

ORIGINAL ARTICLE

Evaluating Knowledge, Awareness, and Satisfaction Regarding Solid Waste Management and Associated Health Risks Among Ampang Jaya Residents

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ABSTRACT

Introduction: Solid waste management (SWM) poses a global challenge with serious environmental, health and economic impacts, particularly in rapidly urbanizing countries like Malaysia due to rising waste generation, limited landfill capacity, and associated public health risks. Improper waste handling leads to pollution, disease outbreaks, and public dissatisfaction. **Objective:** This study aimed to assess the knowledge, awareness and satisfaction of residents in Ampang Jaya regarding SWM and the potential health problems from waste generation. **Methodology:** Conducted in Ampang Jaya, Selangor, this study involved 420 respondents across 42 Ampang Jaya Municipal Council (MPAJ) waste collection zones. A set of well-structured questionnaires in Bahasa Malaysia was adapted from a previous validated study and administered to assess respondents' knowledge, awareness, and satisfaction with solid waste collection performance in their area. Data was analyzed using IBM SPSS Statistics for descriptive statistics, one-way ANOVA, independent t-tests, and multiple linear regression. **Results:** Significant demographic differences were observed among respondents, who were generally young, well educated, and had high household incomes. Knowledge of SWM was low (score < 0.5), with educational level being the only sociodemographic factor affecting knowledge ($p < 0.05$). Most respondents displayed medium awareness (scores ranging 12–55), also influenced solely by educational level ($p < 0.05$). Satisfaction with SWM showed significant association with age ($p < 0.05$), and trends indicated consistent satisfaction, likely due to uniform SWM services across the area. **Conclusion:** Findings from this study can aid local authorities in improving SWM strategies and encourage community involvement in maintaining a cleaner environment.

Malaysian Journal of Medicine and Health Sciences (2026) 22(2): 1-13.doi:10.47836/mjmhs.v22.i2.1530

Keywords: Knowledge, Awareness, Satisfaction, Solid Waste Management, Health Risks

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INTRODUCTION

Solid waste, often regarded as non-useful and sometimes hazardous material with minimal liquids content (1-3), has become a global issue with significant geo-economic and socio-environmental implications. Factors such as economic growth, population expansion and rapid urbanization challenge sustainable waste management strategies worldwide (4). Malaysia is also affected, as solid waste management (SWM) is an increasingly

urgent concern for both authorities and the public due to a steadily increasing population and SWM demands (4, 5). According to International Trade Administration (6), with the current amount of waste generated, Malaysia will run out of space by 2050 due to maximum disposal of waste in landfills.

The most populous and urbanized state, Selangor, hosts 6.3 million residents, accounting for nearly 20% of Malaysia's total population, with an annual growth rate of 1.9% (7). Population growth and economic development have driven up waste generation, necessitating effective waste management solutions. By 2024, Selangor's waste production has increased to 10,000 tons per day, compared to 8,276 tons per day

in 2018, marking a 21% increase over six years (8, 9). Without sufficient infrastructure, most municipal solid waste (MSW) is landfilled, posing both environmental and health risks. As a major source of methane emissions, MSW accounts for 11% of global methane emissions, worsening climate-related challenges (8).

Improper SWM poses serious health risks. Uncollected or poorly managed waste can contaminate water sources through leachate, leading to diseases like typhoid and increasing pollution through air emissions. Vector-borne diseases are a particular concern in densely populated areas with inadequate waste collection systems, where uncollected waste becomes food and breeding grounds for vectors like flies, mosquitoes, and rodents, thereby increasing risks of diseases such as dengue and leptospirosis (10, 11). Additionally, communities near illegal dumping sites face immediate health risks. Exposure to waste pollution can cause respiratory infections, skin diseases, and even chronic conditions like cardiovascular and respiratory diseases (12, 13).

Previous studies indicate that public awareness and knowledge of SWM in Selangor remain moderate, with only half of respondents acknowledging the health impacts of improper waste management (10). A study in Sungai Buloh, Selangor, found that awareness and knowledge regarding domestic waste management were limited, suggesting a gap in effective public education (10). Similarly, Desa et al. (14) observed that many Malaysians still lack adequate awareness of the importance of waste management. Health problems associated with SWM deficiencies include increased risk of disease outbreaks, food poisoning, and vector-borne illnesses such as dengue fever, particularly in communities exposed to uncollected waste and illegal dumpsites. According to The Star (15), several areas in Selangor, namely Taman Lembah Maju, Taman Bukit Teratai, Kampung Tasik Permai, Taman Melawati, and Taman Ukay Perdana have been identified as dengue hotspots, many of which are located within Ampang Jaya area, further highlighting the public health risks linked to poor waste management.

Therefore, this study aimed to assess the knowledge, awareness and satisfaction of residents in Ampang Jaya regarding solid waste management and its potential health impacts. As a rapidly urbanizing area facing increasing waste volume and recurrent dengue outbreaks, Ampang Jaya represents a critical case for evaluating SWM performance. A comprehensive assessment of current waste collection services is essential to inform local and state authorities in developing more effective, cost-efficient, and health-conscious waste management strategies. The findings will support evidence-based planning to reduce environmental degradation and mitigate public health risks in Ampang Jaya and similar urban settings.

MATERIALS AND METHODS

Study Design

This was a cross-sectional study which aimed to assess the knowledge, awareness and satisfaction of the SWM and the potential health risk from the waste generation in the selected urban areas in Selangor. This study was conducted between August to October 2019.

Study location

The study was conducted in Ampang Jaya, a metropolitan area in Selangor located near Kuala Lumpur, selected due to its high population density, strategic location, and recurring public health concerns. Ampang Jaya falls under the administration of the Ampang Jaya Municipal Council (MPAJ), which oversees areas within two districts: Mukim Hulu Klang in Gombak District and Mukim Ampang in Hulu Langat District, covering a total area of 14,350 hectares (16). The northern boundary of MPAJ borders Mukim Setapak in Gombak District, which falls under the jurisdiction of the Selangor Municipal Council, while the western boundary borders the Federal Territory of Kuala Lumpur (Fig. 1).

On 1 February 2017, the Selangor State Government appointed KDEBWM Sdn. Bhd. as the sole contractor for solid waste collection in MPAJ's jurisdiction, aiming to improve waste management services. MPAJ led this transition, while other local authorities maintained existing service providers. The MPAJ area is divided into 42 waste collection zones, each managed by a designated contractor.

Ampang Jaya is also known for recurring dengue outbreak, often linked to improper solid waste management. According to EdgeProp.my (17), three dengue-related deaths were reported from January 1 to June 25, and nine dengue hotspots were identified, including Sri Maya Condominium, Kampung Ampang Campuran, Kampung Bukit Sungai Puteh, Apartment Sri Putri, and Flat Taman Kosas. These public health risks further justify the area's selection for evaluating SWM and its health implications.

Study population

The sampling population of this study comprised residents of Ampang Jaya, Selangor. The study area was selected using simple random sampling from among the 43 MPAJ waste collection zones to ensure broad geographic coverage. Respondents were purposively and randomly selected within each zone based on inclusion and exclusion criteria. Inclusion criteria for respondents in this study were local resident who reside in MPAJ for more than 3 years and aged between 18 to 65 years old. The 3-year criterion was selected to ensure that respondents had sufficient exposure to the current waste management system to provide informed and meaningful responses. This timeframe aligns with the appointment of KDEBWM Sdn. Bhd. in 2017 and

enables respondents to reflect on service performance following the contractor transition. Meanwhile exclusion criteria were transient residents and residents who reside in MPAJ less than 3 years. To minimize sampling bias, the study employed random selection across multiple zones, ensured demographic diversity, and excluded non-residents and temporary visitors. All subjects were provided with written informed consent to study participation after having received detailed explanation of the study purposes and potential benefits associated with study participation.

Sampling size

According to the Ampang Jaya Municipal Council's Local Plan 2035, the total population of MPAJ was approximately 612,000 in 2020, the most recent official figure available. Using this estimate, the minimum required sample size was calculated based on a 95% confidence level and a 5% margin of error using the formula below (Openepi.com):

$$A = \frac{Z_{21 - \alpha / 2} * P (1 - P)}{D^2}$$

where:

$Z_{21 - \alpha / 2}$ is value from standard normal distribution corresponding to desired confidence level ($Z = 1.96$ for 95% CI)

P is estimated proportion = 0.5

D is margin of error of 5% = 0.05

$$N = \frac{(1.96)^2 * (0.50)(0.5)}{0.05^2}$$

N = 384

However, to account for a non-response rate of 10%, the adjusted sample size will be:

$$384 / (1 - 0.09) = 384 / 0.90 \\ = 427 \text{ respondents}$$

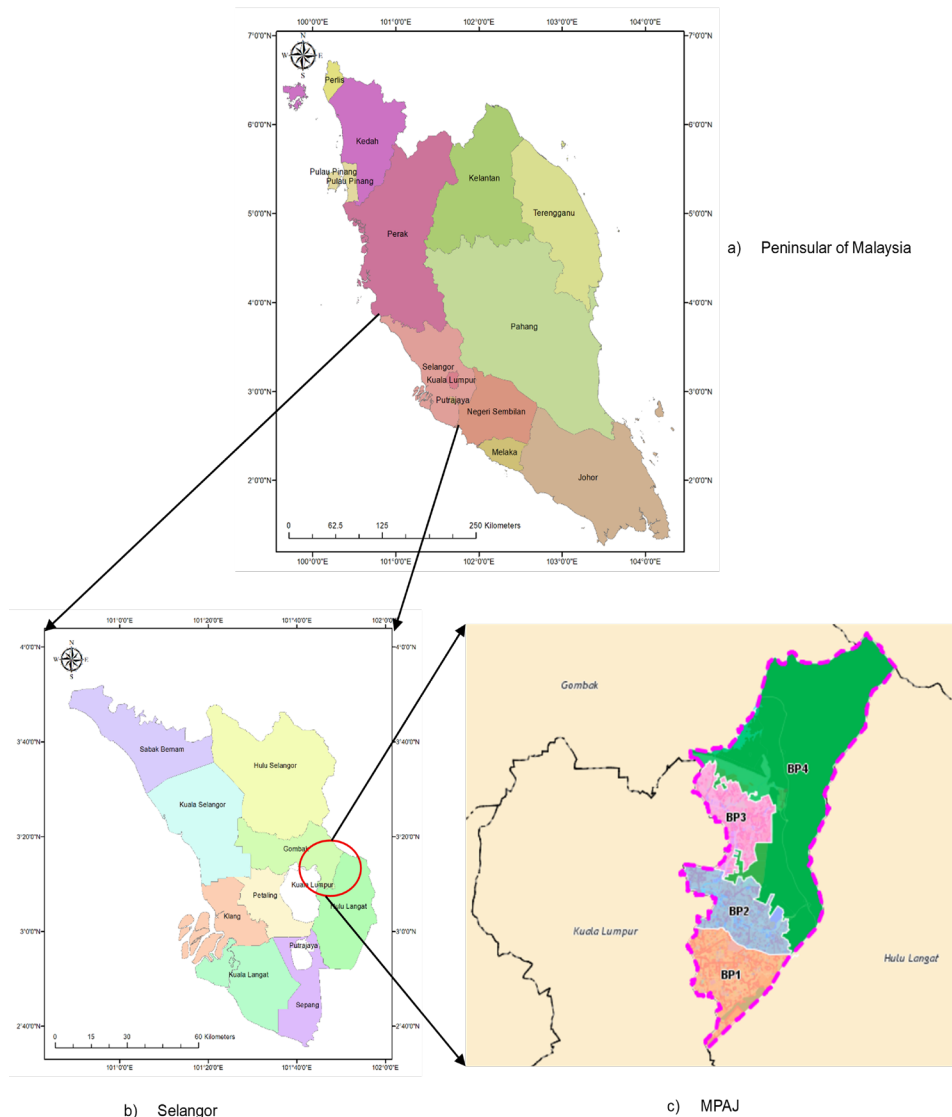


Figure 1: Map of Ampang Jaya Municipal Council (MPAJ) showing the four identified Planning Blocks (BP) under the MPAJ Local Plan 2020: BP 1 – Pandan Indah, BP 2 – Ampang, BP 3 – Melawati, and BP 4 – Conservation Area. These divisions guide land use planning and municipal service management within the MPAJ jurisdiction.

However, a total of 420 respondents participated in the survey, resulting in a response rate of 98%, which is acceptable and exceeds the typical minimum thresholds in population-based studies.

Study instrument

A set of well-structured questionnaires in Bahasa Malaysia was given to respondents. The questionnaires were adapted from a previous study done by Sakawi et al. (18) and have been slightly modified. The questionnaire gauges the knowledge, awareness and satisfaction level of the public on the performance of solid waste collection in their areas.

The questionnaires consisted of four sections as follows:

a) Section 1: Demographic background

This section gathered data on respondents' residential area, age, education level, and income.

b) Section 2: Knowledge of solid waste management

Respondents assessed their knowledge of solid waste management in their area, including awareness of waste collection schedules, responsible contractors, and relevant regulations.

c) Section 3: Satisfaction with solid waste collection service

This section collected feedback on public satisfaction with waste collection services and contractor performance, evaluating service quality in respondents' areas.

d) Section 4: Awareness of environmental pollution and health issues

Questions addressed respondents' awareness of pollution and health risks from improper waste management, focusing on diseases like dengue, cholera, leptospirosis, and malaria, and examined the impact of waste management on public health.

Prior to data collection, a pre-test of the questionnaire was conducted to assess its clarity and reliability. The questionnaire was reviewed by three panels of academic experts in environmental health and waste management to ensure content validity. Subsequently, a pilot study

involving 42 residents in Bangi was carried out. The questionnaire was tested for internal consistency, yielding a Cronbach's alpha value of 0.81, indicating acceptable reliability for the study instrument.

Data analysis

Data collected from the questionnaire was analyzed using IBM SPSS Statistics software, version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive analysis including frequency, percentage, mean, and standard deviation were used to summarize the demographic and other relevant data. The Kolmogorov-Smirnov test was applied to assess data normality. For inferential analysis, one-way ANOVA and independent t-tests were used to examine differences among groups, while multiple linear regression was conducted to identify predictors and relationships between variables.

RESULTS

The socio demographic background of the respondents

A total of 420 individuals participated in the questionnaire survey. The socio-demographic profile of the research participant is illustrated in Table I. The proportion of male and female households was 195 (46.4%) and 225 (53.6%), respectively. Most respondents identified as Malay ethnicity ($n = 330$, 78.6%). The educational achievements of respondents were notably high, with nearly half, around 207 (49.3%), having completed tertiary education. The study's findings indicated that most respondents were privately employed (37.6%), followed by 24.1% who were self-employed or operating a business. Most households, comprising 56.4%, include 4 to 6 occupants, indicating a moderate occupancy level. Households' income levels were classified into five categories. The respondent's income was primarily distributed among three categories: 91 (21.7%) between RM 1,001 and RM 3,000, 84 (20.0%) between RM 3,001 and RM 5,000, and 117 (27.9%) between RM 5,001 and RM 10,000. The study also found that most respondents lived in terrace (30.0%, $n = 126$), strata/apartments (16.0%, $n = 67$) and semi-detached houses (14.0%, $n = 59$). About 70.7% ($n = 297$), resided for over 10 years and met the inclusive criteria.

Table I: Demographic analysis of respondent distribution

Demographics parameters	N = 420	(%)
Age		
18-24 years	101	24.05
25-34 years	129	30.75
35-54 years	97	23.10
55 and above	93	22.14
Gender		
Male	195	46.4
Female	225	53.6
Ethnicity		
Malay	330	78.6
Chinese	54	12.9
Indian	27	6.4
Others	9	2.1
Education levels		
Primary Schools	25	6.0
Secondary Schools	181	43.1
Diploma and higher level	207	49.3
Others	7	1.7
Employment status		
Student	11	2.6
Government servants	45	10.7
Private employee	158	37.6
Self-employed/business	104	24.8
Housewife	46	11.0
Unemployed	56	13.3
Household size		
1 to 3 occupants	84	20.0
4 to 6 occupants	237	56.4
7 to 10 occupants	92	21.9
10 and above occupants	7	1.7
Average households' income per months		
RM 1,000 below	61	14.5
RM 1,001 - RM 3,000	91	21.7
RM 3,001 - RM 5,000	84	20.0
RM 5,001 - RM 10,000	117	27.9
RM 10,000 above	67	16.0

Table I: Demographic analysis of respondent distribution (CONT.)

Demographics parameters	N = 420	(%)
Household size		
1 to 3 occupants	84	20.0
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RM 1,000 below	61	14.5
RM 1,001 - RM 3,000	91	21.7
RM 3,001 - RM 5,000	84	20.0
RM 5,001 - RM 10,000	117	27.9
RM 10,000 above	67	16.0
Types of houses		
Bungalow	81	19.3
Semi-detached house	59	14.0
Terrace	126	30.0
Strata/Apartment	67	16.0
Double storey	21	5.0
Commercial	6	1.4
Lot Kampung	60	14.3
Period of stay at MPAJ		
> 3 years	67	15.9
10 years	56	13.3
More than 10 years	297	70.7

Level of knowledge on solid waste management among respondents

Table II presents the respondents' knowledge level regarding SWM. Approximately 62.9% (n = 264) of respondents reported being unfamiliar with the term "zero waste," while 65.6% (n = 275) indicated a lack of knowledge regarding the Solid Waste and Public Cleansing Management Act (Act 672). Among the respondents, 57.4% (n = 241) are unaware of the contractor responsible for waste collection and handling. Approximately 85.7% (n = 360) of respondents are aware of diseases caused by improper solid waste management such as leptospirosis, dengue, skin diseases, typhoid, and cholera.

CONTINUE

Table II: Level of knowledge on SWM among respondents

	Statement: To what extent do you know about the following matters:	Yes, N (%)	No, N (%)
1	Have you ever heard of the term 'Zero Waste'?	156 (37.1)	264 (62.9)
2	Do you know about the Solid Waste Management and Public Cleansing Act 2007 (Act 672)?	145 (34.5)	275 (65.6)
3	Do you know the name of the contractor responsible for solid waste collection in your area?	179 (42.9)	241 (57.4)
4	If you were told by a collection contractor to separate the garbage, would you do it	269 (64.0)	149 (35.5)
5	Do you know about diseases caused by poorly managed solid waste?	360 (85.7)	60 (14.3)
6	Effect of improper waste management on health:		
	Leptospirosis	49 (11.67)	371 (88.33)
	Dengue	107 (25.47)	313 (74.52)
	Skin disease	51 (12.14)	349 (83.10)
	Typhoid disease	200 (47.62)	220 (52.38)
	Cholera	284 (67.62)	136 (32.38)

Level of awareness on solid waste management among respondents

Table III presents the proportion of respondents' awareness regarding the effects of SWM. Most respondents, 61.9% (n = 260), strongly agreed that inadequate management of solid waste can lead to environmental pollution, while 70.5% (n = 296) strongly agreed that it can result in human disease. Fewer than half of the respondents (41.2%, n = 173) agreed that there are vectors or disease agents associated with

improper solid waste management that can lead to various infectious and non-communicable diseases in humans. About 62.9% (n = 264) of respondents strongly agreed on the significance of effective practices in solid waste management. In the context of effective waste management practices, 36.9% (n = 155) indicated their participation in Gotong Royong activities, while 59.3% (n = 249) expressed strong agreement regarding their involvement in activities aimed at environmental preservation.

Table III: Proportion of Responses for awareness on the effects of SWM among respondents (N = 420).

Statement: To what extent are you aware of the effect of solid waste management on environmental health		Strongly Disagree N (%)	Disagree N (%)	Neutral N (%)	Agreed N (%)	Strongly Agreed N (%)
1	Know that the effects of poorly managed solid waste can cause environmental pollution	1 (0.2)	8 (1.9)	23 (5.5)	128 (30.5)	260 (61.9)
2	Know that the effects of poorly managed solid waste can cause disease to human	1 (0.2)	8 (1.9)	23 (5.5)	92 (21.9)	296 (70.5)
3	Know of vectors or disease agents that are closely related to improper solid waste management and can cause various infectious and non-communicable diseases among humans.	2 (0.5)	23 (5.5)	63 (15.0)	173 (41.2)	159 (37.9)
4	Knowing the importance of good practices in solid waste management	1 (0.2)	8 (1.9)	36 (8.6)	111 (26.4)	264 (62.9)
5	My family and I have participated in gotong-royong activities with local communities	26 (6.2)	51 (12.1)	67 (16.0)	155 (36.9)	121 (28.8)
6	Support activities that can help preserve the environment.	1 (0.2)	7 (1.7)	33 (7.9)	130 (31.0)	249 (59.3)
7	Recycling is a key step that can make the environment healthier	0 (0.0)	13 (3.1)	28 (6.7)	113 (26.9)	266 (63.3)
8	Separate plastic waste from other solid waste at home so it is easy to recycle.	77 (18.3)	32 (7.6)	57 (13.6)	132 (31.4)	122 (29.0)
9	Willing to reduce the use of plastic bags to protect the environment	10 (2.4)	14 (3.3)	52 (12.4)	163 (38.8)	181 (43.1)
10	Solid waste management at home is one of the effective measures in reducing waste generation	1 (0.2)	8 (1.9)	42 (10.0)	136 (32.4)	233 (55.5)
11	Good solid waste management can reduce pollution to the environment and human health	0 (0.0)	7 (1.7)	45 (10.7)	65 (15.5)	303 (72.1)
12	Environmental pollution will have a negative impact on me and my family	16 (3.8)	13 (3.1)	17 (4.0)	84 (20.0)	290 (69.0)

*Score of "5", "4", "3", "2", "1" for "strongly agree", "agree", "neutral", "disagree" and "strongly disagree" were given; respectively

In relation to recycling activity, 63.3% (n = 266) expressed strong agreement that recycling is a crucial measure for enhancing environmental health. About 29.0% (n = 122) strongly agreed that they separate plastic waste from other solid waste at home to facilitate recycling, while 43.1% (n = 181) strongly agreed that they are willing to reduce the use of plastic bags to protect the environment. Regarding attitudes towards improved solid waste management, 55.5% (n = 233) strongly agreed that home solid waste management is an effective measure for reducing waste generation. Additionally, 72.1% (n = 303) strongly agreed that effective solid waste management can mitigate pollution affecting the environment and human health, while 69.0% (n = 290) strongly agreed that environmental pollution negatively impacts themselves and their families. According to Table III, the total awareness score ranged from 12 to 55, indicating a medium level of awareness among respondents concerning the effects of SWM.

Level of satisfaction on solid waste management among respondents

The findings in Table IV reveal moderate satisfaction levels among respondents regarding solid waste management (SWM) services. Nearly half of the respondents (47.9%, n = 201) expressed satisfaction with their awareness of and ability to estimate the waste collection schedule, though 28.8% (n = 121) were dissatisfied with the information provided by the contractor. Approximately 36.2% (n = 152) of respondents reported high satisfaction with the timeliness of waste collection, while 48.6% (n = 204) were satisfied with the overall quality of work. However, 29.5% (n = 124) were uncertain about the adequacy of cleaning efforts in and around bins, and 45.2% (n = 190) were dissatisfied with the cleanliness and odor of the collection trucks.

Table IV: Proportion of responses for satisfaction on SWM among respondents.

Statement: To what extent are you satisfied with the following services rendered by		Very Dissatisfied N (%)	Not Satisfied N (%)	Neutral N (%)	Satisfied N (%)	Very Satisfied N (%)
1	Know about the collection schedule that has been set by the contractor	45 (10.7)	36 (8.6)	57 (13.6)	201 (47.9)	81 (19.3)
2	Informed by the contractor about the collection schedule that has been set in my area	70 (16.7)	121 (28.8)	93 (22.1)	104 (24.8)	32 (7.6)
3	Timely garbage collection time as in the schedule.	30 (7.1)	52 (12.4)	75 (17.9)	111 (26.4)	152 (36.2)
4	Quality of work carried out by garbage collection workers	15 (3.6)	21 (5.0)	79 (18.8)	204 (48.6)	101 (24.0)
5	Workers clean all solid waste that is placed either inside or outside the bin	25 (6.0)	36 (8.6)	124 (29.5)	156 (37.1)	79 (18.8)
6	The bins are properly closed and repositioned after collection.	34 (8.1)	14 (3.3)	71 (16.9)	182 (43.3)	119 (28.3)
7	The condition of the truck during collection is clean and odorless	76 (18.1)	190 (45.2)	93 (22.1)	54 (12.9)	7 (1.7)
8	Workers wear uniforms while collecting garbage in the home area	34 (8.1)	12 (2.9)	61 (14.5)	149 (35.5)	164 (39.0)
9	Employees who carry garbage collection are concerned about personal safety (wearing PPE)	3 (0.7)	28 (6.7)	111 (26.4)	188 (44.8)	90 (21.4)
10	The contractor has provided bins in each collection area	28 (6.7)	31 (7.4)	60 (14.3)	103 (24.5)	198 (47.1)
11	The collection service is carried out without causing any noise or other disturbances	41 (9.8)	37 (8.8)	102 (24.3)	207 (49.3)	33 (7.9)
12	Workers pick up trash from inside the bin using their hands without using a lifter bin	26 (6.2)	52 (12.4)	164 (39.0)	125 (29.8)	53 (12.6)
13	The vehicle was stopped while garbage collection was made.	15 (3.6)	10 (2.4)	124 (29.5)	128 (30.5)	143 (34.0)
14	The customer complaint center is very user friendly and convenient.	9 (2.1)	50 (11.9)	258 (61.4)	82 (19.5)	21 (5.0)
15	The time taken to solve the problem is noticeably short and fast.	10 (2.4)	21 (5.0)	298 (71.0)	69 (16.4)	22 (5.2)
16	Satisfied with the feedback on the action taken	2 (0.5)	12 (2.9)	262 (62.4)	91 (21.7)	53 (12.6)
17	Satisfied with the current solid waste collection contractor services than the previous contractors.	1 (0.2)	21 (5.0)	128 (30.5)	136 (32.4)	134 (31.9)
18	Overall satisfaction with current services/contractor	30 (7.1)	109 (26.0)	143 (34.0)	65 (15.5)	73 (17.4)

*Score of "5", "4", "3", "2", "1" for "very satisfied", "satisfied", "neutral", "not satisfied" and "very dissatisfied" were given.

A substantial proportion of respondents expressed satisfaction with the contractor's allocation of waste bins (47.1%), use of personal protective equipment (44.8%, $n = 188$), and the noise-free collection process (49.3%, $n = 207$). Despite these positive aspects, 61.4% ($n = 258$) of respondents were uncertain about the user-friendliness of the customer complaint center, and 71.0% ($n = 298$) doubted the promptness of problem resolution. Additionally, 62.4% ($n = 262$) expressed uncertainty regarding the adequacy of feedback from customer service. Overall, respondents reported moderate satisfaction (mean = 40) with the current SWM system, with 32.4% ($n = 136$) indicating greater

satisfaction with the current contractor compared to previous services.

Comparisons between the level of knowledge, awareness and satisfaction on SWM among respondents with the socio-demographic data

Table V compares knowledge, awareness, and satisfaction related to solid waste management among respondents, in relation to their socio-demographic data. The findings indicate a significant difference (2.801, $p < 0.05$) in awareness relative to the age of respondents. The results indicated significant differences in respondents' knowledge levels based on gender (0.691, $p < 0.001$).

Table V: Comparisons between the level of knowledge, awareness and satisfaction on SWM among respondents with the socio-demographic data

Parameter	Knowledge		Awareness		Satisfaction	
	F- value ^a / t-value ^b	Sig. value	F- value ^a / t-value ^b	Sig. value	F- value ^a / t-value ^b	Sig. value
Age	2.37 ^a	0.07	2.801	0.040*	1.726	0.161
Gender	0.691 ^b	0.001**	0.297	0.586	1.890	0.087
Ethnicity	1.29 ^a	0.278	0.225	0.879	0.272	0.846
Educational level	1.79 ^a	0.99	1.083	0.371	0.806	0.566
Employment status	2.471 ^a	0.32	0.381	0.862	1.905	0.092
Household size	1.916 ^a	0.126	0.967	0.408	0.380	0.767
Household income	0.812 ^a	0.518	1.963	0.099	0.770	0.545
Type of house	0.460 ^a	0.838	1.425	0.203	0.909	0.488
Period of stay	1.99 ^a	0.115	0.829	0.478	0.313	0.816

a – One Way ANOVA test

b – Independent t-test

* p value significant at $p < 0.05$

** p value significant at $p < 0.001$.

Sociodemographic factors that affect the level of knowledge, awareness and satisfaction of the respondents

Table VI presents the results of the multiple linear regression analysis concerning the sociodemographic factors influencing the respondents' level of knowledge. The findings demonstrate a significant association between educational level and the knowledge level of the respondents (B value = 0.018, t -value = 1.683, $p < 0.005$). The educational level also was significantly

correlated with the respondents' level of awareness (B value = 1.051, t -value = 2.087, $p < 0.005$). The socio-economic analysis indicates that age (B = 2.268, t -value, 2.208, $p < 0.05$) is a significant socio-demographic factor affecting respondents' satisfaction levels concerning solid waste management (SWM). In addition, the type of gender (B value = 3.924, t -value = 2.008, $p < 0.05$) was significantly associated with the level of satisfaction among respondents.

Table VI: Sociodemographic data that affects the level of knowledge, awareness and satisfaction of the respondents

Parameter	Level of Knowledge (B, t-value, p-value)	Level of Awareness (B, t-value, p-value)	Level of Satisfaction (B, t-value, p-value)
Age	0.003 (0.253, 0.801)	0.808 (1.416, 0.158)	2.268 (2.208, 0.028)*
Gender	0.009 (0.383, 0.702)	0.283 (0.260, 0.795)	3.924 (2.008, 0.045)*
Ethnicity	0.012 (0.740, 0.460)	0.045 (0.059, 0.953)	1.251 (0.902, 0.367)
Educational Level	0.018 (1.683, 0.043)*	1.051 (2.087, 0.038)*	1.016 (1.122, 0.263)
Employment Status	0.015 (1.498, 0.135)	0.560 (1.234, 0.218)	0.044 (0.054, 0.957)
Household Size	0.009 (0.531, 0.596)	0.573 (0.693, 0.489)	1.656 (1.112, 0.263)
Household Income	0.018 (1.697, 0.090)	0.748 (1.555, 0.121)	1.577 (1.822, 0.069)
Type of House	0.006 (0.037, 0.970)	0.378 (1.263, 0.207)	0.174 (0.080, 0.937)
Period of Stay	0.025 (1.837, 0.067)	0.156 (0.250, 0.803)	0.090 (0.080, 0.937)

* *p* value significant at *p* < 0.05** *p* value significant at *p* < 0.001

Knowledge and awareness on potential human health risks

This study poses several inquiries concerning knowledge and awareness of potential human health issues linked to inadequate waste management. The results indicate that most respondents (83%) are aware that diseases can arise from improper waste management. However, when asked about the potential types of diseases that may occur, their knowledge was significantly limited, as the majority responded "No" in the questionnaire. Results indicate that only 45% of respondents are aware that typhoid disease is a potential consequence of improper waste management. In contrast, most respondents (91% and 92%) demonstrated a strong awareness of the health effects associated with poorly managed solid waste, including the role of vectors such as flies and mosquitoes in the transmission of various infectious and non-communicable diseases, respectively.

DISCUSSION

This study evaluates the knowledge, awareness and satisfaction of residents of Ampang Jaya on solid waste management and associated health risks. For knowledge, most of the respondents unfamiliar with the term zero waste, suggest a lack of understanding of this sustainable waste management concept. According to Awasthi et al. (19), zero waste is a global movement that aims to minimize waste generation through practices such as reducing, reusing, and recycling. In addition, more than half of respondents (65.6%) also indicated a lack of knowledge regarding the Solid Waste and Public

Cleansing Management Act (Act 672). Selangor has become the eighth state to adopt this legislation (20). This legislation provides the regulatory framework for SWM in the country, including responsibilities for waste management practices, guidelines, and enforcement measures. The lack of knowledge of this act is concerning, as understanding relevant laws is essential for fostering a sense of responsibility among citizens and encouraging compliance with waste management policies. Educating the public on Act 672 could improve adherence to proper waste disposal and handling procedures, ultimately supporting national environmental goals. Moreover, more than half of respondents (57.4%) are unaware of the contractor responsible for waste collection and handling in their area. This lack of knowledge could result in confusion over where and how to report waste management issues, potentially leading to delays in addressing local waste concerns. Improving public knowledge about waste contractors can help residents understand who to contact for waste related issues and promote accountability in waste management services. Most of the participants knew (85.7%) about disease related to improper waste management. This finding contradicts with study conducted at Bandar Baru Sungai Buloh, Shah Alam which showed most of the participants were in the "moderate" category with only about half of them knew about diseases related to improper waste management (20). Al-Naggar et al. (10) suggested the need to educate these people on this issue, especially on the health impact that can occur because of poor domestic waste management.

The present study found that respondents had moderate levels of awareness. This finding stresses the need to enhance public awareness about SWM and associated issues, as greater awareness can lead to stronger community involvement in SWM practices. However, awareness alone may not drive change, as lifestyle factors and convenience often impede the adoption of environmentally responsible behaviors. Although respondents showed a moderate awareness level, this aligns with findings by Sultana et al. (21), where awareness did not necessarily translate into concern or action. This highlights the importance of designing educational campaigns that resonate with diverse demographics and promote lifestyle changes conducive to effective SWM. Notably, several respondents reported common local concerns, such as irregular garbage collection, unattended bulk waste, blocked drains due to uncontrolled trash, and illegal dumping near residential and commercial zones. These issues were particularly reported in high-density housing areas such as flats and apartments, and are consistent with complaints lodged at MPAJ's e-aduan platform. The findings suggest targeted educational initiatives and behavioral interventions could foster more consistent and environmentally responsible waste practices among the public, thus underscoring the critical role of human behavior in SWM success.

In terms of satisfaction, 32.4% of respondents expressed higher satisfaction with the current waste collection services compared to prior providers, with overall satisfaction reaching a moderate level. This aligns with Olli et al. (22), which suggest that satisfaction with SWM services correlates with knowledge, awareness, and individual responsibility. Notably, no significant differences were found in satisfaction levels based on demographic factors, likely due to the same contractor serving the Ampang Jaya area, resulting in uniform service experiences across demographics. According to Wang et al. (23), satisfaction with SMW will accelerate residents' separation behavior, services expectations and perceived quality and social interactions among communities; then, it affects community social and environmental sustainability.

The multiple linear regression analysis further shows that among sociodemographic factors, educational level was the only variable significantly associated with knowledge and awareness of SWM, consistent with Al-Naggar et al. (10). Respondents with higher educational attainment displayed greater understanding and awareness of SWM issues, affirming findings in social science research that knowledge does not automatically translate into behavioral changes without a confluence of social and psychological motivators. Furthermore, gender was notably linked to satisfaction levels, as seen in Zhou et al. (24) study, suggesting a potential role of gendered perspectives in shaping SWM satisfaction. According to Raphela et al. (25), women tend to exhibit greater awareness and knowledge regarding proper waste management compared to their male counterparts. This heightened awareness is attributed to their roles within the household, where they often take on primary responsibility for managing household waste. Consequently, this factor significantly influences their satisfaction with SMW systems.

Improper waste management practices were also identified as contributing factors to health risks, including vector-borne diseases such as dengue, leptospirosis, and typhoid. Poor waste disposal practices create breeding grounds for disease-carrying pests and rodents, especially near populated residential areas and recreational zones, impacting public health. Improper disposal sites often contaminate water and soil, elevating pollution risks that affect both environmental and human health (26, 27). Improper waste management also exposes waste workers to various health risks, including respiratory and infectious diseases, muscular issues, and overall reduced well-being (28). These health risks underscore the importance of robust SWM practices and targeted public education to mitigate SWM-related health impacts effectively.

CONCLUSION

The findings from the study provide an overview of the household perceptions on waste management, knowledge and awareness in solid waste management in Ampang Jaya area. Respondents exhibited low levels of knowledge, moderate awareness, and moderate satisfaction regarding SMW services. Educational level was significantly associated with knowledge and awareness, while age and gender were linked to satisfaction. These results underscore the importance of targeted public education initiatives and enhanced service delivery to improve public engagement and satisfaction with SWM.

Importantly, the data gathered offer valuable baseline information for local authorities and contractors such as KDEBWM Sdn, Bhd., which can support the formulation of more responsive and effective waste collection strategies. Addressing knowledge gaps and improving public understanding of waste policies could help foster behavioral change, while optimizing collection and transportation systems may improve operational efficiency and satisfaction.

Future research should consider longitudinal assessments to evaluate the sustained impact of public education campaigns on behavior and awareness and should compare performance and satisfaction across different municipalities to assess contractor effectiveness and policy implementation outcomes.

Ultimately, strengthening solid waste management through informed community participation and evidence-based policymaking contributes not only to public health improvements but also to broader environmental sustainability goals, such as reducing landfill dependency, lowering greenhouse gas emissions, and promoting a cleaner urban ecosystem.

ACKNOWLEDGEMENT

We sincerely extend our gratitude to all respondents of Ampang Jaya, Selangor, for their valuable participation and contributions to this study. Your cooperation has been instrumental in achieving the objectives of this research.

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