Social Cost Benefit Analysis of Water and Sanitation Improvement in a Poor Urban Slum
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Background

Study Area

- Poor and absent water infrastructure
- Lack of safe drinking water
- Lack of hygienic systems

Negative Impact on:
- Health
- Income
- Poverty

Study Area Characteristics

- 0.4 Km² area
- Highest population density in the country (~69,000/km²)
- Poor community
- Average monthly income = 200 USD per month
- Inadequate infrastructure

Field surveys

- Standardized close-ended field questionnaire in 325 households
- Socio-demographic
- Health status
- Water and wastewater infrastructure

Field Observations

- Water pollution problems occur at the building/household level due to deteriorated water distribution networks
- Old, corroded uncovered water storage tanks located in the attic

Diarrhea Incidence

- Assumptions
  - 88% of reported diarrheal cases attributed to unsafe water supply, inadequate sanitation and hygiene
  - Cases are distributed uniformly throughout the year
  - Annual incidence of diarrhea in Tebbaneh (2009): 33.1 percent
  - 9,200 cases

Socio-economic Assessment

- Supplied water is of acceptable quality with more pollution within buildings

Cost Analysis

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Cost (USD)</th>
<th>Capital Cost (USD)</th>
<th>Annualized Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1</td>
<td>Installation of new plastic-lined high-pressure storage tanks</td>
<td>50-80</td>
<td>500 - 1,000</td>
<td>0.05 - 0.12</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>Installation of a new water purification system to alleviate the risk of wastewater infiltration into the water pipes and to protect the supplied water from contamination</td>
<td>60</td>
<td>500 - 1,000</td>
<td>0.08 - 0.11</td>
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<tr>
<td>Alternative 3</td>
<td>Installation of new wastewater treatment plant to eliminate the problems of seepage, stagnation, and broken pipes and the associated risk of wastewater infiltration into the water piping system or accumulation in basements</td>
<td>60</td>
<td>2,000 - 6,000</td>
<td>0.03 - 0.11</td>
</tr>
<tr>
<td>Alternative 4</td>
<td>Implementation of both Alternatives 1 and 2</td>
<td>50-80</td>
<td>1,000 - 2,000</td>
<td>0.01 - 0.03</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>Implementation of Alternatives 2 and 3</td>
<td>50-80</td>
<td>3,000 - 6,000</td>
<td>0.04 - 0.09</td>
</tr>
</tbody>
</table>

Impact Analysis

- Economic benefits from improved water supply and sanitation
- Cost of disease (USD)
- Cost of avoided DALYs
- Cost of reduced cases
- Cost of averted damage

Table: Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Benefit to Cost Ratio</th>
<th>Conclusion</th>
</tr>
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<tbody>
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<td>Installation rooftop tanks and replacing water piping at the household were the most economically viable interventions</td>
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<td>Benefit to Cost ratio ranged between 4.6 and 16.8 USD for every 1 USD invested</td>
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<td>A positive return on investment within a maximum of 10 years from implementation</td>
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</tbody>
</table>

Simple low cost interventions are expected to result in positive health impacts which translate into a significant positive socio-economic impact in a poor urban slum.