PUBLIC OPINION, PERCEPTION AND KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) LEVEL ON SOLID WASTE MANAGEMENT PROGRAMS IN PENAMPANG, SABAH: A VILLAGE-LEVEL STUDY

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ABSTRACT Information on the citizen's knowledge, attitude and practice (KAP) level is critical as educational diagnosis and guideline prior to implementation of publicly funded programs and policies. Essentially, the citizen's perception on the effectiveness of the solid waste management programs and policies are also imperative. This research studied the KAP level of 113 respondents in Hubah Village, Penampang and most respondents have excellent levels of KAP. Gender of the respondents were found to be significantly related to their knowledge level, and both their attitude and practice was significantly correlated with their education level using the Kruskal-Wallis test. Spearman Rho test also reveals that knowledge and attitude has positive correlation with each other. Subsequently, the study explored on the respondents' opinion and perception on solid waste management programs implemented locally. It was found out that 74.3 per cent of the respondents stated that the provision of waste management services is generally inadequate. Another 75.2 per cent said that the communication tools needed improvement to increase citizen participation in solid waste management programs. 78.8 per cent of the respondents also agreed that education and awareness programs should be inclusive to all levels of society and not only targeting certain groups as what have been done previously. 54 per cent of the citizen wanted an improvement in the accessibility of officers and policy makers regarding issues on solid waste management, and 51.3 per cent agreed that technology should be optimized to ensure acceptance and participation in solid waste management programs from the citizen could be improved.

Keywords: Knowledge, attitude and practice (KAP), solid waste management, solid waste management program, public opinion, public perception.

INTRODUCTION

In 2020, the daily waste generation was expected to reach to 36,138 tons per day and will continue to increase to an estimation of 41,035 tons per day by 2026 and 49,670 tons per day by 2030 (Chua et al., 2019). From a period of 1988 to 2015, the Malaysian Government has implemented numerous programs and policies to improve solid waste management, including the Action Plan for a Beautiful and Clean (ABC) Malaysia, the Reduce, Reuse, Recycle (3R), the Master Plan on National Waste Minimization and Waste Separation. Inopportunely, due to poor implementation and lack of public involvement, most programs failed (Chua et al., 2019).

Penampang is located in the West Coast division of Sabah, Malaysia. According to the 2010 census, the population in the district was estimated to be around 137,002 and has five subdivisions and 55 villages. Hubah Village is located approximately 2.5 kilometers from the town. The estimation of the total population in the village was around 400 to 800 residents (Penampang District Council website, n.d.). This study will look into the citizens public opinion, perception and KAP level of two solid waste management programs, namely the Reduce, Reuse and Recycle (3R) campaign and the Anti-Litterbugs campaign (*Kempen Anti Kutu Sampah*). The 3R campaign was implemented in Penampang since the early 1990's. Posters of the campaign were displayed in public places such as the general market (*tapak tamu),* public library, schools, polyclinic, government department offices and others. The main tool of the campaign, the three coloured bins were also placed in some places in the Donggongon town such as within the vicinity of the District Council, the public library and the police station (Penampang District Council website, n.d.).

Although the campaign did not garner as many participants as it should be, it is still being implemented to date. The Anti-Litterbugs campaign was introduced in the year 2011 with the purpose of tackling the littering problem using psychological tactic by publicly shaming the litterbug. Penampang was the first district in Sabah to be declared as the No Waste Zone (*Zon Tanpa Sampah)* (Zulkifli, 2011). The policymakers were confident that this campaign will help to reduce public littering effectively and it is still being implemented currently, although the campaign's promotional and educational activities are discreet.

An analysis of the participants' knowledge, attitude and practice or commonly known as the KAP study has the ability to enhance awareness, behaviors and activities (Gumucio et al., 2011). Most governments worldwide prioritize sustainable development, and thus, according to Tatlonghari and Jamias (2010), a KAP study could be optimized as planning and implementation apparatus of solid waste management programs and policies. Babaei et al. (2015) also stresses the importance of the KAP tool towards enhancement of solid waste management effectiveness and quality that will eventually lead to greater participation from the general society. In waste management decision-making, public opinion also plays critical role, influencing both what programs (infrastructure) can be placed in place and if and how effective implementation is feasible (Kirkman & Voulvoulis, 2017).

This study was implemented with the following objectives:
1. To identify the respondents' KAP level towards the solid waste management programs and policies in Penampang, Sabah
2. To identify the respondents' public opinion and perception towards the solid waste management programs and policies in Penampang, Sabah

METHODOLOGY

A survey research design was engaged to extract information from the respondents concerning their public opinion, perception and KAP levels. Snowball sampling, which is a non-probability sampling method were deemed to be appropriate to acquire prompt response from the respondents. Both the questionnaire design and the sampling process have been carefully planned to ensure they will not in any way, violate the respondents' privacy.

The questionnaire has three sections, namely:
Part A: Sociodemographic Information
Part B: (i) Knowledge (ii) Attitude and (iii) Practice
Part C: Opinion and Perception on (i) Enforcement, (ii) Facilities (iii) Communication and Education

The Bloom's cut-off points scoring system was adapted from Nahida (2007) and Nasarudin et al. (2013) to compute the total score of the respondents' KAP level as shown in Table 2.

Table 1 Scoring system of KAP level

Percentage	Knowledge Score	Attitude Score	Practice Score	Level
80-100	35-44	13-16	26-32	Excellent
60-79	26-34	10-12	19-25	Good
40-59	18-25	8-9	13-18	Adequate
0-39	0-17	0-5	0-12	Poor

Source: Nahida (2007) and Nasarudin et al. (2013)

Table 2 KAP scoring system

Answer	Score
Knowledge	
Correct Statement	2
Yes	0
No	1
Do not know	
False Statement	0
Yes	2
No	1
Do not know	
Attitude	
Agree	2
Not sure	1
Disagree	0
Practice	
Positive practice	
Daily	4
Weekly	3
Monthly	3
More than once in a month	1
Never	0
Negative practice	
Daily	0
Weekly	1
Monthly	2
More than once in a month	3
Never	4

Source: Nahida (2007) and Nasarudin *et al.* (2013)

RESULTS AND DISCUSSION

Part A: Sociodemographic distribution

A total of 113 individuals from Hubah Village participated in this preliminary study. The housing arrangement in the village are mostly scattered along the main road that connects few other villages nearby. Table 3 shows the sociodemographic distribution of the respondents and 57 male and 56 females participated in the study. Most of the respondents (62 individuals) were born between the year 1981 to 1996. The year of birth were grouped based on the Pew Research Centre's definition of generational categories; from 1965 to 1980 (Gen-X), from 1981 to 1996 (Gen-Y) and from 1997 to 2012 (Gen-Z). This was done particularly in an attempt to understand the preference and behavior of the respondents through a more elaborated study in the future.

Table 3 Sociodemographic distribution of the respondents (n=113)

Variables	N	Percentage
Gender		
Male	57	50.4
Female	56	49.6
Year of Birth		
1965 to 1980	43	38.1
1981 to 1996	62	54.9
1997 to 2012	8	7.1
Education Level		
High School	34	30.1
Certificate	10	8.8
Diploma	26	23.0
Degree	33	29.2
Masters	9	8.0
PhD	1	0.9
Employment		
Public	75	66.4
Private	17	15.0
Business Owner	4	3.5
Self Employed	7	6.2
Homemaker	3	2.7
Student	4	3.5
Unemployed	2	1.8
Retiree	1	.9

Source: Field study (2020)

Part B: Distribution of KAP Level of Solid Waste Management

(i)   Knowledge of Solid Waste Management

Most of the respondents has excellent level of knowledge (n=113) as shown in Table 4. They are capable of distinguishing basic concepts of solid waste management such as recycling, repurposing waste, pollution and consequences of inappropriate waste management such as flooding, safety and health issues and others.

Table 4 Level of knowledge of solid waste management
among respondents (n=113)

Level (Score)	Total (n)	Percentage (%)
Excellent (15-20)	109	96.5
Good (10-14)	4	3.5
Adequate (5-9)	0	0
Poor (0-4)	0	0

Source: Nahida (2007) and Nasarudin et al. (2013)

Table 5 Comparison of knowledge on solid waste management between
different sociodemographic variables using Kruskal-Wallis Test

Variables	N	Mean Rank	p -value
Gender			.035
Male	57	50.68	
Female	56	63.44	
Year of Birth			.171
1965 to 1980	43	50.60	
1981 to 1996	62	59.10	
1997 to 2012	8	75.06	
Employment			.361
Public	75	53.82	
Private	17	58.44	
Business Owner	4	81.88	

Self Employed	7	61.79	
Homemaker	3	69.17	
Student	4	69.13	
Unemployed	2	79.75	
Retiree	1	7.50	
Educational Level			.237
High School	34	50.44	
Certificate	10	61.85	
Diploma	26	64.48	
Degree	33	60.71	
Masters	9	46.67	
PhD	1	7.5	

Source: Field study (2020)

Table 5 shows the Kruskal Wallis analysis identifies a significant correlation between knowledge and the gender of the respondents (H (1) = 4.446, P = 0.035, <0.05). The year of birth, employment and educational level did not have any significance to the respondents' knowledge level. To distinguish which one of the genders that has the most significance, a Mann Whitney test was conducted and found out that the female has higher significance than male in knowledge level ($U = 1235$, $p = 0.035$, <0.05). A study done by Torgler and Garcia-Valinas (2005) also found out that women are more compassionate and cooperative when it comes to environmental concerns.

(ii)   Attitude of Solid Waste Management

Most of the participants has excellent attitude level towards solid waste management efforts done at the households' community level (n=87, 77.9 per cent) (Table 6). According to Welsch and Kuhling (2010) attitude towards solid waste management program were more likely to be stimulated by the respondents' experience and observation rather than their sociodemographic traits. Additionally, the formation of attitude also depends on how a person was raised and their previous experiences (Awang Besar et al., 2013).

Table 6 Level of attitude towards solid waste management among respondents (N=113)

Level (Score)	Number (n)	Percentage (%)
Excellent (12-14)	87	77.9
Good (8-11)	26	23.0
Adequate (4-7)	0	0
Poor (0-3)	0	0

Source: Nahida (2007) and Nasarudin et al. (2013)

Table 7 Comparison of attitude of solid waste management between different sociodemographic variables using Kruskal-Wallis Test

Variables	N	Mean Rank	p -value
Gender			.290
Male	57	53.89	
Female	56	60.17	
Year of Birth			.098
1965 to 1980	43	50.60	
1981 to 1996	62	59.10	
1997 to 2012	8	75.06	
Employment			.505
Public	75	55.29	
Private	17	52.50	
Business Owner	4	56.50	
Self Employed	7	63.50	
Homemaker	3	86.00	
Student	4	54.75	
Unemployed	2	94.50	
Retiree	1	65.50	
Educational Level			.050
High School	34	47.69	
Certificate	10	32.70	
Diploma	26	48.40	
Degree	33	56.80	
Masters	9	70.17	
PhD	1	20.00	

Source: Field study (2020)

Table 7 shows that there is a significant relationship between educational level and attitude level ($p = .050$, < 0.05) using the Kruskal-Wallis test. A post-hoc analysis was conducted to test pairwise comparisons later reveals that high school was significantly different to diploma ($p=0.010$). This explains that educational level, specifically those with high school and diploma qualification has better attitudes towards solid waste management compared to those with higher education level. This is inconsistent with López-Mosquera et al. (2015) that stated those with higher educational level has higher attitude level because they were advantaged with information compared to those who did not attend undergraduate and postgraduate education. Banga (2011) advocated that it is common for those with lower education to exhibits better attitude towards waste management since they sometimes rely on waste recycling for extra income.

(iii)   Practices of Solid Waste Management

Table 8 shows 40.7 per cent of the participants has good practice level (n=46); 38.9 per cent (n=44) has excellent level of practice, while another 22 of them has adequate level of practice in solid waste management. The types of waste management currently practiced by the respondent are listed in Table 9, while the composition of household waste is presented in Table 10.

Table 8 Level of practice of solid waste management
among respondents (n=113)

Level (Score)	Number (n)	Percentage (%)
Excellent (28-36)	44	38.9
Good (19-27)	46	40.7
Adequate (9-18)	22	19.5
Poor (0-8)	1	0.9

Source: Nahida (2007) and Nasarudin et al. (2013)

Table 9 Household disposal system and respondents' preferences (n=113)

No.	Preference	No. of Respondents
	Waste Management Practice	
1	Waste separation	11
2	Recycling	10
3	Composting	9
4	One-bin waste	32
5	Open burning	20
6	Backyard landfill	9
7	Drainage	5
8	Reduce waste	8
9	Reuse waste	9
	TOTAL	113

Source: Field study (2020)

Respondents were asked to disclose the disposal systems used in their households, as shown in Table 10. One bin waste method was the most popular method (n=32) because of its convenience to be managed by everyone in the households but unfortunately is harmful to the environment. Waste disposal through the drainage systems were the least preferred method (n = 5) as chosen by the respondents, mostly because they are aware that it will cause unwanted incidences such as flooding, which is a common occurrence in Penampang, as well as other issues including safety and health concerns.

Table 10 Perceived abundance of household waste

No.	Abundance / Types of Waste	Most Abundant	Abundant	Moderately Abundant	Least Abundant	Most Least Abundant	TOTAL
1	Plastic	113 (100%)					113/100%
2	Papers	31 (27.4%)	40 (35.4%)	28 (24.8%)	14 (12.4%)	0	113/100%
3	Food Scraps	36 (31.9%)	38 (33.6%)	22 (19.5%)	17 (15.0%)	0	113/100%
4	Glass	0	0	3 (2.7%)	53 (46.9%)	57 (50.4%)	113/100%
5	Yard Trimmings	0	0	6 (5.3%)	47 (41.6%)	60 (53.1%)	113/100%
6	Cans	0	2 (1.8%)	19 (16.8%)	45 (39.8%)	47 (41.6%)	113/100%
7	Cloth	0	0	3 (2.7%)	35 (31.0%)	75 (66.3%)	113/100%
8	Others (napkins, cigarette ends, cotton pads, etc)	0	0	22 (19.5%)	42 (37.2%)	49 (43.4%)	113/100%

Source: Field study (2020)

The respondents were also asked to rank the common waste in their households in terms of their relative abundance as shown in Table 11. Plastic was perceived as the most abundant by all respondents, followed by food scraps (31.9 per cent) and papers (27.4 per cent). Meanwhile, cloth (66.3 per cent), yard trimmings (53.1 per cent), glass (50.4 per cent), others (43.4 per cent) and cans (41.6 per cent) ranked the most least abundant solid waste in the respondents' households.

All of the respondents' household waste composition consists of plastic waste (100 per cent). This is not surprising since most packaging of food and non-food items were made from plastic. The other two most abundant waste in their households are paper and food waste. Paper waste usually came from boxes packaging and some of the respondents admitted they dispose old newspapers and used papers. The most least abundant waste were cloths as respondents commonly reuse old clothes as cleaning rags and will only disposed them when it is no longer useful (stained or torn). Recyclable items

such as glass and cans are among the most least abundant waste since most households recycle them as they would attain high buying price, compared to old newspapers and used papers.

Table 11 shows that practice was statistically significant ($p < 0.05$) with year of birth (H (2) =9.453, P=0.009). Significant differences between the year 1965 to 1980 (Gen-X) and the year 1981 to 1996 (Gen-Y) ($p=.012$) were acquired through post-hoc analysis. Therefore, year of birth does have an effect to the respondents' practice level. Bieser (2015) also found similar findings stated that Gen-Y sustainable consumption are more deliberate (buying organic consumables and using reusable bags); whereas baby boomers (Gen-X) prefer to act responsibly towards the environment (recycling, composting, waste separation). Conclusively, both groups are practicing pro environmentally behavior according to their preference and habitual routine.

Table 11 Comparison of practice of solid waste management between different sociodemographic variables using Kruskal-Wallis Test

Variables	N	Mean Rank	p -value
Gender			.074
Male	57	62.45	
Female	56	51.46	
Year of Birth			.009
1965 to 1980	43	46.95	
1981 to 1996	62	65.56	
1997 to 2012	8	44.69	
Employment			.061
Public	75	58.84	
Private	17	52.91	
Business Owner	4	76.88	
Self Employed	7	63.21	
Homemaker	3	30.67	
Student	4	24.75	
Unemployed	2	93.25	
Retiree	1	1.00	
Educational Level			.014
High School	34	68.51	
Certificate	10	32.70	
Diploma	26	48.40	
Degree	33	56.80	
Masters	9	70.17	
PhD	1	20.00	

Source: Field study (2020)

The level of education was found significantly correlated with the practice level (H (5)=14.298, P=0.14). Post-hoc analysis indicates that there are significant differences with those who have certificate and high school education (p = 0.35). Similarly, Banga (2011) also found out that those with low education level were more motivated to recycle and separate waste compared to those with higher education level since recyclables could help to supplement their income.

In order to conclude the correlation between knowledge, attitude and practice, a Spearman's rank-order correlation analysis was conducted and found out that knowledge-attitude (KA) and attitude-knowledge (AK) has significant correlation (r_s = .278, p = .003). It can be concluded that knowledge and attitude level have an impact towards the respondents' KAP of solid waste management.

Li et al. (2019) also agreed that knowledge, attitudes, locus of control and sense of responsibility, among others, were impactful towards pro environmental behavior. Lange et al. (2014) also stated that environmental attitudes were also affected by facilities, opportunities and knowledge. Unfortunately, the knowledge and attitude level were inadequate in convincing the desired behavioral change in waste management practices amongst the citizens. The reasons why knowledge and attitude did not translate to practices were not explored in this study and necessitated further investigation for future studies.

Table 12 Correlations between knowledge, attitudes, and practices in total respondents using Spearman Rho

Variables	Knowledge	Attitude	Practice
Knowledge	1	.278[a] (*p* = .003)	.163
Attitude	.278[b] (*p* = .003)	1	.577
Practice	.163	.577	1

[a,b]Correlation is significant at the p < 0.01 level (2-tailed)

Part C: Public Opinion and Perception of Reduce, Reuse and Recycle (3R) Campaign and the Anti-Litterbugs Campaign (*Kempen Anti Kutu Sampah*)

Enforcement: 65 (57.5 per cent) respondents stated that implementation and enforcement of the 3R and the Anti-Litterbugs campaign in Penampang should be improved since problems such as littering, open dumping and open burning were done repeatedly by most residents in the village. 61 (54 per cent) of the respondents also strongly agreed that officers and decision makers should be accessible to assist and offer advice on solid waste management to the public. This will actually be a win-win situation between both the public and the council since they are able to cooperate in maintaining the cleanliness of their village and Penampang in general. Globally, proficient waste management is a complex and challenging matter, and is heavily dependent on professional institutional capability, strict enforcement of environmental regulations and cooperation across municipal governments, as well as community's awareness (Dlamini et al., 2017).

Facilities: 84 (74.3 per cent) of the respondents strongly agree that waste disposal facilities within the vicinity of residential areas in Penampang are inadequate. Currently, most villages in Penampang relies on the council to collect their waste 2 times a week. The three coloured bins were only provided in the town area and in public places such as the public library. Respondents also stated that facilities for waste separation and recycling drop-offs should be made accessible to villagers. Struk (2017) also emphasized that the proximity and availability of waste segregation and recycling facilities is crucial and may influence the citizen's involvement in waste management programs, particularly at the household level. In Daraup et al. (2020), the respondents were also demanding more services and facilities to be improved as they believe this will help to increase people's awareness in managing their waste responsibly.

Communication and Education: 85 (75.2 per cent) of the respondents answered strongly agree that communication tool should be improved in order to encourage participation of proper solid waste management from the citizen. Currently, the only communication tool that are utilized actively

by the Penampang District Council are social media, posters and banners. Respondents felt that this type of communication tool is not effective enough to inculcate awareness on waste segregation, recycling, cleanliness and such in the long run. When asked about the education and awareness programs implemented by the local authority on 3R and Anti-Litterbugs campaign, 89 (78.8 per cent) of the respondents strongly agree that they should be inclusive to all regardless of sociodemographic status. Presently, education and awareness programs mainly target students in primary, secondary and tertiary level and public sector employees. Most respondents also agreed that trainings on waste separation and recycling will be the most beneficial. 58 (51.3 per cent) of them also feel strongly about utilizing technology to encourage participation and assistance in proper waste management practices. However, another 43 (38.1 per cent) respondents were unsure of technology usage will improve the participation and acceptance of the citizens towards the programs. This finding determines that public perception on communication and education are essential. Kirkman and Voulvoulis (2017) also stressed the importance public perception and public engagement in the early stage of decision-making process in order to determine the appropriate public communication in waste management infrastructure delivery.

CONCLUSION

The condition of solid waste in Malaysia is alarming. Publicly funded programs and policies often failed due to the no support and participation from the citizen. The findings from this study indicated that most participants, mostly within the category of Gen-Y, have excellent level of knowledge and attitude, and good level of practice. Knowledge and attitude are significantly correlated. A KAP study is useful to identify the citizen's knowledge, attitude and practices level, but other factors such as the communication tools, the citizen's beliefs, environmentally responsible behavior and moral norms are also vital to be considered. Therefore, policymakers may need to specifically focus on the factors to consider prior to any decision making and they are responsible to socialize citizens with the skills of participating in the programs and policies so as to ensure the achievement of the policy goals.

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