

Solid Waste-Mumbai A Case Study

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Abstract

Generation of waste is an integral part of human society. With the advent of industrialisation there is phenomenal increase in wastes all over the world. Population is the main cause behind generation of wastes. Generally, with increase in population quantity of waste increases. Problems of waste are beset by problems more confined to urban centres where concentration of population is large resides on a relatively less area coupled with huge commercial activities. Mega city like Mumbai generates huge quantity of solid wastes and problems associated with it are many.

KEYWORDS: industrialization, solid waste, population, megacity.

1.1 Introduction

The quality of living environment is increasingly deteriorating day-by-day in the wake of industrialisation and rapid growth of population. Population problems due to industrial and traffic emissions, and more so, solid wastes are acute in large metropolitan cities which are no less significant a concern to city planners than the problem of provisions of housing, shopping and water supply. With more quantity of materials brought under use in the modern times, there is an increase in the quantity of solid wastes which unless disposed of properly become a single major source of environmental pollution and pose a health hazard to the population.

The solid waste refers to unwanted and discarded materials in solid form resulting from normal practices of the communities and it includes garbage, rubbish, street sweeping, ashes and other industrial wastes (Daney,1972), which are organic, inorganic, bio-degradable, non-biodegradable and combustible. They are the main sources of environmental pollution. However, they have potential for utilizing as manures and for generating energy in the form of Bio-gases.

Solid waste management, as an important area of study, has received wide attention only recently when most of the urban centers are running out of space to dump the waste.

The concern for where to put the waste, especially, in fast growing urban areas has made some people aware of the enormity of the problem and that attention is being focused in recent times (Berry 1977; Kayastha and Kurma 1979).

2.1 Aims and Objectives

The study of solid waste is beset by problems (Berry 1977). The collection, handling and disposal of solid waste in metropolitan cities have become a problem of worldwide concern. Mumbai the urban prima in India also faces the

nightmare possibilities of its teeming million's strangling in their own excrement and on their own garbage(Sarkar,1986).

In the present study an attempt is made to highlight the quantity of solid wastes generated in Greater Mumbai in relation to its population.

More specifically the study is carried out:

- (A) To understand the quantity of solid wastes generated;
- (B) To bring out the spatial and temporal variations, if any, in the waste generation; and
- (C) To focus light on any issues arising out of it.

3.1 Methodology

The study is based on secondary data sources. The principal source of information is Mumbai Municipal Corporation of Greater Mumbai (MCGM), Mumbai. Census data for population was another source.

Greater Mumbai which is totally an urban district consists of twenty-one wards in 1981, and 24 wards in 2015. Keeping the ward as unit of analysis the required information's are collected for each ward and are analysed. Sections would have been the better choice but non-availability of comparable data restricted the investigation to ward level.

A simple statistical analysis was carried out of these data. Both cartographical and statistical techniques are employed in the analysis for a better insight. The solid wastes generated in different wards of Greater Mumbai and its temporal variations are portrayed with the help of bar graphs and proportionate divided circles to understand the spatial pattern.

4.1 Generation of Solid Waste

The solid waste generation is a factor of population and function of an area. It is the result of human activities and hence the quantity and type of solid waste generated varies from place to place, according to population and socio-economic characteristics.

The present study is paid to bring out the spatial and temporal variations in the generation of solid waste in Greater Mumbai. Greater Mumbai, the multi-functional primate city of western India covers an area of 603.4 sq. km. and has about 128 million populations, who generate about 8900 tonnes of solid waste daily. The Mumbai Municipal Corporation generally takes the responsibility to collect and dispose of the solid waste generated from various sources. The Mumbai Municipal Corporation spends nearly 1790 crores of rupees annually on this respect (GMMC Budget 2014-15).

The total amount of solid waste generated in Greater Mumbai is 10,92,405 tonnes during 1982-1984. The figure 1 shows three-year average (1982-1984) ward wise generation of solid wastes vis-à-vis population of 1981.

The graph (fig.1) shows that city wards like A, B, C, D and E accounts for more generation of wastes as compared to their size of population. The five wards (which includes most of the older part of city) covers 6.7% of the area but

accounts for 39% of the total waste. The remaining 93.3% of the area accounts for the rest.

Population vs Solid Waste (1981)

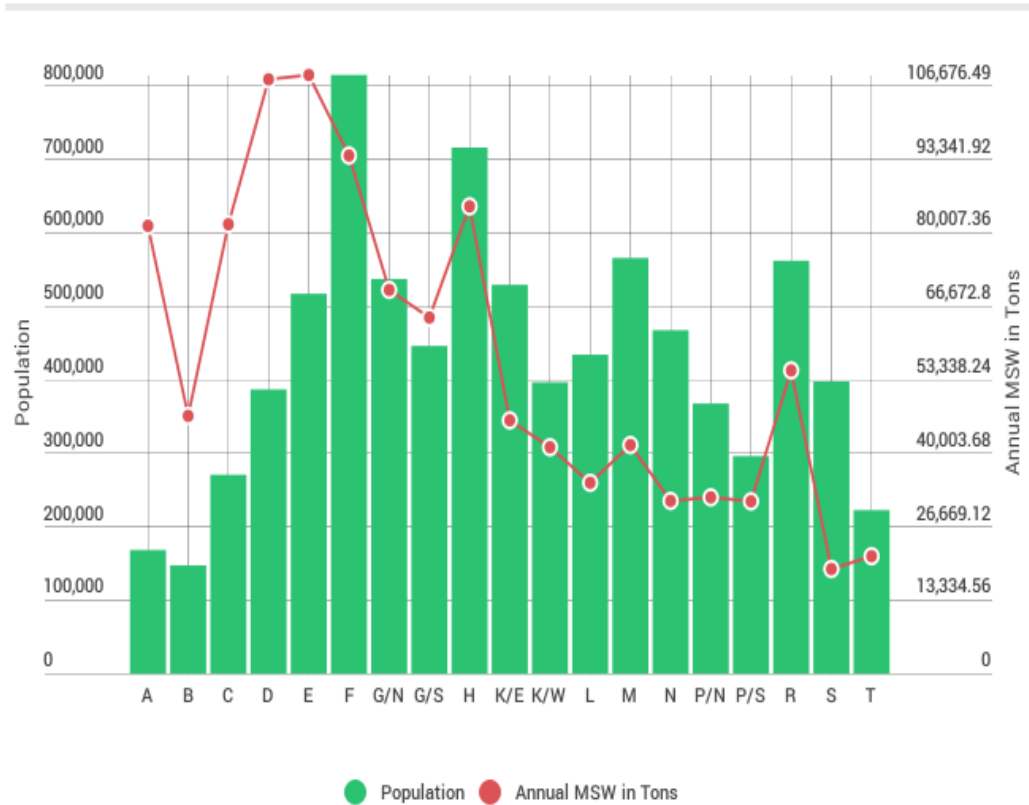


Fig.no.1

The figure 2 shows percentage share of population vis-a vis percentage share of wastes in each ward in 1981. It reveals that city wards of A, C, E, F and G are having very high share of waste to their population.

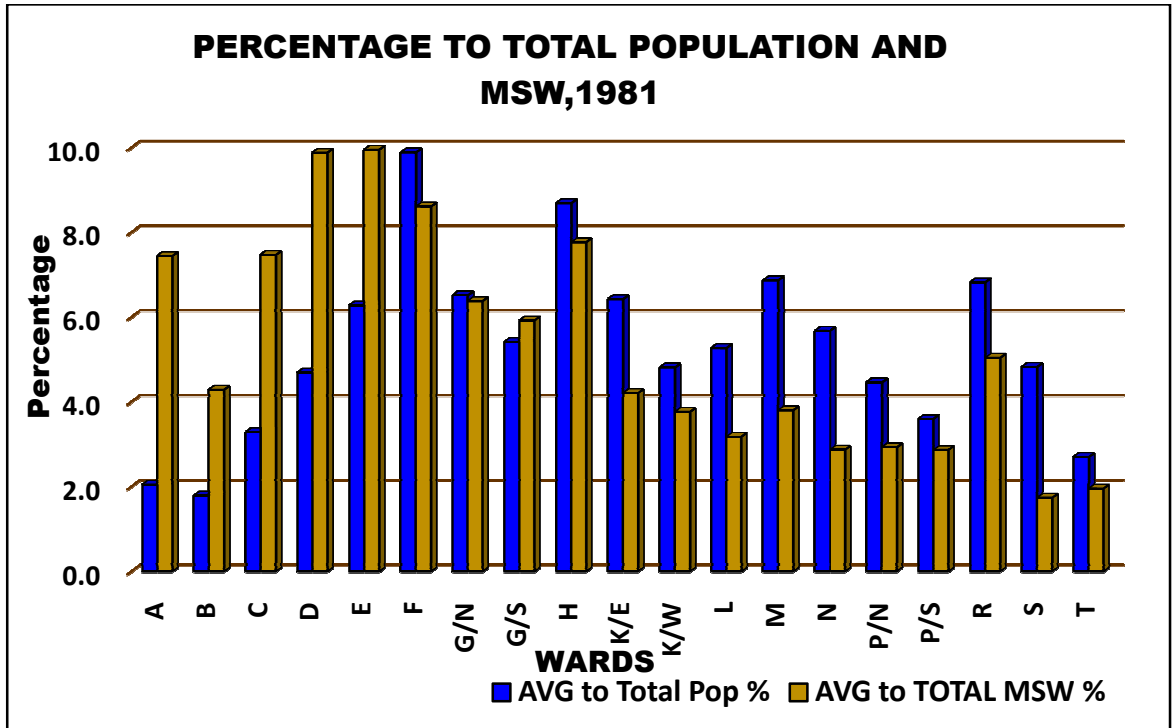


Fig.no.2

Most of the economic activities are located in city wards coupled with residences of high to very high income group of population are the main reasons for high quantity of solid wastes generated. In suburbs share of waste in H, K/W, M and R is prominent but less than the percentage share of population. The suburban ward of H generates highest wastes in the suburbs of Greater Mumbai.

It is noteworthy to mention that post 1981 Mumbai city has experienced depopulation and rearrangement of ward boundaries. As a result, one would notice divisions of wards like F, H, M and R.

The figure 3 reveals that a considerable increase in population in suburbs in 2011. The increase in population is more significant in K/E, K/W, P/N, R/N, R/S and in R/C.

Population vs Solid Waste (2015)

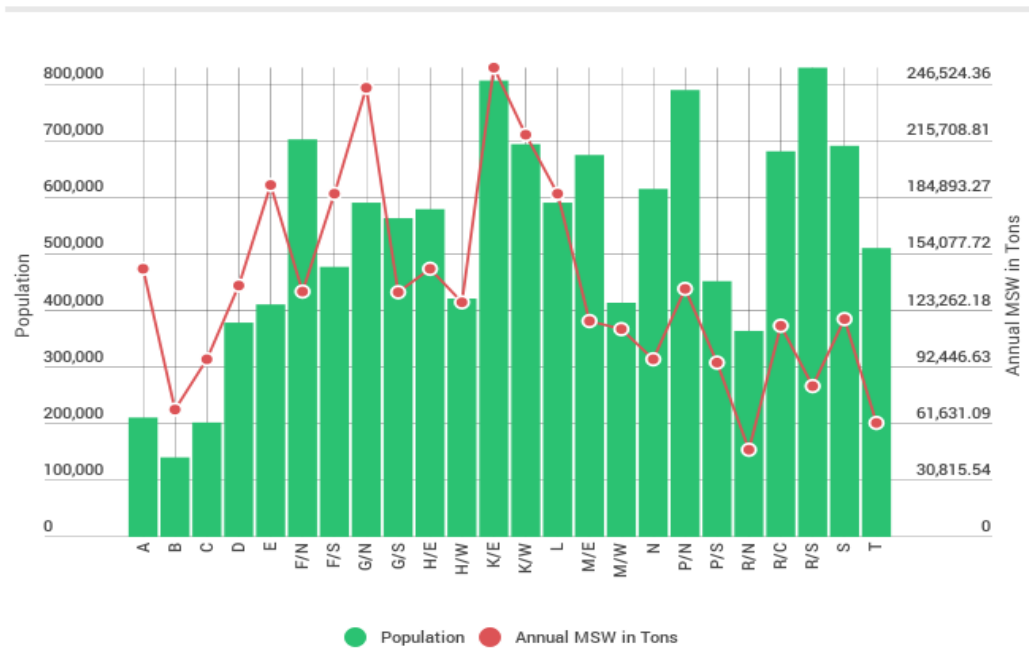


Fig.no.3

Amongst these wards K/E, K/W and L wards have seen high increase in generation of solid waste. While in city wards except for F/N the increase in generation of solid wastes is more significant than rise in population. In general, there is significant increase in generation of solid wastes in all wards of Greater Mumbai.

The figure 4 reveals a clear picture of percentage of population share vis-à-vis percentage share of wastes in each ward. In sharp contrast to the year 1981 (fig no. 2) percentage share of wastes of all city wards is very high in comparison to share of population. It is discernible from the figure 4 that percentage share of waste has increased in many folds in suburbs along with population.

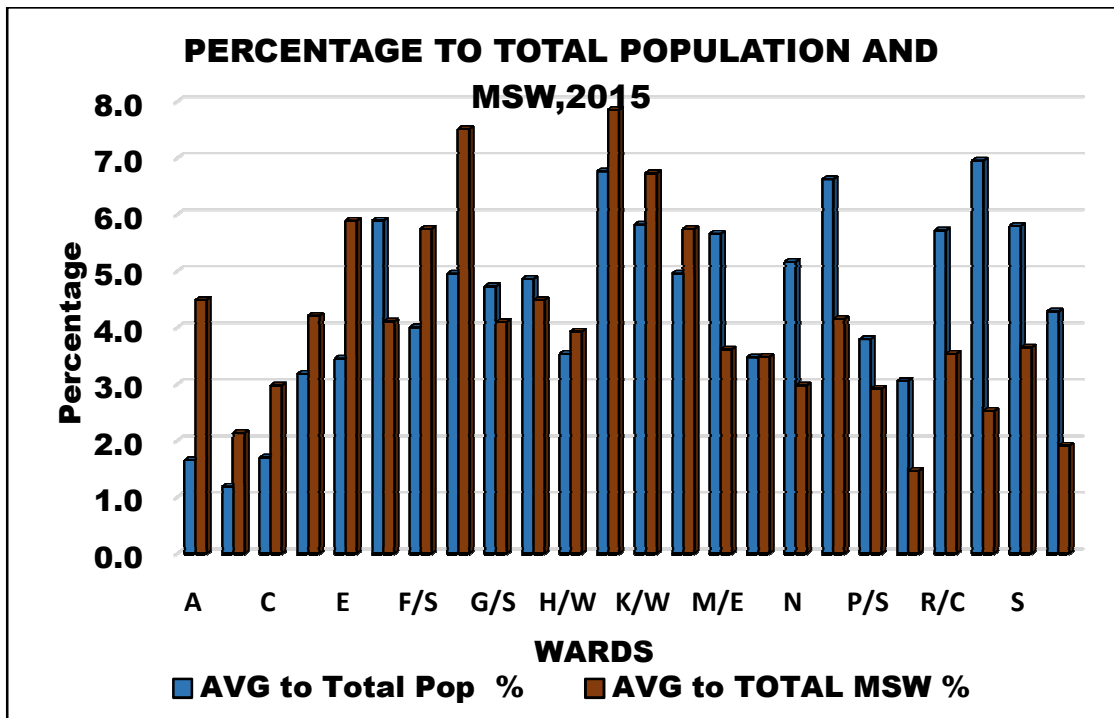


Fig.no.4

A spatio-temporal comparison of per capita solid waste is shown in figure 5 which reveals that per capita wastes per day is more in city wards. In sharp contrast to this both generation of solid wastes and per capita per day waste are low in the year 1981 from that of the year 2015. Ward A in terms of per capita wastes per day is conspicuous, while per capita waste per day of ward S is least. This reconfirms the fact that generation of wastes hinges on population and income. Higher the income more the generation of wastes.

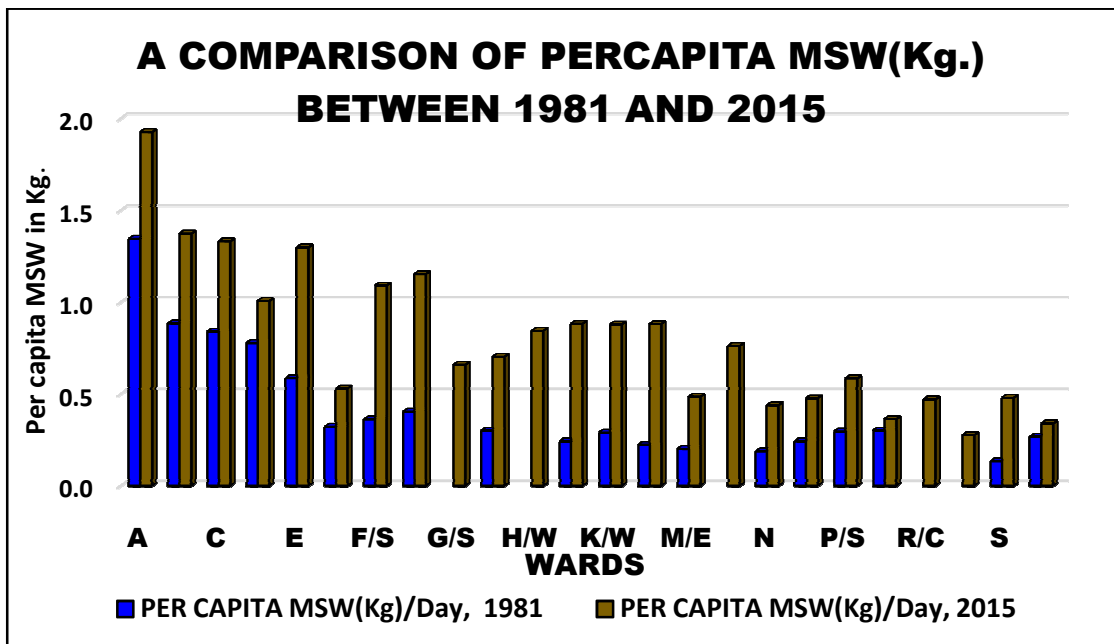


Fig.no.5

A significant increase in per capita waste in all wards is distinctly visible in city and suburban wards in the year 2015. City wards houses high to very high income population. City is also the Central Business District(CBD) having all offices, markets, commercial establishments. The quantity of solid waste generated here is naturally very high as compared to suburban areas.

An attempt is made to compare ward wise distribution of per capita msw(msw: Municipal Solid Waste) per day of 1981 and 2015 with the help of divided pie diagrams (fig.6 &7).

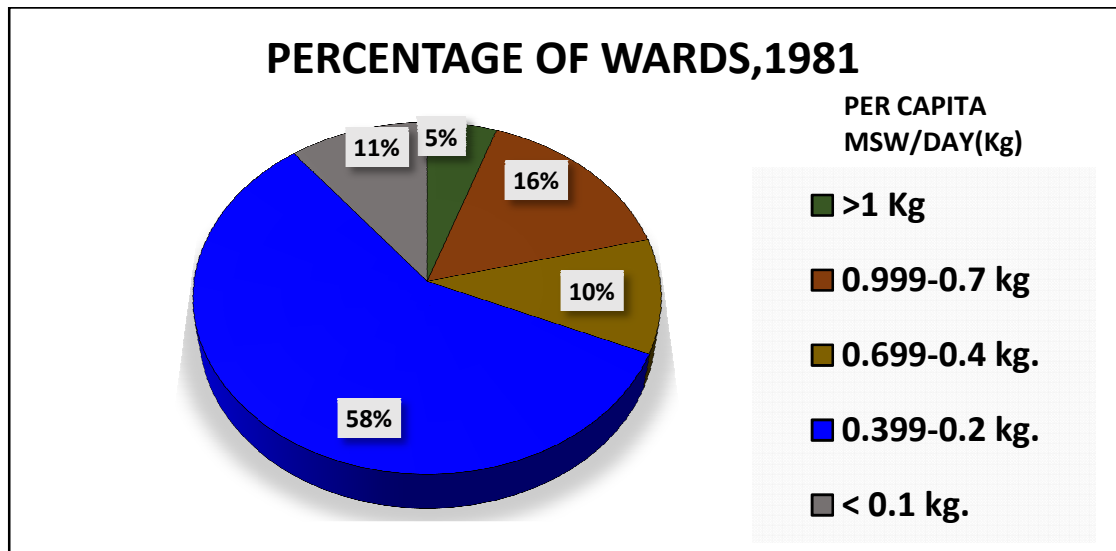


Fig.no.6

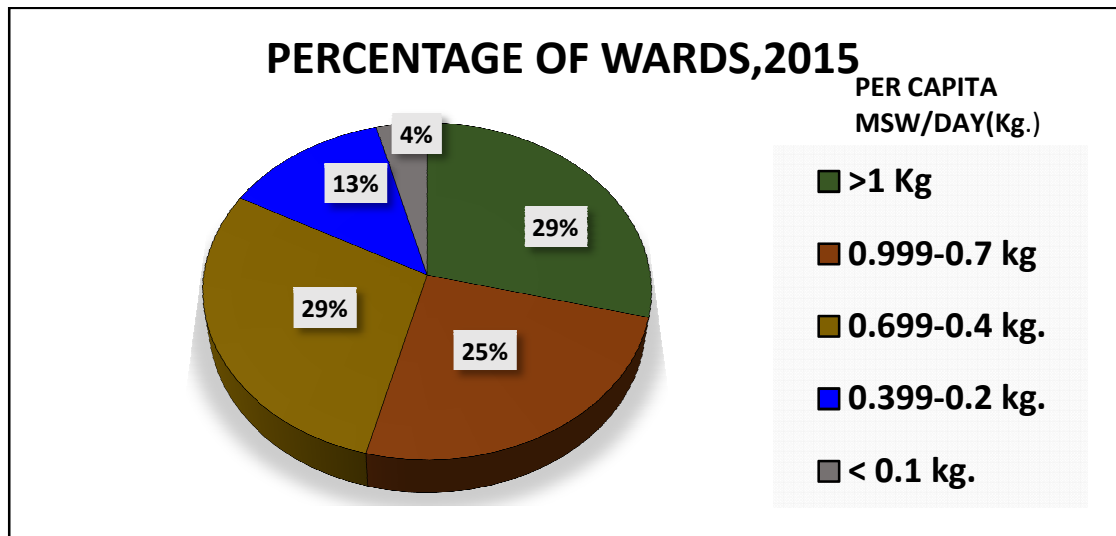


Fig.no.7

It is clearly seen from the figure 6 that per capita msw /day of 58% of wards generate waste is between 0.3999 -0.2 kilograms(Kg.) (i.e. 400 gms -200 gms) per capita per day and 5% of wards generate wastes >1 kg. msw per capita per day in the year 1981.

One can observe from figure 8 that 29% of wards generatemswper capita /day > 1 kg.in the year 2015. Percentage of wards generate msw in the category of 0.999-0.7 kg. per capita /day has increased from 16% in 1981 to 25% in 2015.

Another significant change in the category of 0.699-0.4 kg which has increased from 10% in 1981 to 29% in 2015. This is primarily because between 1981 and 2015 the population has increased by 1.5 times while the generation of solid waste has increased two fold.

5.1 Conclusion

Waste may be generated at any place either at household premises or at commercial premises but ultimately it is human being that generates wastes. There is a marked difference in the quantity of waste generated between the older part of the city and the rest part of the area. Though it constitutes less in area and in population, concentration of large hotels, markets and other commercial activities coupled with high to very high income group occupying this part are the main factors behind huge quantity of waste being generated from the city.

Suburbs on the other hand houses 71% of the total population accounts 60% of the total solid waste generated. In other words, city with 29% population generate 40% of the total solid waste. Post 1981 experienced depopulation in the city region, resulted in movement of people to suburbs of Greater Mumbai or even to areas beyond the municipal limits of Greater Mumbai. A very high income group population which occupies the space today. The high purchasing power of the people in the city region more quantity of materials is brought under use, hence the generation of solid waste is very high. Along with this fact city still continues to be the locations of various commercial activities which also contribute significantly to generate high quantity of wastes.

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