KNOWLEDGE, ATTITUDE AND BEHAVIOUR AMONG UNDERGRADUATES FROM THE SCIENCE AND TECHNOLOGY FIELDS TOWARDS CLIMATE CHANGE

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Abstract: This exploratory study aims to investigate the knowledge and attitude of undergraduate science and technology students towards climate change. In December 2020, an online questionnaire has been distributed to undergraduate students in the field of science and technology. Collected data were made for demographic information, knowledge, attitude and behaviour towards climate change. The survey found that there were a total of 166 respondents which consists of 31.71% male students and 68.29% female students around 18 to 26 years old. Most of the respondents believed that climate change has happened, and negative impacts on human beings can result from climate change. The respondents have multiple understandings in indicating the reason for climate change but many agreed that climate change would promote extreme weather and ecological crisis. The majority of respondents obtained data and materials about climate change from the internet. Moreover, the majority of respondents indicated that they were willing to change their behaviour and wanted to join environmental protection activities relating to climate change. Finally, this research concludes that further actions and awareness need to be enacted especially among undergraduates to combat climate change near future.

Keywords: Climate Change, Undergraduates, Science and Technology, Knowledge, Attitude

Introduction

Climate change and global warming have become major issues discussed by many politicians and environmentalists as the temperature is an important factor that affected the bio ecosystem. By 2050, the surface temperature has been expected to up by 0.2˚C per decade, beyond the peak of 2˚C above pre-industrial levels (IPCC, 2007; North, 2014). Since 1880, there has been an increment of 0.8˚C of the global temperature and carbon dioxide concentration has reached up 400.71 parts per billion. The earth has already suffered the loss of forest and vegetation by about 1.5 million square km during a survey conducted between 2000-2012 (IPCC, 2007; Sivaramanan, 2015). The living things that thrive in the marine environment for instance are very delicate to the changes in temperature (Kamaruddin et al., 2020).

While climate change is universal, unfortunate people especially those who are poor and lived in low-income countries are taking its adverse effects more seriously. Due to its higher reliance on natural resources and inadequate capacity to handle climate unpredictability and extremes, they are defenceless (Kamaruddin et al., 2018). In their adaptation efforts, the conservation and preservation of key habitats will help communities and sustain livelihoods that rely on the services of these ecosystems. It will help to reduce greenhouse gas emissions, improve human health and welfare, and create green jobs by shifting progressively towards low-carbon cultures (North, 2014).

Recent evidence had indicated with rapid change, would give a negative impact on humans, biodiversity, ecosystems, and biomes (Solomon et al., 2009). Many species that are considered as endangered such as Porifera species, sea birds, reptiles and amphibians are facing extinction. In many East African countries, crop failure due to drought spells. Cases such as dehydration may occur in a location such as in the Mediterranean and Southern Africa. Severe events have also been reported involving forest fires such as in Australia, flooding and serious tropical events in Southern Asian countries. Report of deadly heatwaves has also been documented in many areas especially in Africa and Asia continents (Sivaramanan, 2015). The earth's carbon dioxide level was greater than 1000 ppm

several million years ago and the global mean air temperature during mammal and dinosaur estimation was around 22 ˚C, whereas the global average temperature today is 15˚C (Macrae, 2018).

Both climate change and global warming are associated with an upsurge in global average temperatures due to a rise in greenhouse gas release. Disaster connected to the impact of climate change and global warming were decrement of forest area due to the event of forest fire, the increased discharge of methane from the ocean floor and agricultures activities, frequently volcanic eruption activities and production of gasses that may harm the ozone layers.

These problems could be addressed professionally, either by adjusting to change or by reducing the likelihood of disasters. Eliminating obstacles to climate-friendly technologies, developing successful host country procedures for the Clean Development Mechanism (CDM) and formulating carbon facility projects through the Millennium Development Goal (MDG) are some of the approaches recommended by the United Nations Development Programme (UNDP). Awareness however has been found strategic by some parties to waste many expenses to the world economy and society in preventing the release and concentrating the greenhouse gases. There is no reason to prolong the climate change actions due to the emerging financial crisis. Indeed, its macroeconomic implications will be tackled in a short period, after which progress will resume, while the impacts of inaction on global warming will continue to become far more expensive in the long run.

Akompab et al., (2013); Wei et al., (2014) and Yu et al., (2013) stated that understanding of climate change risk by an individual is closely linked to mitigating actions and changes in adaptive behaviour. There has been limited information on the knowledge, attitude and behaviour of undergraduates particularly in the field of science and technology. The purpose of this study was to collect data in terms of response among undergraduate students (Diploma and Degree) towards climate change problems. This study recruited the participants from all undergraduate students (Diploma/Degree) of Universiti Teknologi MARA (UiTM), Perlis Branch, Arau Campus. The research is significant to know their current understanding and response to the negative effects of climate change. The outcome of this research would help concerned parties especially policymakers and health professionals to develop a plan to combat climate change and future problems faced by the next generation.

Methodology

The targeted study population was the undergraduate students of science faculties in UiTM Perlis. The purpose of this study is to investigate the perception, attitude and behaviour regarding climate change among undergraduate students of science and technology faculties in UiTM Perlis. Among the faculties involved in this study were the Faculty of Applied Sciences, Faculty of Sport Science and Recreation, Faculty of Plantation and Agrotechnology, Faculty of Computer Science and Mathematics, and Faculty Of Architecture, Planning and Surveying.

An extensive review of the literature on the knowledge, attitude and behaviour concerning climate change was carried out to design a questionnaire so that it will be easier to collect data from the respondents. The development of questionnaires is guided by research made by Wei et al., 2014. Specific questions (such as the impact of climate change, influence of climate change, greenhouse effect, causes of global warming, behaviour to cope with climate change) were asked to the respondents. All questions had closed-ended responses using Likert-type items or other categorial items such as “Yes”, “No”, “Uncertainty” or “Do not know”. Several demographic information such as age, gender and education level were also sampled.

Result and Discussion

Respondents’ Demographic Characteristics

A total of 166 respondents (aged 18-26) had answered the questionnaires. The majority of respondents are female (68.29%) while (31.71) were male. In terms of the level of education, a majority of the respondents (56.10%) had a Bachelor degree and (43.90%) had a Diploma.

Respondents' Climate Change's Knowledge

Respondents were asked how they know about climate change knowledge (**Table 1**). Almost (96%) of respondents answered yes, (3%) answered no and only (1%) answered uncertainty. Then, respondent was asked whether their region where they lived had climate change happened. Most respondents (82%) answered yes, (16%) answered no and only (2%) answered uncertainty. (94%) of respondents signify they thought global climate change would point to negative outcomes. In terms of the source of such knowledge, the research found that most respondents agreed that the internet is the most common source to acquire information (78%) followed by course learning (10%) and radio or newspapers (6%).

Table 1 Responses to climate change knowledge items

Climate change knowledge items	Number	%
Do you think global warming has already happened?		
Yes	118	96
No	1	1
Uncertainty	4	3
In your local region, has climate change happened?		
Yes	69	56
No	14	11
Uncertainty	40	33
What impacts do you think climate change will bring to us?		
None	4	3
Positive effects	4	3
Negative effects	115	94
Where do you usually get information about climate change from?		
Internet	94	78
Course learning	12	10
Relatives or friends	2	1
Radio or newspaper	7	6
Personal Involvement in environmental protection activities	4	3
Environmental protection campaign	1	1
Doctors and nurses	0	0
Other	1	1

Respondents' Attitude Towards Impacts From Climate Change

Respondents were asked how concerned they were about the impacts of climate change (**Table 2**). Based on the study, the majority of respondents choose the "Agree" option compared to "Strongly Agree". Respondent believed that the increasing extraordinary weather and causes ecological crisis were the main impacts of climate change at 61.99% and 60.99%, respectively. Respondents also agree that climate change could give health effects on humans (58.54%) and agriculture production (52.03%). However, the research notified that fewer respondents think that triggering sea level rise and lying area submerge to contribute less impact as a result of climate change (47.15%).

Respondents' Knowledge And Attitude Towards Causes Related To Climate Change

Respondents were asked about knowledge and attitude towards the causes of climate change. Respondents indicated many reasons such as population explosion (28%), serious air pollution (25%), destruction of forest and farmland (2%), motor vehicles increasing (2%), changes in the atmosphere (27%), greenhouse effect (15%), and the rapid development of industry (1%). Most respondents (45%) believed that carbon dioxide made the greatest contribution to the greenhouse effect, followed by carbon

monoxide (19%). In addition, (64%) of respondents believed human activities were the main cause of climate change. In terms of mitigation, the majority of respondents (77%) believed that the developed and developing countries both responsibilities fairly for climate change.

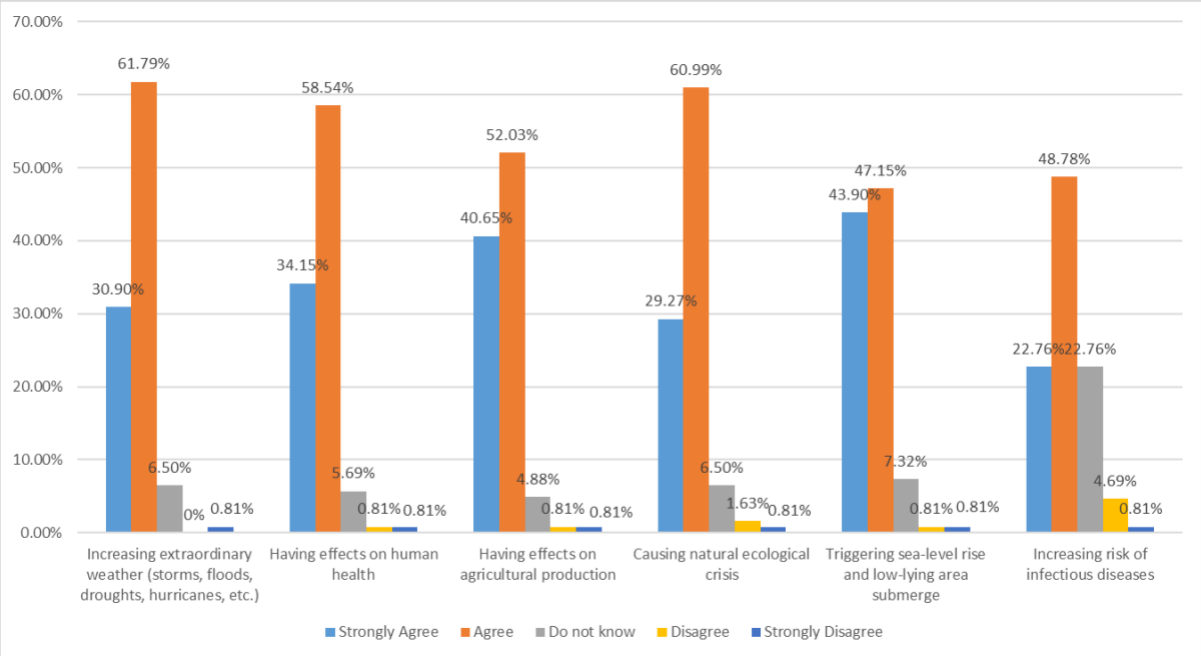

Figure 1: Bar graph indicates respondents attitude towards impacts from climate change

Table 2 The causes of climate change

Attitude items on climate change causes	Number	%
What is the cause of global warming?		
Population explosions	34	28
Changes in the atmosphere	33	27
Serious pollution	31	25
Greenhouse effect	19	15
Forest, farmland destroyed	3	2
The rapid development of the industry	1	1
Process of rural urbanization	0	0
Ecological environment deterioration	0	0
Motor vehicles increasing	2	2
Which gases do you think are the causes of the greenhouse effect?		
Carbon dioxide	55	45
Methane	12	10
Nitrous oxide	5	4
Ozone	12	10
Freon substances	12	10
Water	0	0
Oxygen	1	1
Carbon monoxide	24	19
Helium gas	0	0
Hydrogen gas	2	1

Do you believe human activities (such as excessive logging, harmful gas emission, usage of CFC-containing aerosol) are the main cause of climate change?	106	64
Yes	42	25
No	18	11
Uncertainty		
Which one do you think (well-developed countries or developing countries) need to take greater responsibility for global climate change?	3	2
The former	2	2
The latter	95	77
Both responsibilities fairly	11	9
Differentiated responsibilities	12	10
Unable to explain clearly		

Respondents' Behaviour To Cope With Climate Change

Respondents were asked the ways they avoid climate change via their behaviour (**Table 3**). The survey found that 44% of the respondent agreed that they can avoid climate change through their behaviour. Whereas (80%) of respondents indicated they would like to join the actual efforts to mitigate climate change through personal endeavour. More than half (59%) indicated they were willing to make a personal sacrifice to improve existing problems. In addition, more than half of respondents (58%) indicated they considered environmentally friendly factors before making purchases. Lastly, more than of respondents (61%) indicated they participated in some environmental protection activities to cope with climate change.

Table 3 Individual behaviour related to climate change

Personal behaviour	Number	%
Can we avoid climate change?		
Absolutely possible	46	37
Mitigate climate change effect on humans through the endeavour	9	7
Can not	49	40
Unable to explain directly	19	16
If someone called for, whether you would like to join the actual efforts to mitigate climate change?		
Yes	98	80
No	1	1
Uncertainty	24	19
Will you sacrifice some individual benefit to solve the existing problem?		
Very willing		
Not very willing	72	59
Not at all willing	48	39
	3	2
Do you take any consideration on the environmental factor before your purchase behaviour?		
Environmentally friendly factors will be taken into account before purchase	71	58
Usually paid little attention to such information before buying		
Even though there are adverse consequences, they will be ignored	51	41
	1	1
Did you join any environmental protection activities related to climate change?		
Yes		

No	48 75	39 61

Conclusion

These findings indicate respondents concerned about the impacts of climate change and its immediate threat to human society. The researchers conclude that there are positive outcomes on the knowledge, attitude and behaviour of undergraduates of science and technology students at the Universiti Teknologi MARA, Perlis Branch, Arau Campus. As the future generation to sustain the environment of Malaysia, the undergraduates, have the responsibilities to create, learn, adapt and spread the awareness of anthropogenic activities that may contribute to climate change, efficiently. The outcomes of this research can also help policymakers and environmentalists to understand the responsibility and role of undergraduates in adapting to the challenges of global warming and climate change issues in future.

Acknowledgement

The authors gratefully acknowledge the generous assistance and support from the Ocean Research, Conservation and Advance (ORCA) and Integrative Natural Product Research Groups of UiTM Perlis.

Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this article.

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