Optimising health benefits of sanitation in rural Africa: critical learnings from India

around toilet technologies and
WASH in schools and health care facilities

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Swachh Bharat Mission: a snapshot

- Largest sanitation campaign
- Monetary incentives for the needy for IHHL promotion
- Large scale awareness and capacity building initiatives
- Pooled technical assistance through development partners, state level institutions and key resource centres
- Measures to ensure involvement of local governments and communities
- Supply chain interventions
- Multi-sectoral approach- programs for schools, child care centres health care facilities, public places, tourism/pilgrimage spots, heritage sites
- Close to 100 million toilets constructed over the last 5 years
- Huge impact on coverage, usage picking up
- Independent status survey- NARSS- and studies
Key lessons for large scale sanitation programs: general

- Clear acceptance that some of the gaps and issues will be part of a large scale initiative
  - Strength of the campaign will be to identify those and time and to address them, than to operate on a denial mode

- Keep and upkeep the appetite for concurrent learnings
  - Promoting openness to criticisms across levels would be beneficial for learning and improvements
  - Institute and leverage changes using action learning measures
  - Concurrent studies and research, to inform rather than to celebrate

- Identifying and addressing institutional constraints to large scale operations
  - Realising scope for corruption and vested interests, and necessary checks and redressal measures
  - Identifying and addressing supply chain gaps, availability
  - Improving skills and scientific knowledge of front line functionaries-masons, mobilisers and managers
  - Building inclusion and accessibility in the program design
Key next steps as suggested:

- Last mile inclusion
- Quality of toilet infrastructure and design appropriateness
- Improving toilet usage
- Sanitation related hygiene behaviours
- Water linkages
- Safe management of faecal matter
Key lessons: Toilet technologies

Lack of toilet use, in many cases, is attributed to problems in toilet construction quality and technologies deployed.
Factors hindering usage
(Immersion study 2019)

- Social activity
- Safety and dignity of women
- Gender
- Elderly
- Large joint family
- Preference for open spaces
- Water
- Toilet cleaning
- Sense of impurity
- Single pits
- (Fear of) Pits filling up
- Limited acceptance of twin pits
- Gaps in toilet construction
- Toilets blocked during rains
- Disconnect to health benefits and Public Health
- Preference for open spaces
- Males preferring OD
- PwD
- Lack of awareness about toilet technology
- Limited acceptance of twin pits
- Safety and dignity of women
- Elderly
- Sense of impurity
• Highlights from the Toilet Technology study in 2017
• covering 8 states, 16 districts, 64 GPs and 1024 households
Mix of substructure technologies

- Twin-leach pit: 57% constructed, 39% under construction
- Single-leach pit: 22% constructed, 36% under construction
- Septic tank: 21% constructed, 24% under construction

[Diagram showing the distribution of constructed and under construction toilets]
Unsafe = unable to prevent contamination
Direct pit (no trap), high risk of leach pits contaminating ground water

Unsafe = will need major upgrades to remain safe beyond 2-3 years

Safety and Sustainability of Toilets

- 31% Unsafe toilets
- 36% Safe, but not sustainable
- 33% Sustainably safe toilets

- 31% Unsafe
- 69% Safe
Proportion of user-friendly toilets

User friendly = solid wall + roof + door with latch + ventilation + natural light + water available
Individual or institution taking the initiative to build toilets

Panchayat representative: 64%
Local mason/contractor: 34%
Family/household’s own initiative: 25%
Contractor from outside the village: 3%
Other: 2%

Technical information provided

Technical information received: 47%
Technical information not received: 52%
Do not know: 13%

Constructing toilets: 37%
Toilets under construction: 8%
**Cost of toilets** - Indian Rupees

- 31% > 20,000
- 32% 12,000 - 20,000
- 58% Do not know cost
- 42% Know cost
- 28% 12,000
- 9% < 12,000

Photo of a toilet.
<table>
<thead>
<tr>
<th></th>
<th>General Caste</th>
<th>Scheduled Castes</th>
<th>Scheduled Tribes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twin leach pits</td>
<td>35%</td>
<td>45%</td>
<td>23%</td>
</tr>
<tr>
<td>Single leach pit</td>
<td>35%</td>
<td>46%</td>
<td>74%</td>
</tr>
<tr>
<td>Septic tank</td>
<td>30%</td>
<td>9%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Issues in onsite sanitation-1

Distance between pits too low; this allows water from one pit to seep into the other; **min distance between pits is 3ft**
Pit is too deep; ideal depth of circular pit is 4ft; if black soil, can dig upto one additional foot.

Photo Credit: Shrikant M. Navrekar
Water source too close to the toilet; water from pit leaches into nearby ground and contaminates the surrounding ground water source; ideal distance to be maintained is more than 10m

Photo Credit: Raman VR
Pipe connecting toilet pan and pit has a bend; connecting pipes must be straight, have the required gradient and have no bends; use of bends makes flushing harder, requires more water and leads to malfunctioning of the toilet.

Photo Credit: Shrikant M. Navrekar
Issues in onsite sanitation-5

Excessive spacing; spaces in the pit are provided for easy passage of gases and water; excessive holes allow fecal matter to leach as well; holes should be in alternative layers with number of holes per layer - 6 to 8; individual hole should be 2 inches wide

Photo Credit: Shrikant M. Navrekar
Single pit; there is no scope for change over to another pit when full; once full people tend to stop using the toilet and start defecating in the open.

Photo Credit: Shrikant M. Navrekar
Vent pipe from pit; vent pipe allows passage of gases; in twin pit, gases pass into soil and so no need for a vent; vent pipe will make surrounding smell and if not covered will attract flies into the pit.

Photo Credit: Shrikant M. Navrekar
Key lessons on toilet technology

- Toilet technologies need to be appropriate:
  - To the geographical context and terrains and water table
    - Sustainable designs for sub-structure
    - Inclusive and accessible superstructure designs for children, women, age-old, PwDs and transgender groups
  - For the cultural context- acceptability- the case of twin leach pits
  - To promote user-friendliness and usage by all

- Users, masons and managers need to know the basics of designs and technological features and the need and ways of protecting water sources- guidebooks and reference manuals in popular languages

- Water (India context) and handwashing infrastructure needs to be prioritised

- Faecal matter / excreta management solutions and technologies to be introduced as required
Need of retrofitting or regular course correction

- Reality checks about appropriateness of technologies
- Localised solution conclaves- identification of problems and solutions
- Course correction initiatives- necessary corrections or retrofitting to improve technologies
- Sanitation safety incorporated in ODF narrative
  - To strengthen toilet technology, water and health linkages, both in awareness and action
- Regulatory measures introduced and enforced
  - Norms for IHHLs and public community toilets including sanitation safety
  - Norms for safe emptying, transportation and treatment
  - Agricultural research linkages for using the converted wastes- both from onsite and offsite sanitation
Toilet Technology solution conclave held in Samastipur, a district of Bihar: key recommendations

- Awareness generation about:
  - Common technology-related challenges and implications on health and environment
  - Need for course correction/retrofitting
  - Training of community, masons, front line workers and local decision makers
  - Identification of technology-related challenges
  - Appropriate course correction options
  - Usage and maintenance of corrected/retrofitted toilets
  - Addressing beliefs around ‘impurity’ of toilets
  - Household level assessment of technology issues
- Finalization of solutions based on:
  - water table, terrain, space constraints, toilet use situation, material and cost requirements
- Convergence with other government programmes to cover material and labour costs
- Ensuring availability of materials such as rural pans, inoculum for bio-digestor toilets
- Monitoring of course correction/retrofitting drive as well as of adoption and regular usage of toilets
<table>
<thead>
<tr>
<th>Settlement pattern</th>
<th>Considerations</th>
<th>Containment</th>
<th>Emptying + Transportation</th>
<th>Treatment + Reuse/Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban growth areas, census towns, villages along highways</td>
<td>Prevalence of septic tanks; twin pits not feasible</td>
<td>Enforce septic tank regulations</td>
<td>Mechanical emptying by regulated private sector</td>
<td>Faecal sludge pre-treatment</td>
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<td>Bespoke faecal sludge treatment plants</td>
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<td></td>
<td></td>
<td>Co-treatment with greywater</td>
</tr>
<tr>
<td>Dense rural villages: big, compact villages</td>
<td>Presence of septic tanks; twin pits not feasible</td>
<td>Enforce septic tank regulation; twin pit improvements</td>
<td>Cluster areas and explore public-private partnerships</td>
<td>Bespoke faecal sludge treatment plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trenches burial</td>
</tr>
<tr>
<td>Compact rural: low density area with medium compact villages</td>
<td>Mix of containment technology options</td>
<td>Enforce septic tank regulation; twin pit improvements</td>
<td>Scheduled desludging by public honey-sucker services; promote safe emptying and address caste</td>
<td>Trenches burial</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Explore safe use for agricultural purposes</td>
</tr>
<tr>
<td>Sparse rural: scattered or small villages</td>
<td>Mix of containment technologies; twin pits ideal</td>
<td>Twin pit promotion and improvements</td>
<td>Promote safe emptying and address caste</td>
<td>Safely abandon; explore safe use for agricultural purposes</td>
</tr>
<tr>
<td>Challenging geographies: high water table, coastal, flood-prone, rocky, remote areas</td>
<td>High cost of safe sanitation services</td>
<td>Context-dependent technologies</td>
<td>Context-dependent solutions</td>
<td>Context-dependent solutions</td>
</tr>
</tbody>
</table>

Need of context appropriate FSM solutions in rural areas - lessons from India
WASH in Schools
The benefits of WASH in schools:

- Reduced illness due to WASH related infections
- Increased attendance
- Reduced drop outs
- Improved academic performance
- Inclusive development

The SBM introduced Swachh Vidyalaya initiative, leading to (JMP 2016):

- India has (with 24 other countries) reduced the proportion of schools with no drinking water service by more than 5% since 2010 from 17% to 9%.
- India has (with 15 other countries) reduced the proportion of schools with no sanitation service by more than 5% since 2010 from 34% to 24%.
- 29% of schools in India report having a toilet accessible to children with special needs, only 14% have at least a ramp and handrail and just 6% also have a wide door for wheelchair entry and support structure inside the toilet.
- Student-toilet ratio: number of girls per toilet is 54; and number of boys per toilet is 63.
School WASH: situation in India

### WASH Ladders for schools in India (JMP 2019)

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Drinking Water</th>
<th>Sanitation</th>
<th>Hygiene</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National</td>
<td>Urban</td>
<td>Rural</td>
</tr>
<tr>
<td>Basic Service</td>
<td>69</td>
<td>72</td>
<td>69</td>
</tr>
<tr>
<td>Limited Service</td>
<td>22</td>
<td>20</td>
<td>21</td>
</tr>
</tbody>
</table>
| No Service       | 9        | 8     | 10    | 24       | 16    | 28    | 41       | 21    | 28    

**Figure 5: Proportion of schools with WASH facilities (ASER 2018)**

- Drinking water availability:
  - 2010: 72.7%
  - 2016: 74%
  - 2018: 74.8%

- Toilet available and usable:
  - 2010: 47.2%
  - 2016: 68.6%
  - 2018: 74.2%

- Girls’ Toilet available and usable:
  - 2010: 32.5%
  - 2016: 61.9%
  - 2018: 66.4%
Key lessons for school WASH

- Schools and child care centres having functional and adequate toilet facilities important
- Along with toilets, running water and hand hygiene facilities to be prioritised
- Children to toilet ratio is crucial to maintain
- Regular cleaning and maintenance systems and allocations
- Attention to school sanitation work, to avoid discrimination of the disadvantaged sections
WASH in Health Care Facilities
WASH in Health Care Facilities

- Adequate water- sanitation hygiene in HCFs- a huge challenge for the rural and remote areas

**SBM introduced important programs and initiatives like:**
- Kayakalp, and evaluation tool for WASH in health care facilities and ranking/ rewarding health care facilities based on WASH infrastructure and services
- Swachh Swasth Sarvatra – improving facility levels
- Visible improvement in various levels of facilities, with a lot of further scope to improve

**OPPORTUNITIES**
- Disease surveillance, and surveillance for anti-microbial resistance
- Capacitating health care providers and staff (Dakshata Guidelines)
- Building the capacity of cleaners to improve hygiene in maternity and newborn units
- Strengthening mandated institutions (Facility Management Committees, District Health Society)
Key lessons for WASH in HCFs

- Institutions are an integral part of community - include them in promotional efforts
- Develop standards, guidance and processes, including for infection prevention and hand hygiene management
  - Standards and regulations to include all institutions in the community irrespective of ownership and management
- Ensure adequate allocations for WASH in HCFs, for public facilities
- Increase role of local governments in institutional O&M and quality of care including WASH services
- Continuous independent tracking of adherence to WASH standards in institutions
- Medical waste management processes, protocols and systems, including for preventing water contamination and antimicrobial resistance
Thanks

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Select contents used from:
Sulabh International presentation
DRDO presentation
MDWS Presentation
Indian rural and urban pans with water seal:

Indian rural pan is usually ceramic and has a slope of 20-29 degree. The water seal is used to prevent flies and odours coming back up the pipe. Urban pan, on the other hand will have a lesser slope.
**P-trap and pipe:** A P trap is a plumbing device which prevents odorous gas in plumbing drains and sewers from rising up through a toilet into home. A P trap is a U-shaped section of pipe that holds water. A **pipe** is a tubular section or hollow cylinder used mainly to convey substances which can flow — liquids and gases (fluids), slurries, powders and masses of small solids.
Twin Leach Pit: The twin pit water seal toilet is a complete on-site sanitation measure at household level. The main component of such a toilet are the two pits used alternatively, a pan, water seal/trap, squatting platform, junction chamber and a super structure.
Different types of leaching arrangements in twin leach pits

Off set double pits with RCC rings

Off set double pits - brick honey comb
**Single Leach Pit (Off-Set):** It consists of water seal pan, a squatting platform, a junction chamber, a temporary/permanent superstructure and a single pit instead of two pits. The pit is constructed away from the squatting platform and connected to the same by a pipe through a junction chamber.
Single Leach Pit (directly under the toilet): This unit consists of a squatting slab monolithically cast with a cement pan having an in-built water seal. A pit is dug in the ground and the squatting slab is placed over it with a superstructure around it for protection and privacy.
Septic tank (Single chamber) (directly under toilet):
This is a simple storage and settling tank that is located directly below the toilet so that the excreta fall into it through a pipe. The bottom of the pipe is submerged in a liquid in the tank, forming a water seal to prevent escape of flies, mosquitoes and smell.
Septic Tank – Chambers (off-set)

- Air vent
- Household toilet
- Vent pipe
- Pipe carrying wastes from toilets, kitchens and bathrooms
- Two-compartment septic tank
- Overflow pipe to secondary treatment
Septic Tank (Single Chamber)- off-set

Important:
Only shallow pits should be dug close to the home to avoid subsidence.

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Shankar Balram
Toilet: This model is more suitable for areas where people use water for ablution. It is basically combination of latrine and specifically designed septic tank.
Indian Ecosan Toilet: The eco-san model consists of the double-vault compost latrine consisting of two water-tight chambers (vaults) to collect faeces. The Urine is collected separately as the contents of the vault have to be kept relatively dry.
DRDO Bio-digester toilets
Bacteria/inoculum developed by DRDO

Hermetically sealed Reaction Vessel/Bio Digester tank for anaerobic treatment

Consortium of acclimatised microorganisms (Inoculum) which can withstand different climatic conditions and routine toilet cleaning agents

Bacteria immobilisation Matrix Reed Bed for Aerobic secondary treatment of water Effluent Tank
Evapotranspiration Toilets
Sato – making twin pits easier
Designs by Sulabh
Sulabhb Options
Lining of Sulabh pits

Can be lined from locally available materials

Brick

Stone

Wooden Logs

Cement Concrete Ring

Burnt Clay
Community biogas digester from Sulabh

The water discharged is treated by passing it through sedimentation chamber, sand filter, aeration tank, charcoal and through ultra violet rays.
Accessible toilets
Dry Toilet: A dry toilet is a toilet that operates without flush water. The dry toilet may be a raised pedestal on which the user can sit, or a squat pan over which the user squats.