Maximizing Sludge Sourcing From Low Income Communities

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Population: 913,334
- 2% sewers
- 37% septic tanks
- 60% Latrines
- Latrines emptied manually
- ~490 tons/day generated in slums

Kipevu Wastewater Treatment Plant
Objectives

• Build relationships with pit latrine emptiers

• Identify and implement collection opportunities

• Experiment with incentives that encourage safe emptying and disposal at WWTP
Incentive Trial

Pivot Provides transport, PPE, containers, and training

Emptiers Bring Sludge to Focal Point

Emptier Baseline Surveys

10 Week Trial
Treatment: Chaani
Control: Portreitz

Emptier & Household Follow Up Surveys
Supply Chain Analysis

GeoLatrine

- Store
- Store Depart
- Focal Point
- Latrine
- Start Work
- Break Slab

Equipment store

Focal point

Plant

Surveys and Focus Groups

- Households and Emptiers

Mobile Web App
- Logistics tracking
- Emptying activity, location, time
- Volume transported

FSM3 PIVOT
Local Entrepreneurs Capacity: ~8140 L $0.05/L $ 57.25/ton
Company 1 Capacity: 1325 L $0.062/L $ 56.93/ton
Company 2 Capacity: 2840 L $0.063/L $48.80/ton
Company 3 Capacity: 3000 L $0.11/L $ 105.58/ton

Transportation costs not covered by fuel revenues

Vacuum Truck and Transfer Station
15,000 L Transfer Station
Estimated: $ 42.80/ton
Pit Emptiers Can Increase Revenue by Offering Safe Sludge Disposal

Household Payment For Emptying Services

<table>
<thead>
<tr>
<th>Emptying Fee (USD)</th>
<th>Before Trial Treatment</th>
<th>After Trial Treatment</th>
<th>Before Trial Control</th>
<th>After Trial Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>$50.71</td>
<td>$30.53</td>
<td>$68.06</td>
<td>$42.46</td>
<td>$71.39</td>
</tr>
<tr>
<td>$34.79</td>
<td>$34.79</td>
<td>$69.74</td>
<td>$29.70</td>
<td></td>
</tr>
</tbody>
</table>

Household Perception of Emptying Service

<table>
<thead>
<tr>
<th>Percent HH Respondents</th>
<th>Treatment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty was more safe and hygienic than usual</td>
<td>64%</td>
<td>40%</td>
</tr>
<tr>
<td>Empty was not more safe and hygienic than usual</td>
<td>36%</td>
<td>60%</td>
</tr>
</tbody>
</table>
Pit Emptying Overhead Costs

- ~37% Chemicals
- ~25% Drugs
- ~38% Bribes

Pit Emptying is not a sustainable livelihood
Reducing Pit Emptying Overhead Costs

- PPE: ~37%
- Training: ~25%
- Policy Influence: ~38%
Incentive Programs may help Reduce Pit Emptying Overhead Costs

**Average Cost of Disinfectants used during Emptying**

<table>
<thead>
<tr>
<th></th>
<th>Treatment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>$4.46</td>
<td>$3.82</td>
</tr>
<tr>
<td>After</td>
<td>$4.76</td>
<td>$2.79</td>
</tr>
</tbody>
</table>

**Average Costs of Drugs Consumed during Emptying**

<table>
<thead>
<tr>
<th></th>
<th>Treatment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>$2.90</td>
<td>$3.07</td>
</tr>
<tr>
<td>After</td>
<td>$2.06</td>
<td>$3.84</td>
</tr>
</tbody>
</table>
"I like transporting sludge away from the community because a clean environment is a better life"

Charo Silas, Manual Pit Emptier
Key Findings

• Potential to cover transportation costs
  – Increase emptier revenue
    • Training/empowering = better service
  – Reduce emptier overhead costs:
    • PPE provision
    • Training

• Identification of hidden actions and new stakeholders in the supply chain
  – Bribes to local leaders
Future Directions

• Decrease costs for emptiers via
  – Household Marketing
  – Sludge pumps
  – Policy advocacy

• Alternative cost structure modeling
  – Incentives for households, truck companies, and local leaders
Thank You