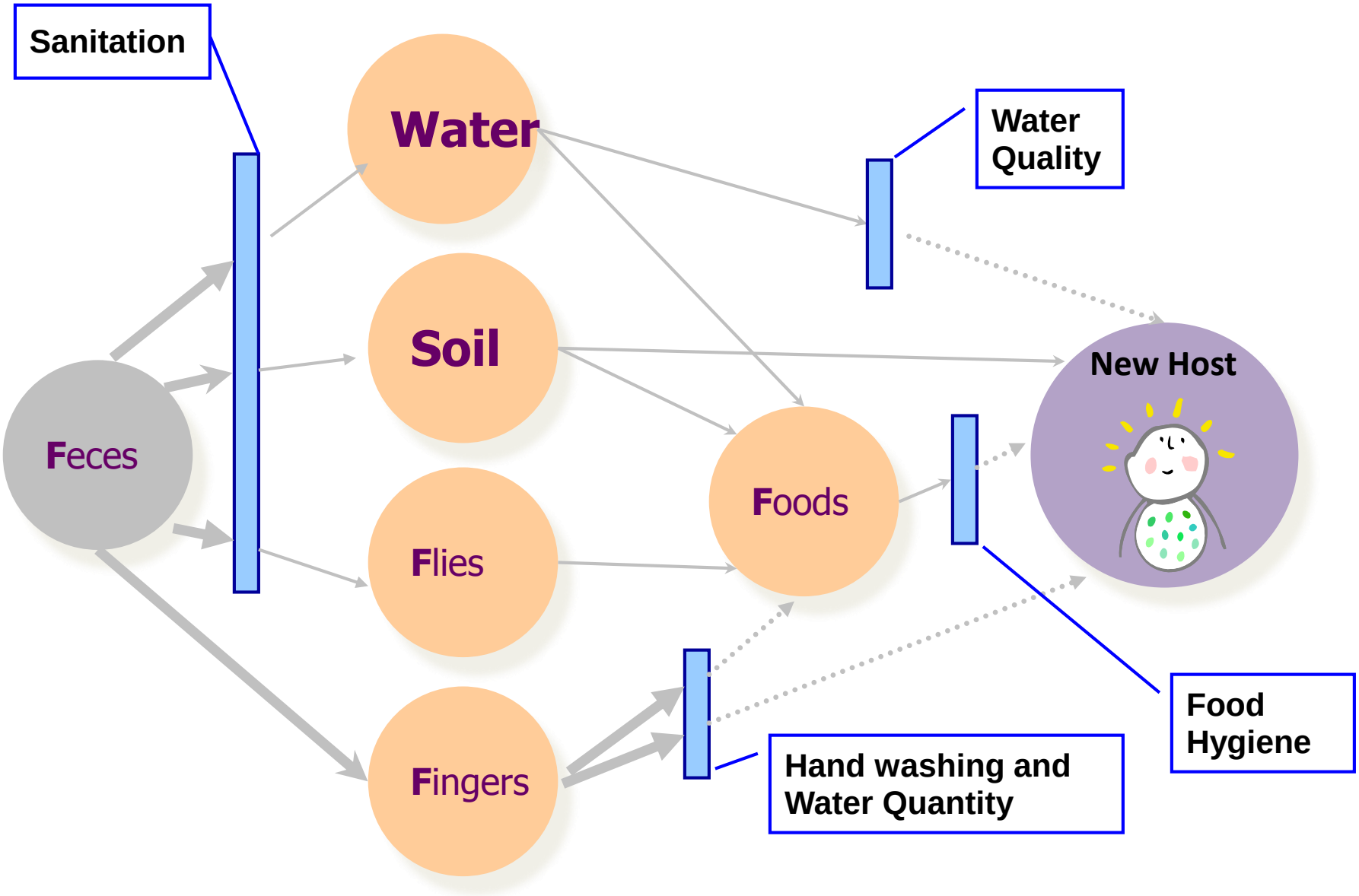
Drinking water

Bathing water

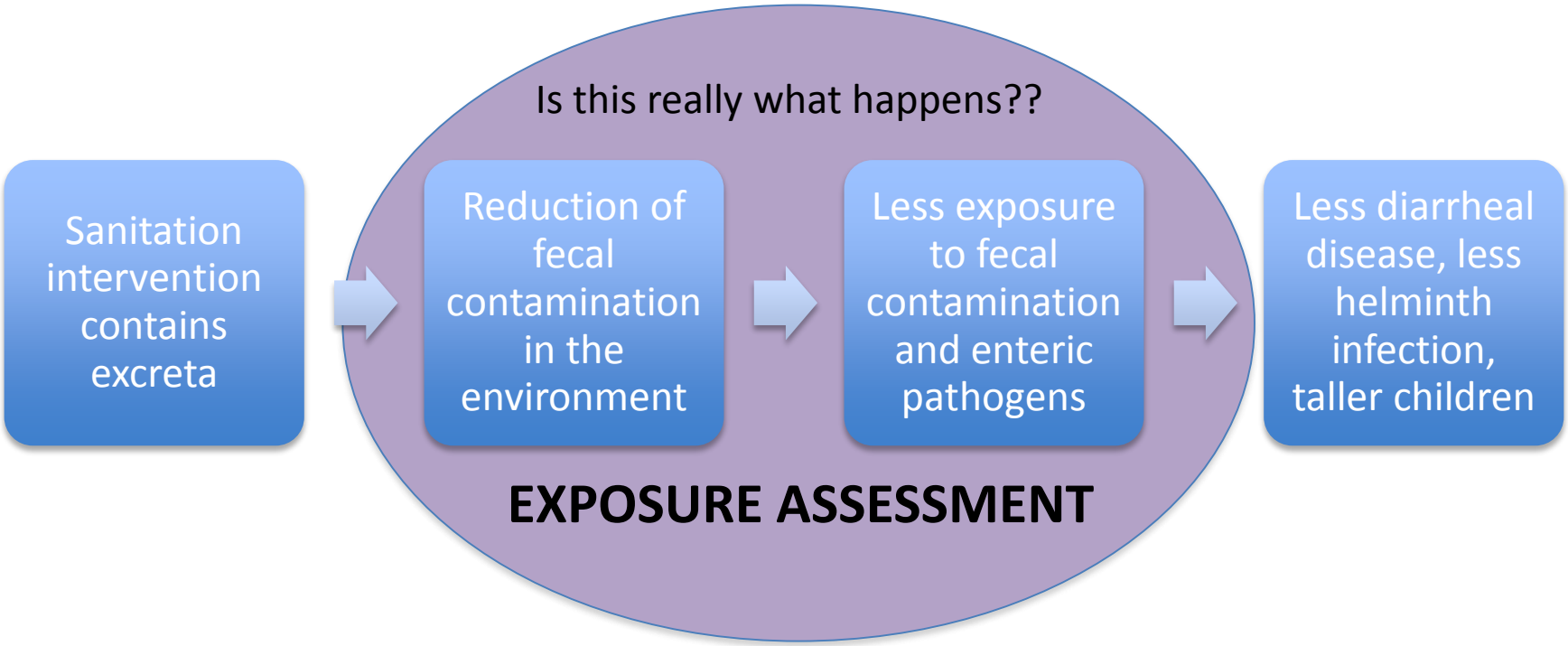
Wastewater-irrigated produce

Soil

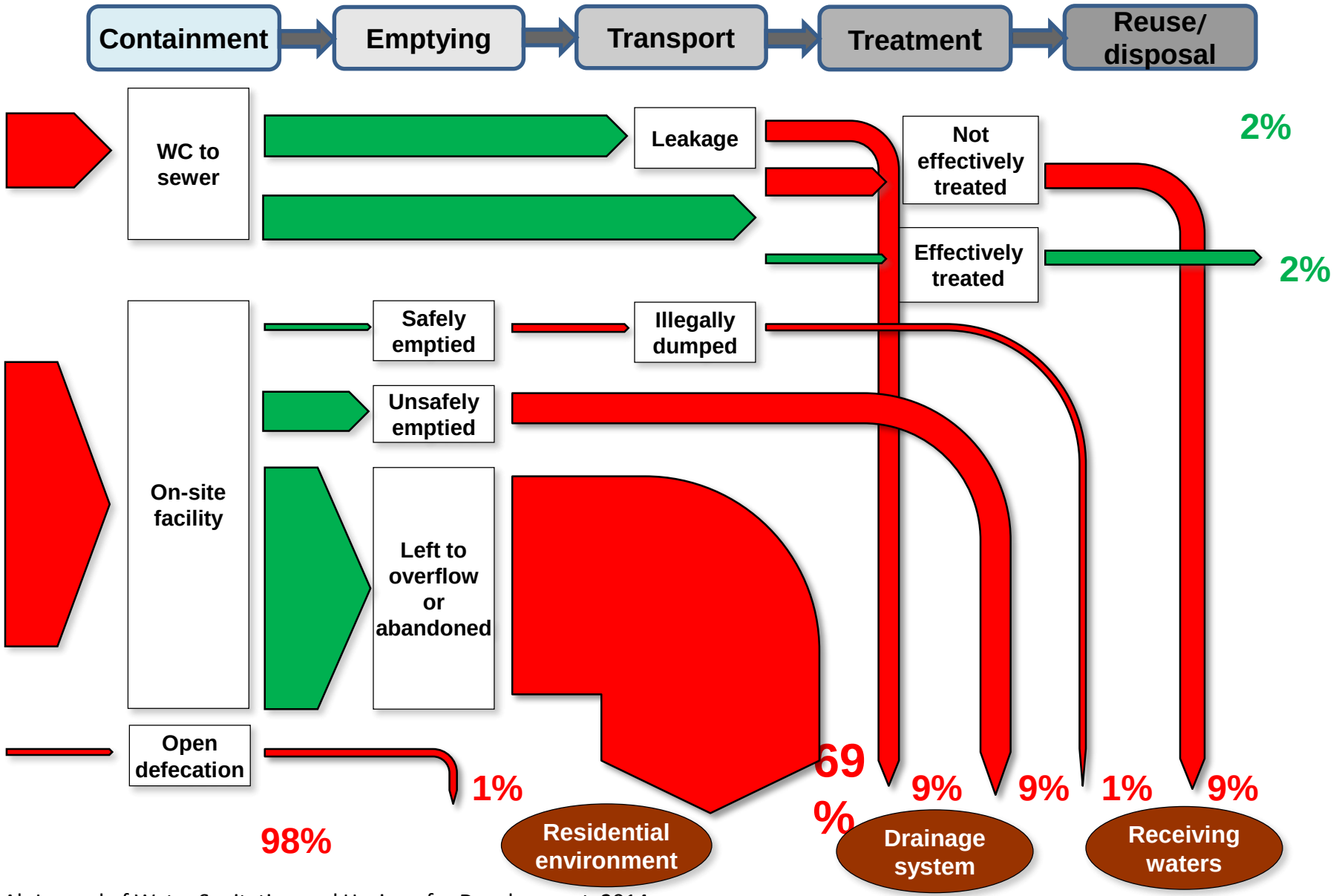
Interrupting Fecal-Oral Transmission



Expected Impact of Sanitation Interventions



Shit Flows Analyses show that Fecal Sludge is NOT Contained – Reservoirs in Urban Environment



Peal et. Al. Journal of Water Sanitation and Hygiene for Development. 2014

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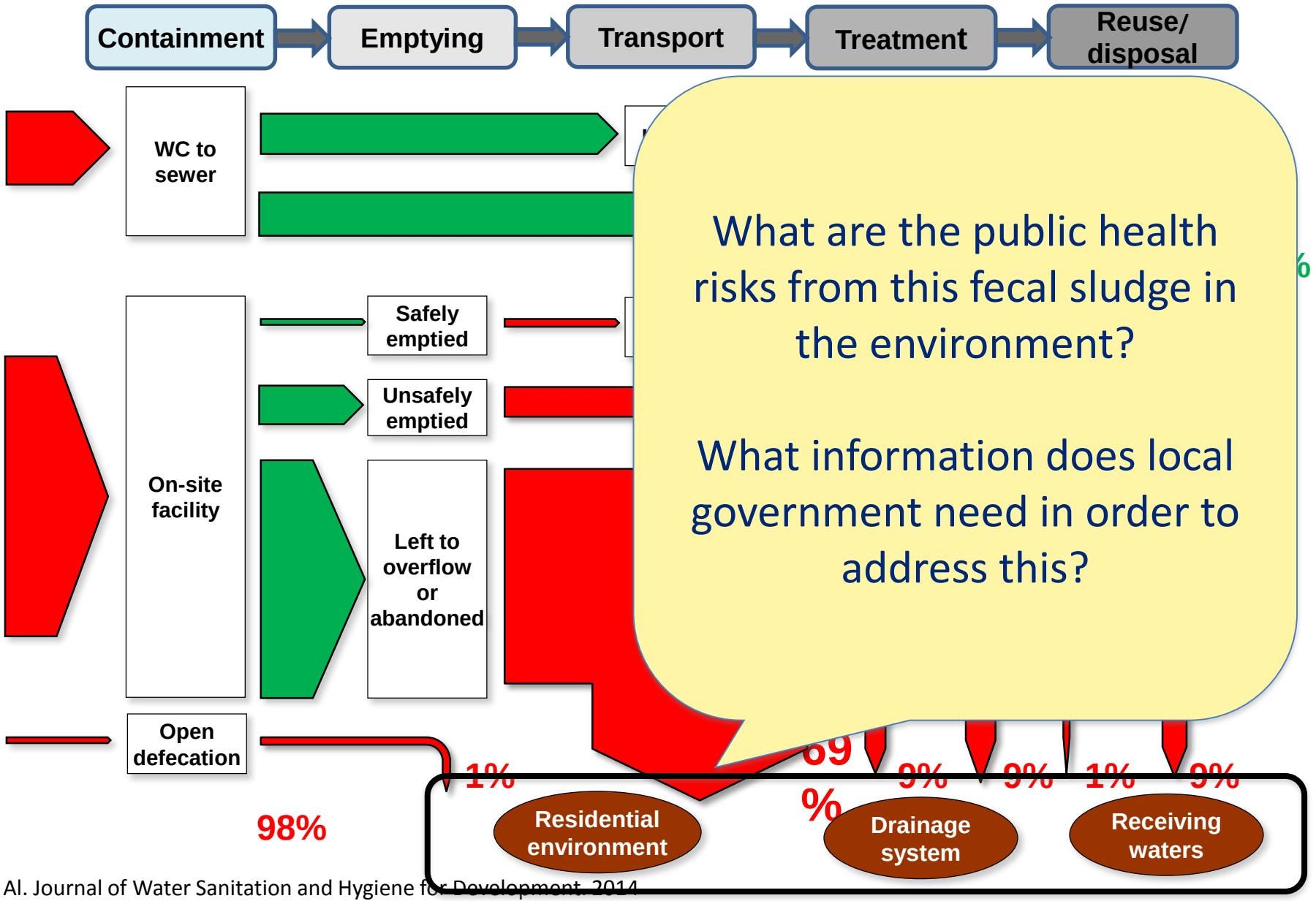

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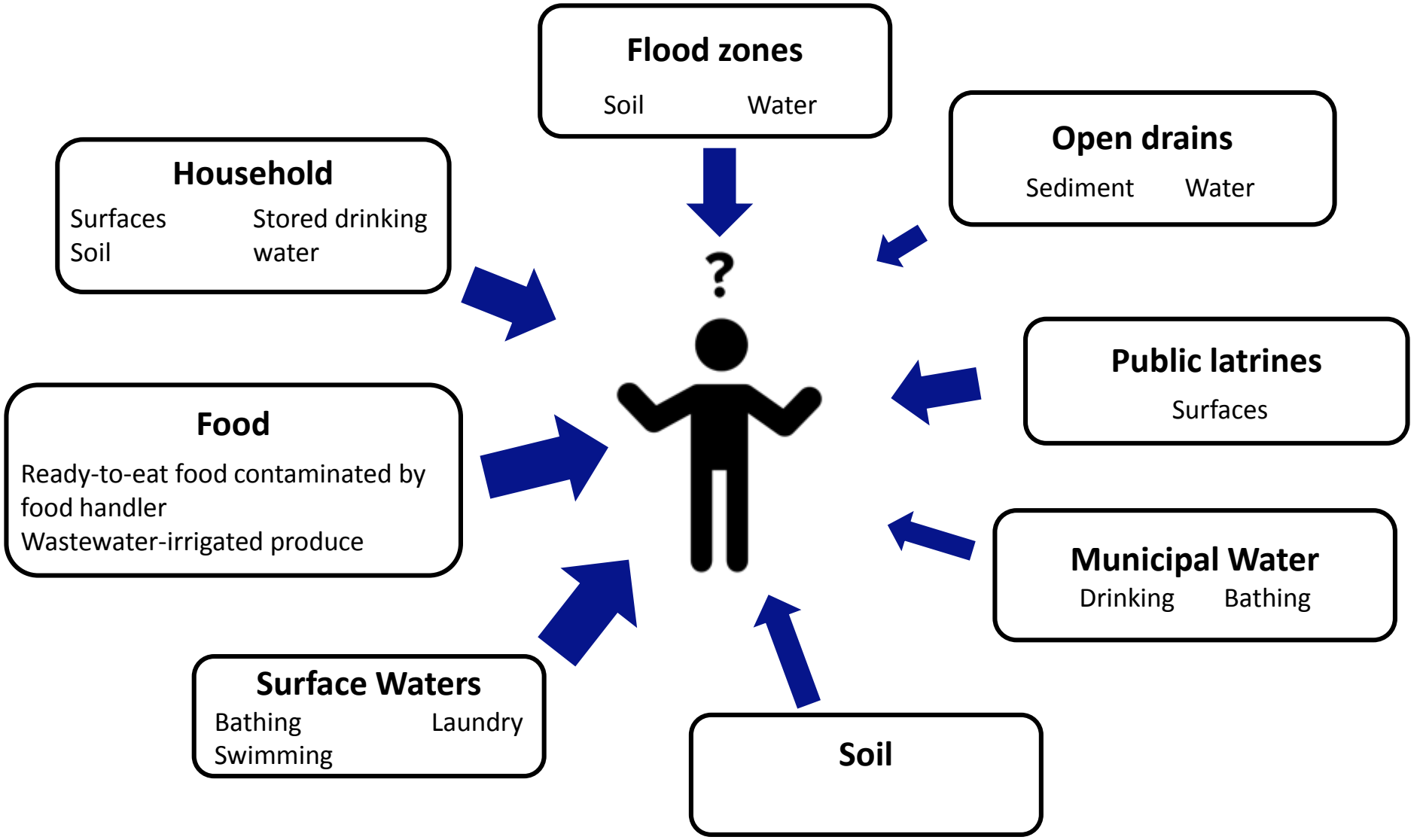
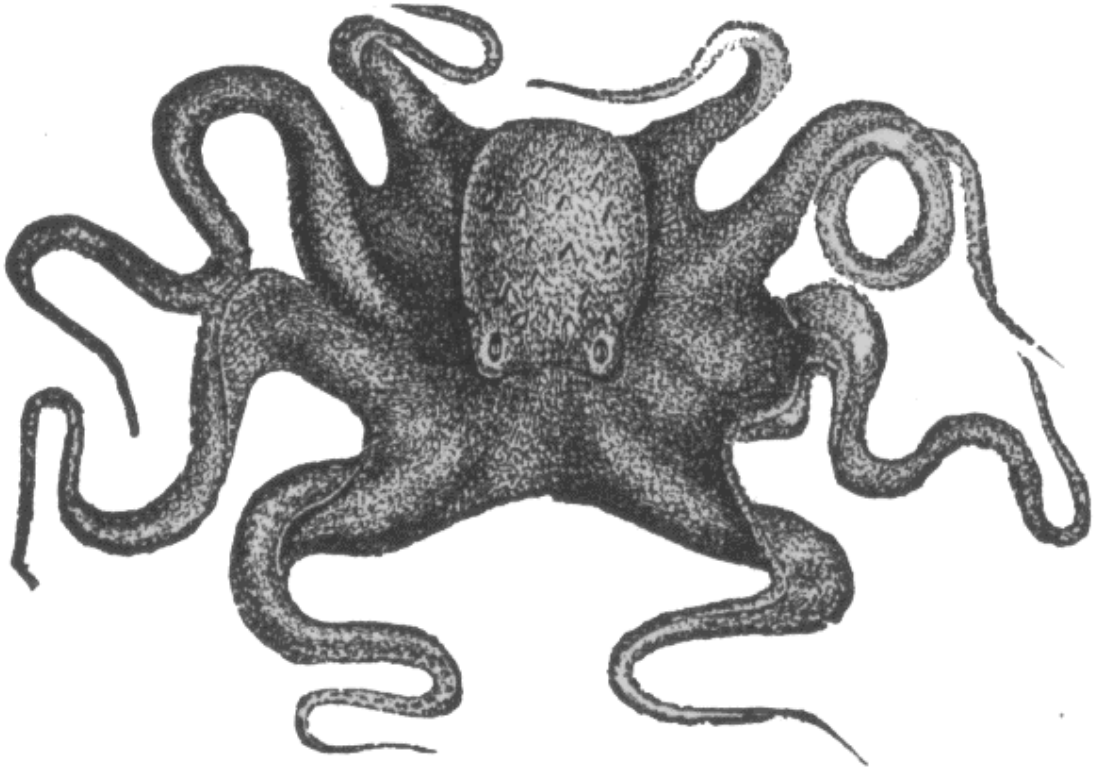
Multiple exposure routes with different risks
Which exposures pose the greatest risk?



Confused designed by Jessica Look for The Noun Project



Which or how many **EXPOSURE PATHWAYS** do you need to cut before you see an impact on health?

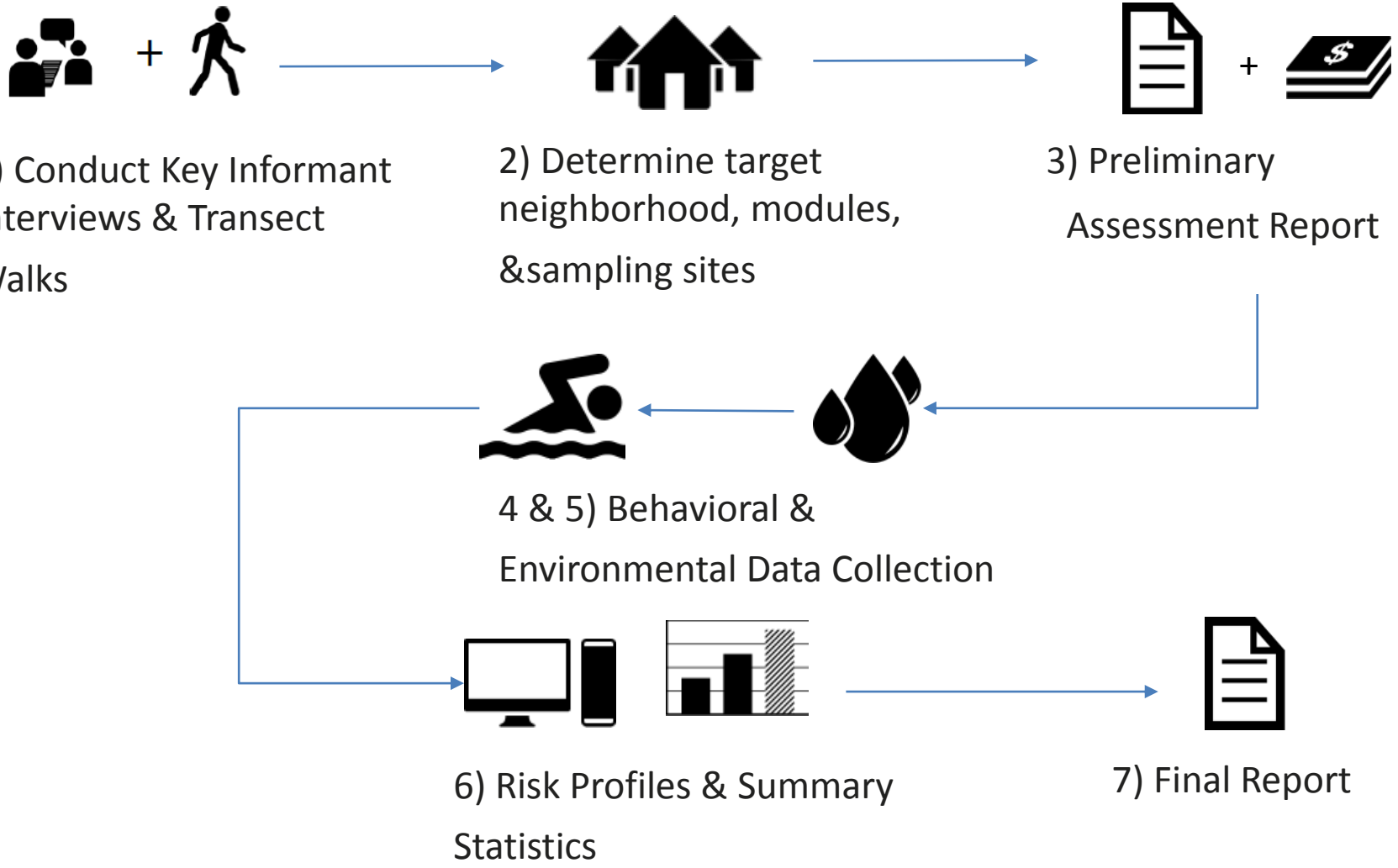
SANIPATH Rapid Assessment Tool

The SaniPath Rapid Assessment 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.

SANIPATH Rapid Assessment Tool

- **Based on in-depth risk assessment** in Accra, Ghana
- **Systematic, customizable method** to collect relevant data on exposure to fecal contamination in low-income, urban neighborhoods
- Designed for use by community, government, and development partners to help guide **decision-making** and **advocacy** surrounding urban sanitation
- **Synthesize data** using open-source software package
- Tool has been used in Accra, Ghana; Vellore, India; Maputo, Mozambique

Process Diagram



Sarah Abraham, Martha Ormiston, Gilad Fried, and Juan Pablo Bravo from The Noun Project created the icons interview, neighborhood, water, and computer. Schematic created by Suraja Raj

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*

Household Surveys | Community Meetings| School Surveys

- Self-reported behavior of adults and children (5-12 years)
- Recommended 100/neighborhood
- ~30 minutes per household

Household Surveys | **Community Meetings**| School Surveys

- Voting method (envelope with buttons)
- Self-reported behavior of adults and children (age 5-12)
- Recommended 2 male and 2 female per neighborhood
- ~ 1.5 hours per interview

Household Surveys | Community Meetings| **School Surveys**

- Voting method (raising hands)
- Self –reported behavior of children and adults
- Children aged 10-12
- Recommended 4/neighborhood
- ~1 hour per classroom

Sample Sizes

Sample Types and Quantities

Exposure Pathway Sample Type	Total Samples*
Drain Water	10
Municipal Drinking Water	10
Raw Produce	10
Public Latrine Surface Swabs	10
Soil Samples	10
Surface Water	10
Bathing Water*	10
Flood Water*	10
Total	80

Survey Types and Quantities

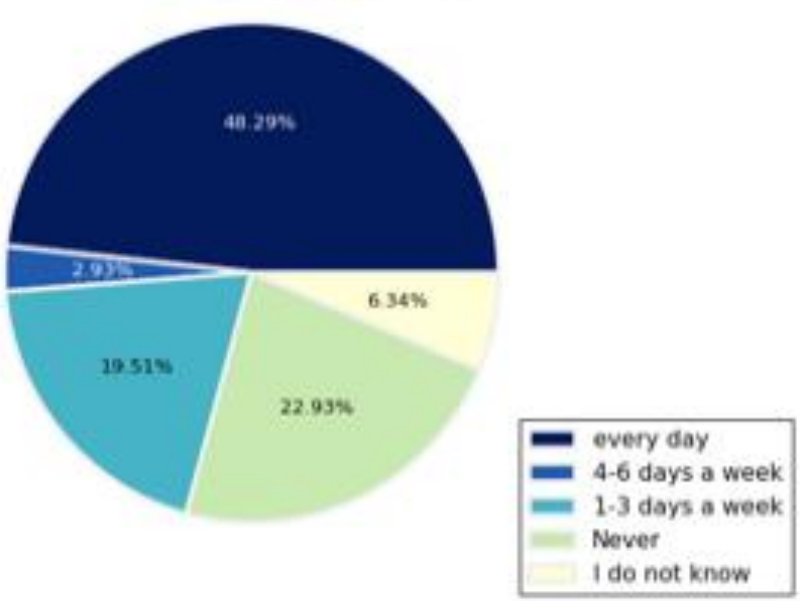
Survey Type	Quantity**
Key Informant Interviews	2
Household Surveys	100
School Group Surveys	4
Community Group Surveys	4

* These estimates assume 10 samples per exposure pathway in one neighborhood. Each sample will be processed at 2-3 recommended dilutions.

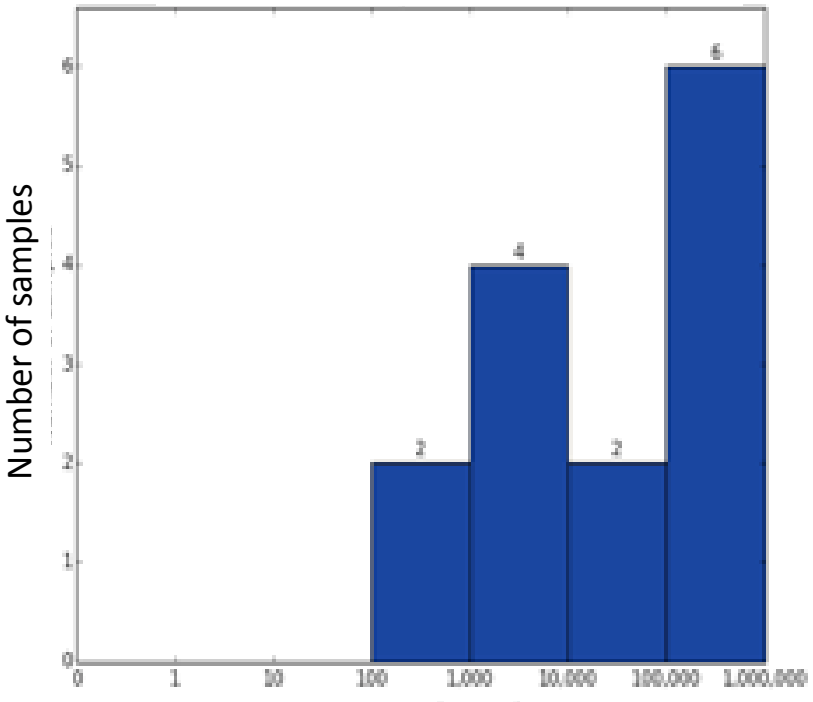
**These survey estimates are for one neighborhood.

SaniPath Tool Outputs

Frequency of exposure to produce in Shiabu (children)



Produce samples from Shiabu

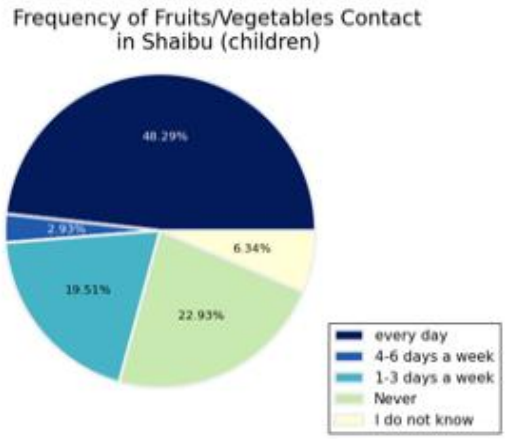


E. coli concentration/serving

Estimating Exposure to Fecal Contamination

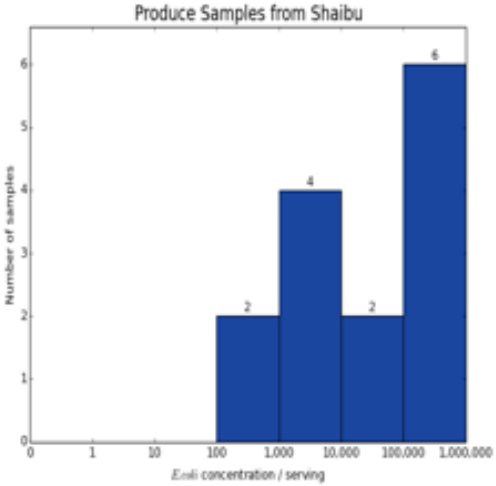
Behavior Frequency

Frequency of exposure to produce in Shiabu (children)



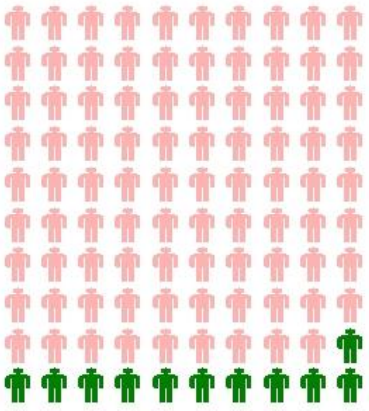
Environmental Contamination

Produce samples from Shiabu



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

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

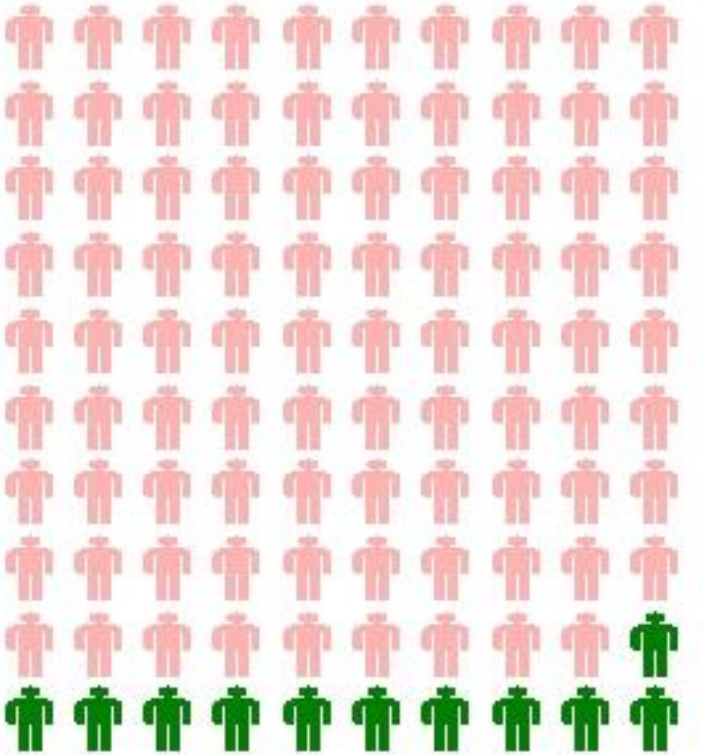


Tool uses Bayesian analysis to estimate the distribution of environmental contamination and frequency of exposure.

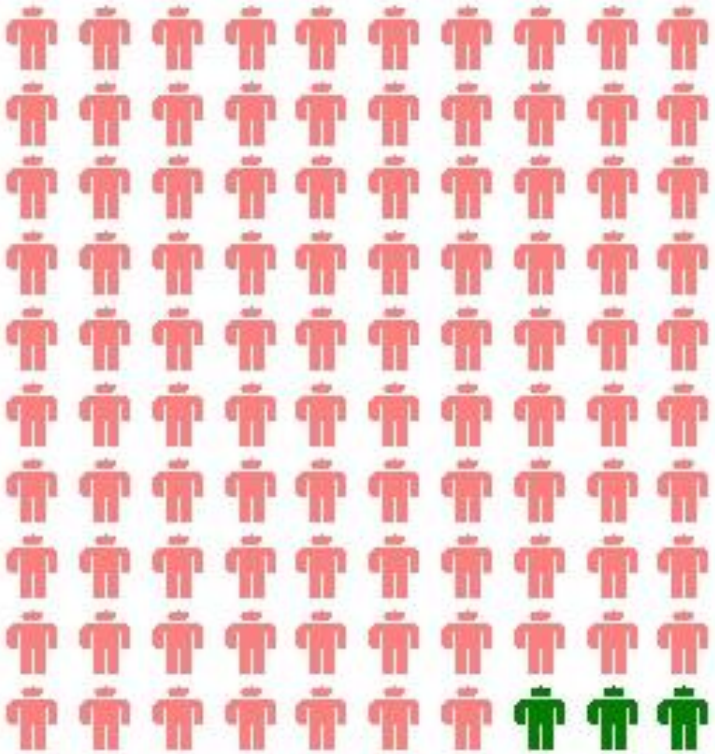
The mean dose and proportion of the population exposed are summarized from simulated distributions and displayed in risk profiles (left).

SaniPath Risk Profiles

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).

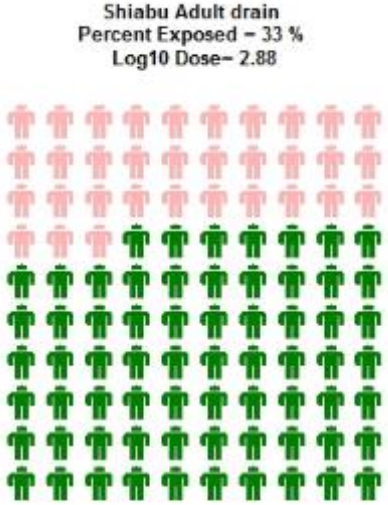
Open Drains

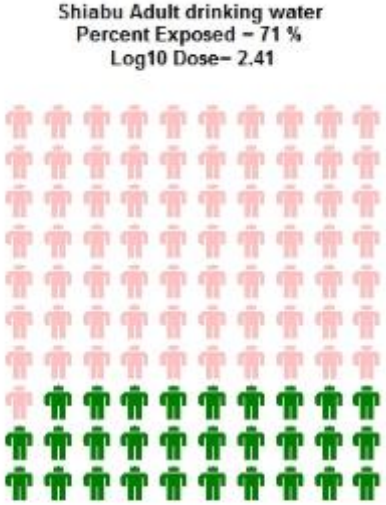
Drinking Water

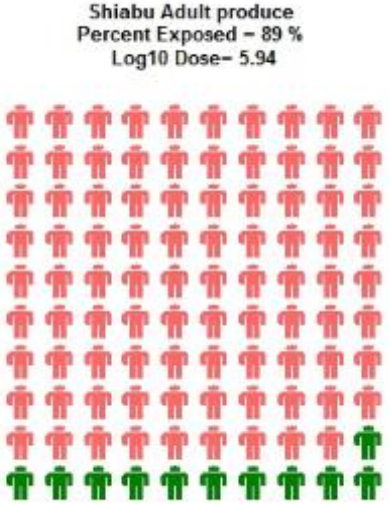
Raw Produce

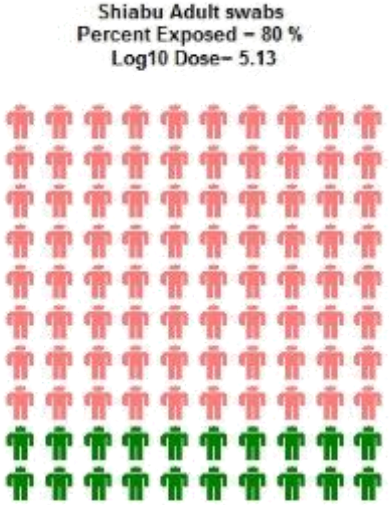
Public Latrine Surfaces

Adults

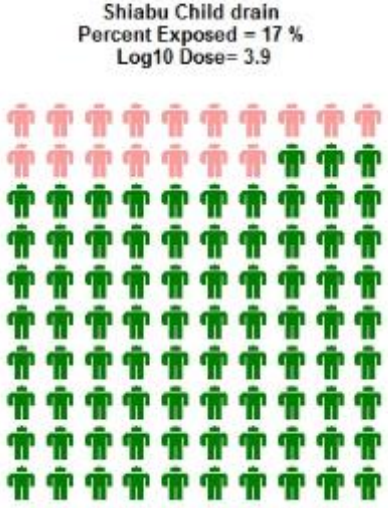


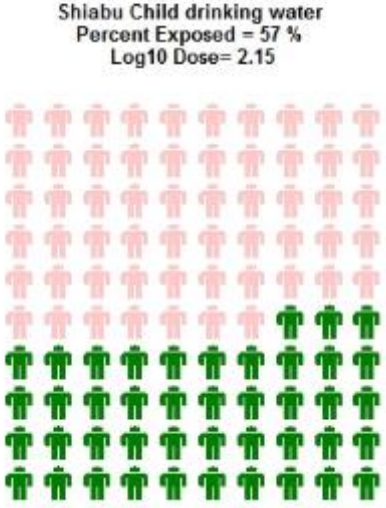


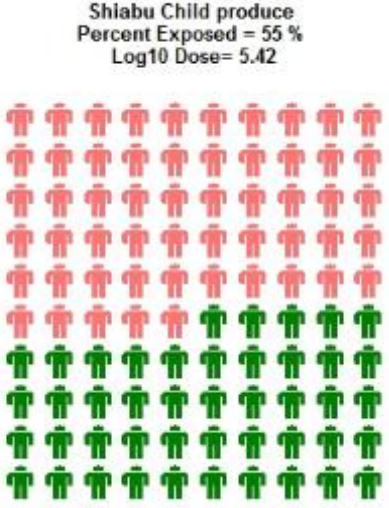


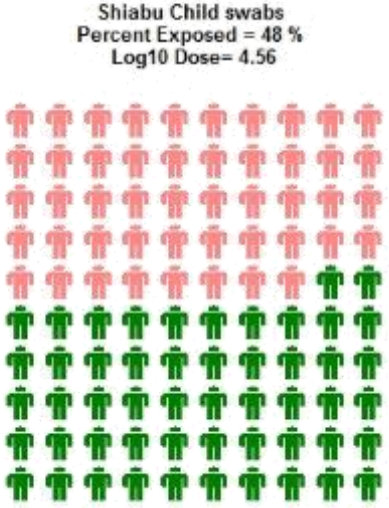


Children



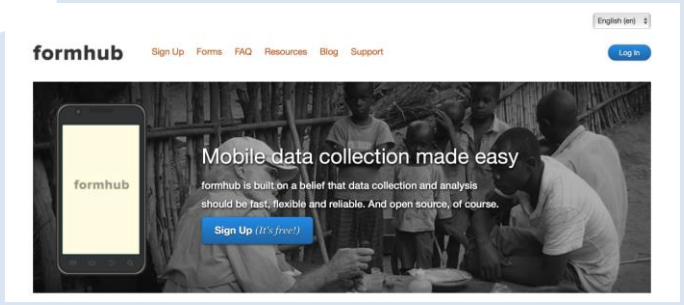


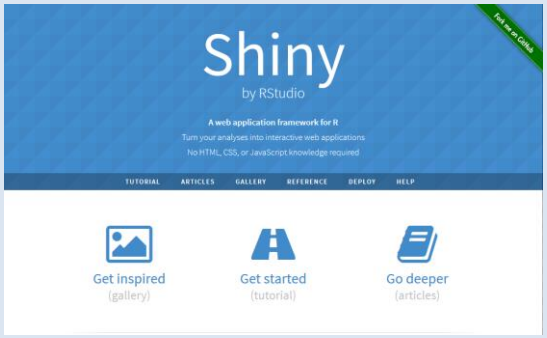




Overview of Tool Architecture

amazon web services™ "The Cloud"





Mobile Data Collection

Data/Form Repository

Analysis and Dashboard

Strengths and Limitations

A simple tool to characterize a complex system…

Strengths

- Significantly more rapid than in-depth exposure assessment (SaniPath Phase 1)
- Systematic but flexible
- Focuses on risk behavior rather than risk perception
- Provides data for decision making
- Can be adapted to cultural contexts
- Includes quantitative environmental microbiology
- Uses mobile data collection and automated analyses

Limitations

- Requires basic laboratory capacity and equipment
- Does not (currently) provide specific recommendations based on results
- Cost could be prohibitive
- One deployment does not capture temporal and seasonal variability
- Limited sample size gives low resolution risk comparison
- Does not assess private domain
- Could be improved with studies of reliability and consistency of results

Acknowledgements

Bill & Melinda Gates Foundation:

Alyse Schrecongost, Erica Coppel, Radu Ban

Center for Global Safe Water, Emory University:

Christine Moe, Clair Null, Peter Teunis, Monique Hennink, Kelly Baker, Amy Kirby, Kate Robb, Habib Yakubu, Suraja Raj, Andrew Wang, James Michiel, Jamie Green, Heather Reese, Katherine Roguski

Water Research Institute: Joseph Ampofo

TREND: Nii Wellington

Christian Medical College, Vellore: Gagandeep Kang

Georgia Tech: Joe Brown

EpiTech Consulting: Nishant Kishore, Aaron White

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

Improve International: Susan Davis

Thank You

For more information visit
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