

STATUS FAECAL SLUDGE AND SEPTAGE MANAGEMENT IN INDIA**Awadhesh Kumar Gupta¹ and Dr. Gaurav Shukla²**¹Research Scholar MUIT Lucknow UP India²Assistant Professor, MUIT Lucknow**ABSTRACT**

Ensuring access to safe sanitation services is essential for promoting healthy and productive lives. The detrimental impact of poor sanitation on health is evident, particularly in India where untreated sewage is a major contributor to water pollution. Conventional sanitation systems pose significant challenges, including high costs, overuse of water resources, pollution of land and groundwater, and inefficient use of vital wastewater components. To effectively address the issue of faecal sludge and septage, a comprehensive strategy is required that meets minimum standards, is economically viable for all locations, and considers specific local conditions. Emphasizing environmentally friendly sanitation methods can alleviate the crisis and mitigate water, soil, and health-related problems in Indian towns. This paper aims to examine the state of faecal and septage management in cities and proposes a roadmap for improving hygienic conditions.

INTRODUCTION

Urbanization plays a crucial role in a nation's development, but it has significantly transformed existing cities in India. The government launched the Swachh Bharat Mission in 2014 to eradicate open defecation and improve sanitation in urban areas. Water, sanitation, and health are interconnected, with contaminated drinking water, improper waste disposal, and poor hygiene contributing to various diseases. Previously, sanitation only focused on waste removal, but it now encompasses food, personal, residential, and environmental hygiene. By providing facilities for waste management and hygiene promotion, sanitation ensures privacy, dignity, and a clean living environment. Good sanitation practices prevent soil and water contamination, thereby promoting health and improving the human development index. Municipal governments and state-level bodies are responsible for providing basic amenities, including water supply, sewage, sanitation, and waste disposal. The 74th Constitutional Amendment Act decentralized administrative and financial functions, empowering local organizations to participate in planning and development.

NEED FOR SEPTAGE AND FSSM:

In India's major cities, underground pipelines, pumping stations, and wastewater treatment facilities are present, but they are expensive and require ample water, continuous power, and skilled operators. However, small Indian communities lack centralized sewage systems due to inadequate infrastructure. The Swachh Bharat Mission, initiated in 2014, aims to provide services to these communities, where many urban households still lack toilets and rely on onsite sanitation systems like pit latrines and septic tanks. Unfortunately, there hasn't been enough focus on how to build latrines, maintain them, manage their septage, and safely dispose of them. Local practices vary, and suitable infrastructure for drainage or soakage is limited. Urban local bodies (ULBs) often lack the resources and authority to regulate septic tank and pit cleaning, while some commercial enterprises and ULBs offer desludging services. Improper disposal of faeces poses environmental and health risks, and sanitation staff often clean onsite sanitation systems without proper safety gear.

In most Indian cities, the prevalence of onsite sanitation systems is evident, with only a small percentage of urban dwellings having access to piped sewers, septic tanks, or pit latrines. These systems, along with open defecation, contribute to water contamination. Proper collection, treatment, disposal, and reuse of sludge are essential for urban sanitation, but these practices are uncommon in Indian cities. Urban septic tanks and pits are often neglected due to resource constraints. Many cities and states lack the necessary infrastructure for safe faecal sludge transport. Desludging of septic tanks and pits is primarily done manually or using rudimentary methods. Finding suitable treatment options for sewage sludge is challenging, and waste is often disposed of improperly. The management

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of septage and sludge must consider local factors, and efforts should focus on improved sludge management and eco-sanitation practices in Indian towns.

Legislation and regulations, such as the National Urban Sanitation Policy, the Prohibition of Manual Scavengers and Dry Latrines Act, and the Solid Waste Management Rules, aim to address these issues. However, there is a need for more precise instructions on septage management and increased enforcement of regulations. The shift from a centralized seweragesystem to a holistic framework, as well as the introduction of the City Sanitation Plan (CSP) framework and Urban Sanitation Awards, has aimed to improve urban sanitation practices.

FAECAL SLUDGE MANAGEMENT:

Faecal sludge refers to the raw, partially digested, semi-solid slurry that has been stored for an extended period. It includes wastewater containing human excreta from toilets, known as black water. Managing faecal sludge and septage is essential and is referred to as faecal sludge and septage management (FSSM). FSSM aims to establish an environmentally safe and sustainable infrastructure for non-networked households along the sanitation value chain. The Family-Supported Self-Management Model (FSSM) includes techniques to deal with the lack of directions, regulation, and understanding of treatment choices. As part of FSSM, the construction of safe treatment facilities plays a crucial role in treating faecal sludge for appropriate disposal or utilization.

Sanitation facilities in India can be broadly categorized into network-based systems (piped sewerage) and on-site systems (all other categories). Only one-third of the urban population is served by network-based systems, indicating the prevalence of on-site systems (NIUA, 2005). Despite a marginal increase in the number of cities with access to sewerage, only 10 percent of cities have over 50 percent of households connected to sewerage systems (2011 Census). It is estimated that only one-third of the total wastewater generated in India is collected (CPCB, 2009). National sanitation assessments reveal that 65 percent of cities lack suitable facilities for safe excreta collection (MoUD, 2010). Poor maintenance, regular clogs, siltation, and other issues plague sewer systems in many Indian cities (WSP-TARU, 2008). Improper solid waste disposal and stormwater ingress further hinder sewer system functioning (Wankhade et al., 2014).

Over 45 percent of urban Indian households rely on on-site facilities like pit latrines and septic tanks, contributing to water and soil contamination. Despite the Swachh Bharat Mission's

(SBM) achievement in controlling human waste, faecal sludge and septage from septic tanks and pit latrines are not properly built, maintained, managed, or treated off. Urban local bodies (ULBs) have limited capacities and resources, resulting in a lack of regulation for maintenance and cleaning of septic tanks and pits. Many households do not report cleaning their septic tanks for years. While some ULBs and private operators offer desludging services, it is insufficient. Faecal sludge and septage are often dumped unsafely, posing environmental and health risks. Sanitation workers often lack proper protective gear and equipment when cleaning pits and tanks. Data on OSS toilets, septage disposal facilities, and procedures are lacking in most Indian cities, requiring a comprehensive approach tailored to each locality's circumstances.

India has made commendable progress in addressing the lack of toilets through initiatives like the Swachh Bharat Mission. However, there are still challenges related to safe and ecological sanitation. The scarcity of water and untreated sewage contamination pose further concerns. The treatment, collection, transportation, and disposal of faecal sludge are crucial aspects of urban sanitation. Yet, there is a lack of adequate facilities and services for faecal sludge management in most Indian cities. On-site sanitation technologies generate faecal sludge with varying concentrations of solids and non-faecal matter, requiring proper treatment. Currently, only 19 percent of urban sewage in India is treated according to standards (Aecom & Sandec, 2010; WSP-TARU, 2008).

The widespread use of water closet flush toilets exacerbates water scarcity and surface water contamination due to untreated sewage. Ecological sanitation offers an alternative to traditional sanitation methods. The lack of safe and sustainable sanitation systems in many cities leads to health issues and severe contamination of water and soil resources. Proper design, dissemination of suitable technologies for sewage treatment in tropical climates, and the

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development of necessary infrastructure and capacities within municipal organizations are vital. Inadequate septic tank designs and improper disposal practices contribute to pollution. Only a small number of municipal entities adhere to guidelines for sewage disposal, resulting in untreated sewage being dumped outside.

To address these issues, inclusive and equitable strategies should be adopted, particularly for underserved urban areas. Sanitation services should prioritize accessibility for all, including the urban poor. Municipal financing subsidies and differentiated price points are essential to ensure equitable services. Inclusion and social equity should be considered in planning, implementation, and monitoring of sanitation programs. Protection of sanitation workers' rights and occupational health and safety measures are crucial. Further expansion of faecal sludge management (FSM) is expected, and an inclusive approach is necessary to reach underserved communities. The Indian government has shown dedication to FSM through various initiatives and collaborations with multiple entities.

A sanitation system encompasses the management of human waste from production to disposal. Faecal sludge emptying and conveyance are essential but often overlooked services. Various service providers, ranging from unofficial individuals to multinational enterprises, offer faecal sludge emptying and transportation services. Manual and motorized methods are used, with considerations for health and safety. Faecal sludge is typically transported to treatment or disposal locations using vacuum trucks or large vehicles. However, some manual service providers dispose of sludge locally or through the municipal sewage system, which is neither sanitary nor sustainable. Precautions, such as wearing protective

gear and ensuring ventilation, must be followed during pit emptying. Improved manual emptying techniques and mechanized options, like vacuum pumps, are available. Transporting faecal sludge safely is crucial, and multi-barrier approaches can prevent virus transmission and protect public health.

India has shown progress in addressing faecal sludge management through national policies, initiatives, and collaboration with various stakeholders. State-specific FSSM rules, Faecal Sludge Treatment Plants (FSTPs), and behavior modification campaigns have contributed to improved FSSM. Inclusive approaches and investment in FSSM have yielded positive impacts.

CONCLUSION

The lack of adequate sanitation facilities contributes to an increase in water-borne infections and overall poor health. Unfortunately, the sanitation conditions in most towns and cities are dire, with no sewer network, ineffective sewage treatment plants, and insufficient sanitation services. In slums, where toilets are lacking, a significant portion of the population is forced to defecate in the open. It is crucial to safely empty and transport faecal sludge to protect the sanitation workers, families, communities, and the environment. Faecal sludge management involves taking sludge from on-site sanitation systems and transporting it for processing or disposal, such as pit latrines or septic tanks. The remaining three components of a sanitation system also require coverage. Sludge operators face challenges in declogging tanks, and the costs associated with declogging vary across cities. Regulation of sludge operators falls under the responsibility of urban local bodies (ULBs) and private organizations. Government sludge operators dispose of sludge at designated places like sewer lines, sewage treatment plants (STPs), or drains after desludging septic tanks and pit latrines. Private operators may dispose of sludge periodically in open drains or STPs if a sewer connection exists. Unfortunately, many people working in the sludge industry lack education on health, hygiene, and safety protocols.

To meet the demand for faecal sludge treatment, it is essential to encourage and involve private sector firms in the faecal sludge and septage management (FSSM) value chain. This will allow the market to be serviced effectively. Private parties can participate in emptying faecal sludge from residential properties and delivering it to faecal sludge treatment plants (FSTPs). They can also take responsibility for the development and operation of FSTPs. In certain urban local bodies, private players are even allowed to combine treatment and conveyance-related activities. Developing a cohesive ecosystem that promotes sustained private sector participation requires focusing on multiple components, such as showcasing market opportunities to potential players in related industries like

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solid waste management and liquid waste management. It is crucial to establish balanced risk-sharing mechanisms in agreements between bidding authorities at the state/city level and concessionaires while ensuring timely payments from the bidding authority.

REFERENCES

1. AECOM and Sandec. 2010. A Rapid Assessment of Septage Management in Asia: Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and Vietnam Thailand.
2. Central Pollution Control Board (CPCB). 2009. Status of Water Supply, Wastewater Generation and Treatment in Class-I Cities & Class-II Towns of India. New Delhi: Central Pollution Control Board.
3. International Water Association (IWA). 2014. Compendium of Sanitation Systems and Technologies. London: IWA.
4. McKinsey. 2010. India's Urban Awakening: Building Inclusive Cities, Sustaining Economic Growth. Seoul: McKinsey Global Institute.
5. Mishra, D. S. 2020. "Sustainable Sanitation in the Cities." Yojana, January.
6. Ministry of Urban Development (MoUD). 2010. Service Level Benchmarking Databook: Improving Service Outcomes, 2008-09. New Delhi: Ministry of Urban Development, Government of India.
7. National Faecal Sludge and Septage Management (NFSSM). 2020. "Inclusive Sanitation: Way Forward For Cities A Framework And A Checklist." New Delhi: NFSSM.
8. NFSSM Alliance- NITI Aayog. 2021. Faecal Sludge And Septage Management In Urban Areas: Service & Business Models. January.
9. National Institute of Urban Affairs (NIUA). 2005. Status of Water Supply, Sanitation and Solid Waste Management in Urban Areas. New Delhi: National Institute of Urban Affairs.
10. Rawat, Y. S., S. S. Oinam, S. C. R. Vishvakarma, and J. C. Kuniyal. 2004. "Saussureacostus (Falc.) Lipsch: a promising medicinal crop under cold desert agro-ecosystem in North Western Himalaya." Indian Journal of Forestry 27 (3): 297–303.
11. Sharma, A., A. Aasaavari, and S. Anand. 2015. "Understanding issues involved in toilet access for women." Economic and Political Weekly, Vol. L, No. 34, 22 August, pp. 70–74.
12. Wankhade, Kavita, et al. 2014. Urban Water Supply and Sanitation in India. Bangalore: Indian Institute for Human Settlements.
13. World Health Organization (WHO). 2016. Sanitation Safety Planning: Manual for Safe Use and Disposal of Wastewater, Greywater and Excreta. Geneva: WHO.
14. World Bank Water and Sanitation Program (WSP). 2008. Review of Sewerage and Sanitation Interventions in Urban India.
15. WSP-TARU. 2008. Review of Sewerage and Sanitation Interventions in Urban India. New Delhi: Water and Sanitation Program-South Asia.