- ***Basic Research***

Impact of Awareness Program Regarding Health Consequences of Climate Change on Knowledge, Perception and Daily Life practices among Nursing Students

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Abstract

Introduction: Climate Change is an environmental impact of the recent and ongoing increase in the average temperature of earth surface and oceans. It could affect human health, plants, animals as well as governmental economies which lead to many negative consequences. A**im:** to evaluate the impact of awareness program on the knowledge, perception and daily life practices of nursing students regarding health consequences of climate change. ***Research design:*** a quasi-experimental design was conducted. ***Setting***: the study was conducted at the Faculty of Nursing, Modern University for Technology and Information (MTI). ***Sampling:*** A systematic random sample consists of 300 nursing students. ***Tools***: Self-administered questionnaires were used pre & post program implementation. ***1)*** Nursing students' socio-demographic characteristics and knowledge assessment questionnaire to assess the nursing students' knowledge. ***2)*** Modified perception likert scale questionnaire to assess students' perception. ***3)*** Daily life practices questionnaire to assess the nursing students' daily life practices. ***Results*** of this study indicated that, the mean age of nursing students was 20.2±1.58. There was an improvement in the total good knowledge level, positive perception and adequate daily life practices of nursing students regarding climate change after implementation of the awareness program (80.6%, 83.25% & 64.3%) with a highly statistically significant differences between pre & 3 months' post-test. Also, there was a positive highly statistical significant correlation between total daily life practices & perception of nursing students and their total knowledge level at P<0.001. ***Conclusion***: The awareness program proved a significant positive impact on the nursing students' total knowledge, perception and daily life practices regarding climate change. ***Recommendation*****:** Awareness programs should be conducted regularly for improving the university students' knowledge, perception & daily life practices regarding climate change.

Keywords: Climate Change, Knowledge, Perception, Daily life Practices, Health Consequences, Awareness Program & Nursing Students.

Introduction:

The environmental protection agency (EPA) outlined global warming (GW) as the recent and evolving temperature rise in earth surface *(NASA, 2021)*. The rise in average global temperature was happened since the commercial revolution. The world temperature has multiplied by regarding one Celsius (1.8 degrees Fahrenheit) since 1880 *(World Meteorological Organization, 2019)*. Warming as a current process; scientists expect the rise in average global temperature to be up a further 0.3 to 0.7 degrees Celsius (0.54–1.26 degrees Fahrenheit) through 2035. An environmental impact of the recent and ongoing increase in the average temperature of both earth surface and oceans was happened because of global warming which resulting in the global climate change (CC), *(EPA, 2021)*.

The greenhouse gases (GHGs) as (CO2) and methane naturally exist in the atmosphere and facilitate keeping the Earth's surface heat enough to sustain life. Without greenhouse gases, the predictable temperature on Earth would be zero Fahrenheit, rather than today's roughly 58.3 degrees Fahrenheit *(USDA Climate Hubs.2021)*. The following diagram shows the gradually increase in global temperature till 2020 and also focused on the warmest six years all over the world.

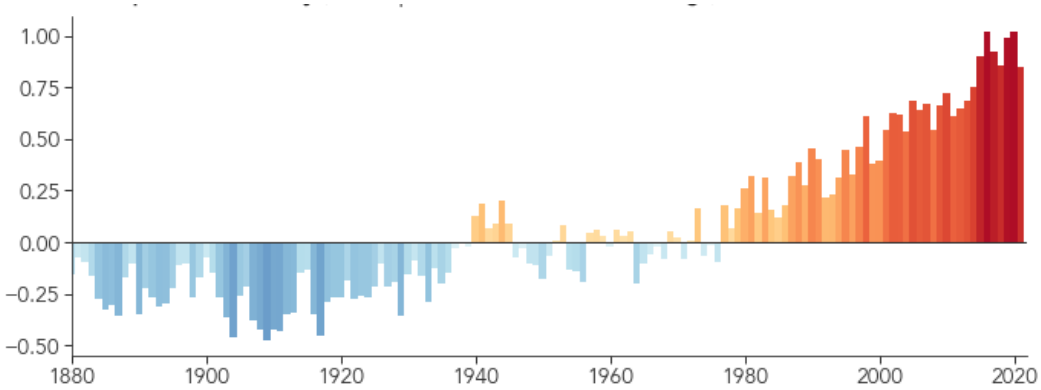


Fig 1. Gradually increasing in the global temperature (C°)

(National Centers for Environmental Information (NOAA), 2022)

Egypt is one of the extremely vulnerable countries that face CC and alternative varied threats to its economic, social, and environmental property together with energy, water, and food security. *(UNDP Egypt, 2020)*. The Egyptian Meteorological Service published a report that summer 2021 had seen an unprecedented rise in temperatures five years ago, with temperatures rising by an average of 3-4 degrees Celsius above normal. This prompted the Egyptian government to take more serious and effective actions, programs, and policies

to adapt to emerging climate changes and to counter its negative impacts on various economic sectors (*Al ahram center for political & strategic studies, 2021*).

In Egypt, the over population is one of the main causes that make the country extremely at risk to CC. Moreover, its densely inhabited Nile delta is seriously vulnerable by water level rise. Global climate change will also have its impact on citizens' health *(International Journal of Environmental Studies, 2022)*. The delta and therefore the slim depression of the Nile includes 5% of the realm of Egypt, however, has over 95% of its individuals and its agriculture. the subsequent areas, agriculture, coastal zones, aqua-culture and fisheries, water resources, human surround and settlements and human health area unit the foremost vulnerable so as of severity and certainty of results *(CDC, 2020).*

Human activities, particularly the burning of fossil fuels as coal, gas and oil to power vehicles, factories, and homes; result in unleash greenhouse gas and different gases into atmosphere. Different activities, as deforestation (cutting down trees) and raising livestock, conjointly emit greenhouse gases *(NOAA,2020)*. The more concentrations of these gases within the atmosphere lure additional heat on Earth, inflicting an evolution (human-caused) rise in global temperatures and CC therefore. Climate scientists agree that human activity/man created is the main cause behind the global warming we tend to area unit suffering *(NASA,2021)*.

This global dramatically CC increases the severity and chance of environmental issues as storms, floods, wildfires, droughts and warmth waves. Expected consequences of CC include a higher sea level, decrease in water level, negative agricultural impacts, food insufficiency and pressures on the national economy *(NOAA, 2022)*. According to the International Energy Agency, compliance with the terms of the global Paris Agreement declared that all the world governments need to spend $13.5 trillion by 2030, along with another $3 trillion to reduce earth temperature by 2 degrees Celsius to overcome CC (*International Energy Agency,2022).*

Climate Change (CC) can cause several serious alterations and eventually impacting human health. Those human health consequences include re-emergence of malaria, respiratory disorders, malnutrition, different heat disorders as heat stress and stroke, infectious diseases like vector-borne and waterborne diseases including gastrointestinal problems and mental health disorders as stress disorders and depression, which associated with natural disasters. The World Health Organization (WHO) reports that global CC is liable for a minimum of 150,000 deaths annually, a number that is expected to double by 2030. In Egypt, the heat wave of 2018 has killed around 65 citizens within three days when the temperature reached about 47°c (116F) *(UN, 2021)*. The following diagram displays the impact of CC on human health.

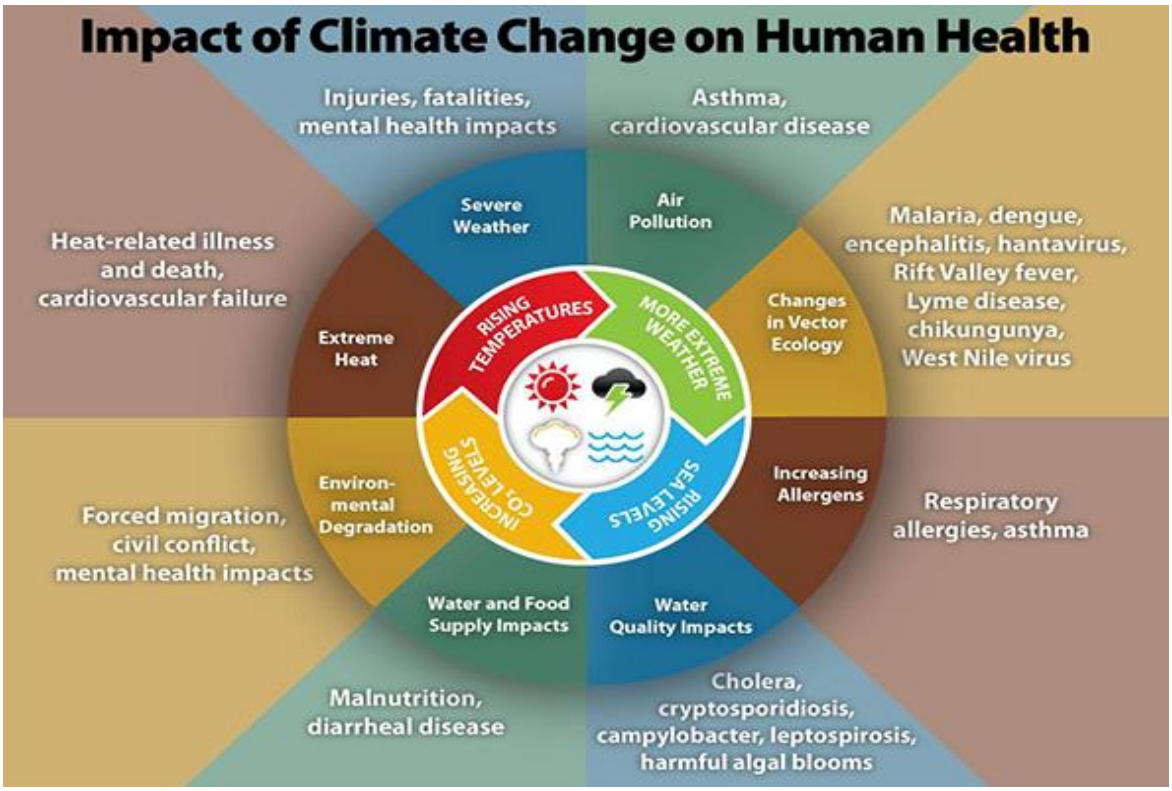


Fig 2. Impact of climate change on human health

*(**National Center for Environmental Health**, 2021)*

During Glasgow Climate Change Conference, the prime minister of United Kingdom (Mr/ Boris Johnson) issued a stern warning that if the world fails to limit rising temperatures, many cities could be underwater disappeared as Miami, Alexandria & Shanghai (*United Nations Climate Change Conference, 2021*).

Climate change experts declared that increase awareness specially in educational institutions can affect youth perception regarding the causes and effects of CC and its related alternative solutions. Improving the youth awareness and own perception related to CC could be reflected on many positive daily life practices for minimizing the great environmental and health consequences. Recently in Egypt, collaboration, and coordination of efforts between ministries of environmental affairs, health & education and other non-governmental agencies become obviously observable in different settings as universities and schools among different populations for improve their awareness, attitude and practices

regarding CC (*Al ahram center for political & strategic studies, 2021*). So that community health nurses and other public health specialists & officers ought to be equipped with high experience and take essential responsibilities in protecting populations from the damage of CC, because they are presupposed to play an important role in mitigating the health risks of CC *(WHO, 2021).* ***Eugene C., et al., 2020)*** investigated college students in terms of their existing knowledge and perception on CC and recommended to be studied in the university curriculum.

Significance of the study:

Egypt is always keen to develop and strengthen joint regional and international efforts in the fields of environment and climate, not only through participation, but also through the presidency of many conferences, negotiations and committees on environmental and climate issues both inside and outside Africa in coordination with the United Nations. Egypt applied to host the 27th session of the Conference of States Parties to the United Nations Convention on Climate Change (COP 27) in 2022 as a representative of the challenges, efforts and priorities of the African continent in the face of the climate change crisis *(Enterprise Ventures,2022).*

Nurses have a high level of recognition and trust within the society, additional to being bound by each clinical practices and professional ethics to handle considerations of their patients and forestall adverse health outcomes. Public health nurses have endeavored to possess a broad view on population health, in order that they will support the implementation of programs and policies in ways in which enhance physical and social environments at the local, national and international levels. Therefore, the preparedness of health professionals forms an important part of the world response to CC. University education could be a smart start line for preparing the health professionals *(International Journal of All Research Education and Scientific Methods (IJARESM), 2021).*

Aims of the study:

The aim of the study was to evaluate the impact of awareness program on knowledge, perception, and daily life practices of nursing students regarding health consequences of climate change through:

-Assessing the nursing students' knowledge level, perception, and daily life practices towards climate change.

-Designing and implementing of an awareness program about climate change (based on the identified pre assessment of nursing students' knowledge level, perception, and daily life practices).

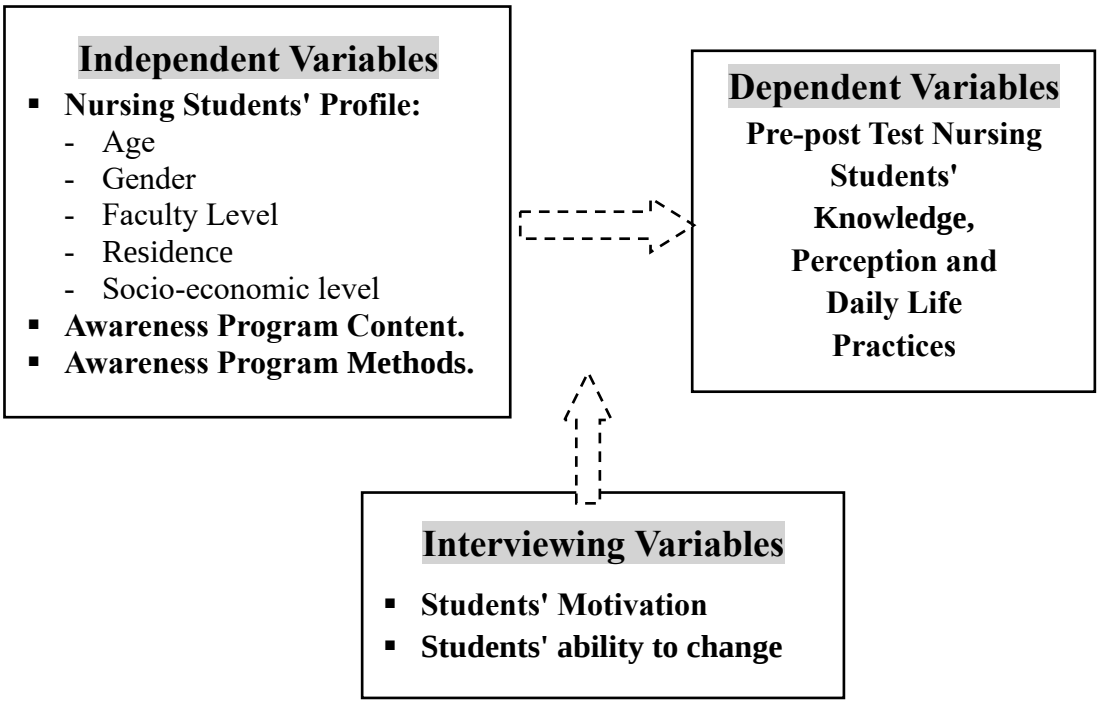
-Evaluating the impact of the awareness program on knowledge, perception, and daily life practices of nursing students' regarding climate change.

-Finding out significant relationships among study variables.

Research Hypothesis:

Implementation of the awareness program will positively change knowledge level, perception, and daily life practices of nursing students regarding climate change.

Research model:



Subject and methods:

Research Design: A quasi experimental quantitative design was used to evaluate the impact of the awareness program on the faculty of nursing students.

Setting: This study was conducted at the faculty of nursing Modern University for Technology and Information (MTI).

Subjects: A systematic random sample consists of 300 nursing students; selection of the subjects was done systematically every 4 students select one to reach 300 students. The sample size was calculated according to the following statistical formula:

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Technical Design:

:

First tool: **Self-administered questionnaires** were used for data collection as following

Part I: A structured questionnaire form was developed by the researchers, based on reviewing related literatures, written in English to assess the nursing students' socio-demographic data as age, gender, faculty level, residence and socio-economic level.

Part II: Pre-post knowledge assessment questionnaire, developed by the researchers depending on the related review of literature and mainly based on the study of *Liarakou et al, 2011*, to assess the nursing students' knowledge regarding CC. It consisted of 36 questions (16 true & false and 20 multiple choice) about basic facts about CC and its occurrence (4 items), factors contributing to CC, green-house gases effect & energy resources of pollution (15 items), effects of CC on environment and humans (8 items) and ways of reducing CC & sources of alternative energy (9 items).

Scoring system: Responses to each question was "correct," or "incorrect." A total score was calculated by the sum of correct answers and converted into a percent to be categorized into:

Poor knowledge <50%.

Average knowledge 50-70%.

Good knowledge >70%.

Second tool**: Pre-post perception assessment questionnaire**, developed by *(Netravathia & Chauhan 2014)*; to assess students' perception regarding CC. It is a Likert scale consisted of 24 statements, 6 statements for concern on CC, 6 statements for optimism on CC, 6 statements for sense of responsibility and other 6 statements for commitment on CC.

Scoring system: Responses to each statement were (agree, uncertain and disagree) by score (2, 1, 0). Total attitude score was summed up and converted into a percent to be considered:

Positive perception ≥60%.

Negative perception <60%.

Third tool: **Pre-post daily life practices questionnaire** to assess the nursing students' daily life practices which can lead to CC. It was developed by the researchers depending on the related review of literature. It consisted of 18 statements measuring the indoor, outdoor and work/school daily life practices.

Scoring system: Responses to each statement was "do," or "undo". A total score was calculated by the sum of done practices and then converted into a percent resulted in:

Inadequate practices <60%.

Adequate practices >60%.

Content validity: The knowledge assessment and daily life practices questionnaires were submitted to a group of 4 expertise in community health nursing and 3 medical expertise in community medicine to test the content validity. Result of content validity index (CVI) approved strong accepting for knowledge & daily life practices tools, with measuring score (0.87 & 0.83). The expertise group also reviewed the contents of the awareness program.

Reliability: The Cronbach's Alpha coefficient of the climate change knowledge and daily life practices tools was (0.86 & 0.82). Also reliability was done by using Cronbach's Alpha test which revealed that both tools consisted of relatively homogenous items by moderate to high reliability (0.81 & 0.79).

Ethical considerations:

Students were informed about the aim and process of the study. They also were informed about their right to refuse participation in the study and confidentiality was assured for all information provided. Then verbal approval was obtained from each student who agreed to participate before inclusion in the study. The ethical aspects were considered during data collecting process.

Statistical design:

Data entry and statistical analysis were done using SPSS 16.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and mean and standard deviation for the quantitative variables. Chi-square test (X2) was used to compare the qualitative categorical variables. Pearson rank

correlation coefficient analysis was used to assess the inter-relationships among ranked quantitative variables, at p-value <0.05 was considered significant.

Operational Design:

Preparatory Phase: A review of literature regarding current and past available literatures was done to cover the CC aspects. This was necessary for the researchers to be acquainted with the actual dimensions and magnitude of CC problem in Egypt and worldwide. It also guided in developing data collection tools and the contents of the awareness program.

Pilot Study: A pilot study was conducted before beginning of data collection. It was carried out on 10% of the total sample to investigate the tools' feasibility, clarity, applicability and simplicity then carrying out any needed modifications.

Field Work: The actual process of data collection was carried out within duration of 4 months from October 2021 to January 2022. Pre-test phase was conducted over one week. Based on the pre-test results, the study sample has been investigated. Implementation phase of the awareness program was lasted about two weeks. As well as 3 months from the finishing of the awareness program to the beginning of the post-test which conducted over one week.

Program construction:

The awareness program was conducted through three phases: assessment, implementation, and evaluation.

Assessment phase started by designing the awareness program by the researchers based on the results of the pre-program assessment (pre-test). The general objective of the program was to improve knowledge, perception and daily life practices of nursing students regarding CC. The program was planned to be conducted online through the Microsoft teams using a variety of online teaching methods as; lectures, group discussion and brain storming. Also, different online audiovisual aids would be such as; sharing pictures, posters, videos and power point slides.

Implementation phase was carried out for all the study participants through six online sessions over two weeks. The content of the awareness program was covering the nursing students' Knowledge regarding basic facts about CC and its occurrence, factors contributing to CC, effects of CC on environment and humans and solutions for reducing CC & sources of alternative energy. Also students' perception regarding concern on CC, optimism on CC, sense of responsibility and commitment on CC. As well as students' daily life practices as indoor and outdoor work/school daily life practices which could lead to CC.

Evaluation phase was done firstly through the pre-test before the program conduction, then finally after 3 months from the implementation phase to evaluate the impact of the awareness program on the nursing students by testing their knowledge, perception and daily life practices of nursing students regarding CC.

Results:

Table 1: shows that the mean age of nursing students was 20.2±1.58 and 60.0% of them were males. Regarding the faculty level, 27.7% of them were at first level. About 50.7% were living in rural areas, as well as 59.3% were living in a middle socio-economic class.

Figure 1: displays that 78.0% of the nursing students' opinion about ranking of the most observable environmental changes in Egypt was the temperature changes.

Table 2: reveals an increasing in the good knowledge score level of the nursing students regarding facts around CC, related factors, effects on human, effects on environment and ways for reduction by 10.3%, 9.3%, 10.3%, 8.0% & 10.0 through pre-test to 78.3%, 81.0%, 81.7%, 83.0% & 79.0 through post-test with a highly statistically significant difference ($p < 0.001$).

Figure 2: displays increasing in the total good knowledge score level of the nursing students regarding CC from 9.58% in pre-test to 80.6% in post-test, with a highly statistical significant difference ($p < 0.001$).

Table 3: illustrates a noticed improving in the nursing students' positive perception regarding CC concern, optimism, sense of responsibility and commitment from 40.0%, 35.7%, 24.0% & 12.7% through pre-test to 94.0%, 62.3%, 92.0% & 84.7% for post-test, with a highly statistical significant difference at $p < 0.001$.

Figure 3: indicates a highly statistical significant improvement in the total nursing students' positive perception from 28.1% to 83.25% at $p < 0.001$.

Table 4: clarifies improving in most aspects of nursing students' adequate daily life practices regarding CC as switching off appliances & lights, limit use of air condition, replacement of energy sources, limit use of domestic plastic products, walking & stairs instead of vehicle & elevator, decrease packaged foods, segregating of domestic waste and other practices by 90.8%, 89.7%, 89.2%, 77.0%, 62.7%, 74.3%, 70.7%, 73.0% and 72.3% with a highly statistical significant difference between pre-test and post-test phase ($p < 0.001$).

Figure 4: shows improving in the total nursing students' adequate daily life practices regarding CC from 13.0% in pre-test to 64.3% in post-test with a highly statistical significant difference at $p < 0.001$.

Table 5: shows a positive correlation between the post-test total nursing students' knowledge and their faculty level (r=.304), in addition to a positive correlation between post-test total nursing students' daily life practices & perception and their faculty level & gender by (r=.298 & r=.302) and (r=.296 & r=.307) at $p < 0.05$.

Table 6: reflects a highly positive correlation between the post-test total nursing students' knowledge score level and total daily life practices & perception (r=.938 & r=.797) at $p < 0.001$, but there was no relation through the pre-test phase.

Table 1: Distribution of the psoriatic people according to socio-demographic data and disease history (n=300):

Socio-demographic data	N	%
Age (years):		
- **18-20**	28	9.3
- **>20–22**	240	80.0
- **>22–24**	22	7.4
- **>24**	10	3.3
Mean±SD:	20.2±1.58	
Faculty level:		
- **First level**	83	27.7
- **Second level**	77	25.7
- **Third level**	67	22.3
- **Fourth level**	73	24.3
Gender:		
- **Male**	180	60.0
- **Female**	120	40.0
Residence:		
- **Urban**	148	49.3
- **Rural**	152	50.7
Socio-economic level:		
- **Low level**	64	21.3
- **Middle level**	178	59.3
- **High level**	42	19.4

Figure 3: Distribution of the nursing students' ranking of the most observable environmental changes in Egypt (at last 10 years) (n=300):

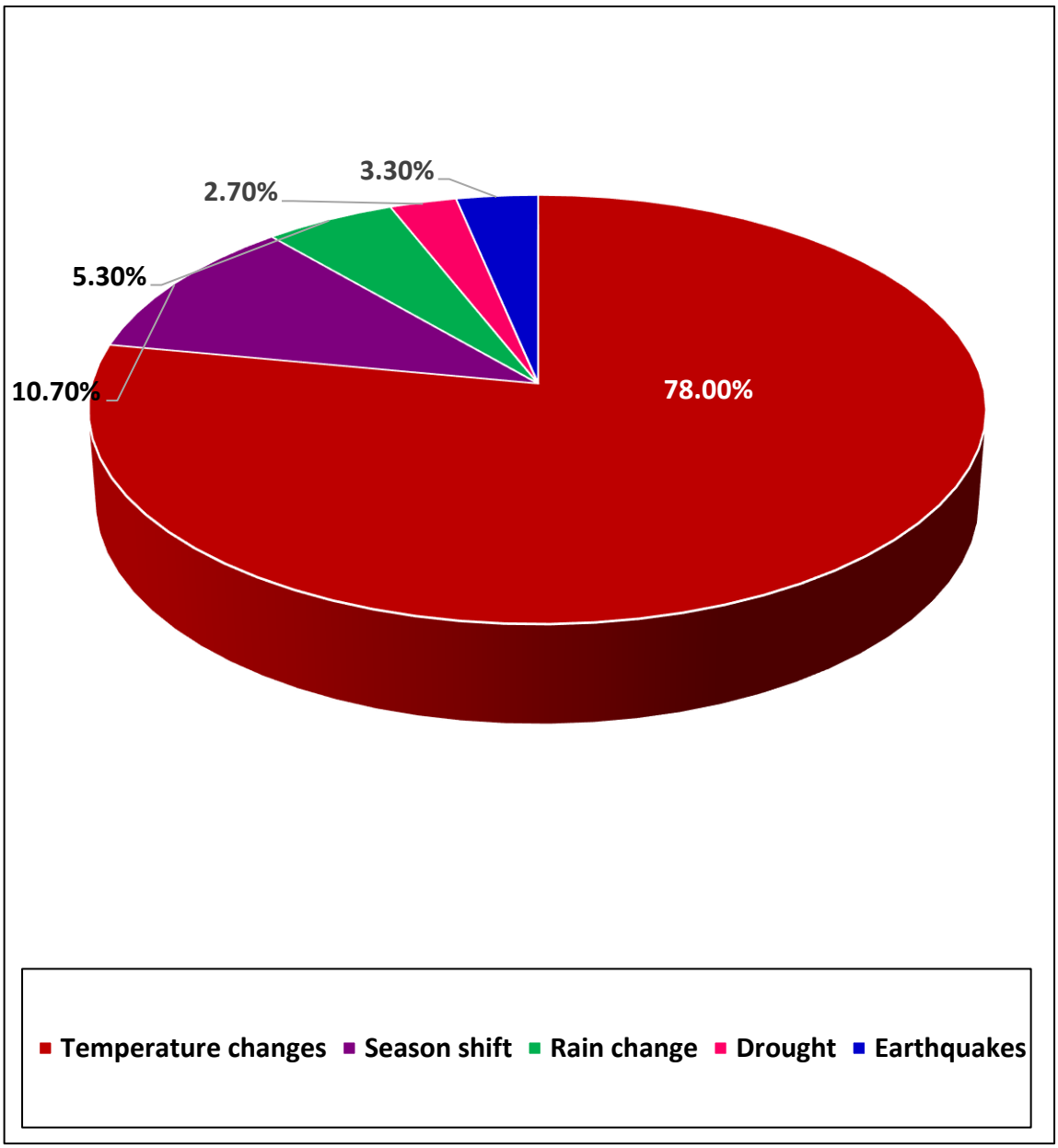


Table 2: Pre-posttest distribution of the nursing students according to knowledge categorical classification regarding climate change (n=300)

Knowledge categorical classification	Pre-test		Post-test		X2	P
	N	%	N	%		
Facts around climate change (definition and occurrence): Good Average Poor	31 42 227	10.3 14.0 75.7	235 36 29	78.3 12.0 9.7	25.012	.001
Factors contributing to climate change: Good Average Poor	28 34 238	9.3 11.3 79.3	243 32 25	81.0 10.7 8.3	28.516	.000
Effects of climate change:						
Effects of climate change on human health: Good Average Poor	31 33 236	10.3 11.0 78.7	245 25 30	81.7 8.3 10.0	29.556	.000
Effects of climate change on environment: Good Average Poor	24 29 247	8.0 9.7 82.3	249 31 20	83.0 10.3 6.7	37.966	.000
Ways for eliminating climate change: Good Average Poor	30 37 233	10.0 12.3 77.7	237 33 30	79.0 11.0 10.0	26.025	.000

Figure 4: Pre-post total knowledge score level of nursing students regarding climate change (n=300):

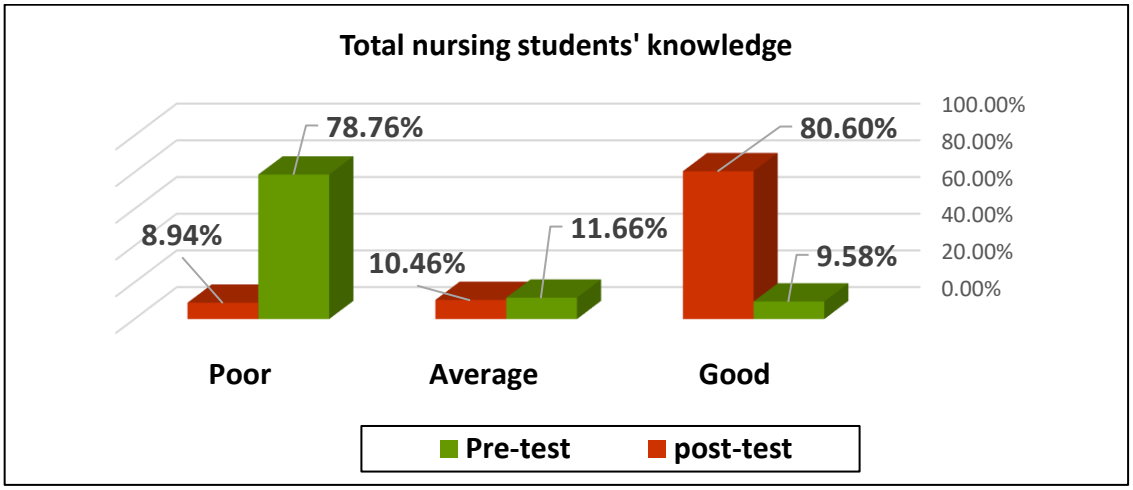


Table 3: Pre-post test distribution of the nursing students according to their perception classification regarding climate change (n=300):

Perception classification	Pre-test		Post-test		X2	P
	N	%	N	%		
Concern on climate change:						
- Positive attitude	120	40.0	282	94.0	29.712	.000
- Negative attitude	180	60.0	18	6.0		
Optimism on climate change:						
- Positive attitude	107	35.7	187	62.3	12.241	.000
- Negative attitude	193	64.3	113	37.7		
Sense of responsibility:						
- Positive attitude	72	24.0	276	92.0	27.981	.000
- Negative attitude	228	76.0	24	8.0		
Commitment on climate change:						
- Positive attitude	38	12.7	254	84.7	21.629	.000
- Negative attitude	262	87.3	46	15.3		

Figure 5: Pre-post total perception level of nursing students regarding climate change (n=300):

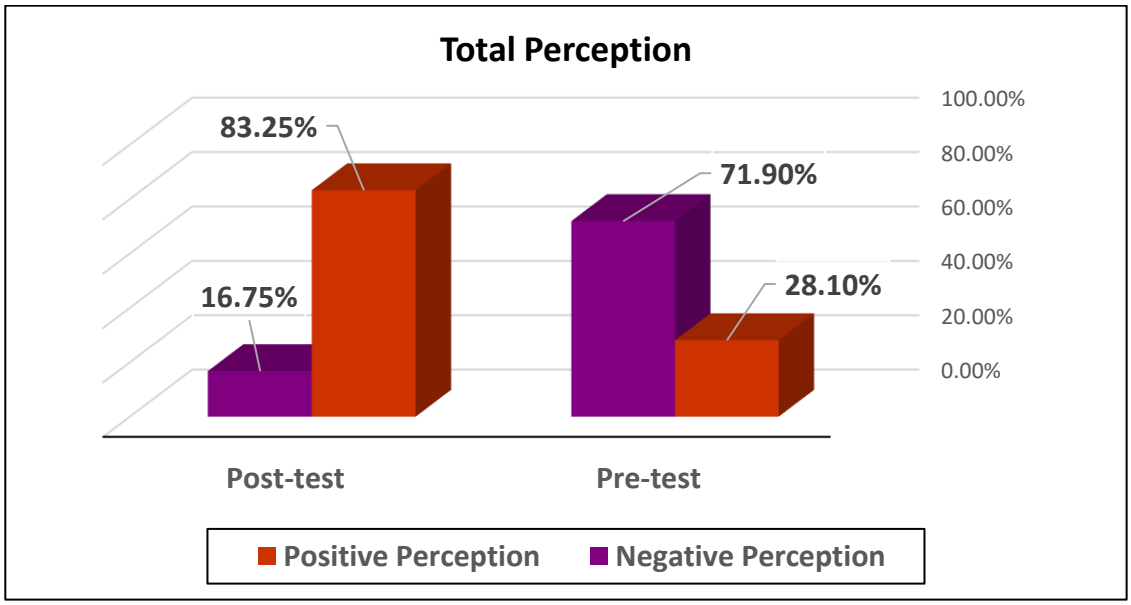


Table 4: Pre-post test distribution of the nursing students according to daily life practices for minimizing health consequences of climate change (n=300):

Daily life practices	Done practices				X2	P
	Pre-test		Post-test			
	N	%	N	%		
Indoor daily life practices:						
Switching-off home/work appliances (TV/ laptop/ computer) at the power point and not keeping on stand-by/screensaver mode.	42	14.0	271	90.3	24.095	.000
Switching-off lights when not in use.	39	13.0	269	89.7	16.249	.000
Replacement of regular incandescent lights with compact fluorescent lights.	41	13.7	231	77.0	18.195	.000
Limit using of air condition at summer. (n=148)	62	41.9	132	89.2	16.248	.000
Set air condition temperature at 24°C. (n=148)	60	40.5	122	82.4	22.516	.000
Use rechargeable batteries.	59	19.7	202	67.3	30.423	.000
Paying more for "green energy" as wind/solar.	44	14.7	190	63.3	24.519	.000
Decrease domestic plastic products.	27	9.0	188	62.7	23.891	.000
Use recyclable products.	45	15	175	58.3	6.586	.024
Segregating the wet & dry household waste.	37	12.3	217	72.3	17.201	.000
Outdoor daily life practices:						
Regular PUC for vehicles. (n=93)	21	22.6	85	91.4	25.054	.001
Use stairs instead of elevators.	22	7.3	212	70.7	21.133	.000
Walking for short distances rather than vehicles.	48	16	223	74.3	14.184	.000
Minimum use of papers.	39	13.0	207	69.0	20.918	.000
Use cloth/cartoon bags in shopping not plastic.	18	6.0	144	48.0	4.501	.034
Reduction in consumption of packaged foods.	51	17.0	219	73.0	16.631	.000
Participation in tree plantation drives.	29	9.7	176	58.7	7.021	.021
Participation in cleanliness drives.	19	6.3	98	32.7	2.541	.068

Figure 6: Pre-post total daily life practices of nursing students for minimizing health consequences of climate change (n=300):

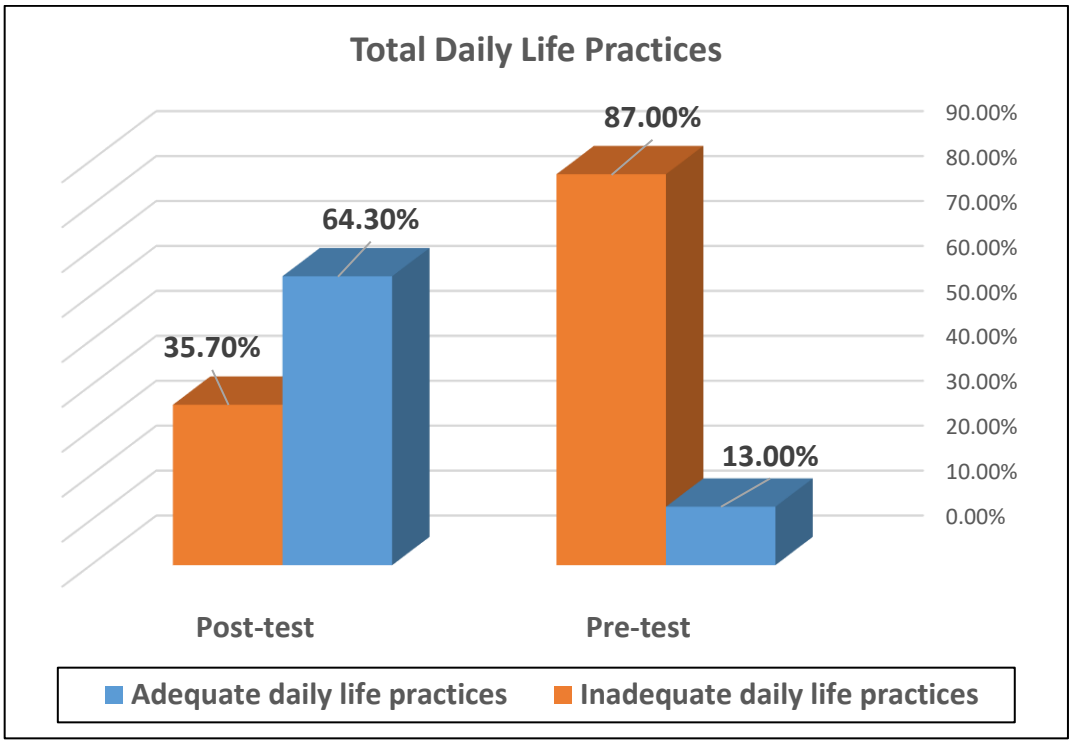


Table 5: Correlation between post-test nursing students' total knowledge, perception & daily life practices and socio-demographic data:

Socio-demographic data	Pearson correlation coefficient					
	Post-test					
	Knowledge		Perception		Practices	
	r	p	r	p	r	p
Age	.076	.433	.180	.081	.131	.088
Faculty level	.304	.01*	.296	.01*	.298	.01*
Gender	.188	.081	.307	.008*	.302	.009*
Residence	.018	.229	.104	.271	-.024-	.292
Socio-economic level	.120	.123	.020	.229	-.036	.704

(*) Correlation is significant at p<0.05

Table 6: Correlation between pre-post total knowledge of nursing students and total perception & daily life practices:

Socio-demographic data	Pearson correlation coefficient			
	Total knowledge			
	Pre-test		Post-test	
	r	p	r	p
Total Daily Life Practices	.065	.504	.938	.000**
Total Perception	-.035-	.697	.797	.000**

(**) Correlation is highly significant at p<0.001

Discussion:

Findings of the current study revealed that the mean age of nursing students was 20.2±1.58 and more than half of them were males, one quarter of them was at first level of faculty and were living in rural areas in a middle socio-economic class. Males nursing students in MTI were more than females at the last few years and most of them were living in rural areas outside of the great Cairo governorate which reflects the culture level of the Egyptian rural with their own traditions, beliefs, norms and other environmental violating practices.

These results were going with **Ibrahim et al., (2018),** who were conducted their cross-sectional study to assess Assuit university students' knowledge and attitude regarding global warming (1300 students). Their study sample was from 4 practical & theoretical faculties. They reported that socio-demographic characteristics of their study sample were characterized by mean age 20.08, more than half of them were males, living in rural areas in a middle socio-economic level. Another cross-sectional study by **Kah M. et al, (2021)**, conducted to assess causes, impact & solutions of CC among Gambia university students, reported that level four students were more than other levels especially in medical school and more than two thirds of them were males aged 21-25 years.

Concerning the nursing students' opinion of the present study regarding ranking of the most observable environmental problem in Egypt, they priority first rank of more than three quarters of them was weather temperature at the last 10 years. At the same line, the results of an online survey about climate change among citizens of the Republic of Macedonia assured the opinion of more than three quarters of them was regarding seasonal shift and surface temperature (**Bojovic D. & Dooel A., 2014**).

The present study results revealed an increasing in the good knowledge score level of the nursing students regarding facts around CC, related factors, effects on human, effects on environment and ways for reduction by more than three quarters of them after the implementation of the awareness program with a highly statistical significant differences.

Although the curriculum of community health nursing of the fourth level was containing a chapter about environmental health, the students' detailed knowledge about CC were still poor. Also shortage of CC awareness among indirect health education methods as TV/Radio are resulted in poor knowledgeable people regarding this sensitive global environmental issue. While, after implementation of the present study related awareness program regarding CC, the nursing students' total knowledge score level increased to be good for more than four fifth of them, which reflects the successfulness of the educational program.

These findings were slightly similar to the results of **Almulhim a., (2021)** who conducted a study to identify the level of knowledge and awareness of people living in Dammam in Saudi Arabia about CC, causes and impacts. **Almulhim a., (2021)** study results cleared that one third of the study sample had poor knowledge about the causes and impacts of CC. Also slightly above one quarter of the study participants had good knowledge level, understanding and awareness of CC.

Another study of **Kurup P. et al., (2021)** was conducted on the high school students in United Kingdom by using an inquiry intervention model, revealed that students developed a strong knowledge regarding awareness related to causes and effects of CC and global warming. Also **Freije et al., (2016)** primary survey study to assess Bahrain University students' global warming awareness, resulted in the fourth year students of the faculty of science were more knowledgeable regarding causes, effects and different solutions for CC more than other students.

Regarding the post-test nursing students' perception related to CC, the present study results recorded a noticed improving in their positive perception regarding CC concern, sense of responsibility and commitment on CC among the majority of them. In addition to nearly two thirds of them had a positive perception regarding optimism on CC to reach more than four fifth of the total study participants started to act a total positive perception after the implementation of the awareness program, with a highly statistical significant difference between the pre-test and post-test of perception results. This improvement in the nursing students' positive perception may be based on their overall improvement in knowledge and daily life practices regarding CC which help in modifying their behaviors towards environmental activities and appreciating the environmental issues.

Also **Ibrahim et al., (2018)** reported that the majority of their studied students had a total positive attitude regarding global warming and CC. Another results agreed with these findings by **Tiong et al., (2020)**, who detected that the majority of their study participants had a highly supportive level of pro-environmental attitudes, depending on strongly belief of more than two thirds of them in negative impact of pollution on human health. In addition to agreement in changing values which would help in solving some of environmental problems.

These results were in contrary with the study of **Adio-Moses & Aladejana, (2015)** who assessed the knowledge and awareness of global warming/CC among inhabitants of an urban community living in industrial areas in Nigeria as an African developing country. Their study revealed that only one-quarter of study participants had a positive attitude.

Concerning the post-test nursing students' daily life practices for minimizing CC, the findings of the present study clarified a noticed improving in their most of indoor & outdoor daily life practices and activities by more than four fifth of the study sample for switching off appliances & lights in case of not use; nearly three quarters of them for replacement of energy sources, limit use of domestic plastic products, walking & stairs instead of vehicle & elevator, decrease packaged foods, segregating of domestic waste and more than half of them for limit use of air conditioner with a highly statistical significant difference between pre-test and post-test phase because of the noticed increasing in their adequate daily life practices level for minimizing CC.

During implementation of the awareness program through an online group discussion with students, they suggested different possible daily life activities that can minimize the health consequences of CC. They said that planting more trees will affect positively on absorption of carbon dioxide and decrease its levels in atmosphere. Students also suggested some different alternative sources of clean energy and said that using public transportation could also reduce carbon dioxide levels, whereas driving cars could increase carbon dioxide levels. With a guidance and effective sessions with good participation from both researchers and students, we reached adequate total level of daily life practices by more than two thirds of the total sample. This adequate level of daily life practices will enable them to eliminate the hazards of CC and minimizing its health consequences.

The results of **Tiong et al., (2020)** also supported the current study results. **Tiong et al., (2020)** conducted their study on the university students in Northern region in the west side of Malaysia to identify the levels of students' environmental health knowledge, perceptions and practices. They detected a moderate overall students' practices regarding save electricity and daily using of water and papers, but less activities in recycling and/or other environmental activities and least participation in gardening or planting trees. As well as **Kurup P. et al., (2021)** study on high school students in United Kingdom resulted that majority of students shared in planting trees, use of alternative sources of energy, use public transports and walked rather than driving cars.

Based on the present study relations between different variables, it was found a positive correlation between the post-test total nursing students' knowledge and their faculty level, this may be as a result of gaining knowledge throughout the faculty academic learning. In addition to containing the fourth level curriculum on a chapter of environmental health which identifying some of the Egyptian environmental issues and WHO international

practical ways to live in a healthy environment. In addition to a positive correlation was detected between the post-test total nursing students' daily life practices & perception and their faculty level & gender, which reflected that female students were more committed to daily life practices and perception regarding CC. Also this results may have detected the importance of involving environmental issues and CC in the university curriculum.

These results were similar to **Ibrahim et al., (2018)** who resulted a significant difference between the academic year of the study participants and their total knowledge & attitude level concerning global warming/ CC. Results of **Freij et al., (2016)** in Bahrain and **Sah et al., (2015)** in India were similar to the current study results.

A highly positive correlation between total nursing students' knowledge level and daily life practices & perception through the post-test. These results were approved the research hypothesis that implementation of the awareness program already improved the knowledge, perception and daily life practices of nursing students regarding CC. **Ibrahim et al., (2018)** resulted in a positive correlation between total knowledge and attitude score regarding global warming/ CC. Also a moderate high positive correlation between the students' perception and attitude on CC and global warming **Tabago Lorelei C., (2016)**

Conclusion: The awareness program proved a significant positive impact on the nursing students' total knowledge level, perception and daily life practices regarding CC. Also there was a highly statistical significant correlation between nursing students' total knowledge score level and their perception & daily life practices regarding CC.

Recommendations: Awareness programs should be conducted regularly for improving the university students' knowledge which could positively affect their perception and daily life practices regarding CC. Also developing in the university curriculum by integrating more environmental issues as CC is necessary**.**

Acknowledgement: The authors grateful thank the nursing students for their effective participation in the study and also the academic staff who help authors through all phases of the study. In addition to many thanks for dean of the faculty of nursing for agreement to conduct this study on the faculty students.

Disclosure: The authors report no funding and no conflicts of interest for this work.

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الملخص العربي

تأثير برنامج توعوي عن الآثار الصحية للتغير المناخي على المعارف، الإدراك و ممارسات الحياة اليومية بين طلاب التمريض

مقدمه تغير المناخ هو التأثير البيئي للزيادة المستحدثة والمستمرة في معدل درجة حرارة سطح الأرض والمحيطات. والتي بدورها تؤثر على صحة الإنسان، النباتات، الحيوانات، إضافة إلى اقتصاد الحكومات مما قد يسفر عن آثار سلبية. **هدف الدراسة**: هو تقييم تأثير برنامج توعوي على المعارف، الإدراك و ممارسات الحياة اليومية لطلاب التمريض تجاه التغير المناخي. **تصميم الدراسة**: تم تطبيق تصميم تجريبي قبلي بعدي. **مكان الدراسة:** تم تطبيق الدراسة في كلية التمريض بالجامعة الحديثة للتكنولوجيا والمعلومات. **عينة البحث**: تم اختيار عينة عشوائية تتألف من 300 من طلاب كلية التمريض. **أدوات البحث**: تم استخدام استبيانات الملأ الذاتي قبل وبعد تنفيذ البرنامج التعليمي لاستيفاء بيانات البحث الخاصة بالمعارف، الإدراك وممارسات الحياة اليومية لطلاب التمريض تجاه التغير المناخي كما يلي: **1)** استبيان الخصائص الديموجرافية و استبيان لتقييم المعارف. **3)** مقياس تقييم الإدراك. **4)** استبيان تقييم ممارسات الحياة اليومية. أوضحت **نتائج الدراسة** أن معدل العمر لطلاب التمريض كان 20.2 سنة. كما أثبتت نتائج الدراسة تحسن في مجمل مستوى المعارف الجيد 80.6%، معدل الإدراك الإيجابي 83.25% و المستوى المناسب لممارسات الحياة اليومية لطلاب التمريض 64.3% تجاه التغير المناخي ، وذلك بعد تنفيذ البرنامج التوعوي مع وجود اختلاف ذات دلالة احصائية عالية بين النتائج قبل وبعد البرنامج. اتضح أيضا وجود علاقة إيجابية ذات دلالة احصائية عالية بين مستوى معارف الطلاب وممارساتهم وإدراكهم تجاه التغير المناخي. وكشف **استنتاج الدراسة** عن تأثير إيجابي لمعارف طلاب التمريض على ممارساتهم وإدراكهم تجاه التغير المناخي.

تتلخص **توصيات الدراسة** في ضرورة تطبيق برامج توعوية بانتظام لرفع مستوى معارف، إدراك وممارسات الحياة اليومية وسلوك طلاب الجامعة تجاه التغير المناخي.

كلمات مفتاحية: التغير المناخي، معارف، إدراك، ممارسات الحياة اليومية، برنامج توعوي، طلاب التمريض.