Sanitation and Hygiene
Rapid Topic Review

Retrofitting: The Next Step for the Swachh Bharat Mission?

Puneet Srivastava

The approach

Rapid Topic Reviews are a time-bound but an otherwise flexible approach to finding out about a priority topic where knowledge has yet to be summarised in a particular context. Specific topics are generated in consultation with policy-makers and development partners. Researchers are required to assess the current state of knowledge and to seek insights and innovations from the field. Reviews triangulate from different sources including academic and grey literature, key informant interviews, preliminary insights from on-going research on progress and rapid and informal field investigations. Conditions for these reviews are (1) methods must be explained, (2) recommendations for practice and policy are provided and (3) work is completed in a set number of days (usually 20).

Outputs are written and disseminated quickly to policy-makers and practitioners so immediate relevant and timely actions can be taken.

This methodology is a work-in-progress. Comments and suggestions to strengthen and develop the process and method, as well as the content and structure of the notes would be very welcome. Or if you wish to do a rapid exploration into a topic that interests you, please contact us: clts@ids.ac.uk

Glossary and definitions

Gram Panchayats: the lowest tier of Local Self Government in rural India.

Open Defecation Free (ODF): the termination of faecal-oral transmission defined as:

- No visible faeces found in environment/village;
- Every household, as well as public/community institutions, using a safe technology option for disposal of faeces.

Retrofitting of toilets: defined as "adapting the existing toilet without direct contact of sanitation workers or users with excreta, to the standards of safe technology options and users' convenience". This is the definition used by the Swachh Bharat Mission-Gramin (SBM-G).

Safe technology option: refers to no contamination of surface soil, ground water or surface water; excreta inaccessible to flies or animals; no handling of fresh excreta; and freedom from odour and unsightly conditions.

Substructure of toilets: the toilet platform and on-site treatment technologies below it. This includes Pan, P Trap, Water Seal, Footrest, Junction chamber, leach pits, septic tanks with soak pits and so on.

Superstructure of toilets: the walls, doors, latches, roof, ventilators, lighting arrangement, special arrangements for person with disabilities, old people, children and women, water arrangements and hand washing facilities.

Swachhagrahis: persons who champion the cause of sanitation promotion voluntarily with rural communities in India and are supporting the implementation of SMB-G.

Summary

Retrofitting of toilets is a complex and challenging stream of work and is included as one of the main components of Open Defecation Free-Sustainability (ODF-S) plans under Swachh Bharat Mission- Gramin (SBM-G). However, minimal data is available about the number of toilets that need to be retrofitted. Furthermore, the typologies of retrofitting needs is largely unclear. Few surveys have been carried out to date, and those that do exist provide conflicting or incomplete data.

This rapid topic review of "Retrofitting" is an effort to combine the findings of various study reports, policies, guidelines, deliberations and secondary literature, as well as key stakeholder interviews and site visits carried out in May and July 2019, in order to provide insights into the scale and nature of the challenges of retrofitting.

The review has highlighted the challenges with existing toilet structures that lead to the need for retrofitting, which can be separated out between substructure components and superstructure components. Some of these challenges should be prioritised for a retrofitting programme as part of an ODF-S drive. Other challenges observed may need a completely new construction with locally suitable or appropriate on-site sanitation technology.

Behaviour change communication approaches have been successful in increasing usage of toilets constructed under SBM-G and therefore will continue to be useful for creating awareness and demand in communities when converting toilets from dysfunctional to functional through retrofitting.

User friendly knowledge building approaches to increase understanding of retrofitting options, technical designs and indicative costs, as well as skills development of rural masons, will be key to any successful retrofitting programme. This may require rapidly piloting a project on retrofitting and standardising the technical options and costs.

Masons and swachhagrahis are the key to a successful retrofitting programme. Therefore, changing the outlook of rural masons towards retrofitting, training them on technical options and addressing their concerns regarding the retrofitting needs to be addressed through well-structured training programmes.

Development of financing mechanisms to incentivise poor and marginalised households will also be critical to ensure outreach of the programme. Various already successful models of revolving funds could be explored to introduce options for financing any retrofitting plans of the communities.

There is also a need to design and pilot sustainable Faecal Sludge Management models in rural areas in order to ensure that the large number of septic tanks constructed under SBM-G remain usable, as well as a quick acceleration of programmes to provide a tap water supply in rural households. This will ensure fulfilment of other hygiene related needs such as bathing, clothes washing etc. within the household, besides regular toilet use and aftercare.

Introduction

The Swacch Bharat Mission-Gramin (SBM-G), the world's biggest behaviour change programme on rural sanitation, is being led by the Department of Drinking Water and Sanitation (DDWS), Ministry of Jal Shakti (MJS), Government of India (GoI).[1] The programme helped the construction of over 100 million household latrines in a period between 2014-19. Retrofitting of toilets is a complex and challenging stream of work. Its inclusion as one of the main components of Open Defecation Free-Sustainability (ODF-S) plans under SBM-G is an indicator that it will remain a critical barrier to overcome on the journey towards achieving this.

In a letter dated 9th June, 2015 DDWS defined "Open Defecation Free (ODF)" as the termination of faecal- oral transmission (see Glossary and Definitions). Retrofitting of toilets, for the purpose of this report, is defined as, adapting the existing toilet, without direct contact of sanitation workers or users with excreta, to the standards of safe technology options and users convenience (as defined in definition of ODF under SBM-G). The scope of this report is limited to the topic of retrofitting of toilets wherever the current structure of toilets constructed under SBM-G does not conform to the definition of "Safe Technology" as outlined by MDWS.

Minimal data is available on the number of toilets that need to be retrofitted, and the nature of retrofitting needs remains unclear. Few surveys have been carried out to date, and those that do provide conflicting or incomplete data.

[1] SBM-G was previously run by the Ministry of Drinking Water and Sanitation until May 2019 when the Ministry of Jal Shakti was creating merging the Ministry of Drinking Water and Sanitation with the Ministry of Water Resources, River Development and Ganga Rejuvenation.

This rapid topic review on "retrofitting" is an effort to triangulate the findings of various study reports, policies, guidelines, secondary literature, key stakeholder interviews and site visits that took place between May and July 2019, in order to provide more specific details about to the scale and nature of the challenges of retrofitting. Field visits were undertaken across a range of terrains in three districts in Uttar Pradesh, in order to look at toilets constructed, the challenges observed relating to retrofitting needs and to undertake interviews with masons and Gram Panchayat.

Summary of available data

According to reports in mid-July 2019 by the DDWS, Ministry of Jal Shakti (MJS), since SBM-G's inception on 2nd October 2014, across India approximately 97.3 million rural household toilets have been built, and 569,950 ODF villages, 622 ODF districts and 30 ODF states achieved. They also reported at that time that ODF status in rural India had increased from 38.70 per cent to 99.50 per cent (DDWS, 2019a). The National Annual Rural Sanitation Survey (NARSS) 2018-19, conducted by an independent verification agency, found that of the 93.1 per cent of rural households who have access to a toilet 96.5 per cent of them use it (DDWS, 2019b).

However, despite the impressive coverage, access and usage and commensurate health benefits that various studies report have been achieved under SBM-G, there have been concerns and contradictory data raised in other reports. A study released in January 2019 by the Research Institute for Compassionate Economics (RICE) and accountability initiative of the Centre for Policy Research (Gupta et al., 2019) claimed that despite toilets being in place, a quarter of the rural population continued to practise open defecation. This study reached 1,558 households in 157 villages in Madhya Pradesh, Bihar, Uttar Pradesh and Rajasthan, and tracked changes between 2014 and 2018. It found that whilst there was a significant increase in toilet ownership, this did not translate into a proportional increase in usage. Another report from the Accountability Initiative found that in ODF *Gram Panchayats* in Udaipur, Rajasthan, of 82 per cent constructed toilets, only 70 per cent are functional and only 49 per cent are regularly used (Deshpande and Kapur, 2018).

These reports indicate that the percentage of toilets that are either dysfunctional or not being used due to behavioural or other reasons (including the need for retrofitting) may be between 3 per cent (as per NARSS) and 12 per cent (Accountability Initiative) of all toilets constructed. It is also possible that many toilets that are reported as being in use do not conform with standard designs that qualify them as 'safe' or ODF, and therefore may also require retrofitting.

In a paper published in Economic and Political Weekly in March 2018, based on National Family Health Survey-4 data from 2015-16, the authors indicated that although open defecation has become less common than it was 10 years ago, it is still highly prevalent, with more than half of rural households reporting open defecation. On average, change has been slow, even with SBM-G (Coffey and Spears, 2018). The SBM-G report indicated that 50 per cent usage of toilets was almost equivalent to the toilets constructed reported - 50.58 per cent. However, whilst it can be assumed that usage of toilets constructed has indeed been high under SBM-G, a number of other reports indicate the possibility that a significant proportion of these toilets do not qualify, as per the ODF definition, as a safe toilet (ibid).

A 2018-19 study of 57 villages, conducted by Delhi University, reported that of the 23 villages with twin pits, in 17 of these villages, the construction of these was very poor. In another 27 villages septic tanks without soak pits were reported. Seasonality was found to be one of the key factors affecting partial usage of toilets in many areas, the implication being that the needs for retrofitting of Twin Pit Pour Flush (TPPF) toilets and septic tanks may be high (2019).

The key findings in a study conducted by WaterAid India on Quality and Sustainability of Toilets included the use of TPPF in 57 per cent of households, single pits in 22 per cent and septic tanks in 21 per cent. This report stated that, based on the responses received, around 62 per cent of the septic tanks reported could in practice in fact be containment structures, and hence end up either overflowing or failing to provide any substantial treatment before discharging through the outlet, creating a health hazard (WaterAid India, 2017). In addition, 31 per cent of the constructed toilets, although functional, were unsafe. Although based on small sample size of 1000 households, this report indicates that a significant proportion of toilets constructed in rural areas have needs for retrofitting to make them safe and usable (ibid).

Immersive research by the Institute of Development Studies, Praxis and WaterAid India in 2017 referred to the use of standard design of TPPF toilets in areas where it is not appropriate or the desired choice, coupled with an absence of training of masons on appropriate toilet technologies as leading to poor construction quality and single pits with increased depths (Institute of Development Studies et al., 2017). This report again indicates that needs for retrofitting may be much higher in certain districts/blocks/Gram Panchayats than is reported by large scale national surveys, such as NARSS.

The Comptroller and Auditor General of India report of Gujarat reported that in 41 out of the total 120 'test-checked' villages, toilets constructed under SBM-G could not be used as there was no water connection. In 15 other villages, toilets were not being used either due to non-availability of water and soak pits, or because they were incomplete (Government of Gujarat, 2018).

The progress on construction and usages of toilets under SBM-G noted in national scale studies is indeed impressive and unprecedented, but it does not accurately portray the scale of retrofitting needs of toilets. There is limited information about toilets which are unsafe (according to technical norms and designs and as per definition of ODF), particularly in relation to the toilets that are reported as being used.

Ongoing activities in retrofitting of toilets and plans

The challenges of retrofitting under the ODF-S drive are recognised by the DDWS, various developmental agencies, and the states grappling with challenges of non-conformity to standard technical designs in the construction of toilets. The DDWS has already recognised retrofitting as a subcomponent within the construction and repair of toilets component of ODF-S plans and envisages the training of masons and swachhagrahi for retrofitting as a main activity under the ODF-S plans. Besides retrofitting the other components are pit emptying, Faecal Sludge Management (FSM), defunct toilets and toilet construction for additional families.

The DDWS has also partnered with the National Skill Development Corporation (NSDC) and the Construction Skill Development Council of India (CSDCI) to develop a technical training manual for masons to ensure the quality of toilets constructed, the retrofitting of unsafe toilets and making dysfunctional toilets functional.

The NSDC (which is implementing the Government's flagship scheme Pradhan Mantri Kaushal Vikas Yojana (PMKVY) under the Skill India Mission has, through the Recognition of Prior Learning (RPL) programme, commenced training of 2,710 masons in twin pit technologies. Under a special project, launched in collaboration with the DDWS, NSDC will undertake RPL training of 50,000 masons in Uttar Pradesh, Bihar, Jharkhand and Odisha. Per a specially designed Rural Mason Qualification Pack, the masons undergo a four-day training of 32 hours which includes 12 hours of orientation and 20 hours of bridge training, followed by an eight-hour assessment and certification. The orientation programme includes construction of twin pit toilet, retrofitting of existing rural toilets, solid and liquid waste management, soft skills and digital literacy (National Skill Development Corporation, 2018).

WaterAid India has been working on developing safer sanitation technologies in retrofitting in its rural sanitation programmes, particularly in high water table and flood prone areas. Between 2014-18 they have worked on converting septic tanks into evapotranspiration-toilets, converting septic tanks into bio-toilets, constructing of soak-pits or seepage-trenches for septic tanks and trialling an innovative junction chamber by Lixil Corporation in twin pit toilets (Lixil, n.d.). They also organised a 2018 Winnovator challenge where team Praan from Sydney Water in Australia presented 'Poo Switcheroo', a simpler junction box that can be installed and switched over between pits without direct contact with sludge or opening of the junction box. In 2018-19, they partnered with the district administration in Sawai Madhapur district of Rajasthan, to train masons in retrofitting of single offset pit toilets into twin pit toilets, superstructure components such as junction chamber, and converting pans into rural pan. The average costs estimated per toilet was between INR 2000-3000.

Between 2016-18, Arghyam (an NGO based in Bengaluru, Karnataka) supported a similar project with Bhartiya Jan Utthan Parishad (an NGO based in Nalanda, Bihar) retrofitting largely superstructures constructed under earlier rural sanitation programmes but defunct by 2016. In this programme around 300 toilets were renovated/ retrofitted. It also undertook construction of new substructures in riverbank areas in a few cases. The average cost per toilet in retrofitting of superstructures was INR 2000-8000.

Several other agencies such as UNICEF and civil society organisations such as the Aga Khan Foundation have started working on retrofitting needs identification.

Types of construction deviations to be considered for retrofitting

The DDWS recommends Twin Pit Pour Flush Toilet (TPPF) as a safe toilet technology for most rural areas in India with normal conditions.

In areas with specific characteristics, such as being flood prone, having a high water table, or having particularly rocky soil, some customisation to the standard design of TPPF toilets is recommended. Although the draft handbook for on-site sanitation options for rural areas released by the DDWS (MJS) has provided many technical options that can be adopted in different situations, the most common technology promoted and adopted remains that of pit toilets (both single and double) with a water seal, followed by the septic tank (MDWS, 2016). A negligible

proportion of the population has been adopting bio-toilets. During talks with community members, particularly in areas that have a high water table or are flood prone, it appears that the aspirational toilet remains the septic tank. The TPPF toilet is popular as the most basic toilet in rural areas.

Key technical deviations for consideration of retrofitting needs are grouped by toilet technology and summarised as below.

Single leach pit toilets

Scale of the challenge

The RICE Institute study that interviewed 10,000 people from 4 states, indicates that the most common - 40 per cent of those surveyed - toilet option was the single pit construction with just 25 per cent of households opting for twin pits (RICE Institute, 2019).

The WaterAid India study mentioned that twin-leach pits were the predominant technology, present in 57 per cent of the households, and that single pits were used in 22 per cent and septic tanks in 21 per cent (WaterAid India, 2017). However, it also stated that 'When adding criteria that ensure pits are not oversized (over 4x4x4 feet for leach pits and over 6x6x6 feet for septic tanks), just over a fifth (22 per cent) of the total toilets constructed could be considered sustainably safe and cost-effective. Average size of leach pits was 7x7.4 square feet and 7.1 feet deep in surveyed households. It is possible to infer, observing the high percentages of single pit toilets, that in the absence of a second pit due to lack of space within households or the costly options for emptying of these pits, people may have instead chosen to adopt oversized single pit toilets to delay the filling time of these pits.

The Hindu's analysis of raw data from the National Annual Rural Sanitation Survey 2018-19, suggests that just 26.6 per cent of rural households surveyed use the recommended twin-pit system to dispose of excreta from their toilets. Septic tanks are the most popular option, with 28 per cent of toilets connected to a septic tank with a soak pit and 6 per cent to a tank without a soak pit (Krishnan and Jebaraj, 2019). This may indicate that the remaining 39 per cent toilets are single pit toilets.

A very rough analysis of various studies (some of which are quoted above) conducted across a limited number of geographical locations, suggests that single pit toilets in rural India may make up between 22% - 40% of the total number of toilets constructed (see table 1). It should be noted that this estimation is very imprecise, and is only intended for the broader purposes of understanding the extent of the challenge, not to provide an accurate representation of the scale of the issue nationally. The purpose of this estimation is to provide, in the absence of real data on single pit toilets nationally, a greater sense of the potential scale of the challenge facing rural sanitation managers at state/ district/ block and GP level when they plan for retrofitting programmes to convert single pit toilets into safe toilet technologies.

Practicalities of the challenge

In some instances single pit toilets were constructed because there was not enough space to construct TPPF toilets and converting these into TPPF toilets through retrofitting may be a major challenge. In some cases, it was observed that extra space for construction of a second leach pit may be made available by shifting the toilet superstructure onto a first floor or roof top. It is important that all these single pit toilets are converted into TPPF toilets before the first pit is filled up in order to make them safe, however for various reasons, they may not be very high priority for retrofitting within a programme for ODF-S because:

- Single pit toilets constructed in the last 2 years of SBM-G, are likely to still have approximately 3-4 years remaining before they are filled and need to be switched over to another leach pit. Where space is available for construction of another leach pit and installation of junction chamber, the users still have some time to decide on this investment and be guided by observing the experience of filling and emptying of pits of other users of similar kinds of toilets in their village or vicinity.
- In households where single pit toilets were constructed because there was no usable space available within the household for another pit, it is possible that switching to a septic tank or bio tank with soakage pit may be an option. This may require completely new construction of the sub-structure rather than retrofitting the single pit.
- Where single pit toilets are subject to seasonal floods or affected by a high water table adopting another safe technology such as a flood or high water table customised TPPF, a raised toilet with bio tank, a raised septic tank, or a raised worm-based toilet might be the preferred option by communities. However, this may require completely new construction of sub structure than retrofitting the single pit.

Single pit toilets are not considered a safe technology under SBM-G, and therefore are not included in the MDWS

Handbook for technical options for On Site Sanitation (2016). However, in certain areas, communities observed that the second pit can remain unused for 3 years, sometimes longer, and become home to rats and rodents that dig tunnels around it, causing the structure to crumble. As a result, some people think that it is better to construct a second pit only when the first one is about to be filled up. However, in the absence of any mechanism to monitor the filling rate of the first pit safely without opening of the lid of the pit, it seems unlikely that this is practically possible. A further detailed investigative research on this aspect of TPPF may help to realistically ascertain needs of retrofitting of single pit toilets.

Containment tanks and/or septic tanks without soakage pits

Scale of the challenge

Many of the toilet substructures that are included in user surveys (both single leach pit toilets or septic tank toilets) ultimately turn out to be containment tank substructures (bottom and side walls completely lined but proper design of septic tank not followed) at best or semi-containment tank substructures (bottom unlined and side walls lined) at worst.

One study reported that 'around 62 per cent of the septic tanks could in practice be containment structures, and hence end up either overflowing or failing to provide any substantial treatment before discharging through the outlet, creating a health hazard' (WaterAid India, 2017). The identification of such structures and finding ways to retrofit them into a safe toilet sub-structure is a huge challenge. The same report indicated that 21 per cent of the total sample were toilets with substructures based on septic tanks, and therefore the overall percentage of such toilets that may have a containment tank of some sort may be around 13 per cent of the total number of toilets constructed (Ibid).

The RICE and Accountability Initiative Report stated that 31 per cent of the sample of toilet substructures taken from states of Rajasthan, Madhya Pradesh, UP and Bihar were containment tanks (Gupta, 2019). Analysis by The Hindu group for NARRS 2018-19 data suggested that the number of septic tanks without soakage pit could be around 6 per cent of the total number of toilets constructed (Krishnan and Jebaraj, 2019).

Practicalities of the challenge

During field visits, it was observed that many septic tanks are constructed within houses and discharge directly into drains. Often when households in rural areas do not have access to emptying services they flush with surplus water meaning that the raw sewage from septic tanks flows, along with grey water coming out of kitchens and bathrooms, to low lying areas, forming a cesspool. The lack of space within households and construction of pucca roads within villages have significantly reduced the possibility of construction of individual soakage pits within households as a means of retrofitting of such toilets. Overall, based on these reports, a very approximate estimate of the percentage of substructures that have containment tanks is between 13%-31% of the total toilets constructed. The retrofitting in such cases may be very complex and challenging and may require a completely new construction of substructures, using low cost appropriate technology. Where there is a high number of cases, it is possible that septic tanks are the more aspirational toilet technology, and in such cases rural FSM service networks need long term scale-up in order to address the needs of such toilets.

Superstructure challenges

Scale of the challenge

According to WaterAid India's report 'looking at the superstructure, 30 per cent of constructed toilets were deemed user friendly, which includes the following criteria: having a solid wall and a roof, a door with latch inside, ventilation, natural light and water available in some form. This means that 70 per cent of the toilets lacked one or more of these criteria for a user-friendly toilet.' (WaterAid India, 2017).

Practicalities of the challenge

The most common problems with superstructures of toilets observed during field visits were:

- No water available near the toilet;
- Door missing, too low height, or unlockable;
- No proper ventilation;
- Size of platform too small;
- Platform too low in flood prone areas with risk of flood water entry;
- No or poor natural lighting;
- Roof of toilet too low;

- Not user friendly for people with special needs, children, women and older people.

The user-friendly designs of superstructure and perceived notions of hygiene, safety and privacy from superstructure of toilet by users is of paramount importance. The superstructure is the first interaction a user has with a toilet. Many small measures in making existing toilets user-friendly, hygienic and comfortable can be undertaken by the households at minimal cost, provided there is a sense of ownership of the toilets constructed.

Table 1 summarises the key findings of this section to understand the retrofitting needs by typologies and estimates of its scale. The purpose of these estimations is to provide, in the absence of real data on quality and sustainability of toilets constructed, assistance to rural sanitation managers at state/district/block and *Gram Panchayats* level to understand the potential scale of the challenge that may be present when they plan for retrofitting programme. The data used to make these estimates has been obtained from different studies, carried out in different years, and which may have limitations of sample size and sample representation. The estimations are therefore very unscientific and should not be considered as representative of the national scale of the challenge.

Table 1: Assessment and estimated scale of anomalies in toilet construction that may require attention for retrofitting

Type of deviation from standard design	RICE Institute	WaterAid India	The Hindu	DU+IDS+WSSCC Immersive research	Gujarat Audit Report	Observations in Field Visits	Range estimates based on various studies
	2014-18	Oct, 2017	2018-19	2018-19	2018	2019	2019
Single Leach Pit	40% (HHs)	22% (HHs)	39% (HHs)	12% (Villages)	-	Difficult to assess as most of the pits and junction chambers reported to be buried underground.	22% to 40% of HHs in select districts/ blocks/ GP level
Septic Tank without soak pits and/or containment Tank	31% (HHs)	13% (HHs)	6% (HHs) - only septic tanks without soak pits	47% (27/58 Villages)	-	Septic tanks are aspirational in most of the villages and people have opted and invested in them heavily who could afford. Missing knowledge among rural masons is a huge challenge resulting in containment tanks, many times oversized	13%- 31% of HHs in select districts /blocks /GP level
Superstructure	-	70% (HHs) not having, at least, a solid wall and a roof, a door with latch inside, ventilation, natural light and water available	-	-	12% (15/120) Villages either due to non-availability of water and soak pits or they were incomplete	The toilet superstructure needs improvement as per standard design and user friendliness in most of the cases. easier to enhance and sustain usages of toilets constructed under retrofitting programme	12% - 70% of HHs in select districts/ blocks /GP level

Note: HHs=Households; GPs=Gram Panchayats

Methods to identify the retrofitting needs under SBM-G

Most of the research identifying the specific substructure related retrofitting needs of existing toilets is based on surveys and interviews of beneficiary families and are subsequently prone to inaccuracies. These may be due to a lack of understanding by users about the technology used, the way questions were posed by researchers, poor observation by households during construction of substructures, and a dependency on masons for selection of appropriate design to be used for construction. The presence of a single or double pit substructure is more easily identified in such surveys.

To identify the retrofitting needs of superstructures, because they are buried in the ground and inaccessible for observation during survey or inspection, surveyors rely on information from families to understand the design of the junction chamber, and the layout and connections of pipes with the junction chamber and pits. The information received is therefore prone to the same risks as the information pertaining to substructures of toilets.

It can be possible to conduct interviews with masons who have constructed toilets to ascertain details of the substructure and superstructure and ascertain whether these have been installed/constructed in accordance with standard designs, or whether design and construction has deviated from standard design to the extent that the toilet qualifies for retrofitting. Although the technical feedback from masons is more reliable than user feedback received in surveys, there is also the risk of inaccurate information due to the survey exercise being viewed as a technical audit by the masons or Gram Panchayats.

Only the visible parts of the toilet such as toilet pan, p trap (Water Seal), footrest, size of platform, door, ventilators, taps or water availability and roof can be inspected for retrofitting needs of the toilets by the surveyors.

Given the limitations of the methods being used to identify retrofitting needs and the subsequent actions required to avoid the risk of direct contact of sanitation workers with human excreta, the job of designing, costing, programming and financing retrofitting needs under SBM-G is a highly challenging area of work.

During group discussions in field visits rural communities observed that often, given the practical and affordability challenges of retrofitting of toilets, they prefer to opt for complete replacement of existing substructure to toilets which are perceived to be better technologies.

Construction challenges that require retrofitting

As previously highlighted, although necessary, the construction of second leach pits in retrofitting may not be urgent. Where there are space constraints it is preferable to convert the existing single leach pit into a bio tank or septic tank with soak pit, over creation of a second leach pit (particularly if the area is waterlogged or high-water table area).

Retrofitting where specific customisation to the standard design of toilet substructures is required in order to make it safe and user friendly should be prioritised. Most poorly constructed substructures of toilet in use, if unsafe, will require switching to another technology or design type due to cleaning issues as well and as the technical design of new technology may be significantly different from existing structures.

Similarly, retrofitting of superstructure deviations must be prioritised. This may include providing a junction box, safe roof material, good ventilation and entry of natural light, an internal and external latch, water access near the toilet and P trap. Most of the superstructures of unsafe toilets will, like the substructure, require switching to another technology or design type due to cleaning issues and because the technical design of new technology may be significantly different from existing structures.

Considering the scale of some common challenges as outlined in the section above, some of the following points can be considered for retrofitting of existing toilets.

Substructure retrofitting

- Single leach pit toilets can be considered for conversion into TPPF toilet through the construction of another leach pit and a junction chamber where there are good soil conditions, ground water level is 1.5 m or below from bottom of pit (even during monsoon season), is not a flood prone area, and where a space of at least 1m between the leach pits outer walls can be achieved.
- Wherever missing in leach pit toilets a Y junction chamber must be provided and connected to both the leach pits separately as part of retrofitting.
- Septic tanks without soak pits, if space allows, can be retrofitted by constructing a soak pit and linking it to the existing septic tank.
- In some cases, where space is not available for the construction of septic tanks a common seepage trench outside the house can be created for 2-5 households, as per Bureau of India Standards specifications (1985).
- Containment tanks can be retrofitted into a well-constructed septic tank or bio tank (DRDO- FICCI, 2019). However, this may require complete cleaning and disinfection of the exiting containment tank before masons can take over the structure. This is important to ensure that no manual scavenging is involved in the cleaning of tanks and proper tools and equipment are used by sanitation workers. Given the dismal experience from urban India (Goswami, 2018), this looks like a highly challenging task for programme managers of rural sanitation programmes.
- In cases where space is not a constraint, the existing single leach pits can be substituted by an ecological sanitation toilet, tiger toilet, or evapotranspiration toilet depending on users' preferences, space availability and affordability.
- Toilet pans, if broken, can be exchanged with a new rural pan that requires less water or flushing.
- If P Traps (Water Seal) are not present these need to be installed.

Superstructure

- The size of the toilet platform should be user friendly and conform to basic standards for users' convenience.
- Broken doors can be replaced with sturdy, user friendly, and correctly sized doors.
- Latches for locking from inside and outside can be installed if broken.
- A ventilator, if not present, needs to be constructed as per technical guidelines.
- Roofing, if leaking or unsafe, can be replaced with an appropriately designed option as per technical guidelines. Appropriate roofing material can also be chosen to allow natural sunlight in during the day.

- Handwashing arrangements near the toilet should be established where not already present.
- Houses which have a private piped water supply connection should ensure an extension tap is available outside the toilet for handwashing after defecation, and for filling water tanks to store water for use in the toilet and toilet cleaning.
- User friendly features should be added, based on specific needs of people with special needs, children, women and old people. Guidelines for meeting these needs were issued by Ministry of Drinking Water and Sanitation in 2015 (MDWS, 2015).
- Where there is scarcity of space within the household to construct a toilet, the toilet superstructure can be constructed on the roof or first floor, and the substructure on the ground floor.

Financing for retrofitting of toilets under SBM-G

The larger policy question asked of key stakeholders is whether the retrofitting of individual household latrines should be funded under SBM-G. Most respondents felt the need for improving incentives for ODF-S under SBM-G in order to support hardware work related to retrofitting. This was in recognition of the fact that people living below the poverty line may need financial support to undertake identified retrofitting requirements. The work related to retrofitting of a rural toilet may cost anything between INR 500 to INR 8,000, depending upon the type and nature of work.

The shift from open defecation to the construction and use of toilets has been largely attributed to successful behaviour change programmes, many of which used behaviour change communication (BCC), and information, education and communication (IEC) tools to trigger community-led demand for toilets and for change. There is an argument that future policies should not focus on directly financing the hardware required for retrofitting household toilets, but instead provide financial support to approaches that will drive demand and strengthen the supply chain of the necessary equipment and services. This would ensure that hardware is available at low cost for any individual households that are motivated to initiate retrofitting of toilets. Funding should support the sharing of information about retrofitting needs, design of appropriate toilets, trainings of local masons on safe retrofitting of toilets and reinforcement of the BCC/IEC based approaches for ODF-S.

Revolving funds, such as those set up by the women's self-help group Jeevika, for the retrofitting of toilets in interior and rear facing housing blocks in the Araraia districts of Bihar is an example of a successful approach to financing the retrofitting of toilets amongst socially excluded and marginalised communities (SBM-G, 2015).

Since sanitation is a state subject, the DDWS has proposed the funding of retrofitting of toilets or making dysfunctional toilets functional under the following funding streams:
- World Bank Funding to States
- Swachh Bharat Kosh
- 14th Finance Commission Funds
- Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)
- Member of Parliament Local Area Development Scheme (MPLADS)
- State Finance Commission under Providing Core Civic Services
- District Mining Fund for any district affected by mining-related operations
- Corporate Social Responsibility (CSR) Funds

State Governments need to consider the retrofitting needs of toilets in rural areas in their state and based on that issue guidelines for incentivisation/ financing of retrofitting hardware works under various programmes supported by it.

Capacity needs assessment on retrofitting

It was observed during field visits that there is a gap in knowledge and understanding within communities and rural masons about the common technologies (TPPF, septic tank etc.) and functionality elements of a safe toilet.

The field visit interaction with communities revealed that many do not understand that the existing non-user-friendly or dysfunctional toilets can be retrofitted with even a small investment and thought that these toilets need to be replaced by a new one. To generate demand for retrofitting of existing dysfunctional or unusable (real or perceived) toilets, a new BCC/IEC module that focuses on triggering community demand for retrofitting needs to be developed. District/ block teams and masons trained on retrofitting and *swachhagrahi* need to be trained on this module for its application in villages where usage of toilets is reported to be decreasing as a result of technically and geographically inappropriate or non-user-friendly toilet construction or toilets with missing safety and security features.

When interest in supporting cleaning of toilets prior to retrofitting was discussed with masons during field visits their answer was a firm NO. They were repelled by the thought and indicated little enthusiasm for working in a toilet that is in use, but also because they are not trained or willing to undertake cleaning jobs professionally. This is a further barrier to engaging local masons in retrofitting without undertaking significant investment in their education, sensitisation, and removal of the revulsion related to working in used toilets from their mindsets before they are likely to undertake retrofitting jobs comprehensively.

Recommendations

Although under SBM-G considerable policy level planning on the topic of retrofitting and dysfunctional toilets has been carried out, action at state, district, block and village level needs to be prioritised and action plans rolled out. The key recommendations from this rapid topic review on retrofitting are summarised as below.

Needs assessment

There is a need to establish a rapid survey methodology to identify the retrofitting needs in areas where state government or the Gram Panchayats are willing to incentivise retrofitting for families living below the poverty line. Smartphone-based survey methodologies with geo-tagging of toilets could help *swachhagrahis* to quickly map and identify such user families. Software such as mWater could be used for developing and running such a survey nationwide.

Not every defunct toilet can be retrofitted, and the distinction needs to be made between what can be retrofitted and what needs to be replaced completely. It is recommended that states prepare guidelines that clearly differentiate between retrofitting and replacement cases and provide technical guidelines in local languages about how toilets can be retrofitted, also taking into account the most common local deviations from standard construction or design. The golden rule here would be that in case of any doubt that the proposed retrofitting may involve manual scavenging, opt for replacement rather than retrofitting.

Financing

Since the DDWS has already shared that SBM-G funds will not be used for direct financing of retrofitting, states should issue guidelines and schemes for financing retrofitting and its rollout mechanisms. Models such as revolving funds for Self Help Groups can also be considered for supporting poor families in need for retrofitting.

Capacity

Rural masons and *swachhagrahis* are key to ensuring the implementation of retrofitting on the ground. Therefore, investing in their capacities for both triggering demands and offering and implementing technical options and costs of retrofitting is of utmost importance for ensuring ODF-S.

Investment in building the capacity of masons and swachhagrahis for retrofitting of toilets is recommended, with key areas of focus being:

- Technical options for retrofitting and the relevant construction skills (this could be integrated into ongoing module of training of masons being undertaken by NSDC)
- Communication skills for household advisors on retrofitting options and triggering demand for retrofitting. Masons should be part of the training with *swachhagrahi* on BCC/IEC based triggering tool for retrofitting wherever needed
- Behaviour change programme for masons for undertaking retrofitting works for a toilet under use to address revulsion.

Every mason being trained must give assurance that they will work for at least X number of Households in need of retrofitting of toilets post training and help conduct BCC/IEC based sessions on retrofitting in at least Y number of GPs with *swachhagrahi*, where X and Y can be decided by the state government. This will ensure that the trained social capital is utilised for ensuring ODF-S.

Community level BCC/IEC based approaches have been critical in ensuring high usage of toilets constructed under SBM-G when compared to earlier rural sanitation programmes. Triggering demand for retrofitting and sustaining toilets in communities in need of retrofitting is key to ODF Sustainability. New modules of ODF-S may be developed and taken to scale in states and communities in need of retrofitting or replacement of toilets for its sustained use. *Swachhagrahis* and masons can be trained on this module of BCC/IEC and to run these sessions at Gram Panchayat level.

It is recommended that a mobile app could be developed in English/Hindi/local languages to assist rural users with understanding the common retrofitting needs of toilets, the options for retrofitting, and indicative costs. To ensure

effectiveness of this, a pilot project could be established by the DDWS, with support from developmental agencies that have a multi-state footprint across their rural sanitation programmes.

Technical innovation

The design and development of a simple device that would enable a household to know how much a leach pit has filled without opening the lid would be helpful in determining when the junction chamber needs to be switched over, when would be an appropriate time to construct another pit for switching over, and assisting the users of TPPF toilets to manage sludge safely.

Tap connections at each house is critical to sustaining toilets that are functional at household level and must be prioritised to ensure adequate health and hygiene benefits through sustained use of toilets and safe hand washing at critical times. Many of the lagging states need to accelerate progress on providing a tap connection to each household to ensure ODF-S.

Finally, with growing use of septic tanks in rural areas, it is of utmost importance to develop systems of safe transportation and off-site management of faecal sludge. We have not found, so far, any successful and pro-poor model of FSM in rural areas that works at Gram Panchayat level, given the low scales, poor demand and affordability and higher costs of services. Therefore, there is an urgent need to develop and pilot models on rural FSM and learn from this to ensure that septic tanks are connected to safe sanitation services in rural areas.

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