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THE FUTURE OF WATER, SANITATION AND HYGIENE:
INNOVATION, ADAPTION AND ENGAGEMENT IN A CHANGING WORLD

Sanitation in emergencies
Lessons learned from Port-au-Prince : the portable toilets

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The response to the Haiti earthquake in 2010 highlighted the use of rented portable toilets in emergency context. To be effective, a WASH response must be provided as a package of 3 components: water, sanitation and hygiene. Water is addressed, among other items, by ready to use treatment plants; hygiene is addressed by pre-positioned NFI kits and promotion material such as posters, leaflets... The sanitation part of the package is less well equipped in terms of kits: there are the ready-to-use squatting slabs as a starting point but a latrine is comprised of a pit, a slab and a superstructure. Pit latrines and defecation trenches can be used only in areas where it is possible to dig. In areas where it is not possible to dig (urban settings, flood prone areas...), other solutions must be employed: among them, portable latrines such as the ones rented by Catholic Relief Service and operated by Action Contre la Faim in Port-au-Prince where found to be an expensive but however a good solution. It would be a temptation to include them in contingency stocks but this is not really possible due to the volume and logistic involved. Rather, it is preferable to have standing agreements with rental companies in various parts of the world where such items may be needed. In case of emergency, the rental company will ship the needed toilet within few days.

The emergency operations that followed the earthquake in Port-au-Prince showed the humanitarian community the importance of ready-to-use solutions for both water treatment and sanitation. Such technologies, easy to store, to ship and to deploy, are well known and developed for water treatment, but similar systems are still to be developed for sanitation and its most sensitive component in terms of human health, the disposal of faeces. In most situations, fortunately, the excreta management problem would be solved by digging pits and/or burying the waste. In such a context, emergency squatting slabs are a good solution. In areas where digging is not possible, portable toilets such as the ones used in Haiti could be an alternative. They could also be an option in situation where digging is possible but would take too long (lack of tools, rocky soils...), if large quantities of latrines are needed in a short period, or in case of frequent displacements of the population, etc. The portable solution, however, is feasible and cost effective only if the cubicles can be rented locally. It would not make economical sense and it would be a logistical nightmare to store the cubicles and desludging equipments in a contingency stock, and to send them (by plane?) in the affected area. Another necessity is to be able to access a safe final disposal site for the sludge. Without such a facility, we would just move the problem somewhere else...

Pa fouillé la: the impossibility of digging

Reasons for not being able to dig pit or trench latrines were numerous after the earthquake. Most of them were linked with the fact that the disaster took place in a town, a capital city (knowing that nowadays, more than half of the world's population lives in towns, such situation is very likely to happen again in the future). The reasons can be classified in 3 categories:

1. Technical reasons, such as the fact that the streets were paved or too narrow, etc. Also in this category (although not really encountered in Port-au-Prince, but could be the case in other cities) is the ground cluttered with pipes, sewers and communication networks.

2. High water table: that was the case in coastal areas of the city. In such case it is not possible to dig latrines, either because there is a high risk of contamination of the underground water, or because the ground would collapse in the water. Flood prone areas can be also included in this category.
3. No authorisation to dig pit given by the land owner or the political authorities.

A good example of these difficulties was met at the Champ de Mars and more generally in all streets of the centre of Port-au-Prince. ACF started to work in the centre less than one week after the 12th of January. 15 water distribution points were installed within a few days, as well as a water treatment plant. But the authorities never gave the authorisation to dig the lawn around the presidential palace or the Museum: nobody wanted to take the responsibility for damaging such national symbols. The streets around were paved or cluttered with rumbles and car wrecks. There was no way to dig latrines.

The portable solution

After a few days spent to look for a suitable solution, ACF and CRS realised that portable toilets would be the only feasible option and came to an agreement: CRS would rent the 400 portable latrines needed and ACF would supervise and monitor their installation and the use in the Champs de Mars. Such toilets were already known and used in Haiti before the earthquake. The number available was not sufficient in the first days of the emergency (only dozens when hundreds were needed) and the price was high, around 25 USD per day for the rental and desludging service. After the earthquake, an international company, leader on this market, came in Haiti and started a joint venture with a local company. Together they had the capacity to ship in hundreds of portable latrines from abroad. The international company had already a record on providing large numbers of latrines in few days during emergency (earthquakes in Italy in 2009 and in Pakistan), as well as during mass events and festivals. After negotiation, an agreement was met on a graduated price for the rental, depending on the number of cubicles and duration of the contract: from 13 down to 9 USD per day per latrine for a 6 months contract. If we consider an average of 50 users per day, that makes a ratio of 5.4 USD per user per month. A very acceptable figure if we consider that the construction of a semi permanent latrines block with wood and tarpaulin cost around 5.2 USD per user, and would need in Port-au-Prince a monthly desludging charged 85 USD/m3.

The latrine is a self standing plastic box equipped with a door, a lock and ventilation. The toilet seat is located over a 200 litres tank. This tank is collecting the urine and faeces, with no addition of water nor chemicals (optional, not recommended if service is daily). These toilets can serve up to 50 persons per day. With so many users they need to be cleaned everyday (or preferably every night). This service is done by a vacuum tanker operated by the same company. The option to rent only the toilets and to do the service with NGO tankers was considered but found not relevant: To manage a fleet of at least 5 trucks is a difficult task as these are difficult to maintain equipments: the pumps are the critical part. It is therefore recommended to rent the full service from the same company.

Table 1. Pro and Con analysis – Portable toilets	
Pro	Con
Ready to use, quickly deployed and can be moved easily if needed. Can allow faster scaling up in case of mass disaster (compared with hand digging).	Expensive for short periods and small numbers. Better for large quantities and long periods. Price should be negotiated (+/- 10 USD/day/cubicle is acceptable)
Very good in terms of acceptance and dignity for the users (lock, comfort...). Strong and long lasting material.	Cannot be stored in contingency stock. Easily flammable (few incidents with candles). Needs to be anchored to the ground to avoid unwanted displacements.
Faeces are contained and well isolated, no risk of contamination, no flies, no smell.	Needs daily service and a well delimited and isolated dumping site. Neighbours tend to complain of nuisances (noise, smell) during cleaning operations.
Also available in larger size for people living with disability.	No tanked hand washing station provided: it needs to be added to the cubicle.

The portable toilets need to be supervised by a cubicle attendant to guarantee maintenance and cleaning. Each row of 10 cubicles was under the responsibility of one attendant, in charge of distributing the toilet paper and keeping the hand washing device full of water and soap. The attendant was a community member, paid for this job for a period of 15 days. Every 15 days, the attendants were changed to allow turn over among the community so that a maximum of people could benefit from the project. This idea was found to be relevant and added a great value to the project, by keeping the hand washing facilities operational (with water and soap) and “humanizing” the latrines. It also contributed to ease user’s mind about using the latrines – there was always a security issue in Port-au-Prince after the earthquake for women and young girls going to the toilets. Hand washing stations with soap were also installed, as they were not included in the rented cubicle – it was possible to rent an optional hand washing station, but this option was not feasible in the Champ de Mars because this hand washing station needs a connection to water network to function. An autonomous hand washing station with a container would be a better option in such context: a design point that should be improved.

A good solution for emergencies?

The portable toilet is a ready-to-use solution that can be deployed quickly in any emergency. From the users point of view the portable latrines is a good solution: it is users friendly, and provide a high class standard in terms of comfort and safety. There is no risk of falling into the pit or the tank, and the door is equipped with a lock. A larger cubicle is also available for wheel chair access, which is also a necessity in emergencies. Its 150x150 cm internal size allows a wheel chair to operate a 180° rotation within the cubicle (Jones & Reed, p 45). The main inconvenient is the price due to the necessity of a daily service. The price is depending on the number of toilets rented and the duration of the contract. This solution would therefore fit better for large numbers of units and long term contract. The cost efficiency must be balanced with other option (if other options are available) and should take into consideration quality of the service and rapidity of the installation, two elements that can make the difference.

To be implemented within the first days of an emergency, the latrines need to be stored in a significant amount in a country where a toilet rental company is operating. This is not really possible due to the logistical constraint and the financial risk and to rent the latrines to “normal” customers would jeopardize the availability of toilets in the case of a sudden emergency. It would not be recommended to store portable latrines somewhere in the world to be dispatched for the next emergency, considering the volume of storage and number of cubicles. It would be cheaper and faster to have a pre-signed agreement with the rental companies, with clear terms and condition for production and shipping of large quantities of latrines (and desludging equipment) in various “hot spots” where they could potentially be needed: flood prone areas, urban centres, etc. This would also allow humanitarian community to have negotiated prices with the rental company. A price around 10 USD / day / user is competitive with other semi permanent solutions, but can be met only if renting larges quantities of latrine or if a clear agreement is established in advance.

Desludging

To empty the portable toilets there are two solutions: a vacuum tanker or a desludging pump (self priming diaphragm pump). The first one is acting as a giant vacuum cleaner and can suck up the waste from the tank as well as faeces “accidentally” dropped around the seat. The second one needs to be operated with a tank of fresh water. The operation consist in injecting fresh water in the tank to dissolve the content, and then to pump it. The first system is more tolerant to small objects and stones that may have been drop in the toilets. It needs a specific tanker, which is not always available in country. The second option can be “home made” with a platform truck, a diaphragm pump and two tanks, one for the fresh water and one for the sludge. It is more difficult to operate and less resistant to objects drop in the toilet. For large size projects, the rental company would provide proper vacuum tankers. This is obviously the best option.

Final disposal of the sludge

This is a critical issue. Under normal circumstances the final destination of the sludge should be either a sewer discharge station (SDS) connected to a semi centralized treatment facility (constructed wetlands), or a sedimentation pond / drying bed, to allow proper treatment of the sludge before final disposal safe for environment (Tilley and al, p 99 and follow). Such facilities are not available everywhere: before even thinking about renting portable toilets, one should think about the final destination of the sludge. Once the toilets are installed and used, the service is daily and if there is no dumping site ready before the installation

of the latrines consequences can be huge for the environment. The minimum facility, to reduce the environmental risk, would be an isolated field, far enough from houses and water sources, where a large pit is dug to collect the waste.

In Port au Prince there was no treatment plant before the earthquake. The existing sanitation companies (half a dozen running a fleet of 20 / 30 trucks) were used to empty their trucks either at the Truitier dumping site or along the highway number one in the direction of Gonaives. The Truitier site was the only official site, recognised by the authorities and equipped with a special pit for latrines sludge. No treatment was applied to the sludge: it was just isolated from people and left in the soil. This was a “less worse” solution, and the only option to stock sludge far away from the town. If such a minimal facility is not available, the portable solution is questionable.

Conclusion

The main constraint faced in Haiti was the quantity of sludge to move: 5 full trucks every day. This was due to the fact that the tanks were collecting faeces *and* urines. Knowing that an adult produce daily 1.5 litres of urines and 0.5 litres of faeces, Urine Diversion Dry Toilets (UDDT) could be an option to reduce the amount of waste to transport every day if urine can be infiltrated in the soil near the latrine (which is not possible everywhere) or used for farming. Such UDDT are not yet operational for emergencies, but the technology is promising. The best option would to have it compatible with the existing emergency squatting slabs, the KK Nag Magic, for a faster and safer deployment during emergency, in contexts where digging is not possible. Portable latrines are another option, to consider if rental companies can commit themselves to significant amount of cubicles and if safe waste final disposal facilities exist in the country.



Photo by the author

To be properly maintained, the latrine should be attended by a cleaner.



Photo by the author

The portable latrines should be serviced every night with vacuum tanker.

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