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# EXPANDING SAFE FECAL SLUDGE MANAGEMENT IN KISUMU, KENYA

## A COMPARISON STUDY OF LATRINE PIT-EMPTYING SERVICES

## OVERVIEW

- Promoting safe pit-emptying services in urban, low-income areas is required to achieve universal access to safely-managed sanitation.
- We compared the performance of three different groups in coordinating safe emptying services in the city of Kisumu, Kenya: the Association of Wastewater Managers, a formal manual emptying organization, and a community-based water supplier.
- The Association of Wastewater Managers performed the best at coordinating emptying services, as indicated by the number emptying jobs, financial viability, and customer satisfaction.
- Productive collaborations between VTOs and formal manual emptying organizations are a useful model for improving pro-poor service delivery.
- However, safe emptying services are often unaffordable, and will likely require subsidies and political action to service low-income areas.

## RATIONALE

Sewerage networks are limited in the city of Kisumu, Kenya, with approximately 70% of households relying on simple pit latrines (Furlong & Jooust, 2016). When pits fill up, middle- and high-income households commonly employ vacuum truck operators (VTOs) for pit emptying; however, VTOs rarely service low-income areas because they are perceived to be too expensive, cannot access households in dense urban settlements, and/or are not equipped to remove the solid waste typically found in pit latrines (Balasubramanya et al., 2017; Chowdhury & Kone, 2012; Mansour, Oyaya, & Owor, 2017). Instead, low-income households typically use informal manual emptiers who remove fecal sludge by hand or buckets and bury it onsite or dispose of it in nearby waterways. Though there have been efforts to train and support manual emptiers to improve the safety of manual emptying in Kisumu (Owako & Renouf, 2018; WSUP, 2018), these “formal” emptying groups currently only serve less than 1% of Kisumu’s low-income population (The Aquaya Institute, 2019). To evaluate strategies for increasing access to safe, regulated pit-emptying services, we compared the performance of different groups in coordinating incentivized emptying services to low-income areas of Kisumu, Kenya.

## METHODS

Our previous stakeholder consultations identified the need for exploring different management models for pit-emptying services (The Aquaya Institute, 2019). We identified three managing groups that had the potential to provide safe pit-emptying services, with different cost and management structures: (1) Kenya Association of Wastewater Managers (The Wastewater Association); (2) Vukasasa, the primary formal manual emptying group operating in Nyalenda; and

TABLE 1:

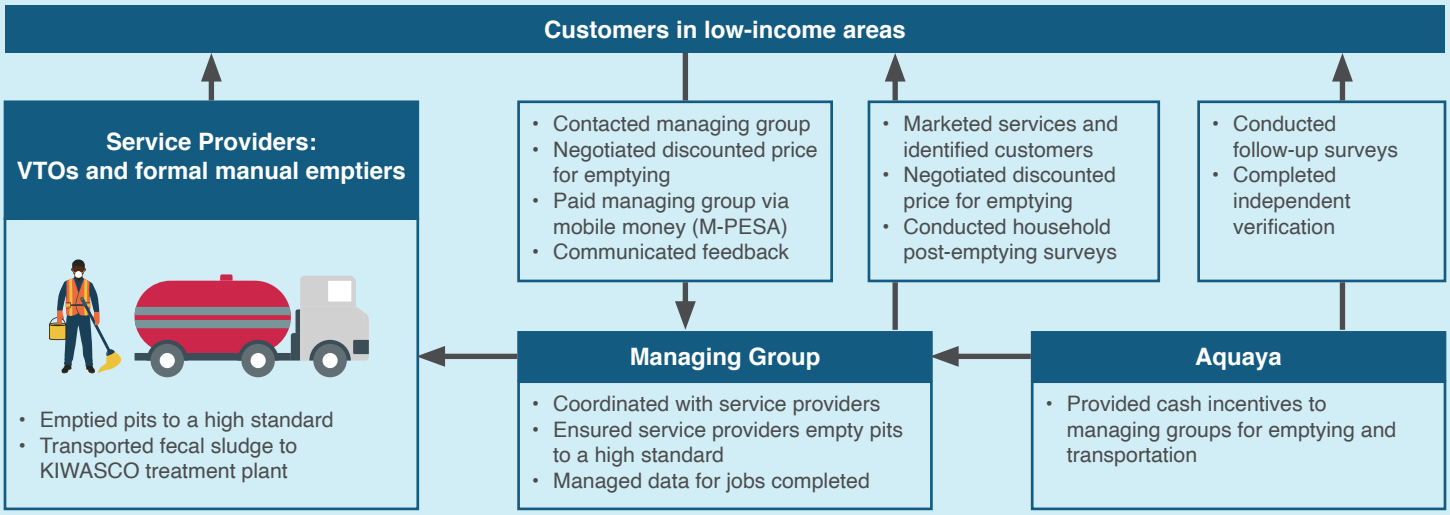
## DESCRIPTION OF THE THREE MANAGING GROUPS SELECTED FOR THE COMPARATIVE STUDY OF PIT-EMPTYING.

| Managing Group | Description and structure |
|---|---|
| **The Kenya Association of Wastewater Managers** *(referred to as "The Wastewater Association")* | • An association of VTOs<br>• Serves as an intermediary to link customers to VTOs<br>• Subcontracts jobs to formal manual emptying groups as needed |
| **Vukasasa** | • A community-based organization that provides safe manual emptying services<br>• Able to subcontract jobs to VTOs, though rarely applied in practice |
| **Nyalenda Water Association** *(referred to as "Nyalenda Water")* | • A small-scale water supplier that provides water in low-income areas<br>• Overseen by Kisumu Water and Sewerage Company (KIWASCO) through a delegated management model<br>• No previous experience in sanitation and, therefore, manages pit emptying by subcontracting jobs to VTOs or formal manual emptiers |

FIGURE 1:

## COMPARATIVE STUDY DESIGN

**The responsibilities for each group are represented by the direction of the arrows. The research team (Aquaya) provided cash incentives to managing groups for emptying and transport.**




(3) the Nyalenda Water Association (Nyalenda Water), one of the small-scale water providers responsible for distributing piped water in Kisumu's low-income areas through a delegated management model (Castro, 2009; Nzengya, 2015; Schwartz & Sanga, 2015) (Table 1). Throughout our comparative study, these selected groups managed their delivery of safe emptying services; they were responsible for marketing services, identifying customers, setting prices, coordinating pit-emptying jobs, and subcontracting jobs as needed. The Wastewater Association and Vukasasa had the discretion to perform emptying services themselves or subcontract to other emptiers (i.e., to formal manual emptying groups or VTOs, respectively); Nyalenda Water did not have the capacity to perform emptying and, therefore, subcontracted all emptying jobs to formal manual emptiers or VTOs (Table 1). Each managing group had a designated geographical zone of operation.

Each managing group established emptying prices directly with the customers. We provided an additional 3,000 KES (30 USD) cash incentive to managing groups for each emptying job completed within their respective geographical zone. For formal emptying services' transport costs, we also provided a 2,000 KES (20 USD) cash incentive per trip to transport fecal sludge to Kisumu Water and Sanitation Company's (KIWASCO's) treatment site.

TABLE 2:

## SAFE EMPTYING AND FINANCIAL PERFORMANCE OF THE THREE MANAGING GROUPS

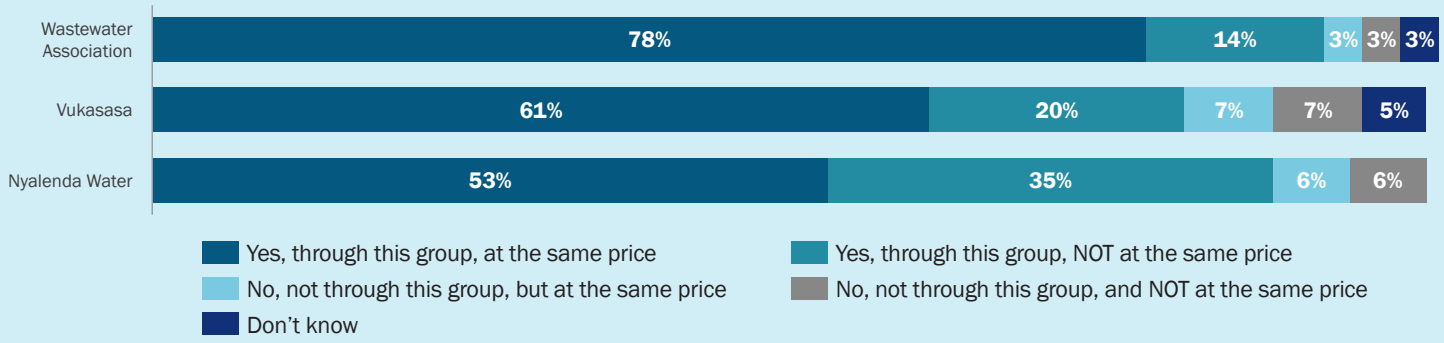
| Managing Group | Wastewater Association | Vukasasa | Nyalenda Water |
|---|---|---|---|
| Number of coordinated pit emptying jobs[1] | 135 | 41 | 18 |
| Volume of sludge emptied during pilot (L)[1] | 1,065,600 | 147,120 | 95,960 |
| Number of trips | 120 VTO,<br>39 formal manual | 118 formal manual | 9 VTO,<br>26 formal manual |
| Average customer payment per job | 1,375 KES<br>(14 USD) | 3,190<br>(32 USD) | 2,696<br>(27 USD) |
| Total managing group profit | 187,486<br>(1,875 USD) | 128,100<br>(1,281 USD) | 44,527<br>(445 USD) |

VTO=Vacuum Truck Operator

1. Volume of sludge removed using VTOs estimated based on exhauster truck capacity. Volume of sludge removed by formal manual emptiers calculated based on number of barrels used of either 60L, 120L, or 210L capacity for each emptying trip multiplied by the number of trips required to transport sludge to treatment site.

FIGURE 2:

## PERCENTAGE OF RESPONDENTS INTENDING TO USE EMPTYING SERVICE FROM THE SAME MANAGING GROUP.




For each managing group, we collected data to assess: (i) *safe emptying performance,* (ii) *financial performance,* and (iii) *customer satisfaction*. After each emptying job, managing groups completed post-emptying household surveys to document the estimated volume of sludge removed, customer price, customer satisfaction, and other details. After the comparative study period, we conducted follow-up interviews with the managing groups and households that received the emptying services.

## KEY FINDINGS

1) **SAFE EMPTYING. The Wastewater Association coordinated the most emptying jobs and removed the highest volume of fecal sludge.** We confirmed that the Wastewater Association coordinated 135 emptying jobs (removing approximately 1,065,600 L of fecal sludge), Vukasasa coordinated 41 jobs (removing approximately 147,120 L of fecal sludge), and Nyalenda Water coordinated 18 jobs (removing 95,960 L of fecal sludge) during our study period (Table 2). We also found that the Association primarily used VTOs, though also subcontracted 15/135 jobs to formal manual emptiers. Vukasasa did not subcontract any jobs, and Nyalenda Water subcontracted half of their jobs to VTOs and half to formal manual emptying groups (Table 2).

2) **FINANCIAL VIABILITY. The Wastewater Association was the most financially viable.** The average price charged by the Association (1,375 KES (14 USD) per job) was substantially lower than the other two managing groups (3,190 KES (32 USD) for Vukasasa and 2,696 KES (27 USD) for Nyalenda Water) (Table 2). However, the Association completed substantially more jobs and their total profit was higher: 187,486 KES (1,875 USD) for the Association, compared to 128,100 KES (1,281 USD) for Vukasasa and 44,527 (445 USD) for Nyalenda Water (Table 2).

3) **CUSTOMER SATISFACTION. Most customers were satisfied with the safe emptying services, and satisfaction was the highest for the Wastewater Association.** The Association's customers reported the highest satisfaction levels, with an average of 4.3 (on a 5-point scale) and 78% of customers reporting that they would use the same service again at the same price (Figure 2). Nyalenda Water received the lowest average satisfaction rating of 2.9, with 53% reporting they would use the same service again at the same price (Figure 2).

## CONCLUSIONS

In this comparison of different pit-emptying groups in low-income areas of Kisumu, Kenya, we found that the Wastewater Association was most efficient in coordinating incentivized emptying services, both in the number of pits emptied and in the numbers of trips required to transport fecal sludge to the treatment site (Table 2). The Wastewater Association charged lower prices to consumers and also received the highest customer satisfaction ratings (Table 2 and Figure 2). The strong performance of the Wastewater Association was likely driven by multiple factors: its higher capacity for performing jobs through its membership of VTOs, the substantially lower operating costs of VTO services compared to manual emptying, which allowed the Association to apply lower consumer prices on average, its greater experience in marketing its services, and its adherence to accurate record keeping.

The Wastewater Association performed most emptying jobs (120/135) via its VTO members and subcontracted some emptying jobs (15/135) to formal manual emptiers, demonstrating that productive collaborations between VTOs and formal manual emptying organizations are a useful model for improving pro-poor service delivery. This outcome challenges the assumption that VTOs are not appropriate solutions for servicing low-incomes areas, at least in Kisumu, Kenya. On the contrary, VTOs can effectively service a large proportion of low-income households in Kisumu, using formal manual emptiers as a substitute in the fraction of cases where they cannot technically operate.

Finally, the study highlighted that safe emptying services are often unaffordable at current market prices, and will likely require some form of subsidies and political action to service low-income areas. Furthermore, efforts to increase safe pit-emptying services will also require the expansion of Kisumu's fecal sludge treatment infrastructure and regulations.

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### See the following publication for additional details on study design and findings:


Rachel Peletz, Andy Feng, Clara MacLeod, Dianne Vernon, Tim Wang, Joan Kones, Caroline Delaire, Salim Haji, Ranjiv Khush; Expanding safe fecal sludge management in Kisumu, Kenya: an experimental comparison of latrine pit-emptying services. *Journal of Water, Sanitation and Hygiene for Development* washdev2020060. doi: https://doi.org/10.2166/washdev.2020.060