Knowledge, Awareness and Behaviour among Malaysians towards the Impact of Climate Change: Case study in Klang Valley

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Abstract

Public knowledge, awareness and behaviour on climate change are crucial to prevent climate change. This study investigates the level of knowledge, awareness and behaviour of Malaysian society on the impact of climate change (Case study in Klang Valley). Adopting a descriptive survey research design, a self-designed questionnaire entitled "Climate Change Awareness" was conducted on a sample of 467 respondents from three (3) main groups (university students, public and government servants). Cronbach's alpha (α) for this study is 0.749, indicating an acceptable level of internal reliability of the scale with this specific sample. The finding indicates that most of the respondents have an average level of knowledge (41.22%) from different levels of education. The level of awareness and behaviour among the respondents was also very weak and fragile. Approximately 55.3% of respondents are not aware of the impact of climate change on the environment, economy and human health. Although the government has promoted its initiatives and policy regarding climate change, it cannot be presumed that the society is having a high level of knowledge awareness and behaviour about climate change. In addition, this study also measured the effectiveness of the national policy on climate change in Malaysian society. This study offers the decision makers some fundamental insights regarding public knowledge, awareness and behaviour towards climate change that could potentially assist in promoting responsive policies and strategies to reduce the impact of climate change.

Keywords: Awareness, behavior, climate change, knowledge, sustainability

1.   Introduction

Climate change scares people with food and water shortage, an increase in flood events, and extreme heat. more diseases and economic losses. The World Health Organization (WHO) defines climate change as the greatest threat to global health in the 21st century. Malaysia has come out with national policies on climate change in 2009, such as National Policy on the Environment (2002), National Green Technology Policy (2009) and National Climate Change Policy (2009). Based on the National Plans, Malaysia will adopt a dual strategy in addressing climate change impacts to adapt strategies onto protecting the economic growth and development

factors from the impact of climate change, and secondly to come out with strategies to reduce the emission of greenhouse gases (GHGs) where carbon dioxide (CO_2) is the major culprit (INC, 2000 and NC2, 2011). According to The Global Climate Risk Index (CRI) developed by the Germanwatch analysis, Malaysia's CRI was ranked 99 in 2019 among 178 countries (Eckstein et al, 2021). The ranking was measured and quantified based on the impact of the extreme weather events where it was counted based on the numbers of fatalities and the economic losses that occurred during the events. The events were based on the past climate variability to the current variability which has left its own footprint for the last 20 years on climate change (Sönke and David, 2014). This finding indicated that climate change had significantly affected the environment of Malaysia.

For the past few years, Malaysia has faced various events of climate change such as haze, storms, dry spells and floods. For example, a flash flood in Kuala Lumpur (Bhuiyan et al., 2021), Penang (Saleh et al., 2022), Selangor (Ahmad et al., 2019), Kelantan (Chan et al., 2019) and Pahang (Safiah et al., 2020). Some of the events have caused the life of the public and properties, and millions of ringgits were spent to support the mitigation and adaptation of climate change (NC2, 2011 and EPU, 2010). Malaysia has adopted technical-strategised measures to prevent climate change. For example, the Putrajaya Energy Commission Suruhanjaya Diamond Building and the Tuanku Mizan Zainal Abidin Mosque (Iron Mosque) as green buildings in Putrajaya, promoting the hybrid car, enhancing the facilities for public transportation (e.g., ERL and MRT). However, there is still a lack of measurement on the non-technical measures (e.g., level of knowledge and awareness of climate change). Based on the reviewed literature, Malaysia has never prepared a Knowledge, Attitude and Behavioural Practice on Climate Change (KAP) reported and endorsed by the UNFCCC. Therefore, the objective of this study is to investigate the level of knowledge, awareness and behaviour of people in Klang Valley toward climate change. This study also may contribute information to the decision makers to develop or enhance the green policy and law that is suitable for the current and future generation which is also to the United Nations Sustainable Development Goals (SDGs).

2.   Methods

2.1 Quantitative Survey

This study was conducted based on the quantitative method through survey distribution among the respondents. The questionnaire was divided into four (4) segments, consisting of demographic, knowledge, awareness and the behavior. The questionnaire inputs were designed based on journals and reports on Malaysia's Second National Communication to the UNFCCC and Knowledge, Awareness and Behavior Pattern of Climate Change reports from other countries like Vietnam and Jamaica and online materials from Environmental Protection Agency (EPA) and The National Aeronautics and Space Administration (NASA) (IFRC, 2011; UWI, 2012; NC2, 2011; NASA, 2014; EPA, 2014).

The questionnaires were distributed through an online and face-to-face survey. Google Forms was used as a platform for the online survey. As a marketing tool to promote the survey, a Facebook page was created and the link to access the google form was posted on every website of universities, communities, personal Facebook, and government and non-government agencies. Respondents were divided into three (3) groups, which are public and private universities in Malaysia, and public, non-government and government servants. For the paper survey, the questionnaire was distributed to six (6) universities (e.g., Universiti Malaya, Universiti Teknologi MARA and Universiti Putra Malaysia, Multimedia University, Taylor's University and Universiti Kuala Lumpur), government servants from the Royal Malaysia Police (PDRM), Ministry of Natural Resources and Environment (NRE), and Department of Environmental (DOE) and lastly the public. Each group were given 100 questionnaires and distributed to the respondents who were randomly selected consisting of different occupations, education background and age range.

The questionnaire started with demographic questions such as their age, nationality, occupation and other relevant question. Followed by questions which were created to measure their levels of knowledge, awareness and behavior toward climate change. Respondents must answer 14 questions which include dichotomous or open-ended, multiple choice, filter or contingency questions and Likert scale-type of questions. Question no. 1 until question no. 8 focus more on the knowledge of climate change (e.g., respondents' rate of understanding of climate change, type of media sources to access the knowledge of climate change and many other relevant questions), followed by question no. 9 and no. 10 which was focused on the respondent's awareness on the climate change (e.g., respondents concern on the potential of the climate changes and awareness statement that they may have or haven't experience either past or present or future of climate changes, and lastly followed by behavior pattern toward the climate change for question no. 11 and no. 12. The questions were designed to measure the respondent's willingness and attitude toward potential activities they can do to reduce the greenhouse gases which reduce the impact of climate change (Poortinga et al., 2019; Kotcher et al., 2021; Baker et al., 2021). The questionnaire ended with the correspondent's opinion and their concern to continue reading and enhancing knowledge on the relevant issues of climate change. The survey was fielded online and face to face for a duration of one month. All collected data were transferred to excel and analyzed using Statistical Package for the Social Sciences (SPSS) Version 17.0.

2.2   Statistical Package for the Social Sciences (SPSS) Version 17.0

Conclusions were drawn by statistically analyzing the data using SPSS. The first step to analyze data is to identify the types of data, whether it is nominal, ordinal, interval or ratio. In this study, most of the data were identified as nominal and ordinal. The second step is to label the variable values. Even though it is not compulsory, labelling variables is a good practice and a useful method of making the data more readable and understandable (Garth, 2008). In analyzing the data, a common descriptive analysis using frequency, which includes percentages and counts was conducted for categorical data, such as age, occupation (demographic questions) and other related questions. Meanwhile, in determining the reliability of scale measurement or ordinal type of data, for example, level of knowledge by education level with a 6-point Lickert scale from "I don't know" to "I'm an expert", Cronbach's alpha was used. In general, alpha scores reaching 0.7 and above are considered acceptable, 0.8 and above are considered good, and 0.9 and above are excellent (Gliem, 2003; Laura, 2014).

3.   Results and Discussion

This study aims to characterize the level of knowledge, awareness, and behaviour pattern toward climate change. From this study, the completed questionnaires were 467 out of 850 and this give 55.76% of the response from the respondents, indicating that the finding of this survey was valid for further analysis. Cronbach's alpha (α) for this study was 0.749, indicating an acceptable level of internal reliability of the scale with this specific sample
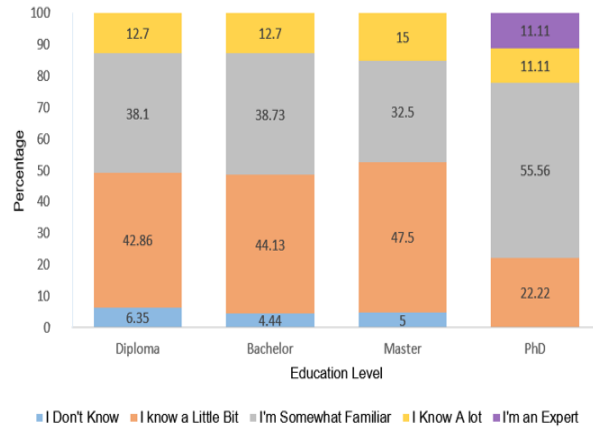
Figure 1. Level of knowledge by education level

Figure 1 shows the level of knowledge of respondents by education level (Refer to Questionnaires 1 to 4). The status of level education of respondents is characterized by four (4) categories, which are Diploma, Bachelor, Master and PhD programs. Finding from this survey shows that approximately 39.18% of respondents which was averaged from Diploma (42.86%), Bachelor (44.13%), Master (47.50%), and PhD programs (22.2%), indicating that most of the respondents have weak (refer to "I know a little bit") knowledge on the climate change. Approximately average 41.22% of the respondents from all education levels show average knowledge (refer to I'm Somewhat Familiar) on climate change. Interestingly, 5.26% and 12.54% of the respondents from all education levels have no knowledge (refer to "I Don't Know") and strong knowledge (refer to "I know a lot" and "I'm an expert), respectively. Referring to the finding of this survey, most of the respondents have average knowledge of climate change compared to other levels of knowledge from different education levels. Respondents from Diploma, Bachelor and Masters education levels were the predominant respondents for the average knowledge of climate change, suggesting that students were not fully exposed to and taught about the current environmental issues on the global platform. This is alarming that the Malaysian government should tackle this issue at every education level by including subjects on the environment that are related to Sustainable Development Goals (SDGs) as a core subject. As an example, Universiti Teknologi Mara (UiTM) includes a Sustainability Management course for master student program as a core subject and Environmental Engineering and Sustainability for the undergraduate student in the School of Civil Engineering. It will be beneficial if every university could include relevant subjects that can promote the sustainability of the environment, economic and social which can contribute to lowering greenhouse gases effect and reducing climate change impact.
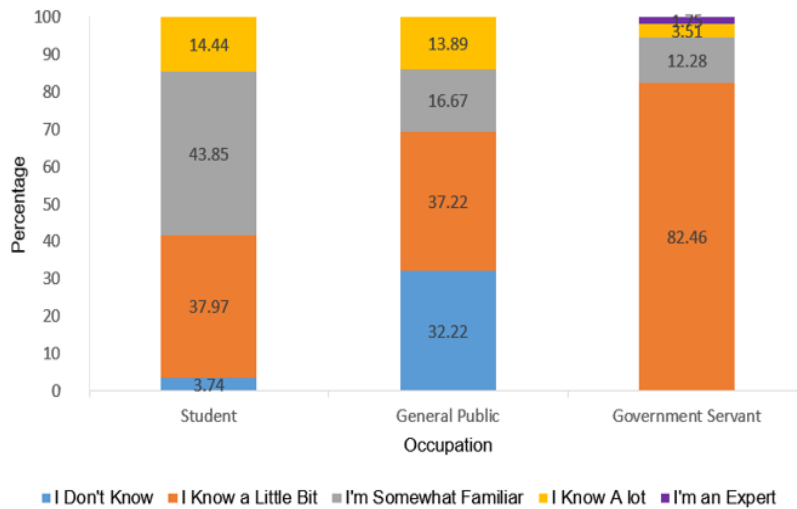
Figure 2. Level of knowledge by occupation

Figure 2 shows the level of knowledge of respondents by occupation (Refer to Questionnaires 1 to 4). The survey data shows that approximately 82.46% of government staff have weak knowledge (refer to "I'm somewhat familiar"). Students (37.97%) and the general public (37.22%) show an almost similar level of weak knowledge of climate change. 32.22% and 3.74% of the public and students show that they lack knowledge of climate change, indicating that level of knowledge of climate change is significantly crucial. Only 14.44%, 13.89% and 5.26% of the student, public and government servants, respectively, have strong knowledge of climate change. Interestingly, the government servant is a dominant group that shows a lack of knowledge of climate change. This is important to take note of as most of the government servants were from the Ministry of Natural Resources and Environment (NRE) such as the Department of Environment (DOE) and Environmental Management and Climate Change Division. The government servant who works in the department that is responsible to spread knowledge and awareness to society on the climate change issue should educate themselves on this current issue. The Malaysian government also should impart knowledge of climate change to every individual without looking at the background of occupation. Every sector and industry should take the responsibility to reduce climate change by sharing the knowledge of the impact of greenhouse gases with the employer and together to combat and prevent climate change. Campaign on energy saving, such as changing conventional office light sources to more energy-efficient bulbs (e.g., LED light) and educate them on the advantages of using the energy-efficient product and solar energy. The government also should encourage private companies and government sectors to calculate and measure the emission of greenhouse gasses released from their building by developing a greenhouse gasses inventory system. Education and awareness programs for the public are very significant and need to be implemented. Collaboration between government sections (e.g, NRE and DOE) and NGOs are urgently required to provide relevant education and awareness programs to the public. It is recommended community site visit the green building in Putrajaya. Putrajaya Energy Commission Suruhanjaya Diamond Building and Tuanku Mizan Zainal Abidin Mosque (Iron Mosque) are successful green buildings in Malaysia and these green buildings can be a center of awareness and education of climate change (Kandar et al., 2019).
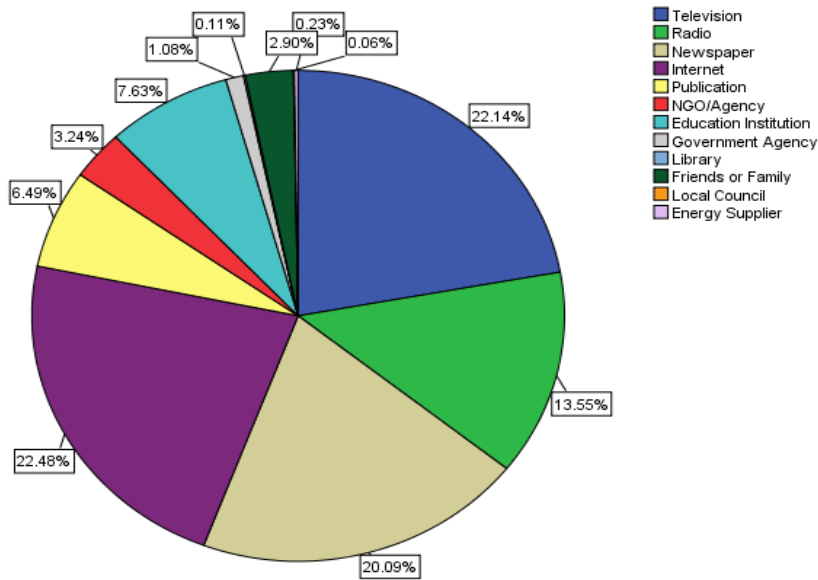
Figure 3. Types of media sources to deliver knowledge on climate change to the public

Figure 3 shows the percentage of media sources to deliver knowledge of climate change to the public This survey reveals that the most effective media to deliver information on climate change are the internet (22.48%), television (22.14%) and newspaper (20.09%). This finding indicates that the respondents prefer the knowledge from these sources probably due to the free and easy access. Source of knowledge from the publication (6.49%), NGOs (3.24%), government agencies (1.08%), library (0.11%), the local council (0.23%) and energy supply (0.06%) are considered very crucial. Therefore, the government should increase promotion of the climate change such as advertisements, short movies, a debate on climate change, animation and many more interesting programs on the internet, television and newspaper than the publication of magazines or articles. The information, communication and technology (ICT) sector should play an important role to provide creative and effective knowledge of climate change to the community. However other media sources such as radio, education institutions, NGO agencies, government agencies, libraries, energy suppliers services and local councils should increase and continue their support too. It is recommended Malaysian government should provide more funding and collaboration with the local council, NGOs, and libraries to spread the knowledge of climate change to Malaysian society.
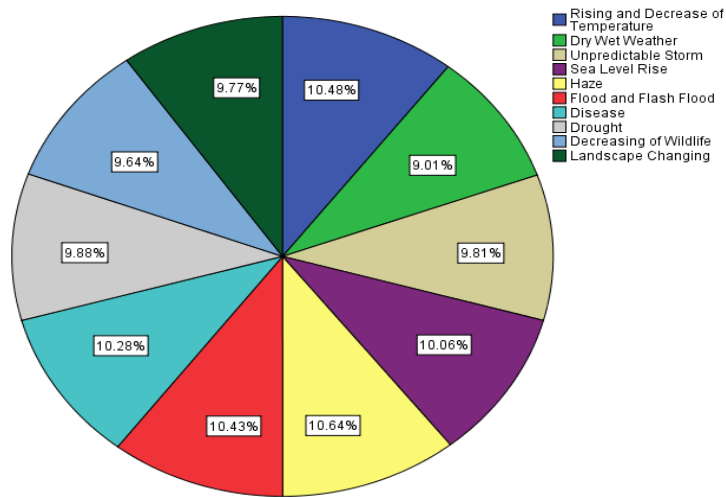
Figure 4. Level of awareness of the concern on the impacts of the climate change

Figure 4 shows the level of awareness of Malaysian society on the impact of climate change. There were 10 impacts of climate change in this survey, which comprised of effects on temperature (rising and decrease of temperature), dry wet weather, unpredictable storm, sea level rise, haze, flood, disease, drought, decreasing of wildlife and landscape changing. Based on this survey, respondents demonstrate significant concern about the haze (10.64%), the rising and decrease in temperature (10.48%) and the flood and flash flood (10.43%) as severe impacts of climate change because they have self-experienced these impacts in Malaysia. However, most of the respondents were not well aware of other severe events, such as decreasing in wildlife (9.64%), landscape change (9.77%), drought (9.88%), unpredictable storms (9.81%), dry wet weather (9.01%). This finding indicates that the level of awareness was still fragile and need to be enhanced. Therefore, an education program on climate change is crucial and needs to be strategized at all levels (e.g., schools, universities, industries and communities). Provide more suitable and effective activities to bring awareness to the impacts of climate change on the environment, economy and human health. It is recommended university may provide a short video and talk on the impact of climate change on the environment and human health. Thus, more awareness and the educational program should be organized by the government and NGOs to enhance the level of awareness of society toward climate change.
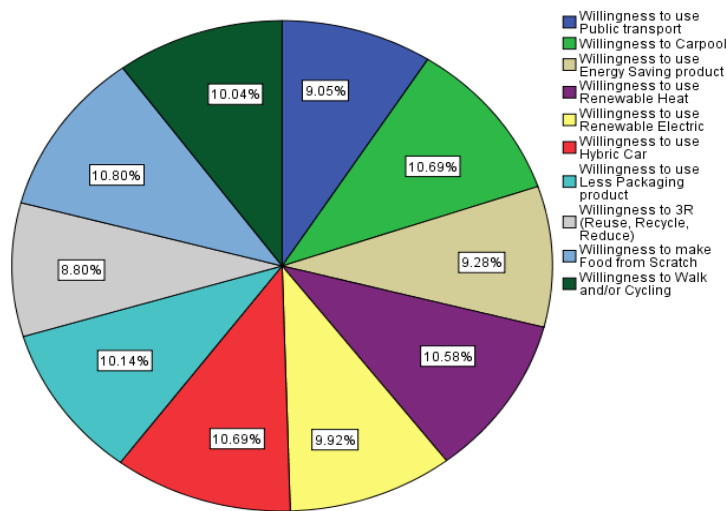
Figure 5. Level of willingness to prevent the climate change

Figure 5 shows the level of willingness of the respondents to prevent climate change. There were 10 types of selected behavior measured in this study, comprised of willingness to use public transportation, willingness to carpool, willingness to carpool, willingness to use renewable heat, willingness to use a hybrid car, willingness to use a less packing product, willingness to do 3R (reuse, recycle and reduce), willingness to make food from starch and willingness to walk and/or cycling to prevent the climate change by reducing the emission of CO_2. There were three (3) predominant willingness of respondents to reduce the emission of CO_2 in their lifestyles, which are to make food from scratch (10.80%), willingness to carpool (10.69%) and use a hybrid car (10.69%). Respondents were lacking willingness to do 3R (8.80%), walking and/or cycling (10.04%), use renewable electric (e.g., solar panel) (9.92%), willingness to use public transportation (9.05%) and use energy-saving products (9.28%). Finding from this survey indicates that respondents lack knowledge of the impact of climate change to the environment, economy and human health. This finding also suggested that Malaysian society may prefer gardening and in addition to the trend to eat organic food, they would prefer to have their garden and cook rather than buy from outside. They are also willing to carpool in one car rather than drive separately, especially in Malaysia the roads are congested during office hours and carpooling would be the best solution. As the petrol price is rising, more respondents choose to use the hybrid car as it is more eco-friendly and can save their finance. Therefore, the Malaysian government should introduce hybrid Malaysian cars from the brands Proton and Perodua with an affordable price tag. Based on this survey, willingness to do 3R (8.80%) was significantly crucial among the respondents. Thus, effective mitigation measures need to be implemented urgently. For example, education to separate the waste (e.g., dry waste and food waste), to implement 3R dustbin the commercial building and houses and providing education to the community (Almasi et al., 2019, Baig et al., 2019, Xiao et al., 2018, Rathore et al., 2020). Moreover, a repetition animation of the 3R is not enough while the main issue on the solid waste is at the landfill that emitted greenhouse gasses (e.g., CO_2 and methane (CH_4)). The Malaysian government should start limiting the number of landfills in Malaysia and implement 3R effectively. Therefore, effective solid waste management in Malaysia should be enhanced urgently. In a conclusion, the level of willingness to prevent climate change can be enhanced by providing more knowledge and awareness to the community.
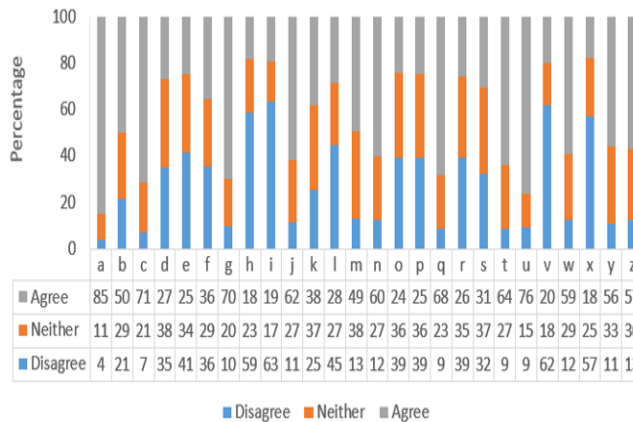
Figure 6. Level of awareness of the climate change awareness statement

Figure 6 shows the overall percentage of respondents that agree with the climate change statement that was mentioned in the survey "climate change is significantly happening in Malaysia and other countries". Approximately 44.70 % of the respondents agreed with the statement above, while 55.3% disagreed and neither (refer to "not sure"). This finding indicates that the 44.70% are the respondents that answered questions for Figures 3.0, 4.0 and 5.0. The remaining 55.3% of respondents significantly thought that the climate change issue is a small matter thus taking it for granted. Therefore, the government should provide an efficient education platform and a green lifestyle to the communities. For example, (1) provide easy access to knowledge on climate change through social media, (2) promote more job opportunities that are related to green products and green technologies, (3) promote waste separation (3R), and (4) promote hybrid car and public transportation. However, the most important task is to have a strict law and policy that is related to sustainable development goals (SDGs) and strict enforcement of the law and policy. It can be implemented by enforcing every sector and industry to promote knowledge and awareness through media sources such as advertisements on the internet, television, newspaper, radio and others. For example, the government should educate the benefits of using public transportation and hybrid car to the community. An electric vehicle is the best alternative to green transportation that significantly reduces the emission of CO_2 (Alimujiang & Jiang 2020; Khan et al., 2020; Zhao et al., 2021). According to Alimujiang & Jiang (2020), the CO_2 emissions have been reduced by 48,851 tons and the highest reduction of 47.39% in 2016 through the implementation of electric buses as the mode of public transportation. Similarly, Todorut et al., (2020) revealed that the emission of CO_2 of electric buses (109465 Q $^{electric}_{CO2}$) was 2.605 times lower than that of diesel buses (285235 Q $^{diesel}_{CO2}$) due to the less production of electric power consumed by electric buses (Todorut et al., 2020). Moreover, it has been found that hybrid electric cars save about 40% consumption of fuel and consequently only emitted 25-30% of CO_2 gases (Jim et al., 2019).
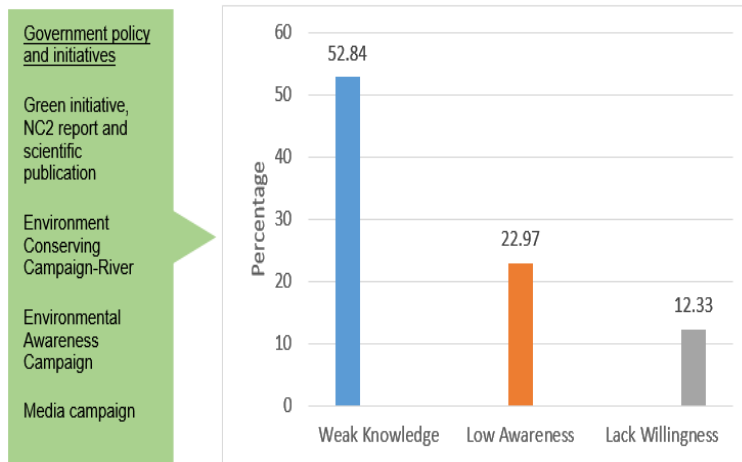
Figure 7. Percentage of the level of knowledge, awareness, and behaviour (willingness)

Figure 7 demonstrates the effectiveness of the national policy on the level of knowledge, awareness, and behaviour (willingness). The results show that approximately 52.84% of respondents have weak knowledge of the impacts of climate change on the environment., while 22.97% and 12.33% have low awareness and lack willingness to prevent climate change, respectively. This finding shows that the Malaysian Government need to enhance the educational program on climate change for Malaysians. Based on the literature, Malaysia has a well-design policy and initiatives on green technology (Chua et al., 2011, Chachuli et al., 2021), but this information is not well delivered to the university student, public and government servants. Proactive mitigation measures are required from the government such as a five (5) years plan approach to Malaysian society, such as encouraging society to write publications or create a documentary on the importance of reducing the greenhouse gasses that can prevent climate change, advertise awareness of the climate change, and encourage communities from the urban and rural area to join the awareness program. The need to leverage the knowledge, awareness and behaviour of climate change such do not open burning, implementing 3R, using energy save products, composting waste and many more can give an impact on the community. It should be promoted holistically through various sources agencies government and non-government, industry, and media so that every individual has a better level of knowledge, awareness and behaviour about the climate change

4.   Conclusion

The study investigates the level of knowledge, awareness and behaviour among the respondents and the prevention of climate change. From the demographic data, respondents are tertiary education students, private sectors and public and government servants, respectively. Of the total respondents, 52.84% have a weak level of knowledge, 22.97% low level of awareness and 12.33% has a lack of willingness behaviour to prevent climate change. To promote a greater knowledge of climate change, several approaches (e.g., easy access to knowledge through social media) were identified to be conducted at the government and non-government agencies, universities, and communities. A society that has a high level of knowledge and awareness of climate change is more likely to act toward reducing the impact of climate change (e.g., willing to use public transportation, willing to do 3R and/or willing to use the hybrid car). This study provides significant findings to the decision makers regarding public knowledge, awareness and behaviour on climate change that could potentially assist in promoting responsive policies and strategies. The government should initiate more initiatives by making climate change as highlight everywhere. It can be implemented by enforcing every sector and industry to promote knowledge and awareness from media sources such as advertisements on the internet, television, newspaper and others. Malaysian society such as parents, government, and private servants, especially the group

of engineers should first be enlightened with knowledge and awareness of climate change. Education programs at kindergarten, primary or even secondary school should already start to educate the youngsters on the climate change problem and concerns and it does not have to wait until the university level. This climate change issue also can be overcome if society can visualize the impact and had known the impact much earlier. A clear explanation of the anthropogenic issues should be shared with all the citizens. A full and thorough mitigation and adaptation of climate change impact on society should be done immediately as other developing countries already have at least one full report of Knowledge, Attitude and Behavioural Practice on Climate Change (KAP) endorsed by UNFCCC. Malaysia by now should have at least one report on climate change matter and one report on the level of knowledge, awareness and good behaviour which could be implemented for the education of a future generation. Therefore, this study is very significant to contribute preliminary findings on the current state of knowledge, awareness, and behaviour of people in Klang Valley. This study will be very helpful to the decision makers to develop or enhance green policy and law which is suitable for current and future generation while at the same time related to the sustainable development goals (SDGs)

Acknowledgements

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