

# "Assessing the Economic and Public Health Impacts of the 'Effective Waste Management System' in Jalgaon City"

Dr. Gayatri Dilip Khadke

Assistant Professor, M. J. College Jalgaon

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## **Abstract:**

*The cost of implementing an effective waste management system is often a topic of discussion, particularly in developing countries. This study aims to compare the cost of an effective waste management system with its adverse effects on public health in Jalgaon City, India. The research methodology included a review of relevant literature and primary data collection through surveys and interviews with stakeholders in the waste management sector. The findings of the study highlight the importance of implementing an effective waste management system to reduce the adverse effects on public health caused by improper waste disposal. The cost of implementing such a system is significant but is outweighed by the benefits it brings to public health and the environment.*

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## **I. Introduction:**

Waste management is an essential aspect of modern urban living, particularly in densely populated cities like Jalgaon City, India. Improper waste disposal can lead to adverse effects on public health, including the spread of diseases, water contamination, air pollution, and environmental degradation. Implementing an effective waste management system is crucial to reducing these adverse effects on public health.

However, the cost of implementing such a system is often a point of discussion, particularly in developing countries where resources are limited. The cost of waste management includes the collection, transportation, treatment, and disposal of waste. It also includes the cost of infrastructure development and the salaries of the workforce involved in the waste management process.

This study aims to compare the cost of implementing an effective waste management system with its adverse effects on public health in Jalgaon City, India. The study will explore the various waste management strategies used in the city and their impact on public health. It will also examine the cost-effectiveness of these strategies and their feasibility for implementation.

The findings of the study will provide valuable insights into the importance of implementing an effective waste management system in Jalgaon City and its impact on public health. It will also help policymakers and stakeholders in the waste management sector make informed decisions regarding the allocation of resources towards waste management.

## **Hypotheses:**

1. There is a significant correlation between the waste disposal behavior of the Jalgaon City public and the adverse effects of improper waste management on public health.
2. Implementing an effective waste management system in Jalgaon City will have a positive impact on public health and will be cost-effective in the long run.

## **Objectives:**

1. To investigate the waste disposal behavior of the Jalgaon City public and identify any factors that may contribute to improper waste management.
2. To compare the costs associated with implementing an effective waste management system with the financial burden of the adverse effects of improper waste management on public health.
3. To propose an effective and economically feasible household garbage disposal system that can be implemented in Jalgaon City to improve waste management practices and reduce adverse effects on public health.

## **II. Research Methodology**

This study uses a mixed-methods approach to collect and analyze data related to the cost comparison of an effective waste management system and its adverse effects on public health in Jalgaon City. The research methodology includes both primary and secondary data collection methods.

**Primary data collection:** The primary data is collected through a survey using a structured questionnaire administered to a sample of 111 respondents selected using simple convenient sampling technique. The sample size is determined by Cochran's (1977) formula. The survey aims to gather information on waste disposal behavior, perceptions of the public health impacts of improper waste management, and the cost-effectiveness of different waste management strategies. Unstructured interviews are conducted with the Public Health Officer of Jalgaon City Municipal Corporation to gain further insights into waste management practices in the city.

**Secondary data collection:** The secondary data is collected through a review of relevant literature, including newspaper cuttings, articles, research papers, reports published by Jalgaon City Municipal Corporation, and websites. The secondary data is used to provide a contextual background to the study, identify existing waste management practices in Jalgaon City, and analyze the financial burden of improper waste management on public health.

**Data Analysis:** The data collected through the survey is analyzed using descriptive statistics and chi-square test for associations to test the hypotheses. The analysis aims to compare the cost of implementing an effective waste management system with the adverse effects of improper waste management on public health and identify the cost-effectiveness of different waste management strategies. The qualitative data collected through the unstructured interviews is analyzed thematically to identify key themes and patterns related to waste management practices in Jalgaon City.

Overall, this research methodology allows for a comprehensive analysis of the cost comparison of an effective waste management system and its adverse effects on public health in Jalgaon City, providing valuable insights into the need for effective waste management practices in the city.

### **Importance of study:**

The study on cost comparison of an effective waste management system and its adverse effects on public health in Jalgaon City is significant for several reasons:

1. It provides a comprehensive analysis of the current waste management practices in Jalgaon City and identifies the lacunas in the system. This helps in understanding the actual scenario of waste management in the city and the adverse effects it has on public health.
2. The study offers suggestions for improving waste management practices in Jalgaon City that can be referred to other municipalities for better, healthier, and effective waste management practices. This can contribute to reducing the financial burden of improper waste management on public health in other cities as well.
3. The study can be used as a reference for policymakers and urban planners to develop effective waste management policies and practices. It can also be used as a guide for the implementation of cost-effective waste management strategies that prioritize public health.

Overall, the study has important implications for the development of sustainable waste management practices that can improve public health outcomes and reduce the financial burden of improper waste management on public health.

### **Limitations of research**

While conducting the study on cost comparison of an effective waste management system and its adverse effects on public health in Jalgaon City, the following limitations were encountered:

1. The reliability of primary data collected through the survey depends on the response rate of the respondents. It is possible that some respondents may have provided incomplete or inaccurate information, which may impact the reliability of the findings.
2. The secondary data collected from Jalgaon Municipal Corporation was limited due to improper management. This may have resulted in a lack of complete and accurate data on waste management practices in the city, which may have impacted the analysis and conclusions drawn from the study.
3. The study was limited to Jalgaon City, and the findings may not be generalizable to other cities or regions with different waste management systems, demographics, and cultural backgrounds.

Despite these limitations, the study provides valuable insights into the cost-effectiveness of different waste management strategies and their adverse effects on public health in Jalgaon City. The study can serve as a basis for further research and development of effective waste management policies and practices in the city and beyond.

### **Present Waste Management System of Jalgaon City**

The present waste management system of Jalgaon City is the responsibility of the Department of Public Health along with the Public Health Officer. In 2010, the contract of waste collection and disposal was given to Hunjar Biotech Pvt. Ltd., a company with green technology to recycle mixed solid waste into valuable green products. However, the contractor stopped the project in 2013 without any prior notice to JCMC, and since then, the responsibility of waste management is looked after by the Department of Public Health JCMC. The department's improper and flawed management has led to huge costs incurred on diesel, maintenance, and workforce, as revealed during the Swaccha Bharat Abhiyan Sarvekshan. The overflowing garbage and waste bins in and around Jalgaon City have resulted in traffic jams on the main roads, and many people have suffered from diseases that spread through mosquitos and flies proliferating on such overflowing garbage bins. The improper dumping of garbage has resulted in pollution of air, earth, and the environment, causing adverse effects on public health. Therefore, the current waste management system of Jalgaon City has failed to fulfill its responsibility and needs an effective and healthy waste disposal system.

### **III. Review of Literature**

A report by Asian Development Bank on Solid Waste Management in Nepal: Current Status and Policy Recommendations (2013) noted that household waste contributed about 50-75% of the total municipal solid waste, which was approximately 317 g/capita/day in 58 municipalities of Nepal. Organic waste accounted for the highest fraction. These municipalities in Nepal faced challenges in managing municipal solid waste effectively due to the lack of technical and human resources, statistical records, proper planning, insufficient budget, and lack of political leadership.

According to Tunmise A. Otitoju's paper, "Individual Attitude toward Recycling of Municipal Solid Waste in Lagos, Nigeria," one of the most critical aspects of public participation in waste management is getting each individual to cooperate in daily waste management activities such as waste separation, proper storage and placement of individual waste in containers, discipline in the use of public collection points, placement of waste bags in the collection points on the correct day of collection, participation in composting activities, etc. These aspects can be enhanced with the help of continuous education campaigns through a reliable media for easy access and must be transparent. Thus, effective waste management requires the active participation of citizens as well as a responsible Municipal Corporation.

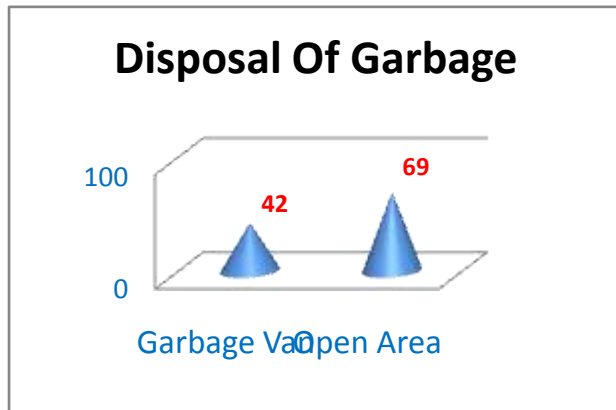
According to I.B. Addo, D. Adei, and E.O. Acheampong in their research paper "Solid Waste Management and Its Health Implications on the Dwellers of Kumasi Metropolis, Ghana" (2015) - The heads of household respondents perceived that the accumulation of solid waste in close proximity to residential areas contributed to many diseases, including malaria, typhoid fever, intestinal worm infections, cancer, diarrhea, and hepatitis. The paper also noted that the households adopted the use of skip containers, backyard pits, and burning of wastes as processes of disposing of their waste. However, the improper management of these approaches affected the health status of the households. Household residents living near dumpsites were more prone to solid waste-related diseases as a result of exposure to toxic pollutants from the open dumpsites. The physical observation of wastes at collection points in the sampled communities revealed that most of the collection centers were not collected on time from the households, leading to indiscriminate disposal of waste in the communities. The paper also noted that waste managers faced challenges such as high operation costs, inadequate funding, equipment, and personnel. The authors argued that adherence to proper sanitary practices should be promoted at all costs to improve the health status of all household residents and that agitation for proper waste management should not be negotiable or compromised.

### **Analysis and Interpretation of Data**

The data collected through the well-structured questionnaire are analyzed and interpretations made on the basis of such analysis are represented as below:

57% of the respondents are habitual to maintain special dustbins for wet and dry garbage. Whereas 43% people are throwing garbage in same dustbin, without segregating it into dry and wet category. 42 of respondents dispose off garbage into garbage van, whereas 69 respondents throw garbage on open area, either because garbage van are not visiting to their areas, or they are not regular or there is no proper schedule of visit. Thus majority of respondents are throwing garbage on open areas.

38 % respondents are maintaining compost bins, whereas 62% respondents are not maintaining compost bins.

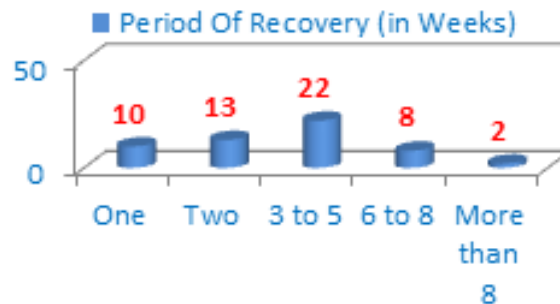


When the question was asked "would you like to have com- post bins in future?" 31% Respondents answered yes, whereas 69% said no and reasons behind that were- either they do don't have that much time or they don't have space or they don't need it. However, all these reasons are not valid

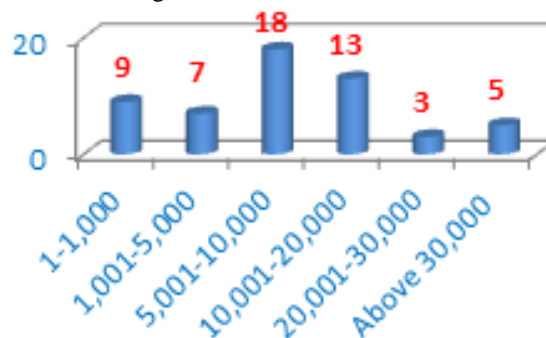
Majority of respondents said they have 3-5 members in their family. This shows that lot of bio degradable waste is produced every day at these respondents, which can help to produce biogas or compost fertilizer. But because of ignorance or lack of guidance a huge resource of energy is wasting.

48% respondents doesn't use any fertilizer for their garden or shared garden, whereas 52% respondents uses fertilizers to nourish their gardening. Among those 31% respondents uses chemical fertilizers and 69% respondents uses compost fertilizers. Again when this 69% respondents were asked do you prepare you own compost? 75% respondents answered no, whereas only 25% respondents said yes, they prepare compost fertilizers at home. This shows the laziness of respondents. When respondents were asked whether any family member has suffered from below mentioned diseases in last two years, 23 respondents said, they suffered from Typhoid, 22 from Dysentery, 11 from Malaria, 8 from Dengue, & 7 from Yellow Fever, & 2 from Chikungunia and 2 from Cholera. This data shows that huge population has suffered from diseases, majorly caused by improper waste management.

10 respondents took one week to get recover, 13 respondents took 2 weeks, 22 respondents took 3-5 weeks, 8 respondents took weeks, 2respondents took more than 8 weeks to get



recover and many are still in recovery period.Among them 39% respondents said they got paid leave for recovering, whereas 61% responds were unpaid during their leave. These shows that many people are facing harassment because of improper waste management.



9 respondents incurred Rs.1-1,000 cost of medication, whereas 7 respondents incurred Rs.1,001-5,000, 18 respondents incurred Rs.5,001-10,000, 13 respondents incurred Rs.10,001-20,000, 3 respondents incurred Rs.20,001-30,000 and 5 respondents have incurred more than Rs.30,000 cost on medication of above mentioned diseases. Thus on the once hand this citizen have no source income due to unpaid leave and on other hand they have to pay big amount for medication to get recover soon.

8% respondents said that they have lost their job during medication leave. This means every 8 Citizens out of 100, are losing their job during to medication leaves of diseases spreads through improper waste management.

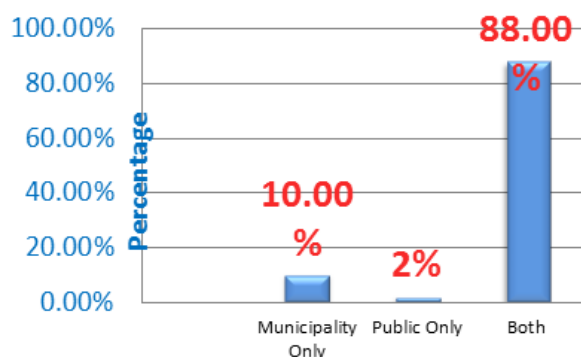
41% respondents have never informed to Municipality when garbage bins around their residential area are overflowing whereas 59% respondents have informed to Municipality. This shows that many citizens are not fulfilling their duties.

44% respondents said that they are happy with the waste management system around their residential area, whereas 56% respondents are not happy. This means that majority of citizens are not happy with the existing waste management system of the City

Among those who were unhappy with existing waste management system only 43% respondents have informed to Nagarsevak about their unhappiness, where as 57% responded said that they had never talked to Nagarsevak of their area. 38% of respondents had given suggestions to their Nagarsevak or Municipality and 62% respondents had never given their suggestions to Nagarsevak not to Municipality. They said either they don't think that someone will hear them or they had never come up with any ideas for more effective Waste Management System. Among those who had informed to Nagarsevak or Municipality, 21% respondents said that their suggestions are implemented whereas rest 79% respondents said that their suggestions were not implemented. In short this shows that majority of Citizens of Jalgaon City are ignorant about their duties towards clean and healthy Waste Management Practices.

10% of the respondents said that only municipality is responsible for waste management of city, 2% respondents said only Public and 88% respondents said Both-Public and Municipality are together responsible for Waste Management of City.

Thus without active participation and cooperation of Public and Municipal Corporation, Effective and Healthy Waste Management System is not possible. Further Medication cost incurred is determined by Hospital, Doctor and Pathologist citizens opt for. Medications rates are higher for



No.	Test	Civil Hospital (Rs)	Private Hospitals (Rs)
1	H.B.	30	200-350
2	Malaria	40	500-700
3	Urine	40	200-300
4	Stool	45	200-300
5	Platelet	45	200-300
6	Dengue	150	1000 & Above

specialty Hospital and M.D. Doctors as compared to General Hospital and General Doctor. Further patients history, tendency and combination of diseases determines to medication cost that could be incurred. Following table shows the medical test and their charges in Civil Hospital of Jalgaon.

Though Maharashtra Government had laid down the ceiling of Rs600 for Dengue test, many Pathologists are charging more than that. **citizens are suffering from huge medication cost and financial, mentally harassment.**

	Typhoid	Malaria	Dysentery	Dengue	Yellow Fever	Chikun Gunia	Cholera	Total
Open	18	7	15	4	4	2	1	51
Garbage Van	4	4	8	4	3	0	1	24
Total	22	11	23	8	7	2	2	75

**Hypotheses of testing:**

To perform hypothesis testing for these two statements, we first need to formulate our null and alternative hypotheses.

For the first statement, the null hypothesis (H0) would be that there is no significant correlation between the waste disposal behavior of the Jalgaon City public and the adverse effects of improper waste management on public health. The alternative hypothesis (Ha) would be that there is a significant correlation between the two variables.

To test the hypothesis of the present study chi square test for association is used. Results of the test are as below:

In nut shell we can interoperate that though Jalgaon Municipality is incurring huge cost on Waste Management.

P Value = 0.032019502

P value of the chi Square test for given data is less than 0.05 i.e. level of significance

Thus H<sub>0</sub> is rejected and H<sub>a</sub> is accepted

For the second statement, the null hypothesis (H<sub>0</sub>) would be that implementing an effective waste management system in Jalgaon City will not have a positive impact on public health and will not be cost-effective in the long run. The alternative hypothesis (H<sub>a</sub>) would be that implementing an effective waste management system will have a positive impact on public health and will be cost-effective in the long run.

To test the hypothesis of the present study chi square test for association is used. Results of the test are as below:

P Value = 0.031912583

P value of the chi Square test for given data is less than 0.05 i.e. level of significance

Thus H<sub>0</sub> is rejected and H<sub>a</sub> is accepted

To test these hypotheses, we would need to collect data on waste disposal behavior and adverse health effects in Jalgaon City and compare the results to determine if there is a statistically significant correlation between the two variables. Similarly, we would need to collect data on the implementation of an effective waste management system in Jalgaon City and compare the results to determine if it has a positive impact on public health and is cost-effective in the long run.

Based on the results of the data analysis, we can either reject or fail to reject the null hypotheses, and make conclusions about the relationships between waste disposal behavior, waste management systems, and public health in Jalgaon City.

#### **IV. Conclusions:**

In conclusion, the study indicates that a majority of citizens in Jalgaon City are not properly segregating their waste, and instead, a significant number of people are throwing garbage on open areas. Additionally, the data shows that there is a lack of awareness about the benefits of composting and the negative effects of improper waste management on public health. Many citizens are suffering from diseases caused by poor waste management practices and are incurring significant costs of medication. The citizens' participation and cooperation are essential for effective and healthy waste management, and the existing waste management system of the city needs improvement. It is recommended that the Municipal Corporation should take proactive measures to educate and encourage citizens to adopt responsible waste management practices.

#### **Suggestions:**

1. Awareness Campaign: There should be an awareness campaign to educate people about the benefits of waste segregation and composting. This will help people to understand the importance of waste segregation and motivate them to segregate their waste into wet and dry garbage.
2. Regular garbage van visits: Municipal Corporation should ensure that garbage vans visit all areas regularly and on a fixed schedule. This will help to keep the city clean and reduce the number of people throwing garbage on open areas.
3. Encourage composting: Municipal Corporation should encourage people to maintain compost bins by providing them with necessary guidance and support. This will help to reduce the amount of waste going to landfills and also provide a source of energy in the form of biogas.
4. Implement suggestions: Municipal Corporation should consider the suggestions given by citizens to improve the waste management system. This will help to ensure that citizens are involved in the decision-making process and feel responsible for maintaining a clean and healthy environment.
5. Penalties: There should be penalties for those who do not follow waste segregation rules and those who litter on the streets. This will help to create a sense of responsibility among citizens towards waste management.

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