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# The Mumbai metropolitan region's municipal corporations utilize public-private partnerships for managing solid waste.

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***Abstract***- The Mumbai Metropolitan Region is experiencing a significant increase in solid waste across all municipal corporations, including Brihanmumbai, Thane, Mira-Bhayandar, Kalyan-Dombivali, Ulhasnagar, Navi-Mumbai, and Bhiwand-Nizampur. This increase in solid waste is attributed to various factors, such as urbanization, population growth, higher income levels, changing food habits and tastes, and the growth of industries, commercial establishments, and recreational facilities like hotels, theaters, restaurants, and malls. Unfortunately, the current capacity of municipal corporations to collect, segregate, and dispose of solid waste is insufficient, leading to water, air, soil pollution, and health risks. To address this issue, municipal corporations should adopt scientific methods for solid waste management and leverage private sector investment and management expertise. Such measures will help in reducing pollution levels and health hazards, as well as enhancing the quality of life for residents in the Mumbai Metropolitan Region**.**

***Index Terms***- Population, Food habits, lifestyle

## I. INTRODUCTION

Solid waste management is a major responsibility of local government, and if it is not properly managed, it can cause risks to the environment and public health. Mumbai Metropolitan Region faces challenges such as inadequate civic amenities and changing food habits, which increase the amount of solid waste generated. Municipal corporations do not have adequate resources for investment in various activities, resulting in low manpower and irregular collection and transportation of solid waste. This leads to lower coverage of solid waste in municipal corporations and causes pollution and health hazards. The paper aims to study the total solid waste generated in different types and each municipal corporation, solid waste generated till 2031, and policy implications for proper management. applications.

## II. WRITE DOWN YOUR STUDIES AND FINDINGS

The study utilizes data obtained from the 2001 and 2011 census to gather information on population and the number of habitations. Additionally, census figures provide data on the number of hospitals, schools, colleges, and commercial units for Kolkata were studied. To investigate factors associated with solid waste management, the ordinary least square regression model development for each municipal corporation were also reviewed. various municipal corporations in the Mumbai Metropolitan Region. Reports on the current environment and city The solid waste management systems of Pune, Delhi, and was used. Finally, a simple forecasting method was utilized to estimate solid waste generation in the Mumbai Metropolitan Region until 2031

## III. COLLECTION OF DATA

Data :

Solid waste includes non-hazardous industrial, commercial, and domestic refuse, such as household organic trash, street sweepings, hospitals and institutional garbage, and construction waste. Domestic waste is generated from various activities, while commercial waste comes from shops and offices. Waste from hotels, restaurants, and hospitals is also included. Industrial waste comprises construction waste and unsalable factory waste, some of which can be highly toxic. The major constituents of solid waste are domestic and commercial waste, paper, and organic matter. Proper solid waste management is essential for public health, environment, economic, and political reasons. Integrated solid waste management is needed worldwide to avoid negative effects on the public health, environment, and natural services.

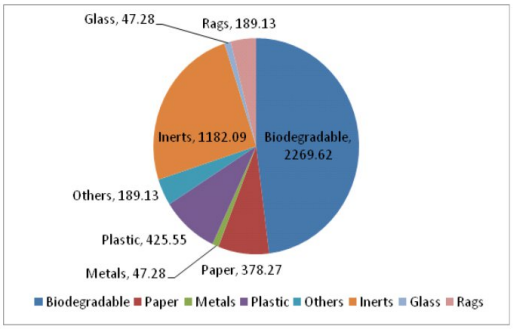
Solid waste in Mumbai Metropolitan Region:

Solid waste generated in different Municipal Corporation is different. In a municipal corporation, the solid waste generation depends on the population, industrial units, shops,
commercial units etc. If the population is growing then these units are also growing. It leads to more solid waste generation in municipal corporation area. We have calculated the solid waste generated in current year.

**Table 1 Solid waste according to Municipal Corporations**

| Municipal Corporation | Solid waste (Metric Tones) | Percent |
|---|---|---|
| Mumbai | 8837.01 | 65.15 |
| Thane | 1061.34 | 7.82 |
| Kalyan–Dombivali | 969.59 | 7.15 |
| Ulhasnagar | 546.54 | 4.03 |
| Navi-Mumbai | 955.62 | 7.04 |
| Mira-Bhayandar | 612.26 | 4.51 |
| Bhiwandi-Nizampur | 583.02 | 4.29 |
| Total | 13565.38 | 100.00 |

**Graph 2 Solid waste components in municipal corporations of Thane district (MT)**




Type of solid waste generated in Mumbai city :

Solid waste is not only generated by the households but it is generated by the commercial units, hotels and welfare and recreation units in city. Such units are regularly visited by the people of same and other municipal corporation area. Therefore solid waste is a combination of all the types of units in corporation area**.**

**Table: 2 Solid wastes in Mumbai city according to type**

| Type | Solid waste (Metric Tones) | Percent |
|---|---|---|
| Households | 5615.00 | 63.54 |
| Slums | 1423.00 | 16.10 |
| Academic institutions | 129.10 | 1.46 |
| Industry | 135.00 | 1.53 |
| Theaters | 37.00 | 0.42 |
| shops and malls | 1211.00 | 13.70 |
| Hospitals | 83.00 | 0.94 |
| Hotels | 53.00 | 0.60 |
| welfare/recreation/fire stations | 151.00 | 1.71 |
| Total | 8837.10 | 100.00 |

In Mumbai city, households generate 5615 Metric Tones of solid waste, which accounts for 63.54% of the total solid waste. This is due to the high population density in the city. Slums generate 1423 Metric Tones, while large and small industries generate only 135 Metric Tones, which is 1.53% of the total. Shops and malls contribute 1211 Metric Tones, which is 13.70% of the total. Hotels generate 53 Metric Tones and hospitals generate 83 Metric Tones of solid waste. Solid waste is also generated by welfare/recreation and fire stations. The generated solid waste is classified according to various components.

Solid waste through biodegradable form is 2269.62 Metric Tones in all the municipal corporations in Thane district. Paper consists of 378.27 Metric Tones in all the municipal corporations. Metals and glass consist of same (47.28 Metric Tones) solid waste generation. Plastic use for different purposes is more in all the municipal corporations. Therefore plastic consists of 425.55 Metric Tones in all the municipal corporations of Thane district. Rags consist of small piece of paper or cloths. It is 189.13 Metric Tones of solid waste in all municipal
corporation of Thane district

Collection and disposal of solid waste in Mumbai Metropolitan Region

In some areas of the city, Thane Municipal Corporation (TMC) provides door-to-door collection of waste from common points and markets. The collection vehicles used include dumper placers, ghanta gadies, and rickshaws. After the waste is collected from each point, it is brought to the dumper placers and other vehicles. TMC collaborates with Enviro-vigil organization to treat solid waste from vegetables, fruit markets, hotels, and segregated wet waste through a bio-methanation process. TMC also provides bio-medical waste facilities through MS/Enviro-Vigil to treat and dispose of biomedical waste using an incinerator located at Chatrapati Shivaji Maharaj hospital in Kalwa. However, solid waste collection from different points in Thane city is not efficient, often delayed due to a lack of transportation, manpower, and management. Industries in Thane city are closing down, and the old industrial area is being converted into a residential area. Integrated solid waste collection and disposal in Thane city is inadequate.

In Ulhasnagar city, solid waste is generated from kitchen waste, papers, plastics, glass, metals, rubber, etc. Commercial units and markets also generate waste. The industrial waste from the stainless steel industry mainly consists of nitric acid, which is sometimes inflammable. The generation of industrial waste is increasing in Ulhasnagar city. In addition to industrial waste, inert waste is generated from repairs of houses, construction activities, silt generated from cleaning of gutters and drainage. The quality of inert waste varies, and it is collected and transported to landfill sites by private agencies that charge on a daily basis. The hired agencies' task is to collect waste from collection bins kept at regular intervals in the city and carry it to

the dumping site. Ulhasnagar Municipal Corporation (UMC) is responsible for collecting domestic waste from all households and other units, but most houses are neglected or remain uncovered due to population density, uneven surface, etc. Slums are entirely ignored by the civic administration, and people living in slums throw waste either in drainage lines, common grounds, streets, or roads. Waste segregation is not done at any level, and the solid waste collected from residential areas, street sweeping markets, commercial establishments, etc., is collected in mixed form and dumped in bins. Town garbage is collected and dumped at two privately-owned sites, and a landfill site at Shanti Nagar is closed. UMC has identified 25 hectares located near Manje Kamba village for a future landfill.

In Mira Bhayandar Municipal Corporation, the average domestic solid waste generation is increasing due to population growth and commercial units. However, there is no universal solid waste collection, segregation, or dumping system in place. Solid waste is only partly collected and dumped in landfill sites, and there is no treatment plant. A 32-hectare area has been located for a new landfill site, and vermi composition has been proposed in the waste processing.

## III. CONCLUSION

The solid waste management systems in Thane, Ulhasnagar, and Mira Bhayandar Municipal Corporations have several gaps and challenges. While some areas in Thane city have door-to-door collection and treatment of segregated wet waste, the overall collection and disposal process is inefficient due to a lack of transportation, manpower, and management. In Ulhasnagar, the private agencies hired to collect waste charge on a daily basis, and slums are neglected, leading to waste being thrown in drainage lines, common grounds, streets, and roads. Mira Bhayandar Municipal Corporation also lacks a universal solid waste collection, segregation, and treatment system. Overall, the average domestic solid waste generation is increasing due to population growth and commercial units, making it crucial to address these gaps and challenges to ensure proper solid waste management and protect the environment and public health. Vermi-composting and bio-methanation processes have been proposed in some areas for processing waste. A new landfill site has also been identified in Ulhasnagar, but more comprehensive solutions are necessary to manage solid waste effectively in these areas.

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