Public Knowledge Regarding E-Waste Recycling in Kuala Lumpur, Malaysia

Amirah Sariyati Mohd Yahya, Tengku Adeline Adura Tengku Hamzah, and Aziz Bin Shafie
Department of Geography, Faculty of Arts and Social Science, University of Malaya, UM, 50603, Kuala Lumpur Malaysia

E-waste is one of the major global environmental issues, defined as electrical and electronic appliances that are no longer used or eventually break down and are discarded. Generation of E-waste over time has become a red alarm as it can impact the environment and human health negatively. One key approach towards sustainable management of E-waste is through E-waste recycling, where the base of action is with the public itself. In order to create the necessary awareness of the problem, and to design and implement such sustainable practices, knowledge is one of the key elements that can assist in minimizing the deleterious effects of such global environmental issues. This cross-sectional study was conducted among 543 respondents in Kuala Lumpur, the capital city of Malaysia, and aimed to determine knowledge levels in the broader public regarding E-waste recycling, based on the demographic background of the respondents. Five out of eight demographic variables with the p-value of <.05, are namely: gender, age, marital status, occupation and residential type. It means relevant stakeholder such as governmental authorities, NGOs and private sectors also play important roles in providing the public with knowledge related to E-waste recycling. Knowledge can be delivered through different channels of information sources based on the suitability of the receiver, in connection with their demographic background.

Keywords: E-waste recycling, Knowledge, Kuala Lumpur

Introduction

Electrical and electronic waste (E-waste) is defined as any electrical or electronic appliances that have been used, are unwanted and end up discarded by end consumers. This category of waste comprises a broad spectrum of items, ranging from basic devices to complicated objects (Afroz et al. 2013; Tiep et al. 2015; Liang and Sharp 2016; Azodo et al. 2017; Iyer 2018). In Malaysia, E-waste is focused on in law within the Environmental Quality Act 1974 (EQA 1974) under the First Schedule Environmental Quality (Scheduled Wastes) Regulations 2005 (code SW 110). E-waste is defined there as waste from electrical and electronic assemblies and devices containing components such as accumulators, mercury switches, glass from cathode-ray tubes and other activated glass or polychlorinated biphenyl-capacitors, or contaminated with cadmium, mercury, lead, nickel, chromium, copper, lithium, silver, manganese or polychlorinated biphenyl. Even though E-waste contains an accumula-

tion of toxic and hazardous materials, such objects still have economic value that needs to be conserved in an effective and sustainable way (Cecere and Martinelli 2017). According to Tiep et al. (2014a), the amount of E-waste generated in Malaysia in 2009 was ca. 134,035.70 metric tonnes in 2009. The magnitude of E-waste for 2020 is projected to increase to some 1,119,155 metric tonnes (Nair 2018).

E-waste is a growing global environmental issue since the quantity of E-waste continues to rise. This exacerbating problem is attributed to the steadily increasing magnitude of E-waste in society, as the population, economic development, development of new models, technology improvements, innovations and less costly equipment experience exponential growth over time (Abeliotis et al. 2006; Babington et al. 2010; Afroz et al. 2013a; Alavi et al. 2015; Yunos and Ismail 2015; Azodo et al. 2017a; Nduneseokwu et al. 2017; Iyer 2018a; Wang et al. 2018; Deniz et al. 2019). In Malaysia, the waste issue can be ranked among the top three environmental issues (Yunos and Ismail 2015a). Management of E-waste involves collection, disposal, keeping and treatment in a sustainable manner in order to prevent damage to the environment and human health (Azodo et al. 2017b). If E-waste is not properly managed, the generation of E-waste will eventually generate negative impacts on the environment and human health. E-waste will pollute water and air, including livestock, due to hazardous and toxic materials contained in equipment in use (Jang 2010; Kalana 2010; Song et al. 2012; Afroz et al. 2013b; Akhtar et al. 2014; Shumon et al. 2014; Haron 2015; Alavi et al. 2015a; Tiep et al. 2015b; Sivathanu 2016; Azodo et al. 2017c; Cesaro et al. 2017; Borthakur and Gowind 2017; Abdeelbasir et al. 2018; Iyer 2018b; Deniz et al. 2019a). According to Yunos and Ismail, (2015b) this environmental issue can also impact destructively on the economy and society. E-waste is widely used and owned privately by members of the public, and given the short lifespan of many such devices, this is a significant source of waste contributing to harming the environment and human health, and thus a public health issue. The lifespan of many electrical and electronic appliances is only up to 72 months (Azodo et al. 2017d). According to Wang et al. (2018a) industrial experts have stated that the average lifespan of a laptop is up to 2 years, and a desktop PC would be up to 4 years; a monitor may have a functional lifespan of some 5 years, whereas printers and copiers average between 3 to 5 years in functional lifespan.

E-waste takes up a huge amount of space in landfills, a problem that can be addressed and overcome via proper management of E-waste through the 3R approach: 'reduce, reuse and recycle' (Wang et al. 2018b). Robust sustainable management is one way to reduce the generation and impact of E-waste. Cooperation from the public and responsible bodies are important in managing our burgeoning E-waste. According to Alavi

et al. (2015b), who conducted a field survey on E-waste generation, sufficient infrastructure, segregation and separation at the source are among the important key factors in managing E-waste. Haron (2015a) and Iyer (2018c) also stress that E-waste recycling is one key method in proper and effective E-waste management. E-waste recycling activity can serve to reduce carbon emissions, lower greenhouse gases, conserve the natural resources, reduce the use of landfill and thus recover valuable materials, while increasing environmental protection (Abeliotis et al. 2006a; Zhong and Huang 2016; Thi Thu Nguyen et al. 2019).

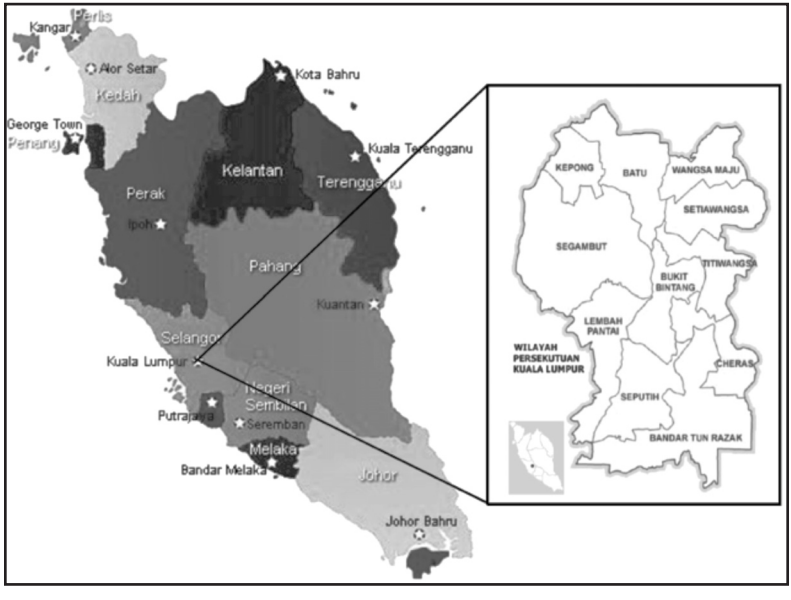
This study sought to empirically assess the current level of knowledge within the broader public in Kuala Lumpur regarding E-waste recycling. Knowledge can be defined as understanding, awareness or familiarity of a subject by and within society. Such knowledge comprises, for example, facts, information and descriptions in regard to a particular subject of interest based on universal truths and scientific facts that can be gained from education and experience in society itself (Launiala 2009; Babei et al. 2015; Ahmad et al. 2015). Related information regarding E-waste, such as the impact of E-waste, is considered to be a mode of knowledge production and dissemination that can assist in influencing the public to properly manage E-waste. Knowledge related to the amount of E-waste being generated, laws and regulations regarding E-waste and issues related to E-waste are also important in order to forge greater public awareness and stimulate the need for recycling amongst the citizenry. Solid accurate information, such as cautionary details about how to handle or reuse appliances whose lifespan and usability have expired will serve to prevent risks to human health and safety (Azodo et al. 2017e; Wang et al. 2018c). Various devices can be repaired and reconditioned, such as computers, monitors, smartphones, tablets and the like, and need not simply be thrown away as waste. In addition, according to Shahzadi et al. (2018), knowledge about waste disposal and management is important in order to reduce the impact of improper waste disposal on human health, such as factors abetting the incidence and spread of cholera, dengue, diarrhoea and malaria. This study was carried out quantitatively and descriptive statistics were employed to determine the association between demographic variables and levels of public knowledge, in order to establish which demographic variables reported a significant p-value$<.05$ in connection with the knowledge variables.

Study Area

Kuala Lumpur (3.0852° N, 101.4143° E) is the capital city of Malaysia, its area 243 km^2 (Official Portal Department of Statistics Malaysia 2019). The population of Kuala Lumpur is about 1,790,000 (official Portal Department of Statistics Malaysia. Kuala Lumpur consists of eight main sections, namely: Mukim Ampang, Mukim Batu, Mukim Cheras, Mukim

Hulu Klang, Mukim Kuala Lumpur, Mukim Petaling and Mukim Setapak (Official Portal Federal Territories Director of Lands and Mines Office 2017). The supervision and jurisdiction of Kuala Lumpur is managed by Dewan Bandaraya Kuala Lumpur (DBKL). It began as a small settlement (Gullick 1994) and nowadays is the capital city of Malaysia. Besides being among the top urban destinations in South East Asia (Amir et al. 2015). Kuala Lumpur works is the major urban centre of a developing nation, with its various activities such as banking, cultural, commercial, educational, financial, political, religion and sports (Mohit et al. 2010). Kuala Lumpur is perhaps the fastest growing metropolitan area in Asia, and as such is not excluded from facing environmental problems due to development and urbanisation (Ibrahim and Samah 2011). Kuala Lumpur has also implemented privatisation in waste management by the enforcement of Act 672. Previously the waste management was conducted by the Kuala Lumpur City Hall, DBKL; through the enforcement of Act 672, Solid Waste and Public Cleansing Management Corporation, SWCorp has taken over the responsibility for waste management (Kuala Lumpur City Hall, 2019). Under the supervision of SWCorp, Alam Flora is the concession company that is responsible for implementing the collection of waste in Kuala Lumpur (Alam Flora 2015). Figure 1 shows the location of Kuala Lumpur.

FIGURE 1
Map of Malaysia, location of Kuala Lumpur



Sources: Forestry Department of Peninsular Malaysia (2020); United Nations Economic and Social Commission for Asia and the Pacific (2020)

Materials and method

Sampling and conducting survey

This cross-sectional study was conducted among 543 respondents around Kuala Lumpur, focusing on Malaysians aged 18 and above. This study was conducted in order to determine the current level of public knowledge regarding E-waste recycling based on the socio-demography of respondents. The data collection was conducted face-to-face as suggested in Huang et al. (2006a); Vidanaarachchi et al. (2006); Zhuang et al. (2008); Babaei et al. (2015). Data collection that is conducted face-to-face is more effective than other methods, since the response rate ranges between 90 and 98 percent.

Instrument

The questionnaires comprised 8 items in Part A for eliciting demographic background data, and 14 items in Part B for determining the level of knowledge regarding E-waste recycling. Knowledge about E-waste recycling was measured by 14 items that were adopted from Ahmad et al. (2015a); Akhtar et al. (2014a); Babaei et al. (2015a); Babington et al. (2013a); Chibunna et al. (2013); Malik et al. (2015); Sivathanu (2016a); Song et al. (2012a); Vicente and Reis (2007). The knowledge section (Part B) was fully measured using the nominal scale (Yes or No); scoring for every correct answer was given 1 mark, and 0 for every incorrect answer. Research design and data analysis.

For this study, a quantitative research methodology was used, based on the survey method and application of statistical tests. Upon completion of data collection, the data were keyed in and analysed using the Statistical Package for Social Science (SPSS). In order to determine the level of knowledge of E-waste recycling present among the public, the collected data is reported in percentages. Then the association between the demographic background variables and level of knowledge on E-waste recycling was analysed and reported using the p-value. The data reported is then visualised in a table.

Results

Demographic background of respondents

The 8 items in Part A of the questionnaire pertain to the demographic background of respondents in Kuala Lumpur and the results are presented in Table 1. All the 8 items as listed were adopted from Abeliotis et al. (2006b); Chibunna et al. (2013a); Babaei et al. (2015b); Laor et al. (2018); Seng et al. (2018); Almasi et al. (2019).

TABLE 1
Demographic background of respondents in Kuala Lumpur (N=543)

Demographic background		Frequency	Percentage (%)
Gender	Male	221	40.7
	Female	322	59.3
Age	< 25 years old	251	46.2
Mean ± SD	25-49 years old	271	49.9
3.06 ± 1.654	> 50 years old	21	3.9
Educational background	Higher Education	468	86.2
	High School	73	13.4
	Primary School	1	0.2
	No Formal Education	1	0.2
Marital status	Single	379	69.8
	Married	156	28.7
	None above	8	1.5
Household numbers		Mean ± SD 3.94 ± 2.356	
Type of residents	Apartment/Flat	218	40.1
	Twin house/Bungalow	38	7.0
	Terrace	180	33.1
	Condominium/ Service Apartment	54	9.9
	Townhouse	6	1.1
	Village	47	8.7
Occupation	Government sector	49	9.0
	Private sector	221	40.7
	Self-employed	54	9.9
	Housewife	10	1.8
	Student	204	37.6
	Pensioner	5	0.9
Income (RM)	<1500.00	122	22.5
	1501.00 - 3000.00	180	33.1
	3001.00 - 4500.00	68	12.5
	> 4501.00	42	7.7
	No income / No stated / Not related	131	24.1

From the total of 543 respondents, the majority were female (59.3%), male respondents were 40.7%. The highest percentage of respondents were between 25 and 49 years old (49.9%), followed by respondents less than 25 years old (46.2%), while the smallest percentage of respondents were aged 50 years and above (3.9%). The largest percentage of respondents had a higher educational background (86.2%). 69.8% of the total respondents were single, with the mean household comprising 4 persons. The majority of respondents in Kuala Lumpur live in apartments or flats,

40.1%. The highest percentage of respondents are working in the private sector (40.7%). The majority of the working respondents, some 33.1%, have monthly incomes ranging between RM 1501 and RM 3000.

Level of knowledge regarding E-waste recycling

In order to determine the current level of knowledge about E-waste recycling among respondents in Kuala Lumpur, respondents completed a survey; each statement answered correctly was accorded 1 mark, each statement answered incorrectly received a 0 mark. Respondents that scored between 1 and 5 are categorised as having a low level of knowledge, while scores between 6 and 10 are considered a moderate level of knowledge; scores between 11 and 14 reflect a high level of knowledge. Example of items highlighted were regarding the definition of E-waste, content of electrical and electronic appliances, the effects of E-waste impacting on the environment and human health, generation of E-waste, advantages of E-waste recycling, legislation pertaining to E-waste in Malaysia, sustainable E-waste management and location of E-waste collection centres. The frequency of respondents based on percentage scores are tabulated in Table 2.

TABLE 2
Level of knowledge on E-waste recycling among respondents in Kuala Lumpur

Scores	Mean±SD	TotalFrequency	Percentage	Level of scores
1-5	10.33±2.550	21	3.9%	low
6-10		254	46.8%	moderate
11-14		268	49.4%	high

Based on Table 2, the mean scores for knowledge on E-waste recycling is 10, which indicates that generally speaking, respondents in Kuala Lumpur have a good knowledge about E-waste recycling. As reported, 3.9% of the total respondents in Kuala Lumpur scored between 1 and 5 (low scores), 46.8% respondents scored between 6 and 10 (moderate scores) and 49.4% of the 543 respondents in Kuala Lumpur scored between 11 and 14 (high level of scores). Respondents that are in the low and moderate scores group need to be provided with adequate knowledge. That is to ensure that the majority of the respondents achieve up to 90% scores, reflecting a high level of knowledge concerning E-waste recycling. According to Iyer (2018d), knowledge will result in a positive impact on the attitude of the individual. A high level of knowledge and positive attitude will serve to undergird good practices (Ahmad, et al. 2015b; Babei et al. 2015). Environmental knowledge is important nowadays and should not be disseminated and strengthened only via formal education, for example through educational institutions. Environmental knowledge needs to be distributed and deepened by means of talks and

campaigns in the community (Bashir et al. 2018), a mode of what some term 'public pedagogy', which focuses on "various forms, processes, and sites of education and learning occurring beyond, outside of formal schooling" (Burdick et al. 2013, 2).

Association between demographic variables and level of knowledge

Regarding the demographic background of respondents, only five demographic variables will be discussed: gender, age, marital status, occupation and type of residence. These five demographic background variables are in association with the level of knowledge about E-waste recycling. The degree of that association is shown in Table 3.

TABLE 3
Association between demographic variables and knowledge scores on E-waste recycling among respondents in Kuala Lumpur

Demographic variables		Knowledge scores (p-value <.05)	Frequency and percentage based on level of scores		
			1-5	6-10	11-14
Gender	Male	.029	8 (38.1%)	102 (40.2%)	111 (41.4%)
	Female		13 (61.9%)	152 (59.8%)	157 (58.6%)
		Total	21 (100%)	254 (100%)	262 (100%)
Age (years old)	<25	.000	6 (28.6%)	132 (52.0%)	113 (42.2%)
	25 – 49		13 (61.9%)	110 (43.3%)	148 (55.2%)
	>50		2 (9.5%)	12 (4.7%)	7 (2.6%)
		Total	21 (100%)	254 (100%)	262 (100%)
Marital status	Single	.000	14 (66.7)	188 (74.0)	177 (66.0)
	Married		6 (28.6)	63 (24.8)	87 (32.5)
	Others		1 (4.8)	3 (1.2)	4 (1.5)
		Total	21 (100%)	254 (100%)	262 (100%)
Occupation	Government	.000	3 (14.3%)	17 (6.7%)	29 (10.8%)
	Private		5 (23.8%)	103 (40.6%)	113 (42.2%)
	Self-employed		4 (19.0%)	24 (9.4%)	26 (9.7%)
	Housewife		0 (0%)	5 (2.0%)	5 (1.9%)
	Student		7 (33.3%)	104 (40.9%)	93 (34.7%)
	Retirees		2 (9.5%)	1 (0.4%)	2 (0.7%)
		Total	21 (100%)	254 (100%)	262 (100%)
Type of residence	Apartment/Flat	.029	8 (38.1%)	107 (42.1%)	103 (38.4%)
	Twin/Bungalow		2 (9.5%)	19 (7.5%)	17 (6.3%)
	Terrace		7 (33.3%)	75 (29.5%)	98 (36.6%)
	Condominium/ Service		0 (0%)	32 (12.6%)	22 (8.2%)

Among the 3.9% of respondents who scored between 1 and 5, 8 (38.1%) are male and 13 (61.9%) female. Among the 46.8% of respondents who scored between 6 and 10, 102 (40.2%) are male and 152 (59.8%) female. Of the 49.4% of respondents who scored between 11 and 14, 111 (40.2%) are male and 157 (59.8%) female. Reported p-values<.05 (.029) show that there is a significant difference between the gender groups. Among gender groups, the majority (41.4%) of male respondents scored between 11 and 14, which indicates a high score level. As for female respondents, the majority (59.8%) scored between 6 and 10, a moderate score level. It is evident from the data that males tend to score higher knowledge than females.

Age reported p-value <.05(.000) shows the association between level of knowledge about E-waste recycling with respondent age. Of the 3.9% of respondents who scored between 1 and 5, 13 were between 25 and 49 years. Of the 46.8% of respondents scoring between 6 and 10, 132 were less than 25 years old. Of the 49.4% of respondents who scored between 11 and 14, 148 were between 25 and 49 years old. The findings indicate that respondents aged between 25 and 49 years old have a high knowledge level pertaining to E-waste recycling as compared to other age groups. Between age groups, the majority of respondents aged less than 25 years old and above 50 years old exhibit a moderate level of knowledge, scoring between 6 and 10. Meanwhile, for respondents aged 25-49 years old, the majority scored between 11 and 14 scores, indicating a high level of knowledge.

Marital status was also found to be one of demographic variables that shows association with the level of knowledge about E-waste recycling p-value<.05(.000). Of the 543 respondents, respondents unmarried reported a majority of scores between 6 and 10. By contrast, in the married group, a majority of the respondents scored between 11 and 14.

The occupation variable showed a p-value <.05(.000), which supports an association between occupation and level of knowledge. Based on Table 3, a majority of respondents working in the government sector, private sector and self-employed were shown to have high levels of knowledge, scoring between 11 and 14. Within the student group, the majority of the respondents had moderate knowledge scores between 6 and 10. Among respondents who scored 1-5 (low level of knowledge) and 6-10 (moderate level of knowledge), the majority were students, 33.3% and 40.9% respectively. On the other hand, a majority of respondents who scored 11-14 (high knowledge level) were working in the private sector, 42.2%.

Among 49.4% of 543 respondents who were shown to have a high knowledge level regarding E-waste recycling, 38.4% were resident in apartments or flats as the majority of the respondents scoring between 11 and 14. However, within the group of respondents based on the type of residence, respondents in terrace housing (36.6%), townhouses (1.5%) and traditional houses (9%) were found to be the majority of respondents

with a high knowledge level. One of the factors that leads to differences in the levels of knowledge is the source of information. It is also related to efforts to create awareness to help the public in understanding the basic information related to the E-waste management.

Discussion

Knowledge and work remain as vital components in creating enhanced public awareness to ensure the successful management of E-waste (Cecere and Martinelli 2017a; Tesfaye et al. 2017). According to Haron (2015b), gender is one of the key variables involved in acknowledging environmental concern. This study highlights that male respondents have high level of knowledge regarding E-waste recycling, whereas female respondents revealed only a moderate knowledge level. This contrasts with the study conducted by Chekima et al. (2016), which showed that female respondents tend to be more attentive towards the environment (i.e. 'pro-environmental'), compared with their male counterparts. This finding suggests that females should be one of the target groups within the public in Kuala Lumpur in order to enhance knowledge regarding E-waste recycling. Therefore, it is suggested that females should be offered adequate environmental education programs to increase female knowledge about E-waste recycling. As illustrated by Singhirunnusorn et al. (2017), improved public knowledge via environmental education, public awareness programs regarding the environment in general and waste reduction in particular have long been considered one of the most significant factors undergirding practices of household recycling.

According to Laor et al. (2018a), age was found to be one of the demographic variables associated with the knowledge levels about waste management in northern Thailand. Also claimed by Haron (2015c), age is one of the keys in determining the levels of environmental concern within the public. Based on the group of respondents below 25 or more than 50 years of age, a majority of the respondents have a moderate knowledge level. This particular group needs to receive supplementary information related to E-waste recycling via various sources' this can eventually help to expand and deepen their knowledge. Song et al. (2012b) found that youngsters are knowledgeable, have a better awareness about environmental issues as compared with other age groups. Similarly, Almasi et al. (2019a) discovered that young people in the city of Kermanshah in Iran had a better knowledge level in regard to waste management. Suggested by Ibrahim and Asmawi (2011) and Bashir et al. (2018a), newspapers, radio and television are examples of media delivering information which can augment knowledge and thus help in enhancing a favourable attitude and behaviour, given that knowledge levels can be demonstrated to play a major role in influencing what actions are taken in a community regarding waste management (Barr 2007).

As noted, occupation is also highlighted as the significant p-value<.05 as an important variable. Laor et al. (2018b) also reports on similar findings, where occupation is also associated with the knowledge level regarding waste management among the broader public in northern Thailand. Suggested by Iyer, (2018e), educational institutions should encourage their staff and students to take part in managing their E-waste hands-on, as stated in Bashir et al. (2018b). How work is organised and perhaps the activity of unions is one of the factors that may influence public awareness about effective and dynamic E-waste management. The public in Kuala Lumpur can be educated based on their occupational background, where different approaches are employed depending on occupation of the individuals involved. An effective strategy to educate the public in minimising the environmental issue of such waste must include the characteristics of the target group within the public (Okoye and Odoh, 2014).

Unmarried respondents and those living in types of residence other than apartments and flats are considered to be a group of respondents that need to be provided with adequate knowledge on E-waste recycling. This study indicates that a majority of married respondents tend to have a higher knowledge level as compared to unmarried respondents, who in the majority have only a moderate level of knowledge. These results contrast with respondents in Kermanshah/Iran, where single unmarried respondents were reported to have high scores in respect to knowledge about waste management. The underlying cause may be that they have fewer burdens to contend with in everyday life than respondents who are married, and hence have more opportunities to learn and improve their behaviour in regard to environmental issues and waste management (Almasi et al. 2019b). As suggested by Okoye and Odoh (2014a) in their study on urban areas, NGOs, private sectors, government agencies and other stakeholders should cooperate with community leaders, religious leaders and landlords who own residential properties to help convey information related to E-waste recycling. Clear information provided to the public and enhanced social motivation can function dynamically to catalyse a greater willingness amongst the public to participate in sustainable E-waste management, and hence to help build and expand a society committed to methods of material recycling (Xiao et al. 2017). Tatlonghari and Jamias (2010) recommend that environmental education or workshops focusing on waste management should be included in schools and higher education institution. Such measures can serve to enhance public awareness about better waste management practices.

Conclusion

In conclusion, this study revealed that of 543 respondents surveyed and tested in Kuala Lumpur, 268 (49.4%) possessed a high knowledge level

about E-waste recycling, scoring between 11 and 14. The remainder of 50.6% respondents had low and moderate levels of knowledge, and thus need to be provided with information and facts related to E-waste recycling in order to increase their level of knowledge. This can function to create enhanced awareness regarding sustainable practices, and hence help in minimising the negative aspects of the global issue of environmental degradation and protection. Information related to E-waste recycling can be delivered through a variety of information sources in the media, such as mass media (television, radio, and newspaper) and social media (Facebook, Twitter, and Instagram), and elsewhere, as forms of 'public pedagogy' about environmental issues (Burdick et al. 2013). This study also highlights the association between demographic variables and the knowledge level of respondents. Gender, age, marital status, occupation and type of residential reported p-value <.05 indicate a demonstrable association with knowledge levels about E-waste recycling. According to Barloa et al. (2016), waste management and recycling are closely linked to the social background of the respondents. Study findings can be utilised as guidelines to determine the suitable approach in delivering the information regarding sustainable and effective modes of E-waste recycling. Hence, besides adequate information, enforcement by the responsible bodies will act as a bridge to connect creation of E-waste and E-waste recycling activity amongst a better-informed citizenry. The public must also be included in any related activity pertaining to E-waste recycling conducted by governmental authorities, NGOs and various stakeholders. This will help in creating a sustainable consumption society: it is an essential truism that the public is the consumer of electronic appliances and digital devices and hence the major factor in E-waste generation. This study will assist all the responsible bodies in designing better E-waste management in order to mitigate the impact of E-waste on the environment and human health, both in urban contexts and more rural environmental frames.

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