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**ACCESS TO SANITATION AND SAFE WATER:
GLOBAL PARTNERSHIPS AND LOCAL ACTIONS**

Faecal sludge management in Accra, Ghana: strengthening links in the chain

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Achieving a fully operational Faecal Sludge Management (FSM) chain requires well managed and sustainable services in all aspects of the collection (emptying), transport (haulage), disposal and treatment of faecal sludge. A fully operational FSM chain offers one type of sustainable sanitation system, particularly for urban populations in low and middle-income countries. Failure to ensure all links in the chain are strong and working effectively results in untreated faecal sludge contaminating the environment, with serious implications for human health and environmental degradation. Research in Accra, Ghana has identified important constraints to achieving an efficient and fully functioning FSM chain, with consequences for both people and the environment. Opportunities to improve the institutional and operating environment are identified, particularly affecting engagement between the public and private sector and civil society. Improved stakeholder engagement, together with better regulation, management and access to facilities, enhances services in a way that bring wider benefits to all.

Introduction

On-site sanitation systems adopted in urban areas need to address the problems associated with faecal sludge management (FSM), especially in relation to difficulties with emptying, transportation and safe disposal of faecal sludge¹. This paper presents the problems currently occurring in Accra, Ghana with respect to FSM practice. The issues addressed in the paper focus around the ability of householders to pay for services, the institutional environment within Accra, the ongoing conversion of pan latrines² and the overall enabling environment within which FSM operates.

Recent research into FSM has identified the broad range of criteria that need to be considered in this field. Initial work in the early 1990s focused attention on improving emptying technologies, such as the Manual Pit Emptying Technology (MAPET) in Dar es Salaam (Muller and Rijnsburger, 1994) and the BREVAC-LA tanker (Carroll, 1989). More current work has sought to tackle the wider context within which faecal sludge is managed, such as the institutional inter-relationships studied in work by Building Partnerships for Development (Schuab-Jones, 2005) and the role of private sector operators studied by SANDEC (Jeuland et al, 2004).

Field research in Accra

Accra is a city of approximately 2.2 million people (World Bank, 2002). As is the case in many towns and cities in Ghana, the two predominant forms of sanitation used are septic tanks and communal latrine facilities, although a significant number of families continue to use household pan latrines (Larbi, 2006). The pan latrines represent a legacy from 17th or 18th century colonial times (Gordon, 1997).

During a three week research trip to Accra, Ghana in mid-2007, structured and semi-structured interviews and focus group discussions were conducted with Accra Metropolitan Assembly (AMA) employees, managers of vacuum tanker and pan latrine emptying contractors, government officials and employees of external support agencies. The intention was to examine the current institutional environment affecting Accra's approach to FSM and the stakeholders involved.

Institutional environment

The Ghanaian government devolves powers to assemblies throughout the country. In Accra, this falls to AMA and the responsibility for FSM falls to the Waste Management Department (WMD) within AMA. The

Liquid Waste Management group, a sub-sector of the WMD, carries out these responsibilities for FSM. A gradual process of privatisation of duties has however resulted in the responsibilities of the WMD, in the area of FSM, being reduced to:

- managing the disposal/treatment facilities in Accra;
- setting tariffs for emptying and disposal;
- monitoring and regulating private operations; and
- enforcing by-laws.

Privatisation of FSM operations began in 1987, when pan latrines started to be phased out. Those that were not phased out at the time came to be emptied by private contractors (Gordon, 1997). Nowadays the nine original private contractors have reduced to five, as four contractors who were found to be using unsanitary practices had their licences revoked.

Pit latrines and septic tanks in Accra are typically emptied by large vacuum tankers (Photograph 1). These tankers are privately operated by a number of separate (approximately 30-40) companies. These registered companies pay an annual fee to the WMD to operate, while they charge fixed costs for emptying, as outlined in Table 1. The view of many private tanker-operator contractors is that the monitoring of their operations by the WMD does not take place either regularly or effectively enough.

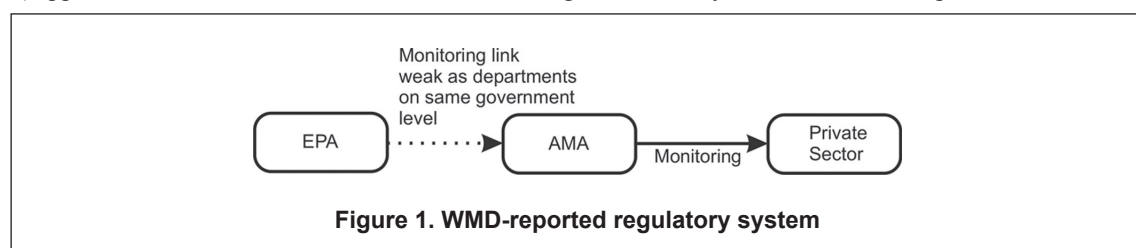


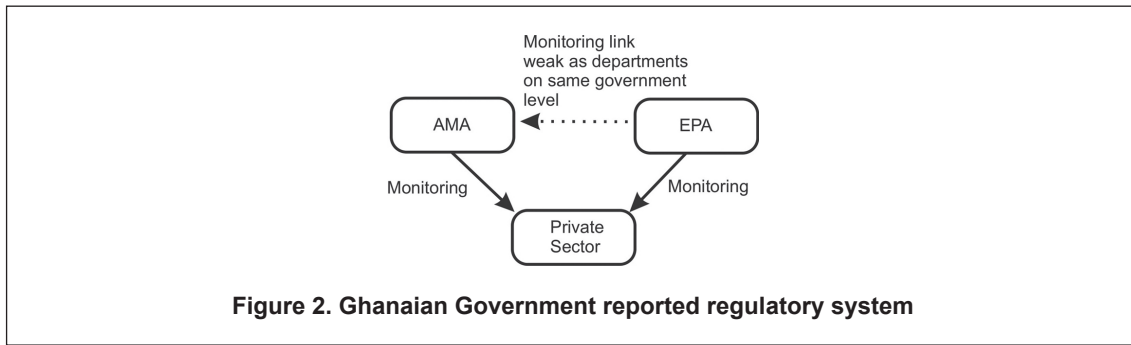
Photograph 1. Tanker discharging faecal sludge at Korle Gono

The ways in which the WMD monitors private contractors' operations is reported differently by the WMD themselves (Figure 1) as compared to the views of the Director for Environmental Health and Sanitation, in the Ministry of Local Government, Rural Development and Environment (Figure 2). The Environmental Protection Agency (EPA) acts as a regulator of services, mandated to monitor both the WMD and the private sector. The WMD reports that the EPA has no direct contact with the private sector (Figure 1). This disparity of opinion could possibly be attributed to poor communication between the EPA and WMD, which exacerbates the lack of clarity in roles, responsibilities and action.

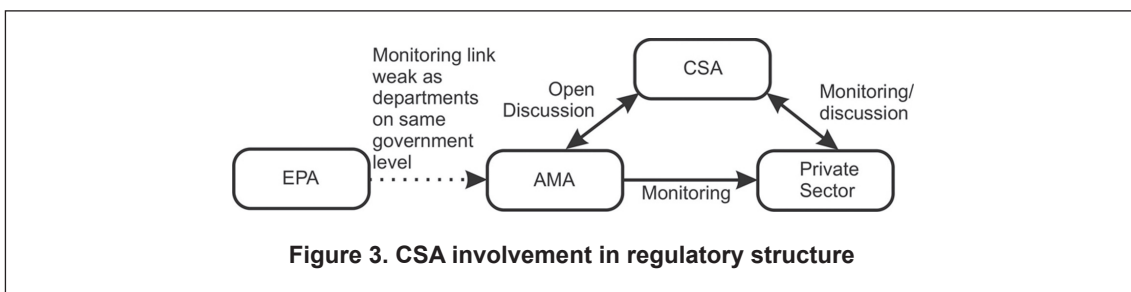
An association representing private vacuum tanker contractors, the Cesspool Services Association (CSA), assists in setting the tariffs for emptying services, monitoring tankers entering and leaving the faecal sludge disposal (tipping) point at Korle Gonno (see Figure 4) and communicating with the WMD. The CSA feels that they have the ability to lobby the WMD to change policy and/or tariffs, however it remains to be seen that such action has ever taken place.

The CSAs role in monitoring and facilitating dialogue within the WMD-reported regulatory system (Figure 1) appears to be more in line with what is shown in Figure 3. Notably the CSA does not represent the interests





of all private vacuum tanker contractors, neither does it represent the views and interests of the significant number of private pan latrine contractors. The CSA, which appears to consist of contract company owners, does not appear to represent the views of their customers or employees.



Faecal sludge management chain

The faecal sludge management processes taking place in Accra can be described, within the context of the FSM chain, under the headings of collection, haulage, disposal and treatment. A notable feature of Accra's FSM system is the use of large underground holding tanks (UHTs) in the collection stage, offering transfer stations for the temporary storage of pan latrine faecal sludge, before this is removed by vacuum tankers.

Collection

Faecal sludge is collected in two ways in Accra. Pan latrines are emptied by operators manually carrying the full pan to a UHT for initial disposal (transfer) of the waste. In some cases the pan latrine faecal sludge is removed from the household using mechanical means, using a small vacuum tanker known as the *dung beetle* (Photograph 2). Vacuum tankers are utilised to empty the majority of household facilities (notably septic tanks), as well as communal latrines.

Problems associated with the collection process, identified by private vacuum tanker companies, include:

- access to latrines occasionally poses a problem to both *dung beetles* and large vacuum tankers, although this is generally overcome by using longer hoses, or making holes in the perimeter walls of households;
- dry-waste sanitation facilities, such as Kumasi Ventilated Improved Pit (KVIP) latrines and simple pit



Photograph 2. Dung beetle machines used in Accra

latrines (where limited amounts of water enter into the pit) are challenging to empty, as they require the excreta to be liquefied and stirred while water is added before it can be removed by vacuum tanker. This puts further strain on the pumps;

- limited regulation of workers, together with the inability of managers to effectively monitor their activities, means that tanker operators sometimes empty two pits while claiming to have emptied one. They are then charged for disposing faecal sludge at the disposal point on the basis of one emptied facility, while money made from the second emptying operation is directly pocketed by the workers; and
- it can be difficult to secure the fixed emptying fees from householders, resulting in some residents paying less than the tariff set by the WMD (the proportion of householders paying a reduced cost was not ascertained in the research), while many other households resort to illegal, but less costly, services.

Similar problems are also faced by the pan latrine emptying contractors, particularly in relation to collection of fees. Pan latrines are typically emptied twice a week, for a fixed monthly fee (Table 1). However, an illegal (unlicensed) group of pan latrine emptiers is in operation, which undercuts the prices and services of the official contractors. These illegal operators have lower overheads, as they do not take the responsibility for emptying the UHTs (although they often dispose of the pan latrine waste directly into them). They face social stigma and significant health risks in their work, yet they continue to provide emptying services for a large number of poor households in Accra. The WMD is not in a position to enforce by-laws to successfully control the operations of these illegal workers. Reliable data on the number of existing pan latrines is unavailable, therefore the number of pans emptied by illegal workers is unquantifiable but potentially high.

Charges set by the WMD for collection of faecal sludge vary, depending on the location of the sanitation facilities within Accra, as this affects the costs associated with different haulage distances. Table 1 shows the key charges associated with emptying sanitation facilities for 2007, including the costs for the ultimate disposal of faecal sludge at a designated disposal (tipping) point.

Table 1. Key charges for emptying sanitation facilities in Accra (2007)	
Task	Cost (Ghana Cedis) per trip
7,000 litre vacuum tanker emptying a pit/UHT	46 (US\$ 50)
7,000 litre vacuum tanker emptying a domestic septic tank	52 (US\$ 57)
Emptying a pan latrine (fixed monthly fee)	10 (per month) (US\$ 11)
Disposal charge for vacuum tankers at tipping point	12 (US\$ 13)
Source: Waste Management Department records, 2007	

Putting these values into context alongside average urban Ghanaian household cash expenditure on other items is informative. A report by the Ghanaian statistical service (Asenso-Okyere et al, 2000) in 2000 shows average urban household annual expenditure in Ghana to be approximately 220 Ghana Cedis on food and beverages (just under 18 Ghana Cedis per month) and approximately 20 Ghana Cedis on medical care and health expenses (less than 2 Ghana Cedis per month).

Haulage

Faecal sludge collected from sanitation facilities is ultimately transported to a disposal point. Haulage is typically carried out using 7,000 litre vacuum tankers. At a localised level haulage is effectively carried out by foot (pan latrine emptiers), or by using the dung beetle machines (predominantly used for pan latrines).

Haulage distances are generally seen to be a key aspect affecting cost recovery, so the ability to aggregate demand for emptying services, as a way to minimize transport needs, is seen as a crucial factor to achieving a cost-effective service (Schaub-Jones, 2005). In Accra, haulage distances have increased in recent years due to the closure of a northern treatment works. Figure 4 shows the location of this closed site, as well as the location of the remaining disposal points at Korle Gono and Teshie, southern Accra.

Current haulage requirements present a large cost to the private vacuum tanker companies, with diesel costs accounting for approximately one third of the cost of a single trip. Since the closure of the northern treatment works (allegedly to make way for a new shopping centre), this cost component is likely to increase, as a significant number of customers of emptying services reside in the northern regions of Accra. Increased haulage distance also increases the frequency of vehicle breakdowns, leading to costly maintenance requirements – a concern voiced by vacuum tanker contractors in Accra.

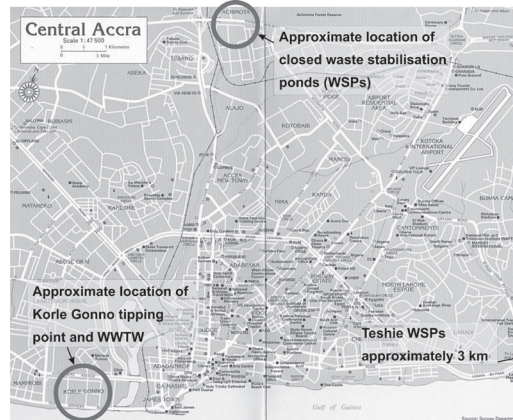


Figure 4. Location of northern treatment site (closed) and remaining disposal points
[Adapted from Ghanaweb, n.d.]

Disposal

As shown in Figure 4, disposal of faecal sludge collected by vacuum tankers typically takes place at two locations, while for pan latrine emptiers, the disposal points are the series of Underground Holding Tanks (UHTs) located around Accra.

Tanker operations

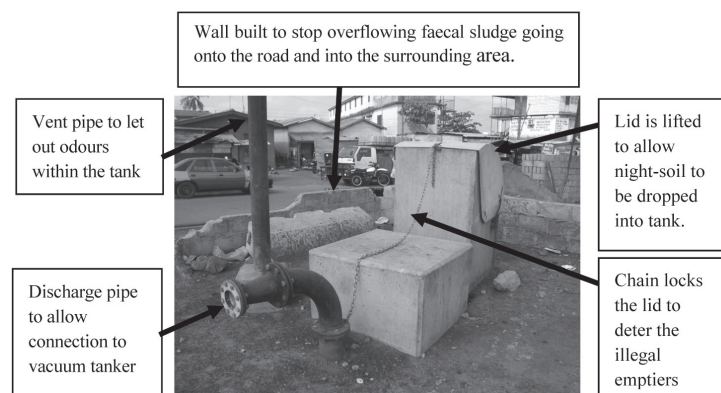
Tankers arriving at one of the disposal points discharge faecal sludge directly into the sea or surrounding area without treatment. Volumes disposed at Korle Gono average 700m³/day, from an average of 100 tankers per day. While the WMD is responsible for monitoring these operations, it has insufficient capacity and resources to ensure disposal is carried out safely.

Pan latrine contractors

Pan latrine contractors typically dispose of collected excreta into the underground holding tanks (UHTs) (Photograph 3). These tanks offer a relatively safe disposal point for the pan latrine contractors, although there are problems associated with both the tanks themselves and the institutional arrangements surrounding their operation.

Technically, the UHTs are challenging to operate for a number of reasons. Siltation of sludge within the tanks is the main problem, exacerbated by the dry nature of the waste they receive. Periodic removal of consolidated faecal sludge requires the above-ground section of a UHT to be removed by crane, allowing access into the tank for it to be de-silted. This is a costly process. The dry nature of the waste also makes the tanks difficult to empty on a day-to-day basis using vacuum tankers.

The tanks were originally installed by the AMA and are currently owned by the WMD. Of the initial 60



Photograph 3. Top section of an underground holding tank (UHT)

UHTs constructed in the 1990s, 33 are reported to remain in operation. The private pan latrine emptying contractors who operate in areas where UHTs are located are charged a fee by the vacuum tanker operators who periodically empty them. Problems occur however when the illegal pan latrine emptiers, working in the same areas, empty their collected waste directly into the UHTs, thereby increasing the emptying frequency and resulting cost to the official contractors. Alternatively, the illegal operators tip the excreta indiscriminately into the local environment, with resulting risks to health.

Treatment

Facilities for the treatment of faecal sludge are effectively non-existent in Accra. The major faecal sludge disposal point is at Korle Gono. According to WMD records, in 2006 over 200,000 m³ of faecal sludge was disposed at this point. This waste is discharged into the ocean or onto surrounding land completely untreated (Photograph 2). Other faecal sludge removed from Accra (approximately 30,000m³ in 2006) is discharged to waste stabilisation ponds at Teshie, but the ponds are said to be silted up and not working effectively.

Phasing out pan latrines

The government of Ghana aims to phase out all pan latrines by 2010. Stakeholders interviewed as part of the research carried out in 2007 cited the following possible problems in achieving this:

- if the septic tanks and pit latrines that are proposed to replace the pan latrines are constructed, vacuum tanker access will be difficult for many areas;
- residents will have difficulty meeting the material costs for the new facilities, as proposed by the WMD;
- in some areas there will not be sufficient room within the household plot to construct a new sanitation facility to the standards stipulated by the government; and
- high real estate value encourages householders and landlords to utilise extra space on a building plot to construct extra rooms (which can be rented out for income) rather than construct a bathroom with a household latrine. Communal sanitation facilities are often reverted to instead.

While there is no doubt that the system of pan latrines should be replaced, the process by which this is to be brought about needs to be done with thorough consultation of all stakeholders. Careful consideration must be given to the impact the changes will have on the overall process of faecal sludge management and provision made for a sustainable service that benefits all.

Findings

The research has highlighted key findings in relation to: the ability of householders to pay for sanitation services (however basic), the role of civil society in the institutional environment associated with FSM, the legal status of informal latrine emptiers (particularly as regards their ability to utilize transfer stations), and the impact of a change in the sanitation facilities on FSM services.

Ability to pay

Vodounhessi (2006) assesses that householders should allow up to 0.5% of their income for faecal sludge management services (a proportion of the WHO recommended 5% standard for all WATSAN services). The current charge in Accra of US\$11 per household per month for emptying a pan latrine represents 0.5% of US\$26,400 per annum. This is obviously a far higher income than the average annual income of a household (in 1999 average household income was found to be US\$409 per annum for the poorest 20% of Ghana's population and US\$1,462 per annum for the population of Accra) (TUC, 2004). This suggests that many poor households in Accra allocate a far higher proportion of their household income than is recommended, as a means to secure regular and reliable latrine emptying services, despite the latrine offering a low level of service.

Costs to septic tank owners are much more variable, resulting from the unpredictable filling rate, tank volume and number of householders sharing one septic tank. The cost to a household for emptying septic tanks is estimated to be within the range of approximately US\$60-340 per annum. Again, this is likely to represent a significant proportion of household income, suggesting that households will and do pay high charges to secure a reliable emptying service.

Involvement of civil society

The need for civil society involvement in urban sanitation has been exhibited in other cases around the world, such as the relative success of the support from a national NGO (DSK) in the management of faecal

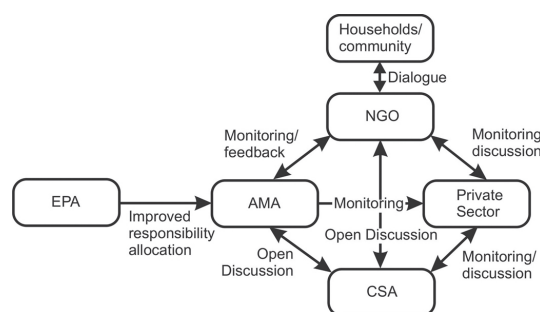


Figure 5. Possible arrangement for civil society involvement in Accra

sludge in Dhaka, Bangladesh (GHK, 2005) and the role of a small-scale private operator in Bamako, Mali (Jeuland et al, 2004).

The current arrangement of public-private partnerships between AMA, CSA and the private sector within Accra offers a medium level of engagement between these actors. What is missing to achieve the full potential from this level of engagement however are aspects of facilitation and collaboration with the wider stakeholder group (Scott and Sansom, 2006). There appears to be scope for this in Accra, as there is no clear operational role, or voice, for civil society in sanitation issues within Accra at present.

Figure 5 shows a possible improvement on the previously identified operational structures (Figures 1-3), with an NGO able to both facilitate and represent civil society in ongoing dialogue with the other key stakeholders. Whilst in this arrangement the CSA retains its current role (albeit with increased capacity to carry out enhanced roles in, for example, greater representation of all workers and providing an additional avenue for reporting complaints), the NGO offers a role in facilitating the representation of informal (currently illegal) pan latrine contractors, as well as householders and other civil society groups.

Such a recommendation for this institutional arrangement is supported by the work of Scott and Sansom (2006), who suggest that the establishment of an umbrella NGO helps to strengthen the enabling environment for better government engagement with non-state providers of sanitation services. The apparent success of the DSK-supported vacutug service in Bangladesh lends further support to this, as does the example of Mvula Trust, an NGO in South Africa who have facilitated engagement between small-scale informal sanitation operators and high-level decision makers (Scott and Sansom, 2006).

Facilitating access to UHTs by informal operators

The presence of illegal (informal) operators in emptying pan latrines makes the use of the UHTs much more onerous for the private pan latrine contractors. The increased cost placed on the private contractors – who are having to pay for the removal of waste received from the illegal operators, means that the users of legal services are effectively cross-subsidising those who use the cheaper, illegal services.

Without a move towards the recognition of these illegal operators, so that their role can be incorporated into a wider plan of improving sanitation services to all, they can only continue to exacerbate the current operations of the registered service providers. Again, there is a potential role for an NGO in facilitating dialogue with the informal sector, representing their interests and needs to the wider stakeholder group, in an attempt to develop solutions with the AMA as to the management of the whole FSM process.

Ideally, the UHTs would be made available for all pan latrine workers to discharge excreta into. For this to be acceptable and sustainable, emptying the UHTs would need to be a publicly regulated operation (even if the management is outsourced to private operators).

Reducing haulage distances, from households to the transfer stations (UHTs) and from these to the disposal and/or treatment locations (possibly supported through the provision of decentralised treatment facilities), could also reduce costs placed on private sector operators. While a third of vacuum tanker direct operating costs go on diesel, other cost elements such as vehicle breakdown and replacement costs, feature in long-run operations. Analysis of the impact of such cost adjustments on operating profitability have not been carried out, but would be an important feature of any modifications.

Phasing out pan latrines: the alternatives

There are alternatives to septic tanks and Kumasi Ventilated Improved Pit Latrines (KVIPs) as a means of

phasing out pan latrines. The problems associated with emptying these two options, as stated earlier, should be accommodated within the framework of an overall design brief for the phasing-out / replacement process. The largest emptying contractor in Accra (Larsen Ghana) has initiated a pilot trial of replacing the pans with a fibreglass box. This box is fitted with a connection that only allows emptying by using the *dung beetle* machines (Photograph 1), in an attempt to address the problems associated with illegal sector operators.

Such a conversion would only have potential if associated with an appropriate technology for emptying, as well as provision of a reliable emptying service. If the private sector seriously took on such tasks, then innovative ideas such as providing reduced-cost conversions, or initiating financing mechanisms that help households pay for conversion in instalments, could be explored further as a method of securing customers.

Lessons learnt

The research carried out in Accra has highlighted a number of key lessons for replication in other urban centres where Faecal Sludge Management improvements are being considered.

- Where low service-level forms of sanitation exist, such as bucket latrines, any process for phasing them out must account for the means by which faecal sludge can be effectively and safely managed, before new facilities are introduced.
- Maintaining a competitive environment for private sector operators should ensure best practice is followed, with an adequately capacitated public sector regulating and monitoring private operators.
- Facilities such as intermittent transfer tanks for temporary storage of faecal sludge help in the aggregation of demand for emptying services. This enhances the operation of emptiers, helping them provide services that are more cost-effective and responsive to household needs. Access to such facilities should be made widely available, supported by good regulation and oversight. Transfer stations offer a potential point for the transfer of responsibility between private operators (who provide household and communal-level emptying services) and public operators (who are involved in transport, disposal and treatment services).
- The management of faecal sludge has many similarities to solid waste management (SWM). SWM often incorporates the use of transfer stations, accessible to both registered and informal waste collectors. SWM service providers are more progressive in recognising the value of informal sector operators, such as waste-pickers, accounting for the impact on livelihoods from changes in SWM practices. Further studies into links between FSM and SWM could help both of these sub-sectors of environmental sanitation enhance operations, working towards improvement in urban environments and achievement of MDG targets relating to combating environmental degradation and improved access to safe sanitation.

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References

- Armah, Nathaniel (2007) (Retired, formerly head of Accra Metropolitan Assembly, Waste Management Department) Personal communication (E-mail/interview).
- Asenso-Okyere, W. K., Twum-Baah, K. A., Kasanga, A., Anum, J. and Pörtner, C. (2000) *Ghana Living Standards Survey: Report of the fourth round (GLSS 4)*. Ghana Statistical Service, Accra.
- Boot, N.L.D. (2007), *Talking Crap: Faecal Sludge Management in Accra, Ghana*, MSc thesis, WEDC, Loughborough University, UK.
- GHK (2005) *Decentralised domestic wastewater and faecal sludge management in Bangladesh*. GHK Consulting Ltd, UK.
- Ghanaweb (n.d.) *Maps of Ghana*. Ghanaweb website. <http://www.ghanaweb.com/GhanaHomePage/images/accra_map.jpg> (Accessed 9th August).
- Gordon (1997) "Collection and disposal of nightsoil from nightsoil buckets: Case illustration from Accra, Ghana", in Muller, Maria (ed.), *The collection of household excreta: the operation of services in urban low-income neighbourhoods*. WASTE, The Netherlands.
- Jeuland, Marc, Kone, Doulaye and Strauss, Martin (2004) *Private sector management of faecal sludge: A model for the future? – Focus on an innovative planning experience in Bamako, Mali*. Department of Water and Sanitation in Developing Countries (SANDEC), Switzerland.

- Larbi, Eugene (2006) *Sanitation in Ghana: A paper on the current state of sanitation in Ghana, the constraints and on-going efforts to improve the situation*. TREND Group, Kumasi, Ghana.
- Muller, Maria S.; Rijnsburger, Jaap (1994) *MAPET: a neighbourhood-based pit emptying service with locally manufactured handpump equipment in Dar es Salaam, Tanzania: Manual Pit-latrines Emptying Project Final report 1988-1992*. WASTE Consultants, the Netherlands.
- Schaub-Jones, David (2005) *Sanitation Partnerships: Beyond Storage: On-site sanitation as an urban system*. Building Partnerships for Development, UK.
- Scott, R. and Sansom, K., (2006). *Supporting Non-State Providers (NSPs) in Sanitation Service Delivery*, WELL Task 2765, report for DFID, WELL, Loughborough University, UK.
- Vodounhessi, Anselme (2006) "Ghana - Financial and institutional challenges to make faecal sludge management an integrated part of the ecological sanitation approach", in Snel, Mariëlle and Smet, Jo, *The Value of Environmental Sanitation – Case studies*. Occasional paper series 42. IRC International Water and Sanitation Agency, the Netherlands.
- World Bank (2002) *Upgrading urban low income settlements. Country assessment report Ghana*. The World Bank.
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Note/s

- ¹ FSM is the complete process of collection, haulage, disposal and treatment of faecal sludge.
- ² Pan latrine is the term used for a form of bucket latrine. The shape and size of the 'pan' is undefined, but they are emptied frequently. They are widely used in Accra and throughout Ghana.
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