Drivers of persistent unhygienic faecal desludging and potential sustainable solutions in unplanned urban settlements in Dar es Salaam, Tanzania

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Pit latrines in high water table congested settlements
There is evidence that in areas constrained with space, the challenge of filing onsite sanitation is to be addressed through desludging.

Mechanized and human powered equipment have been invented for hygienic desludging (GOAL, 2016).

Unhygienic desludging persist.
Dar es Salaam, Tanzania, 03.09.2015
Field based assessment

Containment → Emptying → Transport → Treatment → End-use/disposal

Offsite-sanitation:
- 9% WW contained decentralized
- 6% WW not contained

Onsite sanitation:
- 3% WW contained
- 40% FS contained (onsite)
- 50% FS not contained (onsite)

Open defecation:
- 1%

Key:
- % of flow
- Green: Safely managed
- Red: Unsafely managed

57% of flow

Local area, Neighbourhood, City
Purpose of the study

This study explored current situation on the ground and factors contributing to the persistence of unhygienic desludging in unplanned settlements in Dar es Salaam.
Material and Methods

- Cross section study
- Mixed methods
- Data were collected from 395 dwelling houses using Epicollect5 app
- Tests of association were performed in SPSS Ver.25.
- Odds ratio calculated using Binary logistic regression model
  \[
  \text{Logit} (\pi) = \alpha + \beta X + \varepsilon
  \]
### Results: Types of toilets and condition

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected to sewer</td>
<td>0.3%</td>
</tr>
<tr>
<td>Septic tank</td>
<td>13.4%</td>
</tr>
<tr>
<td>Pour Flush</td>
<td>23.3%</td>
</tr>
<tr>
<td>VIP Latrine</td>
<td>8.1%</td>
</tr>
<tr>
<td>Improved Traditional Latrine</td>
<td>41.5%</td>
</tr>
<tr>
<td>Ecosan</td>
<td>0.8%</td>
</tr>
<tr>
<td>Traditional latrine</td>
<td>12.4%</td>
</tr>
<tr>
<td>No toilet</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

- 22% of sewage systems are full
- 34% are unlined
- The water table is high
Results: Desludging equipment and practices

HYGIENIC DESLUDGING

UNHYGIENIC DESLUDGING

75%  
24%

1%  
0%
### Drivers of unhygienic desludging:

**Results of Logistic regression model**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Exp. (B)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low lying areas</td>
<td>1.677</td>
<td>0.400</td>
</tr>
<tr>
<td>Lack of space for parking</td>
<td>4.828</td>
<td>0.002*</td>
</tr>
<tr>
<td><strong>Toilet design and condition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unimproved toilets</td>
<td>2.23</td>
<td>0.505</td>
</tr>
<tr>
<td>Dry pits</td>
<td>1.026</td>
<td>0.871</td>
</tr>
<tr>
<td>Direct to pit toilets</td>
<td>1.034</td>
<td>0.958</td>
</tr>
<tr>
<td>Unlined pits</td>
<td>1.717</td>
<td>0.403</td>
</tr>
</tbody>
</table>
Drivers of unhygienic desludging: 
*Results of Logistic regression model...*

<table>
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<tr>
<th>Parameter</th>
<th>Exp.(B)</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-economic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low rent per Month</td>
<td>1.262</td>
<td>0.672</td>
</tr>
<tr>
<td>Few families (≤3) in a dwelling house</td>
<td>1.856</td>
<td>0.252</td>
</tr>
<tr>
<td>Collect water from public collection point</td>
<td>1.432</td>
<td>0.783</td>
</tr>
</tbody>
</table>
Conclusion and Recommendations

Unhygienic desludging still a common practice

The practice is common among the poor, those in low lying areas and HH with toilets that lack lining

Weak stakeholders collaboration with regard to manual operated equipment despite ineffectiveness of the Gulper
Conclusion and Recommendations...

• Improvement in desludging services should insist on lining of pits
• Consideration should be given to the poor who can not afford pit lining e.g. loan schemes
• The effectiveness of sanitation solutions that do not require deep pits such as simplified sewers, BFL toilets need to be investigated
Residents in unplanned settlements are likely to be left behind if desludging challenges are not addressed

- Pit lining along with a space for desludging may improve faecal desludging
- Shallow pit sanitation systems in water logged areas
- Feasibility of non pit based toilets in water logged areas need to be researched further
Points to remember

Hygienic desludging still a challenge in unplanned settlements

Poor toilet design and high water table traps hygienic desludging in DSM