Knowledge, Attitudes, Awareness and Practices on Household Hazardous Waste Disposal Among Undergraduate Students in Selangor, Malaysia

Nurhidayah Hamzah, Nur Syazwina Marzuki, Fauzi Baharudin, Nur Liza Rahim, Nor Amani Filzah Mohd Kamil, Nor Azliza Akbar, and Nur Shazlinda Mohd Zin

Abstract The exponential growth of population in Malaysia and the consequently growing number of residences have aggravated the problem of household waste. Like many other towns of Selangor, a small town located in every district of Selangor also faces serious problems in terms of household hazardous waste disposal. The households of every district of Selangor generate and discharge a huge amount of untreated hazardous waste daily. In this study, an attempt has been made to analyze the scenario of household hazardous waste disposal in Selangor by means of a Knowledge, Attitude, Awareness and Practices (KAP) survey. Interview and personal observation were used to collect the data. The data collected were tabulated and processed to supplement the analysis through them. This study was using Microsoft Excel to

N. Hamzah (✉) · N. S. Marzuki · F. Baharudin
School of Civil Engineering, College of Engineering, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia
e-mail: nurhidayah0527@uitm.edu.my

F. Baharudin
e-mail: fauzi1956@uitm.edu.my

N. L. Rahim
Faculty of Civil Engineering Technology, Universiti Malaysia Perlis, Kompleks Pusat Pengajian Jejawi 3, 02600 Arau, Perlis, Malaysia
e-mail: nurliza@unimap.edu.my

N. A. F. Mohd Kamil · N. S. Mohd Zin
Faculty of Civil Engineering and Built Environment, Universiti Tun Hussien Onn Malaysia, Batu Pahat, Johor, Malaysia
e-mail: noramani@uthm.edu.my

N. S. Mohd Zin
e-mail: nursha@uthm.edu.my

N. A. Akbar
School of Civil Engineering, College of Engineering, CawanganPulau Pinang, Universiti Teknologi MARA, Kampus Permatang Pauh, 13500 Permatang Pauh, Pulau Pinang, Malaysia
e-mail: norazliza049@uitm.edu.my

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obtain percentage and correlation. The findings show that the average level of knowledge among students was 89.8%. While the average awareness level was 93.7%. The average attitude level for them is 91.8%. Lastly was 44% for practice level. Generally, this paper validates how knowledge influences attitude that subsequently determines behavior particularly in household hazardous waste management as intervened by appropriate environmental education. This study also indicates towards many positive aspects along with the negative ones. The positive aspects are mostly related to the awareness and efforts made by the students, whereas the negative aspects are mostly related to the improper methods of waste disposal adopted by the students and the existing scenario of the disposed waste. It is suggested that the household hazardous disposal practice can be improved by introduce more extensive program in university collaborated with related agencies.

Keywords Household Hazardous Waste (HHW) · Household Hazardous Waste Management (HHWM)

1 Introduction

Waste is defined by the original consumer as unused residues, disposed residues and items or artefacts which are no more usable. These items are by-products of human activities such as preparing, sorting, shipping, reassembling, disassembling, refurbishment, construction restoration and extraction. Fast urbanization, growing economy, industrialization and a rise in people's well-being have contributed to rising growth of disposal of waste [1]. The increase in atmospheric waste generation and disposal without recycling is seen as a risk to the planet and health impacts [2].

Household hazardous waste is classified as a fraction of household waste that contains corrosive, destructive, flammable, poisonous, inflammable, or reactive materials and is difficult to dispose of or endangers human health and the environment due to its biochemical nature. Dangerous waste from households is the unwanted portions of those products which contain hazardous ingredients. Household waste is a large portion of municipal solid waste, 4% or more of which can potentially affect both the environment and human health. In general, hazardous product divided into five categories: automobile, sanitation and polishing, paint and associated solvents, pesticides, and various things (examples include batteries, fingernail polish remover, certain cosmetics, and shoe polish). These materials are considered dangerous because they can be poisonous, combustible, corrosive and/or cause violent reactions to the chemical [3].

A good environmental controls good health and increases the quality of life for humans. Knowledge and awareness about waste management for households is very important [4]. Proper waste disposing is important for environmental conservation. Lack of awareness, erratic and unplanned waste dumping are the key causes of inappropriate waste disposal. Poor awareness of waste management is the main human health problem. People need to have information on disposal of household

waste. It is important to be conscious between people about dealing with waste. Inadequate and inappropriate information of household waste handling can have severe health effects as well as the environmental impacts become more significant.

Moreover, Jatau [4] explained that a good understanding about household waste disposal will avoid infectious diseases and ensure safe environment. The attitude towards waste management is affected by their level of understanding. Inadequate collection and insufficient treatment of waste facilitates the transmission of bacteria, induces diseases such as cholera and diarrhea, and provides breeding grounds for disease vectors such as mosquitoes (malaria, dengue fever), flies (diarrhea) and rodents [5]. People ought to get good practice in their homes to dispose of household waste. Moreover, inadequate waste disposal activities contribute to environmental degradation by rising the burden of illness and disease among people. Therefore, a survey was conducted in Selangor because of previous study stated that huge household waste was collected as Petaling Jaya in 2010 was found to have 1.70 kg per household and 0.34 kg per person per day [6]. The population estimate living in this area (Bandar Baru Sungai Buloh, Shah Alam, Selangor, Malaysia) is 8000 people with a total population of approximately 2000. Bandar Baru Sungai Buloh is one of the old housing estates in Selangor is currently facing problems in the management of their domestic waste. Thus, this study aims to determine the level of understanding on the hazardous household waste management amongst undergraduate students by determine the percentage of knowledge, attitude, awareness, and practices. It is expected from the results obtained; more efficient program/policy can be performed by universities to achieve sustainable environment.

2 Materials and Method

Setting: The research has been conducted the undergraduate students in Malaysia that live in Selangor.

Research Design: A descriptive cross-sectional study has been carried out the undergraduate students in Malaysia that live in Selangor.

Population: The study population has female and male of students age between 20 to 30 years.

Sampling: Data was randomly collected of 100 samples. The research is primarily subjective and incorporates data obtained from the student questionnaire survey.

Research Instrument: Data was collected by pre-designed adopted questionnaire [7, 8], interview technique on different variables household hazardous waste, knowledge, attitude and practices.

Data Gathering Procedure: Convenience sample technique has been used to collect data on demographic variables, knowledge, attitude, and practice among undergraduate students.

(i) Section 1—Background of Respondents: Respondents are asked to provide details such as name, age, student's residence, and current semester. It is

necessary to understand the student's background to get a general view of the respondent.

(ii) Section 2—Knowledge on HHW: This section aims to access the student's knowledge regarding household hazardous waste. Such as, do the respondents know how to classify the hazardous household waste. There are 5 questions in this section which require student to answer agree or disagree. Agree means students has knowledge on that question while disagree shows otherwise.

(iii) Section 3—Awareness on HHW: In this section, there are 3 questions. First question is designed by using the Likert scale. For this, the waste disposal was divided into four levels: Excellent awareness (very agree), Good awareness (agree), Satisfactory awareness (disagree) and Poor awareness (very disagree). Another two question are designed by using single choice answer (Yes or No).

(iv) Section 4—Attitude on HHW: In this section, there are 5 questions. These questions are designed by using the Likert scale. For Attitude on HHW analysis, assessing type of respondents' attitude towards household hazardous waste management was divided into three: positive attitude (very agree and agree), not sure (neutral) and negative attitude (disagree and very disagree).

(v) Section 5—Practices on HHW: In this section, there are 8 questions. These questions are designed by using the single choice and multiple choice.

Analysis of Data: Data analysis was done using Microsoft Excel. Data was analyses to obtain percentage of each section and the correlation analysis. The percentage of each section was calculated by determined the average value of the questions.

Study Timeline: Study has been conducted in 10-month duration from March 2020 to January 2021.

3 Result and Discussion

3.1 Profile of the Respondents

The study has done for undergraduate students in Malaysia that live in Selangor. The study indicates that majority of respondents were among the female group with 58% which equal to 58 female respondents while the rest 42 are among male respondents. Therefore, the overall results from this study can be concluded as more women preference rather than men. This can relate with some studies have shown that women are more in line with social comparisons than men [9]. Rather, it seems that men and women vary in their form of interdependence. For example, in view of the primary duty of women for washing, food preparation, family wellbeing, laundry and domestic maintenance, women and men can view household waste and its disposal differently. They may have different knowledge of waste or garbage. They will also handle waste differently and set different goals for disposal.

From this survey, the largest range of age that contributed to the percentage was 20–21 years old with a percentage of 51%. The second-largest range of age was

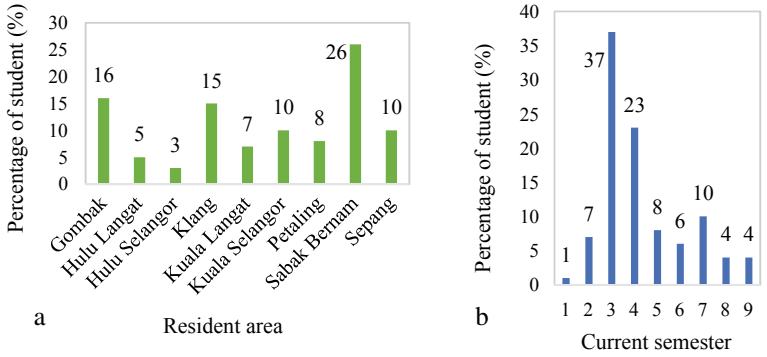

Fig. 1 Demographic Characteristic of Respondents which shows **a** current semester of the respondents and **b** resident area of the respondents

22–23 years old with a percentage of 43%. Then, the data followed by age 24 years old above with the percentage of 6%.

According to Fig. 1a the highest respondents were coming from semester 3 which consists of 37 respondents. While the lowest respondents were coming from semester 1 which consists of 1 or 1% of the respondents. Another semester for semester 2, 4, 5, 6 and 7 were 7%, 23%, 8%, 6% and 10% respectively. Semesters 8 and 9 were equal which were 4%. This study shows that most of respondent was come from semester 3 which enroll the environmental studies in their curriculum plan. For respondents' resident (Fig. 1b), the highest percentage was 26% which at Sabak Bernam. For the lowest percentage was 3% which at Hulu Selangor. For Kuala Selangor and Sepang got same percentage which was 10%. For Gombak, Hulu Langat, Hulu Selangor, Klang, Kuala Langat and Petaling were 16%, 5%, 3%, 15%, 7% and 8% respectively.

3.2 Knowledge on Household Hazardous Waste (HHW)

Figure 2 reveals the level of knowledge of respondents. In knowledge on HHW analysis, calculating the extent of knowledge of respondents about household hazardous waste disposal was split into two: knowledge (agree) and less knowledge (disagree). More than 80% respondents were agreed and less than 20% were disagree with the question given. Therefore, the analysis showed that an average of 89.8% of the respondents had knowledge of household hazardous waste disposal. This value is consistent with study made by Barloa et al. [10] and Shahzadi et al. [7] which shows satisfactory knowledge of 73.4% and 72% respectively on solid waste management.

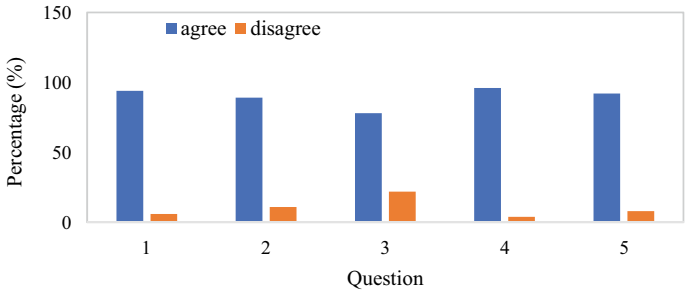

Fig. 2 Respondent's knowledge on HHW disposal which asked about (Q1) Chemical waste is considered as HHW, (Q2) Electronic and Electrical waste are considered as HHW, (Q3) Sharp waste are considered as HHW, (Q4) Education of family members is effective on quality and quantity of HHW, (Q5) The type and area of residential building are effective on quality and quantity HHW

3.3 Awareness on Household Hazardous Waste

This study estimated the level respondents' awareness towards HHW as shown in Fig. 3a which the average result of awareness level in this study showed that 45% respondents were excellent, 48.67% were good, 3.67% were satisfactory and 2.66% were poor in awareness. The study found a total of 93.7% of the respondents that had good and excellent awareness towards HHW disposal. This value is aligning with similar study conducted in South Africa which indicated 80.0% of the community had knowledge of household waste disposal and were aware of the detrimental effects of excessive waste disposal. Most of the population (83.0%) is conscious that further waste generation could damage the environment [7]. As shown in Fig. 3b an 83% of respondents had an environment topic in curriculum, so they have knowledge on HHW disposal. This clearly shown by 75% of respondents were knew how to dispose household waste. According to Maddox et al. [11] and Wang et al. [12],the awareness of students about environmental problems and solutions can be increased through

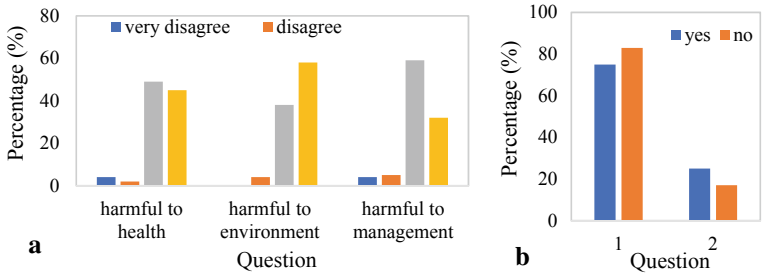

Fig. 3 Respondent's Awareness on HHW disposal that shows **a** awareness on health, environment, and management **b** question 1 asked if respondents know how to dispose HHW and question 2 asked if respondents have an environmental subject in their curriculum

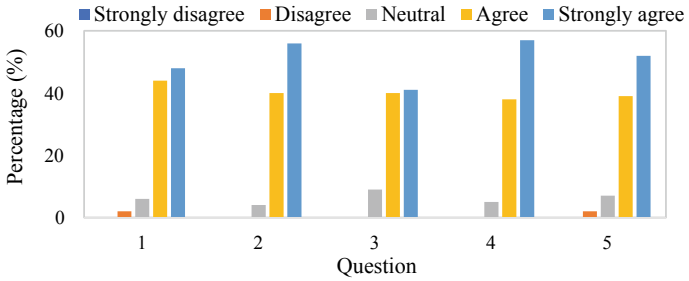

Fig. 4 Respondent's Attitude on HHW disposal which each question asked about the importance of (Q1) considering hazardous household waste material and their properties, (Q2) health and environment effects of hazardous household waste, (Q3) adverse effect of hazardous waste management on the proper management of normal household waste, (Q4) proper management (collection, processing, and disposal) of household hazardous waste, (Q5) media training in management of household hazardous waste

education. Thus, the particular skills and knowledge gained from environmental education would help in changing human behavior towards the environment [13]. Moreover, students with some knowledge and skills in environmental education are more motivated to take part in environmental protection activities and plans or known as ecological behavior [14], thus creating new ideas for solving environmental problems.

3.4 Attitude on Household Hazardous Waste

Based on Fig. 4, most of the respondents showed positive attitude towards household hazardous waste management with 91.8% of respondents were agree and very agree with the questions given. There was a strong positive correlation (0.86) between attitude and knowledge. According to Goytay and Thatte [15], value between 0.5 and 1 indicated strong positive correlation. This supported by Ghanbari et al. [16], which attitude was found to be positively correlated with family background knowledge. This study proves that the degree of continuity between environmental attitudes and behavior is influenced by a person's knowledge and understanding, public verbal engagement and sense of obligation [17, 18].

3.5 Practice on Household Hazardous Waste

For Practice on HHW analysis, a total of 61% respondents had worst practice on household hazardous waste disposal which relying on family members to dispose the HHW. This study was supported by the previous study which weak correlation was

found between students' knowledge and environmental practices [19]. In general, people with a good level of knowledge and attitude did not show a satisfactory practice, which may be due to lack of a comprehensive and appropriate plan for household hazardous waste disposal. Furthermore, a high level of understanding and a strong perspective on environmental issues have not been shown to necessarily transform into positive environmentally friendly practices [20]. This supported by Tatlonghari and Jamias [21] which did not find any relational evidence between attitudes and practices, taking into account their observations on the clear association between degrees of awareness and practice.

Moreover only 44% respondents were separated the household waste while 56% were not separate the waste. This showed that half of the respondents were not good in practices on household hazardous waste. Most of the respondents knew that excessive disposal of waste would affect the lives of humans. In the study of the quality of knowledge and practice undertaken in Ogun State, Nigeria, Ayodeji [22] reported the same findings. It was noted that secondary school students were aware of the waste problems in their school compounds in the sampled areas, but the same students had ineffective waste management activities.

As shows in the Fig. 5a, none of the respondent separate battery and medical waste from their household waste and 53% of respondents did not separate their household waste at all. This study was supported by Ismail et al. [23] which showed that municipal waste management (MWM) practices were low in all classes of employees surveyed at the tertiary health institute in Dakshina, India, and generally, it appears that the prevalence of unsafe MWM practices in developing countries is troubling due to lack of proper training and allocation of medical waste to poorly trained personnel. About 72% of respondents were using the polythene to dispose the household waste as shown in Fig. 5b. This showed that lack of sustainable environmental method of hazardous household waste being disposed as polythene is known to contribute to the plastic pollution. According to Budhiarta et al. [24], the plastic waste generated in Kuala Lumpur, Malaysia is 21% which is considered high. The result also consistent

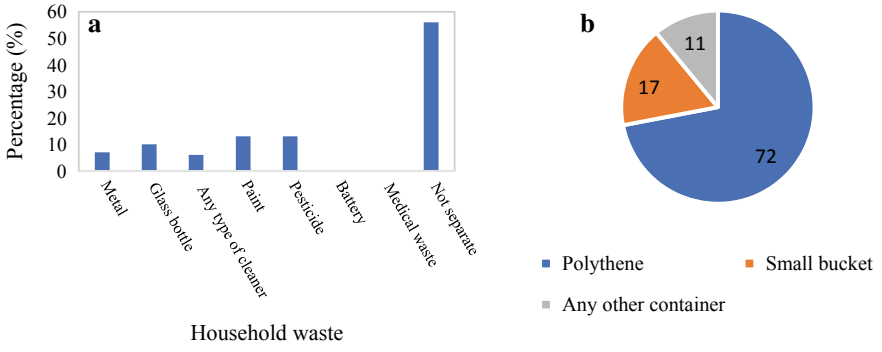

Fig. 5 Respondent's Practice on HHW disposal which **a** shows the separation items in the household and **b** the type of container respondent used to dispose the HHW

with the review made by Chen et al. [25] that the inconsistent application of policy initiatives by state governments, lack of public awareness and household recycling practices were found to be the major factors to plastic pollution in Malaysia.

4 Conclusion

The results showed that the students that live in Selangor have responded to 89.8% of knowledge level with an excellent 93.7% of attitude, 91.8% of awareness, but only 44% were good in their practice of household hazardous waste management. Most of the students are aware of the necessity of proper waste disposal. Therefore, it can be suggested that the study undertaken undergraduate students at Selangor revealed many attention-grabbing facts relating to the perception of the residents on household waste disposal. It helped in analyzing the present scenario of household waste disposal in student's resident. Environmental education is recommended, by held a program with emphasis on issues regarding household hazardous waste management and recycling, it should also be included in the basic curriculum or certain course works of college students that all students must be participated, to expand their knowledge on how to improve practices on household hazardous waste management. Relevant seminars and programs on environmental protection and waste management should be organized by Kementerian Pelajaran Malaysia (KPM) and all the higher institutions in Malaysia to encourage students and the public to become environmentally responsible citizens.

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