POLICY BRIEF

Towards a Sustha and Swachha Rural Dhenkanal: Institutionalizing Faecal Sludge Management for Achieving ODF Plus

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SCI-FI SCALING CITY INSTITUTIONS FOR INDIA WATER SANITATION

Introduction

The state of Odisha, with one of the lowest reported level of access to a toilet among rural households at 13.75% during 2014[1], has increased the access to individual toilets to a purported 100% under the Swachh Bharat Mission – Gramin (SBM-G). Nonetheless, recognising the elimination of open defecation as a first step and not the goalpost of sanitation, the Chief Minister proclaimed the message of 'Swachh Odisha, Sustha Odisha' in 2019 for furthering the state's achievement toward the Sustainable Development Goal 6 of ensuring 'availability and sustainable management of water and sanitation for all'. The state-level imperative is echoed in the recently launched SBM-G Phase II that renews the focus on sustainability of the Open Defecation Free (ODF) status and instituting Solid and Liquid Waste Management (SLWM) in all villages. Odisha, already a champion for sanitation and Faecal Sludge Management (FSM) in the urban setting, is poised to lead the path for rural sanitation through its ongoing interventions to the national- and state-level thrust.

As a first step toward the goal of clean and sanitised villages, the state has issued the Odisha Rural Sanitation Policy in October 2020 that guides and enables sanitation interventions in rural areas over a ten-year horizon. In operationalising the Policy and in line with the objectives of SBM-G Phase II, Dhenkanal district in the state, with support from UNICEF and the Centre for Policy Research (CPR), is undertaking a one-of-its-kind project to

- formalise urban-rural convergence and coordination mechanisms for utilising urban FSM systems to cater to peripheral rural areas
- pilot a greenfield SLWM system for a cluster of Gram Panchayats (GPs) in the district
- demonstrate a district-wide approach to sanitation planning

The first of these targets the villages in the identified 'plug-in area' surrounding the Dhenkanal municipality. The municipality had set an example for smaller cities and towns across the country through the institution of a citywide FSM system, including the construction of a Faecal Sludge Treatment Plant (FSTP). The FSTP, operational since October 2018, has been serving surrounding villages in addition to the areas directly under the purview of the ULB. Therefore, the first initiative aims at formalising the rural-urban convergence through formally 'plugging-in' these rural areas to the FSTP. The second initiative focuses on rural settlements that can't feasibly be plugged into the FSTP through the implementation of a greenfield SLWM system for a select cluster of GPs.

To better understand the prevailing SLWM landscape, including households' perceptions and their willingness to pay for these services, the Project undertook primary data collection through a survey of 1000 households and interviews with over 30 key stakeholders at the GP-level during August-September 2020. The survey helps identify the gaps – both infrastructural and non-infrastructural that the Project needs to address including household information, education and

[1] SBM-G State-level data (Source: https://sbm.gov.in/sbmReport/State.aspx; last accessed on October 20, 2020)

communication (IEC) concerning ODF sustainability and proper SLWM, the capacity building of governmental and elected officials, among others.

The present policy brief discusses the key findings from the survey[2] that evince the need for FSM and charts a roadmap towards institutionalising FSM systems for a *Sustha* and *Swachha* Dhenkanal.

Why the Dhenkanal District needs Faecal Sludge Management

The Dhenkanal district has made commendable gains in increasing the households' access to individual toilet facilities. Between the Census of India 2011 and the district-level sample survey in 2020, the district has augmented access to a toilet facility by 50% (Figure 1). As per the SBM-G MIS, during 2014-19, the district enabled the construction of more than 252,000 toilets. The wide-scale implementation of SBM-G is also evinced by nearly 94% of all toilet-owning households reporting that their toilet has been constructed under the programme.

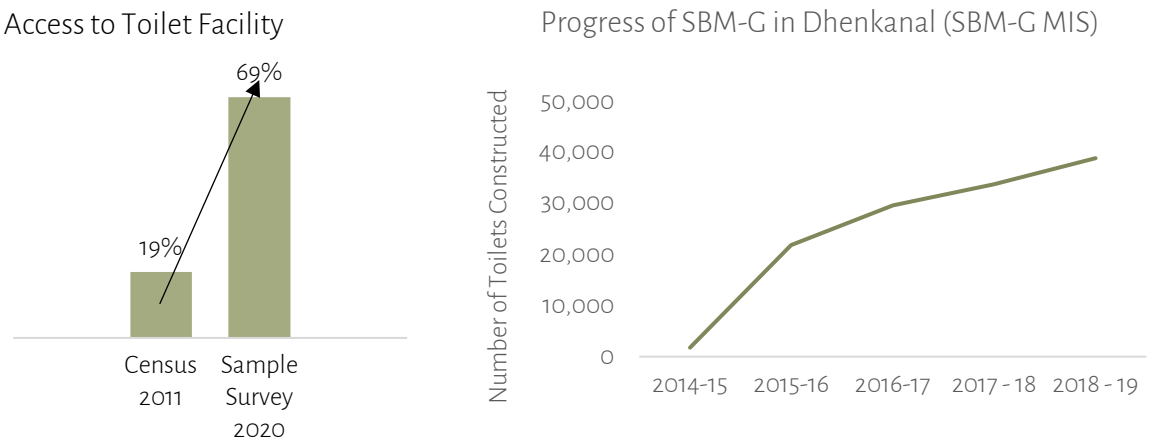


Figure 1 Increase in access to a toilet facility

The overwhelming majority of toilets in rural areas are connected to a single pit for managing blackwater. The Dhenkanal district broadly mirrors the state-level trend in the high prevalence of single pits among different types of On-Site Sanitation (OSS) systems (Figure 2). As per the survey, 86% of toilet-owning households reported dependence on a single pit, followed by 8% and 7% of households relying on a septic tank and the twin pit system respectively. The GP Sarpanches interviewed as part of the survey also confirmed single pit as the OSS system predominantly constructed under SBM-G.

[2] The following charts use the categories of 'Plug-in' and 'Greenfield' to disaggregate the district-level data. At the time of the survey design, 'Plug-in' has been defined as rural areas within a 30km distance from the Dhenkanal municipality. 'Greenfield' refers to those rural areas lying outside of this zone in the district.

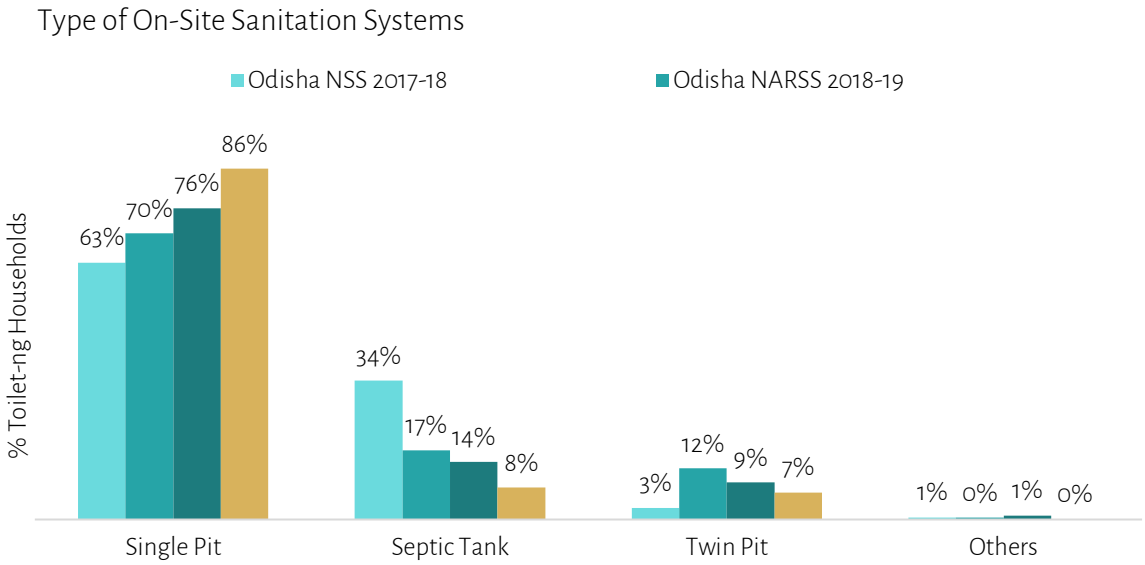


Figure 2 Prevalence of different types of On-Site Sanitation systems

The high prevalence of single pits necessitates either institution of FSM systems for safe transport and treatment of faecal sludge or retrofitting of single pits to twin pit(s) systems. Unlike the twin pit system which produces treated biosolids at the end of an operation cycle, the faecal sludge from a single pit requires further treatment before it can be safely disposed or reused. Accordingly, SBM-G, like its predecessors, promoted the twin pit system as a low maintenance OSS system for rural areas. Nonetheless, given that single pits are present in high numbers across the district, they necessitate either one of the two interventions - conversion to the twin pit system or timely emptying of the pit followed by transport and treatment of the pit contents.

Single pit owners exhibit very low willingness to pay for the conversion of single pits to the twin pit system. The SBM-G Phase II prescribes the upgradation of single pits, especially those in high water table areas for upgradation to OSS systems like the twin pit system that perform in-situ treatment as the first option. As an alternative, the programme recommends FSM, allocating INR 230 per capita as financial support for FSM projects. On the other hand, the absence of central or state funding for retrofitting entails that the entire cost for the retrofitting is borne by the household. However, only 10% of single pit owning households report that they are willing to pay the retrofitting, although, the proportion is relatively higher at 22% in rural areas surrounding the Dhenkanal municipality (Figure 3). Still, among those who profess the willingness, the majority of households are willing to pay INR 1000 or less – necessitating a combination of IEC and financial support for such an endeavour.

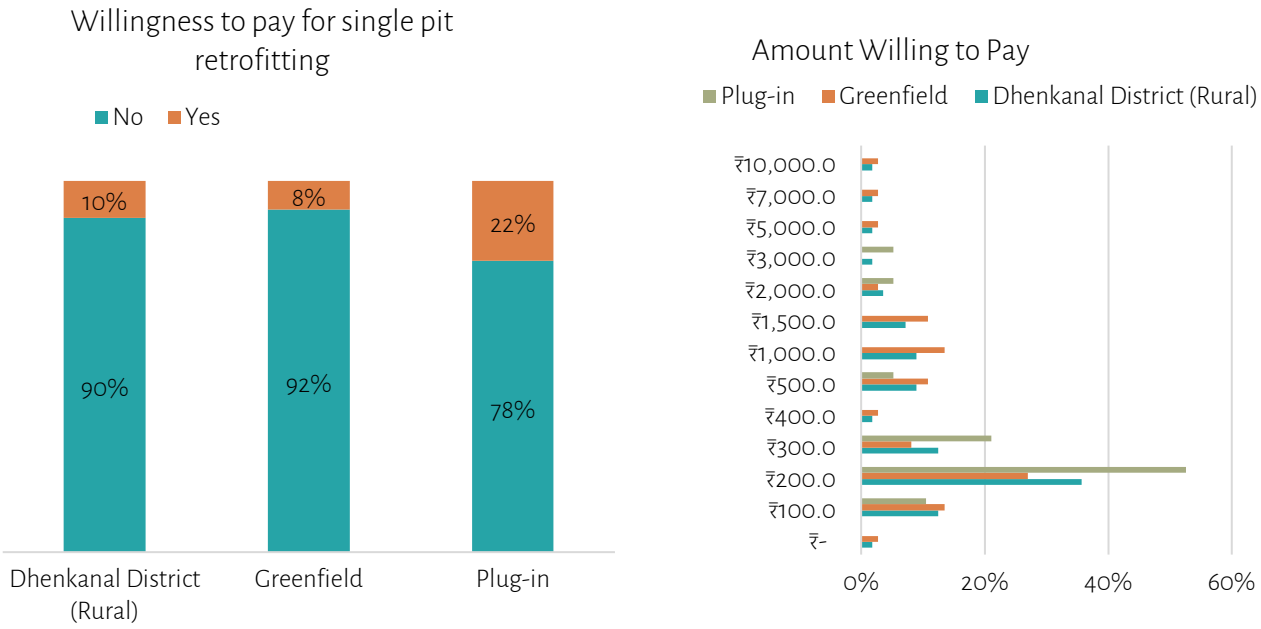


Figure 3 Willingness to pay for retrofitting single pits to the twin pit system

State support can nudge households to convert single pits to the twin pit system - in its absence, success will be limited and uncertain over the 5-year SBM-G Phase II horizon. With intensive state- or district-led conversion, barring an assumed 10% of cases presenting technical feasibility, even if the remaining 90% of single pits are converted to the twin pit system, 17% of households will still require FSM. Alternatively, in the absence of state- or district support, and with heavy community mobilisation through IEC and Behavior Change Communication (BCC), if 50% of single pit owners finance the conversion (albeit over an uncertain), overall, 51% of the rural households in the district will require FSM (Figure 4). Depending on the mode and extent of single pit conversion, overall, the district could require FSM for 17% to 94% of the toilet-owning households.

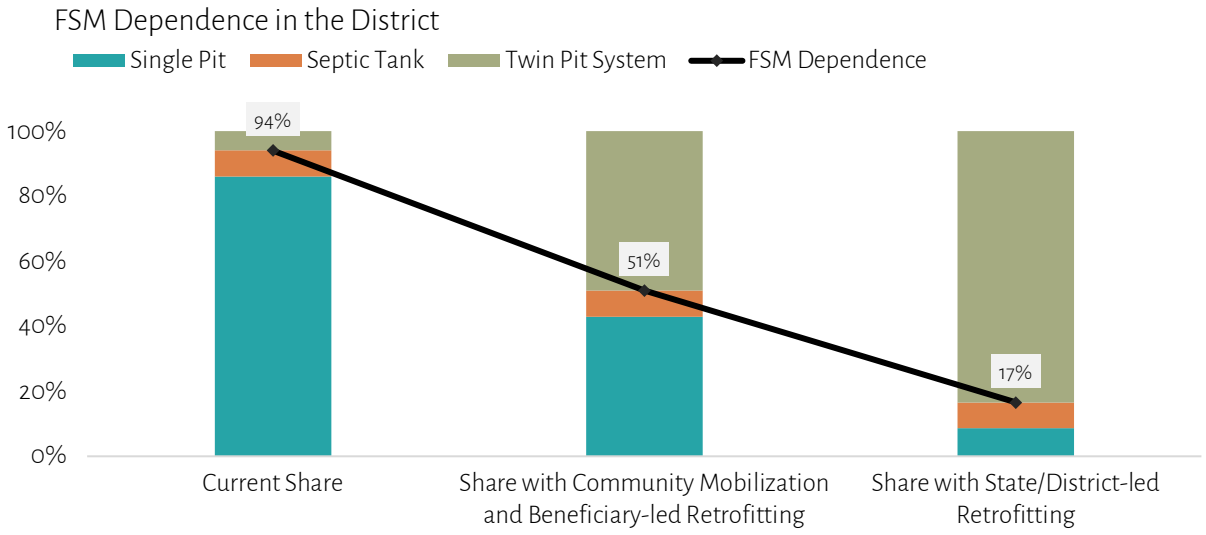


Figure 4 FSM dependence in the district (does not include off-site treatment requirement on account of twin pits in high water table regions)

Female-headed households are a distinct stakeholder group when it comes to targeted support for single pit conversion and accessing FSM services. While male-headed households are spread out nearly uniformly across the five MPCE quintiles, female-headed households are concentrated at the lower end of the distribution (Figure 5). However, a relatively higher share of female-headed households expressed willingness to pay for the conversion of single pits to twin pits. Moreover, despite their relatively lower economic status on average, their willingness to pay for the conversion is not significantly different from those of male-headed households.

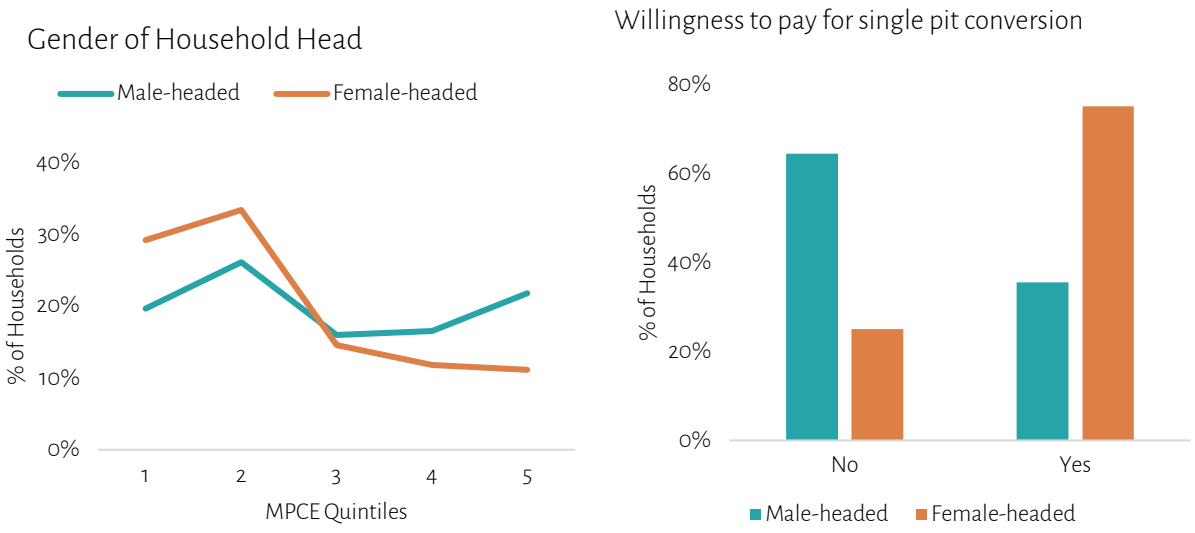
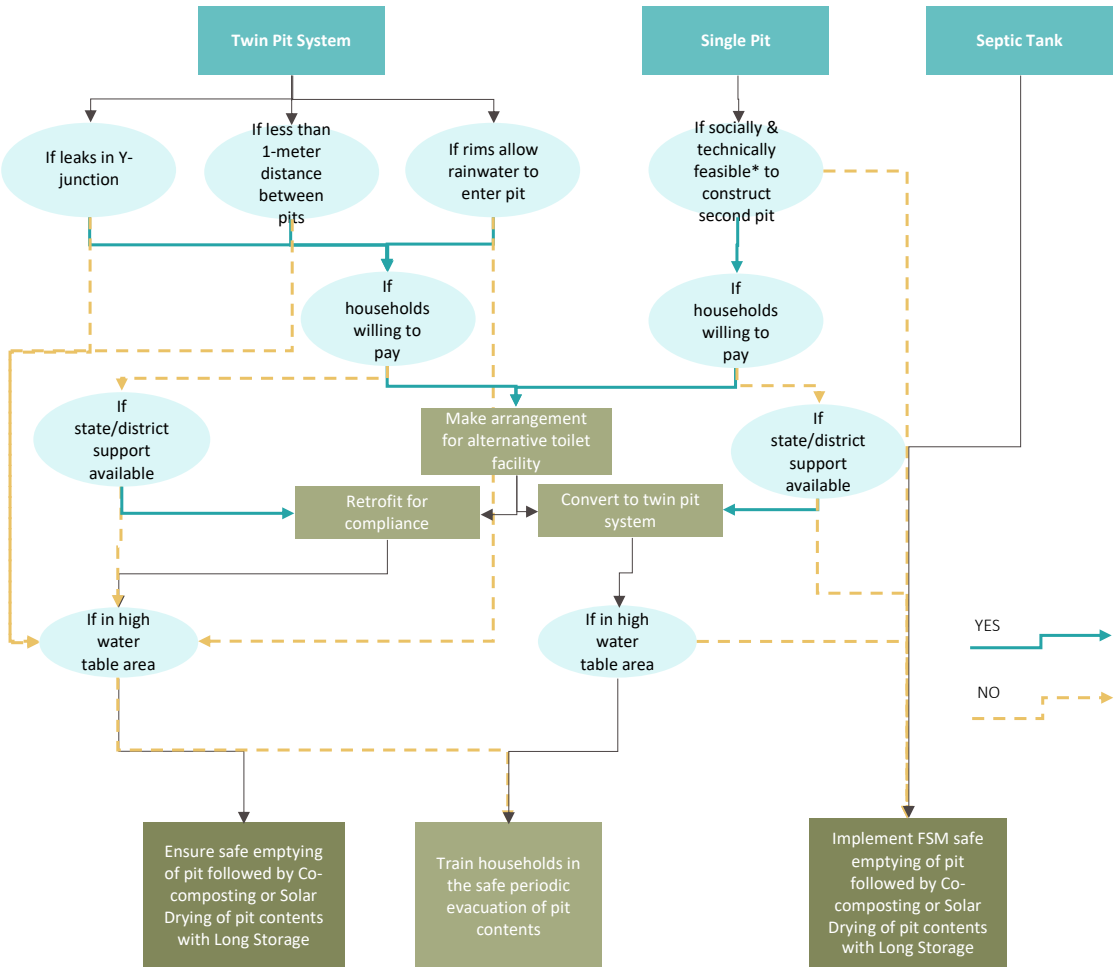


Figure 5 Disaggregation of male- and female-headed households along the MPCE quintiles and along the willingness to pay for single pit conversion

Still, with nearly nine out of every ten toilet-owning households dependent on a single pit and owing to inherent techno-economic constraints, single pit conversion is neither a rapidly scalable nor universally applicable alternative. An alternative to instituting FSM service delivery for single pits is their conversion to the twin pit system. The low willingness of households to finance the conversion notwithstanding, the SBM-G Phase II posits that even twin pit systems can require off-site management of pit contents in the form of co-composting or solar drying in a high water table region like the Dhenkanal district (Figure 6)[3]. Therefore, the conversion of a single pit to the twin pit system as the primary and universal strategy for ensuring ODF Plus in the district has limited technical and economic feasibility. Moreover, it is critical to realise that the government should exercise caution in universally promoting the self-emptying of twin pit systems since there are scenarios (especially likely in a high water table district like Dhenkanal) where the manual emptying of pit contents by households may not be a safe process.

A mix of FSM and state/district-subsidised single pit conversion is most suited to the district since current per capita funding for FSM under SBM-G Phase II translates to only about 15% of the costs of single pit conversion. Assuming that the cost of single pit conversion is 40% of the total cost of a twin pit system, or INR 8,000, a fully-funded state/district-led construction drive would

[3]The guidance on off-site treatment of pit contents from a twin pit system is predicated on the idea that in certain settings (such as wet climates, high water table, etc.) preclude the full sanitization of the faecal sludge in the twin pit system even after a prolonged storage period.



*Includes factors such as availability of space; suitable hydrogeological conditions and setback available from water sources; willingness of masons/contractors to undertake repair of toilets in use; alternative to toilet use during retrofitting period

Figure 6 Requirement for off-site treatment as per FSM Implementation Approach (adapted from SBM-G Phase II guidelines)

lead to an infrastructural cost of INR 134 crores (Table 1). SBM-G Phase II currently provides funding assistance of INR 230 per capita for FSM which while could suffice for simple settlement-level solutions covers only 15% of the single pit conversion cost on an individual basis (given such convergence is allowed). The households will need to bear the remaining cost, however, that itself would require investments in community mobilisation and IEC.

Even then the success of single pit conversion is predicated on the assumption that masons would be widely available and willing to undertake the work of single pit conversion. But as a recent study[4] shows that masons are firmly opposed to undertaking retrofitting of a toilet in use, it could be crucial to engage them through extensive training and sensitisation before such an intervention can be rolled out.

[4]Srivastava, Puneet. Retrofitting: The Next Step for the Swachh Bharat Mission? Sanitation and Hygiene Rapid Topic Review. 2019. URL: https://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/RTR%20_Retrofitting%20FINAL.pdf

Table 1 Financing for Conversion of Single Pit to Twin Pits System

Financing for Conversion of Single Pit to Twin Pits System						
Household Share	0%	86%	75%	50%	25%	0%
District Share	100%	14%	25%	50%	75%	100%
Household Burden	₹8,000[a]	₹6,850	₹6,000	₹4,000	₹2,000	₹0
District Burden per Toilet[c]	₹0	₹1,150	₹2,000	₹4,000	₹6,000	₹6,000[b]
District burden per capita	₹0	₹230[d]	₹400	₹800	₹1,200	₹1,200
Total District Burden	₹0	₹26 crore	₹44 crore	₹88 crore	₹134 crore	₹134 crore
Time Horizon	Uncertain					5 years

(a) ₹20,000 is the average cost of standardised twin pits quoted by masons interviewed during the study; for retrofitting 40% of total cost or ₹8,000 assumed
(b) Scaling gains with full district implementation
(c) District burden calculated as District Burden per Toilet multiplied by 88% of 2,52,640 IHHLs reported under SBM-G
(d) Funding for FSM under SBM-G Phase II

Moreover, the significant proportion of households depend on septic tanks – more so in large and dense villages and rural areas surrounding Dhenkanal municipality – further exert a need for FSM. Previous studies attempting to understand the household preference for different types of OSS systems show that rural areas that exhibit urban characteristics like large and dense villages (LDVs)[5], and by proxy peripheral to urban local bodies have a preference for septic tanks. The sample survey too finds that areas surrounding the Dhenkanal municipality and LDVs report a higher than average share of septic tanks. These septic tanks require periodic emptying and the treatment of the evacuated septage at designated treatment facilities. Unlike faecal sludge from a single pit, the septage is more watery in consistency and has a comparatively lower fraction of solids necessitating a multi-step treatment process or thorough feasibility and safety assessment of interventions like deep row entrenchment.

Given its importance to ODF Sustainability and ODF Plus efforts, FSM service delivery, currently ad hoc, requires streamlining – from both the supply and demand ends – in the district. As per the survey, 94% of the toilets in the district are connected to either a single pit or a septic tank. Of these, 8% of all septic tanks have been desludged at least once in their lifetime, and 4% of pits have filled up. When pits fill up, households don't always empty the pit for continuing its use or that of the toilet. One-third of households whose pit had filled up in the past reported reverting to open

[5] Large Dense Villages, a classification coined by an earlier CPR study, refers to census villages with a population of more than 1000 and a population density of more than 400 people per square kilometres.

defecation (Figure 7). Such a behaviour could be the direct result of a lack of awareness about desludging options or the unwillingness, alternatively, unaffordability of the service. Those households that have desludged their OSS systems have relied on mechanised services – both public (from the municipality) and private – as well as manual labour. Overall, the majority of households who have desludged their OSS reported engaging manual labour as the desludging service provider, especially among single pits, possibly due to its lower cost for smaller systems[6]. Therefore, while it is important for the government to encourage households to desludge their OSS system timely for sustaining ODF outcomes, it should also ensure that households are able to access safe and affordable mechanised desludging services.

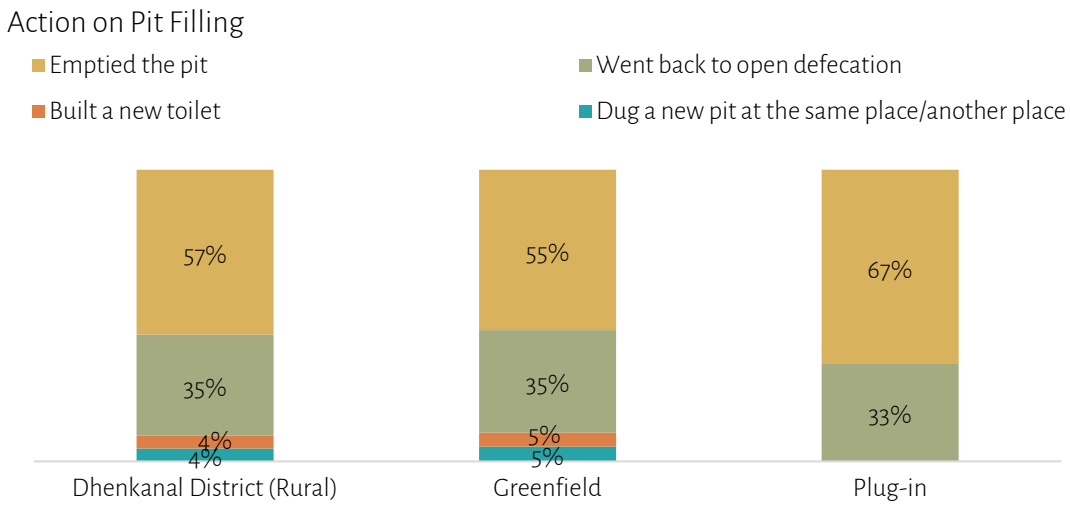


Figure 7 Household action on pit filling up

Recommendations for Way Ahead

Adopting a district-level approach to planning and instituting interventions for FSM has the potential to enhance the sustainability of services due to more efficient use of infrastructure and resources. Going forward, it is important to recognise that standalone neither single pit conversion nor FSM would be the most optimal path to ODF Plus. The district should strive to strike the right balance between the two for ensuring that all villages are able to achieve and sustain the ODF Plus status. The following evidence-based recommendations discuss hope to enable the Dhenkanal district to not only emerge as one of the first districts in the country with 'safely managed sanitation', but also to show the path to many more.

- **Targeted and subsidised single pit conversion**: The twin pit system has the potential to serve as the ideal OSS technology subject to proper construction and specific hydrogeological conditions. However, as the SBM-G Phase II notes, converting single pits

[6] As per the manual labour interviewed as part of the survey, desludging costs vary between INR 500-1000 per person depending on size of the pit or the tank. Between 2-6 people typically work together to desludge the system. Households have reported paying INR 1000-2000, INR 1000-5000, INR 3000 to manual labour, public desludging operator, and private desludging operator respectively for desludging.

to the twin pit system is a counterproductive exercise in high water table areas since it still necessitates off-site treatment in the form of solar drying or co-composting. Therefore, the district can undertake the targeted conversion of single pits to the twin pit system subject to

- Low settlement density
- Moderately high to low water table
- High willingness to pay, or alternatively, funding for IEC campaigns
- Financial support for impoverished and vulnerable households, with a focus on female-headed households which have an intrinsically higher interest in retrofitting

With these pre-requisites met, the district would still need to rally masons through training and sensitisation to overcome both technical and cultural barriers to the process of retrofitting, as well as, make alternative arrangements for toilet usage while the conversion is underway.

Moreover, the district should design a programme for single pit conversion, including a framework for prioritisation of settlements and mechanisms for lending financial support to household.

- **Off-site treatment for twin pit systems:** In addition to constraining the applicability of single pit conversion to the twin pit system, high water tables also necessitate off-site treatment for the evacuated contents from a twin pit system. The district should identify hydrogeologically vulnerable areas – high water table, poor soils preventing leaching of wastewater and sanitisation of biosolids – which challenge the efficacy of the twin pit system. For these areas, the district should institute mechanisms for safe emptying of pit contents (manual handling may not be safe) and their subsequent treatment before the final disposal or reuse of the biosolids. Potential solutions for treatment include co-composting, solar drying, and solids module in existing or upcoming FSTPs.
- **Plug-in rural areas to urban FSM facilities**: Given that the strategy of single pit conversion to the twin pit system has limited applicability, the district needs to formulate a plan to institute FSM systems. With a state-wide scale-up of FSM systems currently underway across the state, the district should establish convergence and coordination mechanisms so that rural areas abutting urban local bodies can be plugged into urban FSM systems (provided the system is underutilised and provisions for expanding capacity are available) within a formal regulatory and convergence framework. Such a framework should incorporate the provisions for co-financing infrastructure and service delivery by the relevant urban and rural departments.

  Whether the off-site treatment facility for septage/faecal sludge/twin pit system' contents is greenfield or urban (to which select areas are plugged-in) notwithstanding, the district should ensure that the imperative to generate revenue for the services is balanced with their affordability. Accordingly, the district should plan to channel

multiple financing opportunities, including from the district/GP's own funds, instead of relying solely on user fees. To extend the reach of the services to the most vulnerable of households, the district can also consider designing a graded tariff system and offering the service to socioeconomic groups that cannot afford the regular cost of the service at subsidised rates. For the latter, GPs may judiciously utilise the finances mandatorily earmarked for sanitation under the 15th Finance Commission.

- **Create FSM systems**: Conversion of single pits to twin pits and plugging in rural areas into urban FSM systems, though important strategies for unlocking ODF sustainability in the district, would still not cover all its rural areas. In areas where neither of these two strategies is feasible, the government should create greenfield infrastructure for FSM. Such facilities would enable the safe management of faecal sludge not only from single pits and septic tanks but also the pit contents from twin pit systems in high water table areas. Therefore, the district should create clusters of GPs for which to create cluster-level FSM systems.

  The precise choice of the technology – whether simpler solutions like Deep Row Entrenchment (DRE), a dewatering unit combined with co-composting or a full-fledged FSTP with multiple unit operations – will depend on the cost of constructing and operating the facility, the willingness to pay, availability of other sources of funding, availability of technical capacities, among other factors.

- **Building Capacity and Demand:** Regardless of the exact contribution of the aforementioned recommendations to achieving the ODF Plus status across the district, the district would need to build a strong ecosystem of relevant stakeholders to drive the post-SBM agenda. The district needs to develop the capacities of GP officials, elected representatives, and relevant committees of the GP like the Village Water and Sanitation Committees (VWSCs) towards the fulfilment of their role in FSM service delivery.

  Secondly, the district should also focus on training and engaging Self-Help Groups (SHGs), Community-based Organisations (CBOs), and other frontline actors to enable not only bottom-up planning for FSM but also community mobilisation for increasing the households' demand and willingness to pay for improved sanitation services in the first place. On the latter, the district would need to conduct IEC campaigns– with a special focus on raising awareness against manual scavenging and the employment of manual labour for hazardous desludging.

  Finally, as part of building institutional capacity, the district could issue an FSM or Sanitation Regulation for rural areas which provides a formal imperative for sanitation interventions and clarifies the roles and responsibilities of individual stakeholders.