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Assessment Knowledge, Perception, and Behaviors towards Climate Change among Universities Youth in Egypt

By Azza Ghanem[*]

Climate change is one of the greatest economic, social, and geopolitical challenges for humans in the coming years. Thus, besides international efforts, youth engagement is vital to environmental conservation and climate action support. Awareness of climate change impacts on human health and all economic activities would help youth to develop positive attitudes towards their environment. This paper assessed university young people's awareness in Egypt by focusing on two aspects. The first aspect is assessing participants' knowledge about climate change which is an obstacle to achieving sustainable development. The second aspect is their behaviors toward climate action. The results can be summarized by the following: the majority are aware of the climate change problem, but it may be necessary to take more steps for building their capacities for facing this future challenge because a deep understanding of the problem is a significant factor for taking shape environmental responsibility.

Keywords: *climate change, awareness, environmental responsibility, environmental education, Egypt*

Introduction

Climate change describes any change in climate over time, as a result of human causes and natural, too. The Intergovernmental Panel on Climate Change (IPCC) clarified that economic activities stand as the major driving force behind the current warming trend since the mid-20th century and proceeding at an unprecedented rate (Edenhofer et al. 2014). Climate change has negative expected impacts, but the vulnerability varies from one place to other. Developing countries, for instance, are the most vulnerable to adverse impacts (Ajuang et al. 2016).

For Egypt, climate change would have potentially negative effects on the ecosystem and economic sectors, causing huge financial losses and social and health problems (Smith et al. 2013). Education and awareness creation of climate change is an important step to achieving adaptation and mitigation strategies as increasing awareness would change behavior towards strengthening the environment and help to face adverse climate change impacts (Acquah 2011, Ekpoh and Ekpoh 2011, Halady and Rao 2010). Moreover, when youth have high levels of awareness of climate change, they are able to educate the citizens of their community and their participation in disaster risk reduction activities could be enhanced (Awusi and Asare 2016, Barreda 2018).

[*]Researcher, Environmental Studies Department, Institute of Graduate Studies and Research, Alexandria University, Egypt.

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Universities are considered high-level centers for education so it is not convenient that students are ignorant of important issues such as climate change and its relationship to achieving sustainable development goals (SDGs) (Agboola and Emmanuel 2016). It is not clear whether university youth in Egypt are aware of what climate change is or its effect, hence this study. This study focused on university youth because they will be future decision-makers and be responsible for dealing with serious climate change consequences for the environment, social, and economic conditions. This result would be helpful for policymakers and stakeholders to identify the way that should be used to develop environmental awareness and climate action by providing an assessment of the current level of awareness about climate change.

Methodology

Study Area

This study was carried out in Egypt- an African country- that is located between 22 to about 33°N and 36 to about 24°E (Smith et al. 2013). As illustrated in Figure 1, it is a part of northern Africa and western Asia (Sinai), bordered from the north by the Mediterranean Sea, Sudan to the south, Libya to the west, and the Red Sea to the east. Its climate is semi-desert, meaning hot and dry most of the time, especially in summer and modest winters with little rainfall (Elmenoufy et al. 2017). Due to its unique location, it holds high political and economic prestige in Africa. It is serving as a trade confluence through its Suez channel. Thus, Egypt's economic activities vary in the service sector, tourism, agriculture, trade, and industry. The land area is larger than 995,000 km^2 with a population of 102 million (The World Bank 2020a), youth (18-29 age) has reached 20 million according to census 2020, with almost 3 million university young people. In general, Egypt has 66 universities out of which 27 are public; the others are private academies and universities (SCU 2021).

Figure 1. *Egypt Map*

Source: University of Texas Libraries 2021.

According to sampling introduced by Steven K. Thompson, the calculation formula of valid sample size is defined as follows:

$$n = \frac{N \times P\ (1 - P)}{\left\{[N - 1 \times \left(d^2 \div z^2\right)\ ] + P(1 - P)\right\}}$$

(Thompson 2012)

Where,
n: Sample size
N: Population size
z: Confidence level at 95% (1.98)
d: Error proportion (0.05)
P: Probability (50%)

The research instrument was a questionnaire titled "Awareness of climate change phenomenon among University youth in Egypt". The questionnaire was conducted in the Arabic language to facilitate the participants' understanding of the terminology and then was translated into English. It consisted of 17 close-ended questions, divided into four sections. The first section was information about the participants, including university ownership, education level, and type of study. The second was about their knowledge regarding climate change and sustainable development. The third section provided a ranking of the potential threats to Egyptian society based on severity. The fourth was about participants' behaviors towards climate action. Finally, an open-ended question was included (optional) if they have any other comments, solutions, or suggestions from their point of view for environmental protection. The online questionnaire was distributed randomly on social media such as Facebook, Linked In, and WhatsApp. In total, 393 responses were collected in a 10 days period. Thus, this analysis was based on 393, which is greater than the minimum valid sample size of 384, meaning the sample satisfies the basic requirements.

The data collected were coded and then analyzed using the Statistical Package for Social Sciences (SPSS) software version 23. Firstly, the data were descriptively analyzed to show a summary of data, such as frequencies, proportions, means, and standard deviations. Because descriptive statistics were not sufficient to determine significant relationships between dependent and independent variables, the Chi-square test was used to determine the association between variables. Statistical significance was set at a 95% confidence level, thus a P value of 0.5 or less ($P \leq 0.05$) was considered statistically significant. The Cronbach's coefficient to test the reliability of the questionnaire was applied, it was equal to "0.677", which indicates an acceptable level of reliability based on (Ursachi et al. 2015). The results were presented as graphs, texts, and tables (Tables 1-4, Figures 1-14).

Results

First Section: Profile of Participants

Table 1. *Shows the Summary of Participants' Profiles*

Category	Sub-category	N	%	Mean	Standard deviation
Level of education	Postgraduate student	104	26.5		
	Graduate	197	50.1		
	Student	92	23.4		
	Total	393	100	1.97	0.706
Ownership of University	Public	358	91.1		
	Private	35	8.9		
	Total	393	100	1.53	0.5
Type of study	Social science	185	47.1		
	Natural science	208	52.9		
	Total	393	100	1.09	0.285

It is obvious that most of the participants are graduates of public universities who have studied natural sciences.

Second Section: Awareness of Climate Change and Sustainable Development

Table 2. *Chi-square Test Results to Determine the Relationship "Having Knowledge about Climate Change among Participants with Their Data"*

	Education level			Total	x^2
	postgraduate student	Graduate	Student		
Yes	95	172	80	347	1.281
No	9	25	12	46	
	104	197	92	393	
	Study			Total	x^2
	Social science	Natural science			
Yes	160	187		347	1.106
No	25	21		46	
	185	208		393	
	University			Total	x^2
	Public	Private			
Yes	315	32		347	0.365
No	43	3		46	
	358	35		393	

Results of the chi-square test from Table 2 showed that there is no statistically significant relationship between knowledge of climate change among participants

and their data "Education level, Type of study, and University" since Chi-square had P-Value = 0.527, 0.293, 0.546 respectively that was greater than 0.05.

Figure 1 shows if they had knowledge about climate change. It has appeared that more than 80% of the participants are aware of the phenomenon of climate change.

Figure 1. *Having Knowledge about Climate Change*

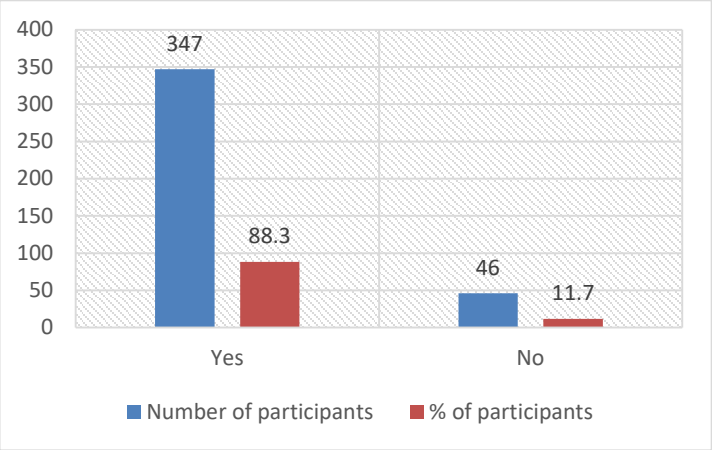


Figure 2 shows asked if they had noticed a rise in the temperature degrees in the past 10 years, and its cause based on their views. Most respondents noticed a change in temperature in the past 10 years and its cause is based on their views. Responses varied either unaware or conscious with different causes of raised temperature. Most of the participants already noticed a temperature change caused by human activities. Noticing temperature changes and other unpredictable weather patterns influence greatly their perceptions of climate change impacts. Thus, awareness programs should be conducted with clarification of climate change scenarios, potential effects, and how to adapt (Shukla et al. 2016).

Figure 2. *Opinions Regarding Climate Change Causes*

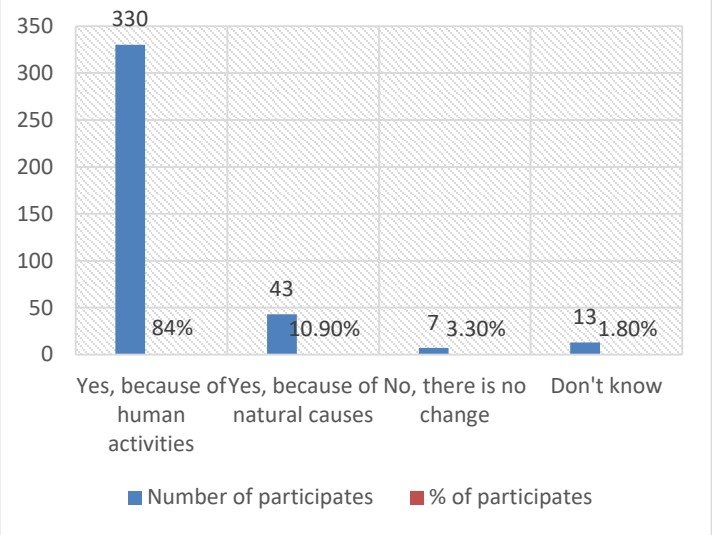


Figure 3 shows the opinions regarding climate change occurrence nowadays. More than 80% believe that it is happening now and more than 2% believe that it is not happening now, while more than 16% do not know to specify their opinion exactly.

Figure 3. *Opinions Regarding Climate Change Occurrence Nowadays*

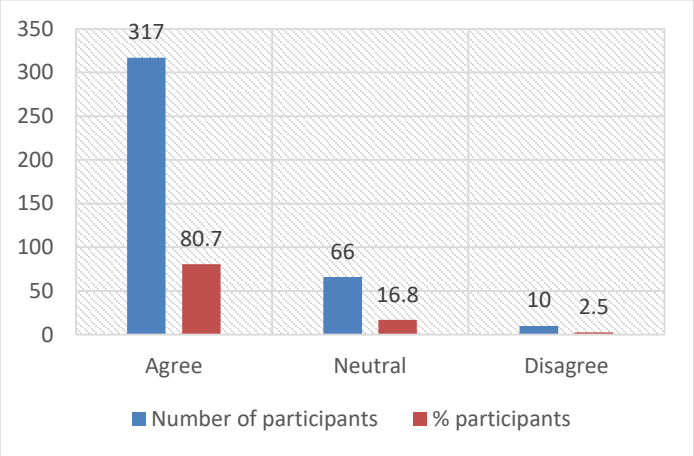


Figure 4 shows if they had known climate change impacts on Egypt. It was found that about 60% of the participants know a little about climate change impacts in Egypt, while more than 10% know nothing. Individuals who feel anxious about the effects of climate change, contribute to environmentally friendly procedures and engage in more climate-friendly actions than those who do not feel affected (Kuthe et al. 2019). This proves that creating awareness among individuals is beneficial for climate action.

Figure 4. *Aware of Climate Change Influences Egypt*

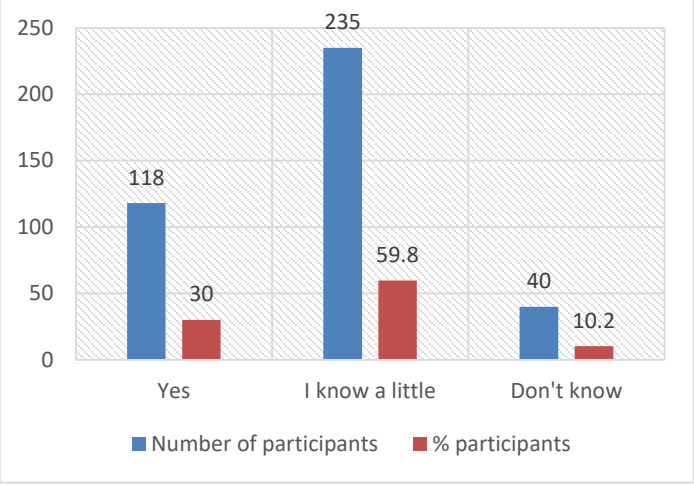


Figure 5 shows if they were aware of the policies or initiatives are taken by the Egyptian government to address climate change. It was found that approximately 80% of the participants know nothing about Egypt's policies and recent initiatives toward climate action.

Figure 5. *Aware of Egyptian Government Initiatives*

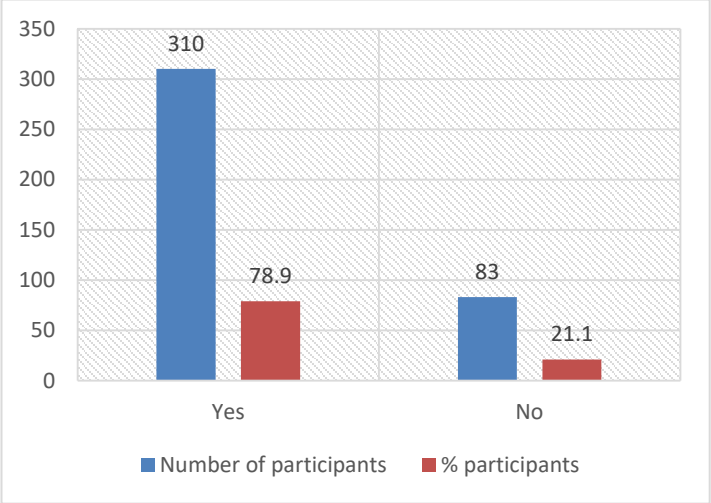


Table 3. *Chi-square Test Results to Determine the Relationship "Having Knowledge about Sustainable Development and its Goals among Participants and Their Data"*

	Education level			Total	x^2
	postgraduate student	Graduate	Student		
Yes	59	64	19	142	33.731
No	12	60	28	100	
I know a little	33	73	45	151	
	104	197	92	393	
	Study			Total	x^2
	Humanities and social	Science			
Yes	61	81		142	1.962
No	52	48		100	
I know a little	72	79		151	
	185	208		393	
	University			Total	x^2
	Governmental	Private			
Yes	132	10		142	4.296
No	86	14		100	
I know a little	140	11		151	
	358	35		393	

Results of the Chi-square test from Table 3 showed that there is no statistically significant between knowledge of sustainable development and its goals with their data "type of study and University" since Chi-square had a P-Value = 0.375, 0.117 respectively greater than 0.05.

On the other hand, there is a correlation between knowledge of sustainable development and its goals with participants' education level because the result was highly significant as a P-Value = 0.000 lower than 0.05.

Figure 6 shows if they had known the concept of sustainable development and its goals (SDGs). Most of the participants either know well or know little about the concept of sustainable development and its goals, while 25.1% of them know absolutely nothing.

Figure 6. *Understanding Sustainable Development Concept and SDGs*

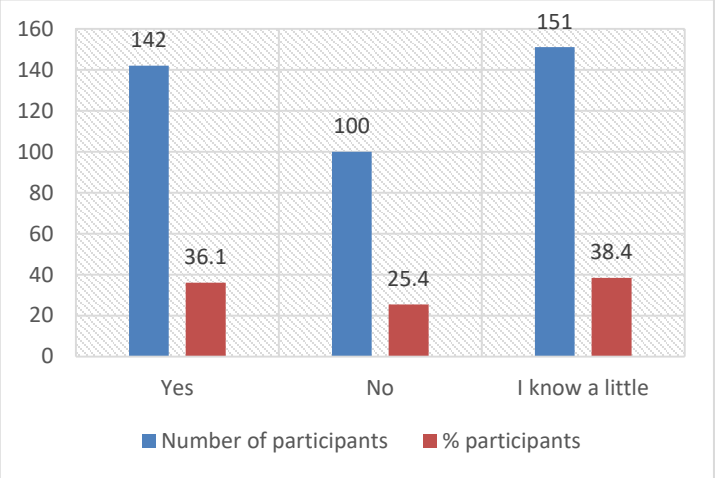


Figure 7 shows if climate change is a challenge to achieving sustainable development goals (SDGs) in Egypt. The majority of respondents have considered climate change as an obstacle.

Figure 7. *Opinions about Climate Change as a Challenge to Achieve SDGs in Egypt*

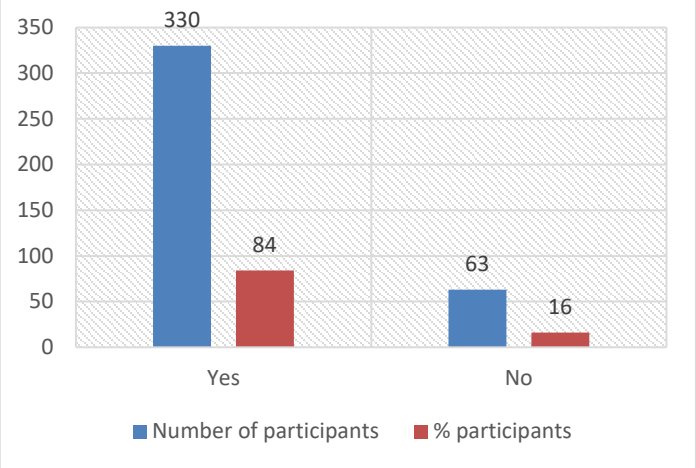


Figure 8 shows if they had studied or attended an event about climate change during the university period. It was found that the ratio is approximately equal between yes and no, but the percentage of those who did not study or attend events on the phenomenon of climate change is greater.

Figure 8. *Participants' Study or Attendance Events about Climate Change*

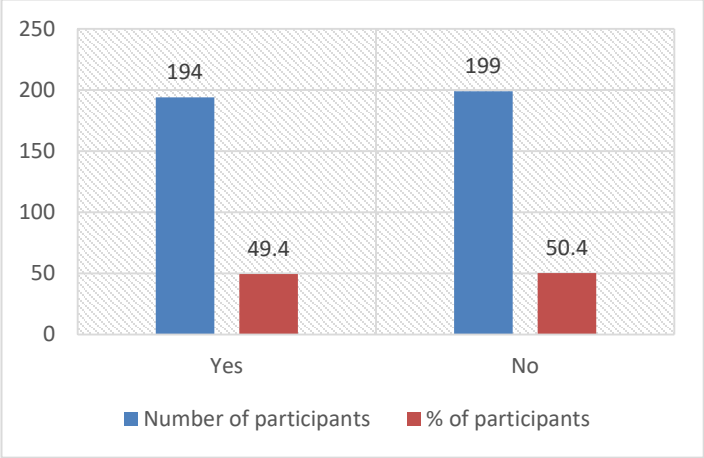
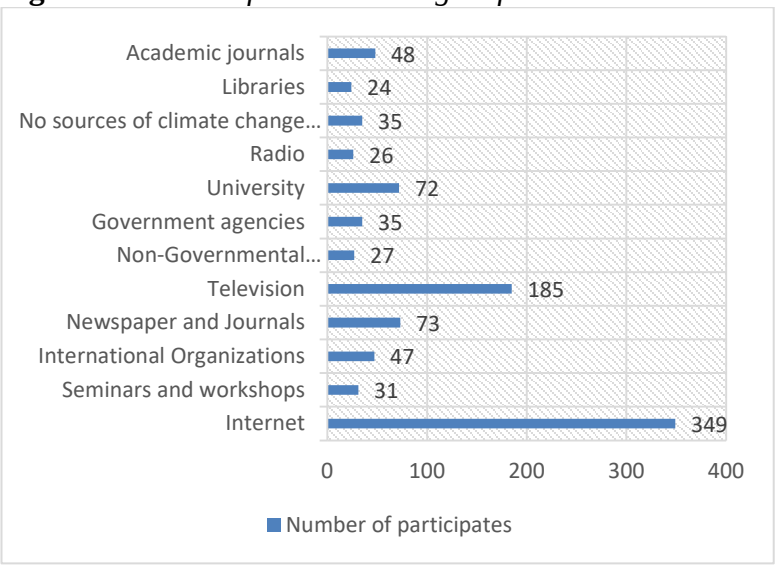


Figure 9 shows the three main sources of information about climate change. It is obvious that both the Internet and television are the most important sources that can be exploited in campaigns, initiatives, and programs to raise public awareness. Media has a positive impact on climate action both directly via changing daily behaviors in short term, and indirectly via changing lifestyles in long term and boosting attitudes towards climate change (Arlt et al. 2011). Nowadays, social media platforms like Facebook, Twitter, and YouTube, for instance, play a vital way to in awareness rise towards the environment, enhance daily climate-related behavior, and inspire youth to contribute to climate action (Duran-Becerra et al. 2020, Hamid et al. 2017). Additionally, television is considered an influential way - if the content is of high quality - to inform climate change and other environmental issues as it has visual and audio effects attracting people (Otinga 2014).

Figure 9. *Sources of Climate Change Information*



Third Section: The Most Serious Problem in the Egyptian Society

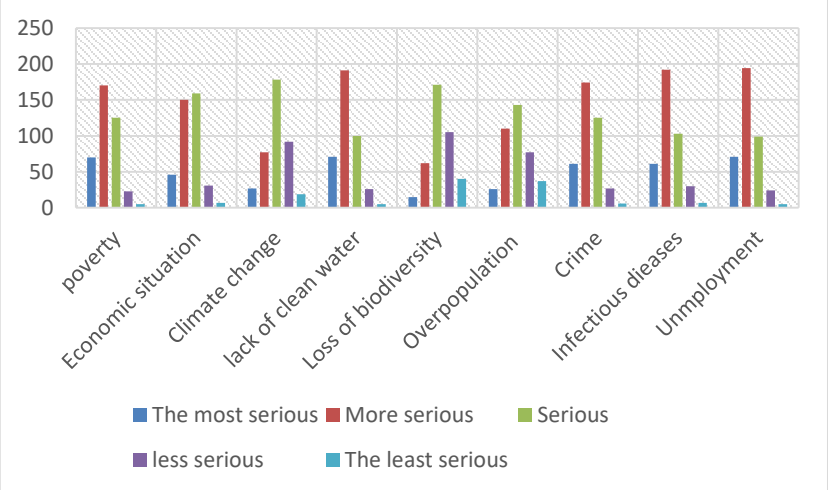
Table 4. *Shows their Opinions Regarding the Most Serious Issue Threatening Egyptian Society*

The problem	The most serious	More serious	Serious	Less serious	The least serious
Poverty	70	170	125	23	5
Economic situation	46	150	159	31	7
Climate change	27	77	178	92	19
Lack of clean water	71	191	100	26	5
Loss of biodiversity	15	62	171	105	40
Overpopulation	26	110	143	77	37
Crime	61	174	125	27	6
Infectious diseases	61	192	103	30	7
Unemployment	71	194	99	24	5

Figure 10 presents participants' views of climate change as a serious but not the most serious problem. Rather, the most serious problems are unemployment and lack of clean water, followed by poverty.

In my opinion, each young person has expressed his concrete fears that he suffers from in his daily life as the most serious problems and maybe expect that these problems will persist in the short term and threaten his well-being. As for the climate change problem, as was noted in the previous answer, about 60% of participants know little about climate change impacts on Egypt. Thus, the youth does not know that climate change in the long term may affect his well-being and even exacerbate the problems he currently fears, such as the lack of clean water, unemployment, and poverty.

Figure 10. *Participant's Classification for the Egyptian Society Problems in Terms of Severity*

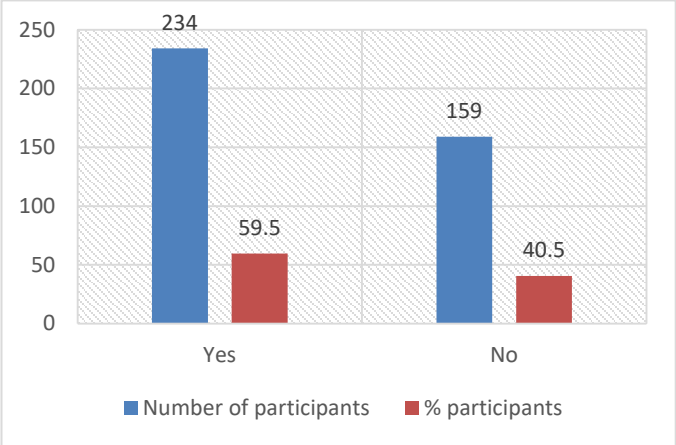


Fourth Section: Behavioral Aspects Analyzing Climate Action

Figure 11 shows if they had participated in activities to mitigate climate change, such as planting trees in Egypt's streets or rationalization of energy consumption via reducing the amount of energy used and using energy-saving appliances in their houses. The majority of participants indeed are positive persons and do actions to reduce emissions. It is worth noting that in recent years the Egyptian government has already encouraged consumers to use energy-saving lamps.

As known that electricity generation depends on burning fossil fuels that cause climate change. Encouraging the household is an important step as behavioral change households undertake may reduce more than 4% of the CO_2 emissions that are released as a result of residential energy demand. Motivate citizens to use energy-efficient appliances, which lead to energy savings (Lin 2015, Niamir and Filatova 2016).

Figure 11. *Engagement in Climate Change Mitigation Activities*



Whilst many countries have ambitious targets exist to raise renewables in many countries, social acceptance may be an obstacle to achieving this. Social acceptance means involving the public to make decisions regarding renewable projects (Zoellner et al. 2008). The public's decision-making depends on their perception of the potential costs, benefits, risks, and of the project. Renewable energy, for instance, wind and solar have many benefits: meeting electricity demand, sustainability, reducing emissions and providing job opportunities. Egypt seeks to implement its renewable strategy to achieve socio-economic benefits and mitigate climate change impacts too (Al-Salaymeh et al. 2016). Figure 12 shows if university youth are willing to pay more for energy produced from renewable energy. Acceptance is very auspicious, more than 80% would willing to pay if prices are reasonable and the sources are guaranteed.

Figure 12. *Participants' Opinions to Pay More for Renewable Energy*

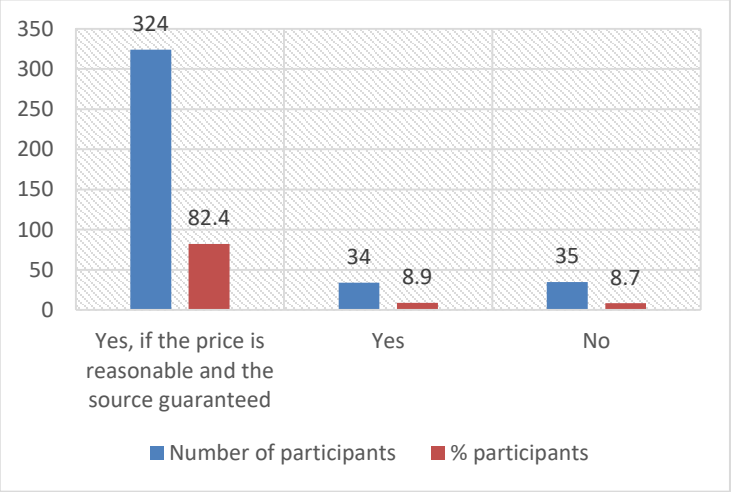
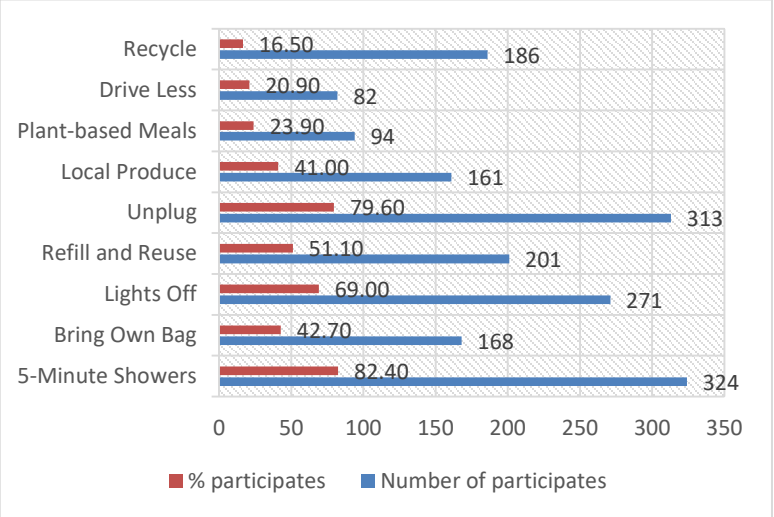


Figure 13 presents participants' responses to the United Nations 'Act Now' campaign for individual action on climate change and sustainability. This campaign's objective is to encourage individuals to preserve the environment and conduct simple actions to address climate challenges and build a more sustainable world. The results are promising and positive, meaning youth are aware of the importance of preserving the environment in relation to making daily decisions, such as saving energy and water and reusing materials.

Figure 13. *The Extent to Which Participants Responded to "Act Now" Campaign*

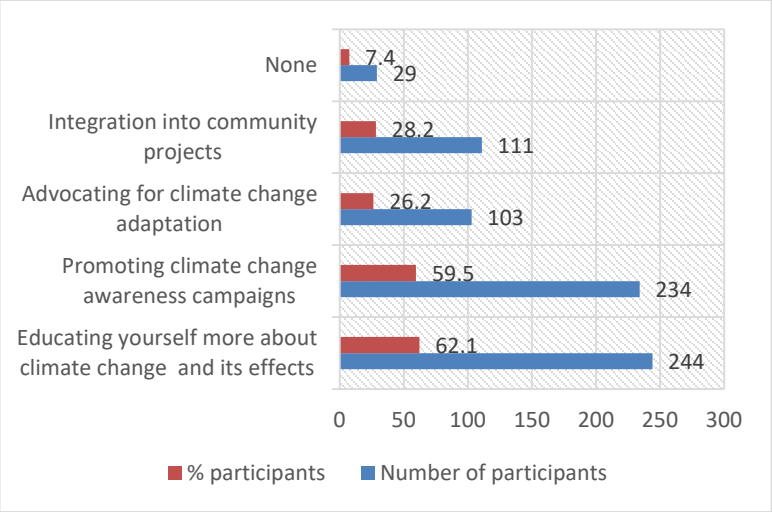


Youth is a fundament for each change. The majority of participants are positive and enthusiastic about climate action. Figure 14 expressed participants' future desires to participate in climate action in all possible ways. They prefer being an effective part of the community to implement projects that would mitigate or adapt to climate change, such as urban gardening, for instance.

Additionally, they preferred to be a part of campaigns to raise awareness of climate change. It is worth noting that Egypt has various environmental youth

initiatives, especially for climate change issues. They also want to educate themselves about the problem and its effects on Egypt.

Figure 14. *Respondents' Desires to Face Climate Change Impacts in Egypt*



Discussion

Achieving climate goals requires drastic changes in the ways of production and human lifestyles (Kang et al. 2020), creating awareness among young people would contribute to tackling the effects of climate change and related problems. As mentioned that radical changes in individuals' behavior would mitigate climate change impacts. That means that public opinion is important while developing effective climate policy. A study indicated that exposure to the Conference of the Parties (COP) news raises climate change awareness (Bakaki and Bernauer 2017). Thus, I think Egypt has a valuable opportunity to be aware of the public via various media means, as COP 24 will be held in Egypt in November 2022. Hence, this study was to assess awareness levels regarding climate change, so I conducted a questionnaire to provide information on their knowledge and attitudes to reinforce local mitigation.

This study indicated that the majority of participants were aware of climate change, meaning that government and individual efforts to develop environmental awareness have met with success. Some participants commented that heavy industrial releases, burning fuel, and cutting trees from the streets are among the human activities responsible for global warming exacerbation. They also mentioned the importance of including climate change lessons into both the tertiary and school education curriculum to create a good awareness. Actually, climate topics inclusion in educational programs and conducting classroom activities play an effective role in increasing awareness levels (Abuelgasim and Daiban 2017). In Nigeria, for instance, it was found that students who studied geography have a high-level aware level of climate change (Onuoha et al. 2021).

As a result of the high awareness level, they are involved positively to conserve the environment including but not limited to gardening, rationalizing energy and water consumption, and recycling. Among these youth may find teachers, agronomists, and others. Therefore, in my opinion, these youth's enthusiasm can be exploited and build their capacities to engage in raising awareness of the public, especially in rural areas.

Nudge is a method that aims to guide people's choices in specific directions. Improving public transportation infrastructure and using energy-saving appliances are examples of nudges. A nudge can change consumers' behaviors to reduce energy consumption, and thus minimize emissions as Thaler indicated in the Nudge theory by Richard H. Thaler (Thaler and Sunstein 2008). Thus, I recommend conducting studies about the effective actions toward sustainable consumption in Egypt.

Renewables play a significant role to mitigate climate change impacts, but climate change may affect them, too (Ebinger and Vergara 2011). Thus, I recommend conducting more research to assess climate change impacts on renewables in Egypt.

The most important source to get information about climate change is the Internet via "blogs, social media platforms, and YouTube", followed by television which can be exploited to increase environmental awareness levels and build their capacity.

Actually, access status to the Internet has improved; reaching 72% of the Egyptian population and 49% are active on social media platforms, especially Facebook (NAOS 2022, The World Bank 2020b). The digital divide among youth reduced in recent years as their usage of mobile phones to access the Internet (Badran 2014). In my opinion, the most appropriate means is YouTube if the content is simple with high quality. YouTube can display information, graphics, and pictures that all enhance the audience's understanding. Additionally, it is easy to follow up and interact with the content, whether by youth or the public. I recommend conducting futuristic studies about how the extent of the Internet's effectiveness to boost climate change awareness.

Participants have expressed concern regarding different problems in Egyptian society, rating the socio-economic problems such as unemployment as more serious than the environmental problems.

Conclusion

This study revealed that awareness levels about climate change are high among university youth, although some participants know nothing about the phenomenon and its impacts on their lives. Thus, there is a need for well-tailored awareness campaigns to raise environmental awareness, especially, regarding the climate change problem that would contribute to enhancing mitigative and adaptive capacity.

Raising the awareness process can be done in three ways. Firstly, integrating climate change topics into the educational curricula. Secondly, exploitation of

youth capabilities to conduct environmental initiatives to aware the public, especially in rural regions. Lastly, the Internet can be harnessed to conduct more environmental seminars to raise awareness levels, especially as it has become familiar to all students as part of academic activities after the COVID-19 crisis.

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