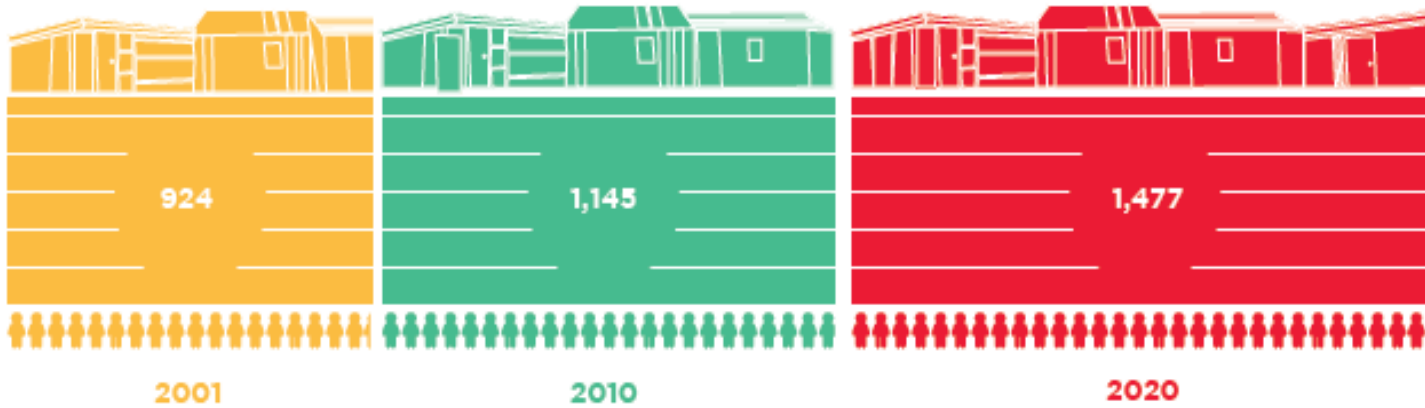


# A Community Health Diagnosis of Rio das Pedras

 COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH  
URBAN + HEALTH INITIATIVE

Funding: Medtronic Philanthropy

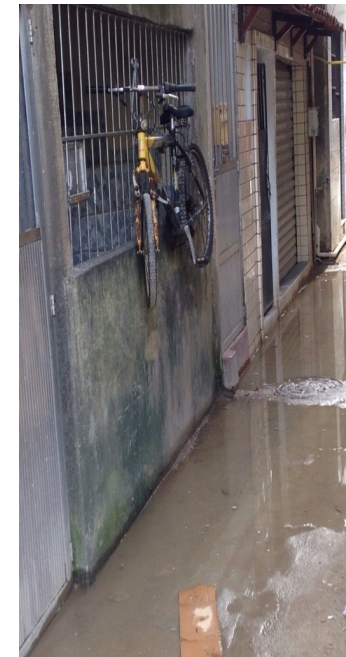
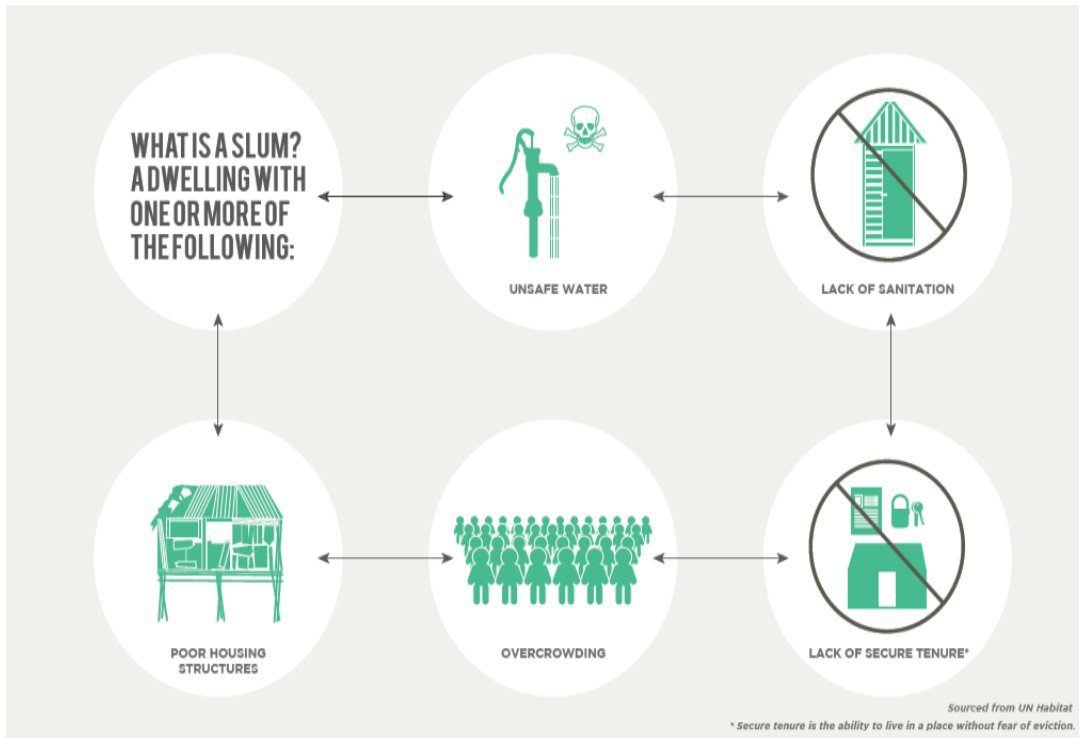
# PEOPLE LIVING IN SLUMS GLOBALLY



Slum population projections in millions (based on slum annual growth rate from 1990-2001)

source: UN Habitat

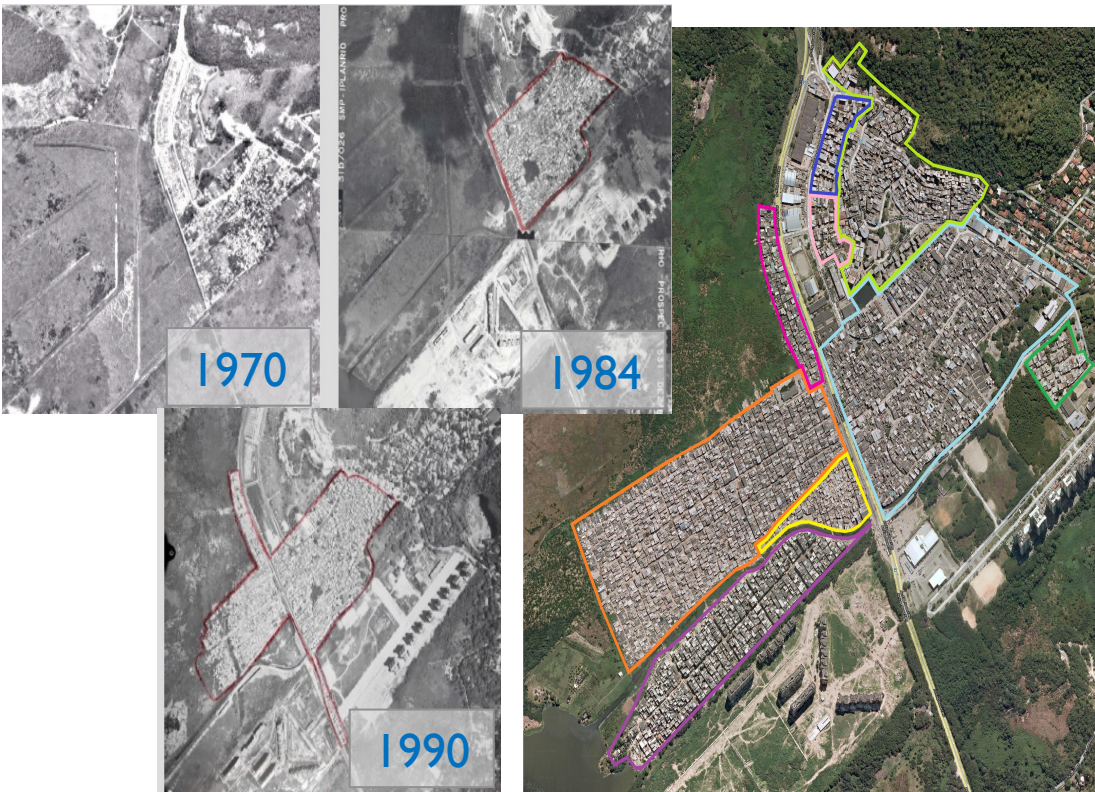
 = 50,000,000 PEOPLE



# Rio das Pedras:

Located on the west side of Rio de Janeiro, this large favela is home to over 63,000 residents according to the census

Already the third largest in the state, Rio das Pedras was recently populated and expanding ('90s+)



Known infrastructure challenges:

- Open sewer
- Seasonal flooding
- Ground soil instability
- Makeshift construction
- Heavy pedestrian and vehicle traffic
- Single health clinic (only 40% coverage)
- Informal connection to city services

Vibrant local economy with over 4,000 commercial businesses

Militia controlled (construction industry focus vs drugs)



Source: Alessio Ferrara

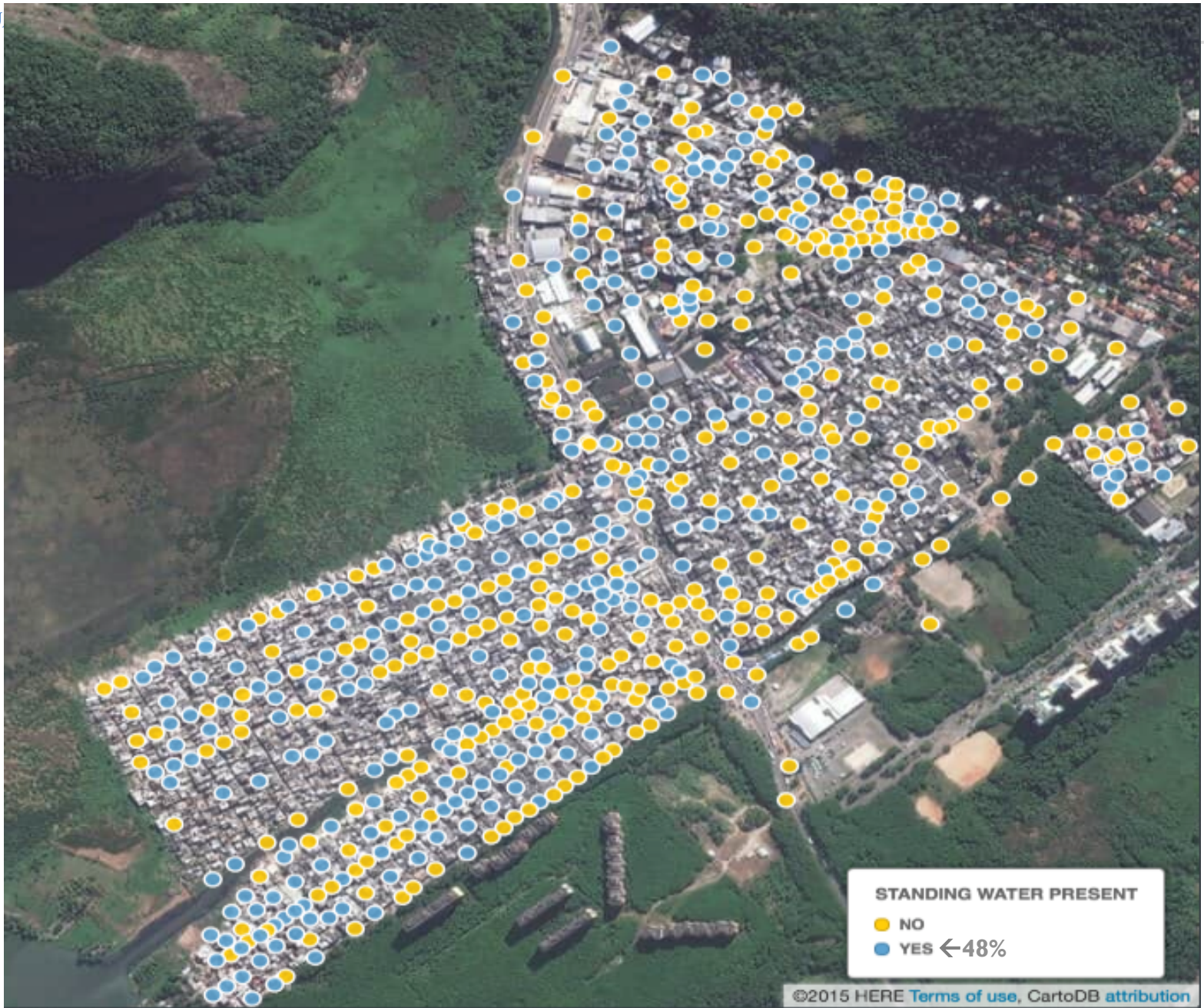
# Street Level Observations

# Street Level Observations

The team used the **Fulcrum platform**, a mobile data collection tool to deploy a customized structured questionnaire Total street segments in Rio das pedras: 751

(a spatially distributed 87% of street segments observed)

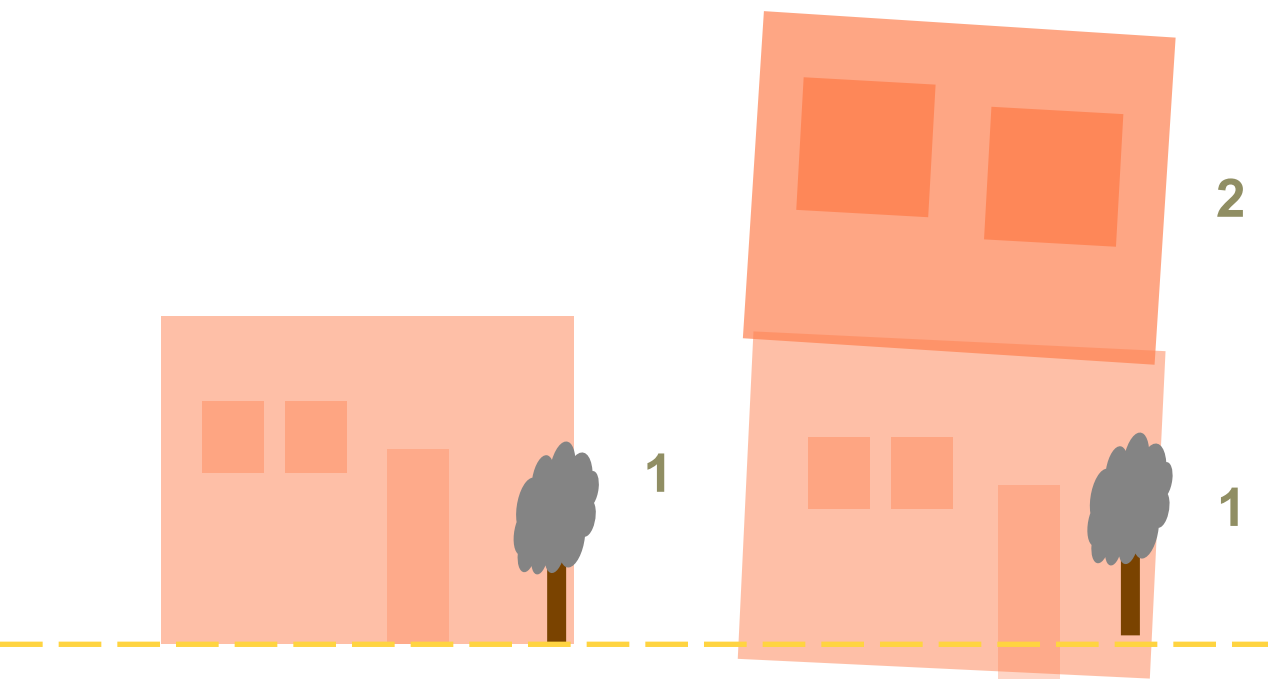


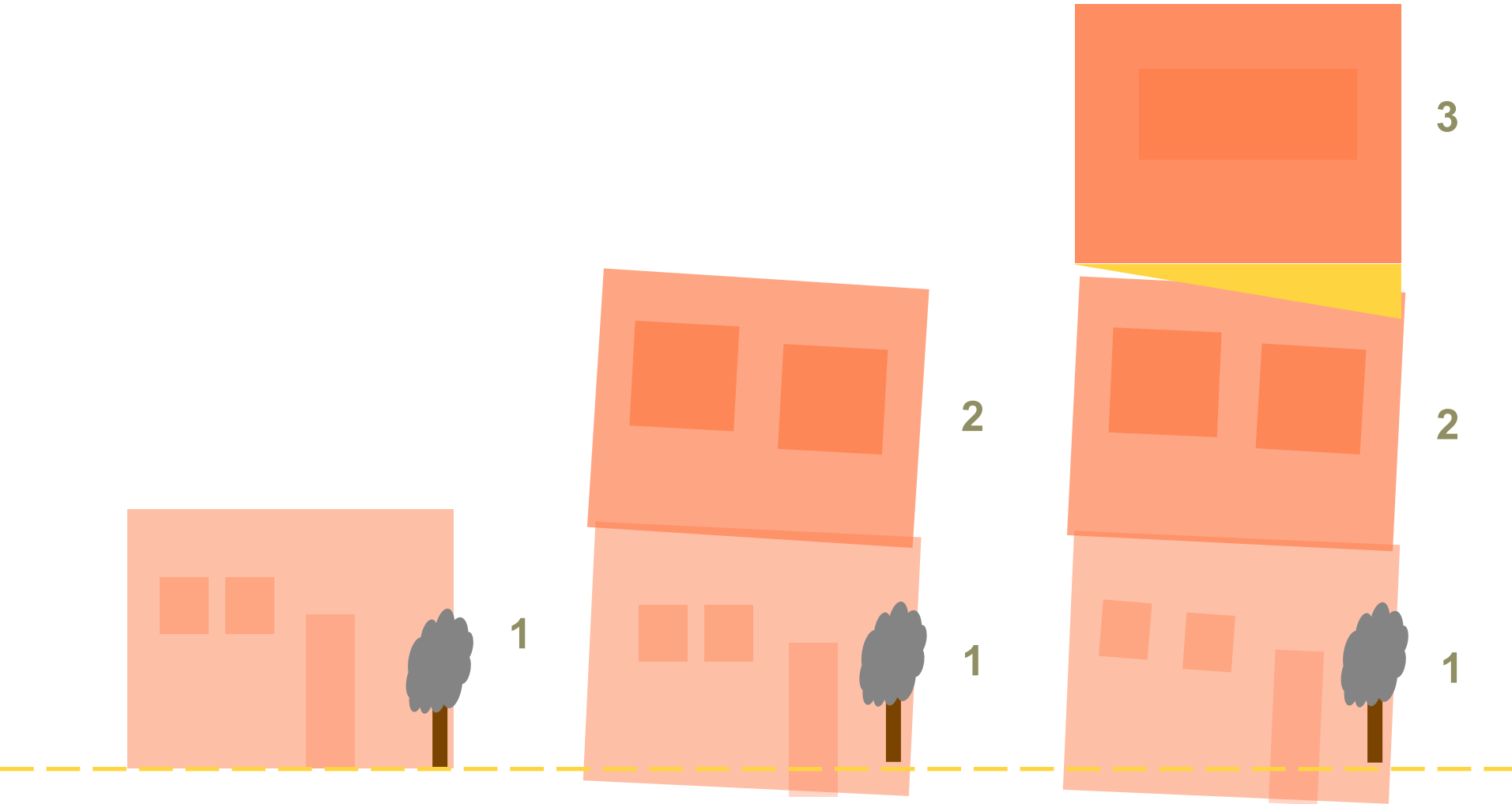












Sinking/Non-Parallelism Presence	
Yes	21.5%
No	78.5%





“Everything was growing mold [at my apartment], even though the house was new when I moved in. Everything started to get moldy and we ended up losing everything and having to move.”



<b>Litter/Trash Presence</b>	
Yes, strewn across street	46%
Yes, organized piles	11%
No, none or very scarce	43%



<b>Construction Site Presence</b>	
Yes	39.7%
No	55.7%
Inactive	4.7%





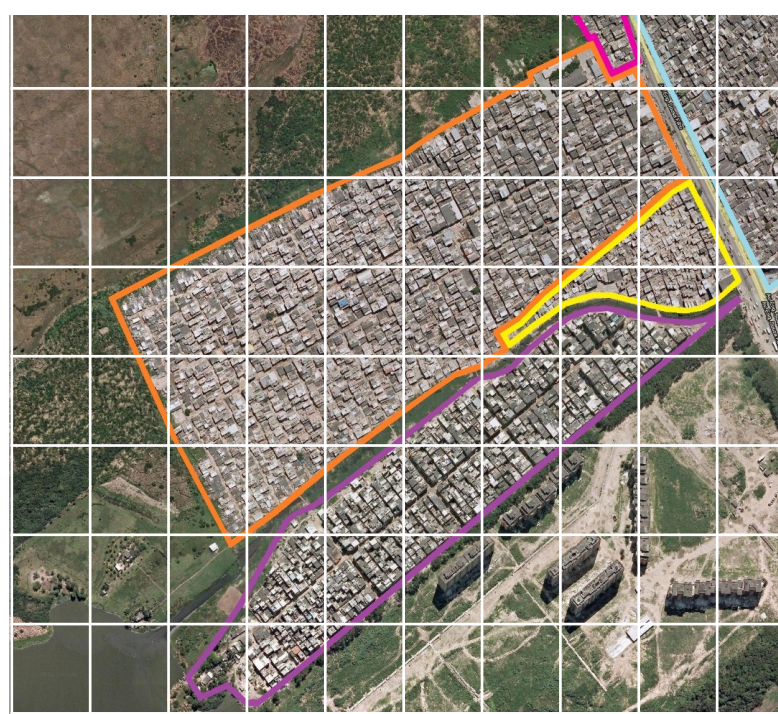
# Household Level Observations

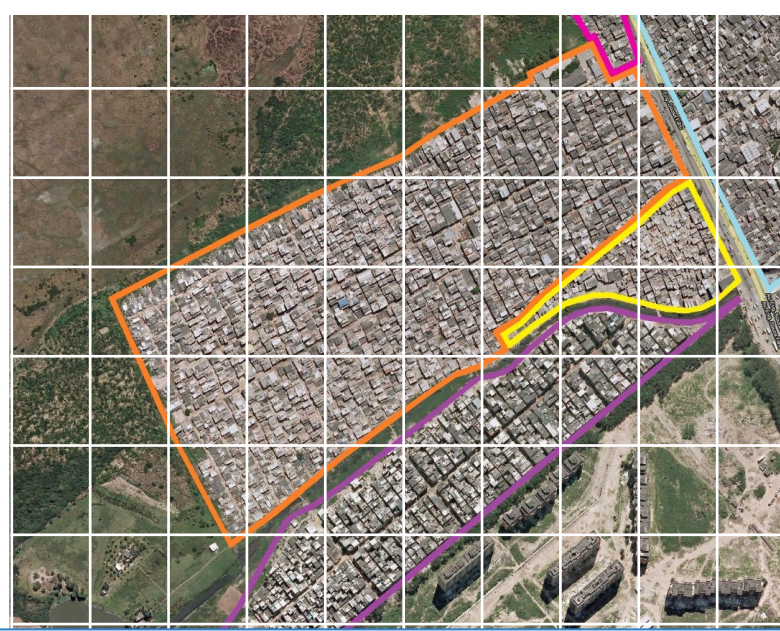


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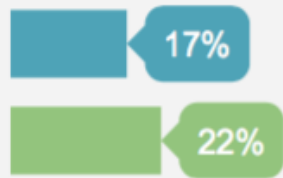
## Sample size:

1. Sociodemographic risk factor **questionnaires** (N=104)
2. Household **water sample** collection for microbial presence and physical-chemical properties (N=96)





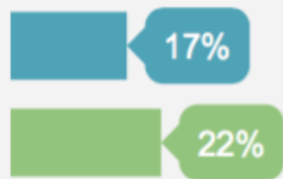
## Presence of Coliforms at Water Source



■ Street Tap ■ Kitchen Tap



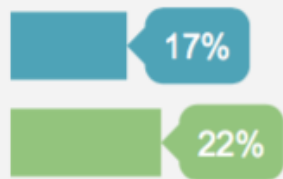
## Presence of Coliforms at Water Source



■ Street Tap ■ Kitchen Tap



### Presence of Coliforms at Water Source



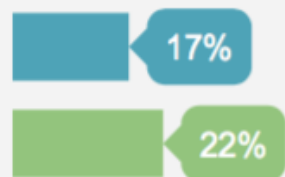
■ Street Tap ■ Kitchen Tap

### Cleaning Water Storage Container

Once a week or more	1%
Once or twice a month	7%
Every 3 months	18%
Every 6 months	31%
Every year	11%
Every other year or less	1%
Never or didn't know	22%
Unspecified	10%

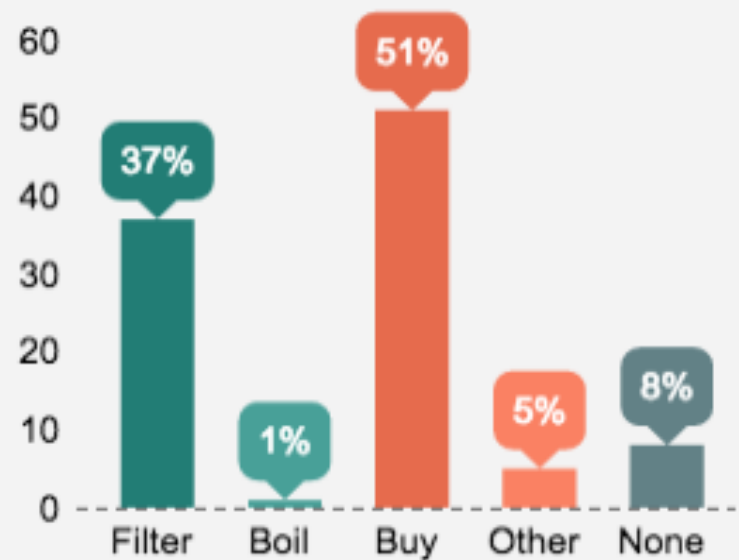


### Presence of Coliforms at Water Source



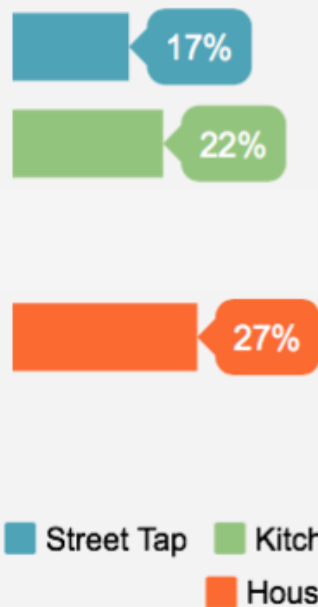
Street Tap    Kitchen Tap

### Water Treatment Method

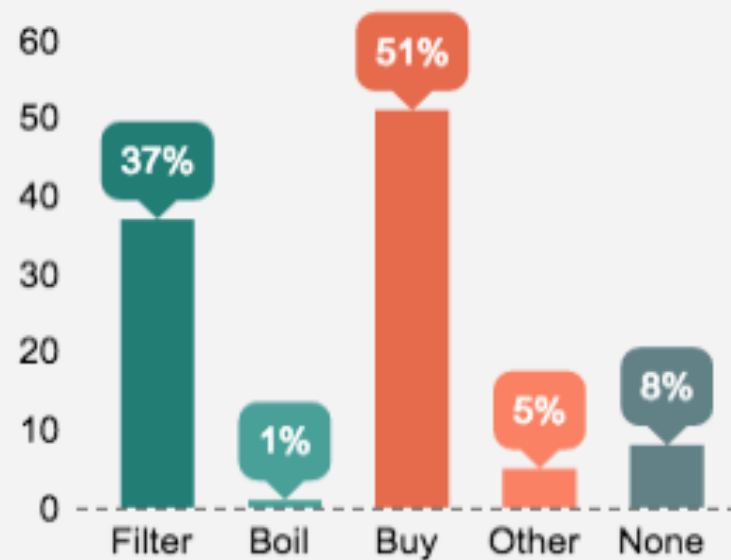




### Presence of Coliforms at Water Source



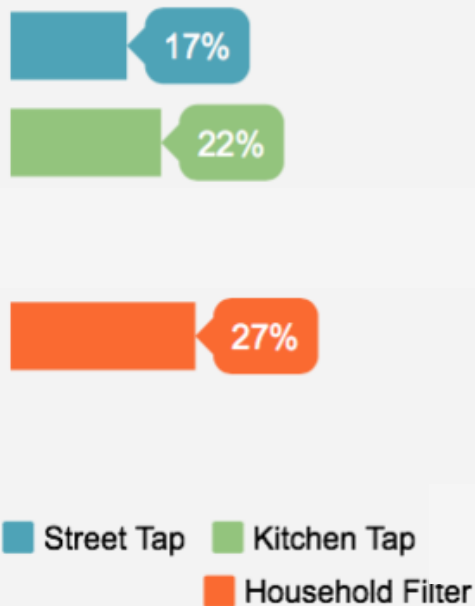
### Water Treatment Method



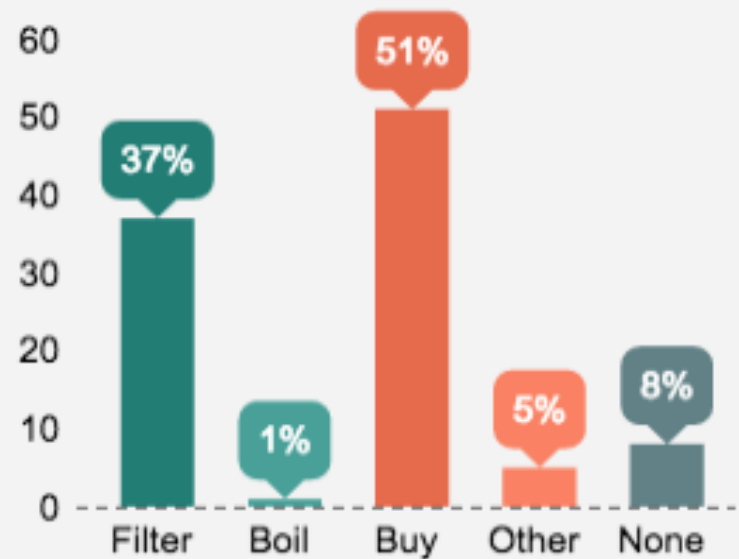




### Presence of Coliforms at Water Source

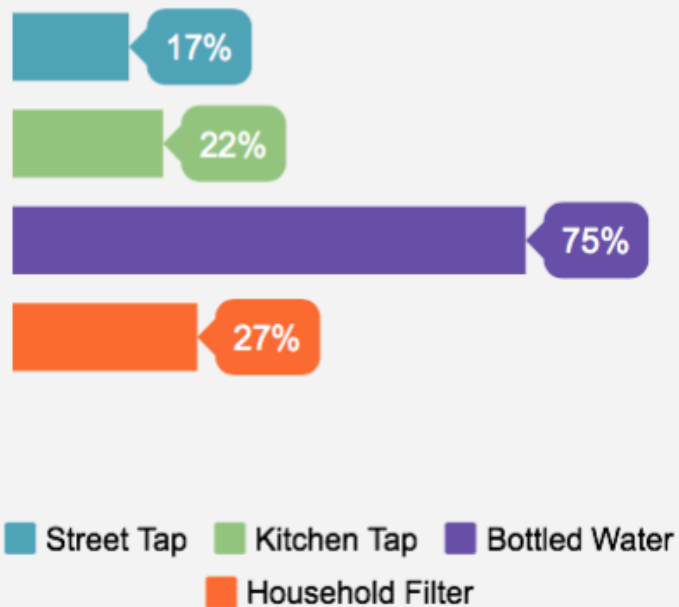


### Water Treatment Method

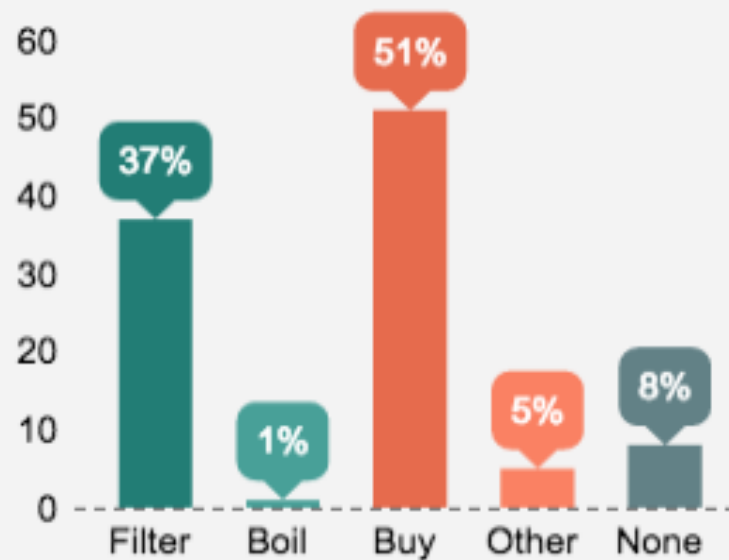




### Presence of Coliforms at Water Source

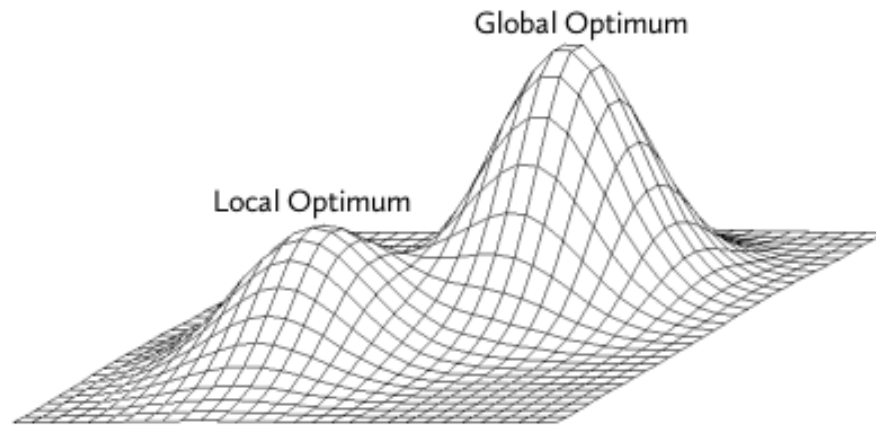


### Water Treatment Method



# Recommendations for Action in Context

One overarching consideration is the need for **local ownership** which will be crucial to maintenance of infrastructure and community use of new resources to positively impact health.



@urbanhealthmsph

# Flood-Related Health Effects

## Acute Health Outcomes

Drowning

Injuries

Toxics Exposure

Infectious Diseases

## Chronic impacts

Non communicable

Psychosocial

Malnutrition

Adverse Birth outcomes

## Infrastructure investment options: Sanitation

- Incorporate the resource reclamation plant which is serving RdP and Barra (<http://datascience.columbia.edu/shifting-resource-removal-resource-recovery>)
  - Build a condominal sewerage system that provides services to a group of houses rather than individual houses.
  - Build a traditional sewer system that is integrated with existing city treatment plants
  - Periodically drain the canal and rebuild the river banks with drainage capacity improvements, incorporating resources for annual maintenance.
  - Cover the canal to limit sewage odor using a systems approach that addresses areas that have the potential for overflow during flooding
-

## Infrastructure investment options: Water

- Install and maintain community storage tanks to diminish interruptions in service by maintaining pressure in the system
  - Build a rainwater collection system
  - Educational campaign to change the perception around tap water (culturally difficult given that all strata view it as non-potable)
  - Resurface streets with allowance for drainage to limit standing water, which in turn contributes to mosquito-borne illness (e.g., dengue) and skin infection (e.g., impetigo)
  - Repair potable water mains and pipes
-

