

Knowledge, Attitudes and Practices (KAP) Study on Household Solid Waste Management among Urban and Rural Homemakers in Kerala

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ABSTRACT

This study examines the knowledge, attitude, and practices (KAP) of urban and rural homemakers in Kerala regarding household solid waste management (SWM). With rapid urbanization and increasing environmental concerns, effective waste management has emerged as a critical issue in the state. The research aims to assess the understanding, attitudes, and behaviors related to solid waste management among households. Using a mixed-methods approach, the study collected data from 526 homemakers through a survey. The findings revealed that 51.7% of participants exhibited moderate knowledge, while 83.8% demonstrated positive attitudes towards solid waste management. Significant differences were observed between urban and rural homemakers in terms of knowledge, waste segregation practices, and disposal methods. Rural homemakers predominantly relied on traditional methods such as composting and burning waste, with lower participation in formal segregation programs. Despite favorable attitudes toward SWM, challenges such as inadequate infrastructure, limited recycling facilities, and space constraints remain, particularly in rural areas. The study highlights the need for targeted awareness campaigns, enhanced infrastructure, and community-driven solutions to foster sustainable waste management practices across both urban and rural regions of Kerala.

Introduction

After the Industrial Revolution, many things created by humans separated them from nature, which was considered dangerous for both humans and the environment. The role of nature shifted to being exploited for human physical benefits. Modern society, technological advancements, and increased urbanization have led to a disconnection between people and nature. This disconnection may impact empathy for other species and hinder efforts towards conservation. Due to industrialization, humans have been generating waste and irresponsibly disposing of it in their surroundings, unknowingly causing harm to nature. This, in turn, affects human health and life. Therefore, there is an urgent need for a sustainable mindset to ensure a safe environment for future generations (Martin and Schouten, 2012). Waste has been a part of society for as long as human existence. Every human activity, from consuming goods onwards, results in the production of waste (Moore, 2012). Almost every household, organization, and human action generates some form of leftover material, which is considered unwanted or useless and is discarded at a specific stage and area by the person in charge (Williams, 2005). Despite better educational systems and a higher literacy rate in Kerala, there is a lack of proper waste management practices among the residents, both young and old (Ifegbesan, 2010). The Environmental Statistics Report of 2002 indicates that Kochi's efficiency in waste collection and management is only 60% of the national average. According to the National inventory on hazardous waste generating industries and hazardous waste management in India published by the Central Pollution Control Board, Ernakulam district has emerged as the new hazardous waste capital of Kerala, producing about 45,560 metric tonnes of hazardous waste annually.

Methodology

The area chosen for the current study was Ernakulam, Kerala. A total of 526 homemakers were showed interest to participate in the study. The method used for conducting the study was survey method. Interview method was used for collecting the baseline information. The interview schedule was pretested using the test – retest method on ten percentage of the total sample (52 homemakers). The reliability coefficient of the KAP questionnaire was calculated and the- value for knowledge component was 0.678, attitude component was 0.78 and practices component was 0.76. The face validity of the questionnaire was established with the help of experts. The data obtained was subjected to statistical interpretation using SPSS (Version 20.0).

Results and Discussion

The results obtained are presented in the following headings:

1. Homemaker's knowledge on household solid waste management

Table No: 01

Homemakers' knowledge on household solid waste management

Knowledge aspect	Responses in percentage (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Waste generation can be minimized at the point of purchase and consumption	241 (45.82)	217 (41.25)	68 (12.93)	-	-
Environmentally friendly and reusable packing materials can reduce the quantity of waste generation	341 (64.83)	125 (23.76)	60 (11.41)	-	-
Prevention, Reduction, Reuse and Recycling is the order of priority to manage non bio degradable wastes	247 (46.96)	177 (33.65)	102 (19.39)	-	-
Improper waste management leads to pollution which is a serious environmental problem	400 (76.05)	54 (10.27)	72 (13.69)	-	-
Segregation of waste at houses reduces the amount of waste to be disposed off	304 (57.79)	191 (36.31)	31 (5.89)	-	-
Segregation before disposal, and reuse and recycling supplements income to the family	300 (57.3)	62 (11.79)	89 (16.92)	75 (14.26)	-
Disposal of waste is the last choice in waste management strategy	269 (51.14)	111 (21.10)	109 (20.72)	-	37 (7.03)
Disposal of waste should be done after segregation	370 (70.34)	84 (15.97)	72 (13.16)	-	-
Burning plastic creates environmental pollution	405 (77)	49 (9.32)	72 (13.69)	-	-
Food leftovers, vegetable peels, garden trimmings, etc can be converted into manure	386 (73.38)	109 (20.72)	31 (5.89)	-	-
Biogas is a good LPG supplement	258 (49.05)	167 (31.75)	60 (11.41)	41 (7.79)	-

Slurry from the biogas plant is good manure	258 (49.05)	208 (39.54)	60 (11.41)	-	-
Recycling and reusing solid waste reduces the need for raw materials and saves natural resources	263 (50)	174 (33.08)	48 (9.13)	41 (7.79)	-

Minimizing Waste at the Point of Purchase and Consumption: A significant proportion of homemakers strongly agreed (45.82%) and agreed (41.25%) that waste generation can be minimized at the point of purchase and consumption. This indicated a strong consensus on the importance of conscious purchasing and consumption habits to minimize waste.

Using Environmentally Friendly and Reusable Packing Materials: Most respondents strongly agreed (64.83%) and agreed (23.76%) that environmentally friendly and reusable packing materials can significantly reduce waste generation. This consensus underscored the critical role of packaging in waste management, although a small neutral segment suggested a need for further awareness.

Priority in Managing Non-Biodegradable Wastes: The principle of Prevention, Reduction, Reuse, and Recycling was strongly agreed upon by 46.96% of the respondents and agreed upon by 33.65%, with 19.39% remaining neutral. No respondents disagreed, indicating widespread acceptance of this waste management hierarchy.

Pollution from Improper Waste Management: An overwhelming majority strongly agreed (76.05%) that improper waste management leads to pollution, with 10.27% agreeing and 13.69% neutral. No respondents disagreed.

Segregation of Waste at Source: More than half of the respondents strongly agreed (57.79%) that segregating waste at the household level reduces the amount to be disposed of. Additionally, 36.31% agreed, 5.89% were neutral, and no respondents disagreed. This showed strong support for waste segregation practices.

Economic Benefits of Waste Management: Regarding the economic benefits of segregation, reuse, and recycling, 57.3% of homemakers strongly agreed, 11.79% agreed, 16.92% were neutral, and 14.26% disagreed.

Disposal as a Last Resort: The view that disposal should be the last choice in waste management was strongly agreed upon by 51.14% and agreed upon by 21.10%, with 20.72% remaining neutral and 7.03% disagreeing.

Segregated Waste Disposal: A substantial majority (70.34%) strongly agreed that waste should be disposed of only after segregation, with 15.97% agreeing and 13.16% neutral. No respondents disagreed. This indicated high awareness of proper disposal practices, although a small neutral segment suggested some ambiguity or lack of knowledge.

Burning Plastic: Most respondents (77%) strongly agreed that burning plastic creates environmental pollution, with 9.32% agreeing and 13.69% neutral.

Conversion of Organic Waste into Manure: The majority strongly agreed (73.38%) that food leftovers, vegetable peels, and garden trimmings can be converted into manure, with 20.72% agreeing and 5.89% neutral. No respondents disagreed, showing a strong inclination towards composting, although a small neutral segment indicated some uncertainty.

Biogas as an LPG Supplement: While 49.05% strongly agreed that biogas is a good supplement to LPG, a considerable portion also agreed (31.75%), 11.41% were neutral, and 7.79% disagreed. This indicated knowledge of alternative energy sources but also highlighted some reservations or lack of awareness among a minority.

Slurry from Biogas as Manure: The majority (49.05%) strongly agreed, and 39.54% agreed that slurry from biogas plants is good manure, with 11.41% neutral. No respondents disagreed, reflecting a positive attitude towards using biogas by-products, although some respondents were neutral.

Recycling and Reusing to Save Resources: Half of the respondents (50%) strongly agreed that recycling and reusing solid waste reduces the need for raw materials and conserves natural resources, with 33.08% agreeing, 9.13% neutral, and 7.79% disagreeing.

Categorization of homemakers based on the knowledge of household solid waste management

Table No: 02

Categorization of homemakers based on the knowledge on household solid waste management

Particulars	Frequency	Percent
Low Knowledge	72	13.7%
Moderate Knowledge	272	51.7%
High Knowledge	182	34.6%
Total	526	100.0

Based on the data obtained in the above table, the majority of the respondents (51.7%) found they had moderate levels of knowledge. A smaller percentage (34.6%) reported having had high levels of knowledge, while the remaining 13.7% reported having low levels of knowledge.

The mismanagement of household solid waste has led to several detrimental effects (Paghasian, 2017). Enhancing knowledge about various aspects of waste management can play a pivotal role in minimizing waste generation and improving waste management processes (Yasmin, 2017). Nair (2016) found that urban homemakers in Kerala possess a higher level of knowledge about waste segregation and disposal methods compared to their rural counterparts. Additionally, Ramachandran et al. (2019) highlighted the significant role of local government initiatives in raising awareness in urban areas.

Area of the house and Level of Knowledge of homemakers

Table No. 03

Area of the house and Level of Knowledge of homemakers

Area of the house	Level of Knowledge Frequency in percentage (%)			Total	χ^2	p-value
	Low Knowledge	Moderate Knowledge	High Knowledge			
Urban	72 (17.1)	204 (48.5)	145 (34.4)	421 (100)	36.16	.000***

Rural	-	68 (64.8)	37 (35.2)	105 (100)		
Total	72 (13.7)	272 (51.7)	182 (34.6)	526 (100)		

(***) significant at the 0.001 level.

In urban areas, the level of knowledge among homemakers varied significantly. The majority had moderate knowledge (48.5%), followed by a considerable portion with high knowledge (34.4%). However, a notable 17.1% of urban homemakers exhibited low knowledge. Among rural homemakers, none were categorized as having low knowledge. Most rural respondents displayed moderate knowledge (64.8%), with the remaining 35.2% having high knowledge.

When considering the total sample, 13.7% of homemakers across both urban and rural areas exhibited low knowledge, 51.7% had moderate knowledge, and 34.6% had high knowledge. The chi-square test ($\chi^2 = 36.16$, $p = .000^{***}$) indicated a significant difference in the levels of knowledge between urban and rural homemakers. This significant difference highlighted the disparity in awareness and understanding between the two groups, emphasizing the need for tailored educational programs.

Comparison and area-wise distribution of homemakers with household solid waste knowledge

Table No: 04

Comparison and area-wise distribution of homemakers with household solid waste knowledge

Area of the house	N	Mean	Std. Deviation	T	p-value
Urban	421	60.741	9.27038	5.35	.000***
Rural	105	65.657	3.11272		

(***) statistically significant at the 0.001 level.

The analysis encompassed 421 respondents in the urban area, where the mean knowledge level was 60.741 with a standard deviation of 9.27038. In the rural area, consisting of 105 respondents, the mean knowledge level was 65.657, with a standard deviation of 3.11272. To ascertain whether a significant difference existed in mean knowledge levels between urban and rural areas, a t-test was conducted. The results indicated a t-value of 5.35 and a p-value of 0.000. Given the low p-value, which was less than the significance level of 0.05, it could be concluded that there was a significant difference in mean knowledge levels between the urban and rural areas.

Comparison of knowledge of homemakers based on age, education, employment, type of house, ownership of house, and available land

A comprehensive comparison of homemakers' knowledge based on various factors such as age, education, employment, type of house, ownership, and available land was analyzed and given in table no. 05

Table No. 05

Comparison of knowledge of homemakers based on age, education, employment, type of house, ownership of house and available land

Particulars	Category	N	Mean	Std. Deviation	F	P -value
Age (Years)	21-30	147	60.2993	10.91148	7.487	.000***
	31-40	185	63.9946	5.84817		
	41-50	127	59.3386	10.11067		
	51 – 60	48	62.6875	3.08846		
	Above 60	19	64.1053	.31530		
	Total	526	61.7224	8.63365		
Education	Primary	83	56.5783	10.86179	25.719	.000***
	Secondary	16	70.0000	.00000		
	HSC	25	59.4800	1.66132		
	Graduation	141	58.6241	10.74546		
	Post Graduate	209	63.9761	4.91998		
	Professional graduation	52	67.8077	2.91742		
	Total	526	61.7224	8.63365		
Employment	Govt	4	67.0000	.00000	21.275	.000
	Private sector	174	64.4023	7.94411		
	Business	33	67.2121	2.39475		
	Self-employed	20	55.0000	.00000		
	Daily wage	22	70.0000	.00000		
	Unemployed	273	59.0989	8.86714		
	Total	526	61.7224	8.63365		
Type of house	Individual House	422	62.0853	9.18883	5.568	.004**
	Flat	90	59.3556	5.57948		
	Villa	14	66.0000	.00000		
	Total	526	61.7224	8.63365		
Ownership of the house	Own	361	61.5651	9.68858	1.557	.212
	Rented house	91	61.0659	6.64798		
	Others	74	63.2973	3.93693		
	Total	526	61.7224	8.63365		
Availability of land	Below 5 cents	128	62.3359	6.77452	8.707	.000***
	6 - 10 Cents	253	59.7747	10.84453		
	11 – 15 Cents	21	64.0000	.00000		
	More than 15 Cents	96	65.4479	3.32414		
	NA (flat)	28	62.0357	2.48674		
	Total	526	61.7224	8.63365		

Age: The highest mean score was observed in the age group of above 60, suggesting that respondents in this age group had the highest level of knowledge. Individuals might have

exhibited varying waste-generating behaviors based on age. In Ali Haider's (2015) study, it was disclosed that a substantial 81.1% of the respondents fell within the age range of 20-40 years. Conversely, in Agwu's (2012) research, it was observed that participants below 25 years exhibited significantly higher knowledge about solid waste management compared to those aged 25 and above. However, when it came to awareness and practice, the study reported contrasting results. In essence, an increase in knowledge was associated with improved waste disposal practices among households (Gusti, 2016).

Education: The mean knowledge level for primary-level educated homemakers was 56.5783, for secondary-level educated homemakers was 70.0, for HSC (Higher Secondary Certificate) homemakers was 59.4800, for graduation homemakers was 58.6241, for postgraduate homemakers was 63.9761, and for professional graduation homemakers was 67.80. A significant difference in knowledge levels was observed among different educational backgrounds ($F = 25.719$, $p < .001$). Arora and Agarwal (2011) conducted research titled "Knowledge, Attitude, and Practice regarding Waste Management in Selected Hostel Students of the University of Rajasthan, Jaipur." The study employed stratified sampling to select a total of 300 students, consisting of 150 Postgraduate (PG) students and 150 Undergraduate (UG) students as respondents. The research revealed that a majority (54%) of the respondents exhibited low knowledge levels concerning waste management, with 64.33% demonstrating less favorable attitudes towards waste management. Additionally, the study indicated that more than half of the participants engaged in moderate waste management practices, while approximately 46.6% followed poor waste management practices. Notably, a mere 1.33% of individuals were identified as practicing good waste management systems. The findings underscored the critical role of education in shaping people's knowledge regarding waste management.

Employment: The mean knowledge level for homemakers in the government sector was 67.0000, in the private sector was 64.4023, in business was 67.2121, for self-employed individuals was 55.0000, for daily wage workers was 70.0000, and for unemployed individuals was 59.0989. A significant difference in knowledge levels was observed among different occupations ($F = 21.275$, $p < .001$).

Type of House: The mean knowledge level for homemakers living in individual houses was 62.0853, in flats was 59.3556, and in villas was 66.00. A significant difference in knowledge levels was observed among different types of homes ($F = 5.568$, $p = .004$).

Ownership of the House: The mean knowledge level for homemakers who owned their homes was 61.5651, for those in rented houses was 61.0659, and for others was 63.2973. There was no significant difference in knowledge levels based on ownership status ($F = 1.557$, $p = .212$).

2. The attitude of homemakers toward household's solid waste management

Table No.06

Attitude of homemakers toward household's solid waste management

Particulars	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Management of waste should start from households	389 (73.95)	137 (26.05)	-	-	-
Over-consumption is wasteful	249 (47.34)	277 (52.66)	-	-	-
Consumption of eco-friendly products	134 (25.48)	161 (30.61)	210 (39.92)	21 (3.99)	-
Re-use plastic bags and bottles	156	240	130	-	-

	(29.66)	(45.63)	(24.71)		
Choose items that are reusable over disposable options	182 (34.60)	130 (24.71)	214 (40.68)	-	-
Recycle more if aware of the benefits.	194 (36.88)	295 (56.08)	37 (07.03)	-	-
Waste is a resource	180 (34.22)	116 (22.05)	214 (40.68)	-	16 (3.05)
Need-based buying of food and other products reduces waste generation	204 (38.78)	259 (49.24)	63 (11.98)	-	-
Waste disposal at the source itself is to be practiced	279 (53.04)	128 (24.33)	119 (22.62)	-	-
Responsibility for protecting the surrounding environment	307 (58.37)	141 (26.81)	78 (14.83)	-	-
Aware of the negative impact of burning plastic waste	366 (69.58)	119 (22.62)	-	-	41 (7.79)
Aware of the negative impacts of illegal dumping of waste	319 (60.65)	166 (31.56)	-	41 (7.79)	-
Aware that the waste has to be sorted before disposal	339 (64.45)	146 (27.76)	-	41 (7.79)	-
Disposing waste in an environmentally friendly way is the responsibility of citizens	365 (69.39)	120 (22.81)	41 (7.79)	-	-
Natural environment should be protected from waste for the future generations.	343 (65.21)	161 (30.61)	22 (4.18)	-	-
Ready to pay premium price for products made from biodegradable materials	93 (17.68)	280 (53.23)	111 (21.10)	21 (3.99)	21 (3.99)

The vast majority (73.95%) strongly agreed that waste management should begin at the household level, with the remaining 26.05% agreeing. This consensus underscores the importance of empowering households to take an active role in waste management practices. Nearly half (47.34%) strongly agreed that over-consumption is wasteful, while the majority (52.66%) agreed. This shows a strong recognition among homemakers of the need to curb excessive consumption to reduce waste. Attitudes towards consuming eco-friendly products were more varied. While 25.48% strongly agreed and 30.61% agreed, a significant portion remained neutral (39.92%), and a small percentage (3.99%) disagreed. This indicates a mixed level of commitment to purchasing eco-friendly products, suggesting potential barriers such as cost or availability.

A combined 75.29% of homemakers agreed or strongly agreed on reusing plastic bags and bottles, reflecting a positive attitude towards reducing plastic waste through reuse. While 34.60% strongly agreed and 24.71% agreed on choosing reusable items over disposables, 40.68% were neutral. This neutral stance could be due to convenience factors associated with disposable items. A significant majority (92.96%) either strongly agreed or agreed that they would recycle more if they were aware of the benefits, highlighting the need for educational initiatives to raise awareness about recycling advantages.

Opinions on viewing waste as a resource were diverse, with 34.22% strongly agreeing and 22.05% agreeing, but a substantial 40.68% were neutral and 3.05% strongly disagreed. This suggests varying levels of understanding and acceptance of waste-to-resource concepts. Most homemakers (88.02%) either strongly agreed or agreed that need-based buying reduces waste generation, indicating a strong awareness of responsible consumption practices. More than half (53.04%) strongly agreed that waste disposal should be practiced at the source, and an additional 24.33% agreed, reflecting a positive attitude towards source-level waste management practices. A significant 85.18% of homemakers felt responsible for protecting their surrounding environment, indicating a high level of environmental consciousness.

A large majority (92.20%) were aware of the negative impacts of burning plastic waste, though 7.79% strongly disagreed, suggesting that more education is needed to eliminate harmful practices. Similar to burning plastics, 92.21% were aware of the negative impacts of illegal dumping, with 7.79% strongly disagreeing. This again points to the need for continuous awareness campaigns. A high percentage (92.21%) recognized the importance of sorting waste before disposal, showing a strong inclination towards responsible waste management practices. An overwhelming 92.20% of homemakers believed it is the responsibility of citizens to dispose of waste in an environmentally friendly manner, highlighting a strong sense of civic duty. A total of 95.82% agreed that the natural environment should be protected from waste for future generations, showing a strong intergenerational environmental concern. The willingness to pay a premium for biodegradable products was less pronounced, with only 17.68% strongly agreeing and 53.23% agreeing, while 21.10% remained neutral and 7.98% disagreed. This indicates that cost remains a barrier to adopting biodegradable products.

Categorization of subjects based on the attitude toward household solid waste management

Table No. 07

Categorization of subjects based on the attitude toward household solid waste management

Particulars	Frequency	Percentage (%)
Low Attitude	41	7.8
Average Attitude	441	83.8
High Attitude	44	8.4
Total	526	100.0

The table showed that the majority of the sample (83.8%) had an average attitude, while a smaller percentage had either a low (7.8%) or high (8.4%) attitude. A contradiction was evident in the distribution of attitude levels towards environmental sanitation between the present study and the study conducted by Duru et al. (2017). The study reported 55.4%, 38.6%, and 6% of participants with moderate, good, and poor levels of attitude towards environmental sanitation, respectively. Research indicates that urban homemakers, particularly in cities like Kochi and Thiruvananthapuram, display more positive attitudes towards recycling and composting. (Sukumaran, 2020). In contrast, rural homemakers often perceive waste management as a communal rather than an individual responsibility, which affects their willingness to engage in practices like waste segregation at the source (Rajan, 2021).

Area of the house and attitude level of homemakers towards household solid waste management

Table No. 08

Area of the house and attitude level of homemakers towards household solid waste management

The area of the household located	Level of attitude on household waste management responses in percentage (%)			Total	χ^2	p-value
	Low Attitude	Average Attitude	High Attitude			
Urban	41 (9.7)	336 (79.8)	44 (10.5)	421 (100)	41.76	.000***
Rural	-	105 (100)	-	105 (100)		
Total	41 (7.8)	441 (83.8)	44 (8.4)	526 (100)		

(***) significant at the 0.001 level.

In urban areas, 9.7% of homemakers exhibited a Low Attitude towards household waste management, 79.8% had an Average Attitude, and 10.5% showed a High Attitude. In contrast, all homemakers in rural areas (100%) had an Average Attitude, with no respondents exhibiting either Low or High Attitudes.

Overall, when combining urban and rural data, 7.8% of homemakers displayed a Low Attitude, 83.8% showed an Average Attitude, and 8.4% had a High Attitude towards household solid waste management.

The chi-square test result ($\chi^2 = 41.76$) with a p-value of .000*** indicates a highly significant difference between urban and rural homemakers in terms of their attitudes towards household solid waste management, suggesting that the area of residence significantly influences attitude levels.

Comparison and area-wise distribution of homemakers with household solid waste attitude

Table No.09

Comparison and area-wise distribution of homemakers with household solid waste attitude

Area of the house	N	Mean	Std. Deviation	t	p-value
Urban	421	71.3705	8.11087	3.16	.002**
Rural	105	73.8857	1.58911		

(**) significant at the 0.01 significance level.

The above table presented the mean and standard deviation of the attitude scores by the area of households. A t-test was conducted to determine whether there was a significant difference in the mean attitude scores between urban and rural areas, and the results indicated that there was a significant difference ($p = .002$). Specifically, individuals living in urban areas had a lower mean attitude score (71.37) compared to those living in rural areas (73.89).

Comparison of homemaker's attitude based on age, education, employment, type of house, ownership of house and available land

Table No. 10

Comparison of homemaker's attitude based on age, education, employment, type of house, ownership of house and available land

Particulars	Category	N	Mean	Std. Deviation	F	P value
Age (Years)	21-30	147	75.6327	5.93698	31.121	.000***
	31-40	185	72.3081	5.03760		
	41-50	127	66.8031	10.14032		
	51 – 60	48	71.2500	1.90743		
	Above 60	19	74.0000	.00000		
	Total	526	71.8726	7.35811		
Education	Primary	83	64.3855	11.52180	34.151	
	Secondary	16	74.0000	.00000		
	HSC	25	70.2800	1.48661		.000***
	Graduation	141	75.0567	7.36184		
	Post Graduate	209	71.7464	3.42331		
	Professional graduation	52	75.8077	2.91742		
	Total	526	71.8726	7.35811		
Employment	Govt	4	74.0000	.00000	18.389	.000***
	Private sector	174	73.5517	5.24599		
	Business	33	78.0303	2.66323		
	Self-employed	20	66.0000	.00000		
	Daily wage	22	78.0000	.00000		
	Unemployed	273	69.9634	8.39416		
	Total	526	71.8726	7.35811		
Type of house	Individual House	422	71.9028	7.82271	4.186	.016*
	Flat	90	70.9333	4.98717		
	Villa	14	77.0000	.00000		
	Total	526	71.8726	7.35811		
Ownership of the house	Own	361	72.0305	8.38197		
	Rented house	91	71.4835	5.14536	.268	.765
	Others	74	71.5811	3.14057		
	Total	526	71.8726	7.35811		
Availability of land	Below 5 cents	128	71.2734	4.74502		
	6-10 Cents	253	70.9723	9.73922	5.073	.001**
	11 – 15 Cents	21	72.0000	.00000		
	More than 15 Cents	96	74.7396	2.37640		
	NA (flat)	28	72.8214	1.49204		
	Total	526	71.8726	7.35811		

Age: Regarding "Attitude," the obtained F-value was 31.121 with a p-value of .000. This suggested a significant difference in attitude based on the age groups. The age group of 21-30 had the highest mean score, indicating a more positive attitude compared to other age groups.

Education: The mean attitude level for primary homemakers was 64.3855, for secondary homemakers was 74.0000, for HSC homemakers was 70.2800, for graduation homemakers was 75.0567, for postgraduate homemakers was 71.7464, and for professional graduation homemakers was 75.8077. A significant difference in attitude levels was observed among different educational backgrounds ($F = 34.151, p < .001$).

Employment: The mean attitude level for homemakers in the government sector was 74.0000, in the private sector was 73.5517, in business was 78.0303, for self-employed individuals was 66.0000, for daily wage workers was 78.0000, and for unemployed individuals was 69.9634. A significant difference in attitude levels was observed among different occupations ($F = 18.389, p < .001$).

Type of house: The mean attitude level for homemakers living in individual houses was 71.9028, in flats was 70.9333, and in villas was 77.00. A significant difference in attitude levels was observed among different types of homes ($F = 4.186, p = .016$).

Ownership of the house: The mean attitude level for homemakers who own their homes was 72.0305, for those in rented houses was 71.4835, and for others was 71.5811. There was no significant difference in attitude levels based on ownership status ($F = 0.268, p = .765$).

3. Practices adopted by homemakers for household solid waste disposal

Table No. 11

Current household solid waste disposal practices of the homemakers

Type of waste	Area	Given to Waste / scrap Collect ors.	Reuse	Home composting / Recycling	Burying	Dumping in the empty plots	Dumping in the road side	Burning	χ^2	p-value
Organic Kitchen-Waste	Urban	242 (63.9)	36 (9.5)	-	101 (26.6)	-	-	-	187.868	0.000** *
	Rural	-	51 (48.6)	-	54 (51.4)	-	-	-		
Paper Waste	Urban	220 (52.3)	107 (25.4)	13 (3.1)	-	-	-	81 (19.2)	53.079	0.000** *
	Rural	76 (72.4)	1 (1.0)	-	-	-	-	28 (26.7)		
Plastic Waste	Urban	268 (67.3)	49 (12.9)	13 (3.4)	-	-	-	62 (16.4)	71.655	0.000** *
	Rural	40 (38.10)	-	-	-	-	-	65 (61.90)		
Textiles, Leather	Urban	175 (43.6)	110 (27.4)	34 (8.5)	-	-	16 (4.0 %)	66 (16.5)	130.965	0.000** *

r and Rubber	Rural	16 (15.2)	12 (11.4)	0 (0.0)			-	77 (73.3)		
	Urban	2 (0.5)	-	-	245 (61.1)	24 (6.0)	22 (5.5)	108 (26.9)	105.751	0.000** *
Sanitary Waste	Rural	-	-	-	21 (20.0)	16 (15.2)	18 (17.1)	50 (47.6)		
	Urban	264 (62.7)	60 (14.3)	41 (9.7)		21 (5.0)	35 (8.3)		62.740	0.000** *
Metal and Glass Waste	Rural	46 (43.8)	44 (41.9)	15 (14.3)		-				
	Urban	316 (79.2)	-	41 (10.3)		21 (5.3)	21 (5.3)	-	38.677	0.001** *
e-waste	Rural	16 (15.2)	-	-	-	89 (84.8)	-	-		
	Urban	325 (77.2)	-	-	-	59 (14.0)	21 (5.0)	16 (3.8)	47.831	0.000** *
Solid Rubbish	Rural	-	-	-	-	105 (100)	-	-		
	Urban	270 (71.1)	38 (10.0)	-	34 (8.9)	21 (5.5)	17 (4.5)	-	41.8214	0.000** *
Hazardous waste	Rural	-	-	-	14 (13.3)	-	16 (15.2)	75 (71.4)	4	
	Urban									

(***) level of significance at 0.001.

Organic Kitchen Waste - In urban areas, the majority of households (63.9%) disposed of organic kitchen waste by giving it to waste or scrap collectors. Additionally, 9.5% of urban households reused organic waste, and a significant portion (26.6%) engaged in home composting or recycling. No urban households reported burying, dumping in empty plots, dumping on the roadside, or burning organic kitchen waste. In contrast, rural households primarily disposed of organic kitchen waste through reuse (48.6%) and home composting or recycling (51.4%), with no reports of other disposal methods. The chi-square test indicated a significant difference between urban and rural disposal practices for organic kitchen waste ($\chi^2 = 187.868$, $p < 0.001$).

Paper Waste - Urban households predominantly gave paper waste to waste or scrap collectors (52.3%), with a substantial number also reusing it (25.4%). A smaller percentage engaged in home composting or recycling (3.1%) or burning (19.2%). Rural households showed a high tendency to give paper waste to waste or scrap collectors (72.4%), but very few reused it (1.0%). A considerable portion of rural households reported burning paper waste (26.7%). The chi-square test showed a significant difference between urban and rural paper waste disposal practices ($\chi^2 = 53.079$, $p < 0.001$).

Plastic Waste - Urban households primarily gave plastic waste to waste or scrap collectors (67.3%), with smaller percentages reusing (12.9%), home composting or recycling (3.4%), and burning (16.4%). Rural households displayed a lower tendency to give plastic waste to collectors (38.1%) but a higher tendency to burn it (61.9%). The chi-square test revealed significant differences in plastic waste disposal practices between urban and rural areas ($\chi^2 = 71.655$, $p < 0.001$).

Textiles, Leather, and Rubber - Urban households disposed of textiles, leather, and rubber primarily by giving them to waste or scrap collectors (43.6%), reusing (27.4%), and burning (16.5%). In rural areas, a significant number of households burned these materials (73.3%), with smaller percentages giving them to collectors (15.2%) or reusing them (11.4%). The chi-square test indicated significant differences between urban and rural disposal methods for textiles, leather, and rubber ($\chi^2 = 130.965$, $p < 0.001$).

Sanitary Waste - Urban households mainly buried sanitary waste (61.1%), with smaller percentages dumping in empty plots (6.0%), roadside (5.5%), or burning it (26.9%). Rural households showed a diverse range of disposal practices, including burying (20.0%), dumping in empty plots (15.2%), roadside (17.1%), and burning (47.6%). The chi-square test highlighted significant differences between urban and rural sanitary waste disposal methods ($\chi^2 = 105.751$, $p < 0.001$).

Metal and Glass Waste - Urban households disposed of metal and glass waste mainly by giving it to waste or scrap collectors (62.7%), reusing (14.3%), burning (8.3%), and dumping in empty plots (5.0%). In rural areas, households mostly reused these materials (41.9%), gave them to collectors (43.8%), or buried them (14.3%). The chi-square test revealed significant differences in disposal practices between urban and rural areas ($\chi^2 = 62.740$, $p < 0.001$).

E-Waste - Urban households predominantly gave e-waste to waste or scrap collectors (79.2%), with some also burning it (10.3%) or dumping in empty plots and roadside (5.3% each). Rural households primarily burned e-waste (84.8%). The chi-square test indicated significant differences between urban and rural e-waste disposal methods ($\chi^2 = 38.677$, $p < 0.001$).

Solid Rubbish - Urban households mostly disposed of solid rubbish by giving it to waste or scrap collectors (77.2%), with smaller percentages dumping in empty plots (14.0%), roadside (5.0%), or burning it (3.8%). Rural households predominantly burned solid rubbish (100%). The chi-square test highlighted significant differences in disposal practices between urban and rural areas ($\chi^2 = 47.831$, $p < 0.001$).

Hazardous Waste - Urban households gave hazardous waste to waste or scrap collectors (71.1%), with some also reusing (10.0%), dumping in empty plots (8.9%), roadside (5.5%), or burning it (4.5%). In rural areas, the majority of households burned hazardous waste (71.4%), with some also dumping in empty plots (13.3%) or roadside (15.2%). The chi-square test showed significant differences between urban and rural hazardous waste disposal methods ($\chi^2 = 41.821$, $p < 0.001$). Based on the table, the chi-square (χ^2) test results for all types of waste show a p-value of 0.000, indicating a highly significant difference in waste disposal practices between urban and rural households for each waste category. A survey by Kumar and Raju (2022) found that nearly 70% of urban households segregate wet and dry waste, with a significant portion also engaging in composting organic waste. In contrast, rural households continue to rely predominantly on traditional methods, such as burning dry waste and disposing of organic waste in local compost pits. Subramanian's (2023) study found that only 35% of rural households participated in formal waste management programs, with segregation practices being less common.

Conclusion

The KAP study on solid waste management by urban and rural homemakers in Kerala underscores the importance of targeted educational initiatives and infrastructure development to address regional disparities in waste management practices. Urban homemakers tend to have better knowledge and practice more sustainable waste management methods, aided by governmental support and infrastructure. Rural households, however, face multiple challenges, including limited access to formal waste management systems and lower levels of awareness, necessitating specific interventions tailored to their needs.

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