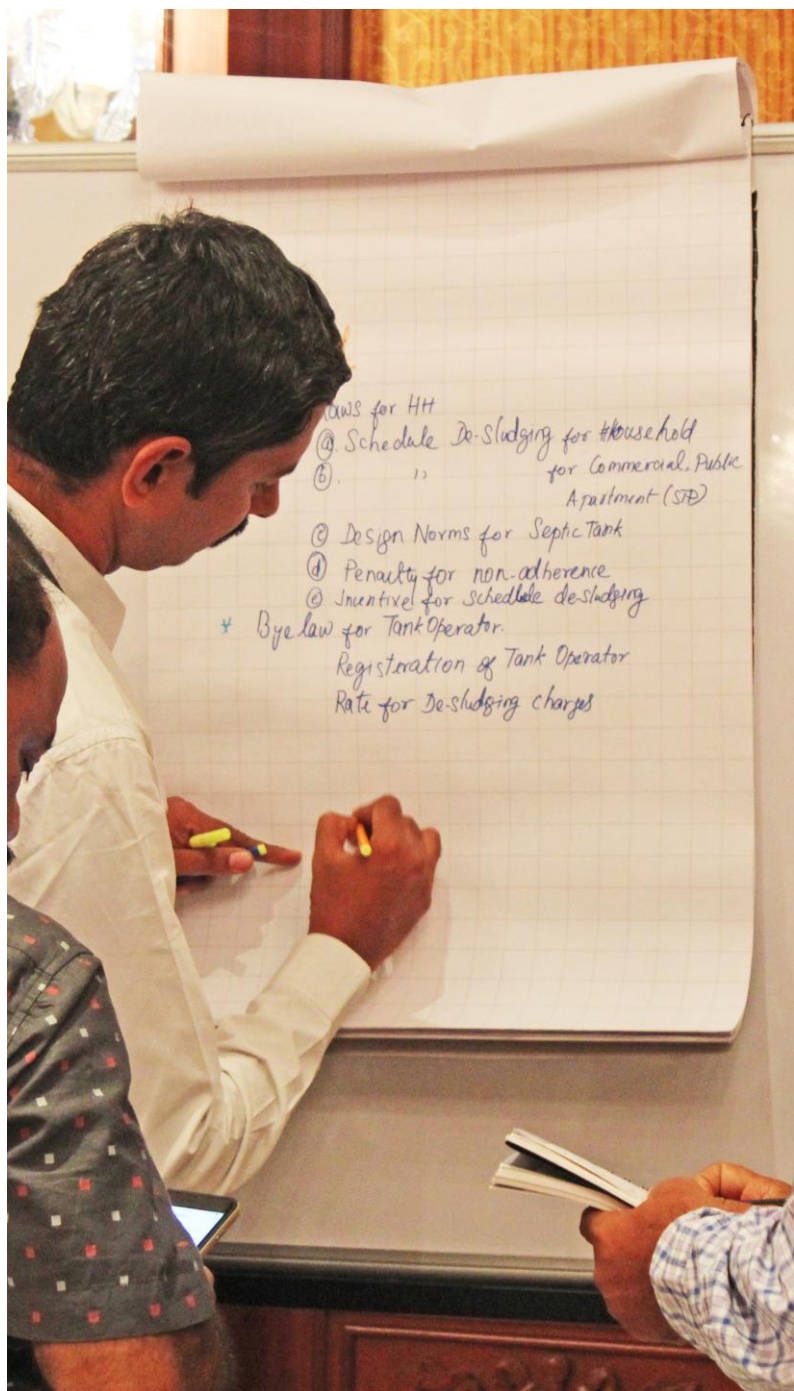




SUMMARY REPORT ON TRAININGS CONDUCTED DURING PHASE 1 OF TNUSSP

December 2018



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Abbreviations

BMGF	Bill and Melinda Gates Foundation
CMA	Commissionerate of Municipal Administration
CPHEEO	Central Public Health and Environmental Engineering Organisation
DRDO	Defence Research and Development Organisation
DTP	Directorate of Town Panchayats
FSM	Fecal Sludge Management
FSSM	Fecal Sludge and Septage Management
FSTP	Fecal Sludge Treatment Plant
GoTN	Government of Tamil Nadu
IEC	Information, Education and Communication
IIHS	Indian Institute for Human Settlements
MAWS	Department of Municipal Administration and Water Supply
NAS	Needs Assessment Study
O&M	Operations and Maintenance
OGSM	Operative Guidelines on Septage Management
OSS	On-site Sanitation System
STP	Sewage Treatment Plant
TNA	Training Needs Assessment
TNIUS	Tamil Nadu Institute of Urban Studies
TNUSSP	Tamil Nadu Urban Sanitation Support Programme
TSU	Technical Support Unit
TWADB	Tamil Nadu Water Supply and Drainage Board
UGSS	Underground Sewerage System
ULB	Urban Local Body

A large, stylized letter 'E' in a light green color, positioned on the right side of the page. The letter is composed of several horizontal bars of varying lengths, creating a stepped effect. The text 'Executive Summary' is placed within the lower right portion of the letter.

Executive Summary

Executive Summary

The Bill and Melinda Gates Foundation (BMGF) has extended its support to the Government of Tamil Nadu (GoTN) to achieve the mission of Muzhu Sughadharam, or complete sanitation, by setting up a Technical Support Unit (TSU). A consortium led by the Indian Institute for Human Settlements (IIHS) is responsible for programme implementation via the TSU. Two urban locations, Tiruchirappalli and Coimbatore, have been selected to demonstrate the implementation of innovations and approaches to improve the entire sanitation chain under the Tamil Nadu Urban Sanitation Support Programme (TNUSSP).

TNUSSP aims to effect changes across the entire sanitation chain and hence, a range of stakeholders have been co-opted into the training programme: officers at the state level and of Urban Local Bodies (ULBs), including officers of city corporations / town panchayats, engineers, masons and desludging operators. This report presents details of the training/orientation programmes undertaken for these four different categories of stakeholders.

Trainings for masons were based on a Needs Assessment Study (NAS), which revealed that majority of masons lack technical training and awareness on the standards for construction of On-site Sanitation Systems (OSS). Trainings were aimed to sensitise them on the full cycle of sanitation and the importance of their role in it. The design and working of septic tanks and twin pits, and EcoSan toilets were discussed along with cost estimates and Do's and Don'ts. A total of four programmes were conducted—two each in Tiruchirappalli and Coimbatore—which were attended by over 120 masons. The training programme was well received and new learnings on septic tank and twin pits were reported.

The NAS for government officers revealed limited knowledge of treatment and reuse of fecal sludge because Fecal Sludge Management (FSM) is a new topic. Officers were unaware of the Operative Guidelines on Septage Management (OGSM) issued by the GoTN. The orientation programme aimed at introducing the concept of FSM and its implementation through international experiences. Through group work and discussions on the Tamil Nadu Operative Guidelines, recommendations and solutions to problems of urban sanitation were sought. Select officers were taken for a domestic exposure visit to the Fecal Sludge Treatment Plant (FSTP) in Devanahalli. Senior officials visited Malaysia as part of an international exposure visit. Around 120 officers participated in at least one orientation/exposure programme. All these initiatives are reported to have deepened their understanding of Fecal Sludge and Septage Management (FSSM), while also helping them explore ways of implementing OGSM.

Eight engineers of the Tiruchirappalli district were trained with the aim of creating awareness about FSSM related policies/guidelines and practices using international case studies. Different technology options and decision-making criteria for technology selection, procurement, and Operations and Maintenance (O&M) were discussed. The engineers reported learning about sludge and wastewater treatment and associated technologies, the working of an FSTP, and methods of properly constructing a septic tank.

The orientation programme for desludging operators emphasised their central role in ensuring that fecal waste is disposed of in the facilities or sites provided by the government. Occupational standards versus current practices were discussed along with scope for improvement. Occupational safety and the need to use personal protective equipment were highlighted. Three programmes were conducted—one in Tiruchirappalli and two in Coimbatore—and a total of around 70 desludging operators were trained. The desludging operators highlighted the need to educate the general public on their role in the full cycle of sanitation and the need to practice safe waste disposal practices.

The way forward for the training component is to scale up capacity-building initiatives through government agencies such as the Tamil Nadu Water Supply and Drainage Board (TWADB) and Tamil

Nadu Institute of Urban Studies (TNIUS) to ensure regular training of new cadres of officers. This would involve building a cadre of master trainers or subject matter specialists and converting the current modules into formal training programmes. For other stakeholders such as masons, desludging operators and non-government sanitary workers, a suitable partner agency needs to be identified that can operate as a training hub. Finally, FSSM needs to be mainstreamed in the academic curriculum to ensure a sustained pool of talent on the subject.



Background

1. Background

Lack of adequate sanitation poses one of the greatest barriers for the state of Tamil Nadu in achieving its full development potential and ensuring high standards of public health for its citizens. The Government of Tamil Nadu (GoTN) has been a pioneer in not only recognising the multiple challenges to improving standards of public health, but also in prioritizing the full sanitation chain, including the strengthening of septage management as an economical and sustainable complement to network-based systems.

In order to achieve the Tamil Nadu Sanitation Mission, the Department of Municipal Administration and Water Supply (MAWS), GoTN aims at scaling up access to safe and sustainable sanitation in all urban areas. Tamil Nadu is envisioned to become a fully sanitised and healthy state, which includes substantially eliminating open defecation, improvements across the sanitation chain, ensuring safe disposal of an increasing proportion of its human excreta and reusing/recovering resources from it.

The Bill and Melinda Gates Foundation (BMGF) is providing support to the state government to achieve this mission. This includes setting up a Technical Support Unit (TSU) to assist in the implementation of state-level and city-level initiatives. A consortium led by the Indian Institute for Human Settlements (IIHS) is responsible for programme implementation via the TSU. Two urban locations, Tiruchirappalli and Coimbatore, have been selected to demonstrate the implementation of innovations and approaches to improve the sanitation chain under the Tamil Nadu Urban Sanitation Support Programme (TNUSSP). Lessons from these two cities will be used to scale up and implement programmes in urban areas across the state.

Under Phase 1 of TNUSSP, the TSU tackled the following programme components: 'Improved Enabling Environment and Governance', 'Engineering and Planning', 'Implementation Support', 'Behaviour Change and Communication', 'Enterprise Development', 'Capacity Building and Training', 'Knowledge Management', and 'Monitoring, Learning and Evaluation'.

Of these, the aim of the capacity building component was to offer flagship programmes in Fecal Sludge Management (FSM) and urban sanitation innovations. The most popular understanding of sanitation in urban areas is restricted to stopping open defecation, using toilets and disposing of waste through the Underground Sewerage System (UGSS). However, within the sanitation sector, FSM is fraught with the following problems:

- Poor domain knowledge and capacity
- Absence of established precedence of the implementation of operational procedures by government agencies
- Lack of systems for orientation and incentives to implement positive changes such as enforcing the full cycle of sanitation

In order to understand the current levels of knowledge and gaps in understanding, especially with respect to key stakeholders such as ULB officers and masons, detailed Training Needs Assessment (TNA) studies were conducted. Based on these studies and inputs from other stakeholders, capacity building programmes were designed for each stakeholder group, which were tailored to meet their specific information needs and knowledge gaps. A range of capacity building programmes such as orientation programmes, hands-on training programmes and exposure visits were conducted for each stakeholder group.

This report presents details of the training/orientation programmes undertaken for four stakeholder groups: officers at the state level and of ULBs including officers of city corporations, engineers, masons

and desludging operators. Wherever applicable, findings of the NAS are also presented. These training programmes were specifically aimed at making stakeholders understand their role in the sanitation chain and mainstream FSM as a credible complement to network-based systems.

This report is organised into six chapters: the introduction is followed by four chapters, each detailing the training programmes organised for masons, government officers, engineers and desludging operators. The last chapter proposed a way forward.



Training Programmes

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2. Training Programmes

2.1 Programmes for Government Officers: Administrators

Government officers at the ULB level are key stakeholders in implementing sanitation initiatives in the state. The focus of ULBs was on solid waste management and not on sanitation or FSM. In order to implement safe sanitation practices at the city level, it is essential that ULBs have officers trained in sustainable Fecal Sludge and Septage Management (FSSM) practices.

2.1.1 Findings of Training Needs Assessment for Government Officers

In 2016, as part of capacity building strategy and action plan, a TNA was conducted across 12 ULBs of Tamil Nadu, which included ULB officers including those from public health and engineering departments. The aim was to assess the training needs across top, middle and frontline staff of ULBs at the state and the city scale, with respect to sanitation. The key target groups of this study were administrators, engineers and other implementing personnel concerned with public health in ULBs and at the state level. The study revealed the following:

- Majority of the officers had limited knowledge with respect to the treatment and reuse of fecal sludge because the concept of FSM was new to them.
- Officers were unaware of the OGSM that was launched in 2014 in Tamil Nadu.
- In locations where Sewage Treatment Plants (STPs) were not available, the officers were either unaware or had limited knowledge of FSM.
- Officers at the frontline and at the junior cadre level were unaware about the rules and regulations concerning improved septic tank construction and its link to public health.

Based on the findings from the TNA, the following aims were adopted for the capacity building strategy:

- Reorienting the mindset of government officers to the various options that were available as alternatives to the conventional UGSS and to introduce FSM and its implementation.
- Familiarising government officers with OGSM, 2014 by providing orientation and training.
- Deepening capacity building efforts for longer-term impacts on FSM by engaging with the same pool of officers in the ULBs.

2.1.2 Programmes for government officers

The training programme for government officers comprised an orientation programme, and domestic and international exposure visits.

2.1.3 Orientation programme

An activity-based orientation programme around FSM was designed for officers from state-level agencies, ULBs and select utilities, in January 2017, with the following aims:

- To create awareness about the policies, guidelines and practices around FSSM, including international best practices and experiments at the state and national levels.
- To enable participants to discuss the key issues in prioritising and promoting innovative solutions for urban sanitation in Tamil Nadu, and help them develop recommendations.
- To help participants develop action plans at the state and regional levels, with a focus on the identified ULBs.

Table 2.1 presents the detailed break-up of the training programme for a total of 51 GoTN officers.

Table 2.1: Details of the training programme for government officers

Topic	No. of days	No. of participants	Key topics covered
Promoting FSSM	2	51 officers including the rank of Principal Secretary, Deputy Commissioner and Chief Engineer, among others	<ul style="list-style-type: none"> • Introduction to and overview of FSM • Discussions about international experiences on FSM (Malaysia and Senegal) • Discussions on Tamil Nadu Operative Guidelines and group work • Presentation to make recommendations to solve problems of urban sanitation in Tamil Nadu
Domestic exposure visits to Devanahalli	1 (5 batches)	42 officers of the rank of Director, Joint Director, Executive Engineer	<ul style="list-style-type: none"> • Meetings with Devanahalli Municipal Council to understand regulations on disposal of fecal sludge, O&M of FSTPs, monitoring construction of septic tanks, and tariff for desludging • Community field visits to understand desludging practices and the use of personal protection equipment • Visits to the Devanahalli FSTP site to understand functioning and reuse options, such as for landscaping, biogas production and composting
International exposure visit to Malaysia	5	11 officers of the rank of Regional Director of Municipal Administration, Joint Director of Town Panchayat and Executive Engineers among others	<ul style="list-style-type: none"> • Overview of sewerage management in Malaysia • Field visits to Sg Udang and Melaka to understand decentralised sewage treatment, desludging work process, Information Education and Communication (IEC), finance, health and safety, and centralised sludge treatment • Closing discussion
Orientation on FSSM	1	14 officers of Tiruchirappalli City Corporation, including Special Officer and Commissioner, Assistant Commissioner and Assistant Engineer	<ul style="list-style-type: none"> • Operational/practical aspects of planning, implementing and monitoring elements of the full chain of urban sanitation, using domestic and international experiences • Focus on comprehensive solutions for small and medium towns, and complementary solutions for larger urban areas.

Source: TNUSSP, 2016-17

2.1.4 Domestic exposure visits

A series of domestic exposure visits to the FSTP in Devanahalli, Karnataka, were organised. The participants learnt about the technology, design and operations of an FSTP as well as how to adopt similar options in Tamil Nadu. Over 40 government officers, including state personnel and engineers from the Directorate of Town Panchayats (DTP), Commissionerate of Municipal Administration (CMA), Tamil Nadu Water Supply and Drainage Board (TWADB), Chennai Corporation and Metro Water Administration, visited Devanahalli as part of the exposure visit.

2.1.5 International exposure visits

In order to demonstrate and improve the understanding of successful models of FSM, TNUSSP organised an exposure visit to Malaysia, where septage management solutions have been successfully promoted. Eleven senior officers of the rank of Director of Municipal Administration, Executive Engineer and Executive Officer were part of this visit in July 2016.

2.1.6 Orientation for city corporation officers

A one-day orientation-cum-training programme was organised to promote FSSM, which was targeted at officers working in ULBs and select utilities. The programme drew upon domestic and international best practices, dwelt upon developments at the state and regional levels, and helped participants understand the operational and practical aspects of planning, implementing and monitoring the elements of the full chain of urban sanitation. The focus was on mainstreaming FSSM in the form of comprehensive solutions for small and medium towns, and complementary solutions for larger urban areas.

2.1.7 Key Learnings

Participants of the orientation programme were asked to self-assess their knowledge levels before and after the programme. Before the workshop, two thirds of the participants rated their knowledge, ability and confidence as poor (12 per cent), below average (15 per cent), and average (38 per cent), while one third thought they were good. After the workshop, about 54 per cent of the participants rated their knowledge, ability and confidence as good; 38 per cent thought they were excellent; and 8 per cent thought they were average.

Areas of learning included greater knowledge about FSSM and its various components, international experience and its application, better understanding of operational guidelines, treatment options, (IEC), STPs, containment and septic tanks; septic tank design, and sludge disposal processes. Another key learning, as reported by a majority of participants, was an in-depth understanding of the design and standards of FSTPs, which helped them better appreciate their functioning.

The main learning outcomes from the international exposure visit included awareness about the changes required in rules, regulations and other implementation solutions for government officers in order to propose and implement septage management in Tamil Nadu.

2.2 Programmes for Engineers

The focus over the years has largely been on networked or sewerage based sanitation, with priority given to connecting wastewater sources from all households to a network and providing end-of-the-pipe treatment. While this is the conventional method of planning, the dearth of funds and a sustainable operation model have led to very few ULBs being seweraged. Most ULBs still primarily rely on non-networked sanitation such as septic tanks, pits and community cess pits, among others.

With recent changes in policy and emphasis by civil society, attention is now being paid to the safe conveyance and treatment of wastewater generated from OSSes. ULBs have been provided the mandate and direction by the central and state governments to promote FSM, which is a major part of non-sewered sanitation. However, the capacities within ULBs and other engineering departments are limited in this field. There is a crucial need to equip engineers with the knowledge and skills to implement effective solutions. The training programme for engineers, therefore, was organised with the following aims:

- To create awareness about policies/guidelines and practices (including operative guidelines) related to FSSM using international best practices and experiments at the state and national levels.
- To develop an understanding of different technological options (along the sanitation chain, but with a focus on treatment).
- To understand the decision-making criteria for selection of technology.
- To understand managerial aspects of FSM, particularly procurement and O&M.
- To understand the data requirements and different approaches for planning FSM solutions.

2.2.1 Engineers' training

The one-day training programme for engineers held in Tiruchirappalli covered the city's current practices in managing sewage and fecal sludge, with emphasis on co-treatment of fecal sludge and sewage (Table 2.2). It also included components of an FSTP, including feasibility, design, implementation and O&M aspects. Participants were exposed to new treatment technologies such as treatment of fecal sludge using black soldier flies and co-composting municipal solid waste with fecal sludge, and made aware of the reuse potential of sludge.

Table 2.2: Details of the training programme for engineers

Location and days	No. of Engineers	Key topics covered
Tiruchirappalli – one day programme	8, including city engineers and junior engineers	FSM, types of OSS, FS characteristics, FSM technologies, O&M of FSTP, contracting and bidding, and treatment and co-treatment options
<i>Source: TNUSSP, 2016-17</i>		

2.2.2 Key Learnings

The engineers reported having learnt about sludge and wastewater treatment and associated technologies, the working of FSTPs and the proper construction of septic tanks. As feedback, they suggested that UGSS blockage removal be included as a topic. They also requested a detailed flowchart of FSTP processes for better understanding and dissemination of knowledge.

2.3 Programmes for Masons

Masons are one of the key stakeholders in the sanitation chain, especially the containment component, as they are involved in the construction of the OSS. Therefore, it is important that they have the technical knowledge required to perform their role as per national standards. The training programmes organized for masons under TNUSSP, therefore, were aimed at enhancing their skills in building OSSes, in order to improve sanitation practices.

2.3.1 Findings of training needs assessment for masons

In order to assess the baseline level of knowledge, required to design a training programme, a TNA of 70 masons (chief masons, masons, unskilled male assistants) was undertaken in Tiruchirappalli and Coimbatore. The key findings of the TNA are as follows:

- Of the 70 masons interviewed, none of the chief masons or masons had undergone any technical training in masonry; all of them had learnt the skills on the job. One of the reasons for this was that for two-thirds of them, masonry was their family occupation.
- A majority of the masons reported that the choice of toilet structure or toilet system was influenced by available space, topography, soil conditions, cultural habits, affordability and availability of water.
- While 90 per cent masons had prior experience of building septic tanks nearly 10 per cent had constructed single-pit or twin-pit toilets.
- Importantly, with respect to the construction of OSSes, masons were unaware of the standards prescribed by the Central Public Health and Environmental Engineering Organisation (CPHEEO) and therefore, had failed to follow them.

In this backdrop, four training programmes were conducted to facilitate improvements in the standards of construction of OSSes and to equip masons with the technical knowledge and skills required for designing them. Held in Tiruchirappalli and Periyanaicken-palayam Town Panchayat (PNP TP) in Coimbatore, the programmes were organised with the following aims:

- To create awareness about the significance of using and constructing toilets and the environmental benefits of eliminating open defecation.
- To provide masons with technical knowledge and skills required for design and principles of OSSes such as twin pits and septic tanks.
- To familiarise participants with the construction norms and specific requirements for the construction of OSSes.
- To stress on the importance of operations and maintenance (O&M) of OSSes.

2.3.2 Training programme for masons

Four workshops extending over one or two days were organised in Tiruchirappalli and Coimbatore, for 126 masons who were involved in the construction of OSSes, i.e. twin pits and septic tanks. They sensitized the masons on the importance of sanitation and on their role in the sanitation chain. The programme covered the basic design and construction of septic tanks and twin pits, including dos and don'ts. It included the importance of designing septic tanks according to particular standards, and of constructing watertight compartments, building partitions, providing air vents and connecting water outlets to draining trenches or soak pits. The masons were then asked to construct prototypes of twin pit latrines and bio-toilets using clay and hardboard cutouts. The workshops were well received and helped the masons gain new knowledge, which they were able to share with others. Table 2.3 presents details of these workshops.

Table 2.3: Details of the training programme for masons

Location, date	No. of days	No. of masons	Key topics covered
Tiruchirappalli, June 2017	1	38	<ul style="list-style-type: none"> • Introduction to full cycle of sanitation • Session on construction of septic tank with soak pit, with discussions on cost and material estimates, and time required to construct twin-pits; effective working and design and construction of a twin-pit, including foundation, inspection chamber, distance between pits and groundwater; civil design aspects; CPHEEO design criteria for septic tanks; and Defence Research and Development Organisation's (DRDO) bio-toilet
Tiruchirappalli, Nov 2018	1	32	<ul style="list-style-type: none"> • Introduction to full cycle of sanitation • Importance of masons' role in building safe containment structures • Design and construction of septic tank; using draining trenches as an alternative to soak pits; civil design aspects; CPHEEO design criteria for septic tanks; and DRDO bio-toilet. • Discussion on material, costs and time requirements
Coimbatore, Dec 2016	2	31	<ul style="list-style-type: none"> • Introduction to sanitation chain • Importance of masons' role in building safe containment structures • Session on construction of twin-pit latrines, and use and construction of EcoSan toilets • Group activity: creating a model of the sub-structure of a proper toilet • Session on details of DRDO bio-toilet • Reference hand-out with design and cost estimates for proper toilet construction, with dos and don'ts
Coimbatore, May 2016	1	25	<ul style="list-style-type: none"> • Introduction to sanitation chain • Importance of masons' role in building safe containment structures • Detailed discussion on technical aspects of design and construction of twin pits • Module on construction of septic tanks, including a video on the design and construction of a septic tank for a household of 5members

Source: TNUSSP, 2016–17

2.3.3 Key learnings

Majority of the masons across the four workshops reported having learnt something new about the construction of septic tanks and twin pits, especially the importance of the junction chamber in the latter. The other important learning was the importance of proper construction of OSSes in protecting ground water.

2.4 Programmes for Desludging Operators

Desludging operators and workers play a crucial role in the collection, transportation and safe disposal of fecal sludge, all of which have implications for public health and the environment. A proper orientation programme for desludging operators and workers on their role in FSM can potentially lead to huge improvements in sanitation practices.

2.4.1 Orientation programmes for desludging operators

Three orientation programmes on the importance of FSM were organised for 68 desludging operators and workers in Tiruchirappalli and PNP with the following aims:

- To familiarize septage transport operators (owners and workers) with the full sanitation chain.
- To discuss the practices they currently follow and share best practices from across the country.
- To impress upon them the importance of their role as desludging operators.

These sessions focused on orienting desludging operators on the full cycle of sanitation and their central role in ensuring that fecal waste is disposed of in the facilities or sites provided by the government (Table 2.4). Relevant discussions were held on vehicle design, different kinds of equipment to be used for desludging and occupational safety procedures to ensure safe sanitation practices. Participants were sensitized on the health implications of handling human waste without protective gear, and steps to be taken in case of an accident. The operators were told about the abolition of manual scavenging and asked to stop entering septic tanks, even if they are forced by customers.

Table 2.4: Details of the orientation programmes held for desludging operators		
Location and days	No. of desludging operators	Key topics covered
Coimbatore (1 day)	6 operators	Full cycle sanitation and role of desludging operators and workers; standards of operation versus current practices and occupational safety
Tiruchirappalli (1 day)	39 participants including operators and workers	
Coimbatore (1 day)	22 participants including operators and workers	
<i>Source: TNUSSP, 2016-17</i>		

2.4.2 Key learnings

The orientation programmes were well received, with operators viewing it as a good platform to build relationships with stakeholders involved in the sanitation chain. More specifically, they learnt about their role in the sanitation chain, the importance of safety gear and of the need for safe disposal of fecal sludge.

Further, they recommended building household level awareness about building proper containment structures, and safe and timely disposal of septage among service users. They also suggested organizing programmes to make people aware of and value the work of desludging operators and workers.



Way Forward

3. Way Forward

The extensive training programmes conducted during the first phase of TNUSSP have had a favourable impact on the participants. They have generated stakeholder-specific training modules and led to key learnings to scale up the programme in a more systematic manner, which will facilitate the uptake of FSSM in other locations. The main lessons are as follows:

- Scale can be achieved by capacitating institutions of ULBs, such as the TWADB and TNIUS to run programmes for different categories of stakeholders like engineers, government officers, sanitary inspectors and government sanitary workers. The modules developed so far can be combined to form a structured training programme, which includes relevant knowledge on FSM, governance and financing. Further, this training programme could be made a mandatory part of the departmental training curriculum/skill development programme as well as during the induction into service.
- In order to operationalise this training programme, a group of state and regional level officers need to be trained as master trainers and subject matter experts so that they can organize internal training sessions on a sustained and professional basis.
- In order to scale up initiatives for other categories of stakeholders such masons, desludging operators and non-government sanitary workers, suitable partner agencies need to be identified which can operate as regional hubs for training programmes and take this forward. The available training material for these stakeholders can be fine-tuned to create a structured training curriculum.
- In the long term, to build a cadre of sanitation professionals who have skills in FSSM, the topic will have to be integrated into professional training curriculums/academic curriculums.



Tamil Nadu Urban Sanitation Support Programme (TNUSSP) supports the Government of Tamil Nadu and cities in making improvements along the entire urban sanitation chain.

The TNUSSP is implemented by a consortium of organisations led by the Indian Institute for Human Settlements (IIHS), in association with CDD Society, Gramalaya and Keystone Foundation.