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PERFORMANCE OF SOLID WASTE MANAGEMENT IN CHANDIGARH: AN ANALYSIS USING SWACHH SURVEKSHAN

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ABSTRACT

Chandigarh, a Union Territory designated as a model city has consistently demonstrated competence in urban sanitation and solid waste management (SWM). This research assesses its SWM performance using Swachh Survekshan (SS) ranks and ratings from 2016 to 2024-25. Using secondary data from official MoHUA reports, city report cards and the District Environment Plan 2026, the research identifies strengths in waste processing (100% score), dumpsite restoration, door-to-door pickup (93%) as well as recurring shortcomings in source segregation (14%). The report builds on historical trends, evaluates literature on SS and SWM in India. The Chandigarh approach provides essential insights for long-term urban waste management under the Swachh Bharat Mission 2.0.

KEYWORDS

Solid waste management, Swachh Survekshan rankings, Chandigarh Municipal Corporation, source segregation at source, door-to-door waste collection, waste processing capacity

1. INTRODUCTION

Solid waste management is one of India's most significant urban challenges, with rapid urbanisation, population expansion, and shifting consumption habits generating about 62 million tonnes of municipal solid waste (MSW) each year. Only a small portion of this garbage is treated scientifically, resulting in environmental damage, public health problems, and taxed municipal resources. In this backdrop, the Swachh Bharat Mission-Urban (SBM-U), established by the Indian government in 2014, has emerged as a game-changing national effort aiming at achieving universal sanitation and cleanliness. Swachh Survekshan (SS), the world's largest urban sanitation survey established in 2016 by the Ministry of Housing and Urban Affairs (MoHUA), is a significant SBM-U instrument. SS assesses cities based on characteristics such as

visible cleanliness, source segregation, waste processing, legacy dumpsite repair, citizen feedback, and institutional procedures, with a greater emphasis on circular economy practices and Garbage Free City (GFC) ratings.

Chandigarh, a Union Territory designed by Le Corbusier in the 1950s as a symbol of contemporary, structured urban living, is an excellent case study for assessing SWM success. With an estimated population of 1.3 million (according to latest forecasts) and daily garbage generation of 500 tonnes per day (TPD), the city has long been regarded as a leader in urban government. However, like many Indian cities, it is under strain from transient populations, migrant workforce, and legacy rubbish accumulation. The city's performance in SS rankings has been notable: it ranked first in early editions (3rd nationally in 2016), but then had changes due to the COVID-19 pandemic before recovering effectively. In the most recent Swachh Survekshan 2024-25 (announced in July 2025), Chandigarh ranked second in the Super Swachh League for Big Cities (3-10 lakh population category), trailing only Noida, with 100% scores in waste processing, dumpsite remediation, and visible cleanliness across residential areas, markets, water bodies, and public toilets. However, significant gaps remain, particularly in source segregation (only 14%) and full achievement of higher GFC star ratings (currently 3-star).

This report conducts a thorough examination of Chandigarh's SWM performance utilizing SS rankings and scores as its major lens. It builds on the introduction by contextualizing the city's distinctive planning legacy against modern waste concerns, reviewing existing literature on SS and SWM in Indian urban environments, outlining the research methodology, presenting empirical findings, and making evidence-based recommendations. By combining data from MoHUA dashboards, the District Environment Plan 2026, and media coverage, the study highlights Chandigarh's achievements in infrastructure and inclusive models (like as women-led MRFs) while recommending pathways for continued greatness. The significance of this study stems from its ability to inform policy for other Union Territories and mid-sized cities aiming for zero-dumpsite and circular economy targets under SBM-U 2.0 and the Solid Waste Management Rules 2026. Finally, Chandigarh's trajectory demonstrates how targeted governance, community participation, and technological solutions may combine urban development and environmental sustainability.

2. REVIEW OF LITERATURE

Mazzoli (2024) carried out a comprehensive life-cycle review of waste management systems in Indian cities, comparing present practices to potential circular economy scenarios. The author emphasized that cities like Chandigarh may achieve higher environmental benefits by scaling up decentralized composting, recycling, and formalizing informal waste pickers. Mazzoli (2024) also emphasized the difficulty of completing material loops in open urban systems, as well as the limitations of awareness campaigns alone.

Gour et al. (2023) conducted a detailed evaluation of current solid waste management practices in India. The authors looked at existing scenarios, problems, and gaps in MSW management, notably in Tier II cities. They found that, while infrastructure development has increased as a result of Swachh Survekshan,

behavioral issues such as source segregation continue to be a key impediment. Gour et al. (2023) found that thorough evaluations can help developing countries like India identify both technological and socioeconomic hurdles to successful garbage management.

Singh (2019) investigated solid waste management in metropolitan India before and after the Swachh Survekshan initiative. The author emphasized that before to 2016, collection, transportation, and disposal systems in Indian cities were "mired in turmoil," with open dumping being the predominant practice. Singh (2019) observed that the implementation of Swachh Survekshan established a competitive benchmarking framework that stimulated public involvement, institutional improvements, and the long-term viability of cleaning activities. The study underlined the importance of annual SS rounds in raising community awareness and institutionalizing online monitoring mechanisms.

Joshi and Ahmed (2016) conducted a preliminary study of the state and difficulties of municipal solid waste management in India. They identified systemic concerns such as poor source segregation, limited processing capacity, and an overreliance on landfills. To achieve long-term results, the authors emphasized the importance of integrated approaches that include collection, treatment, and resource recovery.

3. RESEARCH METHODOLOGY

3.1 Objectives

- To examine the history and current SS rankings and scores for Chandigarh using SWM criteria.
- To identify the city's solid waste management system's strengths, shortcomings, and best practices.
- Compare Chandigarh's performance to those of national leaders.
- To provide evidence-based recommendations for improving GFC ratings and maintaining excellence.

3.2 Nature and Source of data collection

This is a descriptive and analytical study that mostly relies on secondary data. It integrates quantitative trend analysis of SS rankings/scores with qualitative evaluations of policy actions and obstacles. Sources of data include official MoHUA SS reports (2016-2024-25), the Chandigarh District Environment Plan 2026, MCC reports, and verifiable media sources.

3.3 Scope of study

The report examines Chandigarh's SWM performance from 2016 to 2024-25 under Swachh Survekshan. It addresses important factors such as source segregation, door-to-door pickup, waste processing, dumpsite remediation, and GFC star ratings. The geographical scope is limited to the Chandigarh Municipal Corporation (MCC) jurisdiction. The temporal scope is aligned with SS cycles, with a focus on recovery after 2021.

4. ANALYSIS & RESULTS

4.1 Analysis of Past and Present SS Rankings and Scores

Since its establishment in 2016, Chandigarh has showed varying but robust performance in Swachh Survekshan (SS). The analysis of historical rankings reveals three different phases: great early performance, a steep pandemic-induced collapse, and a robust post-2021 comeback, culminating in a significant achievement in the most recent edition.

Historical Trend (2016–2023)

- **2016:** Chandigarh ranked third nationally (out of 73 cities surveyed) and was among the top achievers in the population category of more than 10 lakh. This impressive launch was attributed to effective door-to-door collection and first garbage processing operations.
- **2018:** The city remained third among cities with a population of more than 10 lakh, cementing its status as one of India's cleanest major cities.
- **2020:** The ranking fell slightly to ninth in the >10 lakh category, although it remained in the top ten.
- **2021:** A significant decline to 66th place occurred, owing mostly to COVID-19 problems that hampered door-to-door operations, citizen input and overall service delivery.
- **2022-2023:** The city made a steady comeback rising to 11th-12th place among cities with more than one lakh people. In 2023, Chandigarh was named the Best Capital/UT for Sanitation Workers' Welfare by Safaimitra Surakshit Shehar.
- **2024-25:** In the most recent Swachh Survekshan 2024-25 (encompassing 4,589 cities), Chandigarh reached a key milestone by finishing second in the newly formed Super Swachh League (SSL) within the Big Cities (3-10 lakh population) category. Noida won this category, followed by Chandigarh, Mysuru, Ujjain, Gandhinagar, and Guntur.

This track demonstrates that whereas Chandigarh began as a national frontrunner, external shocks like as the pandemic exposed gaps in operational continuity. The post-2021 recovery demonstrates the effectiveness of focused initiatives like infrastructure enhancements and legacy waste removal.

The city received ideal marks in output-oriented criteria (processing, remediation, and visual cleanliness), but fared poorly in behavior-oriented indicators (source separation). Overall, Chandigarh outperformed in the Solid Waste Management and Visible Cleanliness categories (which are each worth 15% in the SS approach), but fell short in the Segregation, Collection, and Transportation component.

4.2 Strengths, Gaps, and Best Practices for Chandigarh's SWM System

Strengths

- **Processing excellence (100%):** Treatment capacity exceeds generation by 57%, with 300 TPD windrow composting, 200 TPD dry waste MRFs, 5 TPD biomethanation, and complete sanitary/floral waste processing (converted into incense). This is consistent with circular economy goals and prevents additional dumping.
- **D2D collection (93%) and evident cleanliness (100%):** 524 GPS-equipped compartmentalized vehicles ensure four-stream collection, with no open dumping at primary sites.
- **Legacy waste management:** Bioremediation at Dadumajra and two other sites is underway; 28 acres have been reclaimed for a prospective CBG plant (a 200 TPD organic waste to biogas project with IOCL is scheduled to begin in January 2026).
- **Inclusive best practices:** Women-led "Pink MRFs" formalize former waste pickers with pay, PPE and uniforms, demonstrating a paradigm of equitable transition. The "Har Ghar, Har Dawar Swachhta Ki Dastak" program and Safaimitra awards promote worker welfare.

Gaps:

- **Source segregation (only 14%):** Despite the obligatory four-bin system's implementation on April 1, 2026, compliance remains severely low. This results in pollution, lower recycling/compost quality, and higher downstream processing costs.
- **The GFC rating has stagnated at 3-stars:** Falling short of the 5-star standard ($\geq 60\%$ segregation) due to behavioral gaps and inconsistent enforcement.
- **Enforcement and regional coordination:** The poor performance of neighbouring Mohali/Panchkula, as well as transient populations, cause spillover consequences.

Decentralized composting in 104 parks, C&D recycling (150 TPD plant manufacturing paver blocks), and GPS-enabled digital monitoring all demonstrate scalable, inclusive innovations.

4.3 Comparative Analysis of National Leaders

Chandigarh surpasses most peers in processing and remediation, but falls behind top performers in behavioral measures.

- **Vs. Indore (constant national #1):** Indore achieves nearly 100% segregation through strong enforcement, citizen incentives, and ward competitions. The difference between Chandigarh's 100% processing and Indore's ~95% can be attributed to 14% segregation.
- **Vs. Noida (1st in Super Swachh League 2024-25):** Noida leads in this category due to higher institutional characteristics and segregation. Chandigarh's second-place finish is excellent, but it underscores the necessity for comparable enforcement rigor.

- **Vs. Surat/Navi Mumbai (Million-Plus Leaders):** These cities combine high segregation (>80%) with 7-star GFC ratings through integrated PPP models and real-time digital tracking. Chandigarh equals their processing capability but falls behind in segregation-driven circular consequences.

Overall, Chandigarh's infrastructure-led model outperforms many Tier-II cities, but it requires an Indore-style behavior-enforcement combination to achieve consistent top-5 national rankings.

4.4 Evidence-Based Suggestions for Increasing GFC Ratings and Maintaining Excellence

To achieve 5-star GFC ($\geq 60\%$ segregation) or 7-star ($\geq 90\%$) within 18-24 months:

- **Strict four-bin system enforcement (required since April 2026):** progressive challans combined with GPS vehicle spot inspections.
 - **Incentive-driven behavior change:** Ward-level competitions, household rebates on usage charges, and recognition for compliant RWAs (based on Indore).
 - **Scale decentralized solutions:** Expand home/backyard composting and model zero-waste wards to achieve 20% coverage.
 - **Digital and AI monitoring:** Under SWM Rules 2026, integrate the Swachhata MoHUA app with real-time segregation quality reporting and ward-level SLAs.
- Regional coordination: Joint campaigns for spillover control in Mohali and Panchkula.

These initiatives, if implemented with political will, have the potential to increase segregation to 60% or more and secure 5-7 star GFC, in line with SBM-U 2.0 circular economy targets.

5. LIMITATIONS

- The study only uses secondary data sources such as official Swachh Survekshan reports, city report cards, the Chandigarh District Environment Plan 2026, and media coverage; no primary data (e.g., household surveys, stakeholder interviews, or field observations) were collected, limiting deeper insights into actual citizen behavior and implementation challenges.
- Swachh Survekshan methodology has changed throughout the years, including the introduction of the Super Swachh League and updated demographic classifications in 2024-25, making exact year-on-year comparisons impossible and potentially affecting trend analysis consistency.
- Chandigarh's inclusion in the Super Swachh League's 3-10 lakh population category (despite its real population exceeding 10 lakh) raises some questions about the city's national standing, given it ranks far lower (96th) in the overall pan-India rating.
- The analysis is based on data available as of April 2026; future editions of Swachh Survekshan (2025-26 onwards) or the complete implementation of the new Solid Waste Management Rules 2026 may change the performance picture.

- The study focuses solely on the jurisdiction of the Chandigarh Municipal Corporation and does not include the larger Tricity region (Mohali and Panchkula), despite the fact that waste management concerns frequently cross city boundaries.
- Quantitative segregation and collection data presented in SS are generally self-reported or observation-based by MoHUA teams, thus there may be some reporting bias or seasonal variation that this desk-based research does not capture.

6. CONCLUSIONS

- Chandigarh has demonstrated substantial improvement and resilience in solid waste management, ranking second in the Super Swachh League (Big Cities 3-10 lakh category) in Swachh Survekshan 2024-25, trailing only Noida.
- The city received perfect 100% scores in crucial output-oriented categories such as waste processing capacity, dumpsite cleanup, and visible cleanliness in residential areas, markets, water bodies, and public restrooms, demonstrating strong infrastructure development and operational efficiency.
- High door-to-door collection coverage (93%) is backed by 524 GPS-equipped trucks, demonstrating good service delivery and institutional procedures under the Swachh Bharat Mission-Urban 2.0.
- Despite these accomplishments, the city's chronically low source segregation rate of only 14% remains a significant drawback, preventing it from raising its Garbage Free City (GFC) star rating above the current 3-star level and limiting the quality of recyclables and compost.
- The Chandigarh model of women-led Material Recovery Facilities (Pink MRFs), legacy waste bioremediation at Dadumajra, and inclusive Safaimitra initiatives provides valuable best practices for inclusive and sustainable urban waste management that can be replicated in other mid-sized cities and Union Territories.
- The study concludes that, while infrastructure-led excellence has earned category-specific recognition, sustained national leadership necessitates an urgent focus on behavior change, strict enforcement of the four-stream segregation system (mandated by SWM Rules 2026), and stronger citizen-MCC partnerships.
- With focused interventions such as incentives, ward-level competitions, digital monitoring, and regional coordination, Chandigarh has the potential to achieve 5-7 star GFC status and become India's national benchmark for circular economy-based solid waste management.

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