



INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES



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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v12-i6/14020>

DOI:10.6007/IJARBSS/v12-i6/14020

Received: 07 April 2022, **Revised:** 11 May 2022, **Accepted:** 26 May 2022

Published Online: 04 June 2022

In-Text Citation: (Zulkipli et al., 2022)

To Cite this Article: Zulkipli, F., Nopiah, Z. M., Jamian, N. H., Basri, N. E. A., & Kie, C. J. (2022). Mean Score Analysis on Awareness of Solid Waste Management in Malaysia. *International Journal of Academic Research in Business and Social Sciences*. 12(6), 649 – 658.

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Vol. 12, No. 6, 2022, Pg. 649 – 658

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Mean Score Analysis on Awareness of Solid Waste Management in Malaysia

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Abstract

Solid waste management is a global issue impacted on climate changes and sustainable environment. Improper management would lead to highly generated amount of solid waste. These happened due to lack of an awareness of solid waste management among the citizen. Thus, this issue motivates the further investigation on awareness of solid waste management among citizens in Malaysia. The objectives are to identify the level of awareness, knowledge, practice, attitude and perception on solid waste management and to compare the level of awareness, knowledge, practice, attitude and perception on solid waste management by gender, age group and state regions. The scope of this study focused on citizens age above 18 years old. A sample of 422 respondents participated by answering the online questionnaire. The questionnaire is distributed using convenience sampling. A mean score analysis method is applied to analyze the results. The result show overall Malaysian citizens have a high level of awareness, knowledge, practice, attitude, and perception. Based on gender, age group and states region it shows slight differences in the level of awareness, knowledge, practice, attitude and perception among these categories. Hence, based on 422 respondents in 2022 show high awareness among the citizens in Malaysia. This result shows a positive contribution towards the 12th Malaysian Plan Agenda to focus on advancing sustainability to the environment by 2025 which aligned with sustainable development goals (SDGs).

Keywords: Solid Waste Management, Awareness, Knowledge, Practice, Attitude, Perception.

Introduction

Solid waste management (SWM) is a complex issue with political, economic, institutional, and environmental dimensions (Zulkipli & Jamian, 2021). In Malaysia, the rise in solid waste output as a result of population growth has become a serious environmental issue. The majority of solid waste is disposed in a landfill, an open dumpsite, or unsanitary landfills that were not built with suitable engineering plans, resulting in severe environmental damage (Tang et al., 2021). Figure 1 shows Malaysia's solid waste generation from 2012 to 2022. (Hassan et al., 2021). Solid waste generation has increased over time, from 33150 tons per

day in 2012 to 38699 tons per day in 2021. In 2022, the rate of increase is predicted to be 39936 tons per day. The increase is attributable to population growth, lifestyle changes, and the rapid urbanization and development process. As a result, the environment suffers from climate change. Malaysia, on the other hand, has poor waste management due to a lack of technology, experienced labor, and infrastructure to adequately address the problem in the country. Furthermore, the public's lifestyles have resulted in a complex MSW composition during the last few decades (Tang et al., 2021).

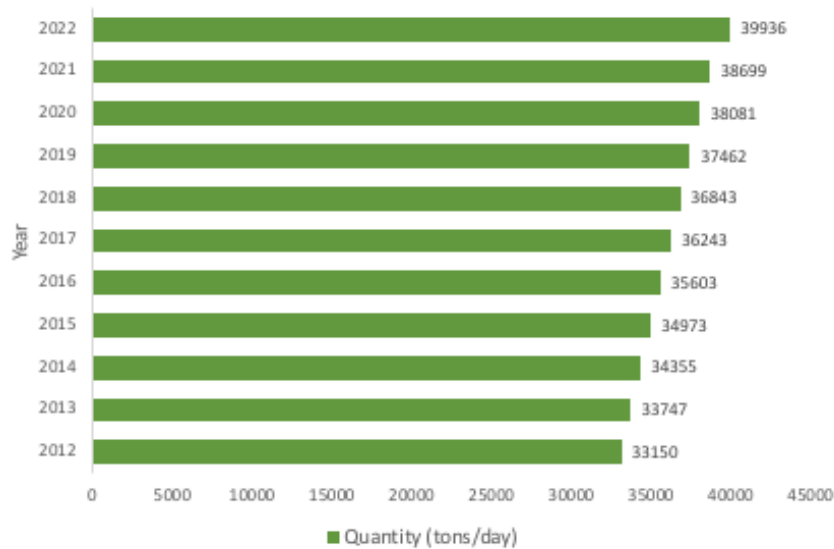


Figure 1. Solid waste generation in Malaysia 2012 – 2022

Due to the increasing waste generation, the Malaysian government devoted to improving the quality of life of its populations (Hamid et al, 2012). A survey on public awareness of solid waste management had been undertaken by previous researchers. Bashir et al., (2018) evaluated public concerns and behaviors related to solid waste minimization through composting in the Kampar district of Malaysia, as shown in Figure 2. The results suggest that more than half of the respondents are willing to practice proper solid waste management techniques, while 37.77 percent are not. The hesitancy is owing to a lack of awareness of how to properly handle solid waste, according to 75.19 percent of respondents. In addition, just 23.33 percent of respondents participate in solid waste management activities in Kampar, Perak.

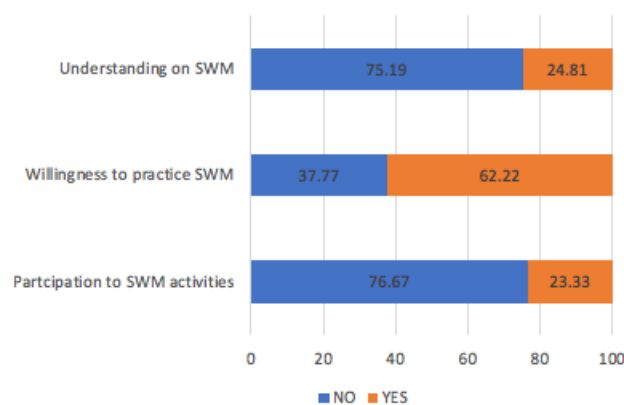


Figure 2. Respondent's feedback from the survey

Chung et al (2019) did another survey on the level of recycling knowledge among Selangor households. Only 16 percent of respondents have the greatest level of recycling awareness, according to the findings. The majority of the respondents (66%) were at moderate level of awareness about recycling, while 18% had a poor level of awareness about recycling. It inferred that the community in Selangor has a moderate level of awareness about solid waste recycling. As a result, the main causes of current human health damage and ecosystem quality deterioration are a lack of awareness and poor solid waste management (Hassan et al., 2019).

Unfortunately, these advancements, along with a culture that is less caring and responsible, have had major ramifications for ecosystems, the environment, and human quality of life (Sabri & Teoh, 2006). Problems with biodiversity, natural resource depletion, global warming, and other forms of pollution make this a nuisance as well as a serious future issue for environmental protection (Ferronato & Torretta, 2019). The need to develop a more environmentally responsible society is equally pressing, given the growing urgency of environmental preservation.

As a result, solid waste management must remain efficient and long-term. To address this issue, citizens' understanding of solid waste management, in particular, should evolve organically in every mind set. These concerns and problems have prompted the authors to investigate public awareness of solid waste management among Malaysian citizens. Therefore, the objectives are to identify the level of awareness, knowledge, practice, attitude and perception on solid waste management and to compare the level of awareness, knowledge, practice, attitude and perception on solid waste management towards gender, age group and state regions. A mean score analysis method is applied to analyze the results.

Methodology

The methodology divided into a few processes. Firstly, the explanation on sampling techniques and data collection method. Secondly, the presentation of research framework. Thirdly, the analysis of questionnaire, which Section A for demography of respondents using descriptive statistics and Section B applied mean score analysis method in order to calculate the mean score for level of awareness, knowledge, practice, attitude and perception towards solid waste management in Malaysia. Finally, draw a conclusion based on results obtained.

A) Sample size, sampling technique and data collection method

Malaysia's population has grown at a 1% to 2% annual rate, reaching 32.6 million people in 2020, 32.7 million people in 2021, and predicted to reach 33.18 million people in 2022. (DOSM, 2021; Worldpopulationreview, 2022). Citizens over the age of 18 make up 23.6 million individuals, accounting for 71.1 percent of Malaysia's total population. The scope of this study is to gather a sample of respondents who are over the age of 18. According to Krejcie and Morgan (1970), the sample size for populations greater than one million is 384 samples. In this study, 422 respondents took the time to fill out the questionnaire. The questionnaire was distributed via an online platform such as WhatsApp, Telegram and email using a convenience sampling technique.

B) Research Framework

The research framework is depicted in Figure 3. The questionnaire is divided into two pieces. In Section A, the demographics of the respondents are depicted. Section B includes components such as awareness, knowledge, practice, attitude, and perceptions that are

relevant to solid waste management. Section B had 19 items, with three for awareness, five for knowledge, five for practice, three for attitude, and three for perception respectively.

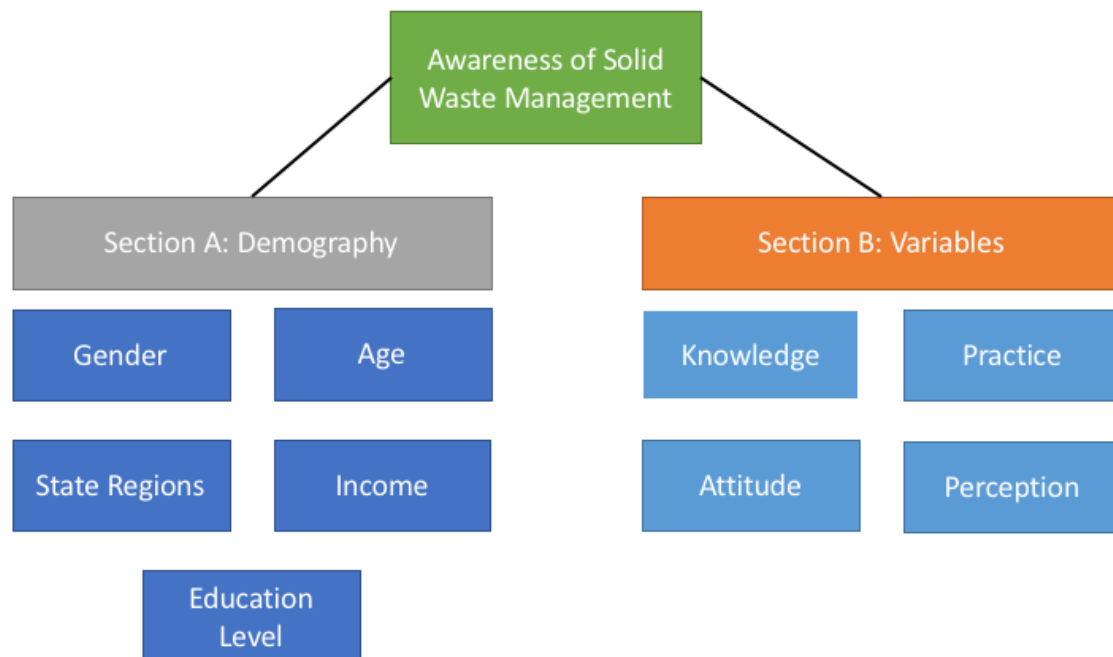


Figure 3. Research framework and design

C) Mean Score Analysis Method

Mean score was calculated by multiplying the frequency with the score point for each item within five variables (awareness, knowledge, practice, attitude and perception) towards solid waste management. Microsoft Excel is used in order to measure the level of awareness, knowledge, practice, attitude and perception by categorizing using Parallellity Level as shown in Table 2 (Husin et al, 2015).

Table 2

Parallellity level

Mean score range	Parallellity level
3.68 – 5.00	High
2.34 – 3.67	Moderate
1.00 – 2.33	Low

Results and Discussions

Section A and Section B were used to present the findings of the analysis. To begin, section A used descriptive statistics to discuss the demographics of respondents. Section B, on the other hand, presented and highlighted the results of each variable's mean score analysis. The author would like to determine the overall level of awareness, knowledge, practice, attitude, and perception among Malaysian citizens, as well as compare the level of awareness, knowledge, practice, attitude, and perceptions of solid waste management based on gender, age groups, and state regions, in order to meet the study's objectives.

A) Descriptive statistics analysis on demography of respondents

The descriptive statistics on respondents' demography are shown in Table 3. There are 20.85% of males and 79.15% of females among the 422 responses. The age ranges were divided into three categories: under 19, 20 – 29, and above 30. More over half of the respondents were under the age of 19, with 41.94% being between the ages of 20 and 29, and the rest being above 30. The majority of respondents came from the state regions of Selangor and Wilayah Persekutuan, with Perlis, Kedah, Pulau Pinang, and Perak accounting for 75.12% of the total. No income was reported by 43.36% of the total respondents. Between RM2001 and RM5000, the average income was 23.70%. Based on education level, the majority of respondents had diploma (80.09%), followed by SPM, Certificate and Matriculation (12.32%) and Degree and Master (7.6%).

Table 3

Descriptive statistics on demography of respondents

Demography	Attributes	Frequency	Percentage (%)
Gender	Male	88	20.85
	Female	334	79.15
Age	Below 19	245	58.06
	20 - 29	175	41.47
	Above 30	2	0.47
State	Perlis, Kedah, Pulau Pinang, Perak	153	36.26
	Selangor, Federal Territories (KL, Putrajaya, Labuan)	164	38.86
	Johor, Melaka, Negeri Sembilan	51	12.09
	Pahang, Terengganu, Kelantan	36	8.53
	Sabah, Sarawak	18	4.26
Income	No income	183	43.36
	Below RM2000	79	18.72
	RM2001 - RM5000	100	23.70
	Above RM5001	60	14.22
Education Level	SPM, Certificate, Matriculation	52	12.32
	Diploma	338	80.09
	Degree, Master	32	7.60

B) Overall mean score analysis of level of awareness, knowledge, practice, attitude and perception on solid waste management

Based on Table 4, results showed that overall based on 422 respondents, it resulted high level of awareness, knowledge, practice, attitude and perception on solid waste management in Malaysia. This result shows a positive contribution towards the 12th Malaysian Plan Agenda to focus on advancing sustainability to the environment by 2025 which aligned with sustainable development goals (SDGs).

C) Mean score analysis of level of awareness, knowledge, practice, attitude and perception on solid waste management towards gender, state regions and age groups

The results of the mean score analysis based on gender, state regions, and age groups are shown in Tables 5, 6, and 7. In Table 5, the level of awareness, knowledge, practice, attitude, and perception in Malaysia by gender shows a slight difference in practice and perception for males compared to females, who have a high level of awareness, knowledge, practice, attitude, and perception on solid waste management. Based on Table 6, the respondents under the age of 19 revealed only one item with a moderate, which is the level of perception.

Meanwhile, respondents aged 20 to 29 displayed a high level of awareness, knowledge, practice, attitude and perception on solid waste management throughout the survey. Respondents over 30 years old, on the other hand, demonstrated some moderate levels of practice and perception. In addition, Table 7 shows Selangor, federal territories (Kuala Lumpur, Putrajaya, and Labuan), Pahang, Terengganu, and Kelantan are the states with the highest levels of overall awareness, knowledge, practice, attitude, and perception. This demonstrates that inhabitants in these states have had an excellent understanding of solid waste management.

Table 4

Overall mean score analysis results

422 respondents			
Variable	Items	Mean Score	Parallelity Level
Knowledge	PQ1	4.52	High
	PQ2	4.59	High
	PQ3	4.8	High
	PQ4	4.86	High
	PQ5	4.79	High
Practice	AQ1	4.41	High
	AQ2	3.81	High
	AQ3	3.84	High
	AQ4	4.43	High
	AQ5	3.95	High
Attitude	SQ1	4.25	High
	SQ2	4.14	High
	SQ3	4.06	High
Perception	RQ1	3.81	High
	RQ2	3.87	High
	RQ3	3.69	High
Awareness	KQ1	4.24	High
	KQ2	4.37	High
	KQ3	4.12	High

Table 5

Comparison based on gender

Male				Female			
Variable	Items	Mean Score	Parallelity Level	Variable	Items	Mean Score	Parallelity Level
Knowledge	PQ1	4.45	High	Knowledge	PQ1	4.53	High
	PQ2	4.45	High		PQ2	4.62	High
	PQ3	4.60	High		PQ3	4.86	High
	PQ4	4.67	High		PQ4	4.91	High
	PQ5	4.64	High		PQ5	4.83	High
Practice	AQ1	4.27	High	Practice	AQ1	4.45	High
	AQ2	3.58	Moderate		AQ2	3.87	High
	AQ3	3.70	High		AQ3	3.88	High
	AQ4	4.20	High		AQ4	4.49	High
	AQ5	3.81	High		AQ5	3.99	High
Attitude	SQ1	4.07	High	Attitude	SQ1	4.30	High
	SQ2	4.01	High		SQ2	4.17	High
	SQ3	3.84	High		SQ3	4.12	High
Perception	RQ1	3.69	High	Perception	RQ1	3.84	High
	RQ2	3.75	High		RQ2	3.91	High
	RQ3	3.64	Moderate		RQ3	3.70	High
Awareness	KQ1	3.99	High	Awareness	KQ1	4.31	High
	KQ2	4.09	High		KQ2	4.44	High
	KQ3	3.82	High		KQ3	4.20	High

Table 6
Comparison based on age groups

Age: Below 19				Age: 20 - 29				Age: Above 30			
Variable	Items	Mean Score	Parallelity Level	Variable	Items	Mean Score	Parallelity Level	Variable	Items	Mean Score	Parallelity Level
Knowledge	PQ1	4.5	High	Knowledge	PQ1	4.53	High	Knowledge	PQ1	5.00	High
	PQ2	4.58	High		PQ2	4.59	High		PQ2	5.00	High
	PQ3	4.78	High		PQ3	4.84	High		PQ3	5.00	High
	PQ4	4.84	High		PQ4	4.89	High		PQ4	5.00	High
	PQ5	4.76	High		PQ5	4.84	High		PQ5	5.00	High
Practice	AQ1	4.34	High	Practice	AQ1	4.52	High	Practice	AQ1	4.50	High
	AQ2	3.8	High		AQ2	3.82	High		AQ2	3.50	Moderate
	AQ3	3.82	High		AQ3	3.89	High		AQ3	3.50	Moderate
	AQ4	4.39	High		AQ4	4.49	High		AQ4	4.50	High
	AQ5	3.89	High		AQ5	4.02	High		AQ5	4.00	High
Attitude	SQ1	4.22	High	Attitude	SQ1	4.29	High	Attitude	SQ1	5.00	High
	SQ2	4.12	High		SQ2	4.17	High		SQ2	4.00	High
	SQ3	4.05	High		SQ3	4.07	High		SQ3	4.50	High
Perception	RQ1	3.8	High	Perception	RQ1	3.83	High	Perception	RQ1	3.00	Moderate
	RQ2	3.89	High		RQ2	3.86	High		RQ2	3.50	Moderate
	RQ3	3.62	Moderate		RQ3	3.79	High		RQ3	3.00	Moderate
Awareness	KQ1	4.26	High	Awareness	KQ1	4.22	High	Awareness	KQ1	4.50	High
	KQ2	4.36	High		KQ2	4.39	High		KQ2	4.50	High
	KQ3	4.11	High		KQ3	4.14	High		KQ3	4.00	High

Table 7
Comparison based on state regions

Selangor , Federal Territories (KL, Putrajaya, Labuan)				Perlis, Kedah, Pulau Pinang, Perak				Pahang, Terengganu, Kelantan			
Variable	Items	Mean Score	Parallelity Level	Variable	Items	Mean Score	Parallelity Level	Variable	Code	Mean Score	Parallelity Level
Knowledge	PQ1	4.61	High	Knowledge	PQ1	4.42	High	Knowledge	PQ1	4.67	High
	PQ2	4.66	High		PQ2	4.52	High		PQ2	4.72	High
	PQ3	4.88	High		PQ3	4.74	High		PQ3	4.86	High
	PQ4	4.96	High		PQ4	4.81	High		PQ4	4.83	High
	PQ5	4.89	High		PQ5	4.71	High		PQ5	4.86	High
Practice	AQ1	4.45	High	Practice	AQ1	4.41	High	Practice	AQ1	4.50	High
	AQ2	3.85	High		AQ2	3.86	High		AQ2	3.83	High
	AQ3	3.82	High		AQ3	3.83	High		AQ3	4.03	High
	AQ4	4.48	High		AQ4	4.42	High		AQ4	4.47	High
	AQ5	3.93	High		AQ5	4.02	High		AQ5	3.94	High
Attitude	SQ1	4.28	High	Attitude	SQ1	4.25	High	Attitude	SQ1	4.36	High
	SQ2	4.12	High		SQ2	4.16	High		SQ2	4.17	High
	SQ3	4.25	High		SQ3	4.00	High		SQ3	3.94	High
Perception	RQ1	3.88	High	Perception	RQ1	3.75	High	Perception	RQ1	4.00	High
	RQ2	3.93	High		RQ2	3.84	High		RQ2	3.94	High
	RQ3	3.79	High		RQ3	3.63	Moderate		RQ3	3.69	High
Awareness	KQ1	4.29	High	Awareness	KQ1	4.27	High	Awareness	KQ1	3.94	High
	KQ2	4.40	High		KQ2	4.35	High		KQ2	4.19	High
	KQ3	4.13	High		KQ3	4.12	High		KQ3	4.00	High

Sabah, Sarawak				Johor, Melaka, Negeri Sembilan			
Variable	Items	Mean Score	Parallelity Level	Variable	Items	Mean Score	Parallelity Level
Knowledge	PQ1	4.22	High	Knowledge	PQ1	4.51	High
	PQ2	4.28	High		PQ2	4.55	High
	PQ3	4.61	High		PQ3	4.76	High
	PQ4	4.61	High		PQ4	4.8	High
	PQ5	4.61	High		PQ5	4.73	High
Practice	AQ1	4.11	High	Practice	AQ1	4.37	High
	AQ2	3.33	Moderate		AQ2	3.67	Moderate
	AQ3	3.78	High		AQ3	3.86	High
	AQ4	4.17	High		AQ4	4.37	High
	AQ5	3.61	Moderate		AQ5	3.92	High
Attitude	SQ1	4.00	High	Attitude	SQ1	4.16	High
	SQ2	3.94	High		SQ2	4.16	High
	SQ3	3.67	Moderate		SQ3	3.84	High
Perception	RQ1	3.78	High	Perception	RQ1	3.63	Moderate
	RQ2	3.78	High		RQ2	3.76	High
	RQ3	3.33	Moderate		RQ3	3.67	Moderate
Awareness	KQ1	4.22	High	Awareness	KQ1	4.22	High
	KQ2	4.33	High		KQ2	4.49	High
	KQ3	4.00	High		KQ3	4.24	High

Conclusion

A total of 422 people took part in the survey. The convenience sampling method is used to pick the samples, which is done by using an online questionnaire. The first study's objective was to determine the level of awareness, knowledge, practice, attitude, and perception in Malaysia about solid waste management. The second study's objective was to compare the

level of awareness, knowledge, practice, attitude, and perception about solid waste management in Malaysia by gender, age group, and state region. According to the findings, all respondents in Malaysia had a high level of awareness, knowledge, practice, attitude, and perception of solid waste management. However, because the sampling technique utilized was convenience sampling, this result can only be applied to this study. As a result, the results cannot be applied to the entire population.

Acknowledgement

The authors would like to express an appreciation to FSKM, UiTM Perak Branch, Campus Tapah for supporting this study. Special thanks to all the respondents for their cooperation to participate in this study.

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