Publisher
Singh Publication
www.singhpublication.com

E-ISSN:2583-0074

Social Science Journal for Advanced Research

2025 Volume 5 Number 3 May

Research Article

Solid Waste

Valuing Household Preference for Functional Features of Solid Waste Management: A Hedonic Pricing Analysis

Rejuna C A[1*], Shabeer K P[2]

DOI:10.5281/zenodo.15532341

[1*] Rejuna C A, Associate Professor, Department of Economics, Government Arts and Science College, Kozhikode, Kerala, India.

[2] Shabeer K P, Associate Professor, Department of Economics, Government Arts and Science College, Kozhikode, Kerala, India.

Solid waste management has become increasingly important in recent times, highlighting the need for active civic participation in preserving environmental quality. This study investigates household willingness to pay for various features of a hypothetical solid waste management project using the hedonic pricing method. The project incorporates multiple components, including the provision of a clean environment, safe drinking water, mosquito and rodent control, waste recycling for gas production, and the construction of a controlled landfill with an extended lifespan. These features are categorized into three functional types: problem abandonment, compensatory interventions, and alternative waste disposal mechanisms. By estimating the willingness to pay for each feature, the study captures the implicit value placed by individuals on different aspects of waste management. The results reveal households' willingness to pay is high for problem of abandonment that is for safe drinking water and environmental quality features, reflecting public preference for interventions that directly affect daily well-being. The findings offer valuable insights for policymakers in designing sustainable, citizen-responsive waste management systems, and support evidence-based prioritisation of project components in urban environmental planning.

Keywords: solid waste, waste management, willingness to pay, hedonic pricing, anova, kerala, india

Corresponding Author

Rejuna C A, Associate Professor, Department of Economics, Government Arts and Science College, Kozhikode, Kerala, India.
Email: rejunaca@gmail.com

How to Cite this Article

Rejuna C A, Shabeer K P, Valuing Household Preference for Functional Features of Solid Waste Management: A Hedonic Pricing Analysis. Soc Sci J Adv Res. 2025;5(3):1-7.
Available From
https://ssjar.singhpublication.com/index.php/ojs/article/view/244

To Browse

Manuscript Received	Review Round 1	Review Round 2	Review Round 3	Accepted
2025-04-02	2025-04-22			2025-05-10

Conflict of Interest	Funding	Ethical Approval	Plagiarism X-checker	Note
None	Nil	Yes	2.48	

© 2025 by Rejuna C A, Shabeer K P and Published by Singh Publication. This is an Open Access article licensed under a Creative Commons Attribution 4.0 International License https://creativecommons.org/licenses/by/4.0/ unported [CC BY 4.0].

1. Introduction

Solid waste management has emerged as a pressing concern in urban development, particularly in rapidly growing economies like India, where rising population and urbanization have led to significant environmental and public health challenges. Effective solid waste management has become a major global challenge (Khan et al., 2022), emphasizing the urgent need for innovative strategies to enhance resource recovery and prevent environmental pollution. India ranks among the top three producers of municipal solid waste, with its composition varying by income level, lower to middle-income groups primarily generate organic waste, while higher-income groups contribute more paper, metal, and glass waste, highlighting the need for income-sensitive waste management strategies (Nanda and Berutti., 2020). Rapid urbanization and alteration in lifestyle occurring across the globe has resulted in an un-controlled generation of municipal solid waste (Jayakumar, 2022). It is well recognized that current global consumption levels and the associated over-reliance on waste disposal and emissions are unsustainable (Kabir and Kabir, 2021).Improper disposal of waste, pollution of water sources and the spread of disease-carrying organisms such as rodents and mosquitoes contribute to a decline in the quality of life, especially in low-income urban neighbourhoods. Addressing these challenges call for integrated waste management systems that combine environmental sustainability with public health and economic viability.

Urban Kerala, known for its high literacy rate, rich culture, and rapid economic development, is experiencing unprecedented challenges related to waste management. The prohibition of open dumping, coupled with severe land constraints, dense population, and environmental sensitivity, highlights the inadequacy of an overly centralized solid waste management approach and the urgent need for decentralized, community-based solutions (Puthillath & Sasikumar, 2015). The growing urban population, changing consumption patterns, and inadequate waste management infrastructure are contributing to the increasing pressure on municipal authorities. Venu et.al., (2024) revealed a growing willingness among individuals to engage in proper waste management practices, with strong support for penalties against open dumping and composting of domestic waste, indicating the need for a comprehensive and inclusive approach to effective solid waste management.

Households are generally willing to pay (WTP) for improvements in waste management services (Adepoju & Salimonu, 2010) and it is an integral attribute of sustainable financing mechanism for improved solid waste management (Boateng et al., 2019). The presence of an effective SWM system in a community positively influenced people's attitudes (Massoud et.al., 2021). However, understanding the specific preferences of the public is crucial for designing and implementing systems that align with their priorities. It is not sufficient to know that people are willing to pay; it is essential to identify which features or attributes of a waste management project they value the most, whether it be environmental protection, access to clean and safe drinking water, the generation of biogas or energy, or improved sanitation and hygiene. In this context, assessing the *willingness to pay* for different attributes of a waste management system provides deeper insights into public preferences. By using economic valuation method such as hedonic pricing method, policymakers and planners can estimate the monetary value that individuals assign to specific features of waste management services.

Hence, understanding the economic preferences of households toward various waste management interventions is critical in designing citizen-centric and financially sustainable policies. Economic valuation techniques such as the Contingent Valuation Method and Hedonic Pricing Method are increasingly used in environmental economics to estimate the public's willingness to pay for improvements in non-market goods, including environmental services (Mitchell & Carson, 1989). In the context of solid waste management, estimating WTP for different service attributes helps policymakers prioritize interventions that align with community needs and preferences, thus enhancing both effectiveness and public acceptability. Additionally, Local self-government bodies in Kerala have proactively implemented institutional reforms to help preserve and protect the region's environmental quality. Nevertheless, a considerable number of households in the state continue to lack access to regular waste collection services from the authorities. This highlights the need for a comprehensive approach that considers the various factors and practices influencing effective waste management by urban municipalities.

2. Objectives

The primary objective of the study is to estimate households' willingness to pay for specific attributes of a hypothetical waste management project using the hedonic pricing method. By assigning monetary values to distinct components such as ensuring a clean environment (problem abandonment), providing safe drinking water and mosquito control (compensatory interventions), and introducing waste recycling and controlled landfilling (alternative disposal mechanisms), the study aims to estimate public preferences and perceived value of each feature.

3. Materials and Methods

3.1 Data Collection

Through stratified random selection, the study collected information from 384 sample households of the Calicut Municipal Corporation in Kerala. The 75 wards that make up Calicut Corporation are separated into two strata according to the average distance (8 km) between them and the waste treatment plant. Thirty-three wards made up Stratum 1, while forty-two wards made up Stratum II, which was farther from the mean distance. Eight wards are chosen at random from Stratum II, while seven wards are chosen at random from Stratum I. In proportion to the overall number of households in that ward, each of the chosen wards represents 24–28 households.

3.2 Theoretical Framework: Hedonic Pricing Approach

This study applies Hedonic Pricing Analysis to assess how households in urban Kerala perceive various attributes of waste management services, including the quality of waste collection, disposal methods, and the environmental and social impact of waste management practices. Along with Hedonic pricing analysis CVM has been used by several scholars to estimate economic values for non-market goods (Basili et al., 2006; Fonta et al. 2008). The present study primarily uses contingent valuation method to elicit actual WTP of the households towards enhanced waste management. Initially, respondents are asked whether they would be willing to contribute financially, even if it's a nominal amount, towards the described waste management improvements.

Following this approach, hedonic pricing approach is adopted to know the preference of the people towards the different attributes of waste management.

The hedonic pricing method estimates WTP for a hypothetical solid waste management project that encompasses key features: clean environment, safe drinking water, mosquito and rodent control, waste recycling for gas production, and controlled landfilling with a substantial operational lifespan. These features are conceptually grouped as problem abandonment strategies, compensatory interventions, and alternative mechanisms for waste disposal. By analysing the price attributed to each component, this study seeks to uncover the underlying preferences of urban residents and highlight the economic value they associate with specific public goods. The hedonic pricing method, by decomposing willingness to pay into the value of the characteristics of the plant provides a tangible way to infer how much people are willing to pay for each of these features.

The study utilized one-way ANOVA to investigate any statistically significant differences in the average willingness to pay for various features of the proposed project. Key assumptions of ANOVA, including normality, homogeneity of variance, and linearity, were tested. A normal P-P plot was utilised to evaluate normality of the distribution. Levene's test for equality of error variance was applied to examine homogeneity of variance. The significant result from Levene's test indicates that variances are notably different. To address this issue, the study applied an adjusted F test, specifically the Brown-Forsythe statistic, as an alternative method. The Games-Howell post hoc test was employed to check which specific groups differed from one another.

4. Results and Discussions

4.1 Estimation of Willingness to Pay: Hedonic Pricing Method

The estimate of individuals' willingness to pay is derived from a hypothetical solid waste management initiative that includes features such as ensuring a clean environment, providing safe drinking water, controlling pests like rodents and mosquitoes, recycling waste for gas production, and establishing a controlled landfill with an extended lifespan.

In this context, the willingness to pay for a clean environment is recognized as a preference for the abandon of the problem. The willingness to pay for safe drinking water and mosquito control is viewed as a compensatory measure. The development of a controlled landfill with a long lifespan and waste recycling for gas production are categorized as alternative disposal methods. By determining the value of these particular attributes, referred to as the hedonic pricing method, the study clarifies the community's preferences for the proposed project.

Table 1: Willingness to Pay – Hedonic Pricing

Features	Percentage to total	Mean	Median	SD	CV
Clean environment	83.3	195.96	200	155.29	79.25
Safe drinking water	83.3	191.67	200	154.17	80.44
Control of mosquitoes	81.8	187.11	200	156.86	p83.83
Gas production	66.4	111.59	100	112.25	100.59
Construction of controlled landfill with a large life span	65.6	110.16	100	112.13	101.79

Source: Estimated from primary data

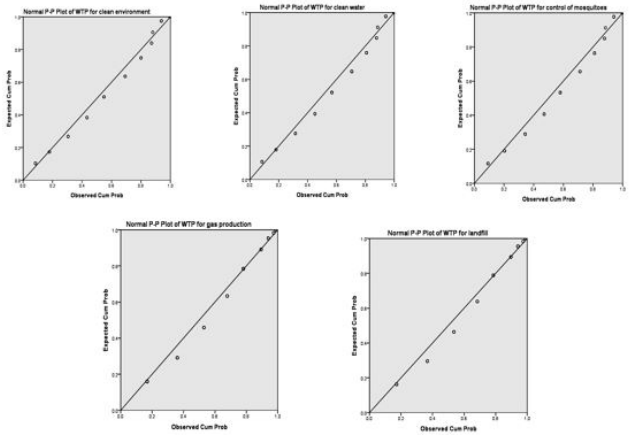
Willingness to pay of households towards different features of the project is given in Table 1. As expected, mean willingness to pay is high (Rs.195.96) towards a cleaner environment because people are more concerned about the need for a clean environment as well as the abandon of the solid waste problem. The findings that city dwellers place a high value on homes in cleaner neighborhoods are consistent with this (Nepal et al., 2020). Mean willingness to pay for safe drinking water is Rs.191.67 followed by willingness towards control of mosquitoes (Rs.187.11).Compared with the first three features of the project, mean willingness to pay towards gas production and construction of landfill with a large lifespan are low which shows people are not much interested in paying for gas production and construction of the controlled landfill. The results show that people prefer for abandon of the problem than alternative methods like gas production and land fill. There is not much of a distinction between compensatory intervention and the preference for problem abandonment.

4.2 Mean Difference Analysis by using One Way ANOVA

The study employed one way ANOVA to check whether there is any statistically significant difference between the means willingness to pay towards different features of the project like ensuring clean environment, provision of safe drinking water, control of rodents and mosquitoes, waste recycling to produce gas for household consumption and construction of a controlled landfill with a large lifespan. The study has to check whether the data satisfies basic assumptions of ANOVA before analysing the data.

To ensure that the collected data can be subjected to ANOVA, the study has to check whether the data follow the basic assumptions. The observations under considerations are independent. The dependent variables of the study such as willingness to pay towards different features of the project are on an interval scale. Normal P-P Plot is employed to determine normality graphically. The distribution of dependent variables follows normal distribution properties as clear from the normal P-P plot (Fig. 1).

Figure 1: Normal P-P Plot of the Dependent Variable



Source: Drawn from the primary data

For testing the homogeneity of variance, the study employed Levene's test of equality of error variance, testing whether the variance of the five groups is significantly different. Notice that the Levene's test is significant; F = 15.45, which shows variance of the five groups are significantly different. Thus, the assumption of homogeneity of variance is violated for this sample. In order to rectify this, the study utilised an adjusted F test like Brown-Forsythe statistic as an alternative.

Brown and Forsythe's test was employed to assess the equality of population variances. This robust test, which is based on the absolute deviations from the group median, is particularly suitable when the assumption of homogeneity of variance is violated. The adjusted F-ratio obtained from the test was 38.62 and was found to be statistically significant ($p < \alpha$). Consequently, the null hypothesis (H_0: $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$) was rejected, indicating that there is a statistically significant difference among the group means. This result justifies the application of ANOVA to further examine the differences in means across the group

Table 2: One way ANOVA: WTP towards different Features of the Project

	Sum of squares	Df	Mean square	F	Significance
Between group	3016960.94	4	754240.23	38.62	.000
Within group	37404589.34	1915	19532.42		
Total	40421550.78	1919			

Source: Estimated from primary data

One-way ANOVA shows a statistically significant result with an F ratio of 38.615, so alternative hypothesis (H_1: $\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5$) can be accepted in which there are at least two group means statistically significantly different from each other. Hence, the study needs to conduct a 'post hoc follow-up test' to determine which group means differ from each other. Because of the violation of the assumption of homogeneity of variance, the Games-Howell test is used to determine which specific groups are different from each other.

Group 1- WTP for a good environment

Group 2- WTP for safe drinking water

Group 3- WTP for control of mosquitoes

Group 4- WTP for gas production

Group 5- WTP for construction of the landfill

Table 3: Post hoc Test: WTP towards Different Features of the Project

	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig
Games-Howell	1.00 WTP for good environment	2.00	4.30	11.17	0.99
		3.00	8.85	11.26	0.94
		4.00	84.38	9.78	0.00
		5.00	85.81	9.77	0.00
	2.00 WTP for safe drinking water	1.00	-4.30	11.17	0.99
		3.00	4.56	11.22	0.99
		4.00	80.08	9.73	0.00
		5.00	81.51	9.73	0.00
	3.00 WTP for control of mosquitoes	1.00	-8.85	11.26	0.94
		2.00	-4.56	11.22	0.99
		4.00	75.52	9.84	0.00
		5.00	76.95	9.84	0.00
	4.00 WTP for gas production	1.00	-84.38	9.78	0.00
		2.00	-80.08	9.73	0.00
		3.00	-75.52	9.84	0.00
		5.00	1.43	8.10	1.00
	5.00 WTP for construction of landfill	1.00	-85.81	9.77	0.00
		2.00	-81.51	9.73	0.00
		3.00	-76.95	9.84	0.00
		4.00	-1.43	8.10	1.00

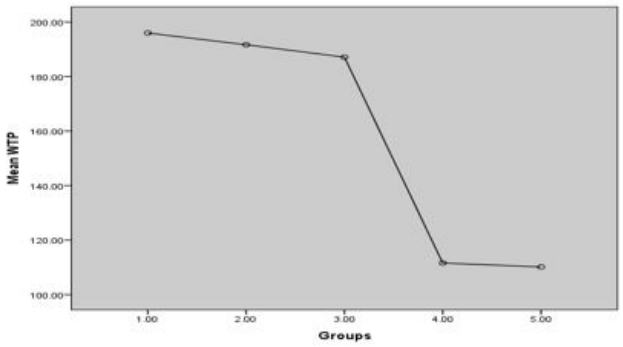
Source: Estimated from primary data

Table 3 shows the results of the Games- Howell follow-up tests. First, locate the (I) group (WTP for the clean environment), then locate the (J) group (WTP for clean water). This is the way how WTP for a clean environment is being compared to the WTP for water. In the next column, mean difference (I-J) shows the mean difference for these two groups. The next column of interest is the significance column, which tells the *p*-value ($p = .99$). The *p*-value is compared with the alpha level to determine whether this pair is significantly different. No significant difference can be seen in the case of group 1 and group 2.

Group 1 ($M = 195.96$) is significantly different from Group 4 ($M = 111.59$), with a mean difference of 84.37 and from Group 5 ($M = 110.16$), with a mean difference of 85.81. Group 2 ($M = 191.67$) is significantly different from the Group 4 ($M = 111.59$), with a mean difference of 80.08 and from Group 5 ($M = 110.16$), with a mean difference of 81.51. Group 3 ($M = 187.11$) is significantly different from Group 4 ($M = 111.59$), with a mean difference of 75.52 and from Group 5 ($M = 110.16$), with a mean difference of 76.95.

The results of post hoc tests shows that no significant difference can be seen in the preference of the people towards abandon of the problem (WTP for clean environment) as well as the preference towards compensatory alternatives (WTP for clean water and WTP towards control of mosquitoes). But preferences towards these two are statistically different from the alternative methods such as construction of controlled landfill and recycling for gas production. It shows people do not prefer alternative methods because alternative methods like controlled land fill may also create all the issues of waste disposal. It will not wash out the problem completely. They prefer more on the abandon of the problem which ensure environmental quality. Hence the conclusion derived from the result is that people are willing to pay for hypothetical project mainly for the clean environment.

Figure 2: Mean Plot from ANOVA



Source: Drawn from primary data

Mean plot represents group means and their linear relationship which helps in interpreting the results. Each group's average is represented by the points on the plot. This graph makes it much simpler to observe that the sample households' WTP is high for cleaner environments and low for landfill building. ANOVA found statistically significant differences in the mean willingness to pay for the various features of the project. The results also indicate that the willingness to pay for the project's first three features that is WTP for a clean environment, safe drinking water, and mosquito control are essentially the same. Additionally, it has been discovered that the average willingness to pay for these three aspects of drinking water and mosquito control is higher than that of the other two.

5. Conclusion

The hedonic pricing analysis reveals that urban households in Kerala place significant value on efficient and environmentally conscious waste management services. These insights imply the need for municipal systems to evolve beyond basic waste disposal and focus on quality, sustainability, and community engagement. As cities grow, aligning waste management policy with household preferences will be key to building cleaner, more livable urban spaces. Here, the study concluded that people demonstrate a consistently high willingness to pay for a clean environment, safe drinking water, and mosquito control, highlighting their heightened awareness of and demand for essential public health and environmental services. The absence of significant differences among these three features suggests that citizens perceive them as equally important; reflecting a collective prioritization of immediate health-related concerns over other less critical project components. This has strong social implications, indicating that communities are increasingly conscious of the link between environmental quality and their well-being, and are willing to contribute financially towards improvements in these areas.

From a policy perspective, these insights emphasize the need for local governments and urban planners to prioritize investments in clean water access, environmental sanitation, and vector control within waste management and public health programs. Targeted interventions in these areas could enhance public satisfaction, build trust in institutions, and encourage greater civic participation. Moreover, incorporating public preferences into the design and implementation of urban infrastructure projects ensures better alignment with community needs and can improve the long-term sustainability and effectiveness of such initiatives. These findings also advocate for participatory planning and the integration of willingness to pay assessments in future policy formulation to promote inclusive, demand-driven development.

References

1. Adepoju, A.A. and Salimonu, K.K. (2010). Household willingness to pay for improved solid waste management in Osun State, Nigeria. *Plenary Paper Session I: Water*, *51*. https://www.researchgate.net/profile/Adebusola-Adepoju/publication/283452822.

2. Boateng, K. S., Agyei-Baffour, P., Boateng, D., Rockson, G. N. K., Mensah, K. A., & Edusei, A. K. (2019). Household willingness-to-pay for improved solid waste management services in four major metropolitan cities in Ghana. *Journal of Environmental and Public Health*, *2019*(1), 5468381. https://onlinelibrary.wiley.com/doi/full/10.1155/2019/5468381.

3. Basili, M., Di Matteo, M., & Ferrini, S. (2006). Analysing demand for environmental quality: A willingness to pay/accept study in the province of Siena (Italy). *Waste Management*, *26*(3), 209-219. https://www.sciencedirect.com/science/article/abs/pii/S0956053X05000528.

4. Fonta, W.M., Ichoku, H.E., Ogujiuba, K.K., & Chukwu, J.O. (2008). Using a contingent valuation approach for improved solid waste management facility: Evidence from Enugu State, Nigeria. *Journal of African economies*, *17*(2), 277-304. https://academic.oup.com/jae/article-abstract/17/2/277/908570.

5. Jayakumar Menon, V., & Palackal, A. (2022). Centralized and decentralized approaches to solid waste management–A case study. *The holistic approach to environment*, *12*(4), 155-164. https://hrcak.srce.hr/283652.

6. Kabir, Z., & Kabir, M. (2021). Solid waste management in developing countries: Towards a circular economy. in *Handbook of Solid Waste Management: Sustainability through Circular Economy,* pp. 1-34. Singapore: Springer Singapore. https://link.springer.com/referenceworkentry/10.1007/978-981-15-7525-9_1-1.

7. Khan, S., Anjum, R., Raza, S. T., Bazai, N. A., & Ihtisham, M. (2022). Technologies for municipal solid waste management: Current status, challenges, and future perspectives. *Chemosphere, 288*, 132403. https://www.sciencedirect.com/science/article/abs/pii/S0045653521028757.

8. Massoud, M., Lameh, G., Bardus, M., & Alameddine, I. (2021). Determinants of waste management practices and willingness to pay for improving waste services in a low-middle income country. *Environmental Management*, *68*(2), 198-209. https://link.springer.com/article/10.1007/s00267-021-01472-z.

9. Mitchel, R. C., & Carson, R. T. (1989). Using surveys to value public goods: The contingent valuation method. *Resources for the Future*. https://www.taylorfrancis.com/books/mono/10.4324/9781315060569/using-surveys-value-public-goods-richard-carson-robert-cameron-mitchell.

10. Nanda, S., & Berruti, F. (2020). Municipal solid waste management and landfilling technologies: a review. *Environmental Chemistry Letters*, *19*(2), 1433-1456. https://link.springer.com/article/10.1007/S10311-020-01100-Y.

11. Puthillath, B., & Sasikumar, R. (2015). Integrated solid waste management score board-a tool to measure performance in municipal solid waste management. *International Journal of Emerging Trends & Technology in Computer Science (IJETTCS)*, *4*(5), 2. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Puthillath%2C+B.%2C+%26+Sasikumar%2C.

12. Venu, V., Ranjith, A., & Ambika, S. (2024). Exploring community attitudes and perceptions towards solid waste management: A case study of Kerala, India.*Current Science, (00113891)*,*126*(12). https://openurl.ebsco.com/EPDB%3Agcd%3A7%3A3752359/detailv2?sid=ebsco%3Aplink%3Ascholar&id=ebsco%3Agcd%3A178140475&crl=c&link_origin=scholar.google.com.

Disclaimer / Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of Journals and/or the editor(s). Journals and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.