



Study on household waste management in Kampung Parit Haji Siraj, Johor, Malaysia

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Abstract

Waste management issue has been a major threat and challenge due to the undergoing rapid industrialization and urbanization not only to Malaysia, but also other countries around the world. To tackle that, the first step starts at household level where people are encouraged to try to manage their wastes properly. The aim of this study was to review the current practices of household waste management, to assess household awareness of the health and safety risk posed by inadequate handling of special household waste and to identify future prospect and potential for effective waste management system in Kampung Parit Haji Siraj, Ayer Hitam, Johor. A survey questionnaire was used to collect complete information and the data were analyzed using SPSS software. Results showed that 97.2% of residents were aware about waste management and social media with 80% contributed the most in delivering information about waste management to the public. The most type of solid waste generated from household were food waste and plastic with 94.4% and 86.1%, respectively. 66.7% of residents emptied their waste container once in 2 days and about 63.9% of the residents dispose their household waste in a hole near their compound. Majority of the residents are aware of any health and safety risk posed by inadequate handling of household waste. Lastly, waste management system in the area can be improved by providing proper waste disposal place and educating proper disposal ways to guarantee that residents do not discard their waste in an indiscriminate manner.

Keywords :

Solid Waste Management, Waste Disposal, Household, Survey Questionnaire, Awareness

1 Introduction

Rapid population growth is leading to a drastic rise in solid waste production globally (Abdel-Shafy and Mansour, 2018). To meet the most basic needs of life, humanity strives to create and manufacture cutting-edge goods (Jain et al., 2022). The subsequent production and use of energy, however, ends up with major problems in the production and management of solid waste in different parts of the world (Kumar and Samadder, 2017). The core objective of waste management is to minimize the volume of waste generated and therefore to reduce the cost of disposal (Zhu et al., 2021), the environmental damage (Wang et al., 2019), and the impact on human health (Ikhlayel, 2018). Despite our best and continuous efforts, the damage from improper waste management continues, only at different rate (Sharholy et al., 2008). The problem might affect and drag to our future generation, hence the urgent need to tackle the arising problem of waste management.

Desa et al. (2011) has shown that despite the vast quantity and sophistication of waste produced, waste management standards in Malaysia are still low. This is mainly caused by inefficient use of land at the landfill site, indiscriminate disposal and dumping of waste, weak management of harmful and dangerous toxic municipal waste, inefficient waste collection system and inadequate documentation of the output and composition of waste (Niyobuhungiro and Schenck, 2020). In addition, the lack of understanding and knowledge of solid waste management (SWM) problems among the Malaysian population and being unaware of the effects that inappropriate SWM has on us, has certainly made the problem worse (Fernando, 2019). Other than that, each household prefers to either dispose or recycle according to its whims and fancies because of a lack of knowledge on the social costs and benefits. Since the disposal and recycling of urban solid waste is privately costless, households will have no desire to recycle (Du Toit et al., 2017).

Abdel-Shafy and Mansour (2018) said that household waste is created typically from variable sources where there are various human activities. Several studies have indicated that the municipal solid waste produced by developed countries comes predominantly from households (55-80%), followed by market or commercial areas (10-30%). The latter consists of variable amounts generated by factories, highways, establishments and many others.

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Another study by Abu Samah et al. (2013) shows that household waste, followed by industrial and commercial waste, is the largest source of municipal solid waste production. For waste management method, a study about waste management is quite commonly, at the final dumping areas; garbage is burned in the open air. In addition to greenhouse gas pollution in the atmosphere, the burning of plastic waste can pollute the environment and damage the ozone layer and its defensive properties, thus raising the risk of health hazards (Yoda et al., 2014). Meanwhile, another study evaluated that at the domestic level, the most traditional waste management method is composting with different methods and appliances available (Jouhara et al., 2017). The ability to recycle the nutrients found in the wood back to the soil is created by composting. Strong quality fertilizer can also be obtained by the user.

Public knowledge and engagement, in addition to sufficient regulations, good technological assistance, and proper financing, is a vital component of any waste management initiative. The participatory approach to waste management is seen as an alternative to the conventional waste management system in which governments and individuals take shared responsibility and co-management for delivering better solid waste management services (Blengini et al., 2012). The individuals became more dominant, engaged decisively and influenced to the management process after being equipped with knowledge and skills regarding solid waste management. There are some recommendation and suggestion on how to improve waste management system. According to Odonkor et al. (2020), residents should be told about the harmful health and environmental consequences of inadequate waste management and the need for better waste management and disposal. This can be supported by Mamady (2016) that suggest promoting public education and adopting community programs on disease prevention will improve the community's comfort.

Generally, the society is still unaware of the proper practice of waste management, especially in household level. Many people are still not segregating the different type of waste and dispose them without proper handling, without realizing that it will affect the environment. Samsudin and Mat Don (2013) reported that the way people responded and collaborated on topics of waste management is impacted by their level of education. The education of the public is also an integral aspect of the effectiveness of every waste management initiative (Tsai et al., 2020). Environmental consciousness among the public is still generally not adequate in Malaysia. Many efforts on educating Malaysian about the importance of proper waste management has been done but the programs did not have positive impact on the waste management issue (Abu Bakar et al., 2020). This shows that the public awareness about waste management is at alarming state. Another study showed that trash collection trucks system faced many challenges contributed to problems such as garbage overflow, ground dumping at recycling points and unregulated spaces as the findings by Fereja and Chemed (2021), Sibanda et al. (2017), Djibo and Zakari (2021), and Narayan et al. (2021). This shows that there are still gap and limitation of today's waste management method that needs further review. Thus, this objectives study is to review the current practices of household waste management in Kampung Parit Haji Siraj, Ayer Hitam, Johor, to assess household awareness of the health and safety risk posed by inadequate handling of special household waste, and to identify future prospect and potential for effective waste management system.

2 Methods

This research consisted of four key activities: study design and sample size, sampling technique, data collection and data analysis.

2.1 Study design and sample size

To collect objective results using questionnaires, this study utilized cross-sectional study. A cross-sectional study is characterized as a form of observational analysis that analyses data from variables gathered through a sample population or a predefined subset at a given point in time. The questionnaires were constructed in English, but later translated to local language which is in Bahasa Melayu for respondents who could not respond in English for literacy purposes. Other than that, the questionnaires in this study were self-administered which mean that it is a formal form that consists of a set of questions that are closed and open-ended. The survey was done using Google Form that allowed people to submit their respond by clicking the questionnaire link.

2.2 Sampling technique

For this study, probability sampling was employed which is Simple Random Sampling. This study will also use both closed-ended and open-ended format. A closed-ended question provides a predefined list of choices for responding, while an open-ended question prompts the respondent in their own words to include a response. Other than that, it also utilized few surveys question types, such as multiple-choice questions, rating scale, Likert scale, and binary scale. The duration of the study was 2 weeks and the collected data sources were from 36 respondents of residents from Kampung Parit Haji Siraj, Ayer Hitam, Johor. The content of the questionnaire was constructed carefully based on the study objectives to gather information from the respondents. The questionnaire consisted of 17 items that distributed into two parts. The first part of the questionnaire which consisted of 6 questions, is about the respondent's background information or socio-demographic variable, such as age, gender, marital status and income. The second part of the questionnaire consisted of 11 questions constructed to predict how the residents are handling household waste, their knowledge of disease caused by inadequate handling of waste and to gather some recommendation about effective waste management. For this study, until data was collected, both verbal and written concerns were requested from the respondents. All the respondents were given short briefing and information about the study and were well assured that all the information given was confidential.

2.3 Data Collection

The set of questions were constructed using Google Form and later the link of the form was distributed to the respondents. Google Form was chosen as the alternative for data collection because it can secure data from respondents efficiently and it is very convenient. The field inspection of questionnaire results was carried out on a regular basis and any mistakes were checked and corrected immediately. The overall data were concluded in the spreadsheet that can be summarized in Microsoft Excel for further analysis. The survey questionnaire took approximately 5-10 minutes to complete the instrument.

2.4 Data analysis

In the analysis process, the data obtained from self-completion questionnaires were noted down and assembled before starting the analysis. The data was then filtered and analyzed using Statistical Package for Social Science (SPSS) software according to its quality to process the report. SPSS provides better option as an analyzing tool because it has built-in data manipulation tools such as recording and transforming variables.

3 Results and discussion

The socio demographic characteristics of the respondents from this study such as gender, age group, marital status, number of people living in a house, duration of living and monthly income is presented in Table 1.

Table 1 Socio-demographic Characteristics of Respondents

Variable	Response	Frequency	Percentage (%)
Gender	Male	17	47.2
	Female	19	52.8
	Total	36	100.0
Age Group	Under 20 years old	1	2.8
	20 – 30 years old	19	52.8
	31 – 40 years old	9	25.0
	41 – 50 years old	3	8.3
	More than 50 years old	4	11.1
	Total	36	100.0
Marital status- Married	Single	20	55.6
	16	44.4	
	Total	36	100.0
	Less than 3 people	0	0
How many people are currently living in your house?	3 – 5 people	16	44.4
	6-10 people	18	50.0
	More than 10 people	2	5.6
	Total	36	100.0
How much is your household income per month?	1-3 years	2	5.6
	4-6 years	7	19.4
	7-10 years	17	47.2
	Total	36	100.0
	More than 10 years	10	27.8
	RM 1001 – RM 3000	13	36.1
RM 3001 – RM 5000	22	61.1	
More than RM 10000	1	2.8	
Total	36	100.0	

3.1 Socio-demographic Characteristics of Respondents

According to Table 1, the gender of the respondents is almost evenly divided, with female being the major (52.8%) and male being the minor respondents (47.2%). For age group distribution, majority of the respondents (52.8%) are from age group 20-30 years old, followed by age group 31-40 years old with 25%. For marital status, majority of the respondents are single (55.6%). Half of the respondents (50%) currently have 6-10 people living in their house. 44.4% of respondents currently have 3-5 people living in their house, while the remaining (5.6%) of respondents currently have more than 10 people living in their house. The minimum household size was 3 and the maximum household size was 10. Out of 36 respondents, majority of them (47.2%) has lived in Kampong Parit Haji Siraj for 7-10 years. Another 27.8% of the respondents has lived in the area for more than 10 years. 19.4% and 5.6% has lived in the area for 4-6 years and 1-3 years, respectively. Large

proportion (61.1%) of the respondents earned RM 3001- RM 5000 as their household income per month, while 36.1% of the respondents earned RM 1001- RM 3000 as their household income per month. The rest (2.8%) earned more than RM 10,000 monthly.

With the percentage of males to females who responded is 52.8% to 47.2%, this small gap is unlikely to have a significant impact on people's attitude and behavior about household waste management. The finding in this study also indicates that the respondents are mostly mature individual (20-30 years old) with a high degree of reasoning regarding household waste management. Half of the respondents lives with 6-10 people in the same house, indicates that there will be more waste generated when more people are living together in a household. Other than that, majority of the respondents has lived in the study area for 7-10 years shows that the current waste disposal method has been practiced for a long time. Lastly, people's orientation, perception and attitude toward solid waste management systems in general tend to be influenced by economic consideration that represented by monthly household income.

3.2 Have you ever heard about Solid Waste Management?

Based on Table 2, majority (97.2%) of respondents have heard about Solid Waste Management. The rest (2.8%) of the respondents never heard of Solid Waste Management. This indicated that the respondents are fairly aware about Solid Waste Management and can be educated more about proper waste management.

Table 2 Respondents' reaction towards solid waste management

Validity	Valid Percent	Cumulative Percent
Once a day	8 22.2	22.2
Once in 2 days	24 66.7	88.9
Once in 3 days	4 11.1	100.0
Total	36 100.0	100.0

3.3 If yes, where did you heard about Solid Waste Management?

From the study result, the respondents expressed that majority (80%) of them heard about Solid Waste Management from social media such as Facebook, Instagram and more. The second highest (48.57%) source of information about Solid Waste Management is from radio and TV. Next, 42.86% of the respondents said that they were educated about Solid Waste Management from school. The rest (11.43%) gain information from posters. Majority of respondents heard about Solid Waste Information from social media indicates that more exposure about proper waste management especially at household level should be done through social media such as Facebook, Instagram and Twitter. This is mainly because of people nowadays are more engaged to social media in everyday life to gain new information and new knowledge. Hence, the effort should be given more to social media exposure. Radio and TV are also some good tools to deliver information about waste management because as seen from the data, 48.57% gain information from radio and TV. This method is much more convenient for the older generation from age group 41-50 years old as they are not using social media as often as the younger generation age group. Early education about Solid Waste Management also should be considered at school for students as 42.86% of respondents said that they heard about waste management in school. Lastly, posters are also a good source of information for public exposure.

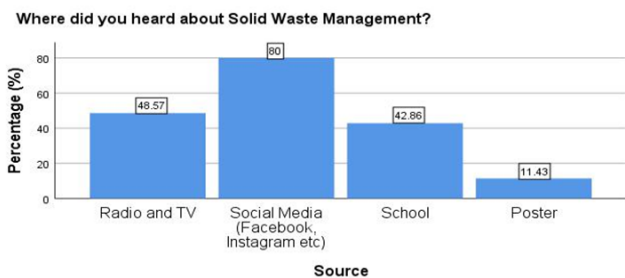


Figure 1 Respondent's source of information

3.4 What type of solid waste comes out from your household?

The table illustrate types of solid waste comes from the respondent's household. Food waste was the major waste generated in the study area, with 94.4% of respondents saying they generated food waste as solid waste. Meanwhile, plastic and tins share the same portion of respond with 86.11% out of 36 respondents as the second highest solid waste generated from household. 41.67% respondents generated paper and carton and the rest (19.44%) of the respondents said they generated glass as their household solid waste. Majority of respondents generated food waste indicates that every day, high volume of food waste is disposed in every household. Food waste produces methane gas as the food rot and degrades. This might cause environmental problem if food waste is not properly discarded. Furthermore, carelessly disposed of food waste might clog drains and impede rivers, perhaps resulting in floods during the rainy season. Because plastic is not biodegradable, the huge volume of plastic garbage created is expected to pose implications for disposal. Hence, another alternative of using plastic or better way of disposal should be further discussed. Even if only 19.44% of respondents generated glass as their solid waste, but proper care of glass solid waste should be taken because it can cause major environment impact due to melting activities. CO₂ is produced by the burning of natural gas or fuel oil and the breakdown of raw materials during the melting process.



Figure 2 Type of solid waste

3.5 How often is the waste container emptied?

The majority (66.7%) of the respondents emptied the waste container in their household once in 2 days. Meanwhile the other (22.2%) emptied their waste container once a day, while the rest (11.1%) emptied their waste container once in 3 days. Emptying the waste container frequently is recommended. This is because, germs, bacteria and that dreadful odor may all be found right out in the open in a waste container. Majority of respondents that emptied waste container once in 2 days displayed good waste management attitude. Fortunately, only minority number of respondents emptied the waste container once in 3 days, because the waste might get bad with all the rotting food and other foul-smelling goods tossed out, attracting flies and maggots after 3 days.

Table 3 Frequency of waste container emptied

Validity	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Once a day	8	22.2	22.2	22.2
Once in 2 days	24	66.7	66.7	88.9
Once in 3 days	4	11.1	11.1	100.0

3.6 Where do you usually dispose your household waste?

From the study, majority (63.9%) of the respondents dispose their household waste in a hole in their own compound or backyard. Other than that, 27.8% of the respondents dispose their household waste in the public bin, while 8.3% out of 36 respondents indicated that they dispose the waste in an open space. The study shows that majority of the respondents does not portrays good waste management as 63.9% of them dispose waste in a hole in own compound or backyard by burying the waste. This condition fosters the reproduction of disease vectors such as mosquitoes and cockroaches, as well as the expansion of rodents such as rats and mice, both of which represent public health risks. 27.8% of the total respondents choose better disposal waste method by disposing in the public bin. However, this system can be enhanced by using color-coded containers for various types of waste, as is done in advanced countries. The remaining 8.3% of respondents who disposed of their waste in an open space should be educated about the serious health and environmental consequences of their actions.

Table 4 Place of disposal

Validity	Frequency	Percentage	Valid Percentage	Cumulative Percentage
In the public bin	10	27.8	27.8	27.8
On an open space	3	8.3	8.3	36.1
In a hole in own compound/backyard	23	63.9	63.9	100.0
Total	36	100	100	

3.7 Do you notice the presence of the following in and around public waste bin / dumping land?

Majority (97.22%) of the respondents said that they experienced odour around public waste bin/dumping land. Meanwhile, 77.78% agreed that they noticed domestic animals such as cats and dogs roaming around the public waste bin/dumping land. Next, 50% of respondents noticed the presence of rats, 33.33% noticed the presence of fire, 22.22% noticed the presence of mosquitoes and cockroaches while the minority 8.33% experienced dark flowing water around public waste bin/dumping land. Sulfides are gases generated by microorganisms from garbage. They have a unique stench that gives the waste a "rotting" smell, hence majority of respondents said that they are uncomfortable with the odor. Proper waste management can help to decrease the odor. Large proportion of the respondents also notice domestic animals such as cats

and dogs that caused discomfort to the residents due to improper waste management. They are attracted to the waste because it is left unattended in the open area. Other than that, half of the respondents (50%) witnessed rats around the dumping land. Waste dumped in areas where it is not allowed or managed can provide a convenient supply of nourishment and shelter for rodents, promoting the development of diseases related to rats. Fire that caused by open dumping can also cause environment problems. Lastly, mosquitoes and cockroaches with 22.22% of respondents noticing it will also bring problems to the residents, due to the chances of spreading illness such as dengue and malaria.

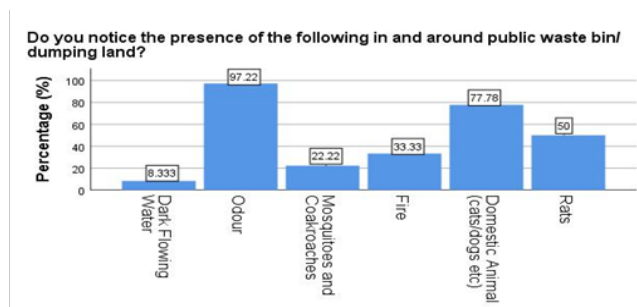


Figure 3 Presence of things around waste bin/dumping land

3.8 How would you rate the solid waste management in your neighborhood?

Based on the study, the respondents were asked to rate the solid waste management in the neighborhood. Majority (50%) of the respondents rated 'Poor' for the solid waste management in their neighborhood. The second highest rate is 38.9% of the them responded 'OK'. 8.3% rated 'Very Poor' while the rest which is 2.8% of the respondents rated 'Good'. This data shows that the respondents acknowledge the poor waste management system in their neighborhood. The next step is to educate about the proper waste management, where is the correct place to dispose waste, how to separate waste according to its type, and many more. 38.9% of respondents that rated 'OK' and 2.8% that rated 'Good' might not know about the incorrect way of waste management currently happening in the neighbourhood. Hence, efforts need to be made to create awareness about proper waste management.

Table 5 Rate of solid waste management

Validity	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Very Poor	3	8.3	8.3	8.3
Poor	18	50.0	50.0	58.3
Ok	14	38.9	38.9	97.2
Good	1	2.8	2.8	100.0
Total	36	100	100	

3.9 Do you think the waste disposal method is a problem in your neighborhood?

Large portion of the respondents (88.9%) thinks that the waste disposal is a problem in the neighborhood. Meanwhile the remaining 11.1% does not think that the waste disposal method is a problem. From previous data, it is said that majority of the respondents dispose their waste by burying it in the hole near own compound. Fortunately, majority (88.9%) of the respondents are aware that the waste disposal method that is being practiced right now is a problem in the neighborhood. Proper method needs to be implemented in order to tackle this problem. The 11.1% of respondents that said waste disposal method in not a problem in the neighbor are satisfied with their ways of disposal which is using public bin.

Table 6 Perception towards disposal method

Validity	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	32	88.9	88.9	88.9
No	4	11.1	11.1	100.0
Total	36	100.0	100.0	

3.10 Do you aware of any health and safety risked posed by inadequate handling of household waste?

(97.2%) of the respondents showed positivity towards awareness of health and safety risked caused by improper waste management. They are aware that inadequate handling of household waste may lead to serious sickness and disease. However, this significant amount of knowledge about the impacts of improper waste management does not match the practice that have been observed where majority of respondents still dispose the waste in an open space or bury it in a hole. Meanwhile only minority of 2.8% that does not aware of illness involving inadequate handling of household waste.

Table 7 Awareness of health and safety risked

Validity	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	35	97.2	97.2	97.2
No	1	2.8	2.8	100.0
Total	36	100.0	100.0	

3.11 Do you agree that every single person has a responsibility to manage household waste adequately?

From the data, all of the respondents agreed that they are entitled to the responsibility to manage household waste adequately. They are aware that they need to effectively manage their own waste starting from household level in order to prevent negative impact not only to themselves, but also to the environment.

Table 8 Awareness towards responsibility of waste management

Validity	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	36	100.0	100.0	100.0
No	0	0	0	0
Total	36	100.0	100.0	

3.12 What would you suggest to improve the household waste management in your neighbourhood?

Based on all 36 respondents that gave their responds, there are many suggestions to improve waste management system in the neighborhood, such as: (a) Raise awareness on the importance of solid waste management around the village by holding exhibitions, talks and distributing posters related to the management of waste generated from home; (b) Bury disposable waste and recycle recyclable items, such as plastic bottles; (c) Provide suitable waste disposal place for all of residents to prevent burying all waste in the compound's hole; (d) Provide special bins for solid waste only and the process of transferring waste to landfill should be done frequently and in orderly manner; (e) Hire a garbage truck to pick up

the garbage with proper schedule; (f) Sort waste according to its type, tie carefully the plastic containing waste, and dispose in the right place; and (g) Issuing fine to the people that fail to follow the rule of managing waste properly.

4 Conclusion

The objective of this study is to review the current practices of household waste management in Kampung Parit Haji Siraj, Ayer Hitam, Johor, to assess household awareness of the health and safety risk posed by inadequate handling of special household waste, and to identify future prospect and potential for effective waste management system. Currently, majority of the residents disposed their household waste in a hole in the house compound or backyard, while only minority of them uses the public bin to manage the waste properly. According to the study, large portion of solid waste created at household was found to be food waste and plastics. Majority of the respondents are aware of the dangers that poor waste disposal poses to their health and safety. They also noted the consequences of improper waste management, such as domestic animals and rats drawn to poorly managed dumping grounds. Holding exhibition and talks, allocate suitable waste disposable place for residents, prepare special bins for recycling activities and provide garbage trucks to pick up wastes are some prospects and suggestion towards effective waste management system in the study area. Overall, this study concludes that, there are problems in how the communities of Kampung Parit Haji Siraj manage their household waste, but it can be mitigated with a little assistance and education to change people's habits and views about waste management.

Declaration of competing interest

The authors declare no known competing interests that could have influenced the work reported in this paper.

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