



# Learning Brief - What can be done when latrines become full? An exploration of faecal sludge management challenges and solutions in Banteay Meas, Cambodia.



What happens when you flush your toilet? Where does your faeces, urine, and all the rest actually go? Over one-third of the world's population uses a toilet connected to a sewer [1], and therefore gives little thought to such questions. However, in many rural areas, faecal waste is stored on-site – meaning that wastes are directed from the toilet into a tank or pit on the household's property. Over time, the faecal waste in these pits will gradually accumulate until eventually the pit becomes full. How does a household know that their pit is full? What (if anything) can they do about it when it happens? These are some of the questions SNV wanted to answer in order to continue its journey to better understand and solve sanitation challenges in rural Cambodia.

More than 70% of rural Cambodians are using a toilet [2] compared to 37% just five-years ago [3]. However, nearly all rural households that use a toilet discharge their faecal waste into an on-site tank or pit (95%)<sup>1</sup>. This means that across rural Cambodia a huge amount (at least 1.2 billion litres per year<sup>2</sup>) of faecal waste is being concentrated and stored underground. This situation represents a potential environmental and public health catastrophe if it is not acknowledged, understood, and if safe Faecal Sludge Management (FSM) solutions are not found and implemented at-scale.

## Box 1 – SNV and the SSH4A programme

Sustainable Sanitation and Hygiene for All (SSH4A) is SNV's comprehensive approach to ensure equitable and sustainable access to improved sanitation and hygiene. The SSH4A approach has since been implemented by SNV with government and development partners in 18 countries across Asia and Africa and between 2010 and 2017, more than 5.7 million people have gained access to improved sanitation. Since 2010, the SSH4A programme has been implemented by SNV in rural Cambodia. Now in its 3rd phase, the current objectives are to:

- Improve the health and quality of life for a further 75,000 rural people in three districts, through the continued elimination of open defecation and increased number of households using their own improved latrine;
- Achieve greater equitable and sustained access to improved sanitation and hygiene facilities including through the implementation of a smart subsidy programme; and
- Find and apply innovative solutions to address faecal sludge management on both the supply and demand sides to ensure safely-managed sanitation.

1 Among all the rural Cambodian households that use a toilet, most use a pour-flush toilet

2 Assuming 12,047,000 rural people [1], 72% of which use a toilet with a tank/pit [1], and at least 140 litres of accumulated faecal waste generated per person per year (estimated) [5]

## Methodology

Four data collection activities were conducted as part of the research study, namely: 1) a latrine pit survey to measure faecal waste accumulation; 2) a household survey to assess FSM perceptions, practices, and intentions; 3) focus groups discussions with households that had, and had not, experienced a full pit; and 4) key informant interviews with Small-Medium

### Box 2 – Safely-managed sanitation

A global initiative is underway to measure and promote safely-managed sanitation through the Sustainable Development Goals (SDGs). In the past, the monitoring of global sanitation progress did not include how faecal waste was actually being managed, treated, or disposed of permanently. Now, a household with safely-managed sanitation must be using an improved\* type of toilet/latrine that satisfies all of the following conditions:



\* Improved facilities include: flush and pour-flush toilets, ventilated improved pit latrines, pit latrines with slabs, composting toilets, and container-based systems

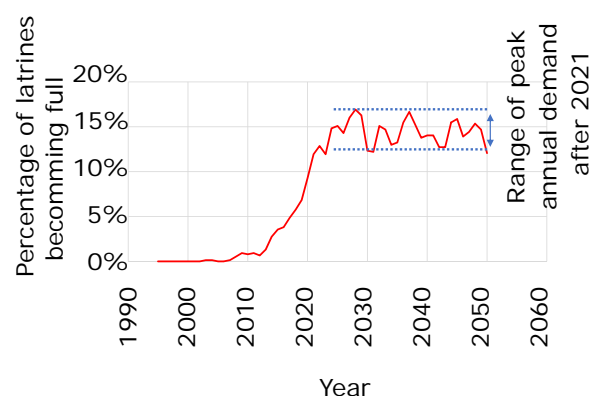
Enterprises (SMEs) that provided pit emptying services to households in the study area. These activities were executed from June 2018 to January 2019. The study area was Banteay Meas District, Kampot Province which has a population of approximately 100,000 people within 21,000 households. Banteay Meas was declared as the first Open Defecation Free (ODF) district in Cambodia in 2016 while the latest sanitation coverage figures suggest 91% have their own toilet and 9% use the toilet of a neighbour [4].

## Results

Approximately 10% of households reported that they had emptied their pit at some time in the past. A member of the family was almost always the one to perform the emptying (92%), which was either performed manually (47%) or using a suction motor pump (42%). After emptying, faecal waste was typically deposited unsafely into a nearby water body or field (73%) and less commonly stored around the compound for composting (19%).

While the number of households experiencing a full pit appears to be increasing each year, demand for pit emptying solutions will not peak until sometime around 2021 (Figure 1)<sup>3</sup>. After this time, our findings suggest that somewhere between 12-17% of the households in Banteay Meas will experience their pit becoming full each subsequent year. Put into real terms, this translates to roughly 2,000 to 3,000 full latrines every year after 2021. If households are willing to pay for FSM solutions, and the private sector is able to offer affordable solutions to match this demand, then opportunities for viable FSM businesses may exist. However, private sector interest and engagement in FSM-related services appears to be weak overall. Operators reported little interest in taking risks and few opportunities to invest in business growth. Additionally, will such solutions also ensure that the faecal waste is safely-managed? The service providers that are currently operating in the district reported that they typically dispose of faecal waste directly and unsafely above ground, and often in farms or rice paddies to serve as a fertiliser.

Figure 1 – Predicted percentage of latrines becoming full annually in Banteay Meas from 1990 to 2050



3 Results from the pit survey revealed a median pit accumulation rate of 0.058 m3 per person per year, which was applied to the individual latrine and household characteristics (number of users, size of pits, pit construction date, etc.) derived from the household survey and extrapolated to the entire district to model past and future pit filling



Most HHs in the district had their toilet connected to two sequential pits connected in series (82%) to increase total storage volume. These pits were constructed approximately 5 years ago on average. Reports and observations of overflowing pits were extremely rare (1%), although 10% of respondents indicated that their pit was currently about full and had not yet been emptied. Most pit lids were sealed with concrete to prevent smells and to ensure safety. Respondents indicated that they would know when their pit had become full by noticing bad smells (85%) or no longer being able to flush (79%). The majority of respondents indicated that they planned to empty their pit once it became full (90%). Most households seemed willing to take FSM-related actions only once their pit actually becomes full. There are some notable differences between what households said they would do once their pit becomes full, and what those that already experienced a full pit actually did, as described in Table 1.

**Table 1 – Actual versus intended/planned FSM actions**

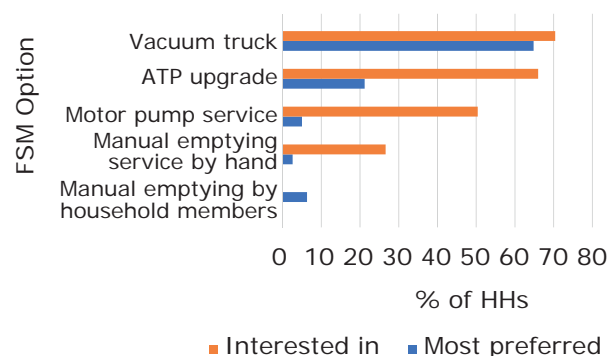
Action	What households actually did once pit became full <sup>x</sup>	What households intend/plan to do once pit becomes full <sup>y</sup>
Pay a service provider to empty the pit	8%	84%
Dispose into nearby water body or field	73%	48%
Store somewhere on or near the compound for composting	19%	25%

<sup>x</sup>Among households that reported emptying their pit

<sup>y</sup>Among households that had not yet emptied their pit

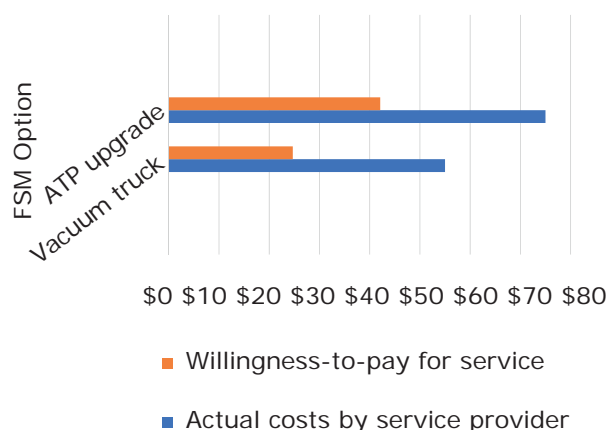
Approximately 47% of respondents indicated that they knew of an existing FSM service provider within their district. The most commonly known type of FSM service provider was a vacuum truck operator (48%). Vacuum trucks were also reported to be the most preferred FSM solution (65%) (Figure 2), although interest was also high for ATPs and motor pumping pit emptying service providers.

**Figure 2 – Most preferred (single option) and overall interest (for each option individually) in FSM solutions**



Significant gaps exist between average household willingness to pay for FSM solutions and actual costs in the marketplace, as presented in Figure 3. However, vacuum truck operators reported that service fees could be reduced (to approximately USD 30 per latrine) if several nearby households ordered the service at the same time.

**Figure 3 – Average willingness to pay and actual costs associated with FSM services**



Most respondents were interested in ATPs (as shown in Figure 4) after their functionality was explained during the interview. Respondents appreciated the fact that an ATP would allow them to respond to a full pit quickly and independently, and some valued the compost that would be produced. Latrine upgrades would have to be performed at most facilities to obtain a functional ATP<sup>4</sup>, as most households already have their own toilet. However, some households seemed unwilling or unable to install the additional pit due to space/land requirements. Affordability may be a constraint, as the average willingness to pay for an ATP upgrade was \$42 while the actual cost being offered is \$75. Additionally, some local latrine producers/masons have demonstrated low levels of interest in adding ATP upgrades to their business offerings due to perceived low levels of profitability and the disgust associated with working on pits that have already been in use.

Most respondents indicated that they were uncomfortable with a household member emptying the pit themselves (61%). However, this was the most commonly practiced response among pit emptiers. Most also regarded faecal waste as being dangerous, but about half also indicated that the overflowing of pits and the disposal of faecal waste directly into paddies/ fields would be acceptable in circumstances where no other suitable alternative exists. Most indicated that the reason why pits should be emptied after becoming full would be to avoid bad smells (94%), while disease prevention (58%) and ensuring continued use of the toilet (43%) were less commonly reported.

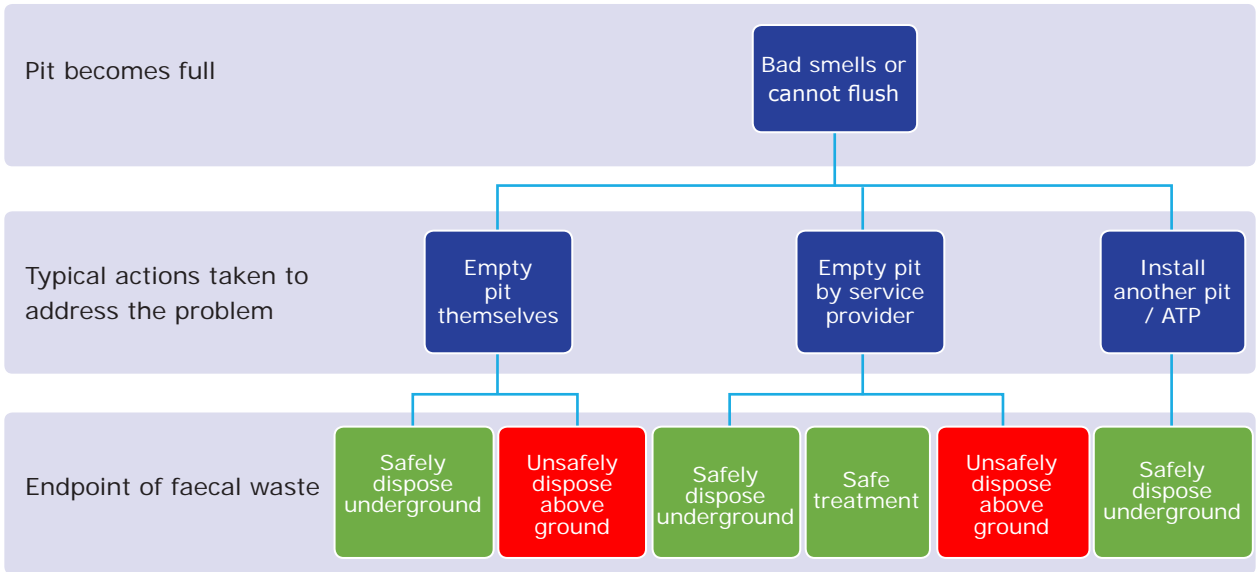
Figure 4 – Installation of a new alternating twin pit latrine



It appears very likely that the combination of ATPs, private pit emptying service providers, and emptying by household members themselves will be among the most common solutions to future pit accumulation (Figure 5). Efforts will have to focus on encouraging and promoting decisions towards safe solutions (indicated in green).

Latrine producers and masons in Banteay Meas have already been trained on ATP construction methods through the SSH4A programme, and pilot demonstrations are being conducted in all 88 villages to promote this safe and sustainable solution. Demand for ATPs will continue to be monitored over time. SNV and its partners are also preparing a FSM behaviour change communication campaign to influence self-emptying behaviours.

Figure 5 – FSM decision-tree: Common actions and endpoints



4 Methods to conduct ATP upgrades have been explored by SNV and its partners. Nearly all households would require the installation of an additional pit (what would be a 3rd pit for most households) and diversion box – all of which would need to be performed by a trained service provider.

## Conclusions and recommendations

Pit emptying remains an uncommon activity in Banteay Meas, and when it is conducted, it is rarely performed safely. Actions and habits will have to change in order to increase the proportion of the population practicing safely-managed sanitation. Demand for FSM solutions is rapidly increasing in Banteay Meas and there may be opportunities for businesses to meet this demand if their products and/or services can match levels of household affordability. Most households intend to hire a service provider to empty their pit, but few are actually doing so – potentially due to limitations in the affordability and availability of such services. Regulatory tools may need to be developed and enforced to ensure that faecal waste is handled and managed safely by the private sector and until safe-disposal solution are found, at-scale offsite rural transport and treatment businesses are unlikely to be viable in Cambodia in the near future.

Pits are detected as having become full by the latrine user being unable to flush or by the detection of foul smells. Pre-emptive pit emptying remains an unresolved challenge given that most pit lids are sealed. Timely FSM solutions are preferred by households to ensure uninterrupted use of their toilet, and innovative technologies and products to monitor pit accumulation levels may promote timely emptying.

Desire for ATPs and vacuum truck services appear to be significantly higher than for manual/pump pit emptying services. However, few households in Banteay Meas appear willing to pay for FSM-services at levels near to or higher than the actual costs that private enterprises currently charge. If FSM service costs are not reduced, or if affordability does not increase, most households seem likely to continue to empty their pits on their own and inequalities in access to FSM services are likely to emerge.

ATPs appear to be the FSM-solution most likely to result in safely-managed sanitation<sup>5</sup>. However, their adoption potential may be more limited in Banteay Meas where households have already invested in consecutive twin-pits (in series). The ATP design is unlikely to be recognised and understood by most latrine producers in

Cambodia, without some form of external intervention. It is recommended that WASH sector actors (government, NGOs and donors) actively promote onsite ATP designs widely in rural Cambodia and support private sector suppliers with training and promotional materials to add this to their business offerings. Initiating such activities at the beginning of any sanitation programme will reduce the inefficiencies associated with future post-construction ATP upgrades. Demand for upgrades may be higher in areas where single pits are common.

The self-emptying of pits seems likely to be a common FSM response into the future. The disgust associated with faecal waste handling and bad smells may be strong behavioural motivators and drivers to influence FSM decision-making. There is a clear need for an FSM behaviour change campaign that utilises these behavioural drivers to motivate households that empty their pits themselves to handle and dispose of their faecal waste safely. In particular, the burial of faecal waste underground (rather than unsafely depositing it on fields and rice paddies) will have to be encouraged.

FSM planning in Banteay Meas should account for the fact that maximum demand for FSM solutions will not yet be reached for several years. Demand in other parts of Cambodia will be significantly different, as Banteay Meas was among the earliest districts to reach high levels of sanitation coverage. It is clear that there is no “one size fits all” solution to FSM in Banteay



5 Due to the fact that the faecal waste is treated in-situ



Meas or in rural Cambodia more generally. The landscape of FSM solutions is likely to include a combination of household-led pit emptying, private emptying – and in cases where demand creation and supply has been initiated – ATP latrines for on-site treatment.

External initiatives could be taken to catalyse growth in private FSM service delivery – potentially through grants or loans to support the scale-up pumping truck businesses, or to expand training for latrine producers interested in ATPs. The costs to customers for FSM services could be reduced through an increase in private sector competition - potentially combined with innovations to in-situ treatment and pit emptying methods.

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