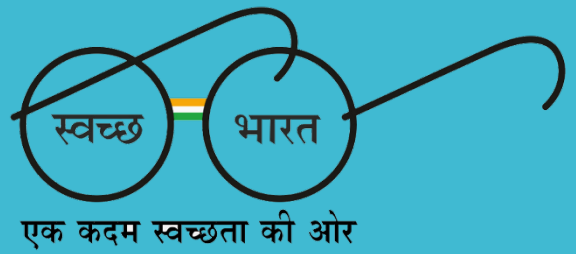
Optimising health benefits of sanitation in rural Africa: critical learnings from India

around toilet technologies and
WASH in schools and health care facilities

Raman VR
Head of Policy | WaterAid India
VRRaman@WaterAid.org



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

SBM: key improvements needed

THE LANCET

https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)30547-1/fulltext

COMMENT | VOLUME 393, ISSUE 10177, P1184-1186, MARCH 23, 2019

Closing the loop in India's sanitation campaign for public health gains

V R Raman • Arundati Muralidharan

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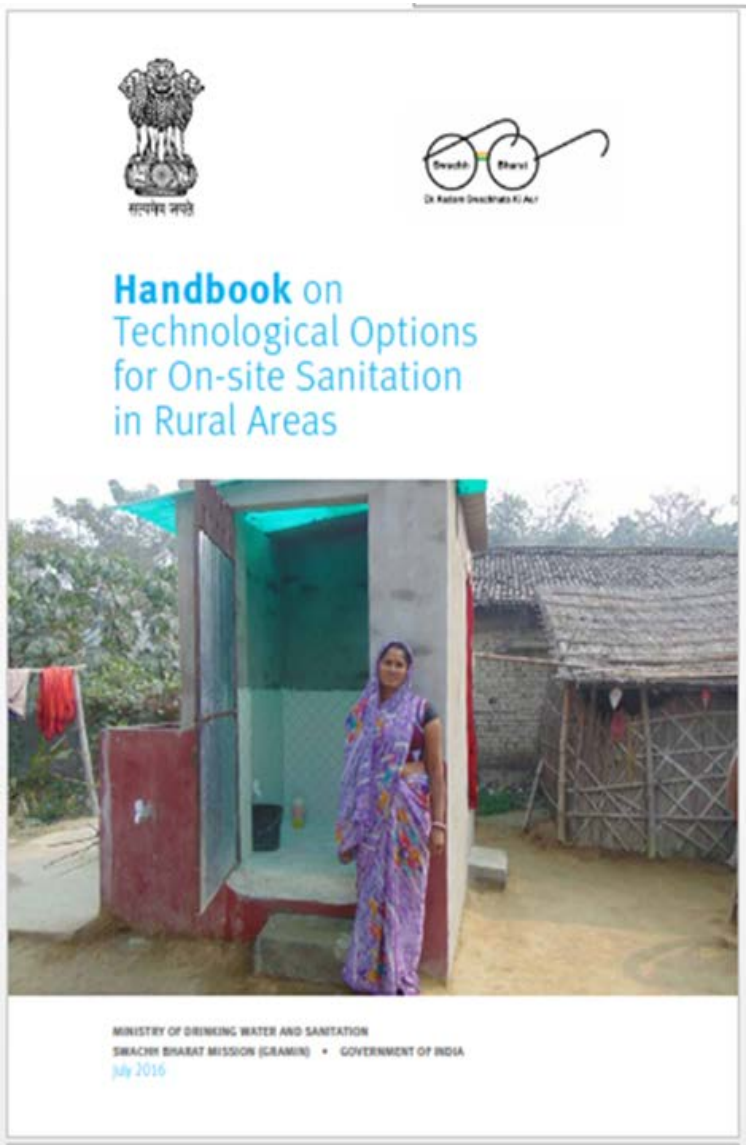
Key next steps as suggested:

- **Last mile inclusion**
- **Quality of toilet infrastructure and design appropriateness**
- **Improving toilet usage**
- **Sanitation related hygiene behaviours**
- **Water linkages**
- **Safe management of faecal matter**

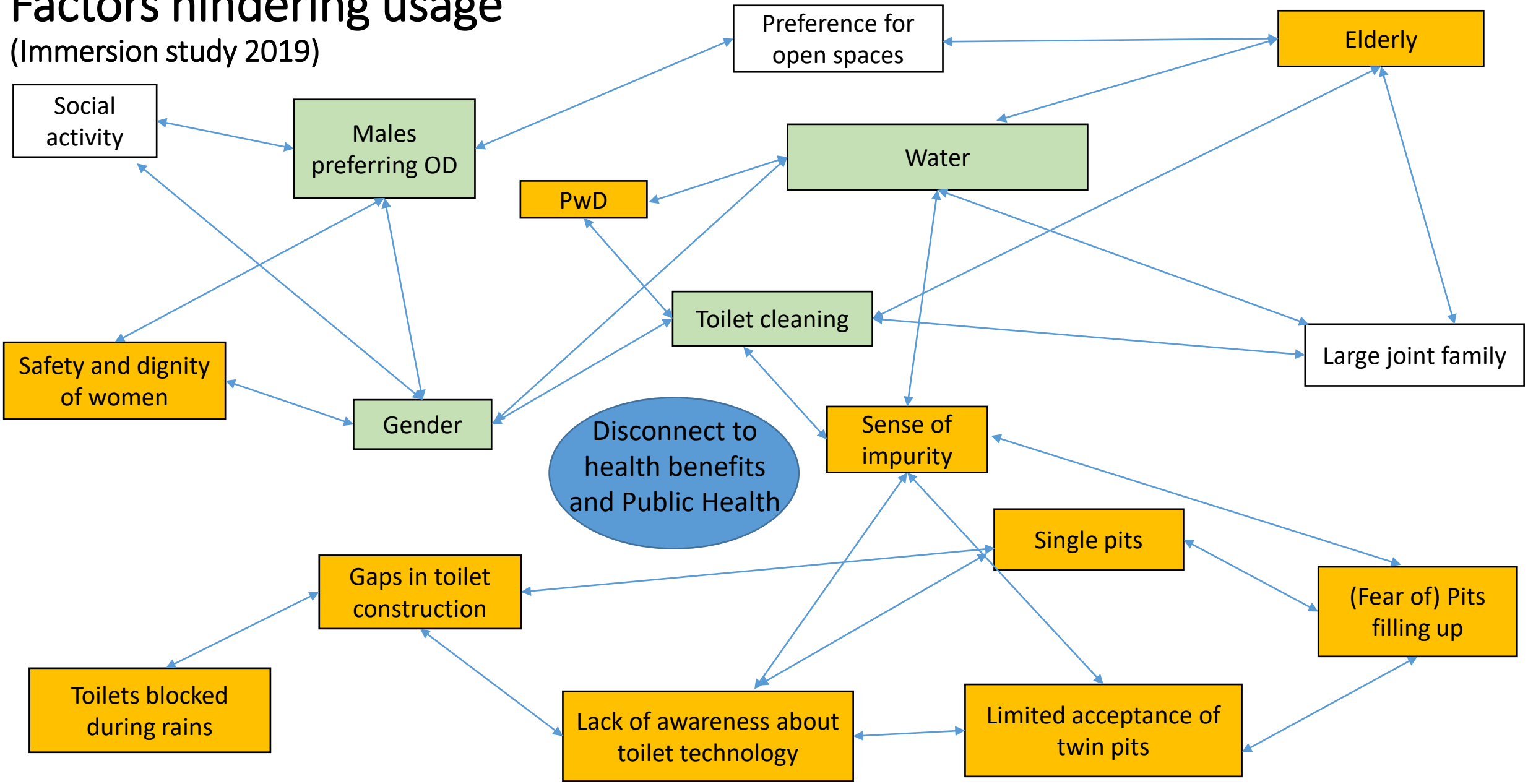


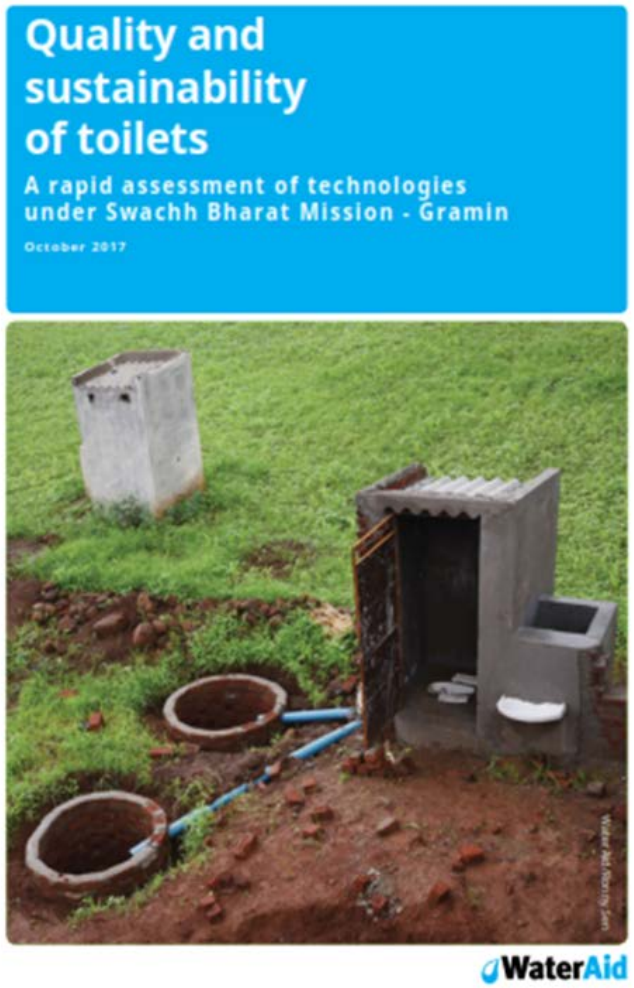
Key lessons: Toilet technologies

Lack of toilet use, in many cases, is attributed to problems in toilet construction quality and technologies deployed

Factors hindering usage

(Immersion study 2019)





- Highlights from the Toilet Technology study in 2017
- covering 8 states, 16 districts, 64 GPs and 1024 households

Mix of substructure technologies

THE HINDU

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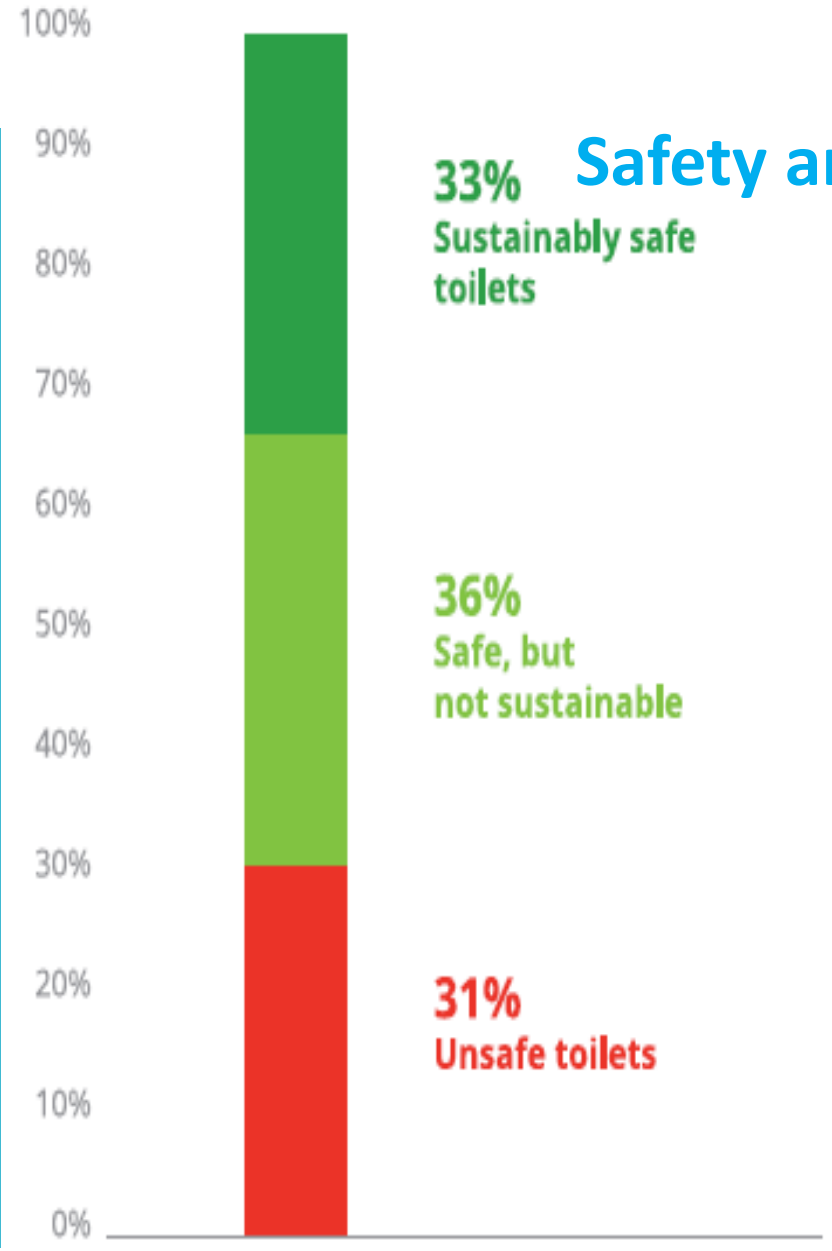
Only 26% of rural toilets use twin-leach pits, finds survey

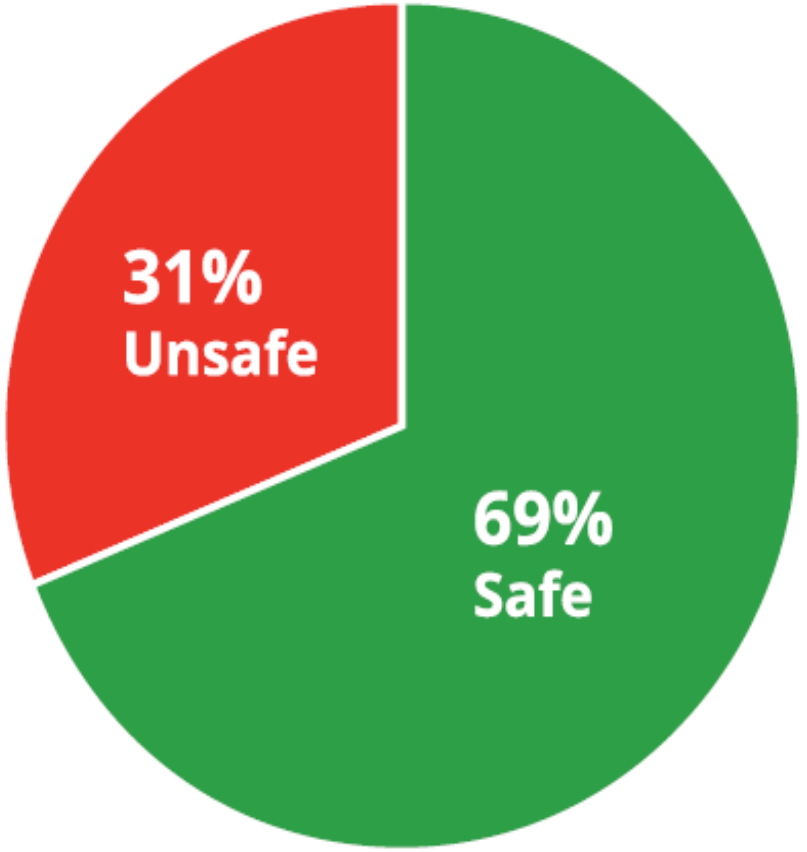
Varun B. Krishnan

Priscilla Jebaraj

NEW DELHI, MARCH 17, 2019 23:30 IST
UPDATED: MARCH 17, 2019 23:30 IST

Safety and Sustainability of Toilets



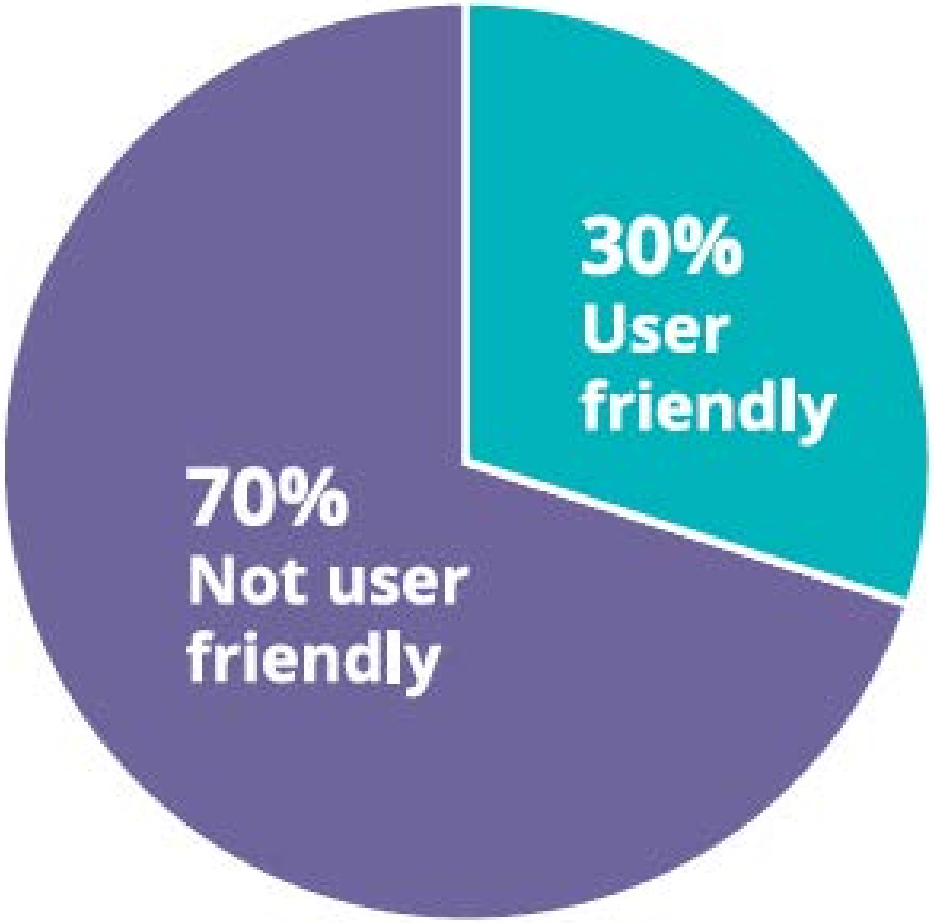


Unsustainable = will need major upgrades to remain safe beyond 2-3 years

Unsafe = unable to prevent contamination

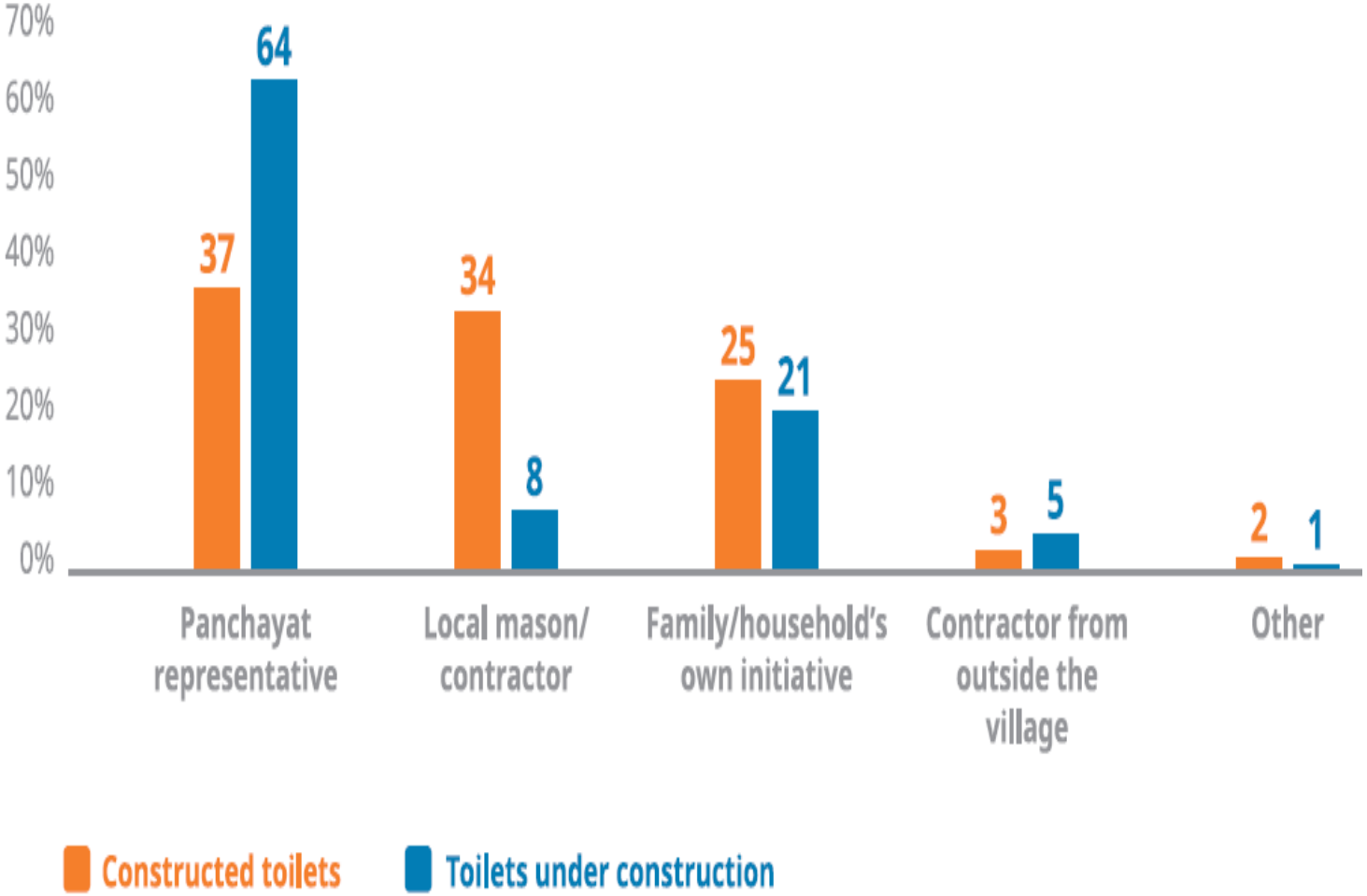
Direct pit (no trap), high risk of leach pits contaminating ground water

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



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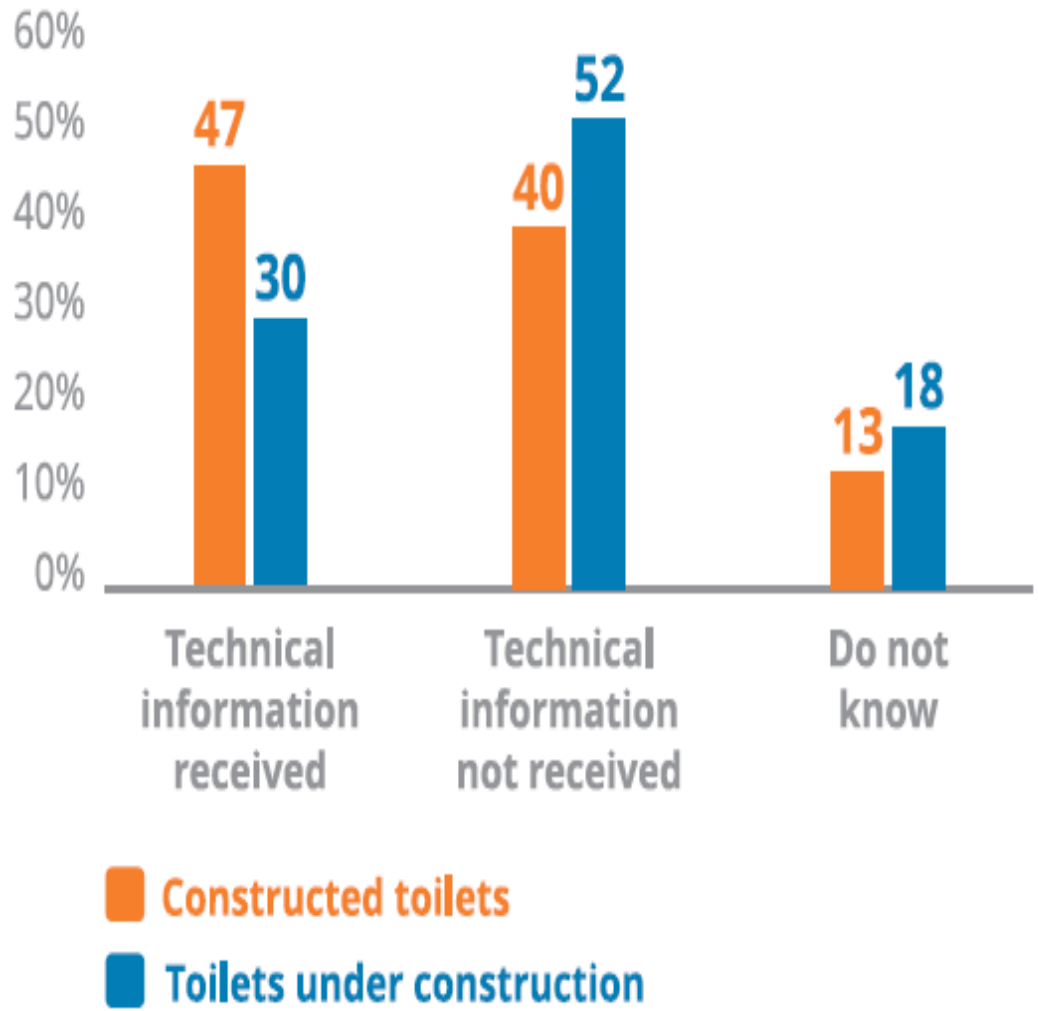


Cost of toilets- Indian Rupees

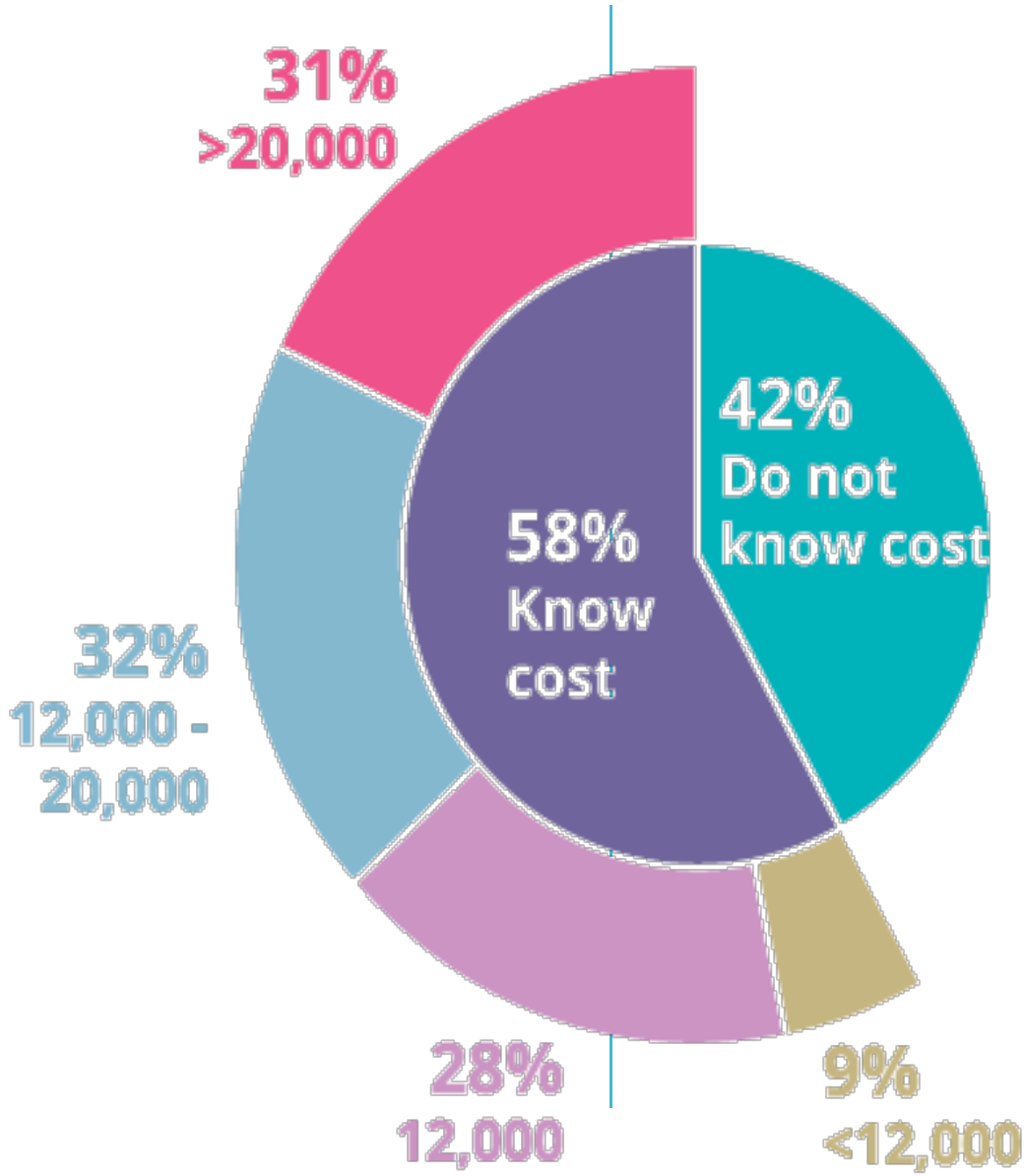


Table 2: Type of toilets under construction by caste

	General Caste	Scheduled Castes	Scheduled Tribes
Twin leach pits	35%	45%	23%
Single leach pit	35%	46%	74%
Septic tank	30%	9%	3%

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

Photo Credit: Shrikant M. Navrekar

Issues in onsite sanitation-2

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

Issues in onsite sanitation-3

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

Issues in onsite sanitation-4

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

Issues in onsite sanitation-6

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

Issues in onsite sanitation-7

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

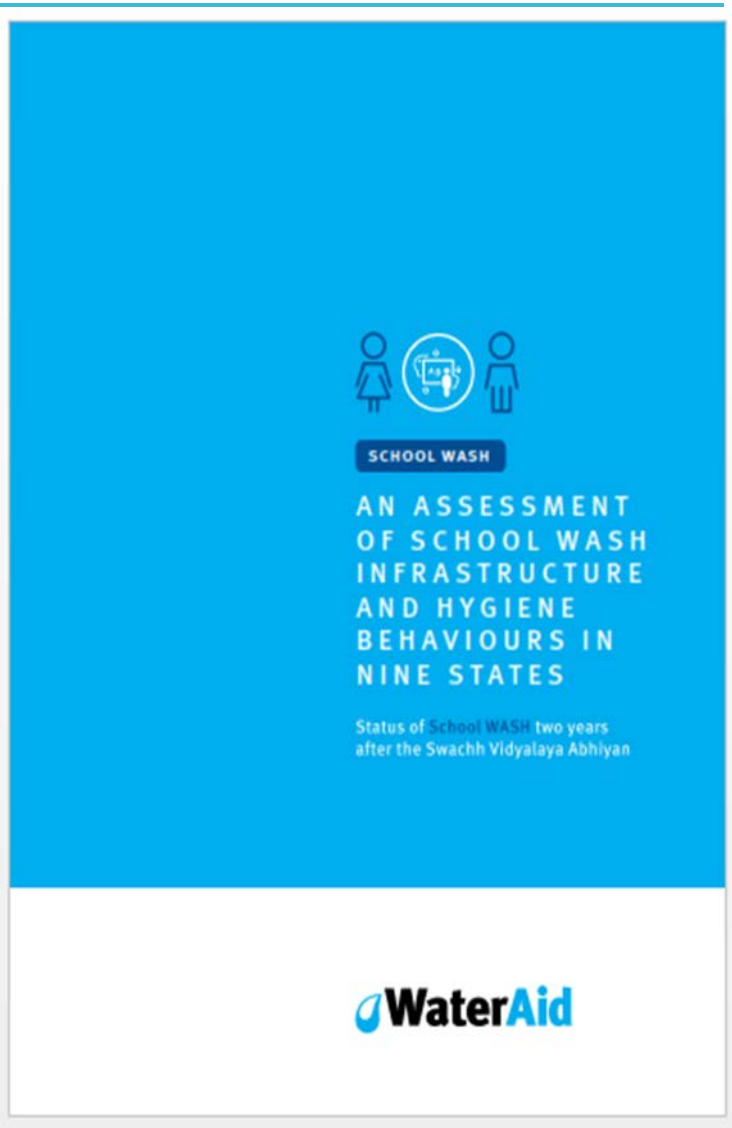
- Reality checks about appropriateness of technologies
- Localised solution conclaves- identification of problems and solutions
- Course correction initiatives- necessary corrections or retrofitting to improve technologies
- Sanitation safety incorporated in ODF narrative
  - To strengthen toilet technology, 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

Need of context appropriate FSM solutions in rural areas- lessons from India

Settlement pattern	Considerations	Containment	Emptying + Transportation	Treatment + Reuse/Disposal
Urban growth areas, census towns, villages along highways	Prevalence of septic tanks; twin pits not feasible	Enforce septic tank regulations	Mechanical emptying by regulated private sector	Faecal sludge pre-treatment Bespoke faecal sludge treatment plants Co-treatment with greywater
Dense rural villages: big, compact villages	Presence of septic tanks; twin pits not feasible	Enforce septic tank regulation; twin pit improvements.	Cluster areas and explore public-private partnerships	Bespoke faecal sludge treatment plants Trenches burial
Compact rural: low density area with medium compact villages	Mix of containment technology options	Enforce septic tank regulation; twin pit improvements	Scheduled desludging by public honey-sucker services; promote safe emptying and address caste	Trenches burial Explore safe use for agricultural purposes
Sparse rural: scattered or small villages	Mix of containment technologies; twin pits ideal	Twin pit promotion and improvements	Promote safe emptying and address caste	Safely abandon; explore safe use for agricultural purposes
Challenging geographies: high water table, coastal, flood-prone, rocky, remote areas	High cost of safe sanitation services	Context-dependent technologies	Context-dependent solutions	Context-dependent solutions



WASH in Schools

WASH in Schools initiatives

The benefits of WASH in schools:

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

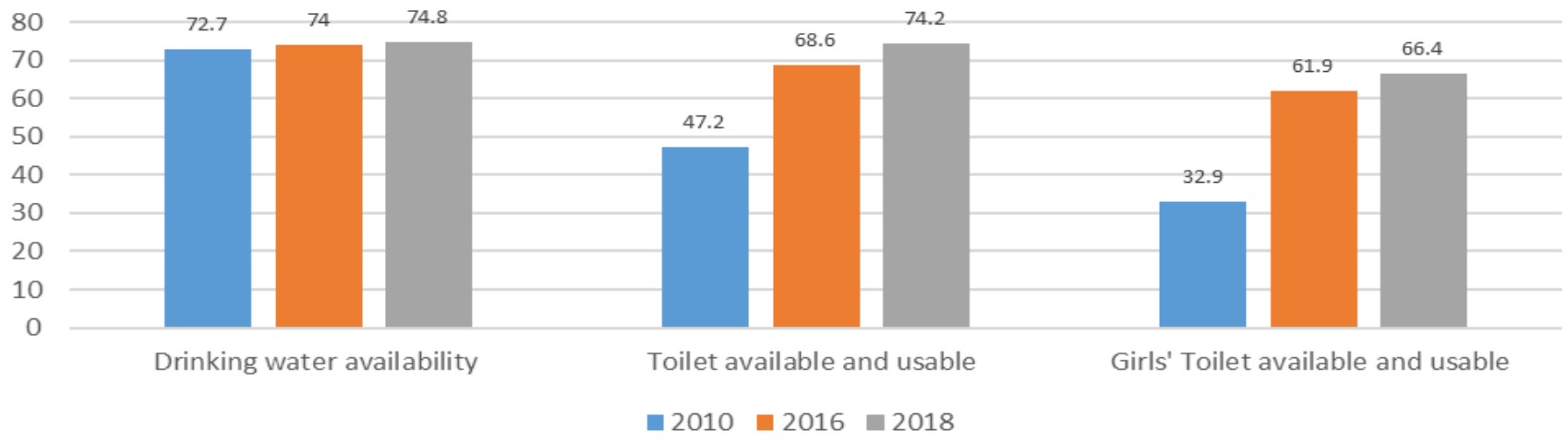
The SBM introduced Swachh Vidyalaya initiative, leading to (JMP 2016):

- 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)									
	Drinking Water			Sanitation			Hygiene		
	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural
Basic Service	69	72	69	73	77	72	54	57	54
Limited Service	22	20	21	3	7	0	5	21	18
No Service	9	8	10	24	16	28	41	21	28

Figure 5: Proportion of s chools with WASH facilities (ASER 2018)



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

WaterAid

Healthy Start

Assessments of WASH in Healthcare Facilities in India

A Snapshot

Water, sanitation, and hygiene (WASH) are fundamental in preventing disease and maintaining good health. Inadequate access to WASH facilities can significantly impact health, and result in adverse consequences from exposure to pathogens. Some diseases are preventable, but may become life-threatening when the person has already lowered immunity, from say, malnutrition.

India has one of the highest rates of maternal and infant mortality in the world: 167 maternal deaths per 100,000 live births[1], and 28 neonatal deaths per 1,000 live births[2]. Poor hand hygiene and contaminated surfaces during birth can lead to genital tract infections and sepsis. Approximately eight per cent[3] of maternal deaths are attributed to sepsis alone. With a push towards institutional deliveries stemming from the Janani Shishu Suraksha Yojana (JSSY), improving WASH standards and practices in healthcare facilities (HCFs) can be an essential step towards reducing statistics.

The WHO and UNICEF report[4] on the status of WASH in healthcare facilities especially highlights how critical gaps in WASH can compound health conditions. The report noted that 1) WASH facilities are often absent in healthcare institutions; 2) while water may be available in facilities, the reliability of water and its quality are questionable; 3) WASH coverage varies by type of health facility (primary, secondary, tertiary); 4) national planning for WASH in HCFs is largely lacking; 5) limited availability of data on WASH coverage in HCFs, and 6) improving WASH services and behaviours can have beneficial impacts at home as well. Studies suggest that clean birth practices in homes and facilities are associated with reduced sepsis and tetanus, a decline in neonatal deaths, and handwashing with soap and water by birth attendants' results in protection against cord infections[5]. Hospitals with poor WASH facilities were found to have higher rates of maternal mortality[6].

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)

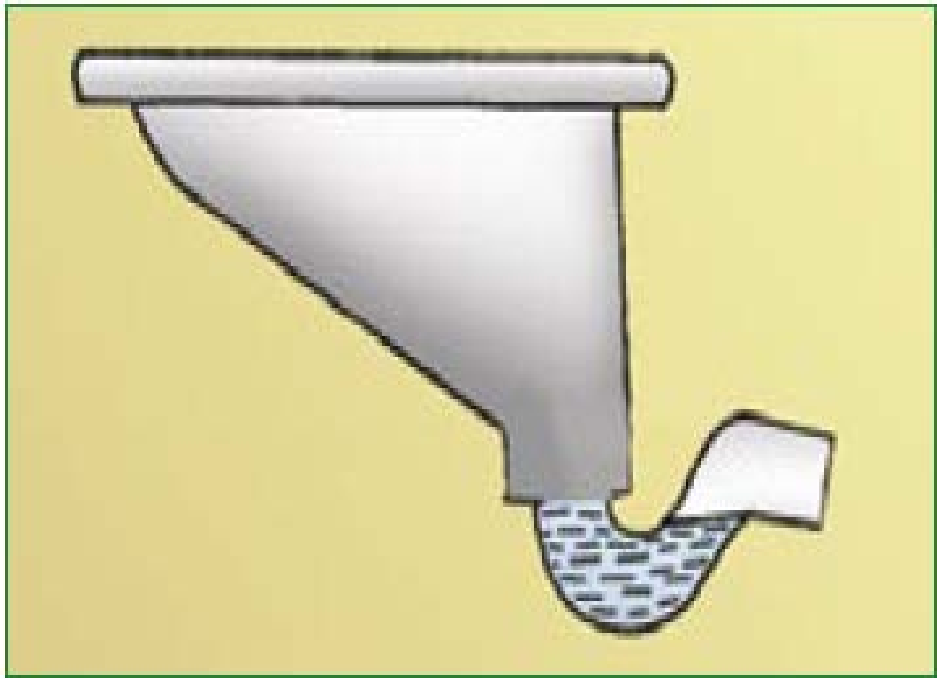
Key lessons for WASH in HCFs

- 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

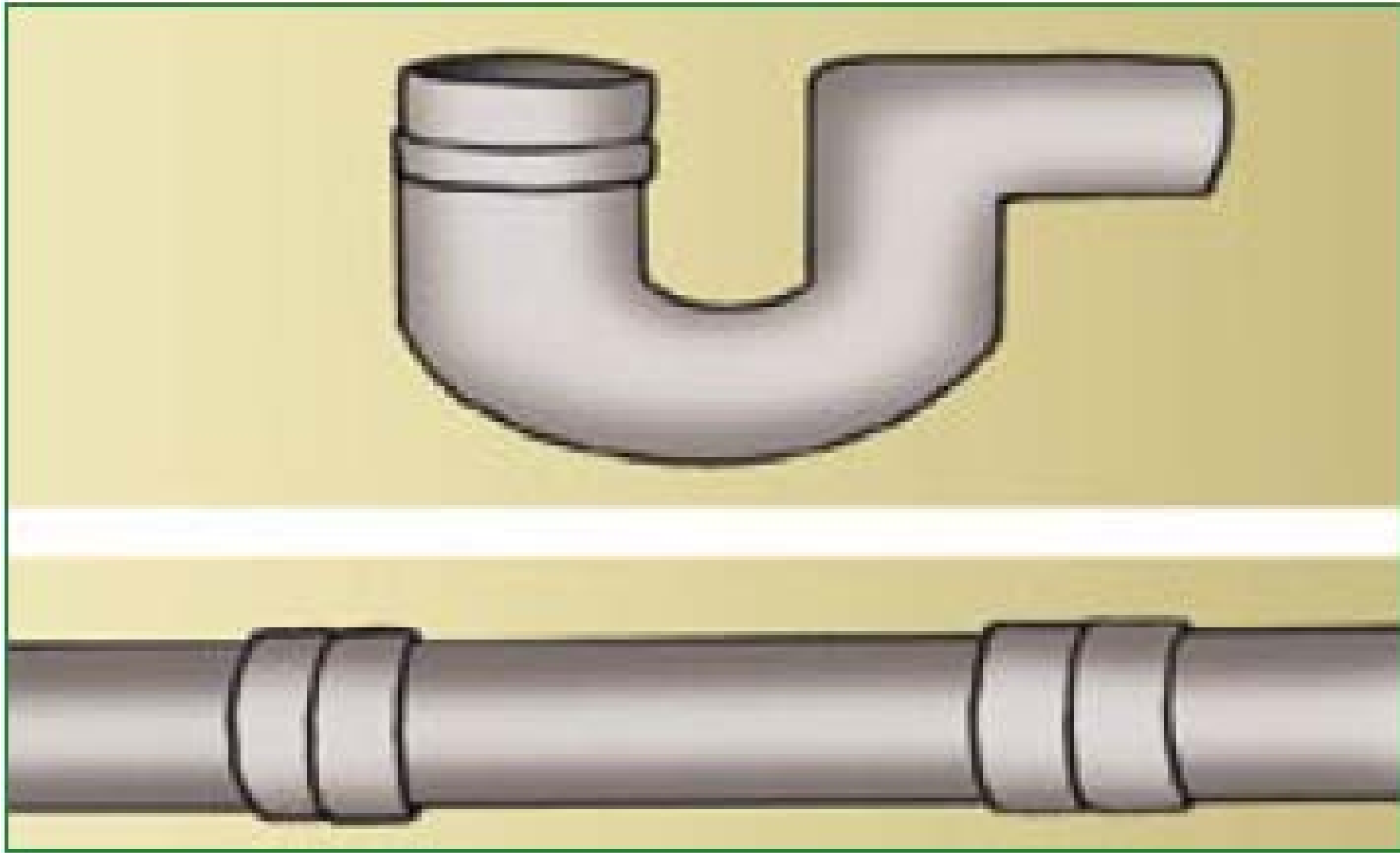
Thanks

Acknowledgements to the inputs from:
Puneet Srivastava, WaterAid
Anurag Gupta, WaterAid
Select contents used from:
Sulabh International presentation
DRDO presentation
MDWS Presentation

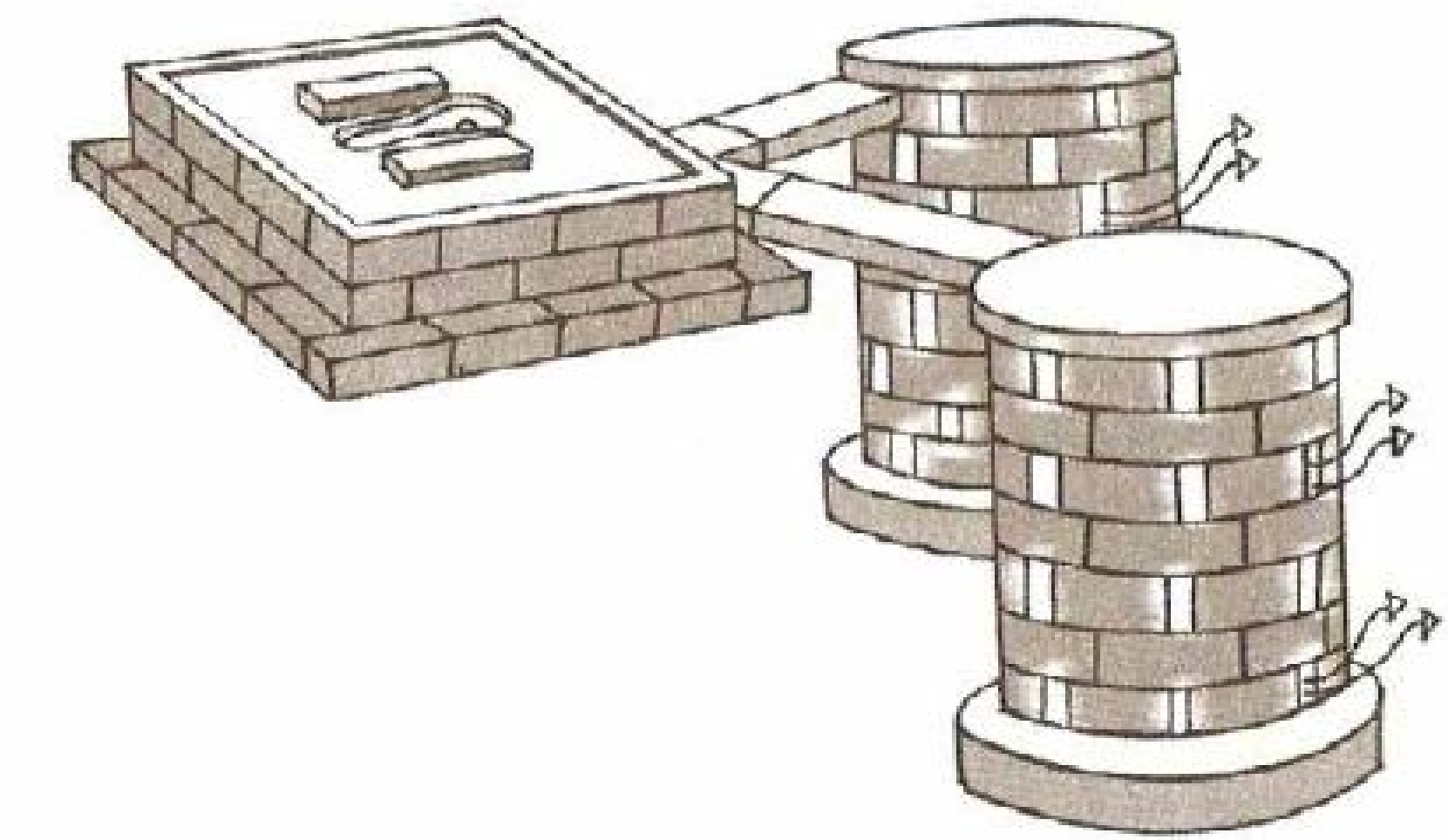
Indian rural and urban pans with water seal : Indian rural pan is usually ceramic and has a slope of 20-29 degree. The water seal is used to prevent flies and odours coming back up the pipe. Urban pan, on the other hand will have a lesser slope



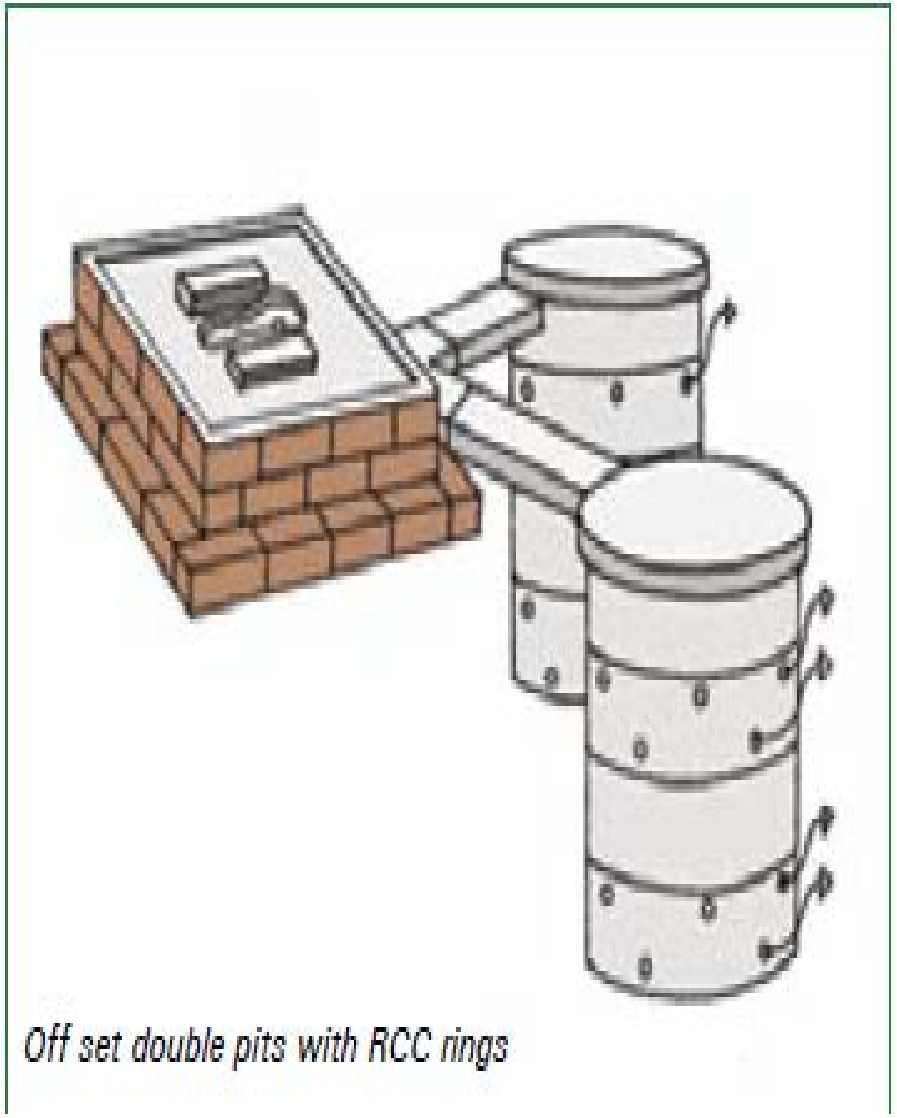
P-trap and pipe: A P trap is a plumbing device which prevents odorous gas in plumbing drains and sewers from rising up through a toilet into home. A P trap is a U-shaped section of pipe that holds water. A **pipe** is a tubular section or hollow cylinder used mainly to convey substances which can flow — liquids and gases (fluids), slurries, powders and masses of small solids.



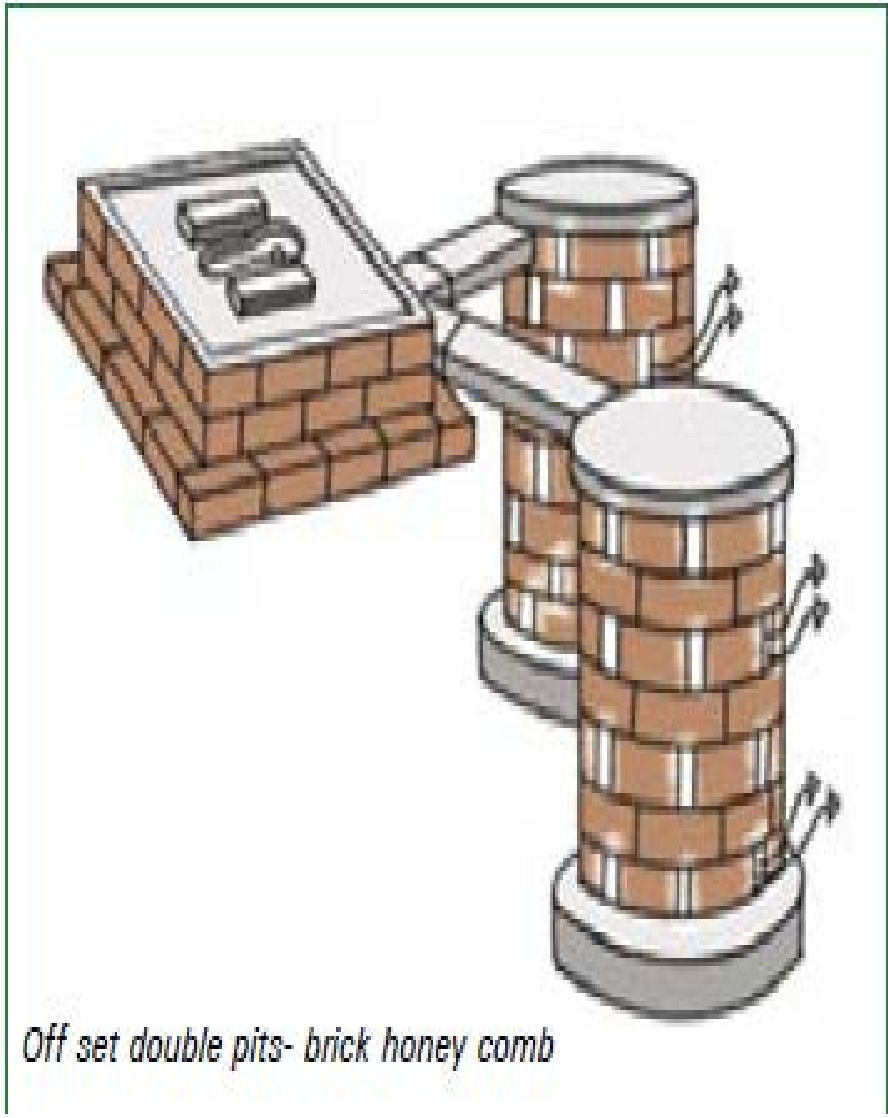
Twin Leach Pit: The twin pit water seal toilet is a complete on-site sanitation measure at household level. The main component of such a toilet are the two pits used alternatively, a pan, water seal/trap, squatting platform, junction chamber and a super structure.



Different types of leaching arrangements in twin leach pits

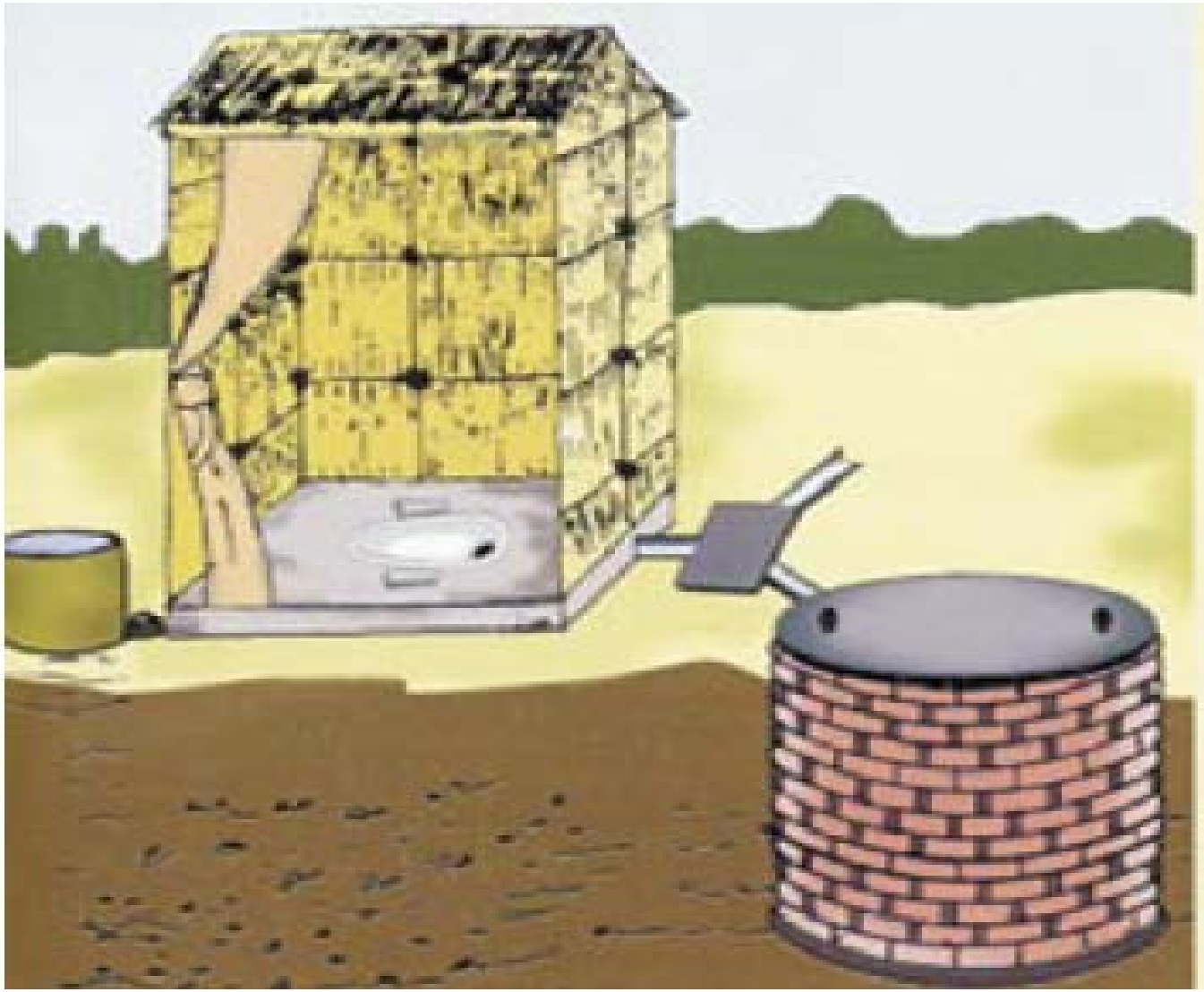


Off set double pits with RCC rings

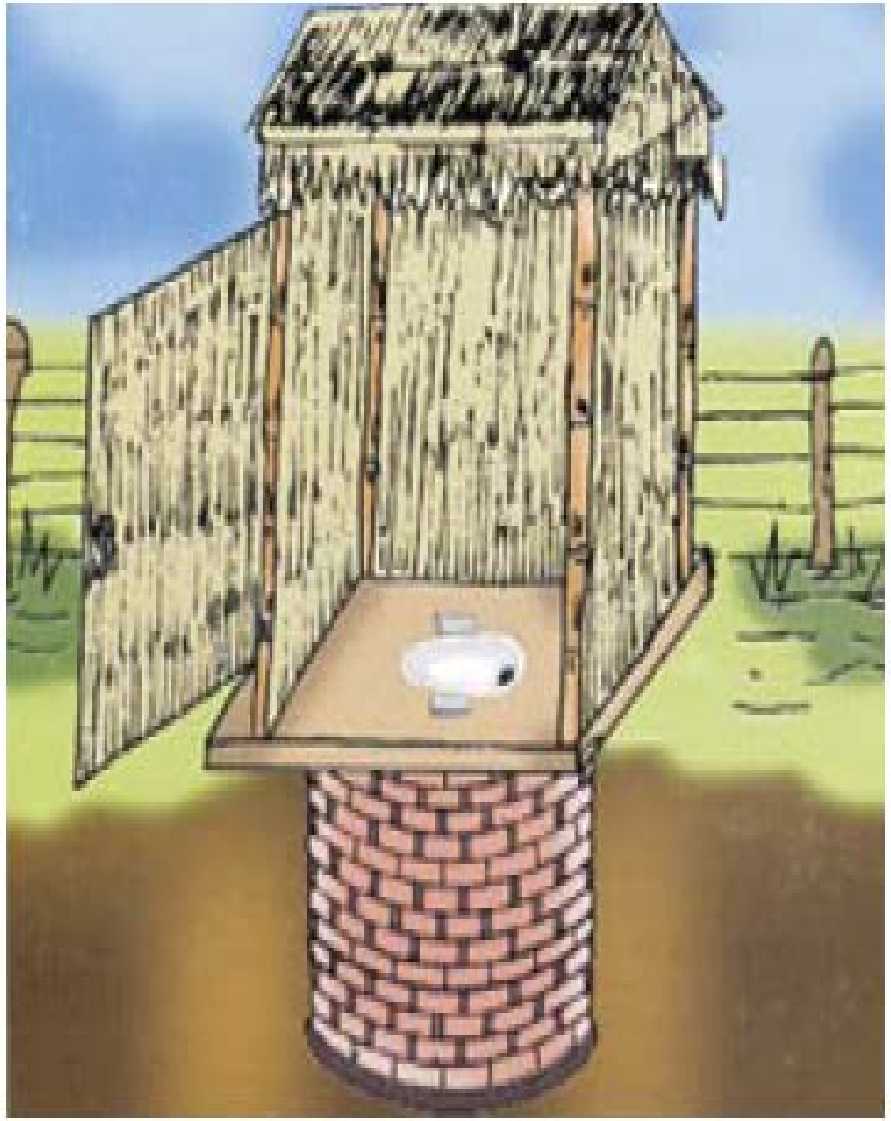


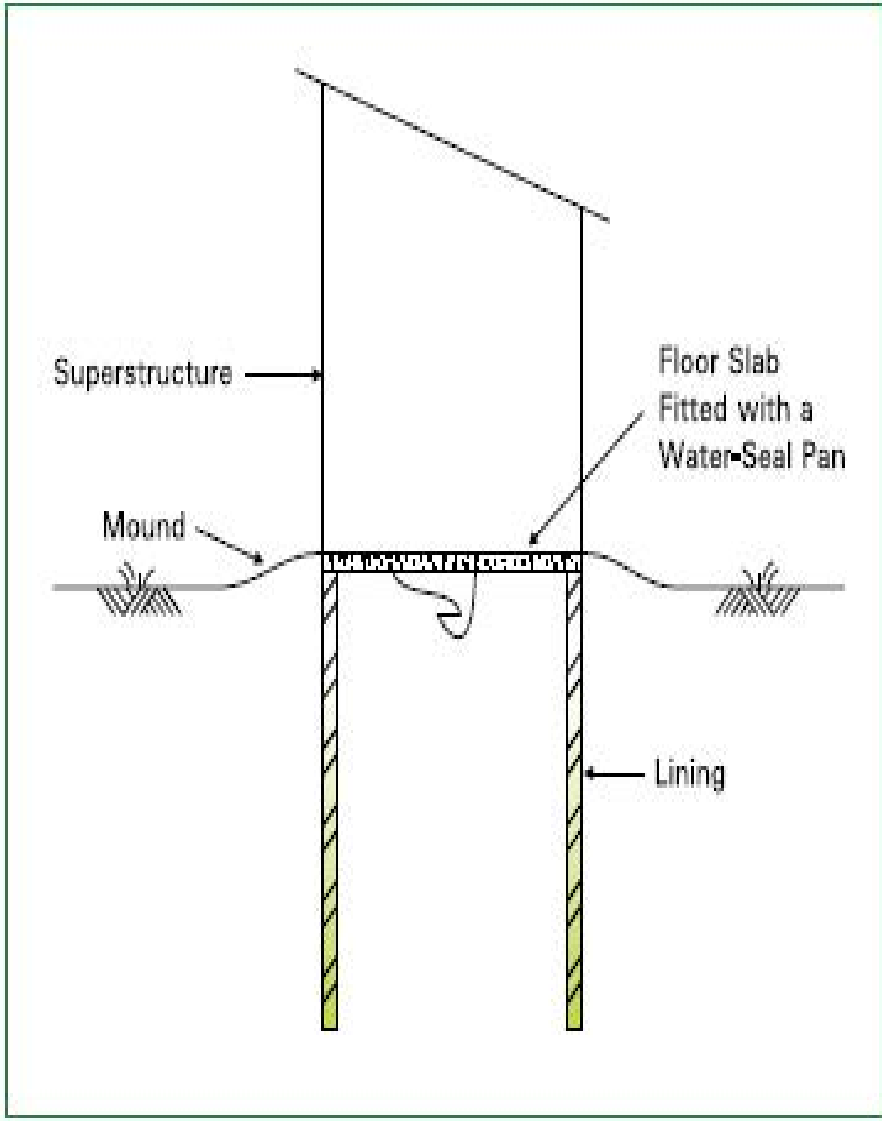
Off set double pits- brick honey comb

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



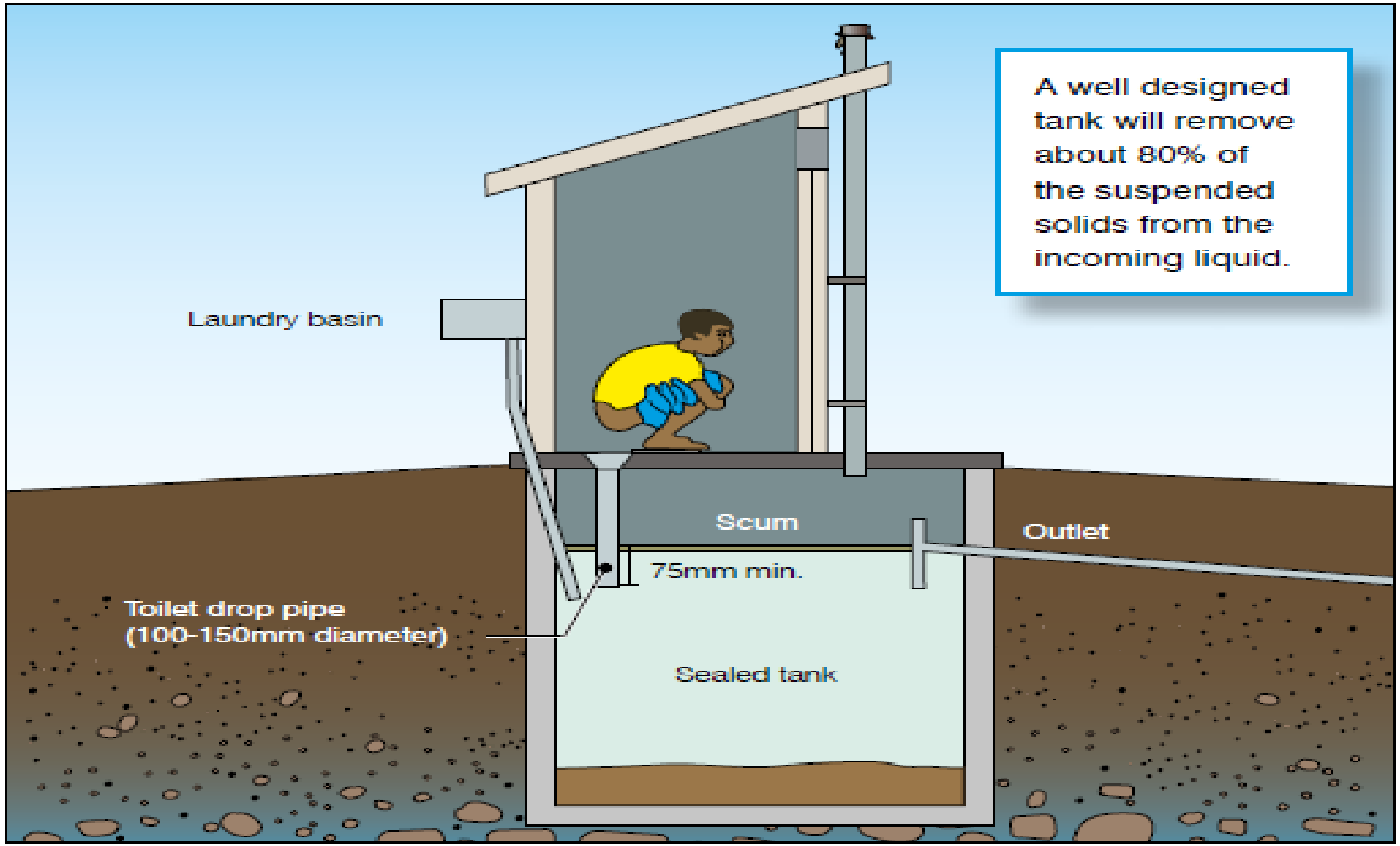
Single Leach Pit (directly under the toilet): This unit consists of a squatting slab monolithically cast with a cement pan having an in-built water seal. A pit is dug in the ground and the squatting slab is placed over it with a superstructure around it for protection and privacy.



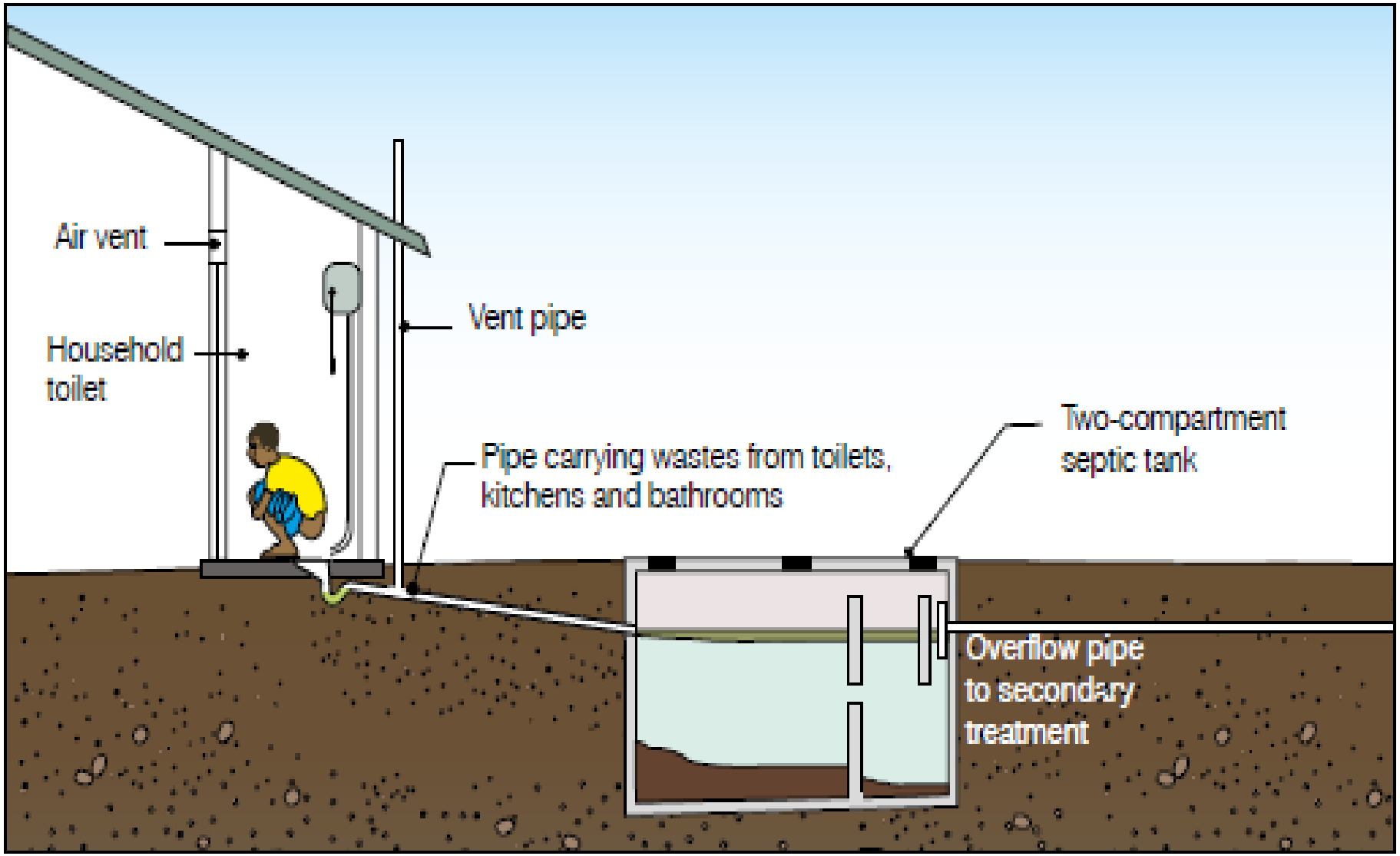


Septic tank (Single chamber) (directly under toilet):

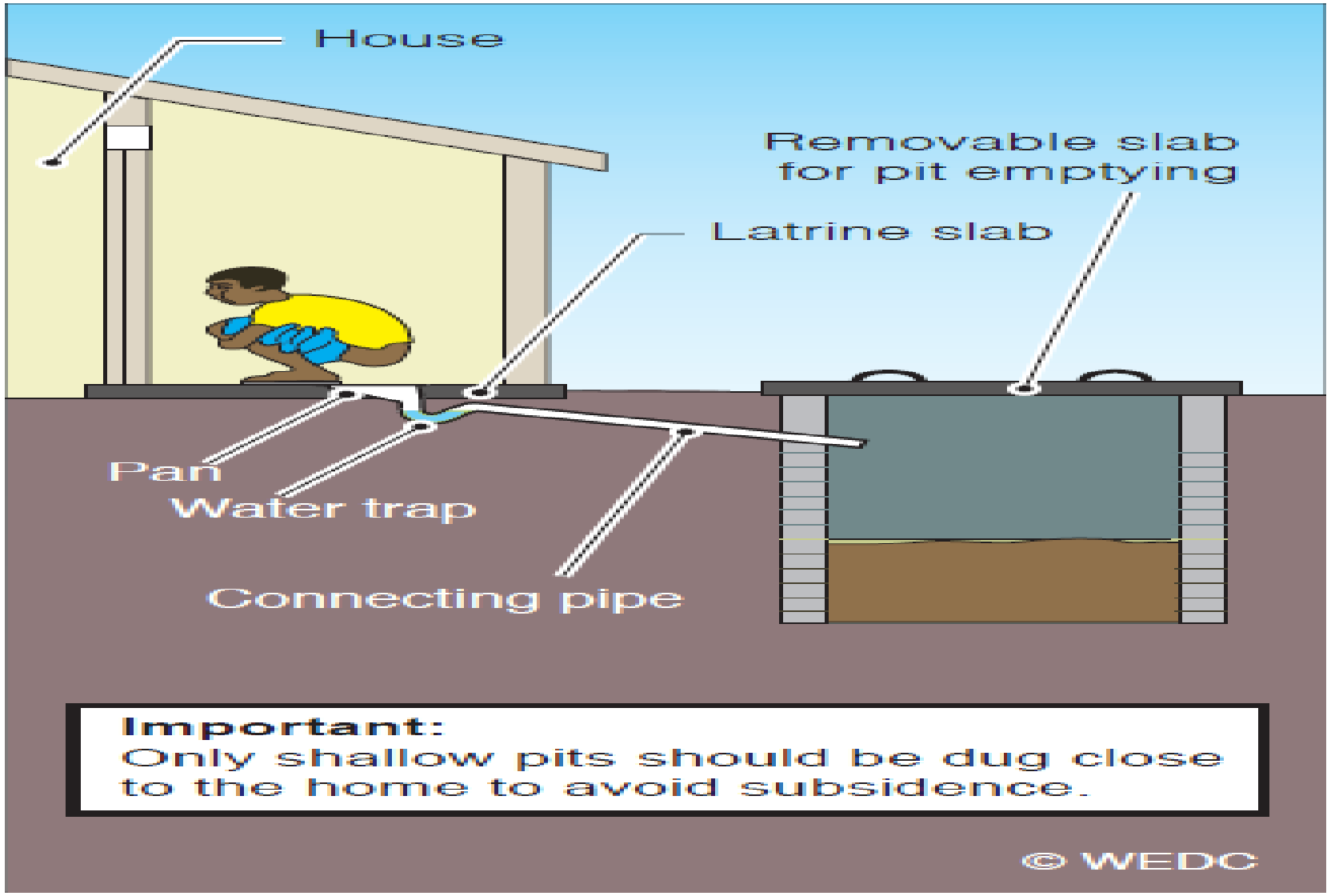
This is a simple storage and settling tank that is located directly below the *toilet* so that the *excreta* fall into it through a pipe. The bottom of the pipe is submerged in a liquid in the tank, forming a *water seal* to prevent escape of flies, mosquitoes and smell



Septic Tank – Chambers (off-set)

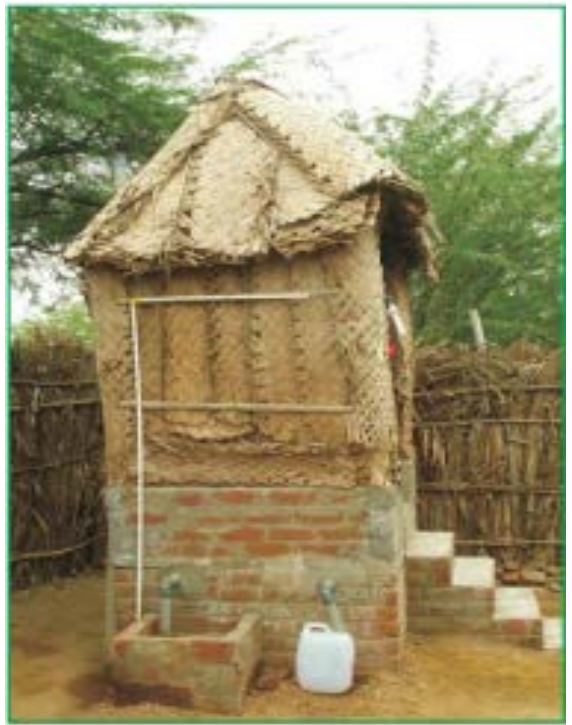


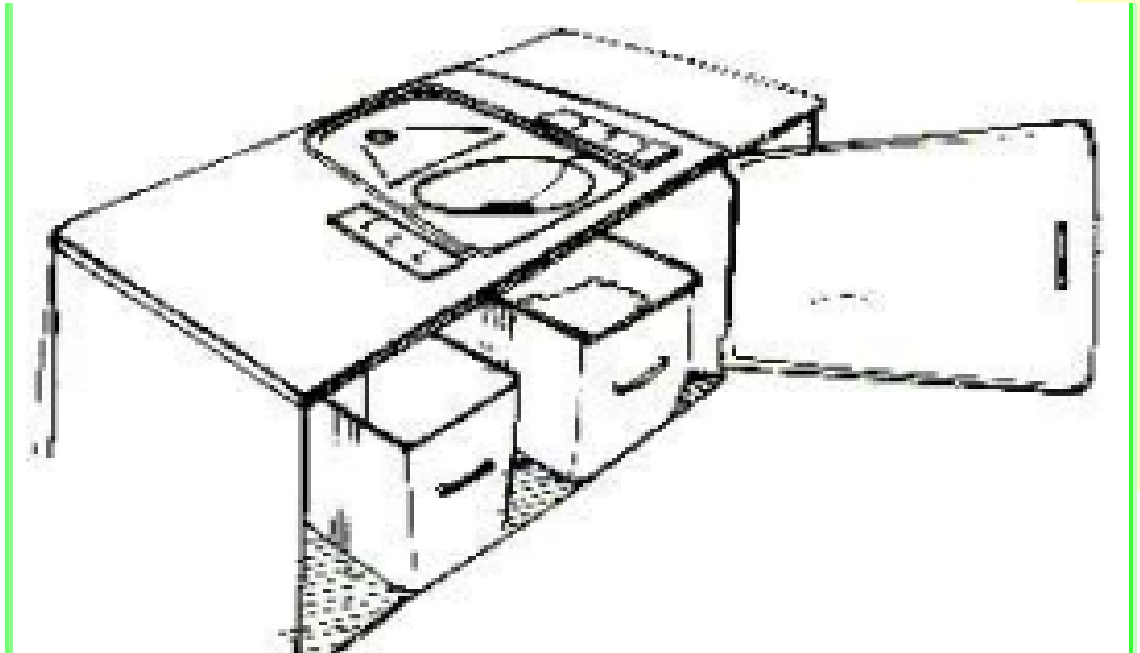
Septic Tank (Single Chamber)- off-set



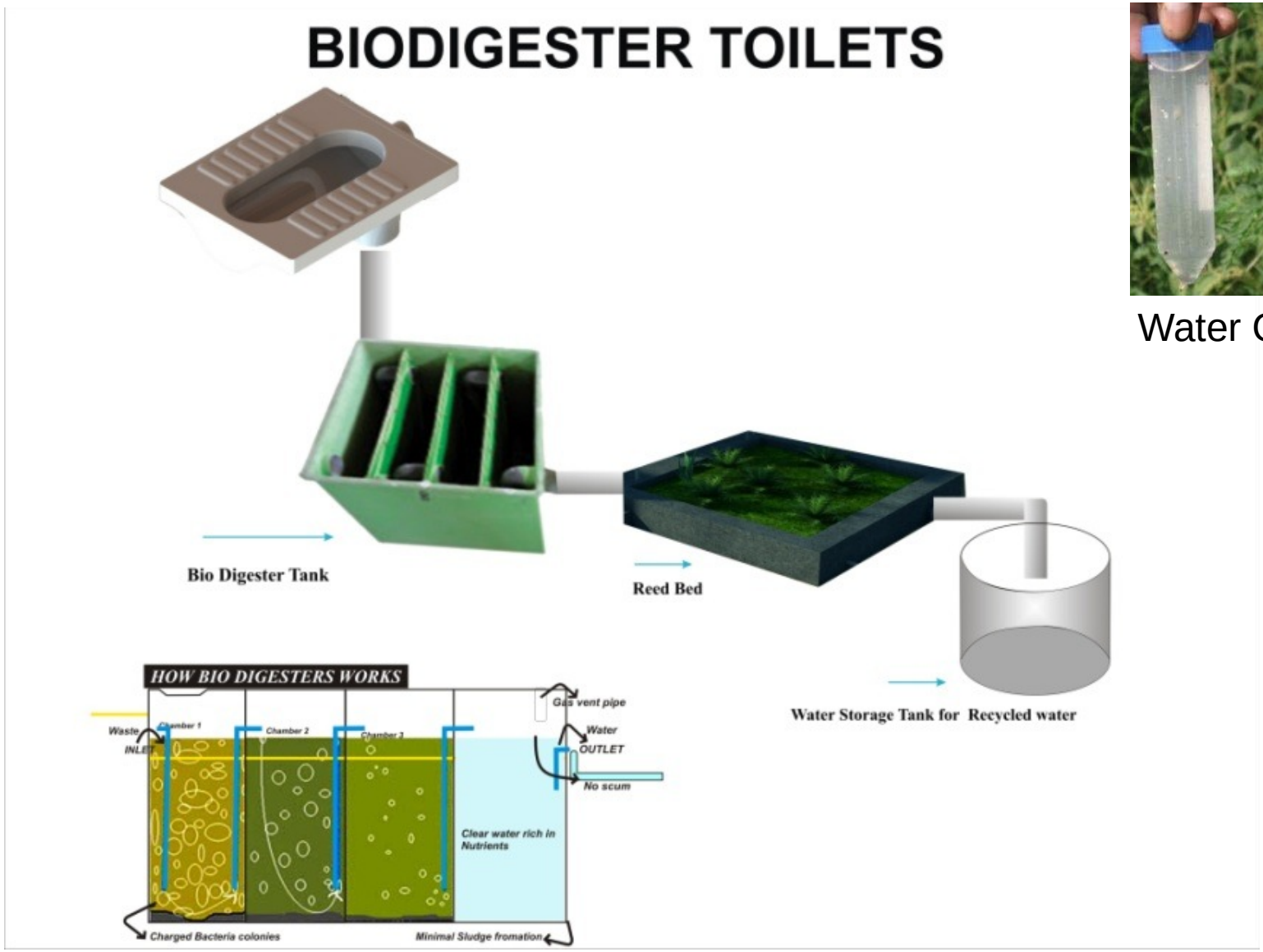
Shankar Balram Toilet: This model is more suitable for areas where people use water for ablution. It is basically combination of latrine and specifically designed septic tank.

Indian Ecosan Toilet: The eco-san model consist the double-vault compost latrine consists 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



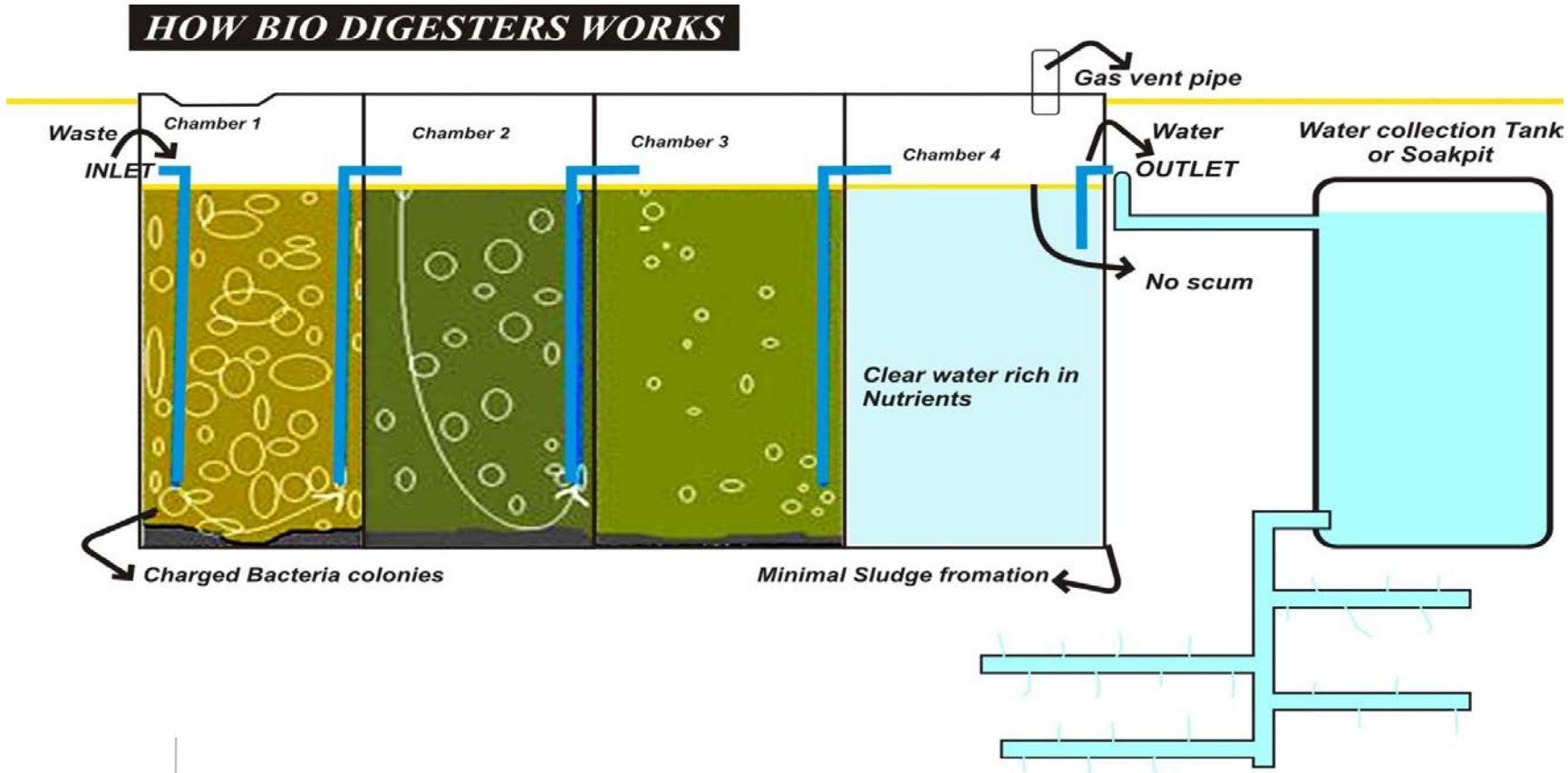
Water Quality

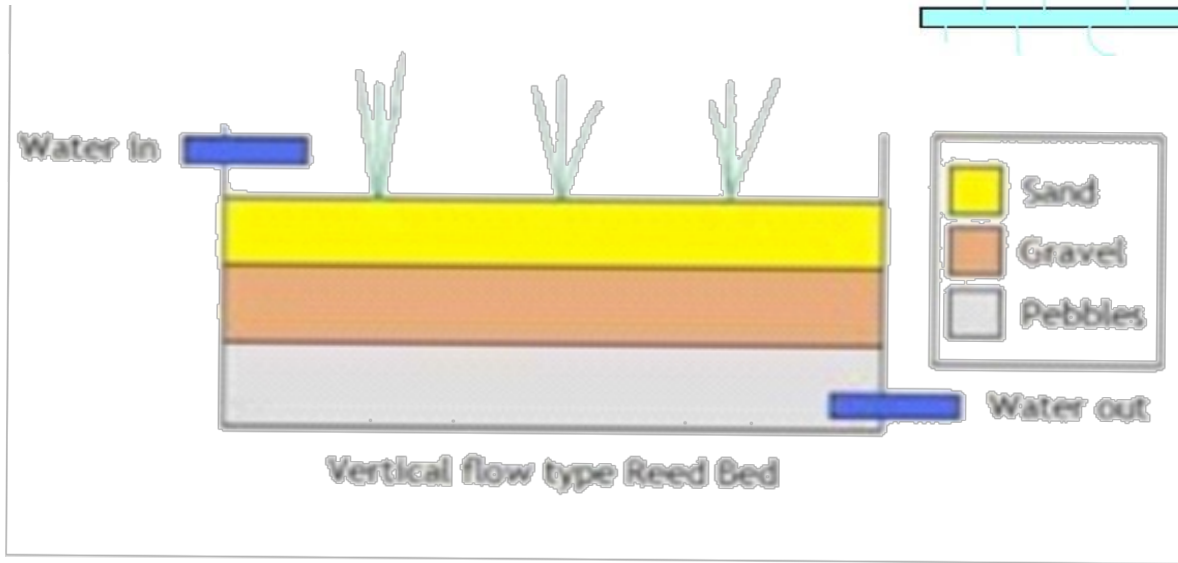
Bacteria/ inoculum developed by DRDO

Hermetically sealed Reaction Vessel/ Bio Digester tank for anaerobic treatment

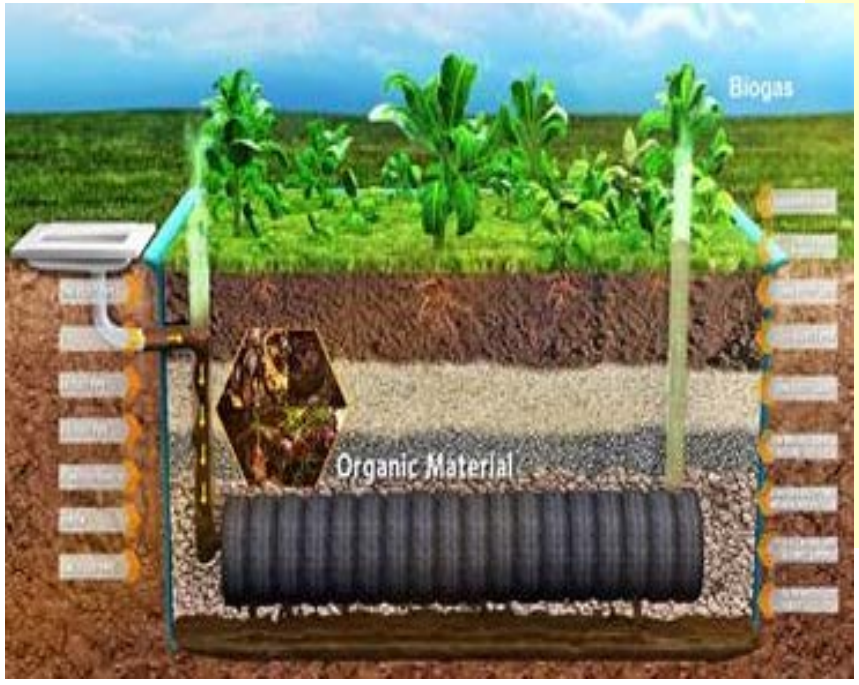
Consortium of acclimatised microorganisms (Inoculum)which can withstand different climatic condition and routine toilet cleaning agents

Bacteria immobilisation Matrix Reed Bed for Aerobic secondary treatment of water Effluent Tank





Evapotranspiration Toilets



Sato – making twin pits easier

Explode State:AN_EX05(+)

Designs by Sulabh

Sulabh Options

Lining of Sulabh pits

Can be lined from locally available materials

Brick

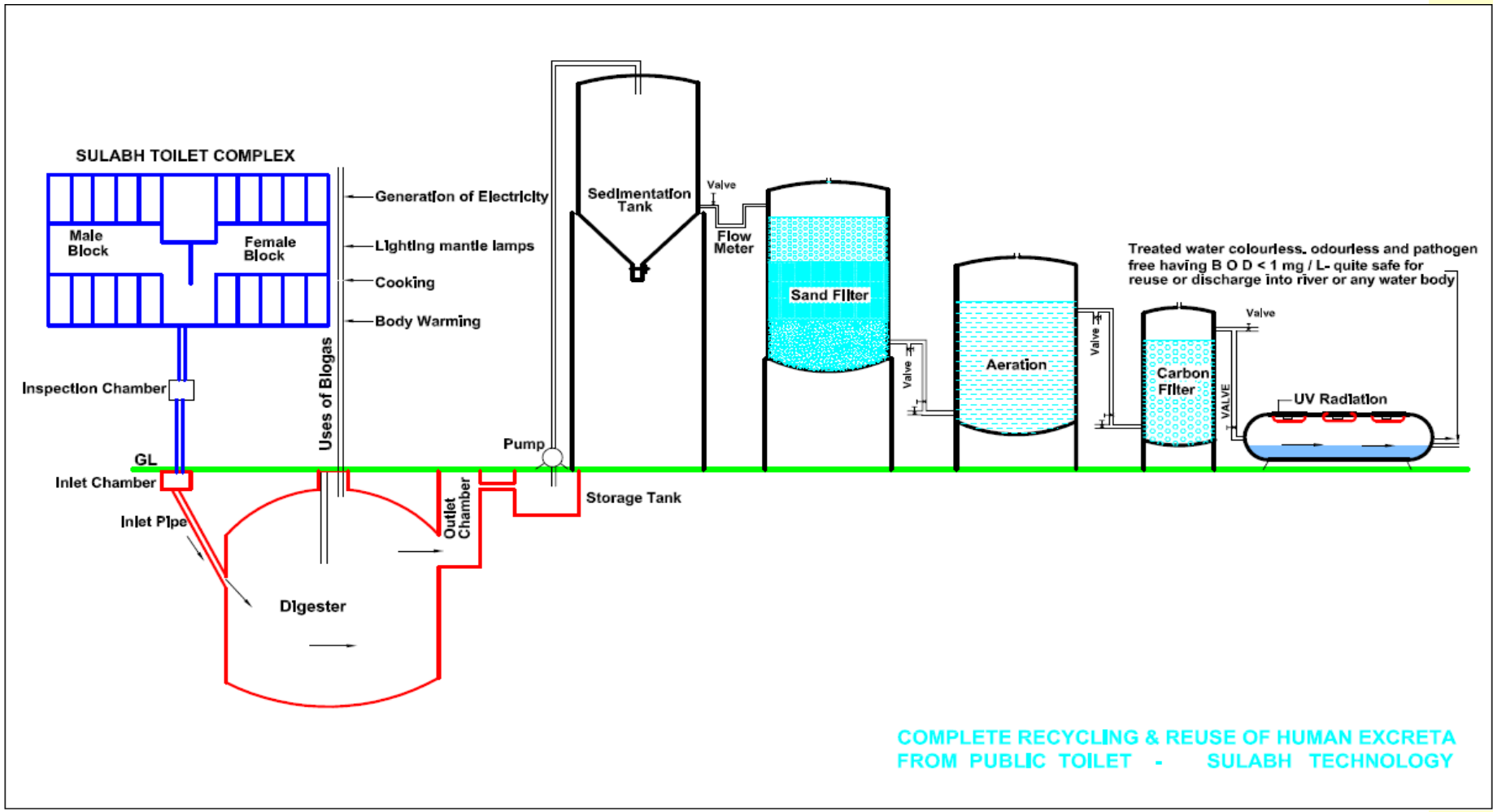
Stone

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