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Comparing the costs of different urban sanitation solutions in developing cities in Africa and Asia

Policy Brief | February 2018

Quick read...

- This literature review indicates that conventional sewer systems are the most expensive urban sanitation solution, followed by systems based on septic tanks, ventilated improved pits (VIP), urine-diverting dry toilets (UDDT), then pour-flush pit latrines. Simplified sewer systems may cost less than both conventional sewer systems and septic tank-based systems.
- Cost reporting methodologies are inconsistent, and few studies provide data on lifecycle costs for the full urban sanitation chain.
- Building sanitation cost databases at country or city level could be useful for investment planning.

Rationale

Improving urban sanitation infrastructure and services is a costly process, and financial considerations are a high priority for municipal planners and legislators. But accurate data on the costs of different sanitation solutions is often not available.

In urban contexts, more than one kind of sanitation solution will invariably be required: planners must consider the costs of the on-site sanitation chain (from containment to disposal and/or reuse), alongside the costs of expanding sewer networks, and factor in different types of costs - just calculating capital costs is not sufficient (see Box 1).

In addition, different components of the sanitation chain may have very different lifespans: pit latrines will require maintenance and repair much more often than a sludge treatment plant. Improving the knowledge base around the cost of urban sanitation systems can help ensure sustainable management of sanitation project finance and help avoid project failure.

Image credit: Gareth Bentley

Box 1: Determinants of urban sanitation system costs

- Technology type, distance to treatment facility, whether reusable products are created
- Costs of labour, materials, energy
- Population density
- Topography, soil characteristics, climate, water table height
- Level of service provided by sanitation system

Urban Sanitation Research Initiative

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Methods

This was a desk study, based on review of existing costing tools and costing studies reported in the academic and grey literature. Data about the costs of different sanitation interventions were taken from each study that analysed the lifecycle costs of two or more urban sanitation systems. These were then converted into 'cost ratios'. This allowed for side-by-side comparison of different systems, while recognising that significant divergences in cost exist between locations even if the same sanitation system is used. Most comparisons found were between 1) conventional sewer systems and 2) FSM systems based on septic tanks and wet pit latrines. An example comparison can be seen in Figure 1.

Findings

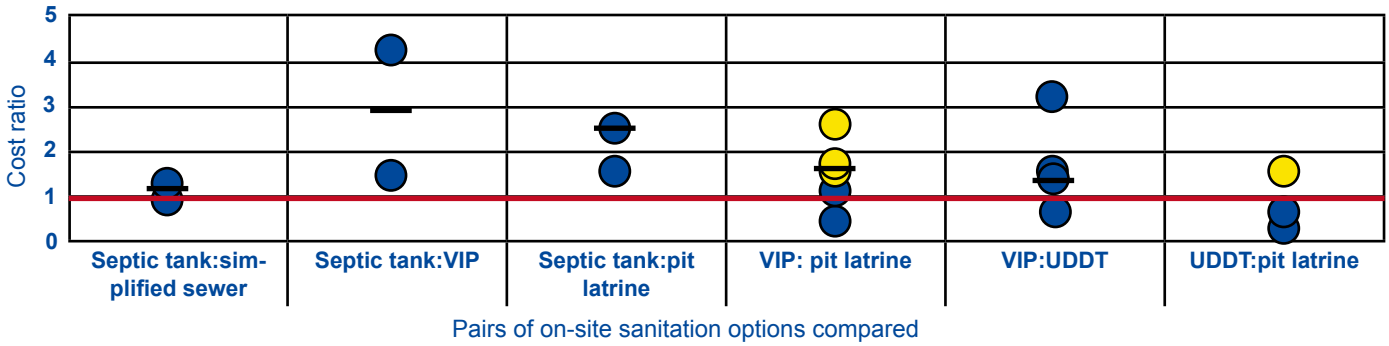
1. **Conventional sewer systems were the most expensive options in all comparisons, regardless of location.** This was followed by (in descending order, beginning with the most expensive) systems with septic tanks, then VIP latrines, then UDDTs and wet pit latrines. Figure 1 below shows the cost ratios.

2. **Results are highly dependent on context.** For example, simplified sewerage was less expensive than a wet latrine-based system in Senegal because the location had high population density, impermeable soils and a high water table.

3. **The distribution of costs among actors varies.** Utilities pay the most if the sanitation system is sewer-based, with households paying only around 4% of the total lifecycle cost. If a sanitation system is on-site and FSM-based, then households are the primary funders, paying nearly 84% of costs (such as tank installation and desludging).

4. **It should be stressed that this study looked only at financial costs, not benefits.** So although septic tank systems are generally cheaper than conventional sewerage systems (for example), this doesn't necessarily mean that septic tanks are the optimal solution in a given context.

Figure 1: Compilation of lifecycle cost ratios of on-site sanitation solutions



Note: For this particular analysis, more data on dry pit latrines were available than for the cost ratio comparison for the full sanitation chain. Dry pit latrines are marked as yellow dots, while wet pit latrines are marked as blue dots

Policy implications

Very few studies provide comprehensive data on lifecycle costs across the urban sanitation chain, and most report on one city and only two or three types of sanitation system. Significant data gaps mean that identifying patterns across sanitation options is difficult, particularly as costs are context-dependent. Sanitation cost databases that capture country- and city-specific information about different sanitation systems would be useful for planners and implementers. Development partners could develop capacity of utilities and governments to do so, and would ideally also report their project cost data more thoroughly – covering different types of costs and each component of the sanitation chain, and information on the factors that affect costs. Finally, it should be noted that this study has only examined costs, rather than benefits: a chosen option in any context may offer lowest cost, but that doesn't necessarily result in an optimal cost-benefit ratio. A 'one-size-fits all' approach isn't realistic.

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