

ORIGINAL ARTICLE

Association of Attitudes and Behaviour With Household Sociodemographic on Food Waste Management in Kuching, Sarawak, Malaysia

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ABSTRACT

Introduction: Food waste has significant economic, environmental and social impacts. The increasing trend of eating habit in urban community has evidence this issues. Henceforth study on food waste management behavioural-attitude in Kuching is imperative. **Methods:** A questionnaire on sociodemographic characteristics, attitude and behaviour on food waste, as well environmental concerns on food waste were developed. A 407 respondents from Kuching city participated in this study. **Results:** The results revealed an association between gender and food waste management which included food purchasing behaviour (p -value=0.046) as well as influence of food expiration date on their behaviour (p -value = 0.003), but with very weak r correlations of $r(405) = -0.099$ and $r(405) = 0.149$, respectively. There was an association between age and environmental belief in the environmental dimension on food waste (p -value= 0.008) with a weak correlation of $r(405) = 0.165$. Lastly, education level with purchasing behaviour (p -value= 0.046), food preparation (p -value=0.000) and their environmental concern on food waste (p -value= 0.020) had very weak correlations of $r(405) = 0.056$, $r(405) = -0.047$, and $r(405) = 0.002$, respectively. Majority of the respondents demonstrated feeling responsible when they disposed of avoidable waste even though they intended to prevent such events. **Conclusion:** Overall, the result had highlighted favourable responses on the relationship between sociodemographic and community food waste generated. This finding could help the policymaker in improving their waste management approaches hence, benefiting the citizen in a whole.

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INTRODUCTION

Food waste management is a global problem that poses major environmental, economic, and social problems (1). Globally, about one-third of all produced food is lost or thrown (approximately 1.3 billion tonnes per year), accounting for around 44% of total solid waste (2). In Malaysia, waste composition is mainly comprised of municipal solid waste, followed by industrial waste, commercial waste, and construction waste (13). In the year 2005, Malaysia recorded the generation of 0.76-kilogram of waste per person per day, where 45% of the waste was food waste and around 30% of the waste was recyclable waste (4).

Waste separation at source aids in adding a few years to the lifespan of landfills, aside from lessening environmental pollution by lowering the number of illegal dumping at random spots (5). The United Nations Environment Programme (UNEP) and World Resources Institute (WRI) have reported that households alone contribute to half of the food waste in landfills, while the rest are from retailers (6). Food waste as a result of the actions and decisions made by retailers and consumers at the end of the food supply chain has been a topic of concern by previous studies (7). The consequences of inadequate food waste management on public health can be classified as physical, biological, non-communicable diseases, psychosocial, and ergonomic health concerns (8). There are also risk of vector transmitting diseases such as food poisoning, dysentery, respiratory diseases (9) as well as other non-communicating diseases such as cancer, syndrome down and lymphoma (10). In general, Malaysians, like

other nationalities around the world, do not regard waste management to be an important environmental issue. Additionally, their awareness and knowledge in managing environmental issues do not necessarily translate into action (3). Multiple types of research have been carried out to better understand the contributing factors to this phenomenon. The most addressed factor is the socio-economic aspect of the population such as household income, the age of the population, and the number of people living in the premises (4). However, there is still uncertainty on the best approach to the management of food waste from the source. Household food waste behavior was incorporated in the study by Amirudin and Gim (11) as researchers have highlighted that the public has low awareness of the environmental and economic impact of food waste (12). Not only that, lengthy and thorough research is needed to unwind the cobweb of this complex issue. Thus, a brief study on both food waste analysis and household survey is insufficient to provide concise data on the actual waste discarded by the sample population (13). All this to say, studies cannot be done in a month or two; more time is needed to truly understand the household solid waste management patterns from time to time.

In Sarawak, the same serious issues on food waste can be observed especially at the urban areas of major cities, including Kuching. It is also contributed from urbanization thus the increasing trend of eating habit among communities at food premises. With the help of the local councils, food waste activities are incorporated in organic waste management system. Most incorporate organic waste composting to reduce the dumping of waste into landfills. At the same time, financial and environmental benefits are gained by reducing landfill costs and simultaneously producing organic compost. Aside from that, the Council of the City of Kuching South promotes organic waste composting on a household level, Takakura Composting. Nevertheless, this study focused on identifying the root of the high food waste generation problem with regards to the consumer aspect, from elucidating reasons for purchasing activities to analyzing their food waste disposal patterns. To achieve such results, the study has outlined the course of action by distributing questionnaires.

MATERIALS AND METHODS

Study areas

A study was undertaken on households in Kuching, Sarawak, Malaysia. The Kuching division is divided into three smaller districts, which are Kuching, Bau, and Lundu. The Kuching district was chosen as the sampling site because it is a more densely populated area that covers all the three demographic dimensions of the rural area, the suburban area as well as the urban area. As of 2020, the total population for the Kuching district was 609,205 (14).

Study design and population size

To study the attitude and behaviour of households in food waste management, a quantitative cross-sectional design was adopted, whereby the modus operandi for data collection was via questionnaires. In a descriptive study or research, the idea is to describe exhaustively a problem or an occurrence such as an issue in each community by analysing the random data obtained through its mean, variance, and distribution (15). For this study, the sample size was determined by applying the Krejcie and Morgan sample size calculation method. Using the Krejcie and Morgan calculation table, the ideal sample size for this study was approximately 383 respondents.

Questionnaires

The instrument used in this study was a questionnaire. The questionnaire was developed by adapting the questionnaire used in previous research studies on food waste and modifying them to increase suitability for the Malaysian population. The language used for the questionnaire was in Malay and English. Studies by Mattar et al. (6) and Djekic et al. (16) were used as a guideline on the research method, creating a pathway for the information to be gathered and tailoring the baseline to discuss the variables that influence the generation of food waste in Kuching households. Permission was obtained from both parties to allow their questionnaires to be adopted and applied in a different setting. The questions written in the Google Form were divided into three sections. Section A covered the socio-demographic variables of the respondents. Section B was on the behavioural and attitudinal questions. This section aimed to explore the behaviour and attitude of the respondents. It required them to answer using the Likert Scale by choosing the number 1 for 'Strongly disagree' with the statement of each question, followed by 2 for 'Disagree', 3 if neutral or without an opinion and indecisive about the statement, 4 for 'Agree' and lastly 5 for 'Strongly agree'. The final section, Section C, was on the environmental concern questions. This section provided statements that could prompt rhetorical thinking in the respondents, especially as it involved the respondent thinking about ethical values before ticking the box.

Data analysis

The Statistical Package for Social Science (SPSS) software version 22.0 was used to achieve a more comprehensive data analysis of this study. The respondents' sociodemographic information was analysed by using descriptive data analysis to understand the frequency of each category. Next, the Mann-Whitney U test was applied to associate the gender of the household with the highest mean rank in each category such as purchasing behaviour, behaviour influenced by expiration date, food preparation behaviour, environmental concern, and environmental knowledge. Similar to the discussion

by Djekic et al. (16), the Mann-Whitney U test was used to analyse the clusters involved in this study by categorizing them according to different segments based on similar beliefs and attitudes. The association between the remaining sociodemographic characteristics (i.e., age, the household's house locality, their education level, as well as the household's total combined monthly income) and the attitude and behaviour of the household in food waste management were analysed using the Kruskal-Wallis H test.

Ethical approval

The UiTM Research Ethics Committee granted written ethics approval for the study titled 'Attitudes and Behavior of Household in Food Waste Management in Kuching District around residential city area Kuching' with the approval code REC/09/2020 (MR/267).

RESULTS

Sociodemographic profile of households

The sociodemographic details of the respondents (n = 407) are presented in Table I. Out of the 407 respondents that participated, 71% (n = 289) of the sample population was residing in an urban area while the remaining respondents were in suburban and rural areas with 106 respondents and 12 respondents, respectively. It can be assumed that 71% of the Kuching population resided in urban areas while the remaining percentage of the population resided in suburban areas and a minority of them lived in rural areas. Half of the respondents preferred to eat at home (50.1%), a small group preferred to eat out most of the time (4.9%) and the rest had a mixture of eating out and dining at home.

Purchasing and food preparation behaviour

Households in Kuching reported that they practiced purchasing more than they had planned whenever there was a sale or auction in food stores (n = 237). This contradicts the data that showed most of the respondents (n = 200) agreed they only purchased products based on their shopping list (Table II). On the contrary, 231 respondents strongly agreed that they never purchased food that they already have in stock at home. Consequently, they controlled themselves by retarding the act of impulsive grocery shopping. Furthermore, 76.9% (n= 313) of the households strongly agreed that they considered the food that they throw away and the costs incurred, which could contribute to them being more cautious in purchasing groceries or even take away foods.

The respondent's behaviour of purchasing more than they planned during a sale or auction in food stores had the second highest frequency of 237 respondents, followed by the respondent's behaviour of not purchasing food that they already had at home with the frequency of 231 respondents. Respondent's behaviour of purchasing products based on their shopping list had

Table I: Sociodemographic profile of respondents

| Characteristics | n (N= 407) | Percentage (%) |
|--|------------|----------------|
| Gender | | |
| Male | 152 | 37.3 |
| Female | 255 | 62.7 |
| Age | | |
| Below 24 years old | 94 | 23.1 |
| 25 to 34 years old | 157 | 38.6 |
| 35 to 44 years old | 57 | 14.0 |
| 45 to 54 years old | 47 | 11.5 |
| Above 54 years old | 52 | 12.8 |
| House locality | | |
| Urban | 289 | 71.0 |
| Suburban | 106 | 26.0 |
| Rural | 12 | 2.9 |
| Education level | | |
| High school/ Diploma or lower | 91 | 22.4 |
| Bachelor or higher | 281 | 69.0 |
| Refuse to answer | 35 | 8.6 |
| Number of persons in the household | | |
| 1 occupant | 11 | 2.7 |
| 2 to 3 occupants | 98 | 24.1 |
| More than 3 occupants | 298 | 73.2 |
| Total combined monthly income in the household | | |
| <RM10,000 | 237 | 58.2 |
| RM10,000 to RM20,000 | 122 | 30.0 |
| RM20,001 to RM30,000 | 29 | 7.1 |
| >RM30,000 | 19 | 4.7 |
| Place usually eat meals | | |
| Mainly at home | 204 | 50.1 |
| Mainly eating out/only eating out | 20 | 4.9 |
| Partly at home and partly out | 183 | 45.0 |

n represents the number of establishments, (%) represents their share in the sample.

a frequency of 200 respondents, while the question with the least number of respondents agreeing to it (n = 179) was for the behaviour of planning meals for several days to purchase more efficiently. When it comes to meal prepping or food preparation as tabulated in Table II, there were two sets of modes apparent for this section. The statements of 'We always prepare more than we need' and 'When someone takes care of their diet, throwing food is unavoidable' had a mode of 1. Most of the respondents answered, 'Strongly disagree/Disagree' to these two statements with a frequency of 160 (39.3%) and 179 (44.0%), respectively; the remaining statements has the respondents choosing the option of 'Strongly agree/Agree'. In addition to this, Table II tabulates the pattern of the respondents' food preparation behaviour by ranking the mean value. The respondents' response to 'if something remains after cooking, they will freeze it for later use' had the highest frequency of 331 or 80.3%. This was followed by their response to behaviour during food preparation where the respondents took care to use everything possible, which had 80.3% or 327 respondents agreeing to the statement.

Besides that, their response to the statement on all prepared food was eaten in their household had a response of 291 respondents (71.5%) agreeing to the statement, followed by the respondents' response to the statement on eating leftover food the next day that had a frequency of 272 or 66.8% and to them agreeing that a lot of the waste that came from their household was mainly from food scraps and meals such as fruit peelings. Lastly, due to the mode of the two remaining statements, 'We always prepare more than we need' and

Table II: Purchasing and food preparation behaviour of the population

| Purchasing behaviour of food | Strongly disagree/ Disagree | No Opinion | Strongly agree / Agree |
|--|-----------------------------|-------------|------------------------|
| I only buy products that are on my shopping list | 92 (22.6%) | 115 (28.3%) | 200 (49.1%) |
| I plan my meals for several days to purchase more efficiently | 127 (31.2%) | 101 (24.8%) | 179 (44%) |
| During sale/ auction in food stores, I buy more than 1 planned | 99 (24.3%) | 71 (17.4%) | 237 (58.2%) |
| I never buy food I already have at home | 78 (19.2%) | 98 (24.1%) | 231 (56.8%) |
| I am worried about the cost of food that I throw away | 27 (6.6%) | 67 (16.5%) | 313 (76.9%) |
| Food preparation | | | |
| During food preparation, I take care to use everything possible | 18 (4.4%) | 62 (15.2%) | 327 (80.3%) |
| If something remains after cooking, I freeze it for a later use | 29 (7.1%) | 47 (11.5%) | 331 (81.3%) |
| I eat leftover food the next day | 55 (13.5%) | 80 (19.7%) | 272 (66.8%) |
| We always prepare more than we need | 160 (39.3%) | 106 (26.0%) | 141 (34.6%) |
| All prepared food is eaten in my household | 38 (9.3%) | 78 (19.2%) | 291 (71.5%) |
| When someone takes care of their diet, throwing food is unavoidable | 179 (44.0%) | 93 (22.9%) | 135 (33.2%) |
| In my household, there is a lot of waste from food or meals such as fruit peelings | 91 (22.4%) | 100 (24.6%) | 216 (53.1%) |

Highest value in each statement is highlighted in bold.

‘When someone takes care of their diet, throwing food is unavoidable’ had the lowest frequency to ‘Strongly agree/Agree’.

Influence of the expiration date

In handling food and expiration dates, a remarkable total of 342 respondents, more than half of the total sample (84%) strongly did not consume food past its expiration date. Typically, to avoid this, 82.6% (n = 336) practiced purchasing food with a long expiration date while approximately 6.9% did not, as tabulated in Table III.

Table III shows that most of the statements had ‘Strongly agree/Agree’ as the mode while the statement ‘I sometimes eat food after its expiration date’ had ‘Strongly disagree/Disagree’ as its mode. Interestingly, even though the highest frequency for respondents in the food preparation section is on them agreeing to storing excess food for later use, the highest number of respondents for this section contradicts the statement whereby the respondents agreed that they felt good when they discarded all the old food and cleaned out the fridge. This is supported by the second highest frequency of respondents to ‘Strongly agree/Agree’ where respondents mentioned that they evaluated food to be disposed of by their appearance or smell (87.0%), further supported by them agreeing that it is better to throw away food than to risk eating unsafe food and getting sick (87.7%). Inevitably, the lowest frequency is

Table III: Influence of expiration date

| Influence of expiration date | Strongly disagree/ Disagree | No Opinion | Strongly Agree/ Agree |
|--|-----------------------------|-------------|-----------------------|
| I take care not to consume food after the expiration date | 19 (4.7%) | 46 (11.3%) | 342 (84.0%) |
| I already take care to buy food with a long expiration date when I purchase food | 28 (6.9%) | 43 (10.6%) | 336 (82.6%) |
| I sometimes eat food after its expiration date | 287 (70.5%) | 52 (12.8%) | 68 (16.7%) |
| I evaluate the food to be thrown by its appearance or smell | 17 (4.2%) | 36 (8.8%) | 354 (87.0%) |
| I think it is better to throw away food than to risk eating unsafe food and getting sick | 18 (4.4%) | 32 (7.9%) | 357 (87.7%) |
| Often, I forget to eat products before they are spoil | 93 (22.9%) | 117 (28.7%) | 197 (48.4%) |
| It feels good to clean out the fridge and get rid of the old food | 14 (3.4%) | 25 (6.6%) | 358 (88.0%) |

Highest value in each statement is highlighted in bold.

on respondents’ response to sometimes they forgot to eat the products before they were no longer edible (48.4%).

Environmental dimension related to food waste

As shown in Table IV, 288 households agreed that wasting food led them to experience a bad conscience. More respondents (n = 374) concurred that when they wasted food, guilty conscience developed because the idea of wasting food also caused them to feel sorry for those who don’t have enough food on the table. Even though 300 respondents agreed that there was food that they could have avoided throwing away, 46.9% (n = 191) did not agree that the food they wasted could have helped undernourished people.

Table IV: Environmental dimension and concern related to food waste

| Environmental dimension related to food waste | Strongly disagree/ Disagree | No Opinion | Strongly agree/ Agree |
|---|-----------------------------|-------------|-----------------------|
| I have a bad conscience when I waste food | 28 (6.9%) | 91 (22.4%) | 288 (70.8%) |
| I feel guilty when I waste food because some people don’t have enough to eat | 7 (1.7%) | 26 (6.4%) | 374 (91.9%) |
| The food I waste would not help undernourished people | 86 (21.1%) | 130 (31.9%) | 191 (46.9%) |
| There is the food I could have avoided being thrown | 36 (8.8%) | 71 (17.4%) | 300 (73.7%) |
| Environmental concern related to food waste | | | |
| I don’t care about environmental impairments that arise when I discarded food | 297 (73.0%) | 70 (17.2%) | 40 (9.8%) |
| Food waste is not an environmental problem because it is natural and biodegradable | 208 (51.1%) | 98 (24.1%) | 101 (24.8%) |
| I feel disturbed by the amount of food being wasted since it takes a lot to grow, process, package, and transport food. | 39 (9.6%) | 74 (18.2%) | 294 (72.2%) |
| The packaging of food thrown away is a bigger environmental problem than food waste | 15 (3.7%) | 37 (9.1%) | 355 (87.2%) |

Highest value in each statement is highlighted in bold.

Environmental concern related to food waste

Respondents showed positive feedbacks in their principles concerning the impact of food waste on the environment, as displayed in Table IV. For example, 297 respondents agreed that they are concerned about the environmental impairment caused by food waste, and that food waste is an environmental problem even though it is a natural and biodegradable product (n = 208). On top of that, corresponding to the above, most of the respondents (n = 294) felt disturbed with the amount of wasted food especially when they considered the process it takes from garden to table, while some believed that one of the many wastes bigger than food waste itself is the food packaging that is thrown together with it (n = 355). In like manner, the mode with the highest frequency in environmental concern was the respondents' response to believing that food packaging creates a bigger environmental problem compared to the food waste itself. The second highest frequency was their response to being disturbed by the amount of food wasted because of the process it takes to grow, manufacture and transport the food. The lowest was to them not agreeing to not caring about environmental impairments that arise when they discard food.

Association between sociodemographic characteristics with the respondent's attitude and behaviour in food waste management

Based on Table V, the Mann-Whitney U test showed an association between gender and their attitude and behaviour in terms of food purchasing (U = 17695; p-value = 0.046) as well to the section on being influenced by expiry date in food waste management (U = 17430.5; p-value = 0.003). However, no associations were found between gender and the rest of the behaviour and attitude variables. Meanwhile in Table VI, for the age group, there was an association between the respondents' age with the environmental dimension on food waste (X² = 13.822; p-value = 0.008). However, there was no association between the household's house

locality with the household's purchasing behaviour, food preparation behaviour, influence on the expiration date, environmental dimension, and environmental concern on food waste as all their p-value is more than 0.05. Meanwhile, there was an association between the households' education level to their attitude and behaviour in terms of purchasing behaviour (X² = 6.169; p-value = 0.046), food preparation behaviour (X² = 24.876; p-value = 0.000) as well as their environmental dimension on food waste (X² = 7.802; p-value = 0.020). Aside from that, similar to house locality, there was no association between the total household income with the behaviour and attitude in food waste management as the p-value was larger than 0.05.

Relationship between sociodemographic characteristics with respondents' attitude and behaviour on food waste management

The Spearman's rank correlation order was then applied to understand the strength and direction of the association between the sociodemographic characteristics with the respondents' attitude and behaviour on food waste management. The significant Spearman correlation coefficient value of association between gender and influence of the expiration date of r (405) 0.149 with a p-value of 0.003 showed a very weak correlation between the two variables which was statistically significant as tabulated in Table VII. Similarly, when comparing gender to the purchasing behaviour variable, there was a very weak negative correlation between the two variables and it was still statistically significant (r (405) = -0.099, p-value = 0.046). The Spearman correlation between the age of respondents to the environmental dimension on food waste was significantly very weak (r (405) = 0.165, p-value = 0.001). However, for education level, it was insignificantly different with very weak correlation to purchasing behaviour (r (405) = 0.056, p-value = 0.260), food preparation (r (405) = -0.047, p-value = 0.341) and even to environmental dimension on food waste (r (405)

Table V: Association between gender of household with attitude and behaviour on food waste management

| Variable (N= 407) | Purchasing behaviour | | Food preparation | | Influence of expiration date | | Environmental dimension | | Environmental concern | |
|-------------------|----------------------|--------------|------------------|---------|------------------------------|--------------|-------------------------|---------|-----------------------|---------|
| | U | p-value | U | p-value | U | p-value | U | p-value | U | p-value |
| Gender | 17695 | 0.046 | 18671.0 | 0.363 | 17430.5 | 0.003 | 18954.5 | 0.433 | 19334 | 0.945 |

The relationship is significant at p < 0.05

Table VI: Association between sociodemographic characteristics with attitude and behaviour in food waste management

| Variable (N= 407) | Purchasing behaviour | | Food preparation | | Influence of expiration date | | Environmental dimension | | Environmental concern | |
|------------------------|----------------------|--------------|------------------|--------------|------------------------------|---------|-------------------------|--------------|-----------------------|---------|
| | χ ² | p-value | χ ² | p-value | χ ² | p-value | χ ² | p-value | χ ² | p-value |
| Age | 4.905 | 0.297 | 9.408 | 0.052 | 0.521 | 0.971 | 13.822 | 0.008 | 2.026 | 0.731 |
| Locality | 0.241 | 0.886 | 4.802 | 0.091 | 0.194 | 0.908 | 3.019 | 0.221 | 0.151 | 0.927 |
| Education level | 6.169 | 0.046 | 24.876 | 0.000 | 0.004 | 0.998 | 7.802 | 0.020 | 0.068 | 0.967 |
| Number of households | 0.326 | 0.849 | 5.818 | 0.055 | 3.190 | 0.203 | 0.889 | 0.641 | 1.836 | 0.399 |
| Combine monthly income | 0.373 | 0.946 | 5.302 | 0.151 | 5.990 | 0.112 | 1.258 | 0.739 | 3.026 | 0.388 |

Highest value in each statement is highlighted in bold.

The relationship is significant at p < 0.05

Table VII Strength of correlation between sociodemographic characteristics with attitude and behaviour of respondents on food waste management

| Sociodemographic characteristics | Attitude and behaviour variables | Value <i>r</i> | <i>p</i> -value |
|----------------------------------|---------------------------------------|----------------|-----------------|
| Gender | Influence of the expiration date | 0.149 | 0.003 |
| Gender | Purchasing behaviour | -0.099 | 0.046 |
| Age | Environmental dimension on food waste | 0.165 | 0.001 |
| Education level | Purchasing behaviour | 0.056 | 0.260 |
| Education level | Food preparation | -0.047 | 0.341 |
| Education level | Environmental dimension on food waste | 0.002 | 0.971 |

Highest value is highlighted in bold.
The relationship is significant at $p < 0.05$

= 0.002, p -value = 0.971). Therefore, statistically, even though the variables showed a significant difference between the two variables, the correlation between them was found to be very weak.

DISCUSSION

Statistically, by evaluating the sociodemographic behaviors of respondents, it can be said that there was an association between gender and education level with the household's purchasing behavior. There was also an association between the education level of the respondents to the food preparation behavior of the respondents on food waste management. Aside from that, there was an association between the education level and the respondents' age with the environmental dimension on food waste. Furthermore, there was an association between the person's gender and the influence of expiration date on food waste management. Interestingly, there were no conclusive associations between household's sociodemographic characteristics and the environmental concern on food waste. Qi and Roe (17) highlighted in their findings that respondents with higher education levels had higher levels of awareness on the harm of food waste to the environment. At the end of the day, it depends on the household's perceived reasoned action and perceived planned behavior, which is to either deliver practical household benefits by doing proper meal planning, purchasing and disposal of food to avoid exposure to foodborne illness or to prioritize environmental benefits.

This is in line with past studies where they found that households are more concerned with the financial implications of wasting food rather than being concerned about the environmental impact of it (18). Additionally, a study by Attiq et al. (19) found that having high environmental beliefs did not guarantee respondents being proactive in reducing their household food waste, where even by practicing recycling and preventing waste, it still did not affect their waste practice. On the contrary, a study by Boulet, Hoek, and Raven (20) discovered that a person with higher level of

environmental knowledge is more likely to be involved in food waste reduction as they believe reducing food waste plays a major role in reducing pollution and impact on the landfills while at the same time preserving natural resources. This is supported by Amirudin and Gim (11) where an individual's level of education did not influence their food waste management but rather their skills and knowledge in lowering food waste, as well as the person's personal and subjective norms on food waste.

When focusing specifically on sociodemographic characteristics, the total number of persons in the household, their house locality as well the total combined monthly income did not show any significant difference when compared to the different categories of attitude and behavior analysis. Apart from the statistics given above, even though the three variables did not differ between the groups, it does not necessarily reflect on the actual food waste that they produced daily. It is comparable to a study by Van Dooren et al. (12) where individuals with higher incomes produced more food waste compared to those with lower incomes.

Personal factors could contribute to behavioral factors on food wastage as highlighted by Romani et al. (21); a household of one person, or even those of a young age without awareness and knowledge in interpreting food labels tend to produce more waste. Ajzen I (22) explained the theory of reasoned action where the psychological determinant to one's action first comes for the intention to perform or to not perform the act. This is influenced by the environment and then there comes social norm, eventually leading to the factor of attitude toward the behavior. For example, in the case of one's intention to reduce food waste, their action might change due to their environment such as the food becoming spoilt before its expiration date. However, as emphasized by Razali et al. (5) where even with many determinants, moral norm creates a bigger weight and in turn causes impact on an individual in managing waste. Thus, at the end of the day, due to different sociodemographic backgrounds, psychological factors create a bigger dent on the person in completing the action, thus influencing their action.

All things considered, the food wastage issue in households differs across every socio-economic status and demographic (23, 24), especially with less consciousness of the volume of food waste generated (25) combined with food storage availability that allows stock-piling or over purchasing goods (26). Another element to be considered is that dietary preference and food decision-making in a household does influence food wastage, in addition to the family's schedule and commitment that might interfere with their food planning regime (26, 27). Furthermore, in every psychological study, there is a tendency towards social desirability bias where the respondents are inclined to choose options

that are more socially acceptable instead of answering the questionnaire according to their true selves (28). Ultimately, in this data collection, individuals acted as the focal point rather than the household as a social unit where the characteristics might differ between individuals and when functioning as a group. More creative and proactive food waste promotion and education need to be done as this would exacerbate food issues, impair food security, and have a negative influence on the overall ecosystem if enough effective precautions were not taken. As a result, ensuring long-term sustainability in food waste management is critical in attempts to improve public health, resource availability, and environmental benefit (29).

CONCLUSION

In essence, households in Kuching city showed positive feedback in terms of their attitude and behavior in food waste management even though there were differences in the priority of their views. Furthermore, in this study, statistically, even with a very weak correlation, there was a significant association between the respondents' gender, age, and education level with their attitude and behavior in food waste management. Even so, future studies on the determinants of households' participation in food waste management may include additional variables such as type of residence and occupation. Further research could also evaluate the impact of certain communication strategies on changing the attitudes and behavior of the community toward sustainable management of solid waste, specifically food waste.

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