



FOSTERING SUSTAINABLE COMMUNITIES: A STUDY ON SOLID WASTE MANAGEMENT BEHAVIOURS AMONG YOUNG RESIDENTS IN BENGALURU”

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Abstract

Solid Waste Management has the potential to contribute to a better, cleaner and healthier community. Embarking on a journey towards sustainable Solid Waste Management (SWM) practices aligns with the global commitment outlines in the Sustainable Development Goals (SDGs). A set of 17 goals are established by United Nations Member States in 2015 by adopting “the 2030 Agenda for Sustainable Development” to address various social, economic and environmental challenges worldwide by 2030. Specifically, Goal 12 of SDGs focuses on “Responsible consumption and Production”. Target 12.5 of Goal 12 stresses on “sustainable waste reduction” and aims at “substantially reduce waste generation through prevention, reduction, recycling and reuse” by 2030. This underscores the importance of adopting sustainable practices in managing solid waste to minimize the environmental impact and to promote efficient use of resources. Communities contribute to achieving not only Goal 12 but also Goal 13 “Climate Action” by initiating SWM strategies to mitigate the effects of improper waste management on environment and climate.

However, implementing such practices is a challenging and daunting facet for the Urban Local Bodies. Participation of stakeholders towards “Sustainable Solid Waste Management” plays a key role in solving the problem. Sustainability starts from the source and focusing on younger demographics helps shape tomorrow's “eco-citizens”. The research aims at evaluating the behaviour of community specifically the young individuals of Bengaluru in the perspective of solid waste management. The research aims at investigating the youngsters knowledge level about solid waste management, their attitude towards waste management practices and their everyday sustainable practices in relation to Solid Waste disposal and management. The study is a combination of descriptive and exploratory research. Data collection is undertaken by administering the structured questionnaire. Stratified random sampling is employed and chi-square test is applied to examine the associations between demographic information and the variables. The findings of the study contributed to the various factors influencing the behaviour of the respondents and suggestions are provided to foster the culture of responsible waste disposal among the city's youth.

Keywords: *Sustainable Solid Waste Management, Knowledge, Sustainable Practices, Attitudes.*

Introduction

Rapid urbanization and continuous change in the consumption patterns of people generates more solid waste. Sustainable community practices involve responsible solid waste management behaviours. Reducing the amount of solid waste generated is pivotal for achieving sustainable development. Solid waste management is a critical task and has gained global relevance because of the challenges encountered by the urban local bodies. The Sustainable Development Goals (SDGs) specified in “2030 Agenda for Sustainable Development” by the United Nations Member States promotes “Responsible Consumption and Production” and focuses on the targets to “substantially reduce waste”.

Participation of stakeholders such as the waste generators, waste processors, Government, financing institutions and non-governmental organizations plays a crucial role in integrated solid waste



management (Kurian Joseph, 2006). According to Solid Waste Management Rules, 2016, “waste generators are responsible for managing their own waste.” Waste generators may be an individual, organization, company and so on; anyone who considers throwing away the product after it ceases to produce any value to the user.

The current research focuses on individuals as significant waste generators as they form a substantial segment of the community. To narrow the focus, the researchers particularly examine young individuals as key demographic in understanding and assessing the behaviour towards solid waste generation and management. Youth play a crucial role in shaping the future of a country through their ideas, energy and contribution to society. Since solid waste is a daunting task for urban local bodies, understanding the knowledge, attitudes and practices of the youth is key in arriving at effective strategies in this domain.

Bengaluru is a rapidly growing city and with the influx of people in search of employment opportunities, there is rapid urbanization, changing lifestyles and increased consumption patterns. According to the article “The Young and Restless” of Bangalore Mirror dated 19-05-2022, it is surveyed that youngsters around 29% of the total population of Karnataka and Bengaluru has highest share of youngsters in the state with 21.73%. The article dated 31-01-2023 in The Hindu newspaper quotes the Economics Survey that Karnataka ranks second in giving jobs to 18-25 age group.

Hence the present research attempts to assess the knowledge, attitude and practices of the young population towards solid waste disposal and management. For the purpose of present research, the youngsters are defined as “the individuals between the age of 18 and 30 years residing in Bengaluru City.”

The knowledge variable seeks to gain insight into the youth’s familiarity regarding solid waste management practices including their understanding of waste segregation, storing, reuse, recycling and disposal method. Parallely their attitudes are explored which throws light on their perceptions, beliefs and opinions about the 3 Rs (**Reduce, Reuse and Recycle**) of waste management and environment conversation. Examining the actual practices adopted by the youngsters about the basic functional elements of waste management in their daily lives emphasizes the practicality of the knowledge and attitudes of the youngsters.

Research Objectives

1. To assess the level of knowledge about solid waste management among young individuals in Bengaluru
2. To explore the attitudes of young residents towards solid waste management in Bengaluru
3. To evaluate the actual solid waste management practices adopted by youngsters of the city in their daily lives

Review of Literature

Kamweru Grace Nyaguthi (2019), in the research work ‘assessment of Household’s Knowledge, Attitude and Practices on Solid Waste Management in Nakuru Town’ studies the link between levels of knowledge and attitudes of a society to their behaviours or practices and identifies that the respondents of the 4 wards of the town had satisfactory knowledge and favourable attitude but poor practices. Zahrasadat Masoumidezzouli (2019) in the research work “An Investigation on Knowledge, Attitude and Practice Among Students of University Malaya towards Solid Waste Management” has



chosen students as respondents because they would be good representatives of society and young generation. Justice Kofi Debrah et.al. (2021) in their review paper “Raising Awareness on Solid Waste Management through Formal Education for Sustainability: A Developing Countries Evidence Review” mentions that environmental sustainability in developing countries could be achieved when environmental awareness, attitudes and knowledge are taught to the students through formal education. It continues that to bridge the gap between the youth and older people in SWM, environmental sustainability education should be integrated into the schools at all levels within developing countries. Jummane Daudi Shangaluka Kalwani (2009) in the thesis titled “Community Participation in Municipal Solid Waste Management in Informal Settlements: Morogoro Municipality, Tanzania” states that municipality is facing problems in involving community in effective Municipal Solid Waste Management because of lack of appropriate organization, mobilization and coordination of local resources and lack of commitment from municipality. Natasha Kalra (2021) in the research paper “Community Participation and Waste Management” focuses on the success stories of community participation in solid waste management and mentions that two factors – people attitude towards waste and understanding towards the consequences if the waste is unattended, plays a major role in involving them.

Research Methodology

A structured questionnaire was administered, and data was collected from the respondents with respect to the demographic information which includes age, gender, educational qualification and employment status. Next section of the questionnaire collected information about the awareness level of the young residents regarding their knowledge about waste segregation, recycling, composting and proper disposal methods. Responses regarding attitudes of young respondents towards solid waste management such as perceived importance, sense of responsibility and willingness to adopt sustainable behaviours was collected. Data about the actual solid waste management practices and behaviour exhibited by young residents related to segregation, recycling, participation, use of reusable products and proper disposal methods was recorded.

The research is conducted using both primary and secondary sources of data. Convenient sampling was used to collect the data. Responses from 170 samples was collected.

Chi-square test is used to examine the association between the different variables, that is to determine the relationship of knowledge, attitude and practices with gender, age, educational level and employment status.

Hypothesis

1. $H_{0,1}$: There is no significant difference in the level of knowledge about solid waste management among young individuals based on their demographic profile in Bengaluru
2. $H_{1,1}$: There is a significant difference in the level of knowledge about solid waste management among young individuals based on their demographic profile in Bengaluru
3. $H_{0,2}$: There is no significant difference in the attitude towards solid waste management among young individuals based on their demographic profile in Bengaluru.
4. H_1 : There is a significant difference in the attitude towards solid waste management among young individuals based on their demographic profile in Bengaluru.
5. $H_{0,3}$: There is no significant difference in the practices towards solid waste management among young individuals based on their demographic profile in Bengaluru.



6. $H_{1,3}$: There is a significant difference in the practices towards solid waste management among young individuals based on their demographic profile in Bengaluru.

Results and Discussion

The hypothesis was tested related to the level of knowledge, attitudes, and practices of young people about solid waste management in Bengaluru.

Hypothesis 1 (Knowledge): There is no significant difference in the level of knowledge about solid waste management among young individuals based on their demographic profile in Bengaluru.

- **Level of knowledge with the gender of the respondents**

Table No 1. Table showing the Knowledge Variable, Number of Respondents and Gender of the Respondents and the statistical Test Result

Knowledge	No of Respondents	Gender	
		Male	Female
Low	30	10	20
Medium	100	60	40
High	40	25	15
	170	95	75

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.585 ^a	2	.023
Likelihood Ratio	7.593	2	.022
Linear-by-Linear Association	5.146	1	.023
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.24.

Findings: The analysis of the data determines that P-value (0.023) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.

Conclusion: There is a significant difference between the level of knowledge about solid waste management and the gender of respondents, thus suggesting that gender plays a significant role in shaping individual's knowledge about solid waste management. This also plays a significant difference in designing educational awareness and taking related initiatives.

- **Level of knowledge with the age of the respondents**

Table No 2. Table showing the Knowledge Variable, Number of Respondents and Age of the Respondents and the statistical Test Result.

		Age
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Knowledge	No of Respondents	18-21	22-25	26-30
Low	30	10	5	15
Medium	100	35	57	8
High	40	5	28	7
	170	50	90	30

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	38.143 ^a	4	.000
Likelihood Ratio	37.097	4	.000
Linear-by-Linear Association	.104	1	.747
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.29.

Findings: The analysis of the data determines that P-value (0.000) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.

Conclusion: There is a significant difference between the level of knowledge about solid waste management and age of respondents, thus suggesting that age may be a significant factor influencing the individual's knowledge about solid waste management practices. Age related variations in imparting knowledge about solid waste management may be recognized and accommodated.

- **Level of knowledge with the educational qualification of the respondents**

Table No 3. Table showing the Knowledge Variable, Number of Respondents and Educational Qualification of the Respondents and the statistical Test Result.

Knowledge	No. of Respondents	Educational Qualification		
		Pre-University	Bachelor's Degree	Master's Degree
Low	30	10	14	6
Medium	100	17	23	60
High	40	3	13	24
	170	30	50	90



Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.572 ^a	4	.001
Likelihood Ratio	19.872	4	.001
Linear-by-Linear Association	11.357	1	.001
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.29.

Findings: The analysis of the data determines that P-value (0.001) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.

Conclusion: There is a significant difference between the level of knowledge about solid waste management and educational qualification of respondents, thus suggesting a significant role of educational level in shaping individual’s knowledge. This highlights the importance of education-focused approaches to promote sustainable practices.

- **Level of knowledge with the employment status of the respondents**

Table No 4. Table showing the Knowledge Variable, Number of Respondents and Employment Status of the Respondents and the statistical Test Result

Knowledge	No of Respondents	Employment Status			
		Employed	Self Employed	Unemployed	Student
Low	30	8	6	11	5
Medium	100	14	38	16	32
High	40	8	11	8	13
	170	30	55	35	50

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.765 ^a	6	.067
Likelihood Ratio	11.485	6	.074
Linear-by-Linear Association	.566	1	.452
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.29.

Findings: The analysis of the data determines that P-value (0.067) > 0.05 and hence the null hypothesis is failed to reject at 95% confidence level.

Conclusion: There is no significant difference between the level of knowledge about solid waste management and employment status of respondents, thus suggesting that employment status may not



be a significant factor in shaping the knowledge of the individuals. This means that employment status alone does not determine knowledge and other factors are essential in shaping the knowledge of the individuals.

Hypothesis 2 (Attitude): There is no significant difference in the attitude towards solid waste management among young individuals based on their demographic profile in Bengaluru.

- **Attitude towards solid waste management and the gender of the respondents**

Table No 5. Table showing the Attitude Variable, Number of Respondents and Gender of the Respondents

Attitude	No of Respondents	Gender	
		Male	Female
Positive	120	70	50
Neutral	30	20	10
Negative	20	5	15
	170	95	75

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.444 ^a	2	.009
Likelihood Ratio	9.621	2	.008
Linear-by-Linear Association	4.129	1	.042
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.82.

Findings: The analysis of the data determines that P-value (0.009) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.

Conclusion: There is significant difference in the attitude towards solid waste management among young individuals based on the gender of the respondents, thus suggesting that the perceptions, beliefs and values related to waste management between male and female differ. This signifies the importance of considering gender perspectives in waste management initiatives.

- **Attitude towards solid waste management and the age of the respondents**

Table No 6. Table showing the Attitude Variable, Number of Respondents and Age of the Respondents and the statistical Test Result

Attitude	No of Respondents	Age		
		18-21	22-25	26-30
Positive	120	35	60	25
Neutral	30	7	20	3
Negative	20	8	10	2
	170	50	90	30



Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.785 ^a	4	.310
Likelihood Ratio	4.931	4	.294
Linear-by-Linear Association	1.617	1	.204
N of Valid Cases	170		

a. 1 cells (11.1%) have expected count less than 5. The minimum expected count is 3.53.

Findings: The analysis of the data determines that P-value (0.310) > 0.05 and hence the null hypothesis is failed to reject at 95% confidence level.

Conclusion: There is no significant difference in the attitude towards solid waste management among young individuals based on the age of the respondents, thus implying that the individuals across different age groups may hold similar perceptions believes or values related to waste management.

- **Attitude towards solid waste management and the educational qualification of the respondents**

Table No 7. Table showing the Attitude Variable, Number of Respondents and Educational Qualification of the Respondents and the statistical Test Result

Attitude	No of Respondents	Educational Qualification		
		Pre-University	Bachelor's Degree	Master's Degree
Positive	120	5	32	70
Neutral	30	7	10	12
Negative	20	18	8	8
	170	30	50	90

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	44.997 ^a	4	.000
Likelihood Ratio	42.069	4	.000
Linear-by-Linear Association	37.806	1	.000
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.12.

Findings: The analysis of the data determines that P-value (0.000) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.



Conclusion: There is a significant difference in the attitude towards solid waste management among young individuals based on the educational qualification of the respondents, thus implying that individuals with higher educational levels of education may hold different perceptions believes or values related to waste management. By recognizing and addressing the educational disparities, efforts to promote sustainable behaviours can be more effective and equitable.

- **Attitude towards solid waste management and the employment status of the respondents**

Table No 8. Table showing the Attitude Variable, Number of Respondents and Employment Status of the Respondents and the statistical Test Result

Attitude	No of Respondents	Employment Status			
		Employed	Self Employed	Unemployed	Student
Positive	120	18	20	7	36
Neutral	30	7	20	6	9
Negative	20	5	15	22	5
	170	30	55	35	50

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41.675 ^a	6	.000
Likelihood Ratio	40.136	6	.000
Linear-by-Linear Association	1.177	1	.278
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.41.

Findings: The analysis of the data determines that P-value (0.000) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.

Conclusion: There is significant difference in the attitude towards solid waste management among young individuals based on the employment status of the respondents thus implying that individuals with different employment status may hold different perceptions believes or values related to waste management. By recognizing and addressing employment related disparities in attitudes towards solid waste management, efforts to promote sustainable behaviours can be effective and inclusive.

Hypothesis 3 (Practices): There is no significant difference in the practices towards solid waste management among young individuals based on their demographic profile in Bengaluru.

- **Practices towards solid waste management and the gender of the respondents**

Table No 9. Table showing the Practice Variable, Number of Respondents and Gender of the Respondents and the statistical Test Result.



Practices	No of Respondents	Gender	
		Male	Female
Sustainable	60	35	25
Unsustainable	110	60	50
	170	95	75

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.226 ^a	1	.635
Continuity Correction ^b	.098	1	.754
Likelihood Ratio	.226	1	.634
Fisher's Exact Test			
Linear-by-Linear Association	.225	1	.636
N of Valid Cases	170		

Findings: The analysis of the data determines that P-value (0.635) > 0.05 and hence the null hypothesis is failed to be rejected at 95% confidence level.

Conclusion: There is no significant difference in the practices towards solid waste management among the respondents based on gender, suggests that gender may not be a significant factor influencing individual’s practices related to solid waste management. It is essential to consider other factors such as education, employment and age.

- **Practices towards solid waste management and the age of the respondents.**

Table No 10. Table showing the Practice Variable, Number of Respondents and Age of the Respondents and the statistical Test Result

Practices	No of Respondents	Age		
		18-21	22-25	26-30
Sustainable	60	24	28	8
Unsustainable	110	26	62	22
	170	50	90	30

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.202 ^a	2	.074
Likelihood Ratio	5.117	2	.077
Linear-by-Linear Association	4.482	1	.034
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.59.



Findings: The analysis of the data determines that P-value (0.074) > 0.05 and hence the null hypothesis is failed to be rejected at 95% confidence level.

Conclusion: There is no significant difference in the practices towards solid waste management among the respondents based on the age of the respondents, suggests that individuals across different age groups may engage in similar practices such as waste reduction, recycling and proper disposal.

- **Practices towards solid waste management and the educational qualification of the respondents.**

Table No 11. Table showing the Practice Variable, Number of Respondents and Educational Qualification of the Respondents and the statistical Test Result

Practices	No of Respondents	Educational Qualification		
		Pre-University	Bachelors Degree	Masters Degree
Sustainable	60	10	20	60
Unsustainable	110	20	30	30
	170	30	50	90

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.796 ^a	2	.001
Likelihood Ratio	15.017	2	.001
Linear-by-Linear Association	13.427	1	.000
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.12.

Findings: The analysis of the data determines that P-value (0.001) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.

Conclusion: There is significant difference in the practices towards solid waste management among the respondents based on the educational qualification of the respondents, suggests that educational qualification plays a significant role in shaping the individuals' practices related to solid waste management. It implies that individuals with higher educational qualifications may engage in different practices such as waste reduction, recycling and proper disposal compared to those with lower levels of education.

- **Practices towards solid waste management and the employment status of the respondents**

Table No 12. Table showing the Practice Variable, Number of Respondents and Age of the Respondents and the statistical Test Result.



Practices	No of Respondents	Employment Status			
		Employed	Self Employed	Unemployed	Student
Sustainable	60	24	15	10	35
Unsustainable	110	6	40	25	15
	170	30	55	35	50

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	36.574 ^a	3	.000
Likelihood Ratio	38.202	3	.000
Linear-by-Linear Association	.337	1	.562
N of Valid Cases	170		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.82.

Findings: The analysis of the data determines that P-value (0.000) < 0.05 and hence the null hypothesis is rejected at 95% confidence level.

Conclusion: There is significant difference in the practices towards solid waste management among the respondents based on the employment status of the respondents suggests that employment status plays a significant role in shaping the individuals' practices related to solid waste management. Understanding these differences is important for designing workshops, seminars and other waste management initiatives.

Table No 13: Table Showing the Summary of the Results

Sl. No	Variable	Demographic Profile	P-Value	Null Hypothesis (H ₀)	Conclusion
1	Knowledge	Gender	0.023	Reject	Significant difference
	Knowledge	Age	0.000	Reject	Significant difference
	Knowledge	Educational Qualification	0.001	Reject	Significant difference
	Knowledge	Employment Status	0.067	Do not Reject	No significant difference
2	Attitude	Gender	0.009	Reject	Significant difference
	Attitude	Age	0.310	Do not Reject	No significant difference
	Attitude	Educational Qualification	0.000	Reject	Significant difference
	Attitude	Employment Status	0.000	Reject	Significant difference
3	Practices	Gender	0.635	Do not Reject	No significant difference



Practices	Age	0.074	Do not Reject	No significant difference
Practices	Educational Qualification	0.001	Reject	Significant difference
Practices	Employment Status	0.000	Reject	Significant difference

Recommendations

1. Educational and awareness campaigns emphasizing on the environmental and health benefits of sustainable waste management may be organized by the local authorities and resident welfare associations to raise awareness among the young residents.
2. Community based workshops and events aimed at fostering collaboration among the between residents, local authorities, and non-governmental organizations may be organized to provide a platform for knowledge sharing, skill building and networking. This creates and sense of collective responsibility and community ownership over waste management initiatives.
3. Community engagement and participation in waste management initiatives may be encouraged by organizing regular clean-up drives, recycling campaigns, and community-based waste management projects.
4. Empowering the young residents to become advocates for sustainable waste management practices within their communities is one of the suggestions as it provides opportunities for youth leadership and involvement in decision-making processes related to waste management policies and programs.
5. At the ward levels, the concerned authorities may invest in improving waste management infrastructure, including the expansion of recycling facilities and the implementation of effective waste collection and disposal systems. These facilities must be easily accessible to all residents.
6. Government and the Urban Local body should ensure necessary steps to strengthen enforcement of waste management policies, such as mandatory waste segregation and recycling regulations. The policies should also implement measures to penalize non-compliance and incentivize adherence to these policies through rewards or tax incentives.
7. Government should support research and innovation in waste management technologies and practices, including the development of eco-friendly packaging materials, waste-to-energy solutions, and decentralized waste treatment systems.
8. Concerned authorities may come forward for collaboration between academia, industry, and government to drive innovation in this field.
9. Peer-to-peer educational programs may be undertaken where individuals and experts can educate and empower each other to adopt sustainable waste management practices.
10. Younger generations are technological savvy, hence digital and technological solutions may be harnessed to engage younger generation in waste management programs. Social media campaigns, and peer influence strategies shall be adopted to promote pro-environmental attitudes and behaviors related to waste management.



Conclusion

The study on fostering sustainable communities through an investigation of solid waste management behaviours among young residents in Bengaluru is an attempt to provide valuable insights into the dynamics of waste management practices in urban scenario. The findings of this study underscore the complexity of solid waste management behaviours among the young residents in Bengaluru and highlight the importance of different approaches to adopt sustainable communities. By addressing knowledge gaps, shaping attitudes and promoting behaviour change, the stakeholders can work towards building more resilient communities that actively contribute to waste reduction and sustainable development.

Scope for Further Research

1. The study is confined to the geographical domain of Bengaluru and is based on a small population due to constraint of time and resources. Hence this study may be extended to larger samples.
2. The participants may be examined over time to assess the changes in their knowledge, attitude and practices that is longitudinal study may be conducted.
3. A comparative study may also be undertaken to compare the waste management behaviours among the respondents in Bengaluru with those in other urban areas.

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