

OCCUPATIONAL HEALTH AND SAFETY ALONG THE SANITATION SERVICE CHAIN

TRAINING MANUAL



OCCUPATIONAL HEALTH AND SAFETY ALONG THE SANITATION SERVICE CHAIN

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Message from the Director



Dr. Debolina Kundu
Director, NIUA

With immense pride and responsibility, I present the Occupational Health and Safety (OHS) along the Sanitation Service Chain training module, a pioneering step toward ensuring that dignity, safety, and wellbeing form the cornerstone of India's urban sanitation journey.

Behind every clean street and functioning sanitation facility stands a workforce whose tireless contributions too often go unrecognised. Sanitation workers, operating across the entire service chain, face significant daily risks exposure to hazardous waste, unsafe environments, and inadequate protection. In recent years, the government's unwavering commitment has instigated a transformative approach to urban sanitation, from the Swachh Bharat Mission –Urban (SBM-U) to the National Action for Mechanised Sanitation Ecosystem (NAMASTE) scheme, focusing as much on human dignity and protection as on infrastructure and technology.

Recognising the hazardous realities faced by sanitation workers, national policies and missions have now decisively integrated OHS practices at their core. The SBM-U 2.0 and NAMASTE scheme not only mandate the systematic provision of Personal Protective Equipment (PPE), mechanisation of hazardous tasks, and health insurance, but also formal training, institutionalisation of self-help groups (SHGs), and access to essential health and social security benefits. By 2025, over 88,000 sanitation workers will be validated under NAMASTE, with robust provision of PPE, health insurance for their families, and that empower this essential workforce in more than 4,800 urban local bodies.

National initiatives such as the Safai Mitra Suraksha Challenge, Deendayal Antyodaya Yojana-National Urban Livelihoods Mission, and state-led models like Odisha's GARIMA scheme further reinforce the commitment to safety, social dignity, and economic empowerment.

Developed by the Sanitation Capacity Building Platform at NIUA, this training module is designed to equip sanitation sector stakeholders with the knowledge and practical skills to recognise OHS risks across the full spectrum of sanitation work: from sewerage networks and treatment systems to community toilets and desludging operations. The curriculum covers risk assessment tools, key legal frameworks, safety protocol

development, contract design, and budgeting for OHS, while addressing the critical impact of stigma and informality on worker safety. Above all, it advocates for institutional responsibility, continuous health surveillance, and collective action through SHGs to safeguard and strengthen the workforce at the heart of our sanitation ecosystem. The training module is in two parts: i. presentations and ii. learning notes. It serves as a guidance for trainees as well as trainers and is available on the NIUA website: scbp.niua.org

By launching this module, NIUA reaffirms its commitment to institutionalising a culture of safety and dignity for sanitation workers as India pursues the vision of universal, safely managed sanitation. Together, let us ensure that India's urban transformation truly leaves no one behind, honouring those whose labour sustains our healthy, resilient, and inclusive cities.



Dr Debolina Kundu
Director, NIUA

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List of Abbreviations

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BIS	Bureau of Indian Standards
CH ₄	Methane
CO	Carbon Monoxide
CPCB	Central Pollution Control Board
CPHEEO	Central Public Health and Environmental Engineering Organisation
CSW	Core Sanitation Workers
CT/PT	Community Toilet and Public Toilet
DSO	Desludging Operator
ERSU	Emergency Response Sanitation Unit
EU	European Union
FS	Faecal Sludge
FSSM	Faecal Sludge and Septage Management
FSTP	Faecal Sludge Treatment Plant
GoI	Government of India
H ₂ S	Hydrogen Sulphide
HIRA	Hazard Identification and Risk Assessment
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act
IDHL	Immediately Dangerous to Health or Life
ILO	International Labour Organisation
MoHFW	Ministry of Health and Family Welfare
MoHUA	Ministry of Housing and Urban Affairs
MSDE	Ministry of Skill Development and Entrepreneurship
MSJ&E	Ministry of Social Justice and Empowerment
NAMASTE	National Action for Mechanised Sanitation Ecosystem
NCSK	National Commission for Safai Karamchari

NHRC	National Human Rights Commission
NSDC	National Skill Development Corporation
NSKFDC	National Safai Karamcharis Finance and Development Corporation
NSQF	National Skill Qualification Framework
OBC	Other Backward Classes
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Administration
OSS	On-Site Sanitation System
PEL	Permissible Exposure Limit
PEMSR Act	The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act
PPE	Personal Protective Equipment
RPL	Recognition of Prior Learning
RSA	Responsible Sanitation Authority
RSI	Repetitive Strain Injury
SBM	Swachh Bharat Mission
SC	Scheduled Caste
SDGs	Sustainable Development Goals
SRMS	Self-Employment Scheme for Rehabilitation of Manual Scavengers
STP	Sewage Treatment Plant
TB	Tuberculosis
TLV	Threshold Level Value
ULB	Urban Local Bodies
UNDDR	United Nations Office for Disaster Risk Reduction
UT	Union Territories
WASH	Water, Sanitation, and Hygiene
WHO	World Health organisation
WMSDs	Work-related Musculoskeletal Disorders

01

Module Overview



1.1 Agenda

Timing	Session Name	Learning Outcome
Day 1		
9:30-10:00	Registration	
10:00-10:15	Welcome, Opening Remarks and Context Setting	
10:15-11:45	Introduction to Occupational Health and Safety (OHS) in Sanitation	Understand OHS principles and its applications, identify sanitation worker roles and associated risks across the service chain.
11:45-12:00	Tea Break	
12:00-13:15	Regulatory Landscape and Compliance	Learn about sanitation and OHS regulations, their enforcement, and the key institutions ensuring worker safety and welfare
13:15-14:00	Lunch Break	
14:00-14:50	Safety Aspects for Toilet Operation and Maintenance Workers	Understand the roles and responsibilities of CT/PT operators in maintaining sanitation systems, and how to manage safety risks through compliance with protocols and best practices.
14:50-15:40	Safety Aspects for Masons	Understand the hazards faced by masons in sanitation construction and how regulatory measures and government policies help mitigate these risks.
15:40-16:00	Tea Break	
16:00-17:00	Safety Aspects for Emptiers and Desludgers (Safaimitras)	Focused discussion on de-sludging in India, prioritising scale, hazards and risks associated, legal and policy framework, tools and equipment and first aid requirements
Day 2		
09:00-10:30	Practical Demonstration on Safe Desludging: Spot, Map & Equip	Learn how to oversee and ensure that desludging operators are equipped with the proper tools, PPE, and safety measures.
10:30-11:00	Recap of Day 1 + Tea Break	
11:00-11:40	Safety Aspects for Treatment Facility Workers	Understand the safety protocols, operational responsibilities, and regulatory requirements for Faecal Sludge Treatment Plant (FSTP) and Sewage Treatment Plant (STP) operations, and how to ensure a safe and compliant working environment for workers.
11:40-12:30	Safety Aspects for Reuse of Treated Used Water and Biosolids	Understand the safety and regulatory aspects of the reuse of treated water and biosolids.
12:30-13:30	Confined Space Safety	Protocol, processes and precautions during safety confined space entry during cleaning and maintenance of septic tanks and sewers
13:30-14:30	Lunch Break	
14:30-15:15	Mental Health of Sanitation Workers	Develop an in-depth understanding of workplace stressors, how they impact productivity and the mechanisms available to mitigate these
15:15-15:30	Tea Break	
15:30-16:45	Exercise on Hazard Management	Identify potential hazards in sanitation work environments and assess risks to improve workers' safety
16:45-17:15	Reflections and Key Takeaways from Participants	
17:15-18:00	Valedictory Session + Closing*	

*Timing for the valedictory session is tentative

1.2. Occupational Health and Safety in Urban Sanitation

1.2.1. The Unseen Crisis Beneath Urban Sanitation

The backbone of urban sanitation in India relies on an invisible workforce—sanitation workers who clean sewers, empty septic tanks, segregate solid waste, operate waste treatment facilities, and manage our waste infrastructure. These workers often operate in hazardous environments without adequate safety training, minimal to no safety measures, and no occupational health screening. According to the National Commission for Safai Karmachari, around 1319 sanitation workers died between 1993 and July 2025 while cleaning septic tanks and sewers, largely due to asphyxiation, toxic gas inhalation, and lack of rescue protocols. Studies have shown a high prevalence of respiratory illnesses, skin infections, musculoskeletal disorders, and even reduced life expectancy among sanitation workers compared to the general population. Many also suffer from mental health issues caused by social stigma and unsafe working conditions. The Government of India, through the Swachh Bharat Mission (SBM) and National Action for Mechanised Sanitation Ecosystem (NAMASTE) scheme, states like Odisha and Tamil Nadu, through their state-level initiatives, have emphasised the importance of ensuring the safety, dignity, and inclusion of sanitation workers. This training aims to equip participants with knowledge and tools to institutionalise and improve Occupational Safety and Health practices for this essential workforce.

1.2.2. Why This Training is Important

- Sanitation work is not merely "conservancy"; it is high-risk labour. However, sanitation workers often lack access to training on safe work practices, health insurance or personal protective equipment (PPE)
- Local bodies and development partners are uniquely positioned to bridge gaps in awareness, enforcement, and service delivery.
- Along with improving the well-being of sanitation workers, strengthening Occupational Health and Safety (OHS) measures also enhances the effectiveness and sustainability of sanitation services.

1.2.3. Key Takeaways for Participants

By the end of this training, participants will be able to:

- Comprehend the typologies of OHS risks across sanitation sub-sectors (sewerage, CT/PT, FSSM, treatment plants).
- Identify legal instruments and duties of city agencies under national law and SBM-U 2.0 guidelines
- Understand how risk assessments (like HIRA) can be mainstreamed into operations.
- Recognise the administrative and procurement levers to improve safety—e.g., service contract that embed training, mechanisation, and PPE usage.
- Understand the role of stigma, informality, and caste in perpetuating unsafe working conditions.
- Formulate actionable recommendations for institutional reform, such as city-level OHS protocols, regular health screening, and budget provisioning for safety.

1.2.4. Pre-Reads for Participants

- To prepare meaningfully for the session, participants will be expected to read the following:
- Prevention of Employment as Manual Scavenger and Their Rehabilitation Act, 2013-
<https://ncsk.nic.in/sites/default/files/manualsca-act19913635738516382444610.pdf>
- National Urban Sanitation Policy-
https://www.mohua.gov.in/upload/uploadfiles/files/NUSP_0.pdf
- Standard Operating Procedure (SOP) for Cleaning of Sewers and Septic Tanks-
<https://mohua.gov.in/upload/uploadfiles/files/AMRUT%20SOP%20Book%20Final.pdf>
- Guidance Document on Equipment & Workforce Norms for Managing Waterborne Sanitation in India
<https://sbmurban.org/storage/app/media/pdf/equipment-and-workforce.pdf>
- Emergency Response Sanitation Unit, An Advisory-
https://sbmurban.org/storage/app/media/Advisory_on_Emergency_Response_Sanitation_Unit.pdf

- SafaiMitra Surakshit Sheher Protocol-
https://sbmurban.org/storage/app/media/SSS_Protocol.pdf
- National Action For Mechanised Sanitation Ecosystem-
<https://socialjustice.gov.in/public/ckeditor/upload/31601728039934.pdf>

1.3. Learning Objectives

1. **Identify Occupational Health and Safety Burdens**
Develop a comprehensive understanding of occupational health and safety risks across the entire sanitation service chain
2. **Legal and Regulatory Compliance**
Gain expertise in the legal frameworks and institutional responsibilities governing sanitation worker safety
3. **Hazard and Risk Assessment Skills**
Identify potential hazards in sanitation work, assess associated risks, and apply effective risk management strategies
4. **Implementation and Monitoring of Safety Systems**
Develop practical skills to establish and oversee comprehensive safety management systems

1.4. Target Audience

The training is designed for key stakeholders involved in sanitation management, worker safety, and regulatory oversight. This includes state-level, city-level, and institutional representatives whose roles directly or indirectly impact sanitation workers' welfare and occupational health. The target department and participants are:

- State Nodal Officer – SBM and National Urban Livelihoods Mission (NULM)
- Department responsible for sanitation in the state and cities
- Concerned Urban Local Body (ULB) officers
- Regional Labour Institute representatives
- Directorate of Industrial Safety and Health officials
- Human Resource Agencies engaged in providing contractual sanitation workers
- Individual sector experts
- State Nodal Officer for SafaiMitra Suraksha / NAMASTE
- Nodal Officer from Occupational Health – National Health Mission
- State Medical Officer / relevant ESIC officers
- Relevant officers – State Labour Department
- Relevant officers – State Commission for Safai Karamchari Uttarakhand
- Relevant officers – Social Welfare Department
- Human Rights Commission representatives

1.5. How to use this Training Manual?

This training package on OHS along the Sanitation Service Chain is designed to support facilitators in delivering an engaging, interactive, and impactful two-day session. The Learning Note and the accompanying PowerPoint presentation (PPT) work together to ensure consistency, clarity, and depth across all sessions.

1.5.1. Structure and flow

Each session in this module is mapped to the agenda outlined in the Module Overview. Sessions are structured with the following elements:

- **Presentation (Slides):** These visually present core concepts, frameworks, and examples visually. Use the slides to guide the session, pace the discussion, and reinforce key messages.
- **Learning Note sections:**
For each session, the Learning Note provides:
 - Detailed content aligned with each slide
 - Explanations, definitions, and contextual notes
 - Talking points and trainer tips
 - Suggested transitions between concepts
 - Links to relevant tools, frameworks, and references
- **How to deliver:**
 - Before the session
 - Review the session's purpose, slides, and Learning Note content. Familiarise yourself with the exercises and case studies. Identify what to emphasise based on the audience.
 - During the session:
 - Begin with the icebreaker or activity as indicated.
 - Use the slides to present content, while referring to the Learning Note for elaboration and examples.
 - Introduce exercises or case studies at the suggested points to enable participatory learning. Use discussion prompts from the Learning Note to guide debriefs.
 - Highlight takeaways at the end of each session.

1.5.2. Training ethics and facilitator tips

1. **Clarify the ethical scope of the module:** Begin by explaining that the training focuses on embedding ethics into occupational health and safety (OHS) for sanitation workers, highlighting human dignity, fairness, and legal rights. Acknowledge that while the module covers key ethical considerations, it does not replace the need for further legal, technical, or human rights training.
2. **Set respectful participation norms:** Establish ground rules for respectful interaction, active listening, and keeping discussions focused. Reinforce that every participant's perspective is valued, and that derogatory or dismissive language towards sanitation work or workers is unacceptable.
3. **Acknowledge the dignity of sanitation work:** Frame the session in a way that recognises sanitation as an essential public service and challenges stigma. Emphasise the trainer's role in creating a safe space for workers and officials to share experiences without fear of judgment.
4. **Promote informed consent and empowerment:** Encourage participants to recognise sanitation workers' rights to be fully informed about risks and to refuse unsafe work. Use case examples to prompt discussion on ethical dilemmas and decision-making.
5. **Integrate lived experiences into hazard identification:** Facilitate participatory discussions where workers contribute their real-life experiences of workplace hazards. Encourage them to critically analyse existing safety procedures and propose improvements.
6. **Emphasise health surveillance as a right:** Present medical care and health monitoring not as a privilege, but as an ethical obligation and legal requirement. Facilitate discussions on accessible healthcare, compensation, and rehabilitation support.
7. **Encourage open and stigma-free dialogue:** Address social hierarchies and discrimination sensitively, especially around caste, gender, and employment status. Use facilitation techniques that protect vulnerable participants and promote solidarity.
8. **Use participatory and peer-learning methods:** Incorporate role-plays, hazard mapping, and group problem-solving to promote shared learning and ownership of safety practices.

9. **Address unsafe or discriminatory remarks immediately:** Intervene respectfully but firmly if any participant's comment undermines dignity, reinforces stereotypes, or promotes unsafe practices.
10. **Provide ongoing learning resources:** Share legal references (e.g., Prohibition of Employment as Manual Scavengers Act, Code on OSH 2020), International Labour Organisation (ILO) guidelines, and relevant government SOPs so participants can deepen their knowledge after the session.
11. **Maintain confidentiality of personal accounts:** If participants share incidents of accidents or unsafe practices, remind the group to respect privacy and avoid sharing details outside the training space.

02

Introduction to Occupational Health and Safety in Sanitation



2.1 Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 1	Welcoming participants, Opening remarks and Context Setting	15
2		Presentation	55
3		Exercise	20
4		Questions and Discussion	10
Session 1 Total			90
Context Setting + Session 1			105

2.2. Learning Objectives

1. Recognise the roles and responsibilities of workers across the sanitation service chain
2. Articulate the importance of Occupational Health and Safety (OHS) in enhancing workplace safety and well-being of sanitation workers
3. Understand core principles and concepts of OHS
4. Identify appropriate safety measures and best practices for implementing effective risk-control strategies in sanitation-related workplaces

2.3. Key Takeaways

1. Comprehensive understanding of types of sanitation workers and their roles across the sanitation chain
2. Competence in highlighting the critical role of OHS in improving workplace safety
3. Understanding OHS principles and key concepts
4. Understanding to promote best practices for safety control implementation in the workplace

2.4. Introduction- Ice Breaker

1. To set the context for this session, participants will be shown the video “How Sewer Diving Became One of the Most Dangerous Jobs in India and Pakistan.”
2. This video illustrates the extreme risks faced by sanitation workers who engage in hazardous tasks, such as sewer diving and manual cleaning, without protective gear or safety protocols. It highlights the physical dangers, health risks, and social stigma associated with such work.



INSIDER | RISKY BUSINESS

Video on how sewer diving became one of the most dangerous jobs in India



Disclaimer: The views, information, and opinions expressed in this video are for training and awareness purpose only. Same visuals or discussions may include references to health risks, sanitation work environments, or other sensitive topics. Viewer discretion is advised.

Figure 1: Sewer diving and its associated occupational health hazards

Source: (Business Insider, 2022)

Discussion Questions

- What were your immediate reactions to the video?
- Why do you think such unsafe practices continue to exist despite laws and guidelines prohibiting manual scavenging and unsafe sanitation work?
- Who do you think is responsible for ensuring that sanitation workers do not have to enter sewers or work in such dangerous conditions?
- Have you come across similar practices in your towns or wards?

2.5. Overview of the Sanitation Service Chain

Sanitation is defined as access to and use of facilities and services for the safe disposal of human urine and faeces. A safe sanitation system is defined as a system that separates human excreta from human contact at all stages of the sanitation service chain from toilet capture and containment through emptying, transport, treatment (in situ or off-site), and final disposal or end-use, for both liquid and solid fractions, see Figure 1 (WHO, 2018).

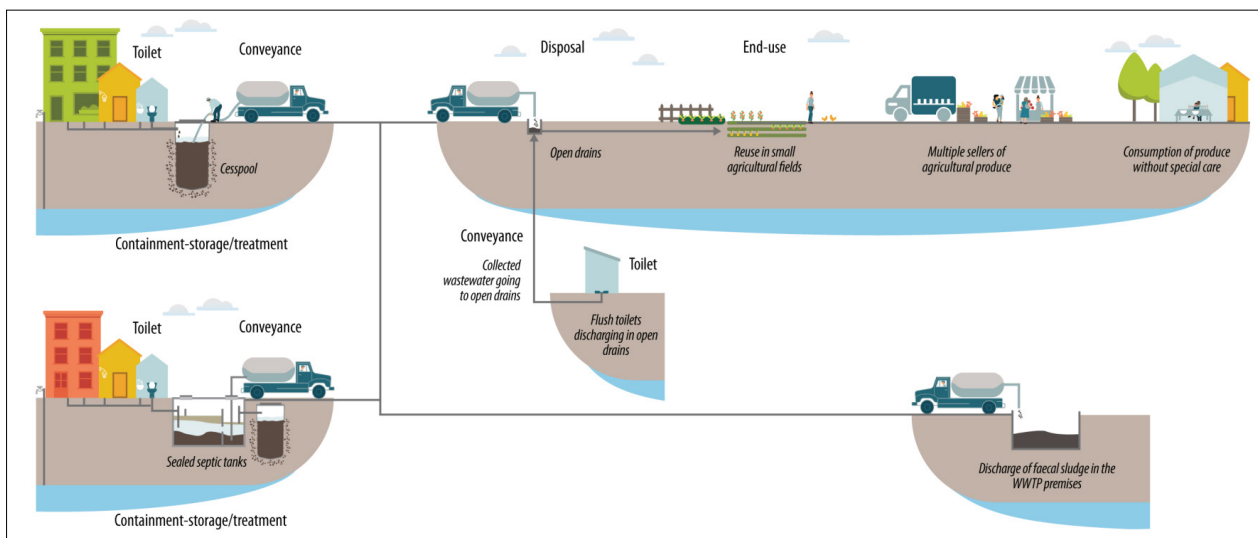


Figure 2. Sanitation Service Chain

Source: (WHO, 2018)

2.5.1. Sanitation workers: Roles and Work Arrangements

Sanitation workers refer to all people- employed or otherwise- responsible for cleaning, maintaining, operating, or emptying a sanitation technology at any step of the sanitation chain. The Figure 2 represents the types of sanitation workers involved in used water management and solid waste management.

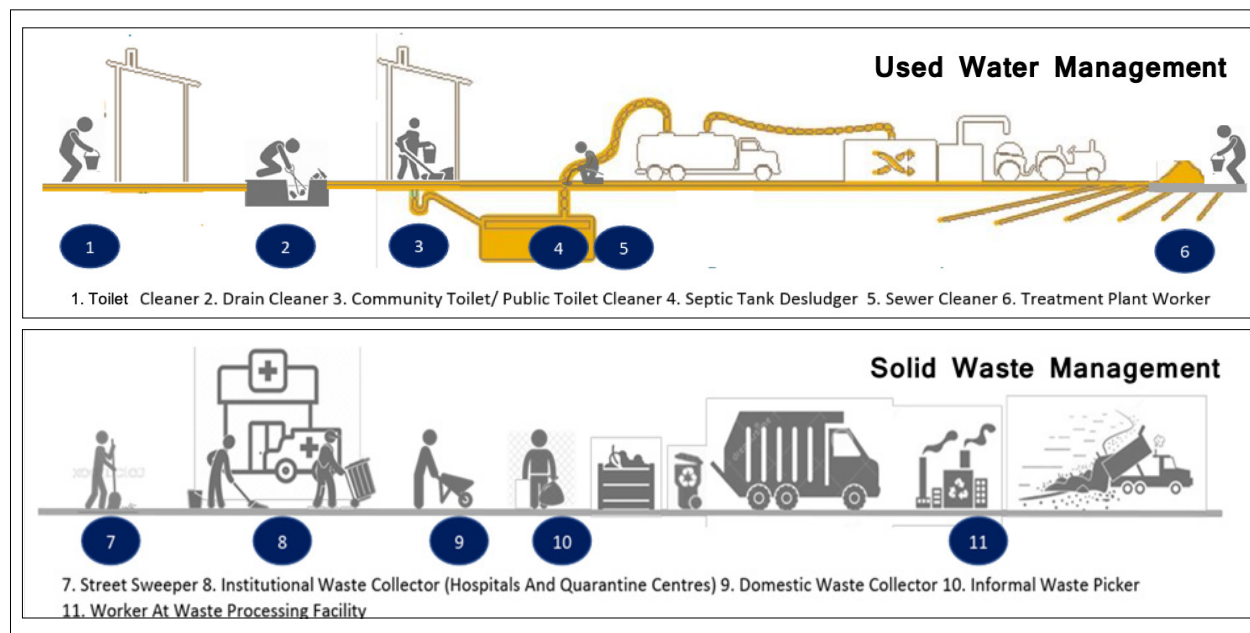


Figure 3. Types of Sanitation Workers in the Used Water and Solid Waste Management Streams

Source: (UMC, n.d.)

The sanitation workers involved in used water management include toilet cleaners and caretakers in domestic, public, and institutional settings; those who empty the filled pits and septic tanks once full; other faecal sludge handlers; those who clean sewers and manholes; and those who work at sewage and faecal waste treatment and disposal sites (Dalberg Advisors 2017; WHO 2018).



Indian Sanitation Workers

a 60 second snapshot

Video on Indian Sanitation Worker - a snapshot



Source: (Dalberg, 2017)

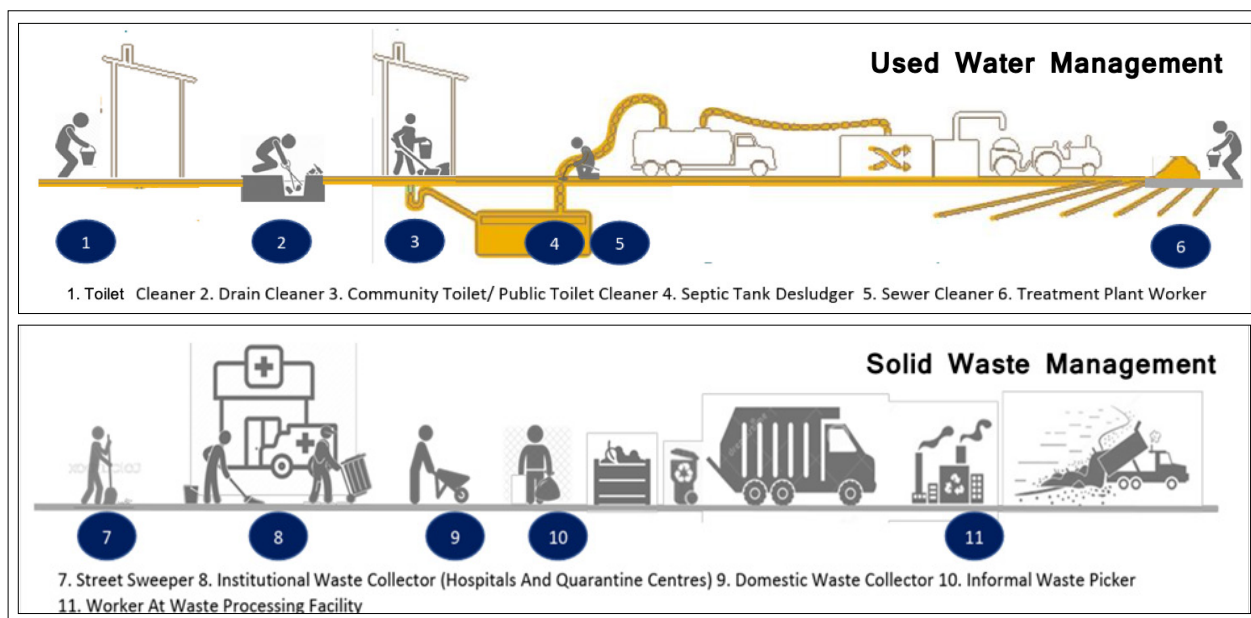


Figure 4. Types of Sanitation workers

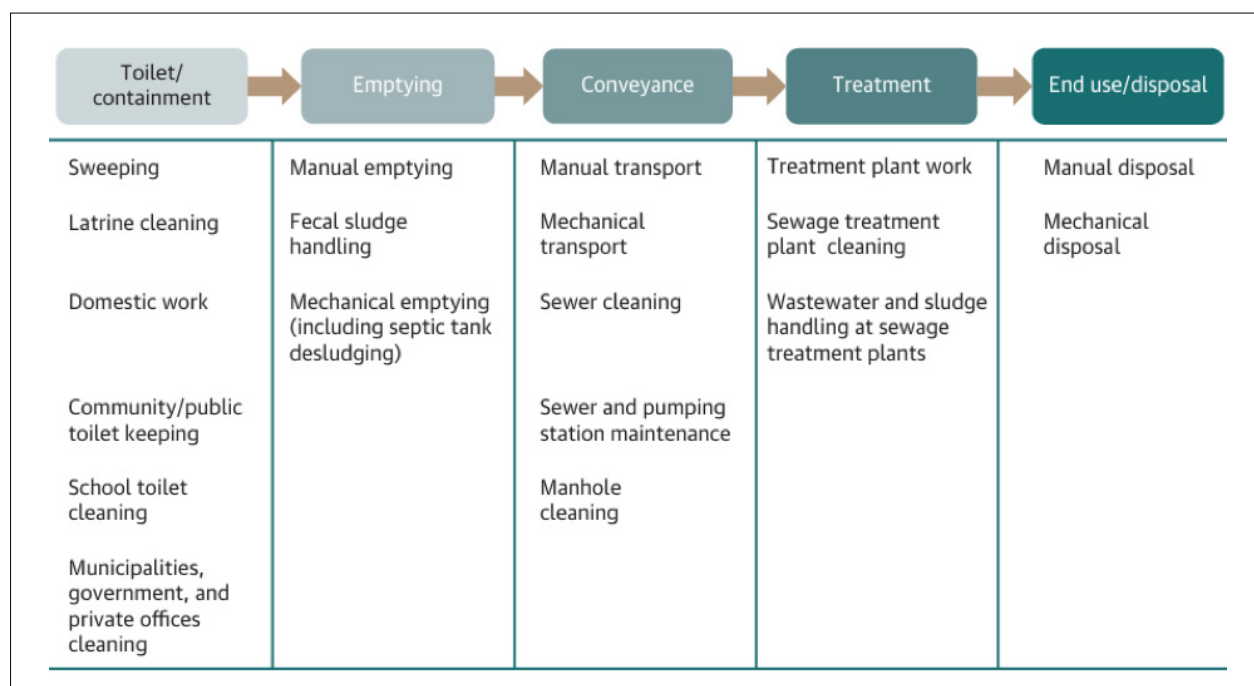


Figure 5:Types of Sanitation workers in the Used water and Solid waste management streams.

Source: (UMC, n.d.)

A study conducted in 2018 estimated that approximately 5 million sanitation workers were employed across various urban locations in India. These workers were classified into nine broad categories based on their roles within the sanitation value chain, reflecting the diverse nature of their work. (Bakshi, 2018; WaterAid, 2019).

1. Sewer Cleaning: This involves clearing blockages and cleaning sewer lines and wastewater drains. The work is mostly complaint-based, seasonal (especially during the rainy season), or done for preventive maintenance. Since sewers exist only in urban areas, this work is concentrated in cities. There are an estimated 1,53,000 sewer cleaners, all of whom are men (Bakshi, 2018).

2. Latrine Cleaning: This includes emptying dry or single-pit latrines, mainly in rural areas. The work involves the daily collection, transportation, and disposal of faecal matter. Around 7,70,000 workers are engaged in latrine cleaning, with 90 per cent working in rural areas and 95 per cent being women (Bakshi, 2018).

3. Faecal Sludge Handling: This refers to emptying, collecting, and transporting human waste from septic tanks. It is usually done on demand, with desludging intervals ranging from six months to over ten years. Around 80% of this work takes place in unplanned urban settlements. There are an estimated 22,000 workers in this sector, all of whom are men (Bakshi, 2018).

4. Railway Cleaning: This involves cleaning waste from railway tracks, platforms, and railway toilets. Since these areas are used frequently, cleaning must be done several times a day. Approximately 95,000 workers are engaged in railway cleaning, with about 80 per cent being women and 20 per cent men (Bakshi, 2018).

5. Treatment Plant Workers: Workers in this category operate and maintain sewage and faecal sludge treatment plants. These jobs are mainly in urban areas, where workers are employed in the 527 Sewage Treatment Plants (STPs) and Faecal Sludge Treatment Plants (FSTPs). There are around 6,000 workers in this field, all of whom are men (Bakshi, 2018).

6. Community and Public Toilet Cleaning: This involves maintaining and cleaning public and community toilets daily. Workers are from both rural and urban areas, especially slums and public convenience shelters. Around 2,02,000 workers are employed in this sector, with 75 per cent being men (Bakshi, 2018).

7. School Toilet Cleaning: This involves maintaining school toilets daily in both rural and urban areas. Over 8,00,000 workers are engaged in this work, with 80 per cent working in rural schools. More than 90% of these workers are women, many of whom choose this work because of their connection with children and the stability of a regular income (Bakshi, 2018).

8. Sweeping and Drain Cleaning: This includes sweeping roads and cleaning open drains. While not always classified as sanitation work, these workers often come into contact with faecal matter due to open defecation and unsanitary latrines connected to drains. Around 4,10,000 workers are engaged in this work, with men and women equally employed (Bakshi, 2018).

9. Domestic Sanitation Work: This involves cleaning toilets in households and institutions, mainly in middle- and high-income areas. These workers are based entirely in urban areas, with over 2 million people employed in this sector across the country (Bakshi, 2018).

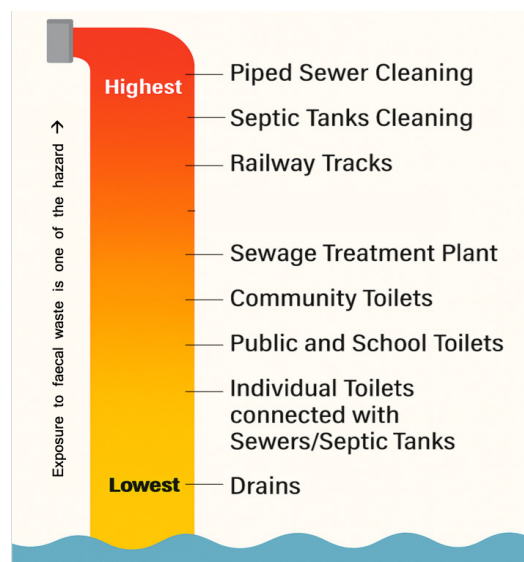


Figure 6: Exposure to faecal waste as per sanitation work categories.

Source: NFSSM Alliance (Dalberg, 2019)

2.6. Introduction to Occupational Health and Safety

2.6.1. What is OHS?

OHS is identified as the discipline dealing with the prevention of work-related injuries and diseases as well as the protection and promotion of the health of workers. It aims at the improving the working conditions and workplace environment (ILO, n.d.).

2.6.2. Principles of OHS

The core OHS principles put forth by the ILO are as follows: (ALLI, 2008)

1. **Workers' rights:** Every worker has the right to a safe and healthy workplace: Employers, employees, and the government must work together to protect these rights and ensure decent working conditions. According to the International Labour Conference (1984):
 - Work should take place in a safe and healthy environment.
 - Working conditions should respect workers' well-being and dignity.
 - Employment should provide opportunities for personal growth, fulfilment, and meaningful contribution to society.
2. **Establishment of OHS policies:** Clear and effective OHS policies should be developed and implemented at both the government and workplace levels. These policies must be communicated to all relevant stakeholders.
3. **Consultation with social partners:** Employers, workers, and other key stakeholders must be involved in shaping, implementing, and reviewing OHS policies to ensure they meet the needs of all parties.
4. **Focus on prevention and protection:** The primary goal of OHS programmes is to prevent workplace hazards before they occur. Workspaces and work processes should be designed to minimise risks and create a safe and healthy environment.
5. **Access to reliable information:** Accurate and up-to-date information on workplace hazards, safety regulations, and compliance measures is essential for effective OHS management. Workplace monitoring and reporting play a critical role in ensuring safety.
6. **Health and well-being:** Occupational health initiatives should focus on improving workers' physical, mental, and social well-being, recognising that a healthy workforce contributes to overall productivity and quality of life.
7. **Access to occupational health services:** Every worker, regardless of their job or industry, should have access to occupational health services that promote their well-being and improve workplace conditions.
8. **Compensation and rehabilitation:** Workers who suffer injuries, accidents, or work-related illnesses should receive appropriate compensation, rehabilitation, and medical support to reduce the long-term impact of occupational hazards.
9. **Education and training:** A strong OHS culture relies on proper training and awareness. Workers and employers must be educated on safety practices, and trainers should receive industry specific OHS training to address unique workplace risks.
10. **Responsibilities of workers, employers, and authorities:**
 - Workers must follow established safety procedures and report hazards.
 - Employers must provide safe working conditions and ensure access to first aid and emergency support.
 - Authorities must develop, implement, and regularly update OHS policies and regulations.
11. **Enforcement and compliance:** An effective inspection and enforcement system is necessary to ensure compliance with OHS standards and labour laws, holding all parties accountable for maintaining workplace safety.

2.6.3. Why OHS is Important?

The World Health Organization (WHO) estimates that around 100 million occupational injuries occur worldwide each year, leading to approximately 100,000 deaths. In India, workplace injuries contribute significantly to this global burden, with an estimated 17 million non-fatal injuries reported annually—accounting for 17 per cent of the global total. Additionally, the country records 45,000 fatal occupational injuries, constituting 45 per cent of global workplace deaths (Zodpey, et al., 2009).

Occupational diseases also pose a considerable challenge in India, with the country contributing 1.9 million cases annually (19 lakh cases), or 17 per cent of the global total, and approximately 1,20,000 deaths, accounting for the same proportion of global occupational disease-related fatalities (Zodpey, et al., 2009).

The economic impact of these workplace hazards is substantial. Work-related health issues cause countries to lose between 2 per cent and 14 per cent of their gross national product Gross National Product (GNP). In India, occupational diseases alone led to an estimated loss of INR 70,000 crores from the GNP in 1999. Additionally, compensation for work-related injuries and fatalities has increased significantly over the decades, rising from INR 8 million in 1961 to INR 186 million in 1997 (Zodpey, et al., 2009). (Zodpey, et al., 2009).

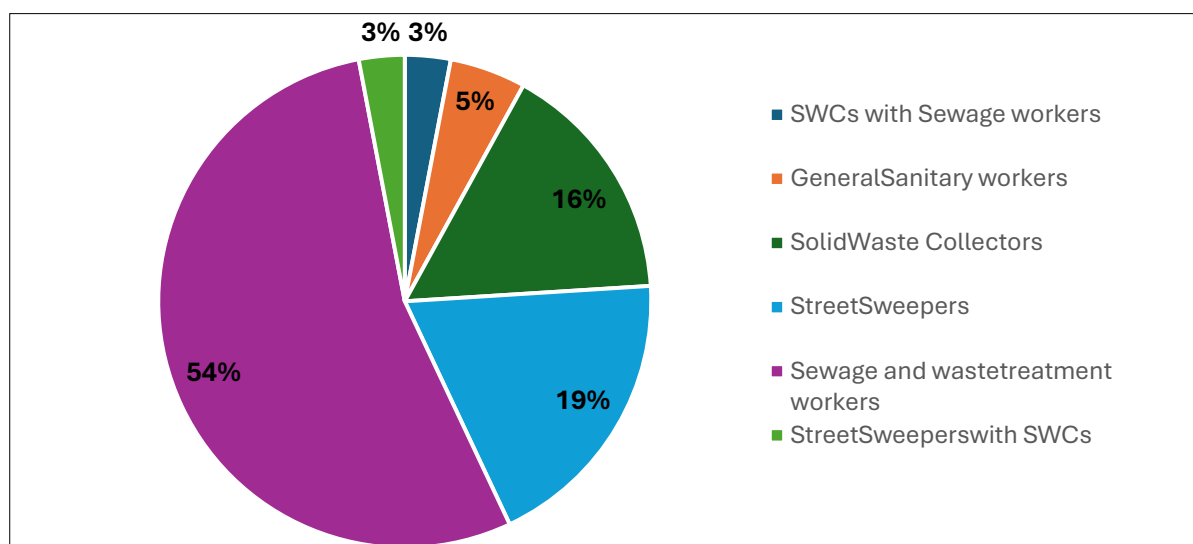


Figure 7: Categories of sanitary workers exposed to OHS problems 2000–2022

Source: (Tolera, et al., 2023)

Among the many hazardous occupations, the manual cleaning of sewers and septic tanks remains one of the most dangerous in India's urban areas, see Figure 5. Despite legislative prohibitions and the availability of technological alternatives, workers continue to be exposed to severe occupational risks. To understand the profile of workers engaged in this high-risk occupation, the government has collected data from over 3,000 ULBs across 33 states and Union Territories (UTs) (MSJ&E, 2024).

The findings indicate that a majority of these workers belonged to marginalised communities. Of the 57,758 Sewer and Septic Tank Workers (SSWs) profiled, out of which 54,574 have been validated across 33 states/UTs. Of which 67.91 per cent belonged to the Scheduled Caste (SC) community, 15.73 per cent are from Other Backward Classes (OBC), 8.31 per cent belong to Scheduled Tribes (ST), and 8.05 per cent are from the general category. Furthermore, government estimates suggest that nearly one lakh workers were engaged in sewer and septic tank cleaning across 4,800+ ULBs (MSJ&E, 2024).

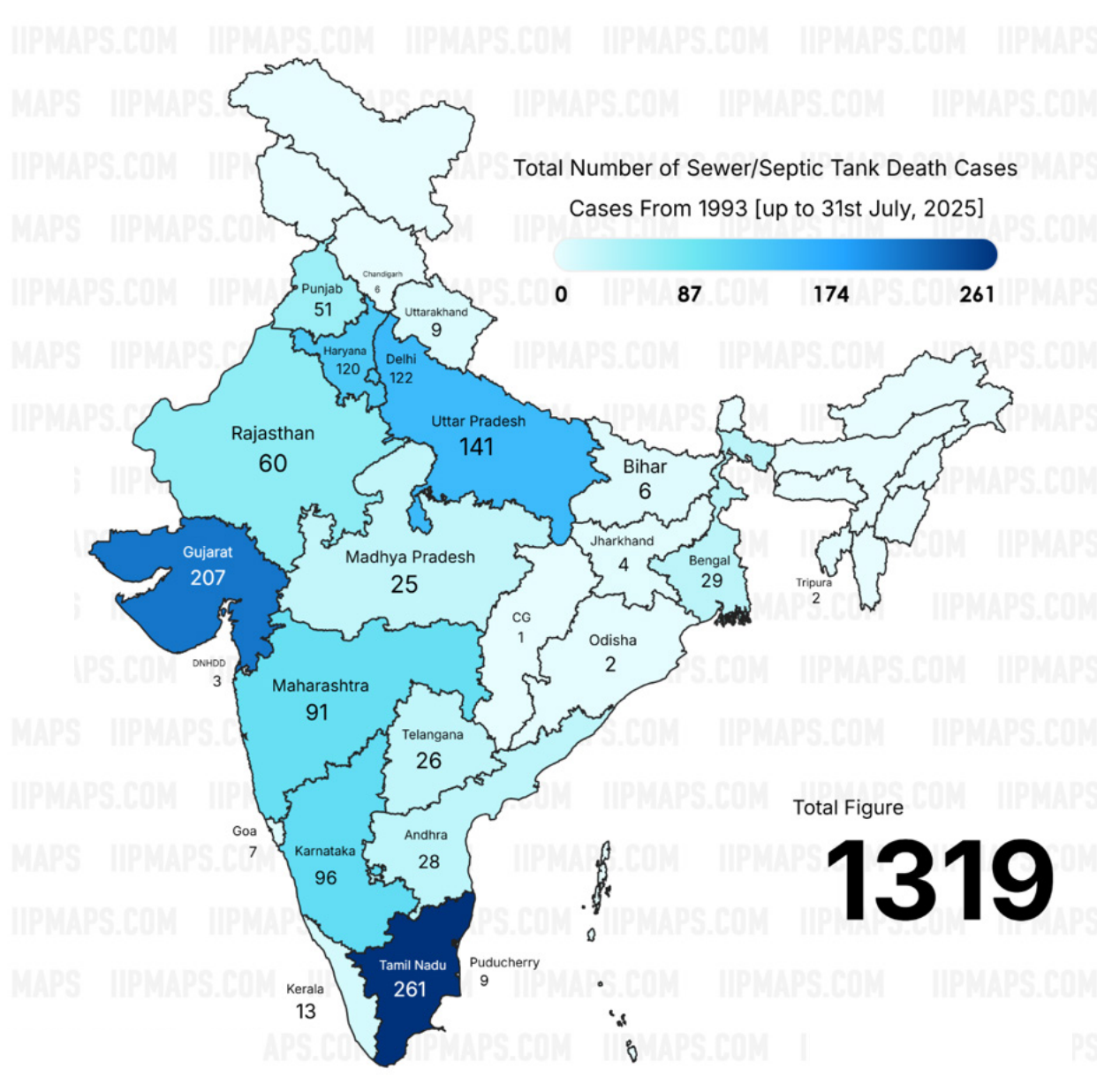


Figure 8: Total Number of Sewer/Septic Tank death cases from 1993 [up to July 2025],

Source: (NCSK, 2025)

Note: Trainers are advised to stay updated with the latest statistics and reports published by the National Commission for Safai Karamcharis (NCSK) and should be referred to periodically to ensure accurate and relevant information is being shared during trainings.

Despite ongoing efforts to improve occupational safety, the risks associated with hazardous cleaning remain significant. Between 1993 and figure say upto July 2025, at 1319 is the figure who died workers lost their lives due to hazardous cleaning operations, as reported in Parliament, see Figure 5 (NCSK, 2025). The states with the highest number of sewer-related deaths (more than 100 cases) were Tamil Nadu, Gujarat, Uttar Pradesh, Delhi, and Haryana. These figures highlight the urgent need for strengthened safety measures, improved working conditions, and the provision of alternative livelihood opportunities to ensure the well-being and dignity of sanitation workers.

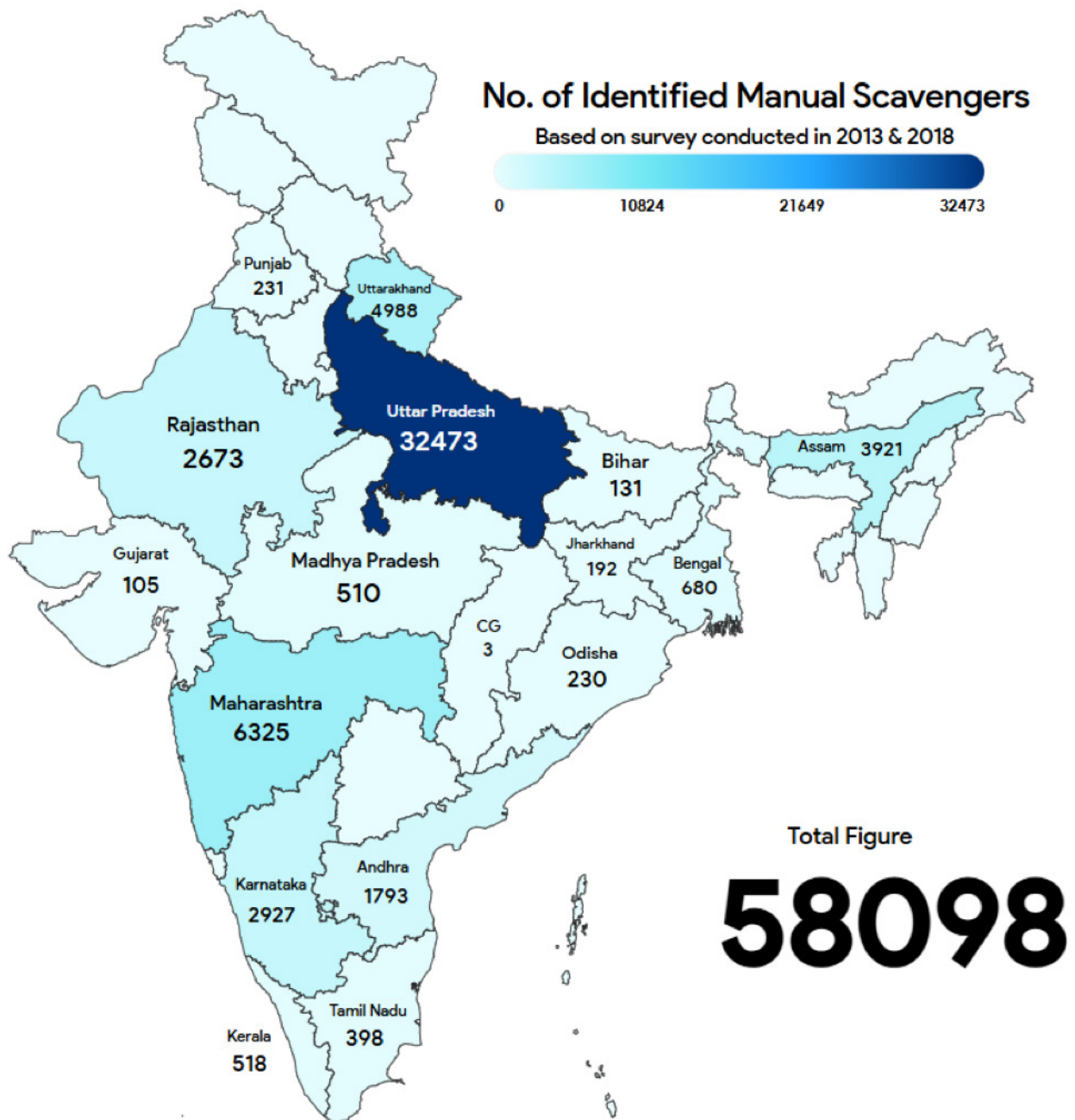


Figure 9: State-wise number of identified manual scavengers

Source: (Rajya Sabha, Unstarred Question No- 1096, Answered On- 31/07/2024, Ministry of Social Justice & Empowerment, GoI)

2.7. Key Principles and Concepts

2.7.1. What is Hazard?

A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (UNDDR, n.d.).

Occupational hazards can be divided into two categories: safety hazards that cause accidents and physically injure workers, and health hazards that result in diseases. It is important to note that a 'hazard' only represents the potential to cause harm (PRIA, n.d.). Table 1 shows the type of occupational hazards and its consequences in sanitation workplaces.

- **Harm:** physical injury or damage to health.
- **Hazard:** a potential source of harm to a worker.

Table 1: Types of occupational hazards in sanitation work and their impacts

Hazard Type	Definition	Sanitation-Specific Examples	Possible Consequences
Chemical	Exposure to toxic chemicals can cause acute or chronic health issues.	Inhaling septic gases, contact with corrosive cleaning agents.	Respiratory illness, skin burns, poisoning
Biological	Harm from viruses, bacteria, or other organisms.	Exposure to faecal matter carrying viruses, bacteria, or other organisms.	Infections (e.g., hepatitis, cholera), fever
Physical	Environmental factors causing injury or discomfort.	Working in confined spaces, noise, and heat stress.	Heat stroke, suffocation, and hearing loss
Ergonomic	Strain due to posture, repetition, or poor workstation design.	Heavy lifting of tools and machinery.	Back injuries, joint/muscle pain
Psychosocial	Mental stress from job conditions or environment.	Stigma, harassment, stress from unsafe conditions.	Anxiety, depression, and low job satisfaction

Source: (Hawwoper OSHA, 2022.) (IIHS, 2025)

2.7.2. Methodologies of Hazard Identification

Hazard identification, risk assessment, and risk control should be integral considerations when developing plans to implement an OHS policy (BIS, 2007).

Hazard identification is a critical aspect of OSH, aimed at systematically assessing potential workplace risks. The primary objective is to recognise and document hazards that may pose a threat to worker safety. This process requires a comprehensive approach, involving collaboration between individuals familiar with daily operations and those with an external perspective to ensure a thorough evaluation. Once hazards are identified, they undergo a risk assessment to determine the likelihood and severity of potential injuries or illnesses resulting from exposure. The final stage involves implementing risk control measures to minimise or eliminate hazards, thereby enhancing workplace safety and compliance with occupational health standards (BIS, 2007).



Figure 10. Hazard Identification Assessment

2.7.3. Hazard Management Tool

The hazard management tool serves as a structured framework to assist workplaces in systematically identifying, assessing, and mitigating potential hazards. It provides a step-by-step approach to recognising workplace risks, evaluating their severity and likelihood, and implementing appropriate control measures to minimise harm. Furthermore, the tool facilitates continuous monitoring of these controls to ensure their ongoing effectiveness, thereby promoting a safer and healthier work environment, refer Annexure II Template for hazard management tool (WSIB, n.d.).

Steps in Hazard Management

Step 1: Hazard recognition (Columns A, B, C)

- **Identify activities and work areas (Column A):** Determine the job roles, tasks, and locations that present potential hazards, considering both routine and emergencies.
- **Classify hazard categories (Column B):** Hazards may be physical, chemical, biological, musculoskeletal, psychosocial, or safety related. Contributing factors include personnel, equipment, materials, environmental conditions, and work processes.
- **Assess potential hazards (Column C):** Identify how each hazard could lead to injury or illness, such as exposure to harmful substances, falls from heights, machinery-related accidents, excessive noise, or extreme temperatures.

Step 2: Hazard assessment (Columns D, E, F)

- **Determine probability (Column D):** Evaluate the likelihood of injury or illness occurring, categorising the risk as high, medium, or low based on exposure duration, frequency, and historical data.
- **Assess severity (Column E):** Classify the potential consequences of exposure as major (serious or fatal injury), moderate (resulting in lost time), or minor (causing no lost time)
- **Establish risk levels (Column F):** Combine probability and severity ratings to prioritise risks using a Risk Evaluation Chart, ensuring that the most critical hazards are addressed first.

Step 3: Hazard control measures (Columns G, H, I)

- **Compliance with regulations (Column G):** Identify relevant legal requirements and industry standards applicable to the identified hazards and workplace activities.
- **Existing control measures (Column H):** Document current hazard control strategies.
- **Planned Mitigation Measures (Column I):** Implement control measures following the hierarchy of controls:
 - Eliminate the hazard where possible.
 - Substitute hazardous materials, processes, or equipment with safer alternatives.
 - Implement Engineering Controls to limit exposure and reduce risk.
 - Enforce Administrative Controls, including training and procedural changes.
 - Use PPE as a last resort.

Step 4: Hazard evaluation and monitoring (Columns J, K, L)

- **Post-control risk assessment (Column J):** Reevaluate hazards after control measures are implemented to determine their effectiveness.
- **Continuous monitoring (Columns K & L):** Conduct periodic reviews and adjust control measures based on workplace changes, incident reports, and emerging best practices.

To access detailed information about the hazard management tool, please scan the QR code provided.



2.7.4. What is Exposure?

Exposure refers to the extent and frequency of contact with the hazard – how often, how long, and how intensely someone comes into contact with it.

Examples:

- A worker spending 8 hours a day inside manholes (high exposure)
- Occasional contact with household waste (low exposure)

1. Routes of Exposure

Sanitation workers in India face multiple exposure routes to various physical, chemical, and biological hazards while performing their duties. These exposure routes depend on the type of sanitation work (e.g., sewer cleaning, septic tank emptying, waste collection), and often result from inadequate protective measures, poor infrastructure, and unsafe working conditions. Here are the main exposure routes:

1. Inhalation (Breathing in harmful substances) Sanitation workers inhale:

Toxic gases such as hydrogen sulphide (H_2S), methane (CH_4), ammonia (NH_3), and carbon monoxide (CO), especially in confined spaces like septic tanks, drains, and sewers.

Bioaerosols, which are airborne microorganisms including bacteria, viruses, and fungi, particularly during manual handling of waste or sewage.

Dust and particulate matter, especially while sweeping streets or handling dry waste.



Health Risks: Asphyxiation, lung issues, infections

Figure 11. Health risks through inhalation as route of exposure

Source: (IIHS, 2025)

2. Dermal (Skin contact with contaminants) Frequent exposure of skin to:

Faecal matter, urine, and other bodily fluids, especially during manual cleaning of toilets, drains, or pits.

Chemical cleaning agents or disinfectants, which can cause skin burns, rashes, or allergic reactions.

Contaminated sharps (e.g., needles, broken glass) leading to injury and infection.



Health Risks: Cuts, burns, skin infections

Figure 12. Health risks through dermal as route of exposure

Source: (IIHS, 2025)

3. Ingestion (Swallowing harmful agents) Occurs when:

Workers eat or drink without washing their hands after waste handling.

Cross-contamination happens due to improper hygiene and a lack of facilities for handwashing and bathing.



Health Risks: Food poisoning, stomach infections

Figure 13. Health risks through ingestion as route of exposure

Source: (IIHS, 2025)

4. Percutaneous (through broken skin or puncture wounds)

Injuries from sharp objects (e.g., syringes, glass, metal scraps) present in solid waste or during drain/sewer cleaning led to infections like tetanus, hepatitis B and C, and potentially HIV.

5. Mucosal (contact with eyes, nose, or mouth)

Splashing of sewage or contaminated water during cleaning operations. It can cause eye and respiratory infections.

6. Combined exposure

Often, sanitation workers are simultaneously exposed via multiple routes- for example, a

worker entering a septic tank without PPE may inhale gases, have skin contact with faecal matter, and may cut by a sharp object, leading to multiple health risks.



Health Risks: Hepatitis

Eye, throat, respiratory infections

Multiple injuries, severe illness

Figure 14. Health risks through percutaneous, mucosal and combined as routes of exposure

2.6.5 What is Risk?

Risk refers to the probability or chance that a person will be harmed or experience an adverse health effect if exposed to a hazard. Risk also pertains to situations involving property or equipment loss, or harmful effects on the environment. Figure 8 shows the difference between hazard and risk.



Figure 15 .Difference between Hazard and Risk.

Source: (efsa, 2016)

Risk level =

Consequence	X	Exposure	X	Probability
The outcome severity (injury/ illness of one scenario)		Frequency and duration of exposure of a person to the chosen hazard		The likelihood or chance that the choasen sequence and consequence will occur.

2.7.6. Risk Assessment Matrix

Risk assessment is a systematic process to identify, evaluate, and control workplace hazards. It is a key component of any OHS programme and critical for preventing injuries, illnesses, and unsafe working conditions.

		Probability of Injury		
		High	Medium	Low
Severity of Injury	Major	High	High	Medium
	Moderate	High	Medium	Low
	Minor	Medium	Low	Low

Figure 16. Risk Assessment Matrix.

Source: (WSIB, n.d.)

Steps in Risk Assessment

Step 1: Hazard Identification

Trainers should guide participants in identifying different types of hazards. Refer 2.7.1 and 2.7.2.

Step 2: Risk Evaluation

After identifying hazards, assess:

- Severity of the possible injury or illness (e.g., minor, moderate, major)
- Probability of the hazard causing harm (e.g., low, medium, high)
- Use a Risk Matrix (Figure 9) to categorise the level of risk, see Figure 8. For example, if the occurrence of a hazard is highly likely to occur and the outcome is severe, it is classified as a High Risk and needs immediate action.

Step 3: Control Measures

- Once risks are evaluated, apply the Hierarchy of Controls to eliminate or reduce risks.
- Refer section 2.7.9.

Step 4: Monitoring and Review

Risk assessments should not be static documents.

- Review assessments regularly—especially after an incident or changes in equipment, tasks, or personnel.
- Use checklists and inspection reports to monitor compliance and control effectiveness.
- See Annexure I for the checklist for risk assessment.

The Table 2 outlines the various occupational risks and hazards faced by different categories of sanitation workers. It highlights how the nature of their tasks exposes them to physical, chemical, biological, and psychosocial hazards.

Table 2: Occupational Risks and Hazards for Different Categories of Sanitation Workers

No	Worker type	Hazards	Safety risks	Health risks
1	Public Toilet Cleaner	Strong disinfectants, poor ventilation, cramped space, pathogens, and hidden sharp objects	Slipping, contact with sharp fixtures, and limited movement	Respiratory irritation, infections, fatigue, skin and eye irritation
2	Sewer Cleaner	Confined spaces, sharp objects, toxic gases, pathogens, heavy lifting, wet floors	Entrapment, injuries from sharp items, slips, trips, and falls	Infections from waste, gas poisoning, heat stress, muscle strain, fatigue
3	De-sludging Operators	Toxic gases, heavy lifting, slippery surfaces, pathogens, and industrial waste	Falls, strain from lifting, cuts, and gas explosions-	Respiratory issues, infections, heat exhaustion, joint stress
4	STP/FSTP Plant Worker	Machinery parts, confined spaces, toxic gases and chemicals, wet surfaces	Machine injuries, falls, and entrapment	Respiratory problems, chemical burns, infections, heat stress

2.7.7. What is Safety?

Safety is the condition of being secure from personal injury and property damage. Safety is when there are no accidents. “Safety is no accident.”

2.7.8. What is an Accident?

An accident is an undesirable, unplanned event that may result in personal injury to persons, including death, damage to property, or disruption of work and environment. Even if no one was hurt, safety should not depend on luck. A near-miss is still an accident.

2.7.9. Hierarchy of Controls

The hierarchy of controls is a structured method used to identify and prioritise safety measures that either eliminate or minimise worker exposure to hazards. These controls are ranked from most to least effective and include elimination, substitution, engineering controls, administrative controls, and PPE as shown in Figure 10.

The most effective approach is to eliminate the hazard. When elimination is not feasible, the next best option is substitution, which involves replacing a hazardous substance or process with a safer alternative.

Engineering controls provide additional safeguards by physically altering the work environment to reduce exposure to hazards. Examples include **local exhaust ventilation systems** that capture contaminants before they enter the air, enclosures that contain hazards, or control cabins that isolate workers from dangerous conditions.

When engineering solutions are not sufficient, **administrative controls** can help minimise risks. These measures include **limiting work hours, scheduling tasks at safer times, enforcing standardised operating procedures, and providing worker training.**

At last, **PPE**, such as respirators and protective clothing, serves as the last line of defence. While PPE is necessary in some cases, it is the least effective method for controlling occupational hazards, as it does not eliminate the source of the risk.

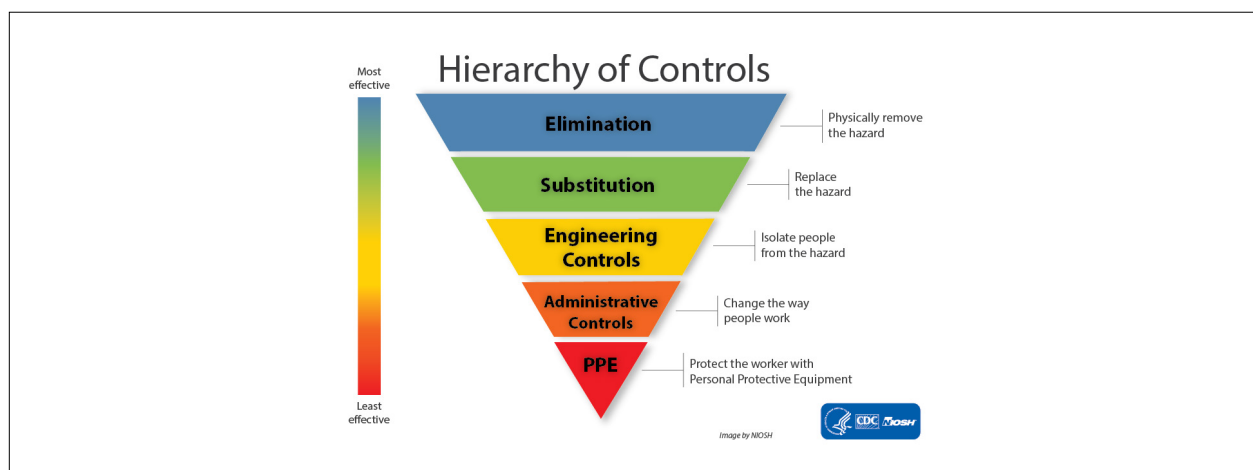


Figure 17. Hierarchy of Controls

Source: (NIOSH, 2024)

Examples on usage of hierarchy of control

Implementing the hierarchy of control in sanitation work demonstrates substantial positive impacts on worker safety, health outcomes, and operational effectiveness. Evidence from municipal councils in India and global best practices shows that systematic application of control measures from elimination to PPE significantly reduces occupational hazards and fatalities among sanitation workers.

1. Elimination examples: PEMSR Act, 2013

The Manual Scavenging Prohibition and Rehabilitation Act, 2013 bans manual scavenging, preventing workers from entering septic tanks and manholes (NCSK, 2013). It reduces exposure to hazardous and unsafe conditions while promoting rehabilitation and alternative employment for those previously engaged in this work (NCSK, 2013).

2. **Substitution examples: Scheduled desludging**

Wai Municipal Council (WMC) implemented systematic scheduled desludging on a three-year cycle for households, substituting emergency hazardous cleaning with planned, safer mechanical operations (CWAS, 2020). This reduced emergency interventions requiring human entry under dangerous conditions (CWAS, 2020).

3. **Engineering controls examples: Septic tank cleaning robot**

Solinas, a deep-tech startup incubated at IIT Madras under DST-TBI, developed Homosep Atom, India's first septic tank and manhole cleaning robot, providing a complete robotic solution that replaces manual scavenging (DST, n.d.). Deployed in 16 cities, it performs cleaning, desilting, suction, and waste storage in one device, improving efficiency, safety, and dignity for sanitation workers while reducing sewer overflows (DST, n.d.). Beyond this, Solinas' AI-based tools like Endobot and Swasth AI detect pipeline leaks, blockages, and contamination, enhancing water quality and reducing losses in cities like Madurai, Chennai, Coimbatore, Hubballi, and Goa. With DST support, Solinas has scaled sustainable solutions that address water wastage, pollution, and urban sanitation challenges, demonstrating how robotics and AI can transform public health and infrastructure management in India (DST, n.d.).

4. **Administrative controls examples: Standard operating procedures**

ULBs adopt standard operating procedures (SOPs) for all sanitation tasks. ULB staff and sanitation workers are trained to follow these SOPs while performing their duties to ensure safety and efficiency (UMC, n.d.). Emergency Response Sanitation Units (ERSUs) are deployed during emergencies or high-risk sanitation operations, providing safe and organized sanitation support and reducing exposure to hazardous conditions (UMC, n.d.).

PPE examples: PPE provision in Wai

In 2018, Wai was selected for the City-Wide Inclusive Sanitation (CWIS) Program funded by the Gates Foundation, with the WMC and the Centre for Water and Sanitation (CWAS) focusing on improving sanitation worker safety, particularly through PPE. A study in 2020 highlighted gaps in PPE provision, monitoring, and training. In response, WMC implemented best practices including: incorporating PPE clauses in contracts, establishing systematic PPE monitoring through registers and the SaniTab app, providing task-specific PPE, conducting regular training and sensitisation workshops, organising health camps, engaging private contractors, and using data for continuous improvement (CWAS, 2020). By June 2022, around 70% of sanitation workers and all private sector workers had access to appropriate PPE, demonstrating improved safety, awareness, and worker dignity, while setting a benchmark for other ULBs (CWAS, 2020).

2.7.10. **Gender-sensitive OHS practice**

The World Health Organization (WHO) defines health as a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity. This definition highlights that mental health is an essential component of overall health and that health should be understood as a positive state of well-being rather than simply the absence of illness. Mental health is further conceptualised as a state in which an individual is able to recognise and develop their own abilities, manage the normal stresses of life, maintain constructive social relationships, and contribute productively to society (European Agency for Safety and Health at Work, 2022).

The EU-OSHA (European Union- Occupational Safety and Health Administration) study highlights that LGBTI (Lesbian, Gay, Bisexual, Transgender, and Intersex individuals) workers are frequently exposed to prolonged psychosocial and organisational risks in combination with physical hazards, which can adversely affect both mental and physical health. Poor mental health among LGBTI workers has been shown to contribute to a higher prevalence of musculoskeletal disorders (MSDs), including cervical tension, neck pain, and back pain, compared to the general workforce (European Agency for Safety and Health at Work, 2022).

Women and men have distinct physiological and anatomical characteristics, including differences in skeletal structure, body fat composition, and respiratory function. As a result, even when employed under similar working conditions, women may experience different health outcomes compared to men. Factors such as smaller body size and relatively lower physical strength influence these variations. Due to reduced physical strength, women are more prone to muscular strain and discomfort, particularly while using PPE. Most PPE is designed based on male body dimensions, often resulting in poor fit and inadequate protection for women. (Bolghanabadi, et al., 2024). The ill-fitting PPE can create several safety risks from hard hats that slip off and loose coveralls that get caught in machinery, to oversized gloves that reduce grip and dexterity, and footwear or shoe covers that increase the likelihood of tripping or falling (ETI, 2025).

Women tend to be smaller than men and have thinner skin, both of which can lower the level of toxins they can be safely exposed to. Hormonal influences (menstruation, menopause, lactation) can also modify the reaction to chemical exposure (IUF, 2020)

Women are also at greater risk when exposed to chemicals and improper usage of tools. For example,

- Tools and equipment designed for men can strain women and increase the risk of musculoskeletal disorders. Improperly designed or incorrectly set-up workstations and machinery contribute to poor posture, leading to higher rates of injuries such as sprains, strains (ETI, 2025).
- The absorption of cadmium through the gastrointestinal tract poses higher risks for women, particularly during menstruation or in cases of low iron reserves and insufficient protein intake (Bolghanabadi, et al., 2024).
- Chemicals tend to disperse more rapidly in women's bodies because of smaller body mass and higher blood circulation rates, causing faster distribution of toxic substances in tissues (Bolghanabadi, et al., 2024).
- Women's renal systems generally eliminate toxins more slowly than men's, allowing harmful substances to remain in the body for longer periods. The higher proportion of adipose tissue in women's bodies also facilitates the accumulation and retention of toxic compounds (Bolghanabadi, et al., 2024).
- Studies have further indicated that occupational exposure to perchloroethylene, a common solvent used in cleaning processes, is linked to an increased risk of cervical cancer among women (Bolghanabadi, et al., 2024).

A gender-neutral approach to occupational health and safety can pose significant risks for women, particularly due to the reliance on data primarily derived from male workers. Policies and decisions related to OHS should adopt an inclusive, integrated, and gender-responsive approach. This includes collecting and analysing evidence that reflects both women's and men's experiences and ensuring that women are actively involved in the decision-making process, allowing their perspectives to inform measures that affect workplace health and safety (IUF, 2020).

The ILO's 10 Keys to Gender-Sensitive OSH Practice, targeted at governments, employers, and workers, outline essential measures to promote gender-responsive occupational health and safety (IUF, 2020):

- Develop policies that address workplace inequalities.
- Implement gender mainstreaming by examining the impact of gender roles on health and safety.
- Incorporate gender considerations into risk assessments.

- Evaluate risks in both male- and female-dominated occupations.
- Ensure that occupational health and safety research, including government studies, reflects gender differences.
- Establish systems for collecting sex disaggregated OHS data.
- Integrate research findings and data into policy development and workplace interventions.
- Provide equal access to occupational health services for all employees.
- Deliver gender-sensitive information, education, and training.
- Design workplaces, equipment, tools, and PPE suitable for both women and men.
- Consider working time arrangements and work-life balance in workplace planning.
- Fully involve both women and men in all decisions affecting their workplace health and safety.

2.7.11. Safe working conditions

Ensuring the safety and well-being of sanitation workers requires a comprehensive approach that includes proper training, hygiene practices, use of protective equipment, and preventive healthcare measures. Workers must receive adequate training along with periodic sessions on hygienic practices, safe waste handling, proper use of PPE, early disease identification, and regular medical check-ups. Maintaining hygiene is essential, including thorough handwashing with soap and water after handling waste, before eating, drinking, or smoking, and keeping nails short to prevent dirt accumulation. Workers should avoid touching their face, eyes, nose, mouth, or wounds with contaminated hands and refrain from tobacco chewing and smoking while handling waste. PPE must be used appropriately, with gloves to protect hands from contamination, goggles to shield eyes from splashes, liquid-repellent coveralls for personal clothing, face masks for respiratory protection, and rubber boots to prevent cuts and exposure to hazardous waste. Additionally, vaccinations against Hepatitis A, Hepatitis B, typhoid, and tetanus toxoid are essential to protect workers from infectious diseases. A combination of proper training, adherence to hygiene protocols, and protective measures is crucial in minimising occupational risks and safeguarding the health of sanitation workers (Gomath & Kamala, 2020). By implementing appropriate measures, fostering collaboration and promoting supportive policies, the well-being of these essential workers can be ensured and in turn, contribute to the achievement of successful sanitation interventions (World Bank, 2019).

The Table 3 details the key actions ULBs should take to protect sanitation workers. It focuses on implementing safety measures, providing proper equipment, and ensuring regular training and monitoring.

Table 3: Actions ULBs should take to ensure the safety of sanitation workers

	Regulation of sanitation work	Training	Provision of entitlements	Enablers
1	Enumeration of sanitation workers	Training of sanitation workers	Service level benefits for sanitation workers	Grievance redressal system for sanitation workers
2	Empanelment of private service providers	Capacity building of ULB staff	Health and safety of sanitation workers	Sensitising citizens
3	Adoption of standard operating procedures	-	Social security benefits for sanitation workers and their families	Recognition of sanitation workers
4	Mechanisation of sanitation work	-	-	-
5	Prohibition of manual scavenging	-	-	-
6	Setting up an Emergency Response Sanitation Unit (ERSU)	-	-	-

Source: (UMC, n.d.)

2.8. Exercise: Hazard vs. Risk Wall

This activity is designed to strengthen participants' understanding of the difference between a hazard and a risk, which is fundamental in conducting risk assessments in sanitation-related work environments.

Participants will analyse everyday sanitation and public workplace scenarios and decide whether each describes a hazard (a potential source of harm) or a risk (the likelihood of harm occurring).

Materials Needed:

- Two large flip charts or chart papers labelled 'Hazard' and 'Risk'
- 25–30 scenario cards with double-sided tap markers
- Markers

Step 1: Set the context (5 minutes)

- Begin by asking the group: “What’s the difference between a hazard and a risk?”
- Write down their responses briefly on a whiteboard or flipchart.
- Clarify using simple definitions:
 - A hazard is something that can cause harm.
 - A risk is the chance that the hazard will cause harm.

Step 2: Wall setup

- Stick up two flip charts on the wall titled 'Hazard' and 'Risk'.
- Place the scenario cards on a table or hand out one card to each participant/pair.

Refer to Table 4 for statements.

Step 3: Group Sorting (10 minutes)

- Instruct participants to:
 - Read their card.
 - Decide if it describes a hazard or a risk and stick the card on the corresponding chart.
- Encourage participants to briefly explain their logic to a facilitator when sticking their note.

Step 4: Facilitator debrief (10 minutes)

- Go through each card on the Hazard and Risk Walls.
- Correct any misclassifications and explain why using relatable examples.

Trainer's Note: Keep it interactive—use humour, relatable stories, or even role play if time permits.

Table 4: List of statements for Hazard vs Risk exercise

Sl. No.	Statement (An Example)	Answer	Explanation
1	A worker may inhale toxic gases while entering a septic tank without a gas detector.	Risk	It is the likelihood of harm due to the presence of toxic gases.
2	Electrical wires hanging loosely from the ceiling in a treatment plant.	Hazard	The loose wires pose a potential source of harm (shock or fire).
3	Using a ladder on an uneven surface may cause someone to fall.	Risk	It describes the potential outcome (fall) from a hazard (unstable ladder).
4	Someone may get a skin infection due to direct contact with faecal sludge.	Risk	The possibility of infection from the biological hazard (sludge).
5	The presence of hydrogen sulphide gas in a manhole.	Hazard	Hydrogen sulphide is a toxic gas with the potential to harm.
6	Operating a sludge pump without gloves and boots.	Risk	It describes unsafe behaviour that increases the likelihood of harm.

Sl. No.	Statement (An Example)	Answer	Explanation
7	A wet floor in the plant entrance where people walk.	Hazard	The wet floor is an unsafe condition that could cause slipping.
8	The possibility of an operator falling due to a slippery surface in the FSTP.	Risk	It is the likelihood of a fall (harm) from the slippery condition (hazard).
9	A broken handrail on the stairs near the digester tank.	Hazard	Broken infrastructure that could cause injury.
10	The likelihood of tetanus infection due to untreated cuts.	Risk	It is the chance of harm (tetanus) following exposure to a hazard (open wound).
11	Faecal sludge is overflowing near the drying bed.	Hazard	Overflowed sludge poses a direct biological hazard.
12	A sharp metal object is lying on the ground in the FSTP.	Hazard	It is a physical object that could cause cuts or punctures.
13	The chance of slipping during the monsoon while inspecting the polishing pond.	Risk	It describes the likelihood of harm during specific conditions.
14	The presence of harmful bacteria and viruses in untreated wastewater.	Hazard	Pathogens are biological hazards with the potential to harm health.
15	An operator might get electrocuted while handling a faulty control panel.	Risk	This is likelihood of harm due to electrical hazard (faulty panel).
16	A broken step on a public staircase.	Hazard	The broken step is a physical condition that could cause harm.
17	The chance of someone tripping on a broken step and injuring their ankle.	Risk	It refers to the potential of the hazard to cause injury.
18	A bottle of acid was stored without a proper label in an office lab.	Hazard	The unlabelled acid is a chemical hazard.
19	The likelihood of acid burns due to mishandling of unlabelled chemicals stored in an office lab.	Risk	It describes the chance of harm from the hazard.
20	Open the electric socket within reach of children.	Hazard	The open socket is a potential source of harm (electrical hazard).
21	A person might get an electric shock from touching an exposed socket.	Risk	It describes the probability of the harm happening.
22	A pile of heavy files is stored unsafely at a height above head level in a government office.	Hazard	The unsafe storage condition is a potential cause of injury.
23	The possibility of files falling from an unsafe storage above the head level in a government office and injuring someone during an earthquake.	Risk	It is the likelihood of harm occurring from the hazard.
24	Loud machinery is operating continuously in a municipal garage.	Hazard	High noise levels are a hazard that can lead to hearing loss.
25	A municipal worker develops hearing problems after long exposure to loud noise due to continuous machinery operation in a municipal garage.	Risk	It describes the harmful consequences of exposure to a hazard.

Trainer's Note



1. **Context setting:** Begin with an introduction to the challenges faced by sanitation workers. The video on sewer diving serves as a powerful tool to highlight the risks these workers endure. Use it as a springboard for discussion, encouraging participants to reflect on the systemic challenges and barriers that perpetuate unsafe working conditions.
2. **Interactive engagement:** The Ice Breaker section should be engaging and relatable. After watching the video, encourage participants to share their emotional reactions and thoughts. This helps humanise the issues and fosters an open environment for discussion.

3. **Understanding OHS principles:** Introduce the core principles of OHS, particularly the rights of workers and the critical importance of prevention over correction. Discuss how OHS policies should be established, implemented, and communicated to all stakeholders. This is a foundational concept that will serve as the basis for later sessions on specific risks and controls.
4. **Real-life applications:** Use case studies (such as those from India) and the figures related to the number of sanitation workers in different sectors to bring relevance to the training. These statistics not only make the content relatable but also provide context for the practical importance of OHS in sanitation.
5. **Hazard vs. Risk activity:** The Hazard vs. Risk Wall exercise is designed to be hands-on and fun. It encourages critical thinking about the difference between hazards and risks. Provide support as needed and ensure that the activity is not just a theoretical exercise but directly linked to the practical risks workers face on the ground.
6. **Hazard Identification and Risk Assessment:** Emphasise the importance of identifying hazards (as potential sources of harm) and assessing the level of risk. Use the examples of sanitation-specific hazards to make the content practical. Discuss the process of risk assessment using the risk assessment matrix and hazard management tools. Ensure participants understand how these tools can be implemented in their work environments.
7. **Safety culture and continuous monitoring:** Reinforce the idea that OHS is an ongoing process. Encourage participants to think about safety culture as a living entity that requires constant nurturing. Regular training, risk assessments, and monitoring are necessary to maintain a safe work environment.
8. **Actionable takeaways:** Ensure that participants leave the session with actionable insights, such as understanding the core OHS principles, identifying hazards, assessing risks, and using tools like the Risk Assessment Matrix and Hazard Management Tool.

Tips for Effective Facilitation:

- Use storytelling to make complex concepts relatable and memorable.
- Actively engage participants with questions and encourage peer-to-peer discussions to foster a collaborative learning environment.
- Provide clear examples of what constitutes a hazard versus a risk, especially within the sanitation context.
- Adapt the pace of the session based on participant engagement. If a topic sparks significant interest or discussion, allow extra time for exploration.
- Regularly refer to the training materials (such as the figures and risk matrices) to visually reinforce learning.

Additional Notes:

- Keep the session practical and grounded in the real-world challenges sanitation workersface.
- Encourage the development of a safety-first mindset, where participants see safety not just as a set of rules but as a critical part of their role in ensuring worker well- being and productivity

2.10 Annexure

IX. Checklist for risk assessment: Hazard mapping and preventive measures

Sl no.	Question	Yes	No
1	Uneven or slippery floor (on which someone may stumble or slip)		
2	Moving vehicles and machines		
3	Moving parts of the machine		
4	Hazardous base/edge of materials or machinery (sharp, blunt)		

Sl no.	Question	Yes	No
5	Hot or cold base, material etc.		
6	High-rise workstation (which may result in items falling)		
7	Hand tools		
8	High pressure instruments		
9	Electrical connections and machinery		
10	Fire		
11	Explosion		
12	Chemicals present in the air (with dust)		
13	Sound/noise		
14	Trembling of hands and arms		
15	Trembling of the whole body		
16	Light		
17	UV, IR, laser and microwave radiation		
18	Electromagnetic field		
19	Hot or cold weather		
20	Weightlifting and carrying		
21	Disinterest towards work/physical weakness		
22	Bacterial problem (virus, micro-organism, bacteria, parasites)		
23	Mental stress		
24	Others: include below and tick 'Yes'		

Source: (DISH, n.d.)

X. Checklist of Worker's Active Participation

Sl no.	Questions for workers	Yes	No
1	Do the workers participate in hazard mapping and are they consulted in this regard?		
2	Do the workers receive training regarding occupational health and safety issues and preventive measures?		
3	Are the workers interested in providing their opinions regarding OSH?		
4	Are the workers trained to find problems/faults in the employer's management of risk?		
5	Do workers participate in developing the instructions, processes, and rules on OSH and provide their feedback where applicable?		
6	Are workers informed and consulted before implementing any planned changes?		
7	Are workers sufficiently trained to actively seek occupational safety and health related training?		
8	Are workers involved in the procurement process of machinery, materials and personal protection equipment?		
9	Are workers asked to provide their recommendations and advice before taking any decision?		

Sl no.	Questions for worker representatives	Yes	No
1	Is there a universally accepted process to ensure participation of worker representative?		
2	Do workers receive training regarding occupational health and safety issues and preventive measures?		
3	Are workers trained to find problems/faults in the employer's management of risk?		
4	Do the workers participate in developing instructions, processes, and rules and provide their feedback where applicable?		
5	Are workers informed and consulted before implementing any planned changes?		

Source: (DISH, n.d.)

XI. Checklist for Chemical Hazard

S No.	Questions	Yes	No
1	Are hazardous chemicals (highly poisonous, poisonous, harmful, erosive, stimulant, sensitive, carcinogenic, cell destroyer, harmful for reproduction, explosive, oxidising, highly inflammable, moderately flammable or flammable) labelled?		
2	Is all the safety information of all relevant hazardous chemicals listed in the Information Sheet?		
3	Are all the hazardous chemicals properly MSDS (Material Safety Data Sheet) labelled?		
4	Are all hazardous chemicals properly used?		
5	Are the workers properly and regularly informed about the hazards posed by the chemicals they handle?		
6	Do young workers and pregnant women come in contact with harmful chemicals?		
7	Do you ensure and maintain the appropriate levels of oxygen in the workplace?		
8	Is the level of chemicals in the air lower than the maximum density acceptable for the human body?		
9	Are preventive measures (ensuring proper air circulation) installed in areas where chemicals are used?		
10	Are personal protective equipment (gloves, goggles, face shield, respirator) given to workers who handle harmful chemicals?		
11	Are medical checkups of workers who handle harmful chemicals done regularly?		
12	Is special care given to the workers who handle carcinogenic products?		

Source: (DISH, n.d.)

XII. Template for hazard management tool

Name of Firm:	Assessment Date:
Person Completing:	JHSC/Representative Review Date:
Work Area/Department:	Sr. Manager Review Date: Sr. Manager Signature:

RECOGNIZE			ASSESS			CONTROL			EVALUATE		
A	B	C	D	E	F	G	H	I	J	K	L
What activity can cause injury or illness? • Job Titles • Work Activities	What hazard groups (categories) can cause injury or illness? • Physical • Biological • Chemical • MSD • Psychosocial • Safety	What potential hazards can cause the worker injury and illness?	How likely are the hazards to cause injury or illness? • High • Medium • Low	How serious could the harm be? • Major • Moderate • Minor	What is the risk level for this hazard? • High • Medium • Low (Use the answers from D & E and plot on the above risk evaluation chart)	What legal requirements / standards apply to the identified hazards, work processes, work activities?	What is currently being done to eliminate or control the hazard?	What future actions are needed to eliminate or control hazards?	How likely is the hazard to cause injury or illness now? • High • Medium • Low	How serious could the harm be now? • Major • Moderate • Minor	What is the risk level for this hazard now? • High • Medium • Low (Use the answers from J & K and plot on the above risk evaluation chart)
Service bay techs working under cars	Physical	Car falling off hoist/car jacks	Medium	Major	High	OHSA TSSA Industrial Regulation	Safe Operating Procedures Maintenance on hoist	Increase inspections, revise maintenance & Safe Operating Procedures, Revise Worker training	Low	Major	Medium

Risk Evaluation Chart				
		Probability of Injury		
		High	Medium	Low
Severity of Injury	Major	High	High	Medium
	Moderate	High	Medium	Low
	Minor	Medium	Low	Low

Source: (WSIB, n.d.)

03

Regulatory Landscape and Compliance



3.1. Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 1	Presentation	30
2		Exercise	30
3		Case Study	10
Questions & Discussion			5
Total			75

3.2. Learning Objectives

1. Understand international and national OHS frameworks
2. Identify the institutions responsible for sanitation worker safety
3. Understand gaps in current safety laws and policies

3.3. Key Takeaways

1. Overview of international, national OHS frameworks, legal protections and obligations under sanitation-related laws.
2. Familiarity with key institutions and regulatory bodies responsible for overseeing sanitation worker safety.
3. Capability to identify non-compliance and violations of the relevant safety standards and regulations

3.4. International Regulations

The evolution of international health and safety legislation has played a crucial role in establishing standardised workplace safety regulations across various industries. Over the years, numerous legal frameworks and international agreements have been introduced to ensure worker protection, mitigate occupational hazards, and promote a culture of risk prevention (Arinite, n.d.).

1. 1970: The United States Occupational Safety and Health Act (OSHA)

The Occupational Safety and Health Act (OSHA) was enacted in the United States in 1970, marking a significant milestone in occupational health and safety regulations. This legislation established the Occupational Safety and Health Administration (OSHA), a federal agency responsible for enforcing workplace safety standards. Under this Act, employers are required to identify, assess, and mitigate workplace hazards while ensuring compliance with prescribed safety measures. OSHA plays a pivotal role in conducting inspections, imposing penalties, and providing training programs to promote safe working conditions across various sectors.

2. 1974: The United Kingdom Health and Safety at Work Act

In 1974, the United Kingdom enacted the Health and Safety at Work Act (HSWA), which laid the foundation for a structured approach to occupational health and safety. The Act mandates that employers ensure the health, safety, and welfare of their employees and the general public affected by workplace activities. The legislation also led to the establishment of the Health and Safety Executive (HSE), a regulatory body responsible for implementing safety laws, conducting workplace inspections, and investigating occupational incidents. The UK's comprehensive approach has influenced safety legislation in multiple jurisdictions worldwide.

3. **1981: International Labour Organization (ILO) Occupational Safety and Health Convention**

The International Labour Organization (ILO) adopted the Occupational Safety and Health Convention in 1981, establishing a global framework for workplace safety standards. This convention emphasises the need for national occupational safety and health policies and calls upon governments to implement measures that prevent occupational injuries, diseases, and fatalities. While the ILO does not have enforcement authority, its conventions provide guiding principles that assist countries in formulating and strengthening their health and safety legislation. For further details, refer to Section 3.4.1.

4. **1989: The European Union (EU) Framework Directive on Health and Safety**

The EU Framework Directive on Health and Safety at Work, introduced in 1989, set forth minimum safety requirements that all member states were required to integrate into their national laws. This directive reinforced the responsibility of employers to systematically identify and mitigate workplace risks. It played a crucial role in harmonising occupational safety regulations across Europe, ensuring that businesses operating within the EU adhered to consistent safety standards.

5. **1992: The Introduction of the EU "Six Pack" Directives.**

In 1992, the European Union introduced a series of directives collectively known as the "Six Pack", aimed at further refining occupational health and safety regulations. These directives addressed specific workplace safety concerns, including:

- **Workplace Equipment Directive:** Establishing safety requirements for machinery and tools.
- **PPE Directive:** Mandating the provision and proper use of protective gear.
- **Manual Handling Directive:** Regulating activities related to lifting, carrying, and transporting loads to prevent musculoskeletal injuries.
- **Display Screen Equipment Directive:** Setting ergonomic guidelines for workers using computer screens.
- **Workplace Directive:** Defining minimum safety standards for physical work environments.
- **Health and Safety of Temporary Workers Directive:** Extending legal protections to temporary and contract workers.

The introduction of these directives contributed to the alignment of occupational health and safety standards across EU member states, ensuring a unified approach to worker protection.

6. **2001: Corporate Criminal Liability for Workplace Safety in Italy**

In 2001, Italy introduced corporate criminal liability provisions for workplace safety violations. Under this legal framework, corporations and senior executives can be held accountable for failing to implement adequate safety measures. While Italian law permits legal action against corporate entities, criminal liability is typically assigned to individuals in decision-making positions, such as board directors and senior managers. This development reinforced the importance of corporate responsibility in maintaining workplace safety standards.

7. **Sustainable Development Goals (SDGs), 2015**

Improving the working conditions of sanitation workers is essential for advancing several Sustainable Development Goals (SDGs). In particular, it contributes to SDG 1 (No Poverty) by ensuring equitable access to basic services, SDG 3 (Good Health and Well-being) by reducing occupational exposure to hazardous substances, SDG 6 (Clean Water and Sanitation) by promoting sustainable sanitation management, and SDG 8 (Decent Work and Economic Growth) by fostering safe and dignified employment. The SDG framework provides a strategic avenue to address the challenges faced by sanitation workers, ultimately enhancing their well-being and economic stability.

8. 2018: Introduction of ISO 45001 – Global Occupational Health and Safety Standard

In 2018, the International Organization for Standardization (ISO) introduced ISO 45001, an internationally recognised standard for occupational health and safety management systems. Designed to help organisations improve workplace safety, reduce occupational risks, and enhance employee well-being, ISO 45001 integrates principles from earlier regulatory frameworks, including ILO conventions. While compliance with ISO 45001 is voluntary, organisations that adopt this standard demonstrate a commitment to achieving high safety performance and fostering a culture of continuous improvement in occupational health and safety.

3.4.1. International Labour Organization (ILO) conventions on sanitation worker safety

The ILO has adopted several conventions aimed at ensuring safe and healthy working conditions across various sectors. Each convention addresses specific aspects of occupational safety and health, outlining the responsibilities of governments, employers, and workers. The Table 4 provides a comparison of selected ILO OSH conventions.

Table 5: Series of ILO Convention on Safety and Health

Important Events	Year	Scope	Key Provisions
Act/ Rules/ Regulations			
Occupational Safety and Health Convention (No. 155)	1981	Applicable to all sectors and workplaces, covering both public and private employment.	Requires member states to develop a national occupational safety and health policy.
			Establishes obligations for employers and workers to ensure workplace safety.
			Mandates the implementation of national OSH legislation, regulations, and enforcement mechanisms.
			Emphasises accident prevention and risk management.
Occupational Health Services Convention (No. 161)	1985	Covers all workplaces where workers are employed.	Requires the establishment of occupational health services at the workplace level.
			Aims to prevent occupational diseases, injuries, and hazards through medical surveillance and risk assessment.
			Ensures monitoring of worker health, workplace adaptations, and ergonomic improvements.
			Emphasises worker education and training on health-related risks.
Safety and Health in Construction Convention (No. 167)	1988	Specifically applies to the construction sector.	Establishes comprehensive OSH regulations for construction activities.
			Covers scaffolding, lifting operations, machine safety, excavation risks, and PPE.
			Mandates employers to identify and mitigate workplace hazards.
			Requires safe systems of work, emergency procedures, and worker training programs.

Important Events	Year	Scope	Key Provisions
Chemicals Convention (No. 170)	1990	Covers all workplaces where chemicals are produced, handled, used, stored, or disposed of.	Establishes comprehensive safety measures for chemical handling in workplaces.
			Requires employers to assess and control risks related to hazardous chemicals.
			Mandates the proper labelling, classification, and safety data sheets (SDS) for chemicals.
			Ensures that workers are informed about chemical hazards and provided with adequate training.
			Regulates transportation, disposal, and emergency response measures for chemical-related incidents.
Promotional Framework for Occupational Safety and Health Convention (No. 187)	2006	Applies to all workplaces and economic sectors.	Establishes a national OSH framework aimed at continuous improvement.
			Encourages governments to promote OSH through education, research, and capacity-building.
			Requires a national tripartite mechanism (government, employers, and workers) to promote OSH initiatives.
			Advocates for a culture of prevention rather than reactive enforcement.

Source: ILO

3.4.2. WHO guidelines for health and safety in sanitation

The WHO guidelines on sanitation and health highlight the fundamental importance of sanitation in safeguarding human health, particularly in preventing a range of infectious diseases, including diarrheal diseases, tropical diseases such as soil-transmitted helminth infections and schistosomiasis, and vector-borne diseases like West Nile virus and lymphatic filariasis. The guidelines stress that sanitation is not merely a health issue but a development issue, particularly in low- and middle-income countries (LMICs) where many people still practice open defecation, and rural areas often lack adequate sanitation services. This situation is exacerbated in rapidly urbanising cities where sanitation needs grow quickly. Safe sanitation systems are critical to achieving broader global health and development goals, as emphasised by the United Nations, which recognised sanitation as a human right in 2010 (WHO, 2018).

The WHO guidelines offer detailed recommendations to address these issues, starting with ensuring universal access to toilets that safely contain excreta. The guidelines point out that access alone is insufficient unless it leads to consistent, safe, and hygienic use. Furthermore, sanitation must be addressed throughout the entire service chain, including containment, emptying, transport, treatment, and final disposal. A key principle of the guidelines is that sanitation must be incorporated into broader local and national development planning processes to ensure that sanitation infrastructure is adequately integrated into urban and rural settings, where rapid urbanisation or informal settlements pose significant challenges. The guidelines emphasise the need for a holistic, risk-based approach to sanitation system planning, which considers the local context and community-specific health risks (WHO, 2018).

The WHO guidelines offer detailed recommendations to address these issues, starting with ensuring universal access to toilets that safely contain excreta. The guidelines point out that access alone is insufficient unless it leads to consistent, safe, and hygienic use. Furthermore, sanitation must be addressed throughout the entire service chain, including containment, emptying, transport, treatment, and final disposal. A key principle of the guidelines is that sanitation must be incorporated into broader local and national development planning processes to ensure that sanitation infrastructure is adequately integrated into urban and rural settings, where rapid urbanisation or informal settlements pose significant challenges. The WHO recommend ensuring universal access to safe toilets, improving sanitation across the entire service chain, and incorporating sanitation into local planning processes. Furthermore, the guidelines stress the need for behaviour change

strategies, such as information dissemination and community-based approaches, to promote sustainable sanitation practices. By emphasising the multi-sectoral nature of sanitation, the WHO guidelines stress the importance of coordination across various government sectors, including health, education, housing, and agriculture, to ensure safe, sustainable sanitation systems are established globally (WHO, 2018).

3.5. National Occupational Health and Safety Framework

Sanitation workers in India continue to face significant challenges rooted in centuries of social ostracisation and stigmatisation. Despite their vital contributions to public health, environmental sustainability, and the local economy, sanitation workers are exposed to numerous hazards daily, often without any protective equipment. This lack of safety measures results in frequent accidents, injuries, and, in many cases, loss of life. In addition to facing physical risks, sanitation workers also endure societal stigma, characterised by the perception of their work as offensive and unclean. This, coupled with low wages, poor living conditions, and limited support from society, further exacerbates their plight.

The Constitution of India, under Article 17, abolished untouchability and prohibited its practice in any form, the issue of manual scavenging, which involves the direct handling of human excreta, remains a grim reality. To address this, the Government of India introduced several legislative measures, including the Civil Rights Act of 1955 and the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act of 1993. Despite these laws, manual scavenging persists, prompting the enactment of the PEMSAR Act. This law bans the engagement of individuals in manual scavenging activities and focuses on the rehabilitation of those previously involved in such practices. Under this Act, workers identified as manual scavengers are entitled to one-time financial assistance, livelihood skill training, housing assistance, and other benefits aimed at reintegrating them into society (Baradi & Malhotra, 2023).

The Government of India's National Urban Sanitation Policy (NUSP), launched in 2008, aimed to make cities and towns cleaner and more liveable by addressing open defecation and ensuring safe treatment of human waste. The Swachh Bharat Mission (SBM), launched in 2014, further supported efforts to eliminate open defecation and improve sanitation infrastructure (Baradi & Malhotra, 2023).

In 2018, a report estimated that there are approximately 5 million sanitation workers in India, with around 2 million engaged in high-risk sanitation work, particularly in urban areas (Dalberg, 2021). This large workforce remains largely invisible, and sanitation work continues to be a significant barrier to achieving the SDGs, particularly SDG 6 (clean water and sanitation), SDG 3 (good health and well-being), and SDG 8 (decent work and economic growth). Recognising the need for urgent action, the Government of Odisha (GoO) launched the Garima Scheme in September 2020 to ensure the safety and dignity of core sanitation workers (CSWs). Similarly, the Government of Tamil Nadu (GoTN) initiated the Sanitation Workers Development Scheme in December 2022, in line with the provisions of the PEMSAR Act. These initiatives aim to provide support and safety measures for sanitation workers while also promoting rehabilitation. The Ministry of Social Justice and Empowerment (MoSJE) is the primary agency responsible for the implementation of these policies, with the National Safai Karamcharis Finance and Development Corporation (NSKFDC) supporting the socio-economic development of sanitation workers (Baradi & Malhotra, 2023).

In 2023, the MoSJE introduced the National Action for Mechanised Sanitation Ecosystem (NAMASTE) scheme, which integrates and builds upon previous initiatives, such as the Self Employment Scheme for Rehabilitation of Manual Scavengers (SRMS). The NAMASTE scheme by the Ministry of Housing and Urban Affairs (MoHUA), aims to mechanise sanitation work and improve the working conditions of sanitation workers, thereby reducing the risks associated with manual scavenging and ensuring their safety and dignity. While significant legal and policy frameworks have been established to protect sanitation workers in India, implementation remains a critical challenge. Continued efforts to provide better infrastructure, safety measures, and rehabilitation

support, along with addressing the social stigma surrounding sanitation work, are essential to improving the lives and working conditions of sanitation workers in the country (Baradi & Malhotra, 2023).

To address the gap in formal training in the sanitation sector, the GoI has launched an initiative to formally train and certify sanitation workers. The Recognition of Prior Learning (RPL) training program, implemented in collaboration with the National Skill Development Corporation (NSDC) and the Ministry of Skill Development and Entrepreneurship (MSDE), is designed to enhance the skills of sanitation workers by formalizing their existing knowledge. The program includes tailored training modules for specific job roles such as Septic Tank Technicians, Desludging Operators, and FSTP O&M Technicians, which are aligned with the National Skill Qualification Framework (NSQF). These modules are offered in flexible formats, such as full courses or bridge courses, making them accessible to workers with diverse educational backgrounds. A key focus of the training is on mechanised sanitation practices, equipping workers to operate modern sanitation equipment and improving both their safety and efficiency. To encourage participation, a monetary payout was provided to compensate for wages lost during the training period. As the benefits of the program became evident, the demand for training grew within the community, leading to greater worker engagement. The success of the RPL program in Odisha has created a sustainable and replicable model, providing a framework for other states to implement similar initiatives, thereby formalising the training and skilling of sanitation workers across India (NFSSM Alliance, 2022).

Important Events	Year	Scope	Key Provisions	Administrative Powers/ Roles
Act/ Rules/ Regulations				
Factories Act	1948	The Act aims to ensure a safe and healthy work environment for all factory employees.	The Factories Act provides a comprehensive legal framework to safeguard workers' rights and welfare. It regulates working hours, mandates fair overtime compensation, and strictly prohibits child labour in hazardous environments. The Act also emphasizes promoting workers' health by ensuring sanitary conditions in workplaces and sets standards for safety and welfare, thereby preventing exploitation and enhancing overall well-being.	State Labour Departments enforce safety standards and inspections.
The Mines Act	1952	To regulate the health, safety, and welfare of workers in mines.	The Act outlines the responsibilities of mine owners, including managing operations and safeguarding worker well-being. It also regulates working hours, minimum wages, and other related aspects to promote safe and fair working conditions.	The Directorate General of Mines Safety (DGMS) ensures compliance.
IS Code IS 2470 (Part 1):1985 - Septic Tank Installation: Design & Construction	1985	To provide technical standards for the design and construction of septic tanks.	The standard provides guidelines for septic tank dimensions, capacity, and construction materials to ensure effective onsite wastewater treatment.	CPHEEO and engineers in Urban Local Bodies ensure implementation.
The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act	1993	Banning manual scavenging and the construction of dry latrines.	This Act prohibits the practice of manual scavenging and the construction of dry latrines, which require human workers to handle excreta manually. It also mandates that those engaged in such activities should be rehabilitated, offering them alternate livelihoods and ensuring they are removed from this dehumanising work.	MoSJE, State Govts, and District Collectors responsible for implementation.

Important Events	Year	Scope	Key Provisions	Administrative Powers/ Roles
The Prohibition of Employment of Manual Scavengers and Their Rehabilitation Act, 2013	2013	Complete abolition of manual scavenging and the rehabilitation of manual scavengers	This Act further strengthens the laws against manual scavenging by completely banning its practice across India. It also outlines provisions for identifying and rehabilitating manual scavengers, offering them cash assistance, skill training, housing, and other support measures. It creates a legal framework to ensure the dignity and safety of sanitation workers.	District Magistrates lead identification and rehab efforts. MoSJE oversees.
Occupational Safety, Health, and Working Conditions Code	2020	Worker safety and rights in hazardous occupations	This Code consolidates and updates various existing laws relating to the safety and health of workers, including those involved in hazardous occupations like sanitation work. It mandates provisions for protective gear, safe working conditions, and healthcare support for workers involved in dangerous tasks, including sanitation work.	Labour Inspectors monitor compliance, especially in urban sectors.
The Social Security Code	2020	Social security benefits for informal sector workers	This Code provides a framework for social security benefits, such as health insurance, pensions, and unemployment benefits, for workers in the informal sector, including sanitation workers. It aims to ensure that sanitation workers, who often work in informal, unregulated conditions, have access to social security measures.	Administrators at ULBs responsible for enrolling workers in benefits.
Scheme/ Advisory/ Others				
The National Safai Karamcharis Finance & Development Corporation (NSKFDC)	1997	Socio-economic development of sanitation workers	NSKFDC was established by the MoSJE to support the socio-economic development of Safai Karamcharis (sanitation workers). The corporation offers various financial assistance schemes to help sanitation workers and their families, including educational loans, skill development programs, and support for small businesses.	NSKFDC works via State Channelizing Agencies and NGOs for outreach.
Self-Employment Scheme for Rehabilitation of Manual Scavengers (SRMS)	2007	Rehabilitation and financial support	Offers financial support for livelihood generation, health insurance, and skill development	District Collectors and implementing agencies facilitate access.
Emergency Response Sanitation Unit (ERSU)	2019	Safe delivery of mechanised sanitation services	Aims to provide a professional, well-trained, motivated and appropriately equipped workforce for the maintenance and management of sewer networks and septic tanks. It thus eliminates the deaths caused by the entry of Sanitation Workers into sewers and septic tanks without adequate skill, the use of proper PPE and non-adherence to safety protocols.	ULBs establish and operate ERSUs; MoHUA provides guidelines.
Safaimitra Suraksha Challenge	2021	Support in providing necessary protective equipment and improving working conditions across participating cities.	The challenge mandates the distribution of PPE kits to sanitation workers and encourages mechanised cleaning methods to reduce human exposure to hazardous tasks. It also includes training, data collection, and monitoring, ensuring compliance with safety measures and providing social and financial support for workers.	ULBs must ensure PPE provision, training, and mechanisation.

Important Events	Year	Scope	Key Provisions	Administrative Powers/ Roles
The National Action for Mechanised Sanitation Ecosystem (NAMASTE) Scheme	2023	Mechanising sanitation work and improving worker safety.	It aims to reduce manual sanitation work by promoting the use of machinery for tasks like cleaning sewer lines and septic tanks. It also focuses on improving the working conditions and safety of sanitation workers by providing them with better tools, training, and financial support.	Jointly implemented by MoSJE & MoHUA; ULBs and States manage execution.

3.5.1. Comparative overview of OHS norms in India

No	Key Aspect	General Sectors (Manufacturing, Construction, Mining etc.)	Sanitation Sector
1	Governing Legislation	Governed by the Occupational Safety, Health and Working Conditions Code, 2020, Factories Act, 1948, and other sector-specific laws.	Same as general sectors; however, additional guidelines such as the Prohibition of Employment as Manual Scavengers & their Rehabilitation Act, 2013, and CPHEEO guidelines apply.
2	PPE Requirements	Employers must provide PPE appropriate to the type of hazard.	A total of 44 PPE items are specified for sewer and septic tank work, including helmets, breathing apparatus, full-face respirators, diver suits, gas monitors, and safety harnesses.
3	Training Requirements	General safety training is required; specialized work demands certification of competence.	Mandatory training on safe work practices, PPE use, and health awareness
4	Health Monitoring	Annual medical examinations for employees in notified establishments.	Regular health camps, counselling sessions, and medical surveillance for occupational diseases specific to sanitation work
5	Emergency Response	First-aid boxes and emergency response protocols as per establishment type.	An ERSU must set up 1 equipped with rescue tools and safety gear.
6	Working Hours	Governed by standard labour laws with provisions for overtime and rest intervals.	Often irregular with frequent night shifts; lack of standardised working hour norms across ULBs.
7	Death Compensation	Compensation varies by sector and is governed by labour and insurance laws.	₹30 lakh death compensation ordered by Supreme Court of India
8	Enumeration and Registration	Establishments must register with labour authorities; licensing requirements apply for factories and mines.	ULBs must conduct mandatory surveys of all sanitation workers; each worker is issued a photo ID with family details and registered under relevant welfare schemes.

Source: (Ministry of Law and Justice, 2020), (Government of India, 1948), (UMC, n.d.) (UNICEF India, n.d.)

3.6. Overview of the Key Institutions Arrangement and Regulatory Bodies

Sanitation workers often suffer because of weak legal protection and lack of enforcement of existing rules. The diverse tasks within the sanitation process—such as the emptying and conveyance of faecal sludge, sewer maintenance, waste treatment, and disposal—are often overlooked or inadequately addressed within regulatory frameworks (WHO, 2018). Many countries either lack laws and regulations that protect sanitation workers or the laws in place are not enforced or are not enforceable in practical terms. Manual emptying, often the riskiest sanitation work, is often characterized by informality. Despite efforts to ban manual emptying, as seen in countries like India and Senegal, these measures have not eliminated the practice but have rather driven it underground. By contrast, in Bangladesh and South Africa, manual work is formally recognised as part

¹ ERSU will be set up in major cities which have Municipal Corporation and/or Water & Sewer Board (in whatever local name) and in capital cities of each State/UT. The ERSU shall be responsible to meet sanitation emergency requests from all smaller towns within a cluster say 75 KM radius

of the sanitation services package, with workers being provided training and occupational health mitigation measures being in place (World Bank, 2019).

Key Institutions responsible in India are:

1. The Ministry of Housing and Urban Affairs (MoHUA) oversees crucial responsibilities related to the safety and health of sanitation workers in India. It develops and enforces policies and guidelines for urban sanitation services, ensuring the prioritisation of sanitation worker safety. The ministry administers the Swachh Bharat Mission (Urban), a significant program aimed at eradicating open defecation and enhancing sanitation infrastructure in urban areas. MoHUA establishes safety standards and guidelines, including the mandatory use of personal protective equipment (PPE) and safe waste handling practices. Furthermore, the ministry is dedicated to advancing the mechanisation of sanitation processes to reduce manual scavenging and foster safer working conditions for sanitation workers.
2. The Ministry of Social Justice and Empowerment (MoSJE) is entrusted with the enforcement of the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013. This Ministry is dedicated to the rehabilitation and welfare of manual scavengers by facilitating skill development and alternative livelihood opportunities. MoSJE provides financial assistance and support through various welfare schemes aimed at improving the living and working conditions of sanitation workers. Additionally, the Ministry advances social justice and equality for marginalised communities, including sanitation workers, by ensuring equitable treatment and opportunities for advancement.
3. The Ministry of Labour and Employment is tasked with the oversight of occupational safety and health regulations across various sectors, including sanitation work. The Ministry is responsible for the formulation of labour laws and safety standards that ensure the protection of sanitation workers from hazardous working conditions. It enforces the Occupational Safety, Health and Working Conditions Code, 2020, which delineates safety standards and guidelines specifically for sanitation workers. Furthermore, the Ministry promotes the enforcement of labor rights, encompassing provisions for minimum wage, health insurance, and social security benefits for sanitation workers.
4. The Ministry of Health and Family Welfare (MoHFW) is responsible for providing healthcare services and implementing programs that address the occupational health risks faced by sanitation workers. The ministry collaborates with other governmental bodies and agencies to tackle health issues specific to this workforce, including the prevention and treatment of communicable diseases and ensuring access to healthcare facilities. Additionally, MoHFW supports initiatives aimed at promoting hygiene and safety practices among sanitation workers to mitigate health risks associated with their work.
5. The National Commission for Safai Karamcharis (NCSK) is a statutory body established to monitor and protect the interests of sanitation workers, including Safai Karamcharis and manual scavengers. The Commission is instrumental in advising the government on policies and programs designed to enhance the welfare of sanitation workers. NCSK undertakes studies and surveys to evaluate the working conditions of sanitation workers and provides recommendations to improve their safety and health. Furthermore, the Commission actively promotes awareness of the rights and entitlements of sanitation workers, ensuring they are well-informed about their protections and benefits.
6. The National Safai Karamcharis Finance and Development Corporation (NSKFDC), established under the Ministry of Social Justice and Empowerment, is a government corporation devoted to financing and advancing the socio-economic development of Safai Karamcharis and manual scavengers. NSKFDC extends financial assistance for self-employment initiatives, educational opportunities, and training programs for sanitation workers and their families. The Corporation collaborates with state governments and urban local bodies to execute welfare schemes designed for sanitation workers. Furthermore, NSKFDC supports programs aimed at enhancing the working conditions of sanitation workers, ensuring access to safe equipment and health services.
7. The Central Public Health and Environmental Engineering Organisation (CPHEEO), under the Ministry of Housing and Urban Affairs (MoHUA), plays a critical role in formulating sanitation and environmental policies in India. Established in 1953, CPHEEO sets standards and guidelines for public health engineering,

focusing on the safety and health of sanitation workers. The organisation develops comprehensive safety protocols, including the use of personal protective equipment (PPE) and safe waste handling practices, to mitigate risks and ensure a safe working environment. Additionally, CPHEEO supports urban local bodies through technical assistance and training, promoting mechanisation to reduce manual tasks and improve worker safety.

8. The Central Pollution Control Board (CPCB), a statutory organisation under the Ministry of Environment, Forest and Climate Change, is tasked with the monitoring and regulation of pollution, including waste management. CPCB establishes guidelines for the safe handling, treatment, and disposal of hazardous waste, which directly influences the safety of sanitation workers. The Board oversees adherence to environmental regulations pertinent to sanitation and waste management. Furthermore, CPCB offers technical support and training on best practices related to waste management and sanitation operations.
9. The State Departments of Urban Development are tasked with the implementation of urban sanitation policies and programs at the state level. These departments ensure that Urban Local Bodies (ULBs) comply with national guidelines concerning the safety and health of sanitation workers. They collaborate with municipal corporations to enhance sanitation infrastructure and advance the mechanization of sanitation work. Additionally, the State Departments oversee the execution of state-specific schemes and initiatives designed to improve the welfare of sanitation workers.
10. Urban Local Bodies (ULBs) and Municipal Corporations bear the primary responsibility for the employment and management of sanitation workers within urban areas. These entities are mandated to implement comprehensive safety protocols and supply essential personal protective equipment (PPE) to ensure the well-being of sanitation workers. ULBs and Municipal Corporations are charged with ensuring adherence to both national and state safety guidelines pertaining to sanitation workers. Furthermore, they are required to facilitate training and capacity- building programs, address any grievances, and actively enhance the working conditions of sanitation workers at the local level.
11. The National Human Rights Commission (NHRC) is tasked with monitoring and addressing human rights violations concerning the working conditions of sanitation workers. The Commission investigates instances of discrimination, exploitation, and unsafe working environments faced by these workers. Additionally, NHRC recommends policy changes and legal actions to safeguard the rights and dignity of sanitation workers, ensuring their protection and fair treatment.

3.7. Enforcement-Related Challenges

Effective enforcement of occupational health and safety laws remains a significant challenge across many urban local bodies. Despite the existence of legal provisions, several systemic and operational gaps hinder their proper implementation. These challenges not only compromise the safety of sanitation workers but also affect the overall accountability of service providers. Key enforcement-related challenges include:

- **Lack of understanding of key legal terms:** Terms such as manual scavenger and hazardous cleaning outlined in the Act have not been understood clearly.
 - **Non-conformance to safety rules:** Health and safety rules are often ignored, and accidents are not properly reported.
 - **Misconception of safety as expensive:** Employers feel it is easier to pay the low cost of fines than to spend more on safety measures.
 - **Limited Training:** Ground-level staff and supervisors often lack adequate training on safety protocols and legal provisions.
 - **Poor Reporting:** Accidents and safety breaches are underreported due to weak accountability systems.
 - **Contractual Gaps:** Many contracts fail to include mandatory safety clauses and responsibilities.
 - **Resource Constraints:** Shortage of staff and limited financial resources hinder proper enforcement.
 - **Weak Monitoring:** Inadequate supervision and follow-up reduce the effectiveness of safety measures.
- 3.7. Best Practices/ Case Study/ Video

3.8. Best Practices/Case Study/Video

3.8.1 Best practices

Improving the safety of sanitation workers in Wai Municipal Council

In 2018, Wai was selected as one of the cities for the City-Wide Inclusive Sanitation (CWIS) Program funded by the Gates Foundation. The Wai Municipal Council (WMC), in collaboration with the Centre for Water and Sanitation (CWAS), implemented the CWIS goals, focusing on improving sanitation worker safety, particularly regarding PPE. A study assessed PPE usage and working conditions of sanitation workers (CWAS, 2020).

1. **Key findings from the study included:**

- Inadequate PPE provision: Many workers lacked appropriate PPE, and replacements were not provided.
- Lack of monitoring: PPE usage was not consistently monitored.
- Training deficiencies: Workers received minimal training on the proper use and maintenance of PPE.

2. **Based on these findings, recommendations were made, including:**

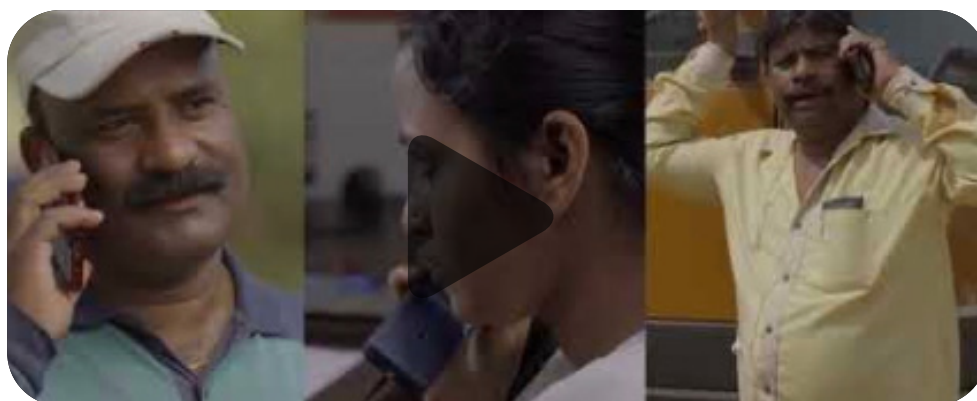
- a. **Incorporation of PPE Clauses in Contracts:** One of the key best practices implemented by the WMC was the inclusion of PPE clauses in all sanitation-related contracts. These clauses specify the type of PPE required for different tasks, ensuring that workers are provided with appropriate protective gear. This step also mandates regular monitoring and replacement of PPE to ensure its effectiveness.
- b. **Establishment of Monitoring Systems:** To ensure the proper use of PPE, WMC introduced a systematic monitoring mechanism. This includes a PPE monitoring register maintained by sanitation supervisors, who are responsible for tracking workers' usage of PPE. Additionally, the SaniTab app was introduced to document PPE usage in real time, allowing for accurate data tracking and identification of issues that require attention.
- c. **PPE Provision Based on Job Specifications:** Another best practice is the provision of work-specific, user-friendly PPE. Based on an assessment of guidelines, WMC ensured that PPE was tailored to the specific tasks sanitation workers perform. This includes gloves, face masks, safety shoes, and helmets for tasks like road sweeping, drain cleaning, and septic tank desludging. The PPE provided was sourced based on a market survey to ensure quality and comfort.
- d. **Training and Sensitisation Workshops:** Regular training workshops were conducted to educate sanitation workers on the correct use of PPE, its maintenance, and the health risks associated with improper usage. These workshops also emphasised the importance of safety at the workplace and provided a platform for sanitation workers to voice concerns and receive guidance on PPE usage.
- e. **Health Camps and Regular Check-ups:** WMC organized health camps as part of the worker safety program. These camps offered medical check-ups and counselling on health issues related to improper PPE use. The camps were an essential component in promoting worker well-being and fostering a better understanding of safety protocols.
- f. **Engagement with the Private Sector and Contractors:** A significant proportion of sanitation workers are employed through private contractors. To ensure their safety, WMC incorporated PPE clauses into contracts with private contractors and labour suppliers. This created a unified approach to sanitation worker safety across both public and private sector workers.
- g. **Data-driven decision-making:** Data from the SaniTab app and monthly monitoring reports helped WMC track PPE usage and identify areas for improvement. The continuous collection and analysis of data allowed for timely interventions, such as the replacement of damaged PPE and additional training sessions where necessary.

3. Impact

As of June 2022, approximately 70 per cent of sanitation workers in Wai were using appropriate PPE, while 100 per cent of private sector workers had access to it (NFSSM Alliance, 2022). The continuous training, health camps, and awareness campaigns have further strengthened the commitment to worker safety. These initiatives have led to improved safety for sanitation workers in Wai and has also set a benchmark for other ULBs to follow, highlighting the importance of comprehensive strategies in ensuring worker dignity and health.

Prioritising FSSM Regulations: Odisha

Odisha has demonstrated effective implementation of FSSM by establishing strong regulatory frameworks for ULBs. The state has institutionalised periodic desludging, ensured safe transport, and promoted the proper treatment of faecal waste. It has also leveraged technology for real-time monitoring and engaged self-help groups and community members to raise awareness. These coordinated efforts have led to improved safety for sanitation workers and increased usage of septage treatment facilities across the state.



Source:

3.8.2. Court cases

1. **Safai Karmachari Andolan vs Government of Tamil Nadu in 2024**

Case reference: W.P.Nos.17380 of 2017; 31345 of 2014 and W.P.(MD) No.24243 of 2017

The Madras High Court judgment on the eradication of manual scavenging in Tamil Nadu highlights the persistent issue of manual scavenging despite legal prohibitions and the deep-rooted social discrimination surrounding it. The court acknowledged the grave human rights violations caused by manual scavenging, emphasising that the practice continues due to inadequate enforcement of laws and a lack of social awareness (Madras High Court, 2024).

The court ordered several key actions to eradicate manual scavenging and improve the conditions of workers:

- a. **Strict Enforcement of the 2013 Act:** The Prohibition of Employment of Manual Scavengers and their Rehabilitation Act must be fully implemented, with strong penalties for those engaging in or employing individuals for manual scavenging.
- b. **Mechanisation:** The court directed that the cleaning of sewers, septic tanks, and stormwater drains should be fully mechanised to eliminate human involvement in these hazardous tasks.
- c. **Compensation:** Compensation of Rs. 30 lakhs for sewer deaths and Rs. 20 lakhs for severe injuries should be provided to victims or their families.
- d. **d. Rehabilitation:** Manual scavengers must be rehabilitated with alternate employment, skill training, and access to education for their children.
- e. **Health and Safety:** The court emphasized the provision of protective equipment and free health check-ups for sanitation workers.
- f. **Awareness Campaigns:** Sensitization of workers about their rights, available rehabilitation schemes, and legal protections against manual scavenging.
- g. **Action Against Local Authorities:** Accountability of local authorities, including municipal corporations and municipalities, for their failure to prevent manual scavenging.

2. Dr. Balram Singh vs. Union of India in 2023 Writ Petition (Civil) No. 324 of 2020

The petition concerns the eradication of manual scavenging and the implementation of the PEMSR Act, 2013. Dr. Balram Singh, the petitioner, seeks effective enforcement of this Act, as manual scavenging continues despite legal prohibitions (Supreme Court of India, 2023). The court issued several directives, including the need for:

- a. **Survey and Rehabilitation:** Conducting a nationwide survey and ensuring full rehabilitation of manual scavengers through cash assistance, education for their children, housing, and alternative livelihoods.
- b. **Mechanisation:** Complete mechanisation of sewer cleaning and septic tank maintenance to prevent human involvement in hazardous cleaning tasks.
- c. **Accountability:** Strict action against contractors and local authorities involved in manual scavenging and unsafe sanitation practices, including compensation for deaths and injuries resulting from such work.
- d. **Institutional Strengthening:** Establishing and operationalizing bodies like the National Commission for Safai Karamcharis (NCSK) to monitor and enforce the laws effectively.
- e. **Judicial Oversight:** Regular monitoring and accountability through the Central Monitoring Committee (CMC) and other related bodies, ensuring the implementation of the Act.

3.9. Exercise

Objective:

To identify policy and regulatory gaps and develop strengthening measures

Instructions:

1. Group Formation: (5 mins)

- Divide participants into small groups of 4-5 people.
- Each group will be assigned a specific case scenario related to policy and regulatory challenges faced by workers in hazardous environments.

2. Case Scenarios:

Here are a few scenarios that can be used for the exercise. Alternatively, participants can think of common OHS and regulatory challenges they encounter in their work environment.

Scenario 1: Lack of Enforcement in PPE Provision Despite rules mandating PPE for sanitation workers, local authorities fail to enforce compliance among contractors. Workers continue to operate without gloves or masks, risking exposure to hazardous materials.

Scenario 2: Gaps in Sewer Safety Regulation Implementation

While SOP and safety guidelines exist on the prohibition of manual entry, ULBs lack the capacity and resources to implement or monitor these standards. The desludging workers are routinely exposed to toxic gases.

Scenario 3: Septic Tank Not Constructed as Per Norms

Scenario 4: Weak Accountability for Accident Reporting In a residential area, septic tanks are being constructed without following proper design standards, resulting in small, poorly sealed tanks that frequently leak untreated sewage. This leads to groundwater contamination and health risks for the community. The lack of enforcement from local authorities allows these unsafe tanks to persist, exposing workers and residents to harmful pollutants.

Scenario 5: Weak Accountability for Accident Reporting

When sanitation-related accidents occur, such as injuries or fatalities during septic tank cleaning, they are often underreported or go unreported entirely. ULBs do not have robust mechanisms to record, investigate, or follow up on such incidents. As a result, families of the victims are denied rightful compensation, and no corrective actions are taken to prevent future occurrences. The absence of clear accountability leads to repeated safety violations.

Scenario 6: Inadequate Monitoring of Private Operators

Private desludging operators often function without registration or oversight, using unsafe equipment and practices. Without a system for licensing, tracking service delivery, or ensuring adherence to safety protocols, these operators expose workers and communities to health risks.

3. Group Discussion: (15 mins)

Identify Regulatory Gaps:

- In your assigned scenario, discuss the key regulatory shortcomings. Consider issues like lack of legal coverage, poor enforcement, fragmented responsibilities, or insufficient institutional capacity.
- Compliance and Strengthening Measures:
- Propose practical strategies to strengthen regulatory compliance. Think about institutional reforms, policy amendments, capacity building, improved inspections, and coordination mechanisms between agencies.

4. Presentation: (10 mins)

After discussing in the group, each group will present their scenario, identify regulatory and policy gaps, and propose strengthening measures to the larger group.

5. Materials Needed:

- Printed copies of scenarios
- Chart paper or whiteboard
- Markers or pens
- Timer or bell to keep a track of time

3.10. Trainer's Note

Encourage cross-learning by prompting comparisons between the challenges and solutions identified by different groups. Acknowledge and validate participants' field experiences, as these help ground the policy discussions in real-world contexts. Conclude the activity with a short reflection, asking participants how they can apply these insights in their work environments to strengthen OHS practices.

Pre-Session Preparation:

1. **Familiarise with Key Regulations and Acts:** Review major safety regulations such as the Occupational Safety and Health Act (OSHA), ILO conventions, and national laws like the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act to guide discussions.
2. **Contextual Examples:** Prepare real-life examples and case studies to provide relatable scenarios.
3. **Create Materials for Group Work:** Ensure printed copies of case scenarios for group exercises. Prepare whiteboards or chart paper for groups to write down their findings.

Trainer Tips:

1. **Keep the Discussion Focused:** Make sure the group discussions stay focused on identifying regulatory gaps and compliance strategies rather than getting sidetracked by unrelated topics.
2. **Highlight Challenges and Solutions:** As a facilitator, help the participants recognise that while gaps and challenges exist, the focus should be on actionable solutions and their implementation.
3. **Empathy and Sensitivity:** The subject matter is sensitive due to the historical stigma and hazards faced by sanitation workers. Maintain a tone of empathy and understanding to create a safe learning environment for participants to share their experiences and insights.
4. **Encourage Collaboration:** Foster an environment where participants feel comfortable sharing their thoughts and learning from each other's experiences. This collaborative approach will help them come up with more effective solutions.

04

Safety Aspects for Toilet Operation and Maintenance Workers



4.1. Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 1	Presentation	30
2		Best Practice/ Case Study	10
3		Questions & Discussion	10
Total			50

4.2. Learning Objectives

1. Identify the key occupational hazards faced by the toilet facility operators.
2. Understand the types of tools, PPE, health screenings and emergency response.
3. Identify the type of training required for worker safety.

4.3. Key Takeaways

1. Ability to identify specific hazards and health risks in toilet maintenance
2. Knowledge of implementing the hierarchy of control
3. Understanding safety and emergency response procedures
4. Preparedness to organise health screening and hygiene protocol sessions

4.4. Understanding Work Environment and Health Risks

Sanitation workers responsible for the Operation and Maintenance (O&M) of toilet facilities are tasked with ensuring that these spaces are clean, hygienic, and functional for public use. Their duties include cleaning toilet bowls, washbasins, floors, and surrounding areas, removing waste and its proper disposal, and maintaining toilet infrastructure. Workers are also responsible for monitoring the water supply, ensuring accessibility, and carrying out repairs when necessary. These duties expose sanitation workers to a variety of health and safety risks, particularly due to the hazardous nature of waste handling and the chemicals used in cleaning.



Figure 18. Cleanliness of a Toilet

Source: (RCEUS, n.d.)

4.4.1. Typical duties and responsibilities

The cleaner is responsible for maintaining the cleanliness of the toilet by performing the majority of the daily tasks as mentioned in Table 6. At least one cleaner should be present during operating hours to ensure continuous service (MoHUA, 2018).

The caretaker is responsible for:

- Overseeing the overall O&M and upkeep of the toilet complex.
- Regulating usage on a 'first come, first served' basis.
- Collecting user charges and, in the case of monthly pass holders, recording the entries and signing the cards upon payment receipt.
- Properly maintaining the complaint and suggestion book.
- Issuing and receiving cleaning materials and equipment.
- Carrying out routine repairs and replacements.
- Educating users on proper toilet usage. If the O&M is managed by the local community, a community member typically assumes this responsibility.

The supervisor is tasked with monitoring the performance of both the cleaner and the caretaker and maintaining a record of the O&M status of each toilet complex. The supervisor should plan visits to inspect the community toilet at various times throughout the day, including peak hours (MoHUA, 2018)

Key responsibilities of the supervisor include:

- Ensuring the toilets are clean, all infrastructure is functioning properly, and users are fully satisfied.
- Addressing complaints and suggestions recorded in the complaint book/box.
- Collecting user service charges from caretakers and depositing them daily in the designated bank or location. If there is a shortfall in the collection or if the O&M expenditure is higher than expected, the supervisor must investigate the cause.
- Reporting any operational difficulties or issues to the relevant authority or individual responsible for the toilet blocks.



Figure 19. Pictorial representation of a male and female Public Toilet caretakers



Video on duties and obligations associated with operating a toilet (in Hindi)



Source: WASH Institute

Case Example: Gender-Specific Challenges in Access to Proper PPE among Women Sanitation Workers

A study conducted in Ghana and Kenya revealed that a majority of women sanitation workers faced health risks and injuries due to the absence or poor fit of PPE such as gloves, boots, and coveralls. Most reported that the PPE provided was designed for men, making it uncomfortable and unsuitable for their body shapes, thereby reducing both protection and efficiency.

A female sanitation worker explained that the jumpsuit provided by her employer did not fit properly during her pregnancy, forcing her to continue work in regular clothing. As a result, she developed skin irritation and rashes due to direct exposure to waste.

Many participants also noted issues with gloves being either too large or too small, making it difficult to perform cleaning tasks safely. Poorly fitting gloves failed to provide adequate protection, leading some workers to stop using them altogether.

Some women workers reported improvising with plastic bags as makeshift protection for their hands and feet due to the unavailability of appropriate PPE. Such practices expose them to infections and gastrointestinal illnesses from direct contact with waste, underscoring the urgent need for gender-responsive PPE design and provision in the sanitation sector.

Source: (Dery, et al., 2023)

Table 6: Do's and Don'ts of CT/PT Workers

Role	Do's	Don'ts
Caretaker	Open the toilet facility on time.	Do not be involved in manual cleaning of toilets when faecal matter is present.
	Collect user fees if the facility operates on a 'Pay and Use' basis -	Do not allow personal visitors inside the toilet facility during operational hours.
	Ensure and supervise thorough cleaning by the cleaner.	Do not enter the female section if it is being used by a female (if male caretaker).
	Do spot cleaning if required.	Do not enter the male section if it is being used by a male (if female caretaker).
	Maintain a daily user register and cash book.	Do not indulge in fund mismanagement.
	Fill out receipt/payment vouchers and ensure proper filing.	Do not cause any damage to the toilet facility.
	Be polite with users.	Do not allow documents, uniforms, or cleaning supplies to be taken out of the toilet facility.
	Be properly dressed in uniform during operational hours.	Do not allow unauthorised or illegal activities in or around the toilet facility (e.g., alcohol, smoking, loitering).
	Be regular to work and do not leave the facility unattended.	
	Inspect the cleaning activity of the cleaner.	

Role	Do's	Don'ts
Caretaker	Replace non-functional components and cleaning supplies in consultation with the agency.	
	Keep extra cleaning equipment and materials for emergencies.	
	Replenish consumables as required.	
	Maintain an inventory of cleaning supplies as per requirements.	
	Prevent disposal of garbage inside toilets or open drains.	
	Ensure periodic cleaning of septic tanks (if applicable).	
	Report unlawful activities near the facility to the agency.	
	Register complaints manually in the complaint register and report them to the ULB.	
	Ensure the security of the facility and consumables.	
	Inform the agency or municipal official in case of theft, burglary, or vandalism.	
	Perform any other responsibility assigned by the agency.	
Cleaner	Be polite to users.	Do not be involved in manual cleaning of toilets when faecal matter is present.
	Be properly dressed in uniform during operational hours.	Do not take sanitary supplies or uniforms out of the toilet facility.
	Be regular at work.	Do not throw or dispose of garbage in toilet seats, septic tanks, open drains, or outside the toilet facility.
	Clean the toilet facility thoroughly every day, using the appropriate equipment and supplies.	Do not enter the female section if it is being used by a female (if a male cleaner).
	Remove debris from the toilet facility.	Do not enter the male section if it is being used by a male (if female cleaner).
	Perform any other tasks assigned by the agency.	Do not cause any damage to the toilet facility.

Source: (UMC, 2020)

4.4.2. Stages of the Work Cycle

The typical work cycle for toilet O&M involves the following stages:

- Preparation: This initial stage involves gathering the necessary cleaning tools, PPE (Personal Protective Equipment), and chemicals. Workers prepare the toilet facilities by inspecting the tools and equipment to ensure they are functioning properly.
- Cleaning: During this stage, sanitation workers physically clean toilet facilities, including toilets, floors, washbasins, and surrounding areas. This often requires the use of cleaning chemicals, brushes, and disinfectants.



Figure 20. Safety Measure for Cleaning of Toilet Cubicle/ Block

Source: UMC & (RCEUS, n.d.)

- **Waste Disposal:** In this phase, sanitation workers collect waste from the toilet, whether it is sewage or sanitary waste, and transport it to the proper disposal or treatment facility. Waste disposal must be done safely to avoid contamination and health risks.

The Table 7 presents a summary of the key hazards and associated risks faced by CT/PT workers. It highlights the physical, chemical, and biological exposures that affect their health and safety.

Table 7: Summary of hazards and associated risks for CT/PT workers.

Hazard Category	Associated Hazard*	Associated Risk*
Physical	Wet or slippery floors	Slips, trips, and falls
	Using cleaning tools, sharp objects or equipment, Structural defects	Minor cuts, bruises, or injuries, accidents
	Insufficient lighting	Eye issues, Accidents or falls
	Electrical shortcuts-Frayed wire, outdated electric panel, cut wires	Electric shock/burns, Electrocution
	Poor ventilation inside CT/PT	Allergy, respiratory issues
Chemical	Exposure to cleaning chemicals and disinfectants	Skin or eye burns, respiratory irritation, allergic reactions
Biological	Contact with contaminated surfaces	Risk of communicable diseases
	Exposure to sewage, faecal matter, or pathogens	Gastrointestinal or skin infections
	Unhygienic conditions and presence of insects or rodents	Risk of animal bites
Ergonomic	Repetitive scrubbing and bending	Joint or wrist pain, fatigue
	Improper lifting or improper carrying of equipment's and bins	Muscle strain or back injury
Psycho-social	Working in early or late hours, stigma, social exclusion	Physical attacks, harassment, sexual violence, substance abuse, anxiety, stress, other mental illness.

Source: IIHS, 2025

Note: *There are numerous hazards and risks that could be identified; however, only important and select items have been listed here for ease of understanding.

4.5. Safety, Health And Emergency Response

4.5.1. Types of PPE required



Figure 21. Type of PPE for CT/PT Workers

Source: (Wash Institute, 2022)

Sanitation workers are exposed to numerous health risks, necessitating the provision of specific PPE for different tasks. The Figure 13 shows the PPE required for CT/ PT workers.



4.5.2. Types of Tools Required

Toilet cleaning requires various equipment and supplies, including safety gear for the worker, consumables like detergents and disinfectants, and other essential tools for convenience. Operational staff must have access to an adequate number of cleaning tools to effectively carry out their tasks, which highlights the need for an inventory and stocking system managed by the operator. Table 8 shows the comprehensive list of the necessary equipment and consumables.

Table 8: List of equipments and consumables

Cleaning Equipment	Consumables	Other Equipment
Brush for cleaning toilet seats/bowls	Sanitary ware cleaning agent	Sign boards / Warning Signs
Plastic scrubber/brush for cleaning wash basins	Tiles cleaning agent	Trolley/tray for carrying cleaning equipment
Brush/scouring paper for cleaning tiles	Floor cleaning agent	Room freshener (optional)
Brooms for wet areas	Plumbing fixtures cleaning agent	Plumber's snake
Brooms for dry areas	Glass and mirror cleaning liquid	Plunger
Cloths/mops for cleaning floors	Soap / non-abrasive cleaning liquid	Ladder
Floor wipers	Disposable garbage bags	
Plastic scrubber/sponge/cloths for scrubbing plumbing fixtures and other general purposes	Hand washing soap	
Bucket for mixing floor cleaning agent with water	Naphthalene balls	

Hazard	Safety and Health Risks	Other Equipmemnt
Bucket for mixing floor cleaning agent with water	Naphthalene balls	
Mug for pouring floor cleaning agent mix		
Sponges / soft cloth for cleaning mirrors		
Dust collecting pan		
Dust bins		

Source: (MoHUA, 2018)



Source: WASH Institute, 2022

Video on
cleaning
equipment for
toilet operators
(in Hindi)



4.4.3. Training Required

To ensure the safety of CT/PT workers, training must align with the hierarchy of controls, which prioritises risk reduction strategies from most to least effective.

1. **Elimination:** Workers should be trained to identify and discontinue hazardous substances or unsafe practices wherever possible.
2. **Substitution:** Training should introduce safer alternatives to harmful cleaning agents or tools.
3. **Engineering Controls:** Workers must be taught the correct and safe use of equipment and methods to ensure adequate ventilation, especially in enclosed spaces.
4. **Administrative Controls:** This includes training on safe cleaning techniques, waste handling procedures, ergonomics to prevent strain injuries, and appropriate emergency response actions.
5. **PPE:** Workers should receive hands-on training on selecting, using, maintaining, and replacing PPE to ensure consistent protection from hazards.

4.5.4. Preventive health measures

- **Regular Medical Check-ups:** Comprehensive health evaluations to detect early signs of respiratory issues, skin conditions, or gastrointestinal diseases
- **Vaccination Programmes:** Vaccines for diseases such as hepatitis can help protect workers from potential exposure to harmful pathogens.
- **Health Education:** ULBs training and awareness programmes to educate workers on the importance of hygiene, PPE usage, and other preventive health measures.

4.5.5. Types of health screening frequency

- **Annual health check-ups:** Regular medical assessments, including tests for respiratory health, skin conditions, and overall well-being.
- **Post-exposure screening:** Immediate medical evaluation for workers exposed to hazardous chemicals or biohazards.
- **Periodic monitoring:** Continuous health monitoring, especially for workers who are regularly exposed to hazardous chemicals or waste.

4.5.6. Reporting and incident Management

An effective reporting system is vital for tracking incidents, identifying hazards, and ensuring that safety concerns are addressed. Workers must be trained to recognise and report unsafe working conditions, accidents, and exposure to hazardous substances. The incident management system should include clear steps for investigation, corrective actions, and communication with relevant authorities to address the issues and improve safety standards.

4.4.7. Emergency response and first aid.

CT/PT workers should receive training in basic first aid procedures to manage minor injuries, burns, and exposure to harmful chemicals. In addition, emergency evacuation protocols must be in place for situations involving toxic exposure, spills, or accidents. Regular first aid drills should be conducted to ensure workers are prepared to handle emergencies effectively. Immediate access to medical care should be available in case of more serious incidents.



Video on
how to
handle an
emergency
(in Hindi)



Source: WASH Institute, 2022

4.6. Best Practices

4.6.1. Enhancing WASH Services for Sanitation Workers in Karnataka

1. Background

Sanitation workers play a pivotal role in maintaining public health and cleanliness, but they are often overlooked by society. Despite their crucial contribution, these workers face numerous challenges, including poor working conditions, lack of proper facilities, and limited access to health and safety measures. Their working conditions directly impact not only their health and well-being but also the broader community's sanitation standards.

2. Interventions in Chikkaballapura and Chintamani

Recognising the hardships faced by sanitation workers, Chikkaballapura Municipal Corporation (CMC), in collaboration with organisations like TIDE and Godda, undertook several initiatives aimed at improving the working conditions of sanitation workers. The goal was to provide a comprehensive approach that addresses both the professional and personal needs of sanitation workers, ensuring their dignity and well-being.

3. Key initiatives:

a. Sanitation worker resting facilities

Two resting facilities were designed exclusively for sanitation workers in Chikkaballapura and Chintamani. These facilities provided workers with a personalised, hygienic space equipped with:

- Separate cleaning areas
- Hygienic restrooms
- Individual lockers for personal belongings
- Common storage area for cleaning equipment
- Dining area with access to clean drinking water
- Comfortable lounge for recreation

These facilities were not only a place of rest but also served as spaces where workers could refresh themselves during breaks, contributing significantly to their overall well-being.

b. Training on health and safety protocols

Over 270 sanitation workers were trained on health and safety protocols through workshops. These workshops provided essential knowledge on proper sanitation practices, personal protection, and safe handling of waste. The training helped workers adopt safer, more efficient cleaning practices, improving their job performance and reducing health risks.

c. Community toilet and health programs

A well-maintained community toilet has been established in the colony, connected to the DEWATS facility for efficient waste treatment. Additionally, regular awareness programmes on health, sanitation, and hygiene were conducted by field staff to educate residents on safe practices, including waste segregation and menstrual hygiene.

4. Impact of interventions

These interventions have significantly improved the lives of sanitation workers and their families in Chikkaballapura and Chintamani. The creation of proper sanitation facilities and the implementation of a decentralised wastewater treatment system have enhanced both the living and working conditions of sanitation workers. The training and awareness programmes have improved the workers' knowledge of health and safety protocols, which has, in turn, enhanced their job satisfaction and efficiency.



Source: (TIDE, 2024)

Video on Enhanced
WASH services for the
sanitation workers in
Chikkaballapura and
Chintamani, Karnataka
(in Kannada and English)



Trainer's Note

This session aims to empower participants with knowledge and practical tools to enhance the safety and well-being of toilet facility operators. By focusing on understanding the health risks, necessary tools, safety protocols, and the required training for these workers

- Begin the presentation by clearly explaining the duties and responsibilities of toilet facility operators, including the roles of cleaners, caretakers, and supervisors. Use real-life examples to explain their tasks and stress the importance of their roles in maintaining hygiene and the safety of the public.
- Move on to health and safety risks, emphasising the exposure to hazardous chemicals, contaminated surfaces, and biological hazards (e.g., sewage). Make sure participants understand the potential health issues, such as infections, gastrointestinal diseases, respiratory problems, and skin conditions.
- Hierarchy of controls: Introduce the concept of the hierarchy of controls and explain how it helps prioritise safety measures, starting from elimination of the hazard, substitution with safer options, engineering controls like proper ventilation, administrative controls such as safe working practices, and finally the use of PPE.
- PPE: Demonstrate different types of PPE needed for sanitation workers, using visuals like diagrams, or real-life examples of PPE items (e.g., gloves, masks, boots). Discuss the importance of proper use and maintenance.
- Emergency response and first aid: Go through emergency procedures, explaining what to do if a worker is exposed to hazardous chemicals or gets injured. Teach basic first aid procedures such as how to treat burns, cuts, or chemical exposure.
- Use videos and images throughout the presentation to break up the text-heavy sections and to provide a visual understanding of PPE, safety procedures, and tools.
- Engage the audience: Instead of lecturing, involve the audience by asking questions. For example, "What do you think would be the first thing a worker should do if they come into contact with hazardous chemicals?" This keeps the session interactive and gives participants a chance to share their experiences.
- Use visuals: Whenever discussing PPE or safety equipment, refer to images or videos to visually demonstrate the protective gear. This will help participants better understand the practical application of what you are teaching.

05

Safety Aspects for Masons



5.1. Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 1	Presentation	25
2		Best Practice/ Case Study	10
		Activity: open discussion	5
Total			40

5.2. Learning Objectives

1. Identify common health and safety risks faced by masons during different stages of sanitation construction work
2. Promote the correct use of PPE, tools and ensure safe working conditions.
3. Set up and monitor safety procedures, including incident reporting systems, emergency response plans, and regular training.

5.3. Key Takeaways

1. Comprehensive understanding of the physical, ergonomic, and environmental risks in sanitation construction.
2. Knowledge of implementing the hierarchy of control.
3. Understanding of safety and emergency response procedures and training needs.

5.4. Understanding the Work Environment and Health Risks

The work environment for masons is inherently hazardous due to the physical nature of the job, the tools and materials used, and the challenging outdoor conditions. As such, it is crucial to understand the specific health risks associated with this profession to mitigate accidents and health problems. The masons' work at each stage of the sanitation service chain is seen Figure 14.

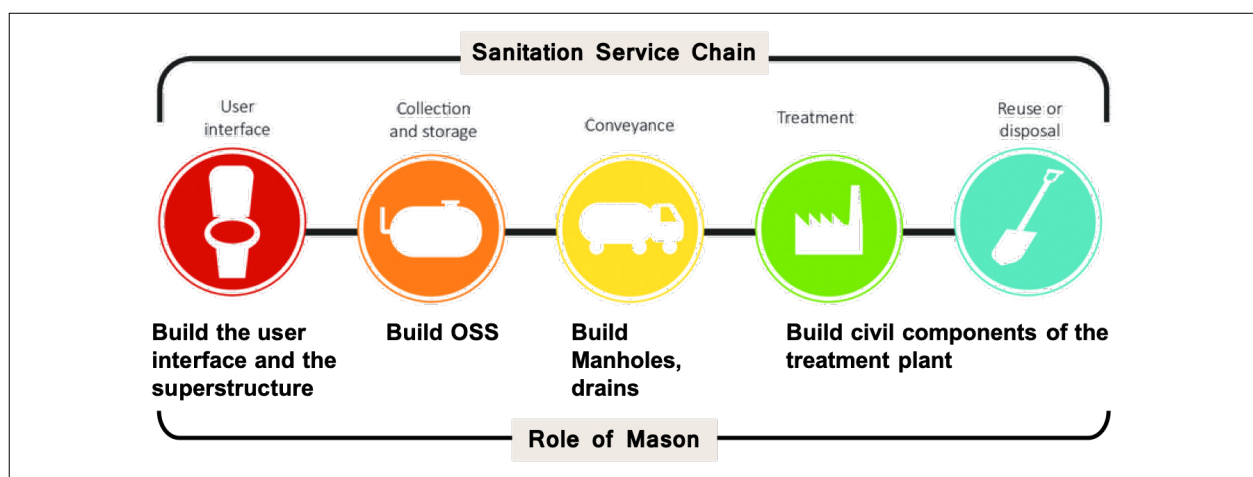


Figure 22. Role of Mason in Sanitation Facilities Construction

The training needs assessment in Tamil Nadu indicates that most masons, including both chief and skilled masons, have acquired their skills through practical experience rather than formal technical education. A significant portion of the workforce, specifically 63% of chief masons and 41% of skilled masons, have continued in their family's traditional occupation. While masonry serves as their primary source of income, most masons work between 6 to 12 months per year, with progression to higher roles often influenced by family ties rather than experience. Although many masons have experience in residential and industrial construction, there is a notable gap in their knowledge of wastewater treatment plants. Furthermore, several masons deviate from Indian standards when constructing on-site sanitation systems, particularly in the sizing of septic tanks and soak pits. Only 22% of masons reported confidence in their knowledge of the correct toilet system designs according to government regulations. However, 86% expressed willingness to participate in training programs. This underscores the need for comprehensive training to educate masons on proper construction standards and improve their practical skills in building on-site sanitation systems (IIHS, 2017).

5.4.1. Typical Duties and Responsibilities

Masons are essential workers in the construction of sanitation infrastructure, particularly in building toilets, septic tanks, and sewer lines. Their daily tasks involve several responsibilities, including:

- **Laying Bricks/Blocks:** Masons are responsible for cutting, laying, and securing bricks or blocks for walls, floors, and other structural components.
- **Mixing Mortar:** They mix the mortar required for binding the bricks or blocks, a task that involves heavy lifting and handling of cement.
- **Plastering:** Masons apply plaster to walls, ceilings, or other surfaces to ensure smooth finishes and waterproofing.
- **Preparing and Using Equipment:** Masons must operate heavy machinery like mixers, grinders, and power tools, requiring specialised skills.
- **Site Supervision and Quality Control:** Ensuring the quality of the materials used and that the structures are built according to specifications is also part of their duties.

In many regions, the masonry profession has been traditionally male-dominated, although more women are entering the field, especially in smaller-scale or community-driven construction projects. Women often face additional physical, social, and cultural barriers in this profession, and specific attention must be paid to ergonomic considerations, access to appropriate PPE (Personal Protective Equipment), and the elimination of gender-related discrimination in the workplace.

5.4.2. Stages of the Works Cycle

The masonry work cycle can be broken down into distinct stages, each with its associated risks and necessary safety measures:

- **Preparation Stage:** This includes setting up the work site, arranging tools and materials, and ensuring that the area is free from potential hazards. Masons prepare all necessary equipment, such as scaffolding, mixers, and PPE, to ensure that they are ready for the tasks ahead.
- **Masonry Work Stage:** The actual work of laying bricks or blocks, mixing mortar, and using power tools happens during this phase. Masons are exposed to physical strain, noise from machinery, and the risk of injury from heavy objects.
- **Finishing and Detailing Stage:** After the construction, masons apply plaster, tiles, and other finishing elements to ensure the aesthetic and functional quality of the structure. At this stage, they also use specialized tools for fine finishing, which can expose them to repetitive strain injuries.
- **Cleanup and Maintenance:** Once the construction is complete, masons clean up the site, remove any leftover materials, and ensure the workspace is safe for the next phase of work. Handling debris, leftover materials, and sharp objects increases the risk of cuts and physical injuries.

Table 9: Hazard and risk categorisation for masons

Hazard Category	Associated Hazard*	Associated Risk*
Physical	Slipping on wet/uneven surfaces at heights (scaffolds, ladders, roofs)	Falls leads Fractures, head injuries, or fatal accidents
	Uneven or wet surfaces	Slips or trips, sprains, bruises, or bone injuries
	Collapse of excavation, wall, or structure	Cuts, fractures, or head trauma
	Contact with sharp or protruding objects	Cuts or puncture wounds
	Exposure to extreme heat	Heat stress, burns, dehydration, heat exhaustion or heat stroke
	Electrical faults from damaged tools or wiring	Electric shock or burns
	Excessive noise and vibration from tools	Hearing impairment or deafness
Chemical	Exposure to cement, dust, and additives	Skin burns, dermatitis, or allergic reactions, Respiratory irritation, chronic bronchitis, COPD, or silicosis
	Contact with bitumen, fumes, asphalt, or solvents	Dermatitis, Chemical burns
Biological	Contact with contaminated soil or stagnant water	Infectious disease such as tetanus, leptospirosis
	Exposure to insects, pests, or allergenic plants	Allergic reactions, bites
Ergonomic	Lifting and carrying heavy materials	Muscle strain, back injury, or hernia
	Repetitive bending, kneeling, or awkward postures or long standing	Joint pain, fatigue, musculoskeletal disorders, varicose veins
	Prolonged use of vibrating tools	Nerve or joint damage

Source: IIHS, 2025

Note: *There are numerous hazards and risks that could be identified; however, only important and select items have been listed here for ease of understanding.

Table 11. Construction site activities and safety considerations

Working at heights and in trenches: Workers are exposed to risks of falls and injuries from uneven surfaces and deep excavations. 	Manual handling of heavy materials: Lifting, carrying materials may lead to strains and musculoskeletal injuries. 
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Lack of PPE: Gloves, helmets, and safety harnesses are crucial for reducing hazards.



Handling of reinforcement bars and sharp tools: Risk of cuts, punctures, and hand injuries.

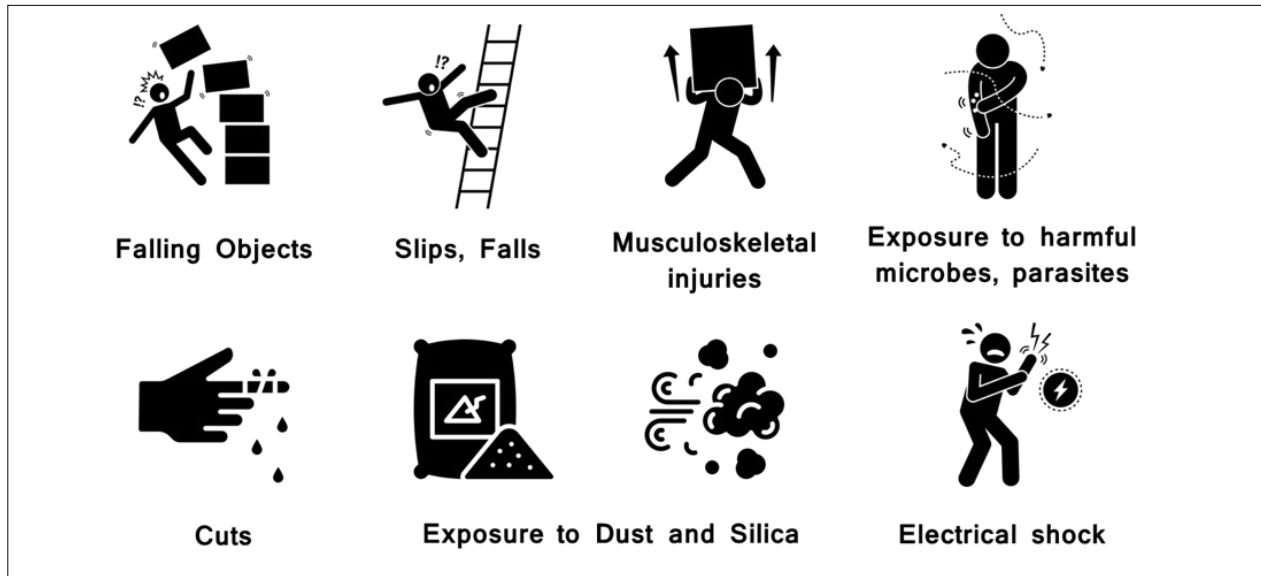


Figure 23. Hazards associated with masons

Source: (Donagi, 2009)

5.5. Safety, Health and Emergency Response

5.5.1. Organising the construction site

A well-organised construction site is fundamental to worker safety. Poor site management is a major cause of accidents, such as collisions between workers and falling materials, trips over debris, or injuries caused by unfinished structures (Beusch, et al., 2017).

- Before starting construction, a site layout should be prepared. It should clearly indicate:
- Areas for storing materials, tools, sand, and aggregates.
- Designated work zones for different construction activities.
- Proper disposal areas for waste and rubble.
- Clear and unobstructed pathways for workers and vehicles.

Organising the site in this way not only prevents accidents but also improves workflow efficiency. Workers can move freely, materials are easily accessible, and the risk of injury from obstructions or clutter is minimised (Beusch, et al., 2017).

5.5.2. Types of PPE required

It is mandatory for the contractor to provide all workers, including supervisory and technical staff engaged in the execution of the work, with appropriate safety equipment and protective gear while on site (NBCC, 2022). PPE safeguards masons from injuries caused by falling objects, sharp tools, dust, and other hazardous materials (Beusch, et al., 2017). Each item of protective gear as shown in Figure 16 serves a specific purpose, and the minimum required provisions, depending on the nature of the work, shall include gum boots, safety helmets, rubber gloves, face masks, safety nets, safety belts, goggles, and other devices necessary to ensure safe working conditions (NBCC, 2022).

- **Helmet (Hard Hat):** Protects the head from falling materials and debris, reducing the risk of serious injuries.
- **Facemask:** Prevents inhalation of dust from cement, sand, or stone, which can cause long-term respiratory problems.
- **Goggles:** Protect the eyes from chips, splinters, and dust during activities such as chiselling, grinding, cutting, or pouring concrete.
- **Safety Boots and Gumboots:** Protect feet from sharp objects, nails, and heavy materials. Sandals or slippers are unsafe.
- **Gloves:** Shield hands from cuts, abrasions, and chemical exposure.
- **Durable Work Clothing:** Reduces minor injuries and scratches. Bright colors and reflective strips make workers more visible to colleagues and machinery operators.

If the contractor is found to be deficient in providing the required safety equipment or protective gear, the Engineer-in-Charge may, at their discretion, procure the necessary items at the risk and cost of the contractor and provide them for use on the worksite (NBCC, 2022). The cost incurred shall be recovered from the contractor's bills. The contractor is required to comply with all applicable rules and regulations related to health, safety, and the environment (NBCC, 2022).

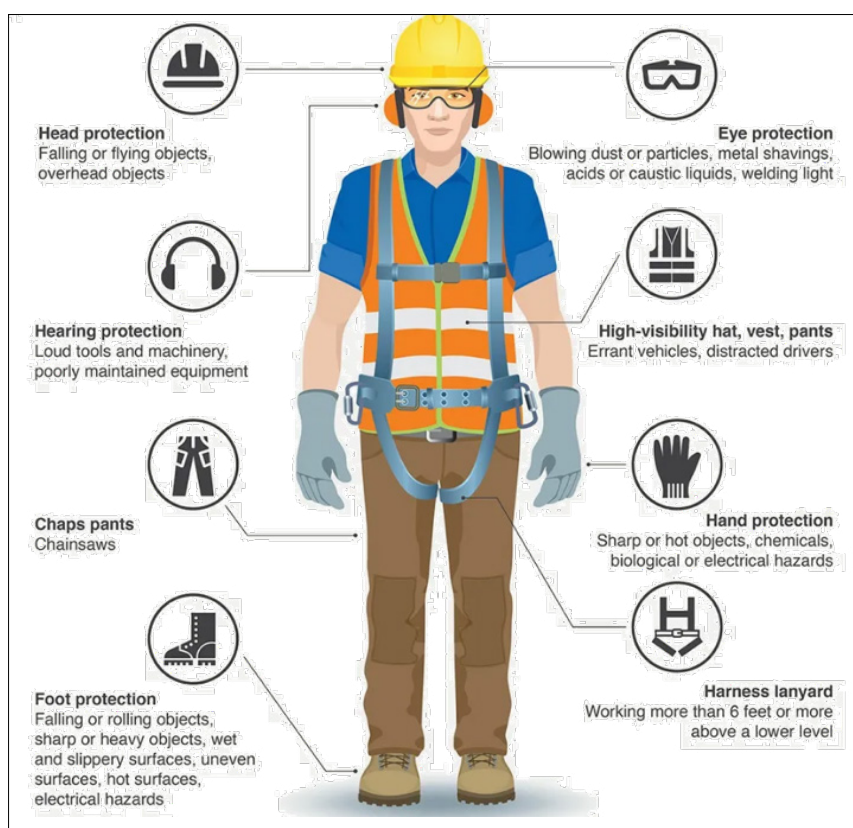
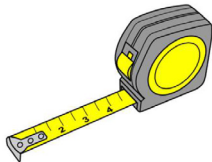
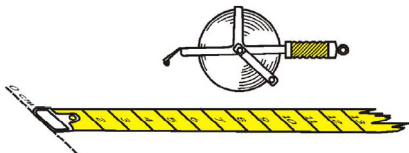
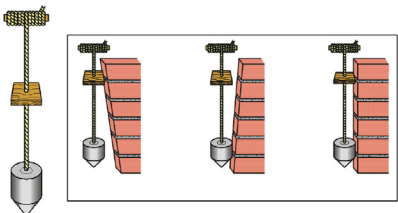
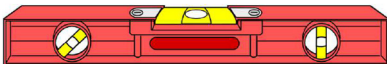
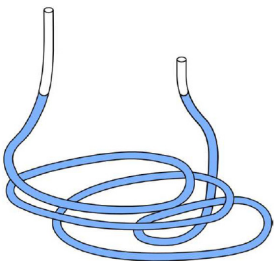
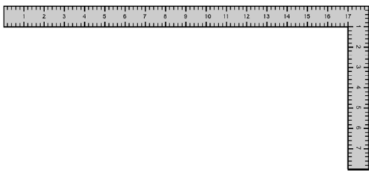
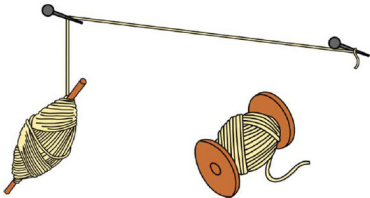
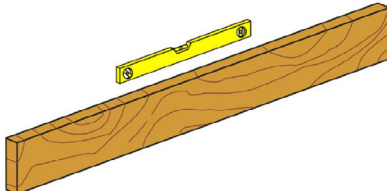


Figure 24. PPE Required for Construction Worker.
Source: (pim.lbl.gov)

5.4.3. Types for masonry works

Masons use a wide range of tools, each of which must be properly maintained and used to minimise the risk of injury:

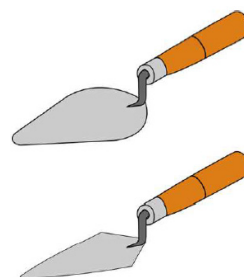
Tool / Equipment	
 Steel Tape (3 m) <i>Description</i> Used to measure short distances accurately; commonly marked with both Metric and Imperial units.	 Measuring Tape (10–30 m) <i>Description</i> Used for measuring longer distances; care must be taken not to damage the zero-point ring.
 Plumb Bob <i>Description</i> Used to check vertical alignment of walls or surfaces.	 Spirit Level <i>Description</i> Used to check horizontal and vertical surfaces; air bubble indicates level.
 Water Tube Level (Pipe Level) <i>Description</i> Transfers levels over distances and around corners; a transparent tube filled with water is used.	 Mason's Square <i>Description</i> Used to measure and check right angles of walls and dressed stones.
 String with Pegs (Mason's Line) <i>Description</i> Guides horizontal lines for laying bricks, blocks, or stones; also indicates trench locations.	 Straight Edge <i>Description</i> Used to level surfaces, transfer levels, and check evenness; can be wooden or light metal.



Mortar Pan

Description

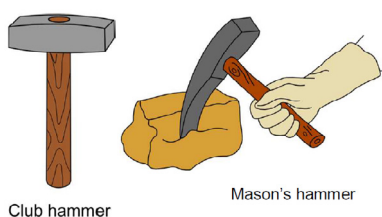
Holds ready-to-use mortar within easy reach of the mason.



Trowels

Description

Brick-laying trowel: Places and spreads mortar. **Pointing trowel:** Places mortar in tight spots and joints.



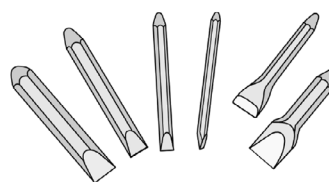
Club hammer

Mason's hammer

Stone and Mason's Hammers

Description

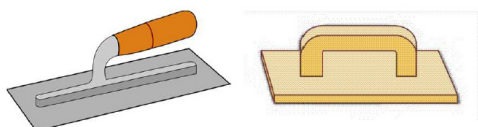
Used to cut and shape stones, bricks, and blocks; mason's hammer has a sharp end for cutting.



Chisels (Point and Flat)

Description

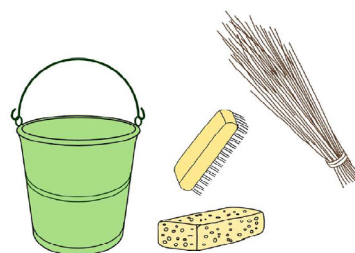
Used to cut and dress stones; point chisels for precision cutting, flat chisels for flattening.



Floats (Wood or Metal)

Description

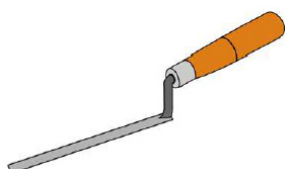
Used to hold small portions of mortar and level mortar or concrete surfaces.



Brooms, Brushes, Buckets, Sponges

Description

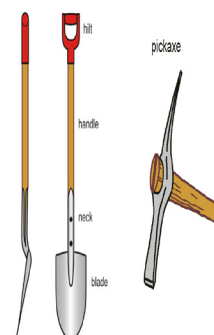
Used to clean work areas and surfaces; dampen bricks and stones before laying.



Jointer

Description

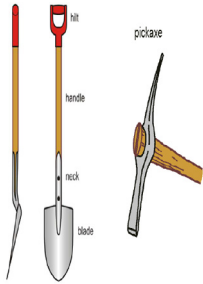
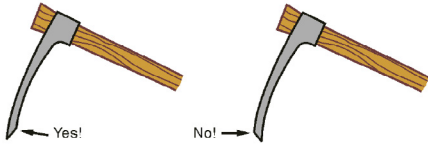
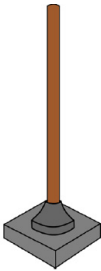
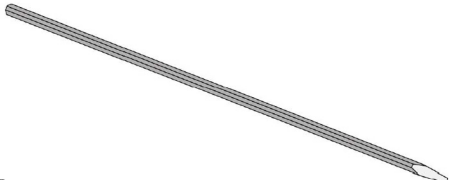
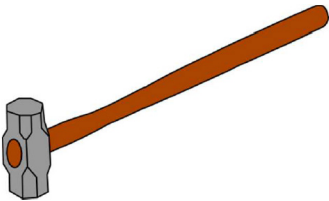
Used to 'point' joints for finishing mortar work neatly.



Shovel

Description

Used for excavation, mixing mortar, and concrete.

Tool / Equipment	
 Pickaxe Description Used for excavating hard soil or breaking small rocks.	 Hoe Description Used to excavate soft to medium-hard soil.
 Earth Rammer Description Used to compact small areas of soil, especially backfill in trenches.	 Crowbar Description Used to loosen hard soil or rocks.
 Sledgehammer Description Used for heavy-duty breaking of stones or driving wedges.	

Source: (Beusch, et al., 2017)

5.4.4 Tools and equipment safety

Many accidents occur due to improper handling or maintenance of tools and machinery (Beusch, et al., 2017). Masons should:

- Use machines, such as grinders, cutters, saws, and cement mixers, only in designated areas to maintain safe distances from other workers.
- Keep all tools and equipment clean, well-maintained, and in proper working order.
- Ensure electrical connections and wiring are safe and insulated.
- Wear the appropriate protective gear while operating any tools or machinery.

Following these precautions helps prevent injuries and ensures the safe functioning of equipment.

5.4.5 Safety practices

a. Safe lifting practices

Improper lifting of heavy materials can result in permanent back, shoulder, or knee injuries (Beusch, et al., 2017). Safe lifting practices include:

- Bending the hips and knees rather than the back when picking up loads.
- Holding the load close to the body for stability.
- Avoiding lifting above shoulder height or twisting while carrying a load.
- Seeking assistance when lifting objects heavier than 30 kg.

By using correct lifting techniques, masons can prevent many musculoskeletal injuries on the site.



Figure 25. Safe lifting posture

Source: (Beusch, et al., 2017)

b. Working at Heights

Falls from heights are among the most serious hazards on construction sites (Beusch, et al., 2017). To prevent accidents:

- Guardrails should be installed along building edges, scaffolds, and near deep excavations.
- Scaffolds must be constructed on level, stable ground. Proper bracing is essential to ensure they can safely support workers and materials.
- Ladders should be inspected for damage and placed securely at a 70° angle. The top of the ladder must extend at least one metre above the platform to ensure safe access.

Following these precautions can significantly reduce the risk of falls, one of the leading causes of injuries in construction.

c. Third party safety audit

The safety audit agency shall conduct periodic, preferably quarterly, safety audits of the project site through a sufficient number of technically qualified and experienced personnel, including safety officers and stewards, or through appropriate authorities or statutory bodies (NBCC, 2022). The purpose of these audits is to ensure that:

- All prescribed safety measures and rules are implemented and consistently followed on site.
- All PPE provided to workers, as required under relevant Acts or Rules, conforms to the applicable Indian Standards.
- A safe working environment is maintained for all workers, supervisory, and technical staff.

1. Materials, equipment, tools, and tackles are used safely; storage of materials, provision of lighting, barricading, and other safety arrangements are properly maintained.
2. Safety is considered an integral part of all activities at every level of the project.
3. The site remains incident-free, with no harm to workers' health, property, or the environment.
4. Proper housekeeping is maintained, as it is directly linked to overall safety on site.
5. Feedback on safety performance and successful implementation of safety measures is documented and submitted to the Engineer-in-Charge on a quarterly basis.

For more information, refer to

[General Conditions of Contract – 2022, NBCC](#)



5.4.6. Training Required

To enhance the safety awareness of the workforce and supervisory staff, the agency shall conduct periodic training and motivational sessions focused on safe work practices. The training should include both visual methods, such as instructional videos, and practical methods, such as mock drills (NBCC, 2022).

The following training can be conducted in alignment with the hierarchy of controls, which prioritises risk reduction strategies from most to least effective.

- **Elimination:** Train masons to identify and avoid unsafe tasks or materials wherever possible.
- **Substitution:** Promote the use of safer construction techniques and materials.
- **Engineering Controls:** Emphasise the use of secure scaffolding, stable ladders, and well-maintained tools to prevent accidents.
- **Administrative Controls:** Include training on safe tool handling, fall prevention, emergency preparedness, and overall health and safety practices.
- **PPE:** Provide practical instruction on the correct use and upkeep of helmets, gloves, masks, boots, and other protective gear.

5.4.7. Utility of the Health Screening

- Health screenings are vital to prevent long-term illnesses caused by working in hazardous conditions. Some preventive health measures include:
- **Regular Health Check-ups:** Monitoring for respiratory issues, skin diseases, and musculoskeletal disorders.
- **Vaccination Programs:** Vaccinations against diseases like hepatitis for workers who handle waste materials or chemicals.
- **Health Education:** Providing workers with information on personal hygiene, proper sanitation practices, and avoiding overexposure to hazardous materials.

5.4.8. Types of Health Screening Frequency

Health screening should be conducted regularly to ensure that any health issues are identified early:

- **Annual Health Check-ups:** Comprehensive exams that include lung function tests, blood tests, and skin evaluations.
- **Post-Exposure Screening:** Immediate medical evaluations for workers who are exposed to hazardous chemicals or extreme working conditions.
- **Periodic Monitoring:** Ongoing monitoring for workers exposed to long-term health risks, such as those in dusty or hot environments

5.4.9. Reporting and incident management

- An effective system for reporting hazards and incidents must be in place:
- **Incident Reporting:** Workers should be trained to recognize and report unsafe working conditions or accidents.
- **Documentation:** All incidents and near-misses must be documented to analyse causes and implement preventive measures.
- **Clear Communication Channels:** Ensuring that workers have clear communication channels for reporting hazards and receiving feedback on safety measures.

5.4.10. Emergency Response and First Aid.

Masons should be trained in basic first aid and emergency response procedures:

- **First Aid Training:** Workers should be equipped with knowledge of first aid for cuts, burns, sprains, and respiratory issues.
- **Emergency Response Plans:** Plans should be in place for evacuations, chemical spills, or accidents.
- **Emergency Equipment:** Ensure that first aid kits and emergency contact numbers are readily available on-site

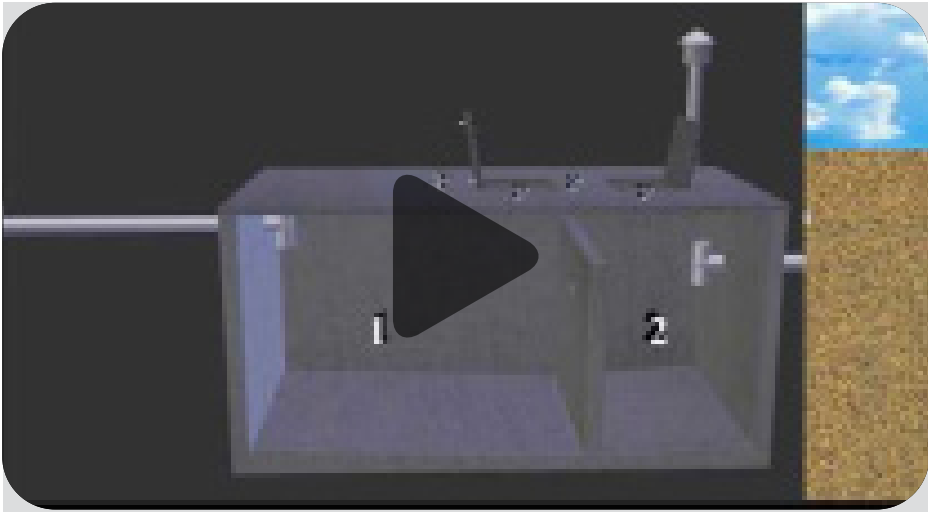
A video thumbnail showing two construction workers in yellow safety vests and hard hats. One worker is lying on the ground, and the other is kneeling beside them, possibly providing first aid. The background shows construction materials and a yellow tarp. A large play button is overlaid on the center. Text overlay reads: "Incident Reporting" and "Understand your WHS reporting and compliance requirements". A small "4:3" aspect ratio indicator is in the bottom right corner.

Source: WorkSafeVP, 2023

Video on Incident Reporting



5.6. Best Practice/ Case study/ Video

A video thumbnail showing a 3D cutaway diagram of a septic tank system. The diagram is divided into two main sections labeled '1' and '2'. A large play button is overlaid on the center. The background shows a cross-section of the ground with a blue sky and clouds above.

Source: IIHS, 2018

Video on How to construct a proper septic tank



5.7. Activity on Ensuring Safety Compliance on Site

Objective:

To encourage ULB officers to share their experiences and perspectives on enforcing safety measures at construction sites, identify common challenges, and discuss practical ways to strengthen monitoring and compliance.

1. Open Discussion

The trainer invites participants to share their thoughts and experiences around questions such as:

- What are the most common safety lapses you notice on construction sites?
- How do you currently monitor whether contractors are following safety requirements?
- What are the main challenges in ensuring compliance with safety standards?
- How can ULBs strengthen supervision, audits, and record-keeping to improve safety outcomes?
- What actions can officers take when contractors fail to provide PPE or follow site safety protocols?

The trainer encourages participants to exchange views, cite examples from their own jurisdictions, and discuss what works well and what needs improvement.

2. Summary and Reflection

- The trainer summarises key insights from the discussion, highlighting:
- Common barriers to enforcing safety standards.
- Practical steps ULB officers can take to monitor and document safety compliance.
- The importance of coordination between ULBs, contractors, and workers to maintain a safe and healthy work environment.

3. Expected Outcome:

- Participants gain clarity on their supervisory responsibilities related to occupational safety.
- Practical ideas emerge on how to strengthen on-site monitoring, audits, and enforcement.
- Officers leave with a deeper understanding of their role in promoting safe and compliant construction practices.

Trainer's Note

This session on Safety Aspects for Masons is designed to raise awareness about the critical health and safety risks encountered in masonry work, particularly in the construction of sanitation infrastructure. The training will focus on the importance of proper use of PPE, safe work practices, and emergency response procedures. By identifying common hazards at different stages of construction, participants will gain practical knowledge to mitigate risks, enhance their safety, and promote a safer work environment.

1. Introduction to the Session:

- **Start with a Personal Connection:** Begin the session by sharing why safety is so crucial in masonry work, using real-life examples and stories to highlight the importance of preventing accidents and injuries.
- **Set Clear Expectations:** Outline the objectives of the session and explain how safety can impact both their health and the quality of the work they do. Emphasise that this training will

2. Engage the Participants:

- **Interactive Discussions:** Encourage participants to share their own experiences related to safety. Ask them about any hazards they have encountered in their work and how they addressed them. This can build rapport and make the training feel more relevant to their daily lives.
- **Ask Questions:** Throughout the training, ask questions to assess participants' current understanding of safety practices. For example, "What PPE do you think is necessary when mixing mortar?" or "How do you ensure your scaffolding is stable before you start work?"

3. Present Key Content:

- **Break Down the Training Material:** Deliver the content in segments. Use clear and simple language to explain each section. For example, first explain what PPE is, then show how it protects, followed by a demonstration of how to wear it properly. **Use Visual Aids:** Show images, charts, and videos to support the discussion. For example, use the video on "How to Construct a Proper Septic Tank" to demonstrate correct procedures. This helps participants visualise the right techniques and tools in action.

4. Demonstrate Safe Practices:

- **Hands-on Activities:** If possible, have the participants engage in practical demonstrations. For example, show how to properly wear and adjust PPE, or demonstrate the safe handling of a brick or a power tool. Let them practice what they've learned.
- **Safety Simulations:** Set up scenarios that mimic real-world risks they may encounter. For instance, you can simulate a minor fall or an accident and show the correct emergency response actions.

5. Group Activities & Discussions:

- **Role-Playing for Emergency Response:** Have participants role-play an emergency response situation. For instance, one person might act as an injured worker, while others practice first aid or coordinate evacuation.

6. Wrap-Up and Review:

- **Recap the Key Points:** Go over the main points of the session one last time to reinforce the takeaways. Summarize the hazards, safety procedures, PPE usage, and emergency plans.
- **Provide Resources:** Give participants access to additional materials, like a written safety guide or a digital resource, so they can refer to it later. Encourage them to keep it with them on-site.

7. Q&A and Feedback:

- **Invite Questions:** Leave time for participants to ask any questions they may have about the training. Address concerns and provide clarity on any points that were unclear.
- **Feedback for Improvement:** Ask for feedback on the training session. This helps you improve future sessions and also shows participants that their input is valued.

Trainer's Tips for Effective Delivery:

1. **Keep the Tone Positive and Encouraging:**
 - Maintain a positive, supportive, and motivating tone throughout the session. This will help participants feel comfortable and open to learning. Emphasize that safety is not just about compliance but also about their well-being and success.
2. **Use Real-World Examples:**
 - Make the training relatable by sharing examples from real-life construction sites. Discuss actual safety incidents and how they were prevented or handled. This will make the content more tangible and relevant to participants.
3. **Adjust to Participant Needs:**
 - Be flexible and ready to adjust the session depending on the participants' experience and level of knowledge. Some may be more experienced, while others may need more basic information. Tailor your delivery to suit the needs of the group.
4. **Make Safety Feel Accessible:**
 - Use language and examples that feel accessible to everyone, regardless of their education or background. Avoid technical jargon and explain any terms or concepts in simple, straightforward language.
5. **Be Energetic and Engaging:**
 - Keep the energy up throughout the session to maintain attention. Use gestures, change your tone, and actively involve the participants. The more engaging you are, the more likely they are to stay involved and retain information.
6. **Empower Participants:**
 - Reinforce that safety is everyone's responsibility, and each mason has a role in making their work environment safe. Empower them by giving them the tools, knowledge, and confidence to make the right safety decisions on-site.
7. **Ensure Comfort and Inclusivity:**
 - Be mindful of cultural and gender sensitivities. Make sure that everyone, including women and less experienced workers, feels comfortable participating. Pay attention to how people are interacting and encourage everyone to take part.
8. **Be Patient and Approachable:**
 - Some participants may be hesitant to ask questions or share experiences. Be patient and create an open environment where everyone feels comfortable expressing concerns or asking for clarification. Acknowledge all questions as valuable contributions to the learning experience.

06

Safety aspects for Emptier and Desludgets (Safaimitras)



6.1. Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 1	Presentation	40
2		Case Study	10
3		Questions & Discussion	10
Total			60

6.2. Learning Objectives

1. Understand the occupational hazards faced by emptiers and de-sludgers in high-risk environments
2. Understand the SOP, use of safety devices and PPE, health screenings and emergency response
3. Understand the know-how of the evolving legal and policy framework

6.3. Key Takeaways

1. Desludgers face serious health and safety risks.
2. Standard procedures must be followed.
3. Regular health checkups are required to screen out workers with medical risks.
4. Laws ban unsafe manual cleaning, and cities must provide trained workers, equipment, insurance, and emergency support.
5. Proper PPE and safety gear are essential and must be used every time.

6.4. Definitions

"The Desludging Worker, also known as a Sludge Emptier is an individual, who is responsible for emptying, transporting and disposal of faecal sludge from the septic tank/sewer line to de-sludging site / FSTP / Co-treatment plant. He /She has to operate a Sludge Vacuum tank with trucks, pumps, suction hoses, and other machinery/equipment to empty the septic tank/sewer line. A desludging operator would further specialise as an entrepreneur, He / She would be trained to venture into desludging services for managing Faecal Sludge. (National Qualification Register, n.d.).

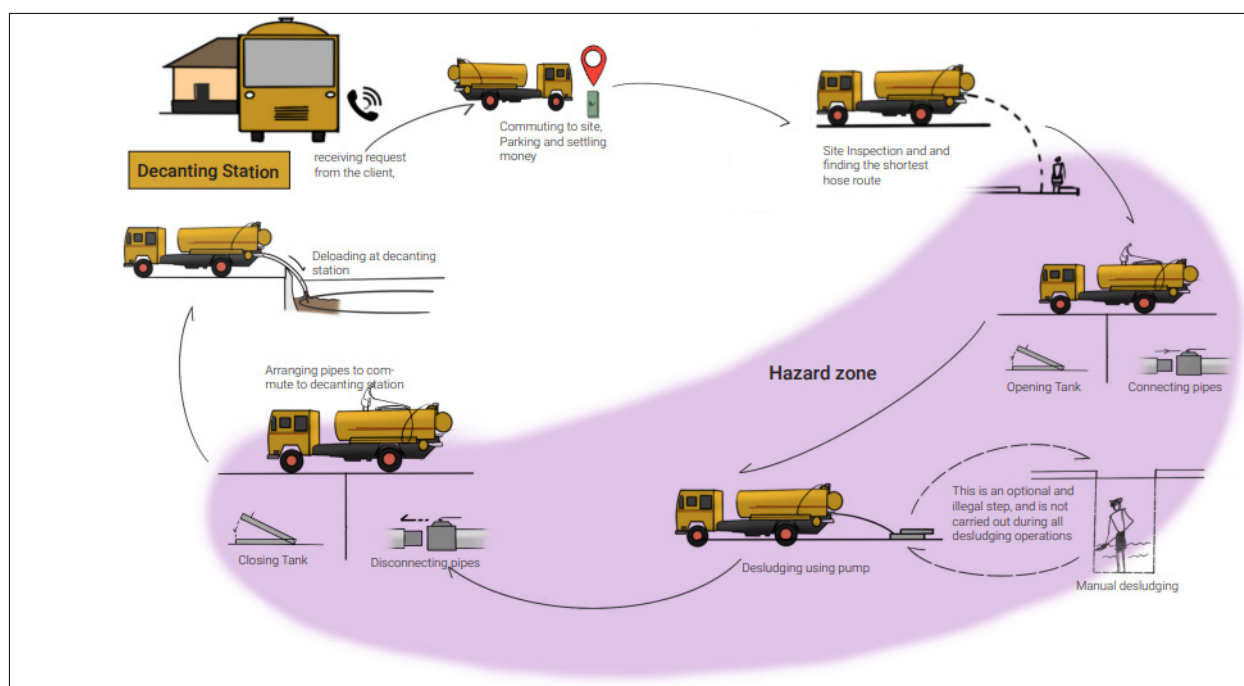


Figure 26. Full cycle of de-sludging of septic tanks.

(Source: IIHS, 2022)

6.5. Scale

India has approximately 4,800 ULBs, but only about 400 of these have established sewerage networks, indicating a predominant reliance on Onsite Sanitation Systems (OSS), such as septic tanks, in the majority of urban areas (Anon., n.d.). This heavy dependence on OSS necessitates effective faecal sludge management services. However, detailed data on the total number of FSM workers across these ULBs, as well as their gender distribution, remains limited. The FSM sector often operates within informal frameworks, with private workers playing a significant role in de-sludging services. This informality poses challenges in accurately assessing workforce demographics and ensuring equitable and safe working conditions. Addressing these gaps requires formalising the FSM sector and implementing comprehensive workforce assessments to inform policy and improve service delivery.

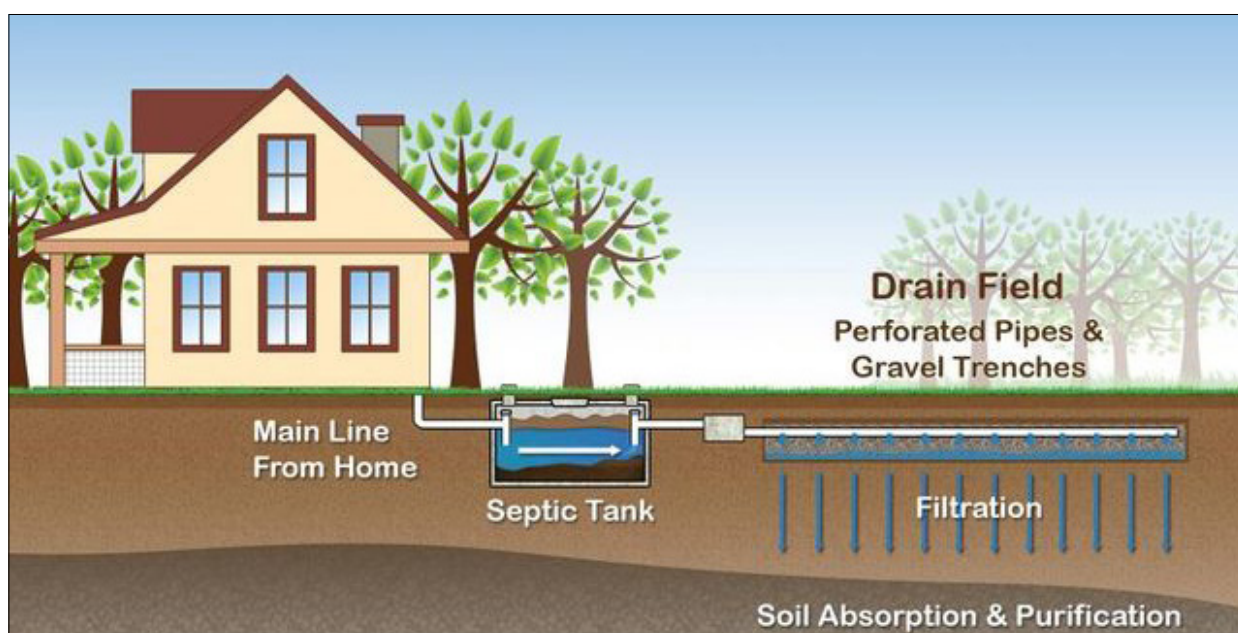


Figure 27. Household on-site sanitation system

6.5. Typical Duties and Responsibilities

Sanitation workers who undertake the desludging and emptying of septic tanks and pits face unsafe working conditions that compromise their health, safety, and dignity. Their work is often ad-hoc in nature, carried out without standard operating procedures (SOPs), adequate training, or awareness of labour rights. The lack of proper safety devices and the high cost of PPE restrict the adoption of safe practices, leaving workers exposed to serious risks.

Beyond immediate workplace hazards, systemic and structural issues deepen these vulnerabilities. Poor septic tank design, including missing vents and irregular maintenance, heightens the chances of exposure to toxic gases and unsafe confined spaces. The informal private market for FSM often prioritises profit over worker safety, leading to corner-cutting and unsafe practices. In many cities, enforcement of occupational safety rules remains weak, delaying improvements in working conditions.

The health consequences of these gaps are severe. Sanitation workers are at risk of musculoskeletal disorders due to strenuous work postures, respiratory illnesses from exposure to bioaerosols, and infections from direct contact with waste. These challenges mirror confined space hazards seen in sectors like maritime safety, yet sanitation lacks equivalent institutional safety codes and protections.

6.6. Safety and Health Risks of Emptiers and Desludgers

Emptiers and Desludgers face a host of occupational safety issues during the course of cleaning septic tanks. The key occupational hazards are:

- 1. Inhalation of gases:** A combination of factors such as sealed tanks (no vent pipe), long de-sludging cycles, and use of chemicals for toilet cleaning lead to the accumulation of gases in the OSS. While a more thorough testing and evaluation is necessary, several newspaper reports seem to indicate that inhalation of gases could cause death – either directly or indirectly. These reports highlight that inhalation of gases have led to unconsciousness, thereby causing a worker to slip. These falls have resulted in death either most probably due to fatal injuries or asphyxiation. While the actual cause of death warrants a thorough study, there is enough evidence to show that inhalation of gas is a critical safety concern.
- 2. Direct contact with sludge leading to skin infections:** Workers are at risk of direct contact with or splashes of faecal sludge at multiple stages in the de-sludging process which is aggravated as workers seldom wear proper PPE. While there is limited evidence on the impact of contact with sludge, studies on sewage workers reveal conditions such as leptospirosis, hepatitis, dermatitis and helicobacter pylori infection.
- 3. Physical injury:** Breaking open the septic tank lid and lowering of the hose pipe are potential sources of physical injury. Risk of physical injury is pronounced inside the tank as invisible sharp objects such as glass pieces, spoons and razors in the sludge, cause injuries to the workers' extremities, since many do not wear protective gear and clean with bare hands. Additionally, if septic tanks are placed in difficult-to access locations, workers are exposed to insects, thorny bushes, and overflowing or stagnant water.

Table 10: Hazards and Subsequent Safety and Health Risks of Emptiers and Desludgers

Hazard Type	Stage	Key Hazards	Safety Risk	Health Risk
Physical Hazards	Preparation	Rash driving, perching on vacuum tankers, driving under influence, falling from vehicle, slip/trip/fall hazards	Road injuries, fractures, head trauma	Not significant
	Emptying	On-site injuries from debris, bruises/cuts from septic tank lid, accidental falls, wounds from handling equipment, explosion risk	Lacerations, fractures, burns, trauma	Infections
	Transportation & Decanting	Injuries from tools, foreign objects on ground, unsafe handling of sludge	Lacerations, fractures, infections	Infections
Biological Hazards	Preparation	No major biological hazards identified	Not significant	Not significant
	Emptying	Contact with sludge due to spillage, exposure while liquefying sludge	Skin infections, dermatitis	Skin infections
	Transportation & Decanting	Contact with sludge, exposure to bioaerosols	Respiratory infections, skin diseases	Respiratory infections and skin infections
Chemical Hazards	Preparation	No major chemical hazards identified	Not applicable	Not significant
	Emptying	Inhalation of harmful gases while opening the septic tank	Respiratory irritation, nausea	Lung diseases, multiple chronic illnesses
	Transportation & Decanting	Exposure to harmful gases at decanting stations	Lung diseases, chronic respiratory issues	Lung diseases, multiple chronic illnesses

Hazard Type	Stage	Key Hazards	Safety Risk	Health Risk
Ergonomic Hazards	Preparation	Repetitive strain injuries (RSI) from continuous motion	Musculoskeletal pain, fatigue	Not significant
	Emptying	Work-related musculoskeletal disorders (WMSD) – back pain, sore shoulders, fatigue	Chronic pain, joint stiffness	Musculoskeletal pain, joint strain
	Transportation & Decanting	RSI from lifting, improper posture while handling sludge	Chronic pain, joint and muscle disorders	Chronic back pain, repetitive strain injuries

High exposure to toxic gases in septic tanks may have a ‘knockout effect’ within minutes; however, **low exposure over a continued period of time** can result in **chronic respiratory illnesses** such as bronchitis and asthma, neurological impairments including memory loss and headaches, eye and skin irritation, and long-term damage to organs such as the liver and kidneys due to prolonged inhalation of hydrogen sulfide, methane, and ammonia.

6.7. Occupational safety and health of workers during De-sludging and treatment of faecal sludge: Regulatory and policy mechanisms

Regulatory and policy mechanism at the national level

Ensuring the occupational safety and health (OSH) of workers engaged in desludging and faecal sludge treatment is crucial to preventing fatalities, injuries, and long-term health risks. In India, various acts, policies, guidelines, and institutions collectively shape the regulatory framework for sanitation workers’ safety. These mechanisms aim to eliminate hazardous manual scavenging, establish safe sanitation practices, and promote mechanisation in FSM. A well-defined and effectively implemented regulatory and policy framework is essential to protect sanitation workers and uphold their dignity.

Acts and Legislations

1. The Environment (Protection) Act, 1986 provides a legal framework for environmental safety, which includes safe faecal sludge treatment and disposal.
2. The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993 prohibits manual scavenging and the construction of dry latrines.
3. The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013 strengthens the 1993 Act by banning hazardous cleaning of sewers and septic tanks without protective gear and mechanised equipment.
4. The Occupational Safety, Health and Working Conditions (OSH) Code, 2020 establishes comprehensive safety standards for workers across sectors, including sanitation.

Policy and Guidelines

- a. The NAMASTE Scheme, implemented in 2019 by the MoSJE, aims to mechanise sanitation work and ensure the dignified livelihood of sanitation workers.
- b. The Safaimitra Surakshit Shahar Initiative, 2022, implemented by the MoHUA, encourages ULBs to adopt safe mechanised cleaning to eliminate hazardous manual cleaning practices. The National Urban Sanitation Policy, 2008 aims to improve sanitation services, and recognise the role of sanitation workers in urban sanitation planning.
- c. The Standard Operating Procedure (SOP) for Cleaning Sewers and Septic Tanks provides safety protocols and technical guidelines to prevent occupational hazards.
- d. The CPHEEO Manual for Manpower and Equipment recommends appropriate tools, mechanisation strategies, and workforce management to ensure safety.
- e. The National Faecal Sludge and Septage Management Policy (NFSSM), 2017 guides states and cities on safe faecal sludge and septage treatment, with an emphasis on worker protection.



The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013



Institutions

1. National Safai Karamchari Commission (NSKC) monitors the implementation of laws and policies concerning the welfare of sanitation workers.
2. National Safai Karamcharis Finance and Development Corporation (NSKFDC) provides financial and skill development support to sanitation workers.

Various state level initiatives

India has made significant strides in FSM and OSH of sanitation workers through targeted state-led initiatives. These efforts include policy frameworks, infrastructure development, mechanisation of sanitation services, and worker rehabilitation programmes. Many states have implemented scheduled de-sludging, Self-Help Group (SHG)-led sanitation models, hybrid annuity financing, and digital tracking systems to ensure safe and sustainable FSM practices. The table below summarises key state-wise initiatives, highlighting their scope and impact.

Table 11: Various state level initiatives to ensure OHS of Sanitation Workers in India

State	Scheme/Initiative	Year	Key Features
Tamil Nadu	State Investment Plan for FSM	2021	Cluster-based approach for treatment facility development.
	Standard Licensing Agreement for De-sludging Workers	2020	Regulates private workers, mandates safety training, PPE usage, and vehicle tracking.
	Co-Treatment of Faecal Sludge at STPs	Ongoing	Implemented in 50+ STPs to ensure cost-effective sludge treatment.
Odisha	Engagement of SHGs for De-sludging Services	2018	SHGs operate de-sludging services, earning per household referral.
	Faecal Sludge Treatment Plant (FSTP) Expansion	2020	Scaling up treatment facilities to improve FSM infrastructure.
	ISO Certification for Septage Treatment Plants	2021	First state to achieve ISO certification for all operational SeTPs.

State	Scheme/Initiative	Year	Key Features
Telangana	Mini Sewer Jetting Vehicles for Mechanized Cleaning	2019	Eliminated manual scavenging; rehabilitated workers as micro-entrepreneurs.
	State FSSM Policy	2018	Institutional framework for FSM and sanitation worker safety.
	Women-led Public Sanitation Facilities	2020	SHGs operate and maintain public sanitation infrastructure.
Maharashtra	Scheduled De-sludging with PPP Model (Wai, Sinnar)	2018	Universal, affordable de-sludging service with performance-linked annuity model.
	Hybrid Annuity Model (HAM) for FSTP Construction	2020	Public-private partnership for FSM infrastructure.
	Digital Technology in FSM Operations	2021	Real-time tracking of de-sludging services.
Andhra Pradesh	Regulated De-sludging Program	2017	GPS-tracked de-sludging vehicles and licensed workers.
	Hybrid Annuity Model (HAM) for FSM Infrastructure	2020	Financing strategy for 147 FSTPs.
Karnataka	Devanahalli FSTP	2016	Model decentralized FSM plant, operational for over five years.
Uttar Pradesh	Faecal Sludge Treatment Plant in Chunar	2019	Integrated FSM and wastewater reuse for cost recovery.
	State-wide FSSM Policy	2018	Guidelines for septage management and worker safety.

Under the Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013, hazardous cleaning is strictly prohibited unless all statutory safety measures, including the provision of protective gear and mechanised cleaning equipment, have been complied with (p.2). The Act prescribes criminal penalties for employers failing to ensure worker safety during sewer and septic tank cleaning.

Furthermore, as per the Rules 2013, no sanitation worker shall be permitted to enter a sewer or septic tank manually unless:

1. Mechanical equipment is unavailable for the removal of obstructions (p.2).
2. Manual intervention is authorised in writing by the Chief Executive Officer (CEO) of the local authority, with clear documentation of reasons (p.2).
3. Protective safety devices, including full-body PPE, are provided (p.8).

Failure to comply with these provisions constitutes a violation of statutory safety obligations, attracting legal liability on the employer.

6.8. Procedure for Desludging: Standard Operating Procedure(SOP) Cleaning Sewers and Septic Tank

Preparation

The preparation stage is critical to ensuring safe, efficient, and hygienic de-sludging operations. Proper planning and precautionary steps reduce risks to workers, occupants, and the surrounding environment. The following actions are to be undertaken prior to commencing de-sludging activities:

1. **Occupant communication**
 - The service team shall inform the household or establishment occupants regarding the planned de-sludging activity. Any concerns raised by the occupants shall be duly noted and clarified to ensure cooperation during the operation.

2. Site inspection

- The site shall be carefully inspected for potential hazards such as unstable ground, electrical lines, or chemical storage nearby. This step ensures that risks are identified and mitigated before work begins

3. Vehicle positioning

- The suction truck or de-sludging vehicle shall be parked as close to the septic tank as possible, without obstructing access routes or posing safety risks to pedestrians or traffic. Proper positioning allows for efficient hose layout and safe operation.

4. Tank Opening and Inspection

- The septic tank shall be opened with caution. The mortar seal shall be broken carefully to avoid structural damage. Once opened, the interior walls and cover shall be checked for cracks, leaks, or any other form of structural weakness that may endanger workers or the public.

5. Hose Arrangement

- The suction hose shall be laid from the vehicle to the tank, ensuring minimal bends and obstructions. All hose connections must be checked and secured tightly to prevent leaks or accidental disconnection during operation.

Emptying

Once preparatory actions are completed, the emptying stage ensures the safe and effective removal of sludge from septic tanks. The following procedure shall be adhered to by the service team:

1. Hose inspection

- The suction hose, including locking mechanisms and joints, shall be checked once again before operation. Any sign of wear, cracks, or leakage must be rectified prior to commencing suction.

2. Tank access

- The septic tank cover shall be opened carefully to provide clear access to the sludge. Adequate precautions shall be taken to avoid exposure to harmful gases.

3. Pump operation

- The vacuum pump shall be started using the truck's transmission system. Suction shall be carried out in a controlled manner to prevent spillage or uncontrolled overflow.

4. Sludge agitation

- If solid or compacted sludge is encountered, it shall be broken manually with long-handled tools. Water may be added in controlled quantities to aid the suction process and to prevent damage to the pump system.

5. Biological action

- As per CPHEEO guidelines, a portion of sludge shall be left in the tank to facilitate continued biological activity. This ensures effective functioning of the septic tank post de-sludging.

6. Screening of contents

- Prior to final disposal, the sludge shall be checked for the presence of plastics, oils, grease, or other non-biodegradable material. Such materials shall be separated and handled in accordance with municipal solid waste rules.

Transportation and Decanting

After sludge is emptied from the septic tank, the final stage involves safe site closure, transport, and proper documentation to ensure accountability and compliance with CPHEEO guidelines. The following steps shall be observed:

1. Tank resealing

- The septic tank cover shall be securely resealed using fresh cement mortar. This prevents accidental entry, foul odour release, or mosquito breeding.

2. Site cleaning

- Any spills or residues around the worksite shall be cleaned immediately. Absorbent materials shall be used for liquid spills, followed by disinfection with chlorine spray to maintain public hygiene.

3. Worker hygiene

- Workers shall change into clean clothes before leaving the site. This measure prevents cross-contamination and supports occupational safety and health.

4. Reporting and documentation

- A written report shall be prepared for each de-sludging activity, recording details of the operation, observations, and issues encountered. The report data shall be promptly entered into the Urban Local Body (ULB) computer system for monitoring and record-keeping.

5. Vehicle preparation

- Before moving the suction truck, all wheel chocks shall be removed, and equipment shall be checked to ensure it is safely stowed.

6. Transport to next site/facility

- The vehicle shall then proceed, as per instructions, either to the next service site or to an authorised treatment or disposal facility for decanting of collected sludge.

Standard Operating Procedure (SOP) for Cleaning of Sewers and Septic Tanks



6.9. Procedure for Cleaning of Underground Sewage Network: Standard Operating Procedure (SOP) for Cleaning Sewers and Septic Tank

The procedure for cleaning of sewers is guided by the Standard Operating Procedure (SOP) issued by the Central Public Health and Environmental Engineering Organisation (CPHEEO) for Cleaning of Sewers and Septic Tanks. The cleaning operation must be undertaken systematically, with due regard to occupational safety, environmental considerations, and operational efficiency.

Cleaning frequency

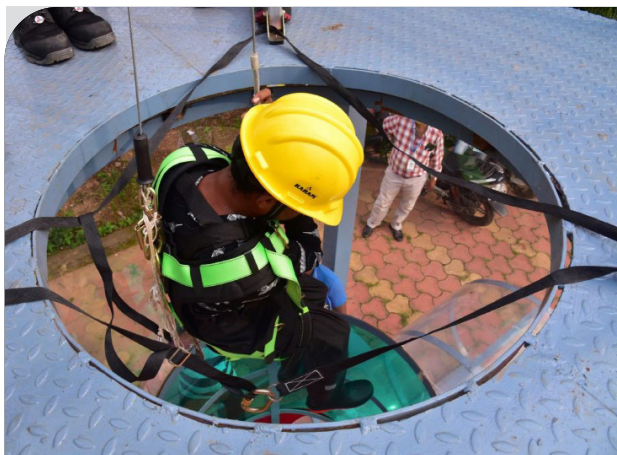
- Cleaning of sewers shall be carried out at least once in six months, and preferably before the monsoon season.
- Frequency shall be determined based on local site conditions, field inspections, and public complaints.

Mechanical Cleaning Procedure

- Pre-cleaning:** Selection of staff, hazard briefing, and provision of PPE.
- Site preparation:** Identification of sewer stretch, barricading of area, deployment of flagmen and traffic cones.
- Gas check:** Opening of manholes for ventilation, followed by gas detection using monitors and acetate paper.
- Desilting:** Deployment of mechanised equipment for sludge and silt removal.
- Post-cleaning:** Sanitisation of equipment, documentation of work, and restoration of site conditions.

Manual Cleaning Procedure (only under exceptional circumstances)

- Initial steps:** Same as mechanical cleaning, but with written consent and authorisation.
- Ventilation and gas check:** Mandatory ventilation of manholes and gas detection.
- Confined entry:** Allowed only if essential, after confirming safe oxygen levels.
- Safety measures:** Workers to be equipped with full-body protective suit, face mask, safety belt, communication device, and CCTV monitoring support.
- Cleaning activity:** Manual removal of clogs using suitable hand tools.
- Work duration:** Strict limit of 90 minutes per entry, with mandatory 30-minute rest intervals.



**01 - Training for
Sewer Entry
Professionals: Safe
Confined Space
Entry**

Three day training program

Transforming the lives of Core
Sanitation Workers

**Training for
Sewer Entry
Professionals:
Safe Confined
Space Entry**





6.10. National Action For Mechanised Sanitation Ecosystem- An Advisory

NAMASTE, a Central Sector scheme for the welfare of Sewer and Septic Tank Workers (SSWs) and having the components of erstwhile 'Self Employment for Rehabilitation of Manual Scavengers' (MS), is operational since 2023- 24. The Standing Finance Committee (SFC) in its meeting held on 20 June 2024 has approved for inclusion of waste pickers as the third component in the scheme from the financial year 2024-25. The scheme subsidises loans for sanitation workers for procurement of sanitation related projects, training support for skill building, and workshops on hazardous cleaning of sewers and septic tanks among others.

Goal of NAMASTE:

- Ensure safety and dignity of sanitation workers. Provide sustainable livelihoods and enhance their occupational safety through capacity building and improved access to safety gear and machines.
- Provide capital for sanitation related projects to make them 'sanipreneure'.
- Bring about behaviour change amongst citizens

Strategy of NAMASTE:

- Establish strong convergence
- Improvement the scheme in close coordination with ULBs
- Create training ecosystem, institutional strengthening and ICT enabled monitoring
- Run sanitation enterprises

Coverage:

- Implementation across all ULBs (at present about 4800 plus ULBs)
- Primary target is sewer and septic tank sanitation workers (SSWs)
- ULBs shall be required to submit details of SSWs through the **NAMASTE Portal**
- Timeline:** NAMASTE will be implemented **over the period of 3 years from 2023-24 to 2025-26**

Convergence:

- The safety of SSWs is a joint responsibility of MoSJE and MoHUA.** The scheme leverages the available financial allocations of NAMASTE, SBM, DAY-NULM, and NSKFDC and brings in a focused approach to provide occupational, social and financial safety nets to the SSWs.
- Ministry of Health and Family Welfare:** for health insurance coverage of SSWs.
- Department of Drinking Water and Sanitation:** DoDWS shall collaborate with ERSUs for sensitisation of its Rural Bodies for availing services of ERSU.
- Ministry of Skill Development and Entrepreneurship:** Provide occupational training of the SSWs in convergence with PMKVY.

Assistance for loan related projects:

Project cost upto 5.00 lakh	50% of the project cost
Project cost above Rs. 5 lakh and upto Rs.15 lakh	INR 2.50 lakh + 25% of the remaining project cost above INR 5.00 lakh
For group projects costing upto Rs. 50 lakh with each beneficiary project share maximum upto Rs. 10 lakh	Same as above with maximum per member capital subsidy of INR 3.75 lakh and maximum group project subsidy of INR 18.75 lakh

- The process of repayment of loan, including moratorium period will be five years for projects upto INR 5 lakh and 7 years for projects above INR 5 lakhs with a moratorium period to start repayment of loan up to 6 months.
- Handholding agencies will be empanelled and would be provided 1 per cent of the project cost for their efforts in providing loan to the target group of NAMASTE.



The poster features the Ministry of Social Justice & Empowerment, Government of India logo and the NAMASTE logo. The title 'NAMASTE' is prominently displayed in large yellow letters, followed by the subtitle 'A New Dawn for Sanitation Workers in India'. A central circular illustration shows two sanitation workers in orange uniforms and yellow hard hats, one holding a large white pipe connected to a yellow tanker truck. To the left, a list of bullet points describes the scheme's goals: ensuring safety and dignity, promoting mechanized equipment, and providing health insurance, skill development, and capital subsidies. At the bottom, a quote reads: 'Empowering the Unsung Heroes of Cleanliness with Dignity and Safety'. Social media handles and the website are listed at the very bottom.

**MINISTRY OF SOCIAL JUSTICE & EMPOWERMENT
GOVERNMENT OF INDIA**

NAMASTE
A New Dawn for Sanitation Workers in India

- An initiative that aims to ensure safety and dignity of Sewer and Septic Tank Workers.
- Promotes the use of mechanized equipment for cleaning sewers and septic tanks
- Includes provisions for health insurance, skill development, and capital subsidies for equipment procurement

"Empowering the Unsung Heroes of Cleanliness with Dignity and Safety"

@msjegoi @goimsje @msjegoi socialjustice.gov.in

Figure 28. NAMASTE Scheme for Sanitation workers in India;
Source: Ministry of Social Justice and Empowerment, Government of India)

Training for strengthening of ERSU:

The cost of such training would not be met out of NAMASTE funds but the training programmes would be conducted by MSDE under PMKVY 4.0. Trainees covered under occupational training programme of MDSE under NAMASTE would be provided the stipend @ Rs. 500/- per candidate directly by NSKFDC, on Aadhar authenticated payment system, through DBT of Public Financial Management System (PFMS).

Provision for PPE for SSWs: PPE kits for surface cleaning sanitation workers, undertaking mechanised cleaning operations would be **provided by MoSJE through ULBs on reimbursement basis at INR 4,000/- per beneficiary.**

Provision of safety devices to ULBs: The scheme would provide safety devices like air compressor for blower, air purified gas mask, breathing mask, breathing apparatus, emergency medical oxygen kit, gas motor, full body water suit, fishing wader suit attached with boots, head lamp, helmet, safety belt, safety body clothing, safety body harness, safety goggles, tripod with safety belt etc. **upto the cost of INR 2 lakh to ERSU on reimbursement basis (after appointment of RSA, having functional helpline number, completion of profiling of SSWs and their occupational training).** About 1000 SRU are likely to be set up in the country for emergency cleaning of sewers.

IEC campaign: Upto 5 per cent of total cost of the scheme can be utilised for IEC campaign

Training for strengthening of ERSU: The cost of such training would not be met out of NAMASTE funds but the training programmes would be conducted by MSDE under PMKVY 4.0. Trainees covered under occupational training programme of MDSE under NAMASTE would be provided the stipend @ Rs. 500/- per candidate directly by NSKFDC, on Aadhar authenticated payment system, through DBT of PFMS.

Provision for PPE for SSWs: PPE kits for surface cleaning sanitation workers, undertaking mechanised cleaning operations would be **provided by MoSJE through ULBs on reimbursement basis @Rs. 4,000/- per beneficiary.**

6.12. Types of Safety Devices and Personal Protective Equipment

The following is the list of safety gear and personal protective equipment mentioned under the SafaiMitra Surakshit Shehar Protocol with their frequency of restocking after use by SafaiMitras.

Safety gear

Sr. No.	Item name	Representative diagram	Key information
1	Safety Tripod Set		Safety harnesses must be inspected carefully before each use. Fabric belts should not be used if the outer plies are cut or worn through or if there are any signs of chemical damage. All belt hardware must be inspected and replaced if it shows any sign of wear. If the belt is riveted, each rivet should be examined separately. The lifeline must be carefully inspected for any sign of damage or wear. If in doubt, replace the rope. Be sure that the lifeline is securely attached to the D-Ring of the belt. Be sure that the tie-off point is of adequate strength. Source: IS 3521: 1999

Sr. No.	Item name	Representative diagram	Key information
2	Nylon Rope Ladder		Rope ladders shall be tested at least once a month. Close visual inspection is preferred to load testing. All ladders shall be carefully inspected, if incidentally dropped or otherwise damaged in use. Immediate replacement in case defects are found. <i>Source: IS 3696 (Part 2): 1991</i>
3	Blower with Air Compressor		Due to ageing of the compressors and inherent inefficiencies in the internal components, the free air delivered may be less than the design value, despite good maintenance practices. For example, a worn out compressor valve can reduce the compressor capacity by as much as 20 per cent. The following considerations are to be considered while inspecting to replace compressor with air blowers: - Inspect and clean air filters on weekly basis. Replace air filters based on suction air conditions. - Inspect and remove fouling of inter-cooler and after-cooler to ensure optimum performance air compressors on quarterly basis. - Inspect the compressor for vibration and noise level on quarterly basis. - Undertake overhauling of air compressors on a periodical basis, as recommended by Original Equipment Manufacturers (OEMs). <i>Source: Bureau of Energy Efficiency, Energy Conservation Guidelines for MSME Sector</i>
4	Gas Monitor (4 gases)		The set shall carry warranty for not less than 2 years including sensors. The supplier has to provide ON-SITE calibration of the detector once every 6 months (i.e. total 4 calibrations- at the end of 6 months, 12 months, 18 months and 24 months respectively). <i>Source: NRDF; Specification of 139 High Value Equipment</i>
5	Full Body Wader Suit		Full body wader suit can be used for a period of 3-5 years depending on frequency of use and maintenance. <i>Source: Ministry of Home Affairs; Qualitative Requirements Specification Clothing Requirement</i>

Sr. No.	Item name	Representative diagram	Key information
6	Gas mask + Breathing apparatus		Inspect the respirator before and after each use and during cleaning. Inspect equipment designated for "emergency use" at least monthly, and before and after each use. Replace all parts that are cracked, torn, broken, missing or worn. <i>Source: Canadian Center For Occupational Health and Safety; Personal Protective Equipment; Respirator Care</i>
7	Safety Body Harness		Safety harness must be inspected carefully before each use. Fabric belts should not be used if the outer plies are cut or worn through or if there is any sign of chemical damage. All belt hardware must be inspected and replaced if it shows any sign of wear. If the belt is riveted, each rivet should be examined separately. The lifeline must be carefully inspected for any sign of damage or wear. Periodic inspection of safety harness to be conducted by competent person once in 12 months as per manufacturers' instruction. <i>Source: Oil Industry Safety Directorate; Personal Protective Equipment OISD- Standards- 155</i>
8	Air Line Breathing Apparatus		Air Line Breathing Apparatus must be taken out of service after 15 years. Air cylinders must be tested every 5 years.

Personal Protective Equipment (PPE)

Sr. No.	Item name	Representative diagram	Frequency for restocking
1	Safety Body Clothing		To be replaced after 25 washes. <i>Source: EN ISO 20471</i>
2	Reflecting Jacket		Replacement to be made after every 6 months, if worn on a daily basis. <i>Source: ANSI/ ISEA 107-2020</i>

Sr. No.	Item name	Representative diagram	Frequency for restocking
3	Safety Helmet		Safety helmets are to be replaced which has resisted an impact. Safety helmets can be replaced every six months. <i>Source: EN 397</i>
4	Safety Gumboots (pair)		Safety gumboots are to be replaced within 2 years since the date of manufacturing. <i>Source: ASTM 2413-05</i>
5	Normal Face Mask + Hand gloves (pair)		Normal face mask must be replaced once in 15 days (Source: IS 9473: 2002) and hand gloves (pair) must be replaced after 3 months of use (Source: EN ISO 94374: 2002).

Guidance Document on Equipment & Workforce Norms for Managing Waterborne Sanitation in India



Importance of preventative health screening of de-sludging workers

The health challenges faced by sanitation workers are multifaceted, influenced by the nature of their tasks, duration of exposure, workplace conditions, pre-existing health conditions, and lifestyle factors such as nutrition and rest. Common health issues include, but not limited to:

6.14. Utility of the Health Screening

Routine health screening of sanitation workers is one of the key strategies to develop an early detection and mitigation mechanism to prevent diseases from turning life-threatening. Govt. of India's Department of Health and Family Welfare in its letter no. 190107/69/2017-NUHM, dated 17 January 2018 suggested to the states and union territories to set up health camps for urban sanitation workers 'in view of health risks on account of nature of their duties'.

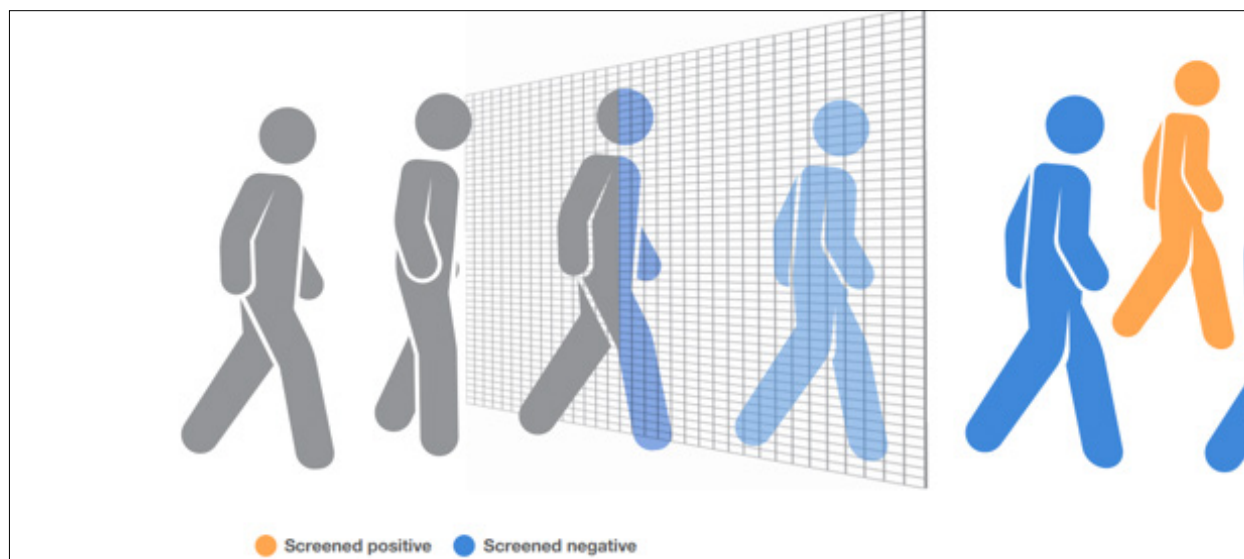


Figure 29 : Health screening of sanitation workers. Yellow indicating workers that have been screened positive for disease.

Health screening of the sanitation workers in urban India is significant and has the policy level backing that is enough to institutionalise it.⁸ Among the prevalent labour laws, The Factories Act, 1948, denotes the responsibilities of employers towards annual health check-up of employees, especially in hazardous working conditions. It stipulates one round of health check-ups at the time of appointment, followed by repeats once every 12 months.⁹ Occupational Safety, Health and Working Conditions Code 2020, in its section III, clause 6(C) protects the rights of workers free of cost annual health check-ups.

Importance of preventative health screening of de-sludging workers

The health challenges faced by sanitation workers are multifaceted, influenced by the nature of their tasks, duration of exposure, workplace conditions, pre-existing health conditions, and lifestyle factors such as nutrition and rest. Common health issues include, but not limited to:

Table 12: Range of occupational diseases faced by sanitation workers

Category	Conditions
Chronic Diseases	Anaemia, respiratory disorders, kidney diseases, cardiovascular conditions, liver ailments
Musculoskeletal Disorders	Repetitive strain injuries, osteoarthritic changes, intervertebral disc herniations
Infectious Diseases	Hepatitis, leptospirosis, infections caused by Helicobacter from direct waste exposure
Acute Risks	Fatal incidents due to toxic gas exposure, structural failures like pit collapses
Dermatological Conditions	Skin ailments from prolonged contact with waste

As per the SOP for Cleaning of Sewers and Septic Tanks, CPHEEO, persons considered for employment in confined spaces shall be physically fit and capable of understanding training given. Those with the undernoted disabilities shall not be recruited for this type of work, and those who contract these should cease to be employed in this capacity:

- Fits, blackouts or fainting attacks, heart disease or disorder;
- High blood pressure;
- Asthma, bronchitis or a shortness of breath on exertion;
- Deafness;
- Meniers disease or disease involving giddiness or loss of balance;
- Claustrophobia or nervous or mental disorder;
- Deformity or disease of the lower limbs limiting movement;
- Chronic skin disease;
- Serious defects in eyesight; and
- Lack of sense of smell.

6.14.1. Types of health screening frequency

Health screening may be conducted through various modes, including health camps organized at hospitals, community venues, or through Mobile Medical Units (MMUs). Individual health check-ups can also be facilitated at designated healthcare facilities, either under general healthcare provisions or through insurance schemes such as Employees State Insurance (ESI).

1. Planning and preparation

Micro-planning is essential with detailed schedules outlining screening dates, locations, and participant attendance. Adequate resources, including medical equipment, must be procured. Collaborations with local health authorities, medical colleges, or NGOs can enhance the programme by providing expertise in general medicine, pulmonology, orthopaedics, psychiatry, dermatology, and occupational health. Urban Primary Health Centers (UPHCs) should be mobilised to provide additional support, and adequate personnel, infrastructure, and budget allocations should be secured.

2. Participant instructions

For tests requiring fasting, overnight fasting is necessary, along with abstinence from alcohol and tobacco. Regular medications should be continued unless advised otherwise, with prior consultation regarding any impact on test results. On the day of screening, participants should arrive on time, bring relevant past medical records to discuss with healthcare providers.

3. Screening approaches

Screening may be conducted on-site at existing healthcare facilities, providing a cost-effective and routine method of assessment. Mobile Medical Units (MMUs) offer flexibility and outreach capabilities. Specialized camps can be organized to address specific health concerns, tailored to worker profiles and local epidemiological trends.

4. Post-screening activities

Following the screening, health records must be maintained. Workers requiring further evaluation or treatment should be referred to appropriate healthcare providers. Feedback should be collected from participants and healthcare providers to assess the effectiveness of the screening initiative and identify areas for improvement.

6.15. Reporting and Incident Management

All incidents, including near-misses, gas exposure, equipment failures, and unauthorised manual cleaning, must be documented and reported to relevant authorities, with Urban Local Bodies (ULBs) maintaining a centralised database for enforcement and accountability.

Employers must strictly prohibit hazardous manual cleaning as mandated by the Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013 and ensure that all sewer and septic tank cleaning operations are conducted using mechanised equipment. They must provide workers with protective gear, gas detectors, safety harnesses, and regular occupational safety training, along with periodic medical checkups and life insurance coverage.

Additionally, individuals and households must engage only authorised agencies for cleaning, report any instance of unauthorised manual cleaning to local authorities, and ensure a safe working environment for sanitation workers. Failure to comply with safety regulations must result in strict legal and administrative action to eliminate hazardous cleaning practices and uphold the dignity and safety of sanitation workers.

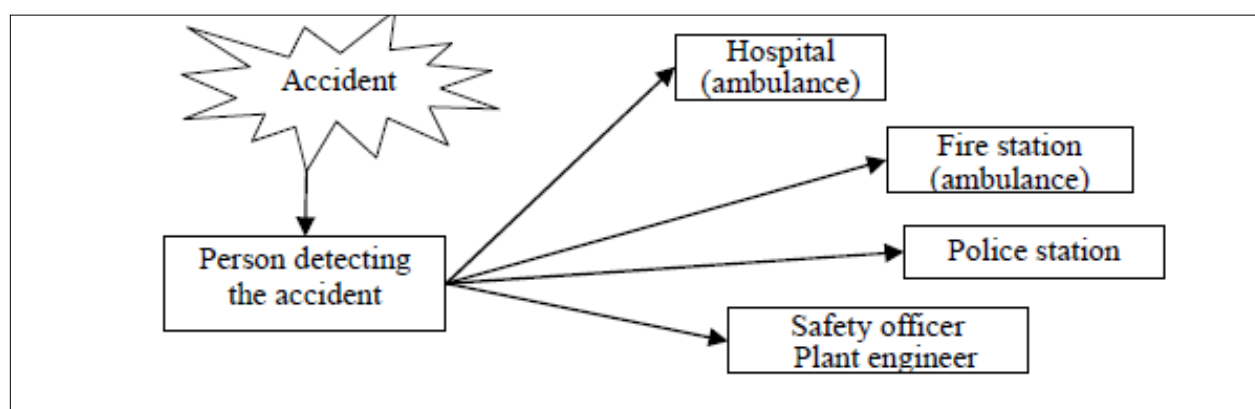


Figure 30 Incident Management and Reporting

Source: CPHEEO, 2012

6.16. First Aid during Desludging of Septic Tanks

Desludging workers face unique occupational hazards that require immediate and appropriate first aid interventions. The nature of their work—handling faecal sludge, operating heavy equipment, and working in confined spaces—exposes them to injuries, toxic gases, and environmental risks. This guide outlines key emergencies encountered in de-sludging operations and the first aid measures necessary to prevent fatalities and reduce injury severity.

1. Toxic Gas Exposure and Asphyxiation

- **Emergency:** Workers opening septic tanks or working in enclosed spaces are at high risk of exposure to hydrogen sulphide (H₂S), methane, and carbon monoxide. Inhalation of these gases can lead to dizziness, nausea, unconsciousness, or death.
- **First Aid Response:**
 - a. Do not enter the septic tank without proper protective gear and ventilation.
 - b. Call for emergency help and alert the fire rescue department if a worker is unconscious.
 - c. If safe, remove the worker from the contaminated area while minimizing exposure.
 - d. Ensure the worker has access to fresh air and loosen tight clothing.
 - e. If unconscious and not breathing, begin CPR immediately.
 - f. Transport the worker to a medical facility without delay

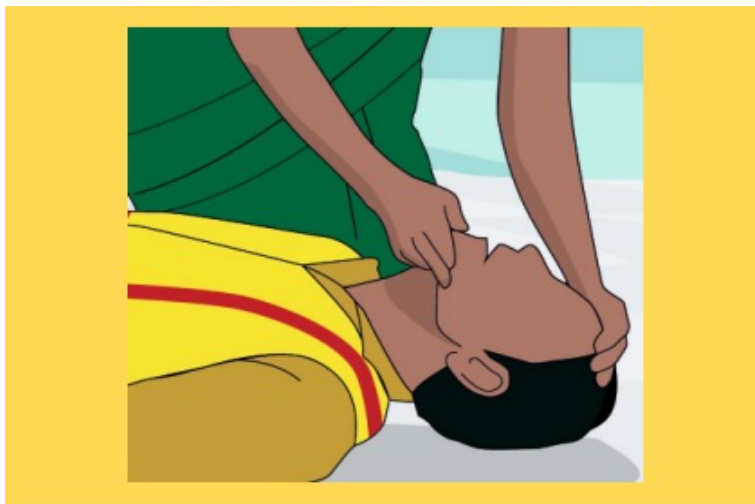


Figure 31. First-aid for De-sludging Worker.

(Source: IIHS, 2022)

2. Falls and Fractures

- **Emergency:** Workers may fall from ladders, trucks, or while mounting and dismantling hoses and septic tank covers. Falls can cause fractures, sprains, or head injuries.
- **First Aid Response:**
 - a. Immobilise the injured area using a splint or a triangular bandage.
 - b. Avoid moving the worker if a spinal injury is suspected.
 - c. Apply a cold pack for swelling and pain relief.
 - d. If bleeding, apply pressure using sterile gauze but avoid excessive movement.
 - e. Transport the worker to a healthcare facility for further evaluation.

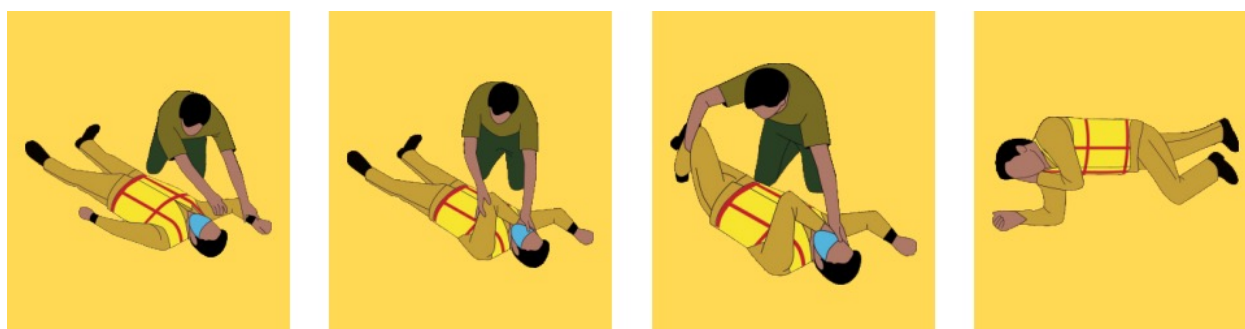


Figure 32. First-aid steps for Desludging worker.

Source: IIHS, 2022

- **Emergency:** Workers in outdoor environments may encounter snakes, stray dogs, or insects that pose a risk of envenomation or infection.
- **First Aid Response:**
 - a. Keep the worker calm and immobilise the affected limb to slow venom spread.
 - b. Do not attempt to suck out venom or apply ice.
 - c. Clean the wound with soap and water.
 - d. In case of severe allergic reactions, monitor for breathing difficulties and be prepared to perform CPR.
 - e. Seek immediate medical help, especially for suspected rabies or venomous bites.

3. Eye Injuries from Chemical or Debris Exposure

- **Emergency:** Splashing sludge, dust, or chemicals can cause eye irritation, burns, or vision impairment.
- **First Aid Response:**
 - a. Rinse the eye immediately with clean water for at least 15 minutes.
 - b. Do not rub the eye or attempt to remove embedded objects.
 - c. Cover the eye with a clean pad and seek medical attention.
 - d. If exposed to chemicals, continue rinsing and refer the worker to a medical professional

4. Suffocation and Confined Space Incidents

- **Emergency:** Workers may experience suffocation due to poor ventilation, oxygen depletion, or collapse inside septic tanks.
- **First Aid Response:**
 - a. Do not enter the space without proper protective equipment.
 - b. Call emergency services immediately.
 - c. If safe, attempt to ventilate the area and use a rope or pole to pull the worker out.
 - d. Check for breathing and begin CPR if necessary.
 - e. Transport to a medical facility immediately.

5. Burns and Skin Exposure to Contaminants

- **Emergency:** Contact with chemical substances or overheated equipment can cause burns or skin reactions.
- **First Aid Response:**
 - a. Flush chemical burns with cool running water for at least 20 minutes.
 - b. Cover thermal burns with a clean, non-adhesive dressing.
 - c. Do not apply ointments, ice, or break blisters.
 - d. Remove contaminated clothing carefully.
 - e. Seek medical care for severe burns.

6. Heat Stress and Dehydration

- **Emergency:** Working long hours in hot weather can lead to dehydration, heat exhaustion, or heat stroke.
- **First Aid Response:**
 - a. Move the worker to a shaded or cool area.
 - b. Provide water in small sips; avoid caffeinated drinks.
 - c. Cool the worker with damp cloths or fanning.
 - d. If symptoms worsen, such as confusion or loss of consciousness, seek emergency medical care.



First Aid Training Manual for De-sludging Workers, Indian Institute For Human Settlements



6.17. Case Study: PPE Standardization, Procurement, And Training Of Sanitation Workers, Odisha, Telangana & Maharashtra

Objective:

To ensure sanitation workers have access to job-specific PPE as per government guidelines and to raise awareness about its importance and proper usage through workshops and handbooks.

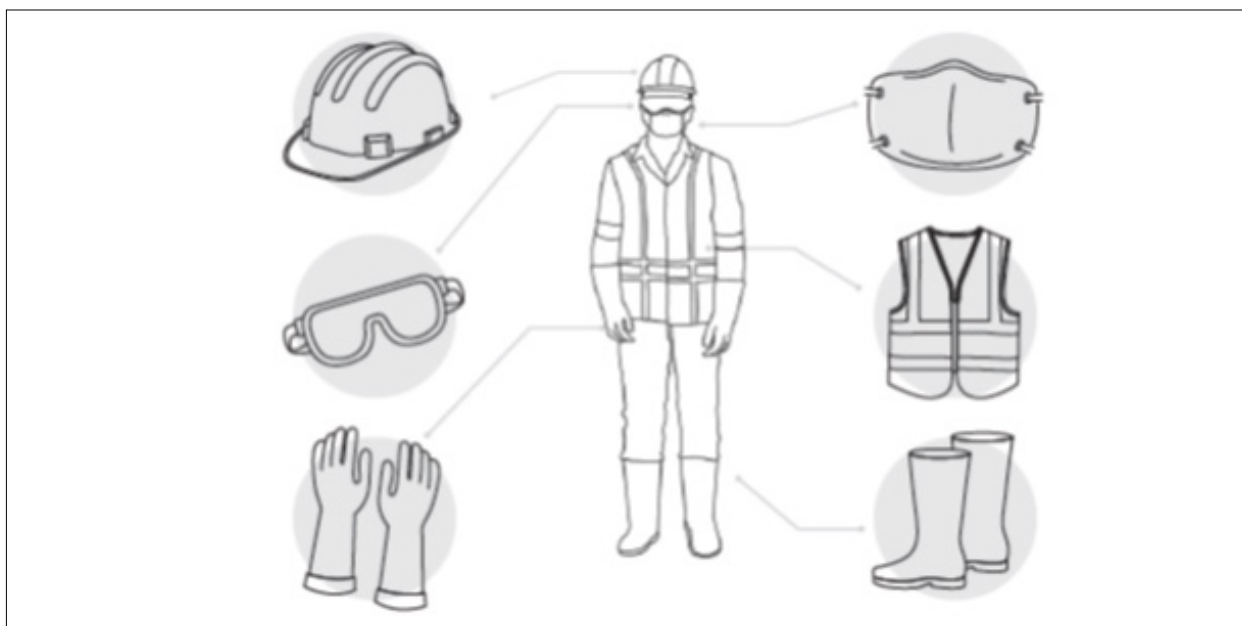


Figure 33 Sanitation Workers Mandated PPE kit

Intervention

The intervention was carried out in following stages:

- A detailed study was carried out in consultation with the sanitation workers to prepare a comprehensive list of PPE required, cross-referencing it with the specified standards and with the products available in the market.
- PPEs were procured and distributed through the technical partner, to sanitation workers (400 workers in Telangana, 1549 in Odisha, and 120 in Wai), taking into account gender and size specifications of the users.
- Feedback was collected from sanitation workers on the challenges of using PPE. This was used to modify the designs and customize future procurement patterns in consultation with the manufacturers.
- Illustration-based training handbooks¹ were prepared in the local language to depict the right method of wearing (donning), removing (doffing), maintaining, and disposing of different kinds of PPEs. The same were distributed to all the sanitation workers for future reference.
- Training workshops were conducted on the usage of PPEs with live demonstrations of the correct order for wearing PPEs and their safe disposal after the work.

Impact

A positive shift in outlook was observed towards the use of PPEs as workers became more aware of the benefits of doing so. This resulted in increased uptake of PPEs among sanitation workers, especially when provided with good quality and well-fitted PPEs.

Challenges

Regular and continuous dissemination of information regarding the right way to wear and dispose PPEs, with a regular monitoring system would be necessary to ensure continued usage among the sanitation workers.

Trainer's Note

Introduction

The trainer welcomes participants and introduces the session by emphasising the critical role played by de-sludging workers—often referred to as Safaimitras—in urban sanitation systems. Despite their essential contribution, these workers are frequently exposed to hazardous working conditions and systemic neglect.

Participants are informed that the session aims to equip them with the knowledge and tools necessary to understand occupational risks, apply safety standards, and advocate for protective measures in their work environments.

Contextualising the work environment

The trainer explains that in India, over 90% of cities depend on on-site sanitation systems such as septic tanks. Mechanical de-sludging has become a widespread but informal service sector becoming predominant, especially in small and medium towns. However, de-sludging continues to be performed with limited regulation, protection, and awareness.

To bring this context alive, the trainer narrates a generic workday of a desludging operator—from receiving a service call to navigating unplanned terrain, opening septic tank lids, and handling faecal sludge—without proper tools or safety measures. The story reflects real conditions reported across multiple cities and serves to initiate empathy and critical reflection among the trainees.

Occupational Hazards and Risk Mapping

The trainer introduces the four primary categories of occupational risks:

- **Physical Hazards** (e.g., falls, sharp objects, collapsing slabs)
- **Chemical Hazards** (e.g., toxic gas inhalation from H₂S, CH₄)
- **Biological Hazards** (e.g., exposure to pathogens causing leptospirosis, hepatitis)
- **Ergonomic Hazards** (e.g., musculoskeletal strain due to bending, lifting)

The trainer uses a visual aid (hazard mapping chart or diagram) to trace risks at each stage of the work cycle—preparation, desludging, confined space entry, and decanting.

Suggested Activity

Trainees annotate a printed work cycle map, identifying risks they have experienced and correlating them to the hazard types.

Legal and policy protections

The trainer outlines the key provisions of the Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013, and the CPHEEO's Standard Operating Procedure (SOP).

The trainer emphasises that manual entry into a septic tank is legally permitted only:

- When mechanical equipment fails,
- With written approval from the CEO of the local authority, and
- After provisioning, complete PPE and emergency response mechanisms.

The trainer further highlights state-level initiatives such as the **Safaimitra Surakshit Shehar Protocol** and the concept of **Emergency Response Sanitation Units (ERSUs)**.

Tools, equipment, and demonstration

Participants are introduced to key safety gear: gas detectors, full-body wader suits, breathing apparatus, safety harnesses, gumboots, and helmets. The trainer explains their function, frequency of inspection, and proper usage.

Suggested demonstration:

The trainer displays various PPE items and conducts a quick inspection demonstration. Participants are asked to identify missing or damaged parts.

Suggested game:

“PPE Relay” – Small groups race to correctly assemble a basic PPE kit from a mixed pool of equipment.

Health risks and screening

The trainer explains the need for routine health screening, referencing policy mandates from the Ministry of Health and Labour Codes. The most common conditions found among de-sludging workers include respiratory illnesses, skin infections, gastrointestinal diseases, musculoskeletal disorders, and chronic fatigue.

The trainer reinforces that annual check-ups are a legal right and a necessary preventive measure. Mobile Medical Units (MMUs), health camps, or UPHC tie-ups can help facilitate screenings.

Emergency response and first aid

The trainer walks participants through first aid measures for high-risk situations such as:

- Toxic gas exposure and asphyxiation
- Falls and fractures
- Chemical eye injuries
- Animal or snake bites
- Burns and skin exposure
- Heat stroke and dehydration

Suggested activity:

Role-play simulation on rescuing a worker exposed to gas inside a septic tank, including emergency call-out, CPR steps, and safe extraction.

Case study reflection

The trainer shares key findings from the IIHS study titled "De-sludging Operators: An Assessment of Occupational Safety in Two Cities." The case study illustrates systemic issues, unsafe behaviours, and opportunities for intervention through design modifications, training, and behaviour change communication.

Suggested group activity:

Participants are divided into small groups and given short excerpts from the study. Each group presents the risks and solutions discussed in their section.

Behaviour change and advocacy

In closing, the trainer emphasises that real change comes not only from gear or laws but from behavioural transformation—both among workers and employers. The trainer encourages workers to:

- Refuse unsafe work conditions
- Demand PPE and SOP compliance
- Engage in peer education and support

The session ends with a **reflection round**, where each participant shares one safety action they plan to implement or advocate in their workplace.

07

Practical Demonstration



Trainers are advised to select one activity that is most appropriate to the local context and site-specific conditions.

7.1. Activity 1: Spot, Map & Equip: Ensuring Safe De-sludging in India

A Live Simulation to Build Safety Leadership in Urban Sanitation

- In cities across India, the buzz of suction machines and the clanking of hoses are becoming familiar urban sounds. Under the Swachh Bharat Mission (SBM) and the NAMASTE initiative, mechanised desludging is scaling fast. Yet, beneath this surface of technical efficiency lies a sobering truth — sanitation workers, often from the most marginalised communities, continue to risk their lives daily due to unsafe practices and weak regulatory oversight.
- This is not just a policy challenge — it's a leadership one. We need public officials who can see the risk, feel the hazard, and act with urgency.
- To address this, we've reimagined traditional training into an immersive, high-energy, zone-wise safety simulation called "Spot, Map & Equip" — a real-time, interactive game that places officials right in the middle of the desludging workflow. It is experiential, gamified, and anchored in the lived complexity of the Indian sanitation landscape.

- **Why a Game?**

- Reason being - memorising SOPs is not enough. When a worker climbs into a septic tank with no harness or gas monitor, or when a suction pipe snakes through a crowded alley without traffic cones, the risk becomes real instantly.
- We need supervisors and engineers who don't just enforce compliance on paper, but who can anticipate these hazards based on local context. This simulation lets officials embody that role, zone by zone.

- **The Game Format: "Spot, Map & Equip"**

Inspired by real desludging operations conducted by both government and private operators across states like Tamil Nadu, Odisha, and Maharashtra, this game simulates a full desludging cycle. From navigating chaotic streets with a suction truck to managing hazardous septic tank entry, officials play the role of safety auditors-in-action.

- **The Zonal Setup**

Participants are split into four teams. Each team is assigned one zone from the desludging process. Every zone recreates a real-life worksite with planted risks and hazard cues.

- **The Four Zones:**

Zone 1: Preparation & Transit

Example: This zone focuses on primary vehicle checks, hose security, PPE, and traffic safety. Hazards include missing seatbelts, bare feet, and unsecured pipes.

Zone 2: On-Site Operations

This zone simulates arriving at a client site, inspecting septic tanks, and ensuring gloves, masks, and gas monitors are in use. Hazards include bystanders in proximity, poor hose handling, and incomplete PPE.

Zone 3: Entry into Septic Tank

This zone teaches confined space protocols: tripod, harness, gas monitor, escape set. Hazards include no tripod, lone worker, inactive gas monitor.

Zone 4: Decanting & Disposal

This zone mimics decanting at treatment facilities, where officials must enforce hygiene and disposal safety. Hazards include lack of disinfectant use, unsafe gear disposal, and fee non-payment.

Each zone is equipped with planted clues, props, and missing tools designed to trick the players – but also teach them.

■ The Activity Flow

1. Hazard Hunt (10 minutes/team):

Each team must identify five hazards in their zone. They log each with a hazard report sheet and capture a “fix recommendation” – the correct tool, behaviour, or PPE.

2. Safety Pitch (5 minutes/team):

Teams return and present their findings as a “Safety Debrief” – showing:

- Hazard found
- Why it's dangerous
- Zone mapping
- Correct mitigation (with real PPE/tool demo)

The twist? They must also invent a catchy “Safety Slogan” (e.g., “No Gloves, No Love!” or “Gas First, Man Last!”)

3. Final Reflection:

The facilitator walks participants through how these scenarios mirror real-life accidents or near misses – linking each zone’s lessons back to India's sanitation worker safety codes.

Zone	Hazard/Risk Clue	Fun Element
Zone 1: Preparation	Driver not wearing seatbelt	Add a flashing “Risk Detected!” tag
	Hose loosely tied to truck	Add sound of rattling hose if touched
	No traffic cone behind truck	Add a “road hazard” cutout driver might hit
	Perching on top of vehicle	Add a flashing “Risk Detected!” tag
	Assistant barefoot	“Step-on-a-tack” hidden to simulate hazard
Zone 2: On-Site De-sludging	No gas monitor check before suction	Add dramatic “gas alert” card nearby
	Operator without gloves	Dirty hands props add visual risk
	Hose directly inside tank without secure lid	Splash sound cue or water balloon nearby
	No use of barrier cone	Add a “Caution: You’re in the zone!” sign
	Operator without helmet	Add a cartoon-style “falling tool” above
Zone 3: Entry into Septic Tank	No tripod setup	Dramatic “DANGER: Confined Space” banner
	Gas monitor not switched on	Hidden “gas explosion” card if entered
	No standby worker	Place “Lonely Worker” sticker
	No harness on entrant	Create a “fall zone” chalk outline
	No escape set nearby	Add a mock “emergency missed” alarm
Zone 4: Decanting & Disposal	No gloves during decanting	Add a splash card with red dye
	Not paying decanting fee	Add a mock “fine receipt” on spot
	Operator spraying without goggles	Add a “chemical splash” sticker
	Using bare hands to clean hose	Add UV glitter on rag for contamination check
	PPE dump on ground post-process	Add a “Clean Zone Violated” alert flag

Resources Required (for 30 Participants)

Resource Type	Item	Quantity	Purpose
Human resources	Desludging Operator (Govt or Pvt)	1 team	To provide equipment, real insights, and simulate realistic zone staging
Hazard Props & PPE	Full PPE Kit (helmets, gloves, boots, vests, goggles, masks)	4 full sets (1 per zone) + extras for demo	To demonstrate correct safety responses
	Hazard Clue Cards	20 (5 per zone)	E.g., "No Gloves!", "Monitor Off", "Tripod Missing"
	Safety devices	As per SOP	Gas monitor, suction hose, tripod, blower, cone, etc
	Splash Material (glitter, water, dye)	As needed	Simulates wastewater for Zone 2/4
Participant Material	Hazard Reporting Sheet	30	For noting down observed risks
	Timer or Stopwatch	1	To manage 10-min/5-min rounds

Partnerships & Desludging Operator Support

This simulation is most powerful when co-facilitated by those who do this work daily. Their role includes:

- Supplying real hoses, suction units, gas monitors, and PPE
- Helping stage zones to mimic live sites
- Sharing field stories to deepen the learning impact

Final Reflection: Why It Matters

This isn't a game just for fun. Behind every missing glove or ignored protocol lies the memory of someone who suffered — often a worker who was invisible to systems.

When an engineer holds up a harness and says, "This could save a life," they aren't roleplaying. They're stepping into the role of protector, policymaker, and public leader.

India's sanitation revolution needs more than machines. It needs people who care enough to spot what's broken — and fix it.

7.2. Activity 2: Hazard Management for CT/PT Workers

Objective: Strengthen the capacity of participants community and public toilet workers to identify hazards, assess risks, and select appropriate control measures that improve health and safety of sanitation workers engaged in community and public toilet.

- **Time Required: 45 to 60 minutes**
- **Materials Required: Hazard Management Tool template (Page 35), pens, charts**
- **Instructions for Trainers**
 1. Form small groups of 4 to 6 workers.
 2. Assign each group one primary CT/PT work responsibility:
 - Daily cleaning of toilet blocks and floors
 - Waste and sludge handling inside the toilet premises
 - Water supply management and cleaning storage tanks
 - Hygiene service delivery to users (including menstrual waste handling)
 3. Provide the Hazard Management Tool template for group-based work.

■ Step-by-Step Activity

Step 1. Understand the Assigned Task (5 minutes)

- Each group lists the specific activities involved in their assigned responsibility.
- Example activities: mopping, handling blocked pans, collection of solid waste, operating wash-down hoses, user interaction.

Step 2. Identify Workplace Hazards (10 minutes)

- List a minimum of five hazards directly linked to their work.
- Encourage participants to reflect across these categories:
 - *Physical hazards:* Slippery floors, falls on wet surfaces, sharp objects in waste, electrical shocks from pump or lighting
 - *Chemical hazards:* Toilet cleaning acids, bleaching agents, irritation from phenyl
 - *Biological hazards:* Direct contact with urine, faeces, menstrual waste, flies and rodents, fungal skin infections
 - *Ergonomic hazards:* Long hours of bending, heavy buckets, repetitive scrubbing, prolonged standing
 - *Psychosocial hazards:* Stigma from users, verbal abuse, stress due to understaffing or night-shift work

Step 3. Assess Risk Level (10 minutes)

- Rate each hazard:
 - *Probability:* Low, Medium, High
 - *Severity:* Minor, Moderate, Major

The trainer supports groups with realistic examples from their daily experience.

Step 4. Recommend Control Measures (15 minutes)

Groups select practical control actions using the Hierarchy of Controls:

- **Elimination:** Closed bins for menstrual waste to avoid manual handling
- **Substitution:** Use of less corrosive bathroom cleaners
- **Engineering controls:** Anti-skid tiles, safe wiring and lighting, hand-washing stations for workers, covered drains
- **Administrative controls:** Clear duty rosters, hygiene breaks, regular OSH awareness sessions, dedicated changing and storage space for uniforms
- **PPE:**
 - Gloves, boots, waterproof aprons, masks, goggles as required
 - Groups document their decisions in the template.
 - **Group Sharing and Discussion (10 minutes)**
 - Each group presents:
 - » Their task and key hazards
 - » One high-risk hazard and its consequences
 - » Best control measure and the reason it is most effective

The trainer encourages recognition of common patterns across CT/PT workplaces.

■ Reflection and Key Takeaways

- Reinforce safe housekeeping and routine PPE usage
- Emphasise immediate reporting of hazards such as broken electrical fittings or damaged cleaning equipment
- Highlight collective safety, respect, and dignity in sanitation service roles

08

Safety Aspects for Treatment Facility Workers



8.1. Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 2	Day 1 Recap	30
2		Presentation	30
3		Questions & Discussion	10
Total			70

8.2. Learning Objectives

1. Identify health and safety risks across the treatment facility work cycle and understand their impact on operators and plant performance.
2. Understand and implement OHS procedures, including proper use of PPE, reporting hazards, responding to emergencies, and providing First aid
3. Ensure safety by using proper tools, protective gear, and emergency plans

8.3. Key Takeaways

1. Comprehensive understanding of health and safety risks specific to treatment facility operation
2. Incorporating Do's & Don'ts into the O&M cycle of plants
3. Competence in training workers on emergency response and basic First aid
4. Promote best practices for safety control implementation in the workplace

8.4. Understanding the Work Environment and Health Risks

The workers working in used water management play a critical role in managing the treatment of used water and faecal sludge (FS). These operators are responsible for overseeing the efficient functioning of treatment processes, ensuring the effective management of waste inflow, monitoring treatment parameters, and ensuring compliance with environmental regulations. The operation of such plants exposes workers to a variety of hazards, necessitating the implementation of robust safety protocols to protect their health and safety.

8.4.1. Typical Duties and Responsibilities

Key responsibilities of workers include:

1. **Monitoring Treatment Processes:** The treatment facility operators are responsible for maintaining the parameters within optimal ranges (e.g., pH, temperature, chemical concentrations) to ensure effective used water treatment.
2. **Used water Inflow Management:** Operators ensure the correct processing of wastewater or faecal sludge and monitor inflow rates.
3. **Maintenance of Equipment:** Regular checks and maintenance of plant equipment (pumps, motors, mixers, and valves) are critical to avoid breakdowns and ensure continued safe operations.
4. **Data Recording and Reporting:** Operators must maintain detailed records of treatment processes, inflow data, chemical usage, and maintenance activities.
5. **Safety Inspections:** They are also responsible for conducting regular safety inspections of the plant, identifying hazards, and ensuring all safety protocols are followed.

8.4.2. Stages of Work Cycle

The work cycle for workers typically follows these stages:

1. Preparation: Before commencing any work, operators inspect the plant's equipment and ensure that all machinery is in good working condition. This also involves ensuring that the appropriate PPE is available and used.
2. Operational Monitoring and Treatment: Operators continuously monitor the treatment stages, adjusting chemical dosages and system controls as required to maintain optimal treatment conditions.
3. Maintenance and Troubleshooting: This stage involves regular inspections and the repair of malfunctioning equipment, ensuring smooth plant operations.
4. Wastewater Disposal: After treatment, operators manage the safe disposal or further use of the treated effluent, ensuring compliance with environmental standards.



Figure 34. Aerial View of Biological FSTP at Idappadi, Tamil Nadu.

Source: IIHS, 2024

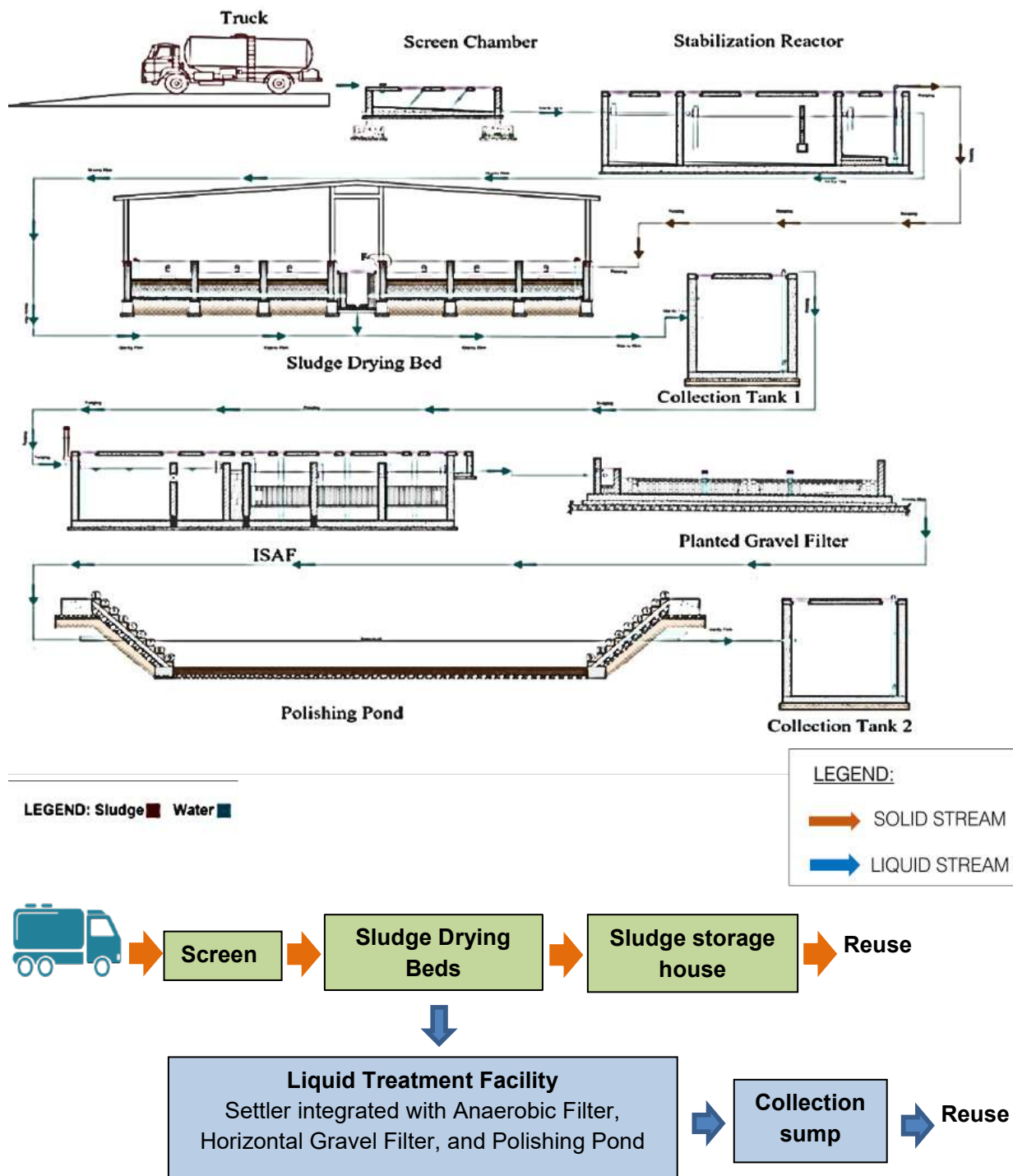
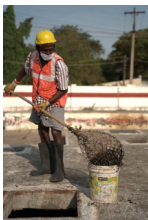


Figure 35. FSTP Treatment Process Flow
 Source: IIHS, 2024

Table 13: Operation and Maintenance Task in the FST

	Component	Task	Frequency	Why	How	How	Precautions
	Screen Chamber	Cleaning	Daily	To avoid clogging and overflow	Open manholes, remove solids with a trowel, flush with water, clean bars, and cover manholes	Broom, trowel, bucket, gloves, mask, shoes	Wear gloves, a mask, and safety shoes. Do not spill solids outside the chamber. Ensure proper disposal of waste.
	Screen Chamber	Repaint/ Replace Screens	Every 3-4 years/when necessary	To prevent clogging and overflow	Remove, wash, repaint or replace screens, reinstall	Paintbrush, emery sheet, water pipe	Follow safety rules and avoid allowing sludge to enter the chamber during cleaning.
	Stabilisation Reactor (SR)	Sludge Conveying to SDB	Daily	To discharge sludge to the drying bed	Connect the hose from SR to SDB, start the pump, clean the hose, repeat	Gumboots, flexible pipe, gloves, mask	Wear appropriate PPE and ensure secure pipe installation to prevent spillage.
	Stabilisation Reactor (SR)	Scum Removal	Every 6 months	To avoid clogging and scum movement to the next chamber	Open the manhole, remove scum with a fishnet sieve, and transfer to the trash bin	Fishnet sieve, plastic bowl, trash bin	Follow safety rules; ensure proper disposal of scum.
	Stabilisation Reactor (SR)	Desludging	Annually	To provide retention time and ensure effluent quality	Use a sludge cutter pump, remove sludge, ensure no clogging, and restore flow if needed	Sludge cutter pump, flexible hose, gloves, mask	Follow safety rules; avoid clogging the pump.
	Sludge Drying Bed (SDB)	Removal of Dried Sludge	When dried/ sludge is visible	For next feeding	Wear gloves, collect dried sludge by hand, transport in wheelbarrow, dispose in storage house	Gumboots, wheelbarrow, gloves, mask, goggles	Wear gloves and a mask; avoid sand removal with dried sludge.
	Sludge Drying Bed (SDB)	Replace Filter Material	Every 5 years/ when necessary	To maintain flow efficiency	Remove sludge, replace or wash sand, ensure media is free from silt/clay, and replace if needed	Shovel, plastic sheet, brush, water	Follow safety rules; wear proper PPE, and clean hands thoroughly.

	Component	Task	Frequency	Why	How	How	Precautions
	Integrated Settler and Anaerobic Filter (IS & AF)	Ensure Free Flow of Water	Every 15 days	To remove obstructions and ensure free flow	Open man-holes, check the flow, and remove obstructions using steel wire and a sieve	Steel wire, steel sieve	Wear gloves and a mask, and ensure the safe disposal of debris.
	Integrated Settler and Anaerobic Filter (IS & AF)	Ensure Vent Pipe Functionality	Monthly	To avoid bad odour	Check for damages/ blockages in vent pipes, clear blockages, or contact the service provider	Brush, rod	Follow safety rules; ensure the vent pipe cowl is replaced after clearing blockages.
	Integrated Settler and Anaerobic Filter (IS & AF)	Check Sludge Level	Every 6 months	To ensure minimal sludge deposit and adequate retention	Measure the sludge level with a stick wrapped in cloth, and remove excess sludge if needed	Long stick, white cloth	Discard cloth after use; follow safety protocols.
 	Horizontal Planted Gravel Filter (HPGF)	Check the Swivel Pipe Level	Monthly	To maintain the desired water level in the filter	Check swivel pipe height, adjust if necessary, and inspect for leakage	Measuring tape, gloves	Follow safety rules; wear gloves and a mask.
	Horizontal Planted Gravel Filter (HPGF)	Weed Removal and Plant Trimming	Monthly or as needed	To prevent clogging and ensure plant growth	Remove weeds, trim plants, check for dead litter or excess growth	Garden scissors, gum boots, a sickle	Ensure no rodents/ snakes; follow safety protocols.
	Polishing Pond	Cleaning	Monthly	To ensure water quality and avoid odour	Remove weeds/litter manually, de-sludge, and clean pond walls/floor with a brush	Long shovel, bucket, wheelbarrow, trowel, pump	Wear gloves and a mask; follow safety rules during cleaning.
	General Tasks (Pumps)	Pump Operations	Daily/ when ever required	To ensure uninterrupted treatment system functioning	Operate pumps as per instructions, clean and maintain solar panels as directed by the service provider	-	Follow vendor guidelines; wear PPE while operating pumps.

	Component	Task	Frequency	Why	How	How	Precautions
	General Tasks (Pipes)	Check and Replace Broken Pipes	Monthly	To avoid leakages and ensure proper functioning	Inspect for pipe damage, replace broken pipes with correct specifications, and follow drawings	-	Follow safety rules; ensure safe handling of pipes.
	General Tasks (Structure)	Check and Repair Structural Damage	Monthly	To ensure system integrity	Inspect for structural damage, repair or replace damaged sections as per specifications	-	Follow safety rules; ensure safe handling of equipment.

Source: (IIHS, 2024)

Table 14: Summary of Hazards and associated risks for treatment facility workers

Hazard Category	Associated Hazard*	Associated Risk*
Physical	Wet or uneven surfaces	Slips, trips, and falls, fractures, sprains, contusions, or secondary infections from untreated wounds
		Risk of falling into treatment ponds, vats, or tanks or drowning
	Mechanical failures or moving equipment	Injuries from equipment malfunction, electrical shock, fires, cuts and pricks from sharp objects
	Excessive noise exposure	Loss of balance, distraction-related accidents, long-term hearing loss, tinnitus
	Working with pumps, motors, and control panels in wet environment	Electric shock, electrocution
	Working outdoors in extreme weather conditions	Heat disorders (e.g. heat syncope) and cold related disorders E.g.-Dry skin
Chemical	Handling of hazardous chemicals	Burns from spills or splashes; chemical burns, respiratory irritation, skin damage, long-term toxic effects
	Exposure to toxic gases or fumes	Immediate collapse or unconsciousness, respiratory illness, or poisoning, fatal
Biological	Contact with raw sewage or sludge without PPE	Gastrointestinal infections, respiratory diseases, or skin disorders
Ergonomic	Repetitive tasks, lifting heavy equipment, awkward postures	Muscle strain, back pain, injury, fatigue, or joint pain
Psychosocial	Social stigma, social exclusion, stressful work conditions	Discrimination and mental distress-anxiety, stress

Source: (IIHS, 2025)

Note: *There are numerous hazards and risks that could be identified; however, only important and select items have been listed here for ease of understanding.

Use the Table 13 to break down potential hazards and associated risks. Example: -

- **Raw sewage exposure:** Explain the infection risks and how to mitigate them by using proper PPE.
- **Chemical exposure:** Discuss the specific chemicals used in the treatment process (e.g., chlorine, coagulants) and their risks.
- **Confined spaces:** Teach operators about the risks of working in confined spaces, the importance of ventilation, and using gas detection devices.



Trainer's Note: Ask participants to share their experiences working in such environments and any safety concerns they may have encountered. This can open up a discussion on how to manage these risks effectively.

8.5. Safety Health and Emergency Response

8.5.1 Mitigation Measures and OHS Need

In the event of mishandling of septage, immediate actions must be taken to mitigate any risks (CWAS, 2020):

1. **Spillage:** If a spillage occurs, first check the pipe connections from the vehicle transferring the septage. Close the valve and reconnect the pipe to prevent further spillage. Any spilled material should be collected with a spade and returned to the SDB.



Figure 36. Protocol for management of spillages at site

Source: (IIHS, 2024)

2. **SDB Overflow:** Ensure that the SDB is only filled up to the red marking to avoid overflow. If the SDB becomes clogged and prevents filtrate from passing through, remove the top two layers (sand and gravel), dry them for a day, and then replenish them back into the SDB.
3. **High Water Levels in PGF:** If the water level in the Planted Gravel Filter (PGF) rises, activate the pump to remove excess treated water. This water should be directed to a storage tank or a designated gardening area.

4. **Sludge in PGF:** If sludge is found in the PGF, immediately stop the feeding of septage. Use suction machinery to remove the sludge from the Anaerobic Baffled Reactor (ABR) and transfer it to the SDB for further processing.

8.5.2. Types of PPE Required

Strainer, Shovel, Scraper, plastic/metal bowls, Wheelbarrows, Plank, Splash pad, Gum boots, Gloves, Apron, Mask, Plastic cover sheets/tarpaulin (CWAS, 2020).

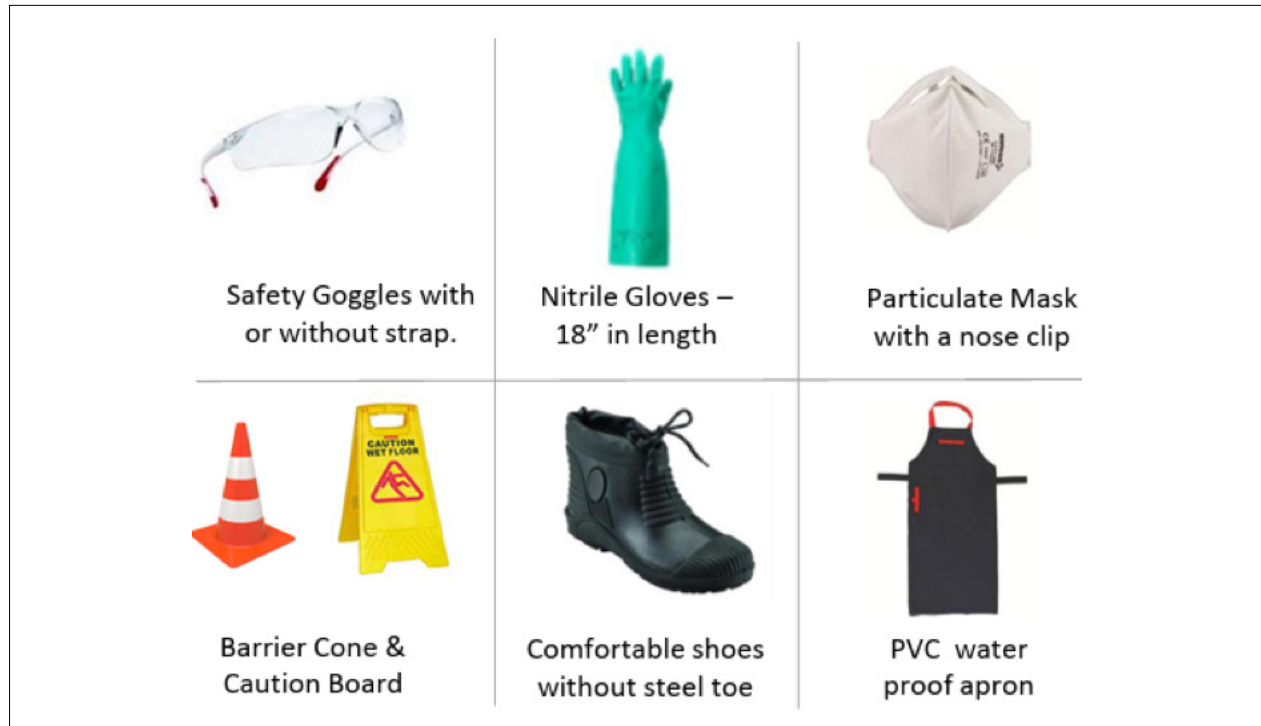


Figure 37. PPE Required for FSTP and STP Operator

Source: (UMC, n.d.)



Figure 38. Recommended good practices for FSTP Operators

Source: (IIHS, 2024)

8.5.3. Types of Tools and Machines Required

Operators require various tools and equipment see Figure 25 to ensure efficient and safe plant operations. Table 12 shows the detailed tools and equipment required for operation and maintenance activity. Usage of various tools and equipment that require specific safety protocols:

- **Chemical Dosing Systems:** Operators must be trained in the safe handling and application of chemicals such as coagulants, disinfectants, and flocculants.
- **Monitoring Instruments:** Operators should be trained in the proper use of instruments for measuring parameters such as pH, temperature, and chemical concentration.

Sl. No	Equipment Name	Image	Sl. No	Equipment Name	Image
1.	Bucket		11.	Measuring tape	
2.	Trowel		12.	Broom	
3.	Gloves		13.	Mechanised tiller and trailer	
4.	Mask		14.	Ladder	
5.	Shoes(Gum boots)		15.	Torch	
6.	Wheelbarrow		16.	Rake	
7.	Shovel		17.	First Aid kit	
8.	Garden Scissors		18.	Plastic Sheet	
9.	Wooden Pole		19.	Pressure Washer	
10.	Fishnet mesh				

Figure 39. List of Equipment Required for treatment plant operators

Source: IIHS, 2024

8.5.4. Safety Requirements

1. Personal Safety

- a. Precautions: Operators and labourers must be cautious of pathogens in fecal sludge (IIHS, 2024).
 - Wear clean uniforms, work boots, face masks, gloves. Wash and disinfect hands after work and before meals.
 - Shower after work, avoid dirty clothes in the office and take prescribed vaccinations (tetanus, leptospirosis, deworming).
 - Alcohol and smoking are prohibited on premises.
 - Avoid sandals/open-toe shoes; wear rubber/leather boots in contact areas.
 - Ensure aeration in confined spaces (manholes, treatment modules); do not enter without proper equipment or rescue personnel.
 - Use long rubber gloves, safety shoes, and gas masks when handling sludge or entering treatment modules.



Figure 40. Safety Precautions.

Source: IIHS, 2024

2. Site Precautions

- a. Storage and Handling:
 - Store materials (pipes, spare parts) neatly and securely to prevent accidents.
 - Safely dispose of junk parts and label spare parts.
 - Adhere to "No Smoking" signs and proper lifting protocols.
 - Use appropriate, well-maintained tools for tasks, with proper lighting in indoor areas.
 - Fire extinguishers should always be available.
 - Take care when handling materials near treatment modules to avoid accidents.

8.5.5. Protocol for Faecal Sludge Testing and Screening

The FS sampling and testing is to be carried out at the receiving facility, which may be a Sewage Treatment Plant (STP) or dedicated Faecal Sludge Treatment Plant (FSTP) or a decanting station. This testing is to screen

wastes such as industrial wastes that may adversely affect FSTP/ STP operations. The protocol describes sample collection, testing, and interpretation of the test results. Sampling and testing shall be conducted on-site by trained plant operators. A sample shall be collected from all the trucks before unloading the FS in the receiving facility.

1. FS Sampling

- The sample shall be collected from the outlet valve or any other outlets provided in the desludging truck. When collecting from the truck outlet valve, the operator shall allow the flow to become low (or one-fourth of the valve opening), before sample collection to avoid splashing.
- A bucket with a 5-litre capacity can be used for sample collection. A grab sample shall be collected from every truck. Pour the sample collected in the bucket into a smaller container for convenience; approximately 50 mL is needed for testing. The same sample can be used for testing both pH and Electrical Conductivity (EC).
- The sampling personnel shall avoid direct contact with FS and must use PPE like safety shoes, safety goggles, a mask and hand gloves.
- Hand-washing facility and 24/7 water availability shall be ensured at the site.
- After testing, the sample shall be disposed of safely.

2. Testing procedure

The samples collected shall be observed for Colour, Odour, and Temperature; and tested for pH, and Electrical Conductivity (EC). The items needed for testing are presented below.

- a. Electrical conductivity analyser
- b. pH paper strips
- c. De-mineralised water for washing

The well-mixed sample is tested for pH and EC as per the procedure below:

a. pH:

- Dip one end of the pH paper strip into the sample.
- After a few seconds, remove the paper and compare the Colour of the pH paper strip to the Colour chart provided with the pH paper kit to determine the pH range.
- Dispose of the used pH paper strips appropriately.
- Do not reuse a pH paper to retest or test another sample. Always use a new pH strip for every sample.

b. EC:

- Remove the cap and press the power button  to turn on the tester.
- Dip the sensor into the sample; the sensor should be fully immersed in the sample.
- Stir the sample with the sensor once or twice to stabilise the reading; Note down the displayed value.
- Hold function: Hold function freezes reading temporarily for ease of recording. To hold reading, press the hold/ent button . The screen flashes **HO** once, then displays the measurement with a blinking unit (mS) to indicate that the tester is in the hold mode. Press again to cancel hold mode **HC**.
- Don't press the Cal button during measurement.
- Refer to the manual if required for troubleshooting or other details.
- Rinse both the beaker and sensor with demineralised water twice and dry using tissue paper.
- Take adequate care not to cross-contaminate the samples. This can be done by cleaning and drying (using soft tissue paper) the sensor and sampling container for each sample taken.
- Press the power button  to turn off the tester.

3. Interpretation of test results

Guidance for interpreting the observation and test results is provided in Table 14.

Table 15: Faecal Sludge Screening/Testing Parameters

S.No	Parameter	Guidance
1	pH	pH in the range of pH 6 to 8 shall be accepted; pH outside this range shall be further investigated for the source of waste.
2	Electrical Conductivity (EC)	Typical values of EC for Faecal Sludge range from >0 to 6 mS. EC of Faecal Sludge shall be referred to and compared with the EC of water used by the households. Typical values across Tamil Nadu range from 0 to 4 mS. It is suggested to check the source of waste for those samples with high EC (> 3mS) and cross-check with other tests or observations for further confirmation. (pH, colour, odour).
3	Colour	Typical colour of fresh sludge is yellow/green/ brownish; anaerobically digested sludge is black; Wastes from dyeing industries, tanneries, metal plating industries may have red, blue, etc Further check on the source of waste is suggested if the colours are unusual.
4	Odour	Typical smell of domestic FS is that of rotten egg; whereas the smell of waste from other sources, such as industrial solvents like turpentine (paints), ethanol (perfumes), ethyl acetate (Glues), etc. shall be further checked for the source of waste.
5	Temperature	High temperature wastewater released from the processing industry, coolant water from condensers and boiler blow-down shall be rejected.



Figure 41. Effect of industrial waste disposed at treatment plant

Source: IIHS, 2024

8.5.6. Training Required

To ensure the safety of CT/PT workers, training must align with the hierarchy of controls, which prioritises risk reduction strategies from most to least effective.

1. Elimination – The Most Effective Control Measure

- Train personnel to identify hazards that they can completely remove from the workplace.
- Instruct workers to eliminate the use of hazardous chemicals whenever possible to fully remove associated risks.

2. Substitution – Use of Safer Alternatives

- Teach workers to apply non-toxic or less hazardous chemical substitutes safely.
- Guide them to evaluate substitutes to ensure they reduce risk without creating new hazards.

3. Engineering Controls – Physical and Mechanical Measures

- Train workers to handle, operate, and maintain equipment correctly to minimize hazard exposure.
- Show them how to implement spillage containment techniques to prevent hazardous substance spread.

4. Administrative Controls – Policies and Work Procedures

- Provide training on Standard Operating Procedures (SOPs) for every plant component.
- Instruct staff to follow emergency response and first aid protocols effectively.
- Teach workers to report and document incidents accurately and promptly.
- Encourage workers to participate in health screening programs and keep vaccinations up to date.

5. Personal Protective Equipment (PPE) – Last Line of Defense

- Train workers to select, use, and understand the limitations of PPE.
- Instruct them to clean, maintain, and dispose of PPE properly to ensure effectiveness and hygiene.

8.5.7. Utility of the Health Screening

Routine health screenings play a crucial role in maintaining the health and well-being of operators. Regular monitoring helps detect early signs of work-related health issues. Preventive health measures include:

- **Medical Check-ups:** Regular health assessments focusing on respiratory issues, gastrointestinal diseases, and skin conditions.
- **Vaccination:** Vaccines for preventable diseases, such as hepatitis, to protect operators against exposure to biological hazards.
- **Health Awareness Programs:** Education on recognising symptoms of exposure to hazardous substances and proper hygiene practices.

8.5.8. Types of Health Screening Frequency

Types of Health Screening Frequency

- **Annual Health Check-ups:** To assess overall health and detect early signs of exposure to chemicals or infectious diseases.
- **Post-Exposure Screening:** Following exposure to hazardous chemicals or biological materials, operators should undergo immediate health evaluations.
- **Continuous Monitoring:** For workers in high-risk areas (e.g., those handling raw sludge or working in confined spaces), continuous monitoring is essential to track any health impacts over time.

8.5.9. Reporting and Incident Management

Operators must be trained to recognise and report hazards, unsafe working conditions, and incidents promptly. Effective communication systems should be in place to ensure that all potential risks are documented and addressed swiftly. The reporting process should include:

- **Hazard Identification:** Operators should identify and report any unsafe conditions, such as leaks, mechanical failures, or the presence of hazardous gases.
- **Incident Reporting:** A standardised process for reporting accidents, injuries, or exposure to toxic substances.
- **Corrective Actions:** Following an incident, corrective actions must be taken to prevent recurrence, including equipment maintenance or changes to work protocols.

8.5.10. Emergency Response and First Aid

Improperly treated faecal sludge may contain harmful bacteria, viruses, parasites, and toxic chemicals. Direct exposure to untreated or inadequately treated sewage can lead to severe health issues. When the FSTP operates as designed, the risk to public health and the environment is significantly reduced. However, during emergencies, the risk to both public health and the environment may increase (IIHS, 2024).

Table 16: Emergency Situation at the FSTP

Emergency Situation	Cause	How It Could Happen	Emergency Response
 Spillage from Truck	Failure of outlet valve or wrong operation of outlet valve of de-sludging vehicle	Damage to the desludging vehicle's outlet valve during feeding.	Close the outlet valve.
		Outlet valve stuck in open position during feeding.	If ineffective, connect the desludging vehicle's hose to the inlet pipe of the SC to bypass the sludge.
		Spillage from the hose pipe used for feeding faecal sludge.	Clean the spillage with a vacuum pump and cover with lime.
			If not possible, wash and direct water to a covered drain, then spray chlorine.
Valve Breakdown	Failure or wrong operation of outlet valve of de-sludging	Valve failure due to debris or solid waste stuck in valve opening.	If sludge has spilled near the valve, cover it with soil and leave for 2 hours.
		Valve damage from incorrect operation or forceful turning.	Collect soil and sludge in a plastic bowl using a shovel.
			Dispose of this sludge in the SDB.
			Report to TMC and repair or replace the valve if necessary.
 Overflow from Any Treatment Module	Clogged module outlet or inlet of the next downstream module	Excessive scum or sludge accumulation blocking pipes or modules.	Stop the flow into the module immediately.
		Crushed or frozen modules or pipe damage.	Clear blockages using an iron bar and pumped water.
		Excessive inflow of water due to flooding.	Push debris to the next module using the iron bar and collect from the downstream module.
			Report any damage or unmovable debris to TMC.

Source: (IIHS, 2024)

In the event of a medical emergency, prompt first aid is crucial. Follow these steps:

- Keep the victim lying down.
- Check for serious bleeding, breathing issues, or poisoning.
- Keep the victim warm and comfortable.
- Send someone to call a physician or ambulance.
- Stay calm; do not move the victim unless necessary.
- Do not give anything to eat or drink to an unconscious victim.
- Keep the crowd away from the victim.
- If needed, provide artificial respiration.

First Aid Kit Essentials:

- Triangular bandage, elastic bandages, splint, ointment for sprains
- Eye pads, iodine solution, cold pack, cotton wool, tweezers, scissors
- ORS sachets, antiseptic, CPR mask, sterilized dressing, cervical collar
- Waterproof tape, hand sanitiser, waterproof plasters, latex gloves
- Band-aids, three-layered masks



Figure 42. Recommended practice for operators to avoid contact with fecal sludge and used water

Source: IIHS, 2024



Trainer's Note: Ensure that participants understand the importance of acting promptly and following these procedures to maintain safety and system integrity. Emphasise the proper use of equipment and safety protocols when performing these tasks.

Trainer's Note

This session on Safety Aspects for Treatment Facility Workers aims to address the critical health and safety risks encountered in treatment facilities. Participants will gain an understanding of the hazards associated with wastewater treatment and faecal sludge management, such as exposure to raw sewage, chemicals, and confined spaces. The session will cover essential safety practices, including the proper use of PPE, emergency response procedures, and basic first aid. By the end of the session, participants will be equipped with the knowledge and skills needed to ensure a safer work environment and effectively manage potential risks in their worker's daily tasks.

1. Introduce Health & Safety Risks:

- Begin by explaining the key health and safety risks specific to treatment facility workers, such as exposure to raw sewage, handling chemicals, and confined space work. Use visuals and real-life examples to make these risks more tangible and relatable to their daily work environment.

2. Explain the Work Cycle Stages:

- Break down the treatment facility work cycle into stages: preparation, operational monitoring, maintenance, and disposal. For each stage, highlight the associated risks and mitigation strategies, using case studies and hands-on demonstrations to make the information practical.

3. Demonstrate Proper Use of Tools & PPE:

- Show the required PPE and tools for treatment facility work. Walk through how to properly use and maintain PPE (gloves, boots, masks, etc.) and demonstrate the correct handling of key equipment. If possible, let participants try on PPE and practice using tools in a safe environment.

4. Facilitate Group Discussions on Risk Mitigation:

- Engage participants in discussing ways to mitigate risks at different stages of the work cycle. Use the "Hierarchy of Controls" as a framework to guide the discussion, encouraging them to brainstorm practical solutions for the risks they encounter daily.

5. Role-play Emergency Response & First Aid:

- Set up scenarios where participants practice responding to common emergencies, such as chemical spills or confined space issues. Teach basic first aid skills and ensure participants understand the importance of quick, effective action in emergencies.

6. Reinforce Health Monitoring & Preventive Measures:

- Emphasise the importance of regular health screenings and vaccinations. Discuss the types of health screenings they should undergo, such as annual check-ups or post-exposure screenings, and encourage participants to take responsibility for their health.

7. Wrap-Up and Q&A:

- Summarise the main points covered during the session and open the floor for any questions or clarifications. Provide participants with additional resources and materials to help them continue learning about safety practices.

Trainer's Tips for Effective Delivery:

1. Be Interactive:

- Encourage discussion and engagement by asking questions throughout the session. Use real-world examples to make safety practices relatable to the participants' daily tasks.

2. Use Visuals and Case Studies:

- Make the content more engaging by using diagrams, photos, and videos. Illustrate concepts with real-life case studies to demonstrate how safety risks can manifest and be mitigated.

3. Hands-on Demonstrations:

- If possible, have participants practice using PPE and tools. This will help them feel more confident and competent in using safety gear and equipment.

4. Facilitate Open Dialogue:

- Create a safe and open space for participants to share their concerns and experiences. This fosters a collaborative learning environment and allows everyone to contribute to problem-solving.

5. Keep it Relevant:

- Tailor your examples and discussions to the specific work environment and tasks of the participants. This ensures they can directly apply the safety measures to their own roles.

6. Be Clear and Concise:

- Explain complex concepts in simple terms to ensure everyone understands the material, regardless of their technical background. Provide clear instructions and avoid jargon.

7. Reinforce Key Takeaways:

- Regularly summarize key points to reinforce learning. Highlight the importance of safety procedures and encourage participants to make these practices part of their daily routine.

09

Safety Aspects for Reuse of Treated Used Water and Biosolids



9.1 Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 2	Presentation	30
2		Case Study	10
3		Questions & Discussion	10
Total			50

9.2 Learning Objectives

- Understand key safety standards for the reuse of treated water and biosolids
- Identify health and environmental risks and ways to manage them
- Learn from case studies and understand the role of institutions in ensuring safe reuse

9.3 Key Takeaways

- Safety Standards and Guidelines: Familiarise with key standards (CPCB, CPHEEO, USEPA) for safe reuse of treated water and biosolids.
- Monitoring and Compliance: Regular testing and adherence to protocols are essential to ensure public health and safety.
- Health Risks and Safety Concerns: Proper treatment and disposal of wastewater and biosolids are crucial to avoid health hazards.
- Government's Role: Administrators must enforce standards, monitor compliance, and promote best practices for safe reuse.

9.4 Overview of Treated Used Water and Biosolids as By-Products of used water Treatment

With the increasing challenges of water scarcity and rising water prices, wastewater treatment has the potential to become a profitable and sustainable solution. Rather than viewing wastewater as a by-product to be disposed of, it should be considered a valuable resource that can be recycled and reused. A shift from the traditional “use and throw” model to a more sustainable “use, treat, and reuse” approach is necessary (CPCB, 2024).

The reuse of treated sewage water helps reduce the demand for natural water sources such as rivers, lakes, and groundwater, contributing to the conservation of these resources. Recently, several ULBs have initiated the reuse of treated sewage for purposes like horticulture, irrigation, industrial cooling, toilet flushing, fire-fighting, and non-contact impoundments. The CPHEEO has set standards for such reuse. Although the practice is currently limited in India, it is gaining traction in states like Delhi, Gujarat, Haryana, Tamil Nadu, and Puducherry, with Delhi aiming to increase its reuse from 12.5% to 60% (CPCB, 2024).

As population growth and water demand increase, the strain on water resources intensifies, making the reuse of treated sewage crucial. The National Inventory of STPs (2021) estimates that sewage generation will rise from 72,368 MLD to 1,20,000 MLD by 2050, with only 20,235 MLD currently being treated. Reusing sewage for non-potable purposes can mitigate this gap and reduce reliance on freshwater sources, fostering sustainable water management (CPCB, 2024).



Figure 43. Storage of Biosolids in the FSTP

Source: (Narain, et al., 2023)

9.5 Legislative and Regulatory Context

Regulation/Act	Description
Water (Prevention and Control of Pollution) Act, 1974	Emphasises maintaining and restoring the “wholesomeness” of aquatic resources by preventing sewage or pollutants from being discharged into water bodies.
National Water Quality Monitoring Programme (NWQMP), 1978	Advises central and state governments on water pollution control and sets standards for water quality in streams and wells through its network of SPCBs.
Ganga Action Plan, 1986	Launched to protect the Ganga River from pollution, improve sewage water treatment, and prevent the mixing of industrial waste.
Environment (Protection) Act, 1986	Provides a framework for coordinating central and state authorities for environmental protection, focusing on human health, ecosystem improvement, and preventing hazards.
General Discharge Standards (Environment Protection Rules, 1986)	Notified standards for effluent discharge, including specific guidelines for irrigation discharge and wastewater generation.
National Environment Policy (NEP, 2006)	Emphasizes recycling of sewage and used water from municipal and industrial sources and implementing action plans to address water pollution.
National Urban Sanitation Policy (NUSP, 2008)	Focuses on sanitary and safe disposal of human waste and recommends recycling and reuse.
Service Level Benchmarks (SLBs) of MoHUA, 2008	Mandates a 20% reuse and recycling of sewage in urban areas.
National Water Policy (NWP, 2012)	The draft revised NWP focuses on reducing water pollution and emphasizes recycling and reuse (2020).

Regulation/Act	Description
Ministry of Environment, Forest and Climate Change (MoEF&CC)	Notified effluent discharge standards for treated wastewater from Sewage Treatment Plants (STPs).
CGWB Master Plan for Artificial Recharge (2013)	Stresses careful monitoring when treated urban wastewater (TUW) is used for groundwater recharge to prevent contamination.
National Guidelines on Zero Liquid Discharge (ZLD), 2015	CPCB guidelines for 22 industrial sectors highlight ZLD challenges such as hazardous waste generation, operational costs, and the need for separate industrial and municipal wastewater.
PMKSY (Pradhan Mantri Krishi Sinchayee Yojana), 2015	Focuses on exploring the feasibility of reusing treated municipal used water for peri-urban agriculture.
Ministry of Power (2016 Tariff Policy)	Requires thermal power plants within a 50 km radius of a sewage treatment plant (STP) to mandatorily use treated urban wastewater (TUW).
Guidelines of National Building Code (2016)	Emphasizes the reuse of treated sewage and sullage in multi-storeyed commercial and residential complexes for purposes such as toilet flushing, horticulture, and firefighting.
National Faecal Sludge and Septage Management Policy (FSSM, 2017)	Focuses on achieving safe sanitation access, safe disposal of faecal waste in urban areas, mandates environmental discharge standards, and promotes an affordable approach.
National Green Tribunal (NGT)	Advocated for more stringent discharge norms for STPs to protect water bodies and public health.
CGWB Notification (Groundwater Regulation)	Requires the use of TUW instead of groundwater for non-potable purposes, such as toilet flushing and irrigation, in areas with high groundwater extraction.
Ministry of New and Renewable Energy (MNRE)	Promotes the generation of green energy from biogas and the conversion of sludge into manure.

Source: (CPCB, 2024) (MoJS, 2022)

Table 17: Roles and Responsibilities of Various Institutions for Usage of Treated Water

Ministry/Organization/Department	Responsibilities
Ministry of Agriculture & Farmers Welfare (MoAFW)	Develop mandates for treated sewage in irrigation and raise farmer awareness on its reuse.
Ministry of Environment, Forest and Climate Change	Draft Liquid Waste Management Rules
State Pollution Control Boards (SPCB)	Regulate STPs, implement discharge standards, and explore industrial reuse of treated sewage.
CPHEEO	Provide technical support and guidelines to States and ULBs, including training modules.
Department of Soil & Water Conservation	Develop infrastructure for small/medium STPs' treated wastewater for irrigation, ensuring feasibility and project design.
Municipal Corporations & Local Authorities	Develop infrastructure for treated sewage supply to industrial clusters and manage STPs to meet prescribed norms.
Ministry of Power/ Department of Power	Ensure Thermal Power Plants (TPP) within 50 km of STPs use treated water for cooling, as per the Tariff Policy (2016).

Source: (CPCB, 2024)

9.6 Standards- Reuse of Treated Used Water

Water reuse reclaims water from a variety of sources then treats and reuses it for beneficial purposes such as agriculture and irrigation, potable water supplies, groundwater replenishment, industrial processes, and environmental restoration.

Reuse of Treated Used Water

Table 18: Effluent Discharge Standards for Treated Effluent of Sewage Treatment Plants

S. No.	Parameters	Norms as per NGT direction dated 30/04/2019 in the matter of OA No 1069 of 2018	MoEF&CC Notification dated October 2017	
			Cities (more than 10 lakh population)	Areas/regions other than those mentioned above
1	pH	5.5-9.0	6.5-9.0	
2	BOD, mg/L	10	20	30
3	COD, mg/L	50	-	-
4	TSS, mg/L	20	50	100
5	NH ₄ -N, mg/L	1	-	-
6	N-Totals, mg/L	10	-	-
7	Faecal Coliforms, MPN/100 mL	100 Desirable, 230 Permissible	-	1000

Source: (CPCB, 2024)

Table 19: CPHEEO Recommended Norms of Treated Sewage Quality for Specified Activities At Point of Use

S. No.	Parameter	Toilet flushing	Fire protection	Vehicle Exterior washing	Recreational use (bathing etc.)	Non-contact impoundments	Landscaping, Horticulture & Agriculture			
							Horticulture, Golf course	Non edible crops	Crops	
									crops which are eaten	
									Raw	Cooked
1	Turbidity (NTU)	<2	<2	<2	<2	<2	AA	AA	AA	AA
2	SS	AA	AA	AA	AA	AA	AA	AA	AA	AA
3	TDS	2100								
4	pH	6.5 to 8.5								
5	Temperature °C	Ambient								
6	Oil & Grease	10	nil	nil	nil	nil	0	0	nil	nil
7	Nitrate Nitrogen as TN	10	10	10	10	10	AA	AA	AA	AA
8	BOD	≤6	10	≤6	≤6*	10	≤6 – 10 (≤6 preferred)			
9	COD	AA	AA	AA	AA	AA	AA	AA	AA	AA
10	Total Phosphorous as TP	1	1	1	1	1	AA	AA	AA	AA
11	Minimum Residual Chlorine	1	1	1	≤0.5	0.5	nil	nil	nil	nil
12	Faecal Coliform in 100 ml	nil	nil	nil	≤50	100	nil	100	nil	≤50
13	Helminthic Eggs/ litre	AA	AA	AA	AA	AA	AA	<1	<1	<1

S. No.	Parameter	Toilet flushing	Fire protection	Vehicle Exterior washing	Recreational use (bathing etc.)	Non-contact impoundments	Landscaping, Horticulture & Agriculture			
							Horticulture, Golf course	Non edible crops	Crops	
									cropsswhich are eaten	
									Raw	Cooked
14	Colour	Colourless					AA	Colourless		
15	Odour	Aseptic, which means not specific and no foul odour								

Source: (CPCB, 2024), All values are in mg/l except for Turbidity, pH, Temperature, Faecal Coliform, Helminthic Eggs, Colour and Odour. AA-as Arising when other parameters are satisfied. *CPCB prescribes a BOD of less than 3 mg/l in the water body for recreational purposes. Adequate storage shall be maintained in the water body for dilution to maintain 3 mg/

9.7 Safe Practice and Standards- Reuse of Biosolids

The sewage from households and commercial buildings is sent to a wastewater treatment plant, where the liquids are separated from the solids, producing a semi-solid, nutrient-rich product known as ‘sewage sludge’ or ‘biosolids’.

Type of Biosolids

Table 20: CPHEEO Recommendations for Managing Various Types of Sludge

Type of Sludge	Prescribed Management Protocol
Raw Sewage Sludge	“Raw sludge as a soil filler directly on land for raising crops is not desirable.”
Liquid Sewage Sludge	“Liquid sludge, either raw or digested, is unsafe to use. If used, it must be thoroughly incorporated into the soil, and land should be given rest to allow the biological transformation of organic material. It should be used in such a way as to avoid all possible direct human contact.”
Dewatered Septage Sludge	“For dewatered septage/sludge agricultural application, it should satisfy the Class A biosolids criteria of US EPA, either by lime stabilization, solar drying, or composting.”
Sewage Sludge from Drying Beds	“Sludge from drying beds should be ploughed into the soil before raising the crops. Top dressing of soil with sludge should be prohibited.”
Heat-Dried Sewage Sludge	“Heat-dried sludge is the safest from a public health point of view. Though deficient in humus, it is convenient in handling and distribution.” “Dried sludge may be used for lawns and for growing deep-rooted cash crops and fodder grasses where direct contact with the edible part is minimal.” “Dried sludge can be used as manure/soil conditioners.” “Dried sludge pellets can also be used as a fuel source in coal-fired power plants and in cement kilns.”

Source: (Agarwal, et al., n.d.)

Biosolids Classification

The U.S. Environmental Protection Agency (EPA) classifies biosolids into two categories under [40 CFR Part 503]:

- **Class A:** Treated to reduce pathogens to safe levels, requiring no special handling or use restrictions. If they also meet “exceptional quality” standards for metal content, they can be packaged and sold for use like other soil conditioners (e.g., peat moss).

- **Class B:** Treated to lower, but not completely remove, pathogens. These biosolids require additional safety measures, such as restricting public access and limiting livestock grazing for specific periods after application, to allow natural pathogen die-off in the soil.

The above rules restrict public access to land treated with Class B biosolids to protect public health. However, these restrictions do not apply to workers handling or applying Class B biosolids. While workers and employers often recognise the need for precautions when dealing with untreated sewage, they may be less aware of the importance of taking basic safety measures when working with Class B biosolids (CDC, 2002).

Type	Pathogen Level	Usage	Restrictions
Class A	Pathogens reduced to safe levels	Can be bagged, sold , and used like peat moss	No special handling or access restrictions
Class B	Pathogens are reduced but still present	Used on land with controlled application	Public access and grazing are restricted for set periods post-use

Source: (CDC, 2002)

Table 21: US EPA Biosolids Rule – Requirements for Class A and Class B Biosolids

Category	Class A Biosolids	Class B Biosolids
For Land Application – Pathogen Reduction	Pathogen levels must be below detectable limits 24 hours after treatment or at the point of application. Faecal Coliform: < 1000 MPN/g dry solids (DS) Salmonella sp.: < 3 MPN/4g dry solids (DS)	May contain pathogens up to certain levels. Animal grazing, crop harvesting, and public access are prohibited until environmental conditions further reduce pathogens. Faecal Coliform: < 2,000,000 MPN/g dry solids (DS)
For Land Application – Pollutant Limits (Heavy Metals)	Must meet limits for 10 trace metals: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Zinc	Same limits as Class A
For Land Application – Vector Attraction Reduction	>38% volatile solids reduction OR 1 of 9 other specified options	Same as Class A
For Land Application – Sites	EQ, APLR: allowed on all CPLR, PC: all except lawns and home gardens	All except lawns and home gardens
For Surface Disposal – Pathogen Reduction	Must meet the same Class A or Class B land application requirements OR have daily cover over the biosolids unit	Same as Class A
For Surface Disposal – Pollutant Limits (Heavy Metals)	If no liner/leachate system: limits for 3 trace metals or site-specific approved limit (based on distance to site boundary): Arsenic, Chromium, Nickel. If liner/leachate present: no limits. Methane gas must be measured at the site and the boundary.	Same as Class A
For Surface Disposal – Vector Attraction Reduction	>38% volatile solids reduction OR 1 of 6 other specified options	Same as Class A
For Incineration – Pollutant Limits (Heavy Metals)	Limits for 7 trace metals before incineration: Arsenic, Beryllium, Cadmium, Chromium, Lead, Mercury, Nickel. Must also meet emission limits (total hydrocarbons, carbon monoxide).	Same as Class A

Source: US EPA

Table 22: Mode of Biosolids Application as per the Part 503 Rule, US EPA

Parameter	Recommended Limit (upper, unless stated otherwise)			
Pollutant	Ceiling Concentration Limits for All Biosolids Applied to Land (mg per kg dry solids)	Ceiling Concentration Limits for EQ and PC Biosolids (mg per kg dry solids)	Cumulative Pollutant Loading Rate (kg per ha)	Annual Pollutant Loading Rate (kg per ha per year)
As (Arsenic)	75	41	41	2
Cd (Cadmium)	85	39	39	1.9
Cr (Chromium)	3,000	1,200	3,000	150
Cu (Copper)	4,300	1,500	1,500	75
Pb (Lead)	840	300	300	15
Hg (Mercury)	57	17	17	0.85
Molybdenum (Mo)	75	-	-	
Ni (Nickel)	420	420	420	21
Selenium (Se)	100	36	100	5
Zn (Zinc)	7,500	2,800	2,800	140
Pathogen Class	Class A	Class A or B	Class A or B	Class A
Type of Land Intended	All*	All except lawns and home gardens	All except lawns and home gardens	All, but most likely lawns and home gardens

Biosolids Treatment Processes

1. Digestion

Conventional digestion of raw or thickened sludge produces a liquid product that typically meets Class B pathogen reduction standards. In Florida, aerobic digestion has traditionally been used for plants with capacities under 10 MGD, while anaerobic digestion is more cost-effective for larger plants. This study focused only on aerobic digestion. The aerobically digested biosolids were assumed to be dewatered and transported up to 100 miles for agricultural use, with covered storage for three months (Foess & Fredericks, 1995).

2. Alkaline Stabilisation

This process can be used to achieve either Class A or Class B pathogen reduction. For Class B, lime or cement kiln dust is added to dewatered sludge to meet the required pH and contact time standards. For Class A, more lime and/or supplemental heat is added to meet stricter pH, time, and temperature criteria. Depending on the method, the stabilised product can range from a wet-cake to a moist, soil-like material. Both Class A and Class B products were assumed to be used on agricultural land, like digested sludge. However, no land lease cost was included for Class A material because of its higher perceived value (Foess & Fredericks, 1995).

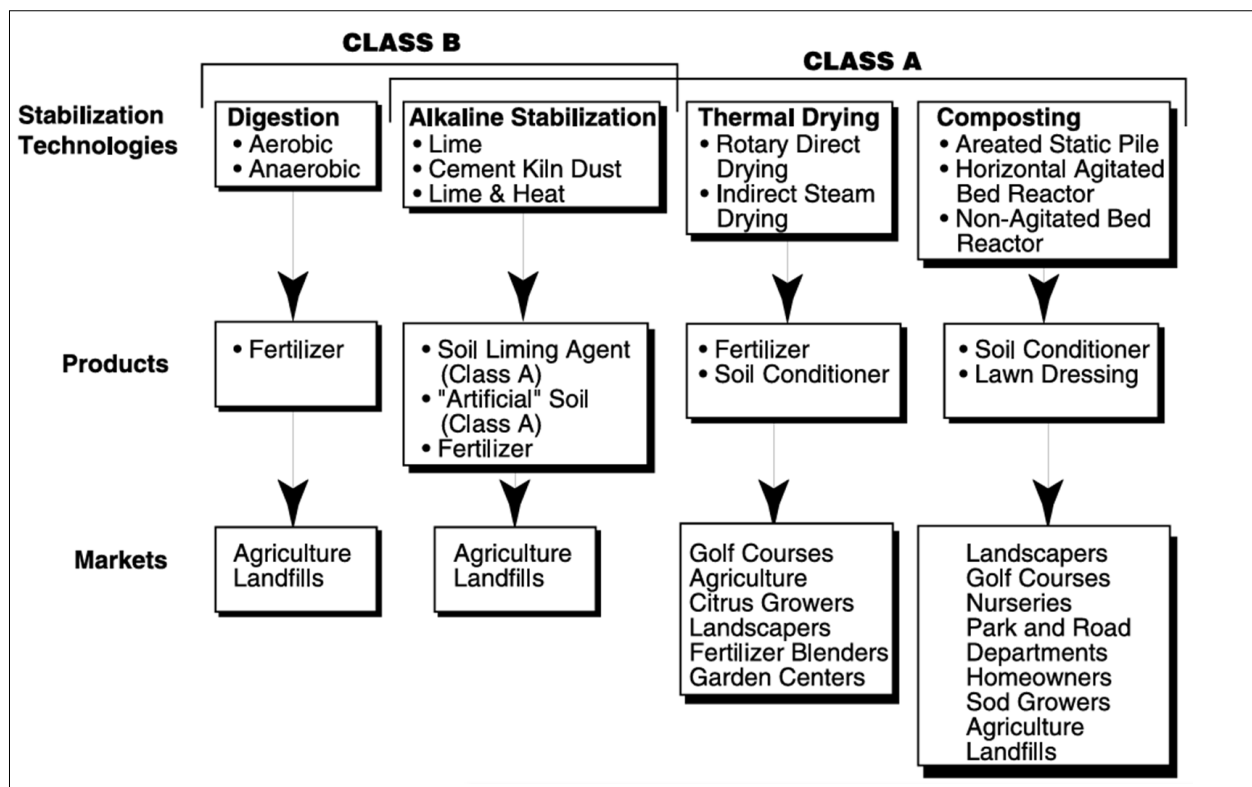


Figure 44. Biosolids Classification

Source: (Foess & Fredericks, 1995)

3. Thermal Drying

Thermal drying uses heat to evaporate moisture from dewatered sludge, producing dried, pathogen-free granules or pellets for beneficial use. This study evaluated both rotary direct and indirect steam drying systems. The dried product was assumed to be sold in bulk to users such as golf courses and citrus growers (Foess & Fredericks, 1995).

4. Composting

Composting combines dewatered sludge (raw or digested) with dry amendment material, such as yard waste, under controlled conditions to produce a disinfected, humus-like soil conditioner. The study evaluated three systems: a horizontal agitated reactor, a horizontal non-agitated reactor, and an aerated static pile system. Compost was assumed to compete with products like peat, soil, and mulch, with yard waste valued (Foess & Fredericks, 1995).

9.7.1 Biosolids: Safe Handling Practices

Proper handling of biosolids is essential to ensure worker safety, maintain product quality, and prevent environmental contamination. The following steps outline safe handling procedures for dried faecal sludge (IIHS, 2024):



Moisture Check

- Before collection, the dried faecal sludge should be inspected to ensure the moisture content is below 60%.
- Moisture testing helps confirm that the sludge has been adequately dried, making it safer to handle and reducing the risk of pathogen survival.
- Workers performing this step should wear appropriate PPE, including gloves, hard hats, and high-visibility vests, to prevent direct contact and protect against accidental splashes or dust.

	Collection from Drying Beds • Once moisture levels are within the acceptable limit, the dried sludge is manually or mechanically collected from the drying beds. • Tools such as shovels, buckets, or other collection equipment should be used to avoid direct hand contact. • Workers should be trained in correct lifting and handling techniques to prevent strain or injury, as dried sludge can still be heavy and uneven in texture.
	Transport to the Storage Yard • The collected sludge should be transferred from the drying beds to the designated storage yard using appropriate containers or vehicles. • During transport, measures should be taken to avoid the spillage or scattering of the material. This may include using covered containers or trucks. • Workers should ensure that storage areas are secure, dry, and protected from rain to maintain product quality and prevent rehydration.

Source: IIHS, 2024

Safety and Hygiene Measures

1. Basic Hygiene Practice

Workers who handle biosolids must follow strict hygiene practices to protect their health. The U.S. Environmental Protection Agency (EPA) has outlined a set of key recommendations that serve as a reliable guide for safe and hygienic work. These practices help prevent the spread of infections, reduce exposure to harmful pathogens, and promote overall workplace safety.

		
Wash your hands thoroughly with soap and water after coming into contact with biosolids.	Avoid touching face, mouth, eyes, nose, genitalia, or open sores and cuts while working with biosolids	Wash your hands before eating, drinking, and before and after using the bathroom.



Figure 45 Step by step process for hygiene practice

Source: (CDC, 2002) and (IIHS, 2025)

2. PPE Required

Workers who may be exposed to biosolids must be provided with suitable PPE. The selection of PPE should be based on job tasks, potential exposure, and professional safety advice (CDC, 2002).

Recommended PPE options refer Figure 30:

- Goggles
- Splash-proof face shields (especially for jobs with risk of spray, high-pressure leaks, or aerosolised biosolids during land application)
- Respirators
- Liquid-repellent coveralls
- Gloves

Good practice measures:

- Make face shields available for any task with spray or aerosol exposure risk
- Include respirator fit-testing, training, and periodic retraining as part of a PPE program
- Involve both management and employee representatives to:
 - Identify job duties with likely biosolids exposure
 - Conduct on-site exposure monitoring
 - Select appropriate PPE with input from a qualified safety and health professional.



Figure 46. PPE required for Biosolids Handling

Source: (CDC, 2002)

9.7.2 Biosolids: Safety Aspects of Co-composting

- Basic Equipment Needed for Composting
- Collection container for organic waste
- Weighing machine to measure input quantities
- Bamboo poles, wooden poles, or dried maize/millet plant bundles for aeration shafts
- Pitchforks, shovels, and other tools for mixing waste
- Knives, machetes, sickles, shredders, and other tools for chopping large components
- Covering materials for compost heap (reed mats, banana leaves, old carpets, plastic sheets)

- Materials to secure the cover (stones or similar weights)
- Compost screens – wire mesh (10–25 mm) with wooden frame for sieving mature compost
- Watering can or similar tool for irrigation
- Compost thermometers and moisture meters
- First aid kits
- PPE for plant workers (safety goggles, face masks, safety boots, gloves)
- Tarpaulin sheets for rain protection
- Cow dung mixed with water as an effective microorganism starter

The following process describes how biosolids are safely handled and processed with municipal solid waste to produce compost, while ensuring worker safety and maintaining hygiene standards.

	Step 1 – Shredding Organic Waste • Organic waste is first fed into a shredding machine to break it down into smaller, uniform pieces. • Shredding helps speed up the composting process by increasing the surface area available for microbial action. • Workers should wear gloves, masks, protective footwear, and safety glasses to protect against dust, debris, and possible contact with contaminants during this stage.
	Step 2 – Collecting the Dried Faecal Sludge • Dried faecal sludge is gathered from drying beds or storage areas once it has reached the required moisture content (below 60%). • This material contains valuable nutrients but must be handled carefully to avoid direct contact. • Workers should use shovels or other tools instead of bare hands and ensure liquid-repellent coveralls, gloves, and boots are worn at all times.
	Step 3 – Mixing with Municipal Solid Waste • The faecal sludge is combined with shredded municipal solid waste in a 1:3 ratio (1-part faecal sludge to 3 parts solid waste). • The mixture is blended thoroughly to ensure even distribution of nutrients and effective composting. • PPE, including gloves, boots, and face masks, is important here due to possible dust, odors, and microbial exposure.
	Step 4 – Siting the Co-Compost Pile • The prepared mixture is placed into windrows (long, narrow piles) measuring 1.5 m wide × 1.5 m high. • Proper sizing ensures adequate aeration and temperature control during composting. • The site should be well-drained and protected from rain to prevent leachate runoff.
	Step 5 – Turning and Monitoring • Manual turning is done 15 days after the pile is formed or when internal temperatures reach 65–70°C. • Turning is repeated weekly until composting is complete (about 45–60 days). • High temperatures help kill pathogens, while turning provides oxygen for microbial activity. • Workers should avoid inhaling dust during turning and maintain PPE use.

9.7.3 Biosolids: Safety and Health Risks

Working with biosolids, treated used water, and chemicals involves multiple safety and health hazards. Understanding these risks helps workers take the right precautions and follow safe practices consistently.

Table 23: Summary of hazard and associated risk for workers handling treated used water and biosolids

Hazard Category	Associated Hazard*	Associated Risk*
Physical	Slippery or wet and uneven surfaces, working in confined spaces	Slips, trips, and falls leading to fractures, sprains, or bruises
	Sharp objects or glass mixed in biosolids	Cuts or puncture wounds
Chemical	Contact with chemical residues or disinfectants (e.g., chlorine, lime)	Chemical burns, allergic reactions, respiratory irritation, or eye damage
Biological	Exposure to untreated or partially treated sludge	Skin infections, rashes, Gastroenteritis, respiratory irritation from dried sludge particles, parasitic infections, other infectious diseases- tetanus, hepatitis
	Exposure to rodents/insects	Animal bite, insect or snake bite, leptospirosis
Ergonomic	Heavy lifting or poor posture while handling biosolids	Back strain, muscle fatigue, or long-term musculoskeletal issues
Psycho-social	Stigma, social exclusion, stressful work conditions	Stress, other mental illnesses, low job satisfaction

Source: IIHS, 2025

Note: *There are numerous hazards and risks that could be identified; however, only important and select items have been listed here for ease of understanding.

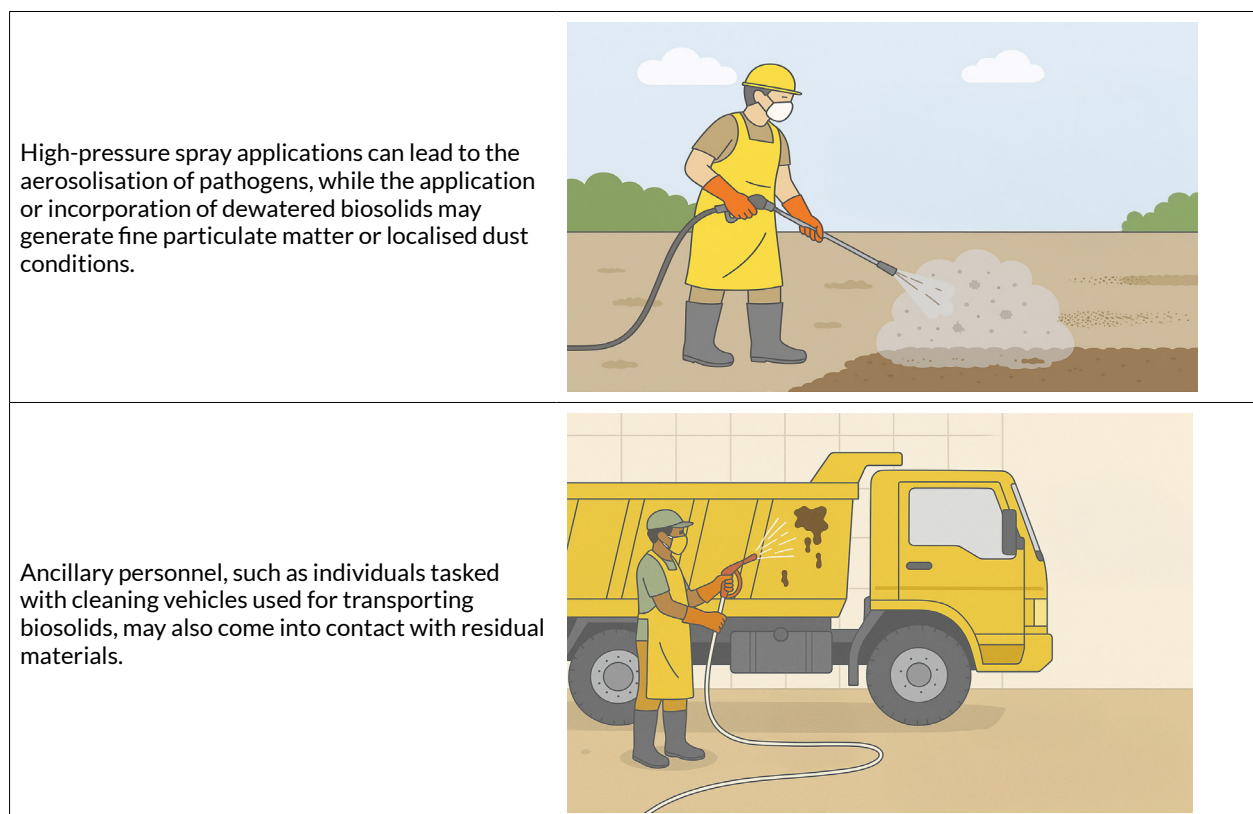


Figure 47. Additional circumstances where one could come in hazardous contact with biosolids

Source: IIHS, 2025

Contaminants from agricultural fields, especially where biosolids are applied, can move through the environment and reach people in several ways, see Figure 31. They can be released into the air through volatilisation, where chemicals become vapors, or as windblown particles carrying dust and residues.

Rain or irrigation water can cause runoff and erosion, moving contaminants into nearby soil, reservoirs, or farm ponds, while leaching and infiltration allow them to seep into groundwater. These contaminants travel through different media, including soil, air, surface water, and groundwater, and create various exposure scenarios. For example, forage crops grown on contaminated fields can be eaten by beef and dairy cattle, leading to the ingestion of beef and milk by humans. Protected, root, and exposed crops can also accumulate contaminants and be eaten directly. Contaminated water from reservoirs, farm ponds, or groundwater may be consumed as drinking water, while fish from polluted ponds can carry contaminants to people who eat them. Inhalation can also be a route of exposure, whether from ambient air containing vapors or dust, or from shower vapors when contaminated water is used. Those most at risk include adult farmers and farm children, who may be exposed through ingestion of food and water, inhalation of air or vapors, or accidental ingestion of soil during agricultural activities (EPA, 2023).

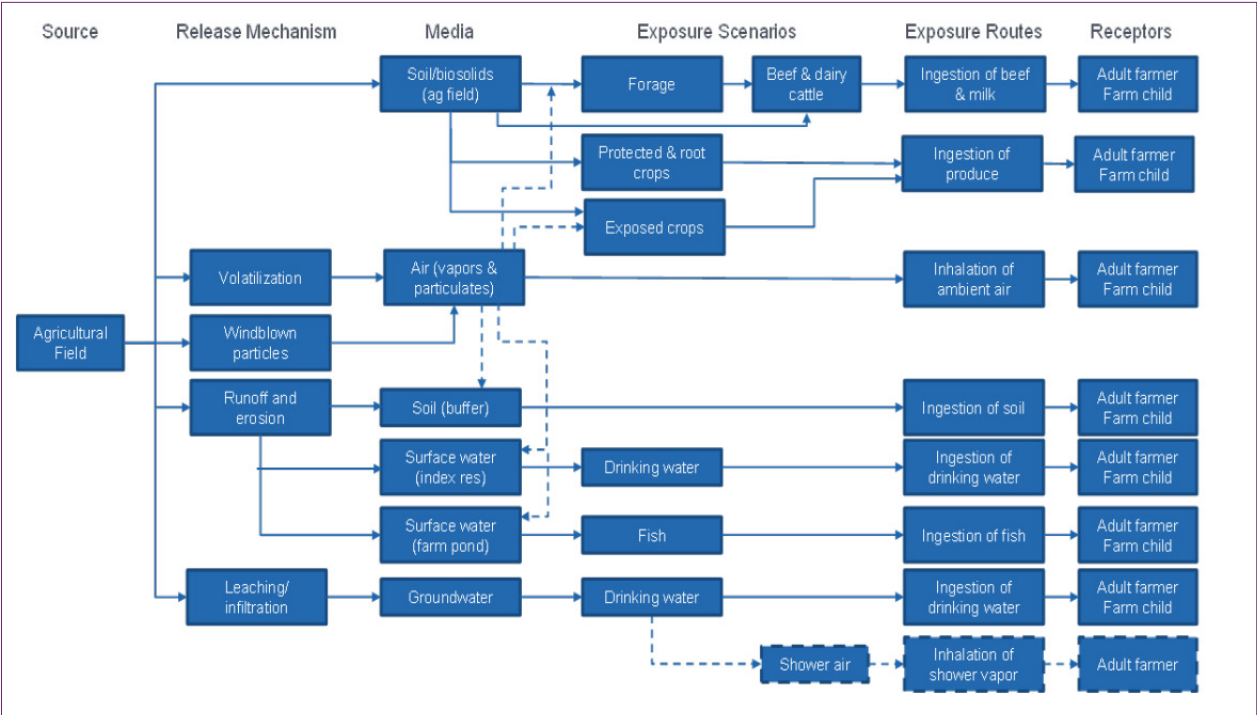


Figure 48. Conceptual model for the agricultural land application and land reclamation scenarios

Source: (EPA, 2023)

9.8 Importance of Monitoring and Compliance

Routine Testing and Monitoring

To ensure the safety of treated water and biosolids, regular testing and monitoring are required. These processes help in identifying the presence of harmful pathogens, chemicals, or heavy metals that could compromise safety.

- **Water Testing Parameters: Monitoring must include the following:**
 - **Pathogen Levels:** Regular testing for bacterial pathogens (e.g., E. coli, fecal coliforms), viruses, and protozoa.
 - **Chemical Contaminants:** Testing for chemicals such as heavy metals (e.g., arsenic, lead, mercury), pharmaceuticals, and pesticides.
 - **Physical and Chemical Characteristics:** Parameters such as pH, turbidity, dissolved oxygen, and total suspended solids should be within the prescribed limits for safe reuse.
- **Biosolid Quality: Biosolids need to be tested for:**
 - **Pathogen Reduction:** Ensuring that all harmful pathogens are reduced to safe levels.
 - **Heavy Metal Concentrations:** Ensuring that the levels of heavy metals are within safe limits for land application.

Safe Disposal or Reuse Protocols

- **Treated Water:** For water to be used safely, it must meet the standards set by regulatory bodies for its intended purpose, whether for irrigation, industrial processes, or recreational use.
 - **Irrigation:** Use treated water for crops that are not for direct human consumption and ensure there is no contamination of groundwater sources.
 - **Industrial and Cooling Applications:** Ensure that treated water meets the specific quality criteria for industrial uses, reducing the risk of contamination in manufacturing processes.
- **Biosolids:** When reusing biosolids, they must be processed in a way that reduces risks:
 - **Composting:** Biosolids can be composted to reduce pathogens before being used in agriculture. Biosolids that conform to Class A requirements are exempt from site restrictions, such as crop limitations, grazing, and public access. However, all other types of biosolid applications, excluding EQ, must adhere to general requirements and management practices. The use of agronomic rates for biosolid application to soil is recommended. For PC and CPL biosolids, a buffer zone of 10 meters must be maintained between the application area and any nearby water sources.
 - **Land Application:** Proper application methods should be followed to prevent soil and water contamination. Biosolids should be spread at appropriate depths and locations to avoid over-application.
 - Local bodies and operators of treatment facilities are required to obtain a permit for biosolid use or disposal, per applicable standards. All biosolid applications are subject to monitoring, recordkeeping, and reporting obligations. The frequency of monitoring is determined by the biosolid production rate, ranging from once per year to once per month. Additionally, the Rule mandates proper labelling for APL biosolids.

9.9 Training Need, Reporting and Immunisation

a. Training Requirements

- Periodic training should be conducted by qualified safety and health professionals, covering:
 - Hand Washing – Frequent and routine washing, especially before eating or smoking, is the single most effective way to prevent infections from biosolids.
 - PPE Use – Correct selection and wearing of coveralls, boots, gloves, goggles, respirators, and face shields.
 - Removing Contaminated PPE – Safe removal to avoid cross-contamination, followed by the use of on-site showers, lockers, and laundry facilities.
 - PPE Care – Proper storage, cleaning, or disposal of contaminated equipment.
 - Clothing Rules – Work clothes and boots must stay at the workplace; they should never be taken home or worn outside the work zone.
 - Work Zone Hygiene – Eating, drinking, or smoking is prohibited in or around biosolids areas.
 - Chemical Safety – Procedures to reduce exposure to any chemical agents present in biosolids.

b. Reporting Procedures

- Train workers to promptly report any work-related illnesses or symptoms to supervisors or health staff for early detection of potential occupational health issues.

c. Immunisation Guidelines

- Ensure employees are up to date with tetanus-diphtheria vaccinations due to the risk of soil-contaminated injuries.

9.10 Best Practices/ Case Study/ Video

A case video on how Bengaluru recovers sewage water

Source: (Deccan Herald, 2024)

Disclaimer: This video is intended solely to showcase best practices adopted by the city for the reuse of used water. It does not represent a comprehensive guide or endorsement of specific technologies or approaches. Viewers are encouraged to assess local context and consult relevant experts before adopting similar practices.



Trainer's Note

This session on Safety Aspects for the Reuse of Treated Used Water and Biosolids focuses on understanding the key safety standards and health risks associated with the reuse of treated water and biosolids. Participants will learn about the regulatory frameworks, proper handling practices, and monitoring protocols essential for ensuring public health and safety. Through a case study and interactive discussions, we will explore best practices for safe reuse and the critical role of institutions in promoting compliance and sustainability in water management.

1. Introduction to the Topic:

- Start by introducing the significance of the reuse of treated water and biosolids, emphasising its role in sustainable water management and resource conservation.
- Discuss the rising water scarcity issues and how treated wastewater can be a valuable resource for agricultural, industrial, and other non-potable uses.

2. Present Key Safety Standards and Guidelines:

- Introduce the main safety standards for treated water and biosolids reuse (e.g., CPCB, CPHEEO, USEPA guidelines). Use simple, easy-to-understand language to explain these standards and why they are critical.
- Highlight the importance of adhering to monitoring protocols and regulatory compliance for both water and biosolid reuse.

3. Discuss Health Risks and Safety Concerns:

- Break down the potential health risks (e.g., pathogen exposure, chemical residues, biosolid handling hazards) that could arise from improperly treated water or biosolid misuse.
- Use visuals to show examples of how these risks manifest and provide best practices for mitigation.

4. Introduce the Case Study:

- Present the case study video on Bengaluru's sewage water recovery, showcasing real-life practices for safe water reuse. Use this as an example of how municipalities can implement reuse solutions while ensuring safety.
- Facilitate a discussion around the case study, asking participants to consider how these methods could be applied in their own contexts.

5. Interactive Q&A and Discussion:

- Encourage participants to share their own experiences or concerns regarding water reuse and biosolids handling.
- Discuss solutions to common challenges faced in their regions or industries. This fosters engagement and learning from real-world situations.

6. Wrap-Up and Reinforce Key Takeaways:

- Recap the key points: safety standards, risk management practices, the role of government, and best practices for reuse.
- Provide additional resources or reading materials on treated water and biosolid reuse and ensure participants understand the importance of continuous compliance.

Trainer's Tips for Effective Delivery:

1. Simplify Complex Concepts:

- Use simple analogies and visuals to explain technical details like water quality parameters, biosolid classifications, and legislative requirements. Make sure the information is relatable and easy to digest for all participants.

2. Incorporate Real-World Examples:

- Share success stories or challenges from other regions or industries to make the content more relevant. For example, refer to the Bengaluru case study to highlight the practical application of safety standards.

3. Engage the Audience:

- Ask open-ended questions throughout the session to prompt participation. Encourage workers to share their experiences or concerns about water and biosolid reuse, creating a more interactive learning environment.

4. Highlight the Importance of Compliance:

- Continuously emphasize the role of monitoring and compliance in ensuring public health and safety. Stress that adhering to regulatory standards is not just about avoiding penalties, but protecting the community's well-being.

5. Use Interactive Learning Methods:

- Supplement the presentation with a quiz or small group discussion to reinforce understanding. This helps solidify the material and engage participants actively.

10

Confined Space Safety



10.1. Session plan

Sl. No	Day	Topics	Duration in mins
1	Day 2	Presentation	25
2		Case Study	10
3		Questions & Discussion	10
Total			45

10.2. Learning Objectives

1. Knowledge of confined spaces and the specific risks they pose to sanitation workers
2. Knowledge of confined spaces and the specific risks they pose to sanitation workers 9.2. Definition of Confined Spaces
3. Expertise in confined space regulations and ensuring compliance during operations
4. Ability in correct use of PPE and emergency protocols for confined spaces 10.3. Definition of Confined Spaces

10.3. Key Takeaways

1. Knowledge of confined spaces and the specific risks they pose to sanitation workers.
2. Expertise in confined space regulations and ensuring compliance during operations.
3. Proficiency in correct use of PPE and emergency protocols for confined spaces.

10.4. Definition of Confined Spaces

Many workplaces contain areas that are considered 'confined spaces' because while they are not necessarily designed for people, they are large enough for workers to enter and perform certain jobs. A confined space also has limited or restricted means for entry or exit and is not designed for continuous occupancy. Confined spaces include, but are not limited to, tanks, vessels, silos, storage bins, hoppers, vaults, pits, manholes, tunnels, equipment housings, ductwork, and pipelines, etc.

Confined spaces may be encountered in virtually any occupation; therefore, their recognition is the first step in preventing fatalities. Since deaths in confined spaces often occur because the atmosphere is oxygen-deficient, toxic or combustible, confined spaces that contain or have the potential to contain a serious atmospheric hazard should be classified as 'permit- required confined spaces' and should be tested prior to entry and continually monitored.

10.5. Risks Associated with Confined Spaces

The health and safety of personnel can largely be safeguarded by using safety equipment and taking precautions appropriate for each hazardous condition. It is desirable to give thorough knowledge of equipment to the sewer-men using them.

Septic tanks pose significant confined space hazards that heighten risks compared to regular worksites. Workers may encounter life-threatening conditions, making strict adherence to safety protocols essential. One of the primary dangers is atmospheric hazard, including oxygen deficiency, which can cause dizziness, confusion, unconsciousness, and death at levels below 19.5 per cent.. The presence of toxic gases such as hydrogen sulphide (H₂S) and carbon monoxide (CO) can lead to respiratory failure and loss of consciousness within minutes. Additionally, asphyxiants like methane and carbon dioxide can displace oxygen, resulting in suffocation.

Chemical and biological exposures further increase health risks. Skin contact, inhalation, or ingestion of sludge-contaminated chemicals can cause severe health effects, while pathogens present in faecal matter, including bacteria, viruses, and fungi, elevate the risk of infections. Fire and explosion risks are another major concern, as the accumulation of flammable gases like methane in an enclosed space can lead to explosions if ignited.

Physical and safety hazards also pose threats, including structural failures where weak tank walls or covers may collapse, leading to entrapment. Engulfment hazards arise when sudden displacement of sludge traps and suffocates workers. Poor visibility and inadequate lighting further increase the risk of falls and injuries. Process-related and external hazards include sudden liquid inflows due to barrier failures, which can cause rapid flooding, as well as prolonged exposure to heat, noise, and vibration, leading to thermal stress and hearing damage. Additionally, work zones near roads present vehicular and pedestrian traffic hazards, increasing the risk of accidents.

10.6. Regulatory Landscape and Compliance

The GoI and various state governments have established legal frameworks to ensure the safety of sanitation workers, particularly in confined spaces like septic tanks. The Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013, strengthened earlier provisions by explicitly banning manual scavenging in sewers and septic tanks and mandating mechanised de-sludging. Violations attract stringent penalties, reinforcing worker safety.

The CPHEEO prescribes SOPs for confined space entry in septic tanks, emphasising pre-entry risk assessment, atmospheric monitoring, mechanical ventilation, and the use of PPE. The guidelines stress the prohibition of manual entry unless mechanised means are unfeasible, in which case strict safety protocols, including standby rescue teams and medical preparedness, must be followed.

To enhance worker protection, the GoI launched Swachh Survekshan's Safai Mitra Suraksha initiative, promoting mechanised de-sludging and monitoring through Remote Sensing Applications (RSA). Additionally, the NAMASTE scheme, operational in 500 AMRUT cities since 2022, supports sanitation workers through skill development and financial aid. The National Safai Karamcharis Finance & Development Corporation (NSKFDC) further aids workers by facilitating socio-economic rehabilitation.

10.7. Safe Confined Space Entry: The Role of IS 2470 and IS 11972 in Protecting Sanitation Workers

Across urban and rural India, sanitation workers are often required to enter **confined spaces**—such as septic tanks, manholes, and sewer lines—to manually clean or maintain them. These are among the most hazardous work environments, where **toxic gases, oxygen deficiency, collapsing walls, and biological hazards** pose a constant threat. Despite repeated national and judicial pronouncements against hazardous manual cleaning, incidents of injury and death continue to be reported.

To further ensure the safety of sanitation workers working in confined spaces, two important Bureau of Indian Standards (BIS) codes—**IS 2470** and **IS 11972**—offer practical and technical guidance to reduce risk and promote safer work practices.

IS 2470: Engineering out the need for manual entry

IS 2470 (Code of Practice for Installation of Septic Tanks, Part 1: Design, and Part 2: Construction) outlines how septic tanks should be designed and constructed to function safely and efficiently while minimising the need for human entry. The standard prescribes:

- **Proper sizing and location** of septic tanks based on occupancy, ensuring accessibility without compromising safety.
- **Mandatory provisions for ventilation**, which prevent the accumulation of poisonous gases such as hydrogen sulphide and methane.
- **Inspection and cleaning access via manholes**, allowing for mechanical cleaning devices to be used instead of manual entry.

When followed diligently, IS 2470 supports a shift from dangerous manual cleaning to safer, **machine-based de-sludging**. It also reduces the frequency with which tanks need cleaning by ensuring proper sedimentation and effluent flow, further limiting worker exposure.

Yet, on the ground, the reality is starkly different. Septic tanks are often built without following IS 2470 guidelines—undersized, unventilated, and without access points. This pushes sanitation workers to enter tanks filled with untreated waste, often without safety gear, training, or supervision.

IS 11972: Codifying safety in sewer entry

- Where entry into sewer systems or manholes is necessary, **IS 11972 (Code of Practice for Safety Precautions to be Taken When Entering a Sewerage System)** provides a detailed protocol. This includes:
- **Atmospheric testing** of confined spaces for oxygen levels and the presence of harmful gases before any entry is attempted.
- **Mandatory use of PPE**, such as gas masks, gloves, boots, and full-body harnesses.
- Provision of **lifelines, rescue equipment, and standby personnel** to respond in case of emergencies.
- Adequate **ventilation** of the work site and clear procedures for entry and exit.
- Training and drills to ensure workers can recognise hazards and respond appropriately.

Despite being a well-documented standard, IS 11972 remains poorly implemented. Many sanitation workers are not informed of these safety measures, let alone equipped or trained to act on them. Often, the urgency to restore blocked lines or clean overflowing tanks outweighs considerations of occupational safety.

Bridging the gap between standards and practice

The existence of IS 2470 and IS 11972 shows that the technical knowledge for safe sanitation work already exists. What remains is the systemic enforcement of these standards across municipalities, contractors, and engineering departments. This involves:

- Making BIS codes a non-negotiable part of all public sanitation tenders and contracts.
- Ensuring training and certification of sanitation workers on these standards.
- Establishing accountability mechanisms for non-compliance, including penalties and legal action.

10.8. Emergency Response Sanitation Unit : Overview, Roles and Responsibilities

Developed by CPHEEO and MoHUA, 'Emergency Response Sanitation Unit: An Advisory' was issued in 2019 focusing on ensuring zero deaths during hazardous cleaning of sewers and septic tanks. The objective is set to be achieved through:

1. **Modernisation of existing sewage systems and coverage of non-sewered areas:** Efforts should be taken to modernise the existing sewage systems so that they are not prone to blockages and more suitable for mechanised cleaning. Further, wherever feasible, the areas serviced by septic tanks need to be covered by sewer lines, in a phased manner.

2. **Tackling non-sewered areas:** In areas that continue to be non-sewered and dependent on septic tanks and/or open drains, 'Faecal Sludge and Septage Management Systems' should be set up for mechanised cleaning of septic tanks and collection, transportation and treatment of the faecal sludge.
3. **Equipping municipalities and local bodies:** Each local body/Municipality, and private sanitation agencies, if any, to be equipped with appropriate technology, machinery, etc. (mechanised solution) and ensure that only trained professionals are allowed to enter the sewer/septic tanks.

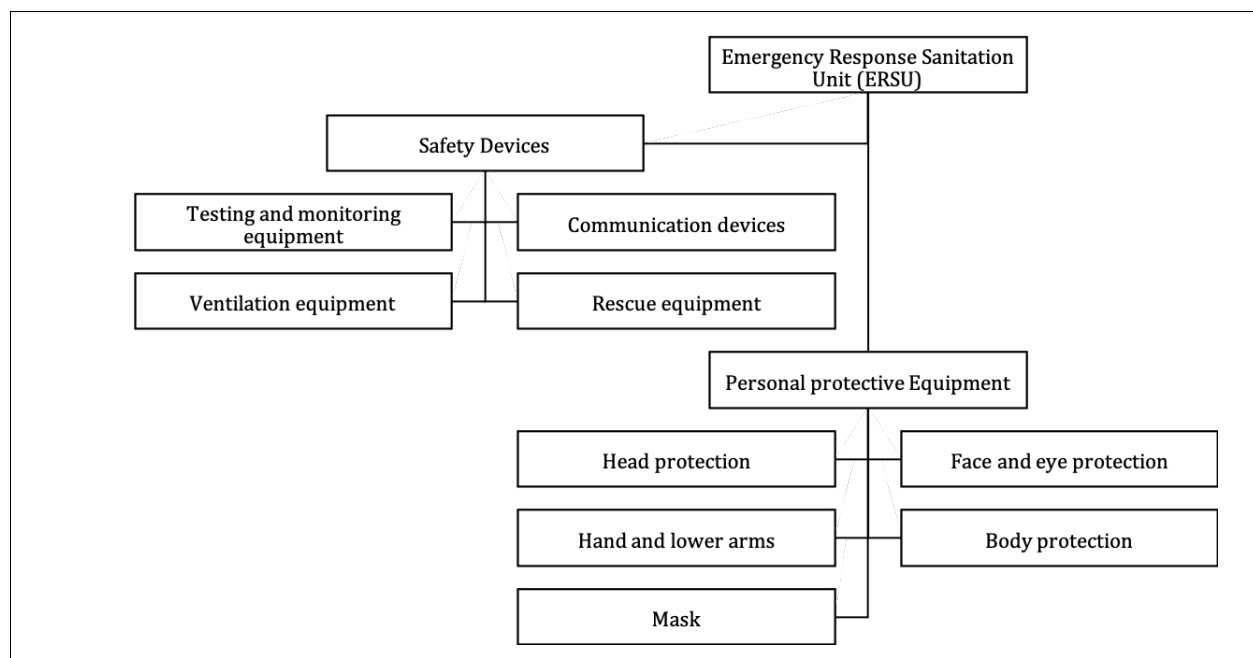


Figure 49. Operationalising Emergency Response Sanitation Unit (ERSU)

10.9. ERSU Protocol and Procedures

To take care of emergency situations of blockage of sewer systems and septic tanks, the major municipalities in each district shall set up an Emergency Response Sanitation Unit (ERSU). The main objective of the ERSU is to provide a professional, well trained, motivated and appropriately equipped workforce for the maintenance and management of sewers and septic tanks, thereby eliminating the deaths caused by entry of workers into sewers and septic tanks without proper PPEs and training and nonadherence to security protocols.

1. ERSUs will be set up in major cities which have Municipal Corporation and/or Water and Sewer Board (in whatever local name) and in capital cities of each state and UT. The ERSU shall be responsible to meet sanitation emergency requests from all smaller towns within a cluster say 75 km radius.
2. The ERSU shall be generally based on the structure of the Fire Services or Fire Brigade; It will be provided a dedicated 3- or 4-digit Registered Telephone Number (RTN)/ or hotline. This RTN will be common for all ERSUs in the state/ UT.
3. Normal cleaning and suction of sewer or septic tanks which does not require entry of a person into sewers, septic tanks or nallahs may be undertaken by contractors or vendors as well as by the empanelled PSSOs Private Sanitation Service Organisation (PSSO) (without any effect on their primary task with ERSUs). For this too, available technology may be deployed and Swachhta Udyami Yojana (SUY) funds made available..
4. Staff for ERSU will be arranged by the RSA. It shall consist of a headquarters and a 24x7 response contact number.
5. Sewer Entry Professionals (SEPs) may preferably be selected from traditionally employed sanitation workers. They must be comprehensively trained on their job and safety and security measures so that they do not risk their lives in cleaning of sewer or septic tanks.

6. RSA should procure adequate full sets of protective equipment (both personal and institutional) and maintain them at optimal efficiency at all times. Whenever, a SEP team is tasked to carry out the job, they may be issued the protective gear and other equipment and should be allowed to do the job under the supervision of a trained officer of RSA.
7. Entry of any individual other than member of a trained SEP team specifically deputed from ERSU into sewers or septic tanks without the permission of ERSU shall be deemed contravention of the PEMSRA Act, 2013, and such individuals and the entity or person allowing such entry directly or indirectly, will be held criminally liable under the Act. RSA will be empowered take necessary action in this regard.

10.10. Emergency Procedures for Confined Spaces

Cleaning of sewers and septic tanks is a critical yet hazardous task that involves confined space entry. The Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013, mandates mechanical cleaning as the primary method. However, in unavoidable circumstances requiring manual entry, stringent safety measures and procedural steps must be followed to prevent fatalities and occupational hazards. As per the SOP for Cleaning of Sewers and Septic Tanks, CPHEEO laid out the following procedural doctrine to ensure safe confined space entry.

1. Site assessment and hazard Identification

- Conduct a preliminary inspection to assess sewer blockage, depth, and potential gas accumulation.
- Identify high-risk areas, such as high hydrogen sulphide (H₂S) concentration zones or oxygen-deficient environments.
- Deploy gas detection devices to measure the presence of toxic gases (H₂S, CO, CH₄).
- Ensure adequate ventilation by opening 2-3 manholes for at least an hour before work begins.

2. Site safety and isolation

- Barricade the worksite with cones, signage, and flags to prevent unauthorised access.
- Deploy a flagman 15 metres ahead to alert vehicular traffic.
- Prohibit open flames, smoking, and spark-generating tools near the confined space.

3. Emergency preparedness

- Keep First-aid kits, oxygen resuscitators, and emergency contact lists at the site.
- A tripod with harness and pulley system should be set up for emergency retrieval.
- Ensure an ambulance is on standby in case of medical emergencies.

4. PPE

Workers entering confined spaces must wear:

- Full-body waterproof suits (for depth > 5 ft) or partial fishing waders (for < 5 ft)
- Breathing apparatus (escape set with 10-minute air supply) in case of sudden gas exposure.
- Helmet with headlamp, safety gloves, and oxygen level monitoring devices.

5. Confined space entry procedures

- The oxygen level inside the manhole must be checked at the bottom, middle, and top. If oxygen levels are below 19.5 per cent or above 21 per cent, entry is prohibited.
- Artificial ventilation (air blowers) must be used if oxygen deficiency or gas presence is detected.
- Workers must descend one at a time using a secured ladder, with continuous monitoring via CCTV or a supervisor stationed above ground.
- Cleaning is done using mechanical tools (scrapers, rods, suction devices) to minimise human exposure.
- A worker's duration inside the confined space should not exceed 90 minutes, followed by a mandatory 30-minute rest interval.

6. Exit and decontamination

- Workers should be pulled out using the safety harness and immediately undergo a decontamination process (washing with disinfectant).
- Equipment and PPE must be sanitised before being stored or reused.
- The manhole cover must be securely sealed to prevent unauthorised access or gas leaks.

7. Reporting

- Supervisors must log all activities, gas readings, and any incidents in a report.
- Data should be digitised in the ULB system to track cleaning schedules and worker safety compliance.

10.11. Use of Safety Devices and Personal Protective Equipment

Entering septic tanks is extremely dangerous and potentially fatal. Just the act of entering the tanks may cause injury in case of an accidental fall. These risks are particularly pronounced if workers wear minimal clothing and do not use safety gear. Without adequate protective gear, the entire body is exposed to faecal sludge. Inhalation of harmful gases and/or asphyxiation while in the tank can cause unconsciousness or death. Further, the presence of multiple objects blocking the tank including menstrual products, condoms and polythene bags increases time to complete cleaning, thereby increasing the duration of exposure.

1. **Injury in case of septic tank collapsing on the workers:** In India, often households, businesses and industries construct septic tank or holding tank as large or deep as possible to avoid periodic de-sludging. The structure may collapse when workers are inside the septic tank as well as when they are working from on top of it the structure collapse and its related hazard include fall, bruise as well as drowning.

Ladder Safety

To minimise the risk of falls from ladder use, adhere to the following safety practices:

- Pre-use inspection: Always inspect ladders for defects or damage before use.
- Extension ladders: Extend extension ladders at least 3 feet above the landing point. Secure them with tie-offs to prevent movement.
- Ladder placement: Position the base of the ladder one-fourth of its length from the wall to ensure stability.
- Hand safety: Avoid carrying tools or materials while climbing. Use a tag line or other methods to transport items.
- Fixed ladders: Use safety cages or fall arrest systems when ascending fixed ladders.
- Step ladders: Ensure step ladders are appropriate for the height required and never stand on the top step.

2. **Bruises, cuts from sharp objects inside the septic tank:** Inside the septic tank, due to limited visibility and presence of foreign objects, de-sludging workers are at risk of bruises and cuts.
3. **Skin infection due to contact with cleaning agents:** Generally, bathroom and toilet cleaning products are liquid acidic products and are therefore more often used undiluted than other cleaning products. Bathroom cleaners are usually liquids and are available in bottles, spray bottles and as aerosol foams. During mixing and loading, the user pours the bathroom cleaner straight into a bucket (no use of a measuring cup). Due to this, inhalation exposure from evaporation, and dermal exposure to the pure product due to spills can occur.
4. **Physical contact with sludge:** While inside the septic tank, de-sludging workers face the potential hazard of coming in contact with faecal sludge. Body are specifically at risk. For detailed discussion on hazards associated with physical contact with faecal sludge during de-sludging, see Desludging Stage.
5. **Inhalation of large quantities of harmful gas leading to unconsciousness and asphyxiation:** The hazard associated with inhalation of large quantities of harmful gas is extremely high when de-sludging workers are inside the septic tank. The hazard remains potentially risky even if the septic tank has been de-sludged prior with mechanised means. Similarly, newly constructed septic tanks have been reported to have harmful gas associated with confined space.

Liquid Protective Suits

- Liquid-protective suits, designed to shield against biological/ chemical splashes, are available in one-piece and two-piece styles. Two-piece suits consist of a separate jacket and pants, but they may not provide complete coverage, leaving areas such as the neck vulnerable to splashes.
- Fully encapsulating suits offer comprehensive protection by covering all parts of the body from liquid and solid chemical exposure. However, these suits are not airtight. Contaminated air can infiltrate through zippers, snaps, or seam openings.
- To mitigate inhalation risks, wear an appropriate respirator that filters out contaminants entering the suit. While most air contaminants pose minimal risk due to their low concentrations, there is a potential for skin absorption or damage. In most cases, the low levels of contaminants that may contact the skin do not pose a significant health threat.

Boots and Gloves

To protect against chemical exposure, workers must wear durable, chemical-resistant boots and gloves, as these are the body parts most exposed to hazardous substances. Utilising multiple layers provides added protection and comfort:

- Layering: Use chemical-resistant outer boots and gloves with additional layers like boot covers and glove liners for enhanced protection and comfort.
- Breakthrough time: Gloves have a limited lifespan. They degrade or reach their breakthrough time, allowing chemicals to penetrate and potentially cause skin damage. Refer to the manufacturer's selection charts to determine the appropriate gloves for specific chemical exposures. Replace gloves before they reach their breakthrough time to maintain effective protection.

Behaviour of Gases inside Confined Spaces

In confined spaces, gases and vapours exhibit different behaviours based on their density relative to air. Heavier-than-air gases, such as methane, settle at the bottom of confined spaces, while lighter-than-air gases, like hydrogen, accumulate near the top. To ensure comprehensive safety, it is essential to test all levels (top, middle, bottom) of a confined space using properly calibrated gas detection instruments (Pettit et al., 1987).

If tests detect oxygen deficiency or the presence of toxic gases, the confined space must be ventilated and re-tested before any entry. In situations where ventilation is not feasible, such as emergency rescues, workers must use appropriate respiratory protection. Understanding the behaviour of gases helps in effective monitoring and risk mitigation within confined environments (What Combustible Gases Are Associated With Confined Spaces?, 2023).

6. Exposure to gases

The following section provides a brief overview of the three most common septic tank gas, their characteristics and human health risk associated with these.

a. Exposure to H_2S

- **Characteristic:** It is a flammable gas, which burns with a blue flame, giving rise to sulphur dioxide, a highly irritating gas with a characteristic odour. Mixtures of H_2S and air in the explosive range may explode violently.
 - **Human health risk:** Even at low concentrations, H_2S has an irritant action on the eyes and the respiratory tract. Intoxication may be hyperacute, acute, subacute or chronic. It enters the body through the respiratory system and is rapidly oxidised to form compounds of low toxicity. There are no accumulation phenomena and elimination occurs through the intestine, urine and the expired air.

In cases of slight poisoning, low exposure from 10 to 500 ppm, a headache may last several hours, pain in the legs may be felt and, rarely, there may be loss of consciousness. In moderate poisoning (from 500 to 700 ppm), there will be loss of consciousness lasting a few minutes but with no respiratory

difficulty. In cases of severe poisoning, the subject drops into a profound coma with dyspnoea, polypnoea and a slate-blue cyanosis until breathing restarts. Tachycardia and tonic-clonic spasms are seen.

Inhalation of massive quantities of H_2S will rapidly produce anoxia resulting in death by asphyxia. Epileptiform convulsions may occur and the individual falls apparently unconscious and may die without moving again. This is a syndrome characteristic of H_2S poisoning in sewer workers. However, in such cases, exposure is often due to a mixture of gases including methane, nitrogen, carbon dioxide and ammonia.

In sub-acute poisoning, the eyes are affected by palpebral edema, bulbar conjunctivitis and mucopurulent secretion with, perhaps, a reduction in visual acuity with the lesions usually being bilateral. This syndrome is known to sugar and sewer workers as "eye". Long term exposure to H_2S may result in bronchitis of the lungs, associated with cough, phlegm, and/or shortness of breath.

- **What causes H_2S accumulation in septic tank or confined spaces:** H_2S is a gas commonly found during the drilling and production of crude oil and natural gas, and in wastewater treatment and utility facilities and sewers. The gas is produced as a result of the microbial breakdown of organic materials in the absence of oxygen. Colourless, flammable, harmful and corrosive, it is noticeable by its rotten egg smell. However, H_2S becomes odourless above the 100ppm.

b. Exposure to Methane (CH_4)

- **Characteristics:** Methane exposure, particularly when experienced in high concentrations, can lead to methane poisoning. While it is considered relatively non-toxic, its primary threat is that it functions as an asphyxiant, similar to the threat posed by carbon monoxide exposure.
- **Human health risk:** When inhaled, it displaces ambient air, thus depriving the body of oxygen needed to breathe. While low concentrations are generally not harmful, higher concentrations lead to less oxygen availability and a range of symptoms may be experienced.
- Symptoms will become more severe as the concentration of methane increases, and the period of exposure becomes more prolonged. Mild exposure over a period of days or weeks can often show relatively few physical symptoms, but still, have a dramatic impact on overall mental health. Long-term effects can include lasting cardiovascular, respiratory, and neurological problems. Those who have been exposed are also at an increased risk of developing memory loss, depression, epilepsy, claustrophobia, and heart problems.
- Symptoms also occur and escalate more quickly when physical exertion increases (due to the increased oxygen needs of the body during physical activity). Prolonged deprivation of oxygen that can occur with methane gas poisoning can also cause permanent damage to the brain and the heart.
- Aside from the severe effects that occur when methane gas exposure displaces oxygen, methane poses few other health hazards for those who encounter it. It is not an irritant, although when in liquified gas form, direct contact can cause frostbite and tissue death to exposed skin. It is not a known carcinogen.
- **What causes accumulation of methane in septic tank and confined spaces:** When organic matter in the waste is decomposed in the absence of oxygen, methane is generated. The enclosed area of the septic tank subsequently fills with methane and an oxygen-deficient space is created. In such a situation, methane – a colourless, explosive, and highly flammable gas accumulates in the septic tank, leading to possible explosions.

Air Monitoring Instrument

The respiratory system, comprising the nose, mouth, pharynx, windpipe, bronchi, and alveoli, is essential for oxygen absorption and carbon dioxide expulsion. Workers use respirators to: Protect from air contaminants: Local effects: Prevent respiratory system injuries from inhaled contaminants. Systemic effects: Avoid chemicals that once absorbed by the lungs can affect other body parts.

Provide breathing air in oxygen-deficient atmospheres: Respirators are crucial when the oxygen level falls below 19.5%, as insufficient oxygen can lead to severe health effects, including death.

Respirators address three hazardous conditions:

1. Gas and vapour contaminants: Molecules integrated into the air.
2. Particulate contaminants: Includes solid particulates (dust, fibres, fumes) and liquid particulates (mists, sprays).
3. Oxygen deficiency: Insufficient oxygen levels.

There are two main types of respirators:

1. Air Purifying Respirators (APRs): Filter or cartridge-based devices that clean contaminated air but do not supply oxygen.
2. Atmosphere-supplying respirators: Provide clean air from a cylinder or airline, necessary in oxygen-deficient environments.

For effective protection, ensure a proper fit by avoiding facial hair that can compromise the respirator seal, leading to exposure to contaminants.

c. Exposure to Carbon Monoxide (CO)

- **Characteristics of CO:** Poisoning occurs when CO accumulates in the bloodstream, replacing oxygen in red blood cells. This can cause severe tissue damage or death. It is an odourless, tasteless, and colourless gas produced by burning fuels such as gas, wood, propane, or charcoal. Inadequately ventilated appliances or engines can lead to dangerous CO levels, especially in confined spaces where gas accumulation is exacerbated.

N95 Respirators: Scope and Limitation

N95 respirators are effective for filtering airborne particles, such as metal fumes, dust, and biological agents like viruses. They are suitable for environments where particulate matter is a concern. However, N95 respirators are not designed to filter gases or vapours. If you are exposed to harmful gases or vapours above permissible limits, you must use respirators equipped with specialized cartridges or canisters containing treated charcoal to effectively remove these contaminants before inhalation.

Ensure that the selected respirator is appropriate for the type of exposure and verify that the filter media is not compromised by the specific conditions in your work environment (N95 Day 2017: When to Think Beyond the N95 FFR | Blogs | CDC, 2017).

- **Health human risks:** CO poisoning primarily affects the brain and heart. Chronic exposure may present symptoms similar to flu but without fever.
- **Sources of CO in confined spaces:** In septic tanks and other confined spaces, CO can accumulate due to incomplete decomposition of waste and sewage. Historical practices, such as using canaries in coal mines, highlight the danger: these birds would exhibit distress or collapse when exposed to CO, providing an early warning system for miners.

10.12. Case Study: Skilling And Training of Core Sanitation Workers Under the Garima Scheme, Odisha

Objective:

To ensure that core sanitation workers have practical training to undertake sanitation services in a safe and dignified manner.



Figure 50. Pictures of training under Garima Scheme, Odisha

Intervention: The programme aims to provide practical and hands-on training considering adult learning pedagogies, in safe sanitation practices, especially for workers engaged in cleaning septic tanks and sewer lines, a semi-literate audience. For this purpose, the Odisha Water Academy was designated as the dedicated training institute, with specially-built demo models to help the sanitation workers get practical training without putting their health and safety at risk. The programme was undertaken in the following stages

1. **Active outreach:** All sanitation workers across the state who have been enumerated under the Garima Scheme and are involved in cleaning of septic tanks and sewer lines were being provided the training through Odisha Water Academy.
2. **Pre-training assessment:** A pre-training assessment was undertaken to understand the existing levels of skills and knowledge among the targeted trainees at the beginning of the training, to set a benchmark.
3. **Hands-on training:** Interactive, hands-on training sessions were conducted in small batches involving participatory methods such as role play, demonstration of safety devices, and sessions for operating them to gain practical experience.
4. **Post-training assessment:** Post-training assessment was conducted to ascertain that sanitation workers have understood the SOP and learnt the practical applicability of various equipment through both verbal and practical assessments. Sanitation workers who scored more than 70 per cent were certified as Sewer Entry Professionals (SEPs) by the Odisha Water Academy.

To assist with this, a cohort of Master Trainers (MTs) was developed from among trainers who have previously delivered training on sanitation-related subjects and those who met minimum eligibility criteria (relevant soft skills, previous experience of giving practical training etc.). A similar pre-training assessment was conducted for the potential MTs and practical training was provided to them to build their capacity for delivering hands-on training to sanitation workers. A post-training assessment was also conducted consisting of theoretical, practical and verbal assessments.

Impact

Until July 2022, 280 workers had been trained, of which 258 were certified as SEP. Similarly, 22 MTs were also trained, of which 19 were certified upon successfully concluding the programme. The programme ensured that identified sanitation workers from all 115 ULBs the training.

Challenges

For states to implement a similar training programme, the major challenges would be identifying sanitation workers who require the training and ensuring that they undertake the same, as well as in identifying an appropriate training institution that is sensitive to the specific target audiences. In Odisha, the enumeration processes launched as part of the Garima Scheme helped mitigate this challenge, as the importance of the benefits of the training could easily be conveyed to the sanitation workers directly. Another challenge was to ensure that sanitation workers have access to training where they can learn hands-on application of safety devices and equipment. Odisha Water Academy ensured the same by developing the necessary infrastructure and procuring safety devices required for delivering practical training.

Trainer's Note

Introduction

The trainer begins by welcoming participants and introducing the topic of confined space hazards, with a focus on septic tanks, manholes, and underground chambers encountered during desludging work. Emphasis is placed on the life-threatening risk of asphyxiation and the critical need for preventive strategies.

Participants are informed that this session aims to deepen their understanding of confined space dynamics, introduce tools for risk detection and control, and reinforce safe work protocols in line with legal mandates and standard operating procedures.

Understanding Confined Spaces

The trainer defines a confined space in the context of sanitation work: **any fully or partially enclosed space with limited access, inadequate ventilation, and potential accumulation of toxic gases.**

Using relatable examples (e.g., narrow manholes in stormwater drains or deep septic tanks), the trainer explains why such spaces pose heightened dangers—low oxygen levels, presence of flammable gases, and difficulty in evacuation.

Asphyxiation and Toxic Gas Hazards

The trainer introduces key gases— **Hydrogen Sulfide (H₂S)**, **Methane (CH₄)**, **Carbon Monoxide (CO)**, and **Ammonia (NH₃)**—and explains their sources, effects on the human body, and typical signs of gas exposure (e.g., dizziness, unconsciousness, nausea).

Suggested Tool:

- **Visual poster** depicting confined space structure and gas layering (heavier gases sinking, oxygen deficiency at lower levels).
- **Gas Detection and Safe Entry Protocol**
- The trainer walks through the **step-by-step safe entry procedure**, including:
 - Pre-entry **gas detection using calibrated meters**
 - Mandatory **PPE**, especially **full-face respirators or BA sets**
 - Deployment of **tripods, safety harnesses, and lifelines**
 - Use of **buddy system and external supervision**
 - Ensuring **mechanical de-sludging first** and entry **only as last resort**

Suggested Demonstration:

Trainer uses a gas detector to test air in a sealed container. Participants read and interpret the digital display.

Legal Safeguards and SOPs

The trainer revisits key provisions from the **Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act (2013)** and the **CPHEEO Manual**, stressing that **manual entry into confined spaces is legally allowed only when:**

1. Mechanical methods are unviable
2. Prior written permission is obtained
3. Full PPE and rescue plans are in place

Suggested Activity:

1. Quick quiz on legal do's and don'ts with case-based scenarios.

Emergency Situations and First Aid

The trainer explains how to recognize and respond to a **confined space emergency**, including:

- Gas-induced collapse
- Delayed rescue attempts leading to multiple casualties
- Role of **rescue equipment and trained responders**

Suggested Role-Play:

Simulated rescue involving unconscious worker, gas detection, CPR, and emergency calling.

Suggested Game: “Confined Space Challenge”

Small groups are given a model confined space layout and a checklist of safety actions. They must arrange entry, perform a simulated test, and respond to an emergency. The first team to complete all steps accurately wins.

Case Study Reflection

The trainer presents a real-world incident involving fatalities due to illegal or uninformed entry into a septic tank. The discussion is used to underline the **importance of refusal rights** and **early risk detection**.

Suggested Reflection Prompt:

“Have you or someone you know ever entered a tank without a gas check? What were the risks, and how can it be done differently?”

Closing and Behavior Change

In conclusion, the trainer underscores that no cleaning task is worth a life. The focus is shifted toward empowerment:

- Refusing unsafe entries
- Always demanding a gas test
- Educating others in the team

Each participant is asked to name one safety action they will never skip again during confined space work.

11

Mental Health of Sanitation Workers



11.1 Session Plan

Sl. No	Day	Topics	Duration in mins
1	Day 2	Presentation (Interactive discussions)	35
2		Questions & Discussion	10
Total			45

11.2 Learning Objectives

1. To psycho-educate the participants about mental health and the unique challenges a sanitation worker deals with.
2. Gain insight into how adverse work conditions and societal stigma can negatively affect the mental health of a sanitation worker.
3. Understand actionable strategies and interventions to bring more emotional and psychological safety for our sanitation workers.

11.3 Key Takeaways

1. Sanitation workers have remained invisible and unheard for far too long.
2. Their struggles have led to suffering that is not just financial, but also physical, psycho-social, and psychological (mental, emotional, social/behavioural).
3. Despite decades of resistance and survival, their mental health needs have remained largely unseen and unaddressed.
4. Positive shifts are now emerging but there is a long way to go.
5. It is time for each of us as citizens, institutions, and policymakers to act collectively as well as individually.
6. Even the smallest effort can contribute to the dignity and mental well-being of Sanitation workers.
7. Supporting their mental health is not charity it is justice, dignity, and overdue recognition.
8. Mental health is a human development issue and therefore, unless varied aspects of a sanitation worker's life are not worked on, their mental health will not improve.

11.4 Understanding Mental Health: A Foundation for Well-Being and Progress

Health is a multidimensional concept that goes beyond merely being free from illness. The World Health Organization (WHO) defines health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” This definition highlights that true health is holistic, encompassing physical, mental, and social dimensions, all of which are interconnected and essential for a person's overall well-being.

11.5 Mental Health: A Vital Component of Health

Mental health refers to a state of mental well-being that enables individuals to cope effectively with the stresses of daily life, realize their abilities, learn efficiently, work productively, and contribute meaningfully to their community. It plays a central role in shaping how people think, feel, and behave, influencing decision-making, relationship-building, and overall life satisfaction.

Good mental health is not simply the absence of mental illness; it is a proactive state of resilience and emotional balance. Individuals with strong mental health can manage challenges, adapt to change, maintain positive relationships, and pursue personal and professional goals. In contrast, poor mental health can affect physical health, social interactions, and economic productivity, demonstrating that mental well-being is deeply intertwined with every aspect of life.

Importance of Mental Health for Society

Mental health is crucial not only for individual development but also for societal progress. Communities that support mental well-being tend to have higher productivity, better social cohesion, and stronger economic and cultural growth. Promoting mental health reduces stigma, prevents social isolation, and fosters environments where people can thrive collectively.

A Basic Human Right

Mental health is recognized as a fundamental human right. Everyone, regardless of age, gender, socioeconomic status, or background, is entitled to mental well-being. Ensuring access to mental health resources, supportive environments, and awareness initiatives is essential to empower individuals and protect this right.

11.6 Addressing the Mental Health of Sanitation Workers

Mental health is an integral part of overall well-being, influencing how individuals think, feel, and function in their daily lives. In India, approximately 1 in 7 people experience poor mental health, yet common conditions such as depression and anxiety often remain undiagnosed or untreated. Contributing factors include limited public understanding, widespread social stigma, and a severe shortage of trained mental health professionals. These challenges make it difficult for vulnerable populations to seek help, leaving many to cope with stress and psychological strain alone.

Sanitation workers represent one of the most marginalized and high-risk occupational groups. Studies examining the mental and social health of sanitary workers, such as those conducted in Uttar Pradesh, reveal that nearly 66.67% of workers experience moderate to high levels of occupational stress. The sources of this stress are multi-faceted: workers are frequently exposed to hazardous conditions, including contact with human waste, toxic gases in sewers, and risk of injuries. Moreover, the societal stigma attached to sanitation work contributes to feelings of social exclusion, low self-esteem, and chronic psychological strain.

The consequences of unaddressed mental health issues among sanitation workers can be severe. Tragically, there are regular reports of sanitation workers-and sometimes their family members-dying by suicide. These incidents underscore the urgent need to consider mental health as a core component of occupational safety, alongside physical protection measures.

Why Mental Health Matters in Sanitation Work

1. **High-Stress Environment:** Daily exposure to hazardous work conditions and societal discrimination creates chronic stress.
2. **Impact on Productivity and Safety:** Psychological strain can reduce concentration and increase the likelihood of workplace accidents.
3. **Social and Family Implications:** Mental health issues affect not only workers but also their families, influencing community health and well-being.
4. **Human Rights Perspective:** Every worker has the right to a safe and healthy working environment, which includes mental and emotional well-being.



Figure 51: Determinants of Well Being: Maslow's Hierarchy

Source: www.healthcareradius.in

Maslow's Hierarchy of Needs is a psychological theory proposed by Abraham H. Maslow in 1943. It aims to explain human motivation and behaviour by categorizing human needs into a structured hierarchy. The central premise is that human beings are motivated to fulfill needs in a sequential order, starting from the most basic physiological requirements and moving toward higher-order psychological and self-fulfillment needs. This framework has been widely applied in psychology, education, management, and health sciences to understand human behaviour and motivation (Maslow, 1943).

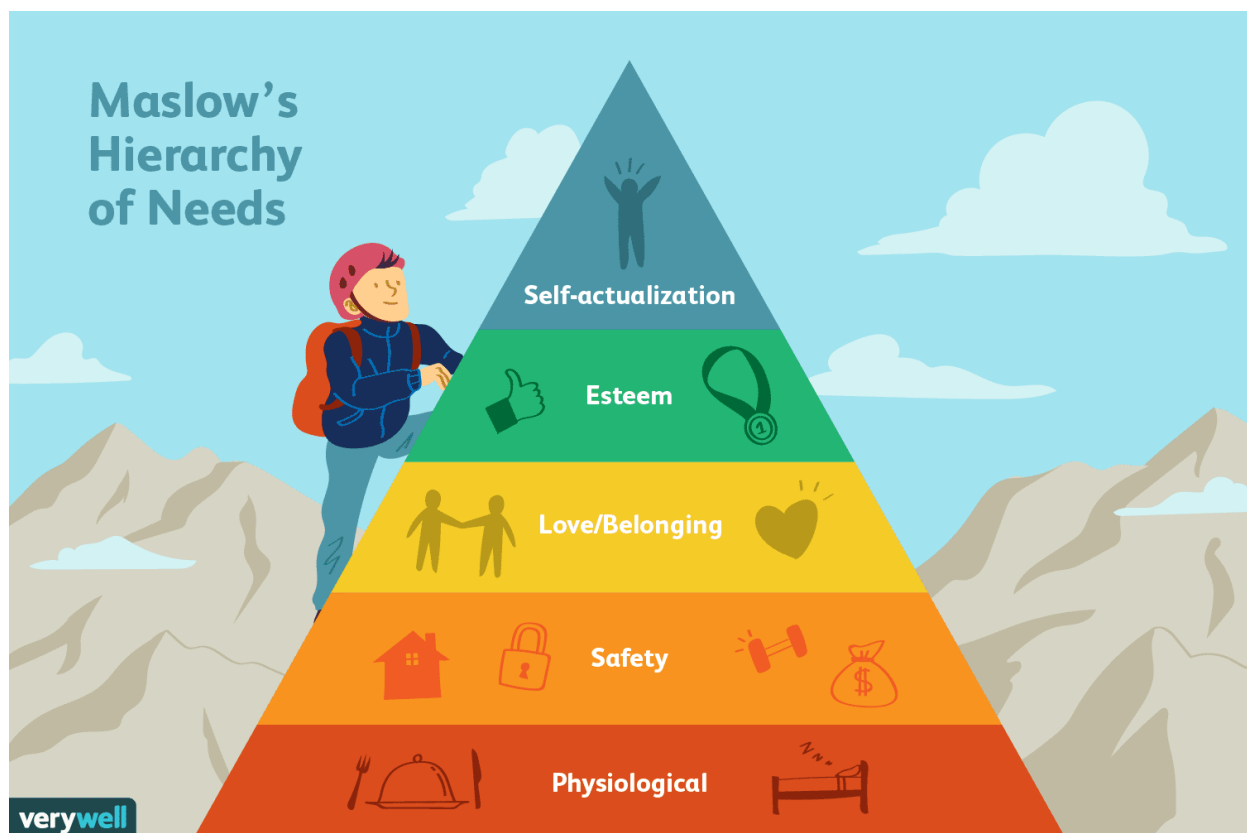


Figure 52 Maslow's Hierarchy of Needs

Source: MSED (2024)

The Five Levels of the Hierarchy:

- **Physiological Needs:** These are the most basic human survival needs, including food, water, shelter, sleep, and clothing. Without satisfying these needs, an individual cannot focus on higher-level needs. In the workplace or social contexts, ensuring these needs are met is fundamental for motivation and engagement. Physiological needs are therefore the primary motivators of human behaviour, as they ensure the body's basic functioning and survival.
- **Safety Needs:** Once physiological needs are met, humans seek safety and security. This includes physical safety, health and well-being, financial security, and protection from accidents or harm. In organizational settings, safety can relate to job security, safe working conditions, and health benefits. Lack of safety may create anxiety and prevents progression or motivation to higher levels.
- **Love and Belongingness Needs:** Humans are inherently social beings. After ensuring safety, individuals strive for love, friendship, intimacy, and a sense of belonging in social groups such as family, peers, and communities. Social inclusion and positive interpersonal relationships are crucial for psychological stability and motivation. In an organizational context, this translates to teamwork, supportive colleagues, positive work culture, and a sense of inclusion, which help employees feel connected and motivated.
- **Esteem Needs:** Esteem needs include the desire for respect, self-esteem, recognition, and a sense of achievement. Maslow divided this level into two categories: (a) self-esteem (confidence, competence) and (b) respect from others (recognition, status). Fulfilment of esteem needs enhances self-confidence and empowers individuals to achieve personal and professional goals. In an organizational context, this can include promotions, awards, responsibilities, and appreciation for one's work.
- **Self-Actualization Needs:** At the top of the hierarchy is self-actualization, which refers to realizing one's full potential, personal growth, creativity, and self-fulfilment. Self-actualized individuals pursue purpose-driven goals and creative expression, which in the workplace can be supported through challenging projects, skill development, and opportunities for innovation and leadership. Maslow described this stage as the desire "to become everything one is capable of becoming".

Mental health and holistic well-being grow like a ladder, from basic survival to self-actualization. For sanitation workers, however, all levels of this ladder are compromised:

- **Physiological Needs:** They struggle with irregular pay, inadequate nutrition, limited access to clean water, and insufficient rest during long work hours.
- **Safety Needs:** Their work exposes them to hazards with minimal protective equipment, little to no health insurance, and no job security.
- **Love and Belongingness Needs:** Social stigma and exclusion leave them feeling isolated, undervalued, and disconnected from the community.
- **Esteem Needs:** Despite their essential contribution to public health, their efforts often go unrecognized, harming their self-worth and confidence.
- **Self-Actualization Needs:** Limited education, skill development, and career opportunities prevent them from realizing their potential and pursuing personal growth.

Taken together, this consistent neglect across all levels of need severely impacts their mental health and holistic well-being, as even the most basic requirements for a stable, respected, and fulfilling life are not being met.

Key Insights and Applications:

- The hierarchy is often represented as a pyramid, with physiological needs at the base and self-actualization at the apex.
- Maslow suggested that higher-order needs become relevant only when lower-order needs are sufficiently satisfied, though some flexibility exists.
- Critiques include cultural bias and the rigid hierarchical order, as some individuals may prioritize higher order needs even when lower ones are unmet.
- For sanitation workers, there is a gap in needs being met at every level.
- Addressing only one need is insufficient; a holistic approach is essential to restore dignity, motivation, and resilience.

Human needs extend far beyond the basics of survival, they include safety, dignity, belonging, respect, and the opportunity to fulfil one's potential. When these needs remain unmet, they leave deep marks on a person's sense of self, influencing self-image, self-esteem, and the distance between the real and ideal self.

11.8 Sense of Self of Sanitation Workers

- An individual's Sense of Self is crucial to maintaining their mental well-being.
- In context of sanitation workers, various factors negatively impact their sense of self, thereby leading to negative mental health outcomes.
- What is Sense of Self? The sense of self refers to an individual's awareness of who they are, including their roles, abilities, and sense of worth. It is shaped by three key factors: self-image (aatma-chavi), self-esteem (aatma-samman), and the real and ideal self.
- A sanitation worker's sense of self is strongly shaped by how they are seen and treated in different spaces, which affects how they perceive their own identity and worth.
- A positive sense of self allows sanitation workers to recognize their importance and build resilience against social stigma, while a diminished Sense of Self may lead to alienation and social withdrawal, in turn leading to poor mental health outcomes.



Figure 53. Picture of sanitation worker carrying waste from households

Source: WaterAid/Sudharak Olwe

Self-Image

Self-image is how individuals perceive themselves, encompassing beliefs, attitudes, and assumptions about one's abilities, appearance, and role in society.

- **Professional self-image:** Workers may feel pride in their technical skills, ability to handle challenging and hazardous tasks, and in maintaining public health. Training, skill development, and recognition of their work enhance this professional self-image.
- **Social self-image:** Stigmatization, public avoidance, and derogatory labelling can distort workers' social self-image, leading to internalized shame or embarrassment. This is particularly evident among younger workers and women in sanitation services, who may feel limited social acceptance.
- **Physical and health-related self-image:** Sanitation work often exposes workers to occupational hazards, infections, and musculoskeletal strain. Physical injuries or fatigue can impact their perception of bodily capability and overall self-image.

Self Esteem

Self-esteem is a person's overall sense of self-worth and value. It is the degree to which individuals respect, appreciate, and believe in themselves. High self-esteem helps people feel confident and capable, while low self-esteem can lead to feelings of inadequacy or self-doubt.

- **Emotional Safety Challenges:** Sanitation workers often face low self-esteem due to societal stigma, lack of recognition, and undervaluation of their essential work. Unsafe working conditions, low wages, and limited career growth opportunities further affect their sense of dignity and self-worth. Constant negative social feedback or discrimination can lead to feelings of frustration, shame, or inadequacy.
- **Enhancing Self-Esteem:** Self-esteem can be strengthened when sanitation workers are treated with respect, acknowledged for their contributions, and given opportunities for skill development and growth. Providing safe working conditions, fair remuneration, and community recognition helps them feel valued, and even small achievements or positive feedback can significantly boost confidence, motivation, and overall well-being.

Ideal Self vs. Real Self

The ideal self represents who a person aspires to be—the qualities, abilities, and recognition they hope to achieve. The real self represents who they currently are, based on actual experiences, skills, and social positioning. The greater the gap between real and ideal self, the lower the well-being.

- **Discrepancy challenges:** Many sanitation workers experience a gap between their real self and ideal self due to low wages, hazardous work conditions, social stigma, or lack of career progression. This gap can lead to frustration, lowered self-esteem, or feelings of inadequacy.
- **Sources of ideal self:** Workers' ideal self often includes professional recognition, social respect, financial stability, improved working conditions, and opportunities for skill advancement.
- **Bridging the gap:** Providing training, safe working conditions, fair remuneration, and community recognition helps reduce the discrepancy between real and ideal self. Achieving even incremental progress toward their ideal self can significantly enhance self-esteem and motivation.

11.9 Factors Hindering the Development of Sense of Self of Sanitation Workers

For sanitation workers, the development of a strong sense of self is often hindered by a combination of social, economic, and occupational factors that undermine their confidence, dignity, and social recognition. Key factors include:

1. **Social Stigma** Sanitation workers frequently face disrespect and social exclusion due to pervasive negative stereotypes associated with their occupation. They are often perceived as “unclean” or “menial,” which can lead to humiliation in daily interactions. Continuous exposure to such stigma erodes self-worth, limits self-expression, and prevents the development of a positive personal and professional identity.
2. **Caste Discrimination** In many communities, sanitation work is historically linked to specific castes. Workers often endure marginalization and discrimination based on caste, which restricts access to education, economic opportunities, and social mobility. This systemic bias diminishes their dignity and reinforces a constrained sense of self.
3. **Low Pay** Despite performing essential services that safeguard public health, sanitation workers frequently receive very low wages. Economic deprivation not only affects their material well-being but also impacts their self-esteem and perception of personal value, creating a sense of inadequacy and dependency.
4. **Hazardous Working Conditions** Sanitation work exposes individuals to unsafe, unhygienic, and physically demanding environments. Daily contact with waste, biohazards, and poorly maintained infrastructure poses significant health risks, leading to stress, anxiety, and chronic illness. These conditions contribute to a weakened sense of self by fostering feelings of vulnerability and helplessness.



Figure 54. Cesspool vehicle operator at work

Source: IRC, 2019

5. **Job Insecurity** Employment in the sanitation sector is often unstable or contractual, with limited benefits or social security. Workers face constant uncertainty about income continuity and job tenure, which undermines confidence, planning for the future, and a stable sense of personal and professional identity.

6. **Gender Bias** Women sanitation workers face additional barriers, including harassment, exclusion from benefits like maternity leave, and limited opportunities for advancement. Gender-based discrimination compounds occupational challenges, making it harder for women to assert their value and develop a confident sense of self.
7. **Social Exclusion** Beyond stigma, sanitation workers are frequently shunned during public crises such as pandemics, when fear and misinformation exacerbate discrimination. Such social exclusion reinforces feelings of isolation, marginalization, and diminished social belonging, all of which are essential for forming a positive self-concept.

11.10 Substance Abuse Among Sanitation Workers: Coping Mechanisms and Job-Borne Addiction Subculture

Sanitation work is inherently hazardous and socially stigmatized, exposing workers to physically demanding conditions, unhygienic environments, and psychological stressors. Many workers develop substance use behaviors as a coping mechanism to manage these challenges.

1. **Coping with Hazardous Work:** The nature of sanitation work, especially tasks such as sewer cleaning, exposes workers to foul odors, toxic gases, and high-risk environments. To endure the physical and psychological strain, some workers turn to alcohol, tobacco, or gutka consumption. These substances temporarily alleviate the stress, discomfort, and trauma associated with their work, serving as a form of self-medication. While this may provide momentary relief, it does not address the underlying occupational hazards and, over time, can create dependency.
2. **Job-Borne Addiction Subculture:** In many cases, substance use transcends individual coping and evolves into a workplace norm or subculture. Some workers consume alcohol or other substances before beginning their shifts to numb their senses against the harsh realities of the job. Repeated use in this context can lead to a work-related addiction subculture, reinforced by factors such as physical fatigue, exploitation, social isolation, and monotony of repetitive tasks. The normalization of substance use within work groups can make it difficult for individuals to seek help or break the cycle of dependency.



Figure 55. Challenges of addiction

Source: Indian Express

3. **Consequences of Regular Substance Use** Chronic substance use among sanitation workers has multiple adverse effects:

- **Cognitive Impairment:** Prolonged use can affect judgment, decision-making, problem solving or simply thinking and being able to pay attention, increasing the risk of accidents at work.
- **Social and Family Impact:** Dependence may strain relationships, leading to social isolation, domestic conflicts, and in some cases, heightened aggression or domestic violence.
- **Occupational Risks:** Impaired physical and mental functioning reduces productivity and increases vulnerability to injuries, further jeopardizing livelihood.
- **Reinforced Marginalization:** Social stigma against sanitation workers can exacerbate isolation, while substance dependency may deepen public perceptions of unreliability, perpetuating cycles of exploitation and exclusion.

Key Takeaway: We need to look beyond the labelling of sanitation workers as users of substances and acknowledge why they are compelled to rely on substance use. This is a systemic issue that needs urgent attention. Substance use has negative impact not only on the sanitation worker themselves but also those around them, including their family members.

11.11. Supporting Sanitation Workers: Individual, Peer, and Institutional Approaches

Sanitation workers perform essential yet often hazardous work under challenging conditions. Their physical health, mental well-being, and social dignity are frequently compromised due to exposure to harmful substances, social stigma, low wages, and high-pressure work environments. Effective support for sanitation workers must operate across multiple levels—individual, peer, and institutional—to ensure holistic care and empowerment.

1. Individual-Level Support

At the individual level, the focus is on empowering sanitation workers to recognize their own needs and adopt strategies that enhance their physical and mental well-being:

- **Self-awareness and Stress Management:** Workers should be trained and equipped with information so that they can understand and identify personal stress triggers. Awareness of these triggers is the first step toward managing stress constructively.
- **Healthy Coping Mechanisms:** Adoption of healthier coping strategies can reduce reliance on maladaptive behaviours such as substance use. Practices like mindful breathing (in safe environments), physical exercises, yoga, or engaging in supportive conversations can help manage stress.
- **Access to Emotional Support:** Workers can connect with peers, NGOs, or government programs designed to provide mental health resources. Awareness and utilization of these services empower workers to seek help before stress escalates into burnout or mental health disorders.
- **Occupational Health Practices:** Regular hygiene, correct use of personal protective equipment (PPE), and adherence to safety protocols are critical individual measures. Workers should be vigilant in maintaining personal safety during sewer cleaning, waste collection, or handling hazardous materials, thus reducing physical and occupational health risks.

2. Peer-Level Support

Peer-level interventions recognize the importance of social connectedness, mutual support, and community-based solutions for sanitation workers:

- **Awareness and Access to Support Systems:** Workers should be informed about the availability of trauma-informed counselling, addiction recovery programs, and mental health helplines. Knowledge of these resources reduces isolation and encourages timely utilization.
- **Peer Support Groups:** Establishing structured peer-support networks enables sanitation workers to share experiences, challenges, and coping strategies. Such groups foster solidarity, reduce feelings of alienation, and provide emotional validation, which is especially critical in stigmatized occupations.

- **Community-Based Counselling:** Access to lay counsellors from within the workers' own communities can mitigate barriers of stigma, language, and cultural understanding. For example, programs implemented for ASHA workers in rural Madhya Pradesh allow workers to access mental health support near their workplaces, creating a safe, trusted environment.
- **Modelling Safe Practices:** Peer groups can encourage adherence to workplace safety, hygiene practices, and proper PPE use, reinforcing behavioural norms that protect physical and psychological health.



Figure 56. Women sanitation workers in Patna safely clean a sewer using the new mechanized system

Source: Deeksha Foundation and UNFPA

3. Institutional-Level Support

Institutions—including urban local bodies (ULBs), municipal corporations, unions, and NGOs—play a critical role in creating systemic protections and a supportive work environment for sanitation workers:

- **Training and Sensitization:** Mental health awareness and sensitization should be integrated into routine workplace training. Supervisors, union leaders, and health officers should be trained to recognize signs of distress and provide basic psychosocial support, including referral pathways for specialized care.
- **Stakeholder Awareness Campaigns:** Campaigns targeting policymakers, supervisors, and the public can reduce stigma, promote dignity, and highlight the essential contributions of sanitation workers. Increased awareness fosters respect and inclusion, mitigating the social isolation workers often experience.
- **Safe Work Environments:** Institutions should implement policies and oversight mechanisms that ensure safe working conditions, appropriate PPE provision, mechanization of hazardous tasks, and adherence to occupational safety protocols.
- **Mental Health Protections:** Institutions can offer on-site counselling services, helplines, and wellness programs, and support the formation of worker advocacy groups for collective bargaining on mental health and safety concerns.
- **Alternative Livelihood Support:** Providing guidance and opportunities for skill development or alternative livelihoods can alleviate financial stress and reduce dependency on hazardous work, contributing to long-term well-being and self-esteem.

11.12 Legal and Policy Framework of Mental Health in India

India's approach to mental health is guided by a combination of statutory laws, national policies, and programmatic initiatives aimed at ensuring access, protection, and quality care for individuals experiencing mental health challenges. Over the past four decades, the country has progressively strengthened its legal, institutional, and programmatic mechanisms to address mental health needs.

1. Mental Healthcare Act, 2017

The Mental Healthcare Act (MHCA), 2017 is the cornerstone of India's contemporary mental health legislation. It provides a rights-based framework for mental health care and treatment, emphasizing the protection of the dignity and autonomy of persons with mental illness. Key provisions include the right to access mental health services, informed consent, decriminalization of suicide attempts, and guidelines for supported decision-making. The Act also mandates the establishment of Mental Health Review Boards to safeguard the interests of individuals in institutional care.

2. National Mental Health Programme (NMHP), 1982

The National Mental Health Programme (NMHP) was launched to integrate mental health care into general health services and ensure accessibility at the community level. The program focuses on reducing the burden of mental disorders through public health initiatives, training of healthcare professionals, and community-based interventions. NMHP laid the foundation for scaling mental health services nationwide.

3. District Mental Health Programme (DMHP), 1996

An extension of NMHP, the District Mental Health Programme (DMHP) was introduced to operationalize mental health services at the district level. DMHP aims to decentralize mental health care, providing treatment, rehabilitation, and preventive services closer to communities. This program emphasizes the role of primary healthcare centers, trained community health workers, and referral mechanisms for severe mental illnesses.

4. National Mental Health Policy, 2014

The National Mental Health Policy, 2014 provides a strategic vision to promote mental well-being, prevent mental disorders, and ensure accessible and affordable care. It stresses early intervention, reducing stigma, and empowering persons with mental illness through community participation. The policy also encourages collaboration between health, social, and educational sectors to create an inclusive mental health ecosystem.

5. Ayushman Bharat – Health & Wellness Centres (2018 onwards) & PM-JAY

Under Ayushman Bharat, Health & Wellness Centres serve as the primary contact points for mental health screening, counselling, and treatment, integrating mental health services into broader primary healthcare. The Pradhan Mantri Jan Arogya Yojana (PM-JAY) provides financial protection for secondary and tertiary care, including mental health hospitalization, thus reducing economic barriers for mental health service utilization.

6. Employees' State Insurance Scheme (ESIC)

The ESIC framework includes provisions for mental health support for insured employees. By covering both preventive and curative services, the scheme facilitates early diagnosis, treatment, and rehabilitation for workers experiencing mental health challenges, linking occupational health with mental well-being.

7. National Tele-Mental Health Programme, 2022

Recognizing the shortage of mental health professionals and the need for wider access, the National Tele-Mental Health Programme was launched to provide teleconsultation, remote counselling, and digital mental health interventions. This initiative aims to bridge the urban-rural divide, strengthen crisis support services, and enhance mental health literacy.



Figure 57. Sanitation workers working in challenging situations

Source: TNUSSP

11.13 Existing Initiatives Supporting Mental Well-Being

1. Several initiatives focus on improving the occupational safety, working conditions, and social dignity of sanitation workers. Key programs include:

- **TNUSSP (Tamil Nadu Urban Sanitation Support Programme):** Promotes safe sanitation practices, provides occupational health support, and encourages dignity in work.
- **GARIMA (Odisha):** Focuses on empowering sanitation workers, particularly manual scavengers, ensuring safe work environments and social recognition.
- **NAMASTE (National Action for Mechanized Sanitation Ecosystem):** Advocates for mechanized sanitation methods to reduce reliance on manual scavenging, providing protective equipment and training.

2. **Financial Security and Economic Empowerment:**

To reduce economic vulnerability and promote sustainable livelihoods, several schemes have been implemented:

- **Ayushman Bharat Yojna:** Health insurance coverage for sanitation workers and their families.
- **NSKFDC (Tamil Nadu):** Financial assistance and skill-based loans for occupational advancement.
- **Self-Employment Scheme for Rehabilitation of Manual Scavengers (SRMS):** Provides financial support and entrepreneurship opportunities for rehabilitated workers.
- **TNUSSP (TN):** Offers livelihood-related financial assistance alongside safety programs.

3. **Skill Development, Education, and Housing:**

Programs under this category aim to equip sanitation workers with marketable skills, educational opportunities, and adequate housing:

- **Recognition of Prior Learning (RPL, Uttar Pradesh):** Enhances skills certification and employability.
- **Bheem Shalas:** Educational support for children of sanitation workers.
- **Safai Karmachari Awas Scheme (Maharashtra, Gujarat, TN, and Delhi proposed):** Provides affordable and dignified housing to sanitation workers and their families.

4. Legal and Rights-Based Protections:

Legislation and codes ensure the protection of sanitation workers' rights and occupational safety:

- **Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013:** Outlaws manual scavenging and ensures rehabilitation measures for affected workers.
- **Occupational Safety Code (2020):** Establishes guidelines for safe working practices and mandatory protective measures for sanitation workers.

11.14 Tele-MANAS Initiative: Mental Health and Emotional Support for Sanitation Workers

The Tele-MANAS Initiative operates under the broader framework of the National Tele-Mental Health Program, aiming to ensure comprehensive mental health support for all, including sanitation workers who face unique occupational challenges. Recognizing the high levels of stress, social stigma, and exposure to hazardous conditions inherent in sanitation work, Tele-MANAS provides 24x7 remote access to qualified mental health professionals, offering a critical lifeline for workers who may otherwise find it difficult to seek support.

Sanitation workers can also connect with trained psychologists and counsellors through free national helplines (8686139139) such as Mann Talks, which provide free emotional and psychological support. These helplines are designed to be accessible and confidential, enabling workers to discuss stress, anxiety, depression, or work-related trauma without fear of judgment.

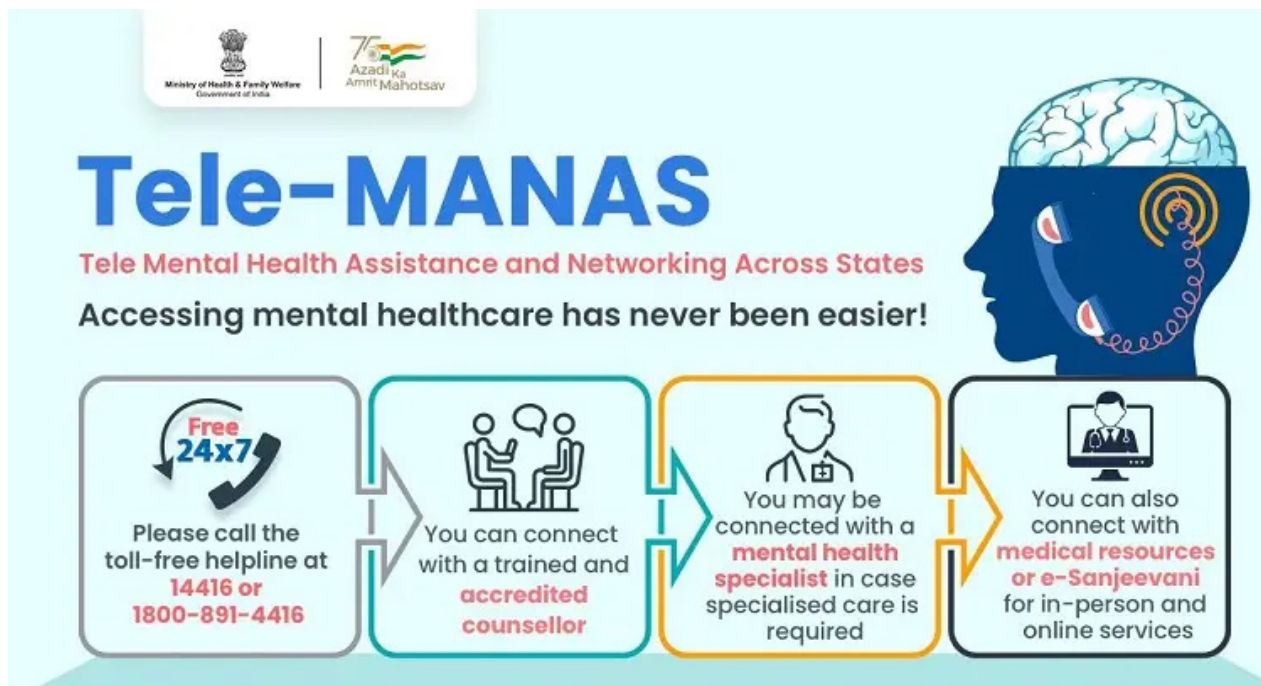


Figure 58: Tele Manas, a mental healthcare helpline

Source: MoF&FW

In addition to tele-counselling, local de-addiction programs play a pivotal role in supporting long-term mental well-being. Many workers develop coping mechanisms, such as alcohol or tobacco use, in response to job stress. NGOs like Parivartan, Muktangan, Antara, and Kripa Foundation offer free or subsidized rehabilitation and counselling programs that can help sanitation workers overcome these challenges, promoting healthier coping strategies and sustainable mental health.

To maximize impact, awareness of Tele-MANAS services, national helplines, and NGO support programs can be integrated into existing training and counselling camps for sanitation workers. By embedding mental health awareness within routine occupational safety and training programs, workers are better equipped to recognize stress triggers, seek timely support, and engage in preventive self-care.

11.15 Exercises

Activity 1: Mapping Mental Health Challenges (Group Discussion & Problem-Solving)

- Objective: Identify the key mental health risks sanitation workers face and brainstorm solutions.
- Method:
 - Provide participants with a printed map of a sanitation worker's daily routine (from starting work to finishing).
 - Ask each group to mark areas of high stress or mental health risk on the map (e.g., public stigma, workplace isolation, unsafe conditions).
 - Groups then brainstorm solutions for each marked risk and present them.

Activity 2: Case Study Analysis – Odisha & Garima Scheme

- Objective: Learn from real-life interventions to improve sanitation workers' mental well-being.
- Method:
 - Assign each group a case study (Emergency Response Sanitation Units, Wage Improvements, PPE Institutionalization, SHG Formation, Health & Social Security Interventions, Mechanization).
 - Groups analyze the effectiveness of the intervention and discuss how similar strategies could be applied in other regions.
 - Each group presents key takeaways and lessons learned.

11.16 Case Study

Trainers Note

Key Talking Points

Mental health as part of total well-being: Explain WHO's definition of health; stress that mental health is not merely the absence of illness.

Unique challenges for sanitation workers: Highlight chronic stress, stigma, hazardous conditions, and low social recognition.

Impact on dignity and productivity: Discuss how poor mental health affects safety, family life, and workplace morale.

Maslow's Hierarchy of Needs: Use it to show how all levels of well-being (physiological to self-actualization) are compromised for sanitation workers.

Sense of Self: Discuss how self-image, self-esteem, and the "real vs. ideal self" shape mental health outcomes.

Substance use as a coping mechanism: Explain why some workers turn to substances and the need for **systemic—not moralistic—interventions**.

Support Systems: Cover the three-level approach—individual, peer, and institutional—emphasizing awareness, stress management, peer groups, and policy-level change.

Fighting Addiction: Mumbai's Sanitation Workers Get a Fresh Start

In the bustling metropolis of Mumbai, a silent struggle plays out among the city's sanitation workers. Long hours, hazardous work, and social neglect have led many to turn to alcohol and substance use as a means of coping. But a new initiative is offering them a way out.

The Rotaract Club of Bombay Film City (RCBFC), in collaboration with local NGOs and rehabilitation centres, has launched a targeted de-addiction program aimed at helping these workers break free from substance dependence. Through awareness campaigns, counselling sessions, and access to rehab facilities, the project is shedding light on an issue often ignored in discussions on labour welfare.

Addiction in the Shadows

For many sanitation workers, addiction is more than just a habit—it is a survival mechanism. The physical toll of cleaning Mumbai's streets, drains, and waste disposal sites, coupled with low wages and social stigma, has driven many into a cycle of alcohol and drug use.

"Most workers start drinking to deal with stress, and before they know it, they are trapped," says a social worker involved in the campaign. The program aims to break this cycle by offering not just detoxification but long-term support.

A Community-Driven Solution

RCBFC has adopted a three-pronged approach:

1. Education and Awareness – Street-level campaigns and interactive sessions to help workers recognize the dangers of addiction.
2. Rehabilitation and Counselling – Partnerships with detox centres to provide structured recovery programs.
3. Sustained Support – Follow-up assistance to prevent relapses and encourage a healthier lifestyle.

Challenges and the Road Ahead

- Despite early success stories, deep-rooted social acceptance of addiction remains a major challenge. Many workers hesitate to seek help, fearing job loss or social isolation. Moreover, the lack of municipal-level health interventions means that addiction treatment often remains a voluntary and inconsistent effort.
- Advocates are calling for formal integration of mental health and de-addiction services into municipal sanitation policies, ensuring long-term support rather than short-term relief.
- As Mumbai continues its battle against urban waste, efforts like these are a reminder that cleaning the city must also mean safeguarding the well-being of those who do it.

<https://rotaractnews.org/combating-addiction-among-mumbais-sanitation-workers/>

Trainers Note

Key Talking Points

- Mental health as part of total well-being: Explain WHO's definition of health; stress that mental health is not merely the absence of illness.
- Unique challenges for sanitation workers: Highlight chronic stress, stigma, hazardous conditions, and low social recognition.
- Impact on dignity and productivity: Discuss how poor mental health affects safety, family life, and workplace morale.
- Maslow's Hierarchy of Needs: Use it to show how all levels of well-being (physiological to self-actualization) are compromised for sanitation workers.
- Sense of Self: Discuss how self-image, self-esteem, and the "real vs. ideal self" shape mental health outcomes.
- Substance use as a coping mechanism: Explain why some workers turn to substances and the need for systemic—not moralistic—interventions.
- Support Systems: Cover the three-level approach—individual, peer, and institutional—emphasizing awareness, stress management, peer groups, and policy-level change.
- National and State initiatives: Briefly mention MHCA 2017, DMHP, Tele-MANAS, TNUSSP, and GARIMA as frameworks promoting mental health and dignity.

Facilitation Tips

- Begin by asking: "What comes to your mind when we say 'mental health'?" to gauge perceptions.
- Use real-life examples and local references to make the session relatable.
- Encourage empathy—ask participants how they might feel if their work was stigmatized or unsafe.
- Keep the tone non-judgmental when discussing substance use or emotional distress.
- Conclude with collective reflection: "What can we do at individual, institutional, and community levels to support mental health of sanitation workers?"

Activities

- Activity 1: Mapping Mental Health Challenges – Groups identify stress points in a sanitation worker's daily routine and suggest remedies.
- Activity 2: Case Study Analysis – Groups discuss successful interventions (Garima, ERSU, Mechanisation, SHGs) and present takeaways.

Key Message

Supporting sanitation workers' mental health is not an act of charity but one of justice and dignity. Each act of awareness, recognition, and safety contributes to restoring their self-worth and holistic well-being.

Exercise on Hazard Management Tool

Instructions

Participants will be completing the exercise following the given template, see Page 37.

1. **Divide participants into small groups** – Assign each group a specific task in used water management, such as collection and transportation of faecal sludge or septage, cleaning of drains and sewer lines, operation of treatment plants, etc.
2. **Identify workplace hazards** – Each group should list at least **five hazards** related to their assigned task, considering:
 - Physical hazards (slippery surfaces, heavy lifting, falling into pits)
 - Chemical hazards (exposure to toxic gases like methane, hydrogen sulphide) o Biological hazards (contact with pathogens, skin infections)
 - Ergonomic hazards (repetitive movements, poor posture)
 - Psychosocial hazards (stigma, work-related stress)
3. **Assess the risk level** – For each hazard, rate:
 - Probability (Low, Medium, High) – How likely is the hazard to occur?
 - Severity (Minor, Moderate, Major) – What are the possible consequences?
4. **Propose control measures** – Groups must suggest ways to reduce or eliminate risks using the hierarchy of Controls:
 - Elimination (e.g., replacing manual cleaning with mechanised de-sludging)
 - Substitution (e.g., using safer disinfectants instead of hazardous chemicals)
 - Engineering controls (e.g., proper ventilation, safe entry procedures for confined spaces)
 - Administrative controls (e.g., shift rotations, regular safety training, health checkups)
 - PPE (e.g., gloves, boots, masks, safety harnesses)

Reflections and Key Takeaways

As the training concludes, both the trainer and participants should focus on reinforcing the key concepts learned throughout the session.

Trainer's Focus:

1. **Reinforce Key Safety Practices:** Ensure that participants fully understand the importance of wearing PPE, following emergency response procedures, handling tools safely, and identifying hazards.
2. **Encourage Continuous Learning:** Stress that safety is an ongoing commitment. Regular practice of the skills learned in the session will help embed them into daily routines.
3. **Highlight Responsibility:** Emphasise that each worker plays a vital role in maintaining a safe work environment and should consistently apply the learned practices.

Participant's Focus:

1. **Commitment to Safety:** Participants should commit to using the proper PPE, following safety protocols, and actively reporting any hazards or incidents.
2. **Practical Application:** Focus on applying the learned safety techniques in their daily tasks, ensuring that they protect not only themselves but also their colleagues.
3. **Ongoing Vigilance:** Participants should recognise that safety is not a one-time practice but something that requires continuous attention and improvement.

Glossary

Attendant – An individual stationed outside a confined space who monitors the authorised entrants and performs all attendant's duties assigned in the employer's confined space programme.

Biohazard – An organism or the product of an organism that poses a health threat to humans or animals.

Biochemical oxygen demand (BOD) – The amount of oxygen that is required to biochemically convert organic matter into inert substances, an indirect measure of the amount of biodegradable organic matter present in the water or wastewater. (WHO)

Burnout – Feeling completely drained or tired from too much stress over time.

Calibration – The process of adjusting a measuring or monitoring instrument by comparing its reading to a known standard.

Chemical oxygen demand (COD) – A measure of the amount of oxygen required for chemical oxidation of organic material in water by a strong chemical oxidant (expressed in mg/L). COD is always equal to or higher than BOD since it is the total oxygen required for complete oxidation. It is an indirect measure of the amount of organic material present in water or wastewater: the more the organic content, the more oxygen is required to chemically oxidize it (high COD). (EAWAG)

Co-composting – Composting of septage along with the organic fraction of municipal solid waste as a form of co-treatment. The organic fraction includes food waste, paper, yard waste (e.g. leaves and branches) cut or removed during landscaping. (CSE, 2017)

Combustible – Any material, chemical, solid, liquid, or gas that can burn. A combustible liquid has a flash point above 141°F (60.5°C). Combustible liquids do not ignite as easily as flammable liquids but can ignite under certain circumstances.

Community toilets – Toilets that are situated in a common place where certain number of families living within a community can use are called community toilets.

Concentration – The amount of a chemical (gas, vapour, or particulate) in the air. For example, 5 ppm of acetone is 5 parts of acetone in every 1,000,000 parts of air.

Containment – Containment describes the ways of collecting, storing, and sometimes treating the products generated at the toilet (or user interface). The treatment provided by these technologies is often a function of storage and is usually passive (e.g., requiring no energy input). Thus, products that are ‘treated’ by these technologies often require subsequent treatment before use and/or disposal. (WHO, 2018)

Coping Mechanism – Anything people do, good or bad, to deal with stress or problems.

Dermatitis – Inflammation of the skin, such as redness, rash, dryness or cracking, blisters, swelling, or pain.

Emotional Resilience – Your ability to bounce back when life gets tough.

Emotional Support – Having someone to talk to who understands and cares.

Engineering Controls – Prevention of worker exposures to contaminants by means of work process controls, mechanical equipment, or ventilation, rather than by requiring workers to wear PPE. *Escherichia coli* (E. coli) – A bacterium found in the gut, used as an indicator of faecal contamination of water.

Explosive Material – A material that can react rapidly, resulting in a sudden and violent release of energy.

Fecal sludge – Sludges of variable consistency collected from on-site sanitation systems, such as latrines, non-sewered public toilets, septic tanks and aqua privies. Septage, the faecal sludge collected from septic tanks, is included in this term (see also excreta and night soil).

Fecal sludge treatment plant (FSTP) – A treatment infrastructure established for treating fecal sludge.

Flammable – A liquid that has a flash point of 141°F (60.5°C) or less. A flammable liquid ignites easily at normal temperatures in the presence of a spark or ignition source.

Full cycle of sanitation (FCS) – Includes five stages, namely, 1) safe containment (consisting of toilets and septic tanks/drainage systems), 2) safe emptying services like de-sludging, 3) safe transport of waste by trucks, 4) safe treatment in sewage treatment plants / fecal sludge treatment plants, and 5) safe disposal/reuse.

Grounding – Simple techniques to help you stay calm and connected to the present moment, such as touching something nearby or deep breathing.

Hygiene – In the SDG definition, hygiene is subsumed under sanitation with a dedicated indicator referring to use/availability of a handwashing facility on premises with soap and water. Hygiene, however, includes a wider set of behaviours and measures that are able to reduce the burden of infectious diseases at home and in the community. It includes e.g. hand hygiene, personal hygiene, safe excreta disposal, ensuring safe water at the point-of-use, menstrual hygiene, general hygiene (laundry, surfaces, baths, sinks), food hygiene (cooking, storing, preventing cross-contamination), animal excreta management and solid waste management. In order to achieve better health outcomes, improved hygiene behaviours, cultural and social sensitivity, hygiene education, behaviour change and increased awareness at all levels of society are required (SSI 2019).

Ideal Self – The version of yourself you wish to become.

Inclusive Sanitation – Inclusive Sanitation is a public service approach to advance Equitable, Safe, and Sustainable outcomes, by strengthening the design and implementation of core public system functions of Responsibility, Accountability, and Resource Planning and Management (IWA 2022).

Improved sanitation – An improved sanitation facility is one that hygienically separates human excreta from human contact and can consist of one of the following facilities: Flush/pour.flush.to piped sewer system, septic tank, pit latrine; Ventilated improved pit latrine; Pit latrine with slab; Composting toilet (UNW DPAC 2011).

Inflammation – A condition of the body (or part of the body) characterised by swelling, redness, pain, or heat.

Ingestion – The process of taking a substance into the body through the mouth and the digestive system.

Inhalation – The process of breathing something into the lungs.

Institutions – The formal organizational arrangements in a country and its WASH sector; the capacity and resources that each organization has to perform its role, and the coordination mechanisms amongst the organizations (IRC 2018).

mg/m³ – Milligrams of contaminant per cubic metre of air, a way of measuring the concentration of a contaminant in the air.

Million Liters per Day (MLD) – Volume of wastewater/water in liters per day. Used for describing capacity of a treatment facility.

Off-site sanitation – System of sanitation where excreta are removed from the plot occupied by the dwelling and its immediate surroundings. It is otherwise known as centralized or network based sanitation.

On-site sanitation – System of sanitation where the means of storage are contained within the plot occupied by the dwelling and its immediate surroundings. For some systems (e.g. double-pit or vault latrines), treatment of the faecal matter happens on site also, through extended in-pit consolidation and storage. With other systems (e.g. septic tanks, twin-pit, single-pit or vault installations), the sludge has to be collected and treated off site (see also faecal sludge).

Organic Compound – A chemical that contains carbon. Volatile organic compounds vaporise easily at room temperature and are found in many industrial and household materials.

Oxygen Deficient Atmosphere – An atmosphere with less than 19.5% available oxygen by volume. Normal air contains about 21%.

Oxygen Enriched Atmosphere – An atmosphere with more than 23.5% oxygen by volume.

Parasite – Organism that lives in or on another living organism, called the host, from which it obtains its food and harms the hosts during the period.

Parts Per Million (ppm) – A way of expressing the concentration of a contaminant. It is the ratio of the amount of contaminant to the total amount of air or water.

Peer Support Groups – Safe spaces where people with similar experiences help each other by talking and listening.

Permissible Exposure Limit (PEL) – Maximum exposure to a chemical allowed by OSHA. PELs may be time-weighted averages (TWA), short-term exposure limits (STEL), or ceiling limits (C).

Personal Protective Equipment (PPE) – Clothing and devices worn by workers to protect against hazards in the environment, including respirators, safety glasses, protective clothing, etc.

pH – An expression of the intensity of the basic or acid condition of a liquid.

Poison – A chemical that can produce an adverse health reaction even when only a small amount gets into or on the body.

Psychological Safety – Feeling secure enough to be yourself and speak up without fear of being judged or punished.

Public toilets – Provided for the floating population / general public in places such as markets, train stations or other public areas, where there is a considerable number of people passing by.

Safe Space – A place or moment where people feel accepted, not judged, and free to share what they are going through.

Sanitation – The means of collecting and disposing of excreta and community liquid waste in a hygienic way so as not to endanger the health of individuals or the community as a whole.

Scum – Layer of suspended solids (grease, oil) less dense than water and floating on top of liquid waste from which they have separated by floatation.

Screens – Screening is essential for removal of floating materials which are mainly sachets, plastic sheet bits, leaves, fibres, rags, etc. A screen is a device with openings generally of uniform size. The screening element may consist of parallel bars, rods, gratings or wire mesh or perforated plates and the openings may be of any shape, although generally they are contrived from circular or rectangular bars. (CPHEEO, 2013)

Self-Esteem – How much you value and respect yourself.

Self-Image – How you see yourself, based on how you look, act, and what others say.

Septage – Partially digested semi-solid sludge removed from septic tanks. It is frequently used as a synonym to Fecal sludge.

Service Provider – The entity responsible for the day-to-day management of WASH services, including operation and maintenance (IRC 2018).

Settler – A settler is a primary treatment technology for wastewater; it is designed to remove suspended solids by sedimentation. It may also be referred to as a sedimentation or settling basin/tank, or clarifier. The low flow velocity in a settler allows settleable particles to sink to the bottom, while constituents lighter than water float to the surface. (Tilley et al. 2014).

Sewage – Mixture of human excreta and water used to flush the excreta from the toilet and through the pipes; may also contain water used for domestic purposes.

Sewage treatment plant (STP) – A treatment infrastructure established for treating domestic wastewater (sewage).

Sewerage – A complete system of piping, pumps, basins, tanks, unit processes and infrastructure for the collection, transporting, treating and discharging of wastewater.

Sludge – A mixture of solids and water that settles to the bottom of latrines, septic tanks and ponds or is produced as a by-product of wastewater treatment (sludge produced from the treatment of municipal or industrial wastewater is not discussed).

Sludge drying bed – A drying bed is a simple, permeable bed that, when loaded with sludge, collects percolated leachate and allows the sludge to dry by evaporation. Approximately 50% to 80% of the sludge volume drains off as liquid or evaporates. The sludge, however, is not effectively stabilised or sanitised (Tilley et al. 2014; Tchobanoglous et al. 2003).

Stigma – When people treat you unfairly or badly just because of something they don't understand, such as your job or mental health.

Substance Use as Coping – Using things like alcohol or tobacco to escape or numb pain and stress.

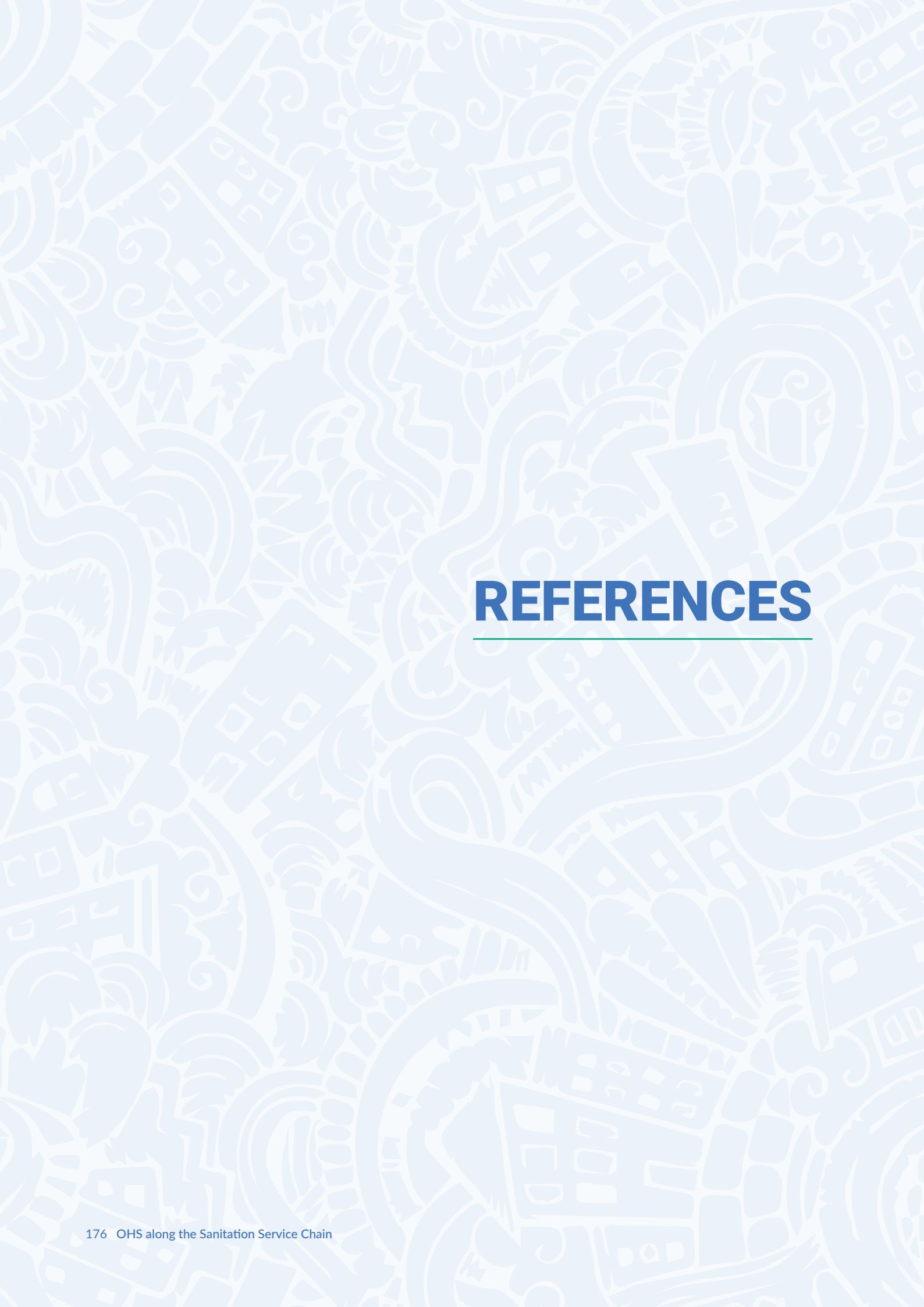
Survival Oriented Identity – When you are so focused on just getting through the day that you cannot think about dreams or goals.

Total Solids – The residue that remains after filtering a water or sludge sample and drying it at 105 °C (expressed in mg/L). It is the sum of Total Dissolved Solids (TDS) and Total Suspended Solids (TSS). (Tilley et al. 2014).

Trauma – Deep emotional pain from very difficult or frightening experiences.

Waste stabilisation ponds (WSP) – Shallow basins that use natural factors such as sunlight, temperature, sedimentation, biodegradation, etc., to treat wastewater or faecal sludges. Waste stabilisation pond treatment systems usually consist of anaerobic, facultative and maturation ponds linked in series (WHO 2006).

Wastewater – Liquid waste discharged from homes, commercial premises and similar sources to individual disposal systems or to municipal sewer pipes, and which contains mainly human excreta and used water. When produced mainly by household and commercial activities, it is called domestic or municipal wastewater or domestic sewage. In this context, domestic sewage does not contain industrial effluents at levels that could pose threats to the functioning of the sewerage system, treatment plant, public health or the environment.



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