A Community Health Diagnosis of Rio das Pedras

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

WHAT IS A SLUM?
ADWELLING WITH ONE OR MORE OF THE FOLLOWING:

- Unsafe Water
- Lack of Sanitation
- Poor Housing Structures
- Overcrowding
- Lack of Secure Tenure*

* Secure tenure is the ability to live in a place without fear of eviction.
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)
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

<table>
<thead>
<tr>
<th>Presence</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>21.5%</td>
</tr>
<tr>
<td>No</td>
<td>78.5%</td>
</tr>
</tbody>
</table>
“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.”
<table>
<thead>
<tr>
<th>Litter/Trash Presence</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, strewn across street</td>
<td>46%</td>
</tr>
<tr>
<td>Yes, organized piles</td>
<td>11%</td>
</tr>
<tr>
<td>No, none or very scarce</td>
<td>43%</td>
</tr>
</tbody>
</table>
### Construction Site Presence

<table>
<thead>
<tr>
<th>Presence</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39.7%</td>
</tr>
<tr>
<td>No</td>
<td>55.7%</td>
</tr>
<tr>
<td>Inactive</td>
<td>4.7%</td>
</tr>
</tbody>
</table>
Household Level Observations
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: 17%
- Kitchen Tap: 22%
Presence of Coliforms at Water Source

- Street Tap: 17%
- Kitchen Tap: 22%
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 17%
Kitchen Tap 22%
Presence of Coliforms at Water Source

Street Tap: 17%
Kitchen Tap: 22%

Water Treatment Method

- Filter: 37%
- Boil: 1%
- Buy: 51%
- Other: 5%
- None: 8%
Presence of Coliforms at Water Source

Street Tap: 17%
Kitchen Tap: 22%
Household Filter: 27%

Water Treatment Method

- Filter: 37%
- Boil: 1%
- Buy: 51%
- Other: 5%
- None: 8%
Presence of Coliforms at Water Source

- Street Tap: 17%
- Kitchen Tap: 22%
- Household Filter: 27%

Water Treatment Method

- Filter: 37%
- Boil: 1%
- Buy: 51%
- Other: 5%
- None: 8%
Presence of Coliforms at Water Source

- Street Tap: 17%
- Kitchen Tap: 22%
- Bottled Water: 75%
- Household Filter: 27%

Water Treatment Method

- Filter: 37%
- Boil: 1%
- Buy: 51%
- Other: 5%
- None: 8%
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.
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 condominial 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
Rio das Pedras

- Rio Mayor's Office
- Local academic and community organizations
- Columbia Engineering, Rio Innovation Lab
- Columbia Mailman School
- Columbia Global Center
- Columbia GSAPP, Studio X in Rio