Effect of instructional Guidelines regarding Climate Change on Nurses' knowledge and its Relation to Environmental Sustainability Practice

Asmaa Mohamed Ahmed Maiz (1), Noha Mohamed Rashed (2), Gehan Awad Shetaway (3)

1) Assistant Professor of Nursing Administration Department Faculty of Nursing, South Valley University, Egypt
2) Nursing Administration department, Nursing College, Misr University for Since and Technology
3) Lecturer of Nursing Administration, Faculty of Nursing, Port Said University

Abstract

Background: Raising climate change awareness at the local level is critical as climate change impacts are exacerbating the number and extent of disasters in this disaster-prone country. So, nurses have a role to coach and inspire the public to play a role against climate change. **This study aimed to** evaluate the effect of instructional guidelines regarding climate change on nurses' knowledge and its relation to environmental sustainability practice**. Design:** A Quasi-experimental research design one group pre & post-test was utilized. **Setting:** The current study was conducted in Port Said Hospital. Datawere collected from Medical, Surgical, Critical Care Units, Obstetrics and Gynecology Unit Affiliated to Port Said Hospital. **Sample:** A convenient sample of nurses whowere working at the previously selected units in the hospital constituted the study sample who agreed to participate in the study at the time of data collection. **Tools:** Tool (I): A structured interview questionnaire and Tool (II): Environmental sustainability practice questionnaire. **Results:** showed that the majority of the nurses had little to no background information about climate change and their main sources of information were social media. The study also revealed that there was a significant difference in the nurses' knowledge and practice of climate change before and after implementing instructional guidelines. Additionally, the study found that there were significant differences in the student's knowledge and environmental practices before and after the implementation of instructional guidelines. The results also showed a positive correlation between knowledge and practice scores. **Conclusion:** Instructional guidelines implemented regarding climate change have a positive effect on improving nurses' knowledge and environmental sustainability practice**. Recommendations:** Develop workplace green teams, influence workplace practices, and policies, and educate patients and families on climate change and health to help provide care that is climate and environment-friendly. Establish strategies to encourage environmental sustainability in the workplace. In addition, the development of educational strategies to make nurses more aware of the importance of sustainability in nursing practice to mitigate the impact of climate change.

Keywords: Climate change, Environmental sustainability practice**,** Instructional guidelines, Nurses' knowledge**,**

Introduction:

According to the Environmental Protection Agency (EPA), global warming (GW) is the recent and ongoing increase in earth's surface temperature. The average world temperature has increased since the beginning of the commercial revolution. According to the **World Meteorological Organization (2019)**, the global temperature has increased by about one degree Celsius (1.8 degrees Fahrenheit) since 1880. The average world temperature is currently rising, and scientists predict that it will do so for another 0.3 to 0.7 degrees Celsius (0.54–1.26 degrees Fahrenheit) until 2035. Due to global warming and subsequent global climate change (CC), there has been an increase in the average temperature of the earth's surface and oceans, which has had an impact on the environment recently and continues to do so **(EPA, 2021).**

Methane and carbon dioxide, two naturally occurring greenhouse gases (GHGs), help maintain the Earth's surface temperature at a level that supports life. Earth's predicted temperature would be zero degrees Fahrenheit in the absence of greenhouse gases, as opposed to the current value of 58.3 degrees Fahrenheit **(Woodhall et al., 2021).**

Egypt is one of the most vulnerable nations, facing several challenges to its energy, water, and food security as well as to its economic, social, and environmental assets (United Nations Development Program. According to research from the Egyptian Meteorological Service, temperatures in the summer of 2021 will be increased by an astonishing 3–4 degrees Celsius above average, five years earlier than usual (**UNDP Egypt, 2020**). The Egyptian government was compelled by this to implement more serious and successful activities, programs, and policies to adapt to impending climate change and to mitigate its detrimental effects on a variety of economic sectors (**Al Ahram Center for Political & Strategic Studies, 2021**). Consequently, nurses and other healthcare providers face significant challenges during the delivery of care due to the impact of climate change. Healthcare facilities also often face disruptions to their operations in the form of power outages or flooding, which inhibit the delivery of high-quality care. On the other side, the sectors contributing the most to carbon emissions in the health system are hospital care (36%), physician and clinical services (12%), and prescription drugs (10%) (**World Health Organization (WHO), 2022**).

To achieve sustainability in underdeveloped nations, it is essential to raise knowledge about climate change. In underdeveloped nations, one of the biggest obstacles to climate change adaptation is a lack of understanding. Since the effects of climate change are intensifying the frequency and severity of disasters in this nation prone to disasters, it is imperative that local communities become more conscious of the issue. At number twelve in the globe, vulnerability to the effects of climate change is extremely high. The Environmental Protection Agency claims that (**EPA, 2021**), Global warming is characterized by a rise in earth's surface temperature that has occurred recently and continues to do so. The main factors causing this change in climate are greenhouse gases, which include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapor (H_2O), and fluorinated gases such as sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and per-fluorocarbons (PFCs). The threat posed by global warming is one of the world's most significant and pressing issues (**United Nations, 2021**).

Sustainability in nursing is conceptually related to the long-term goal of preserving a safe environment for current and future generations. The healthcare sector urgently has to become more ecologically responsible and sustainable, based on the moral obligation to implement a health-in-all-policies strategy (i.e., "first do no harm") (**Anåker et al., 2021**). Environmental sustainability is the responsibility to conserve natural resources and protect global ecosystems to support health, and well-being, now and in the future, and is crucial to protecting future generations' access to resources like clean water, air, and wildlife. The ultimate goal of environmental sustainability in nursing is to protect the environment without compromising prospects for optimal health, both now and in the future (**Moustafa & Elsabahy, 2022**). Environmental sustainability is a component of sustainable development.

By implementing sustainability practices in the healthcare industry, such as reducing overall waste volume, minimizing chemical waste, and educating patients about pollution prevention and toxics minimization, nurses and other healthcare professionals can support sustainability efforts. However, nurses must have a thorough awareness of their role in providing sustainable healthcare, as well as the ability to minimize the effects of climate change and create a sustainable environment (**Richardson et al., 2019**).

Form a green team at work: these teams promote environmental sustainability and concentrate on raising awareness through campaigns and education. Green teams usually begin by concentrating on one or two practical issues, such transportation, waste management, utility management, or sustainable food production. Think about Put recycling and recyclable sorting bins in easily accessible locations near rubbish containers. Implement a recycling and/or composting program and carry out workplace waste and recycling audits (**Law & Joanna, 2021**).

Cultivate a fresh, seasonal vegetable garden at your office. Engage patients and clients in conversation about climate change. Nurses may help patients see how vulnerable they are to it, as well as how friends and family are. Think About: Encourage patients to schedule an

appointment or join a webinar to learn more at regular learning sessions about health and climate change. As a reminder to patients, include notes and memoranda to the calendar about impending extreme weather events, such as heat waves, wildfires, and heavy rains that could result in flooding (**UNDP Egypt, 2020; Law; Joanna, 2021 & Martin, et al., 2021**). Additionally, share instructional resources in a more environmentally friendly way.

It is anticipated that nurses, and particularly scientific students, will have some of the greatest levels of climate change awareness effect among students in the formal educational pyramid. This is a significant predictor of the general public's level of understanding. Higher education students should set an example for all other educational levels by spreading awareness through education, which is the first line of defense in changing people's behavior and attitudes toward the environment (**Ayeni, 2019**).

Experts on climate change stated that raising awareness, particularly in educational institutions, can influence young people's perceptions of the causes, effects, and related potential solutions of climate change (**Eugene et al., 2020**). The mitigation of the significant environmental and health consequences can be achieved through a variety of positive daily practices that are reflected in the increased awareness and perception of climate change among young people. In an effort to increase people's knowledge, attitudes, and practices about climate change, the ministries of environmental affairs, health and education, and other nongovernmental organizations have recently begun collaborating and coordinating their efforts in Egypt. These efforts are being observed in a variety of settings, including universities and schools, among various populations (**Al Ahram center for political & strategic studies, 2021).**

Since they are expected to play a significant role in reducing the health risks associated with climate change, community health nurses and other public health specialists and officers should be highly experienced and assume essential responsibilities in protecting populations from its damage (**WHO, 2021**). Lastly, nurses have a powerful and important voice as leaders in the healthcare industry and the community. Given that climate change has a detrimental effect on both human well-being and environmental sustainability, nurses can take significant action now to lessen its effects by implementing sustainable practices and advocating for a more climate-resilient future (United States Environmental Protection Agency (**EPA, 2021**).

Significance of study:

Egypt's new vision for sustainability, dealing with the environment after the harmful effects of the coronavirus pandemic, and working to reconstruct the future, occurred while the environment minister participated in the meeting of the American Chamber. By communicating Egypt's goal of achieving green growth with the private sector and fostering a friendly climate Egypt as a representation of the challenges due to the catastrophe of climate change (**Enterprise Ventures, 2022).**

WHO, (2022) revealed that the greatest health hazard to humanity is climate change, which is predicted to result in an extra 250,000 deaths per year from its negative impact between 2030 and 2050. In addition, Climate change is anticipated to have a direct cost impact on health of USD 2-4 billion each year. In addition, (**UNDP Egypt, 2020**) found that the negative effects of climate change on environmental sustainability, such as "drought" or "water scarcity," hurt human health, placing a heavy strain on hospitals to care for those who are suffering from these effects; in light of this, healthcare systems must address climate change and its potential repercussions (**WHO, 2022**).

Rose, (2020) concluded that the nursing profession has a significant role in climate change and environmental sustainability as health promoters and providers of health care services; also, it is the largest consumer of supplies and equipment for delivering care. Nurses can prepare by establishing a green team at their place of work that promotes environmental sustainability and emphasizes greater awareness through training programs and initiatives, starting with waste management, transportation, or sustainable food production. Additionally, due to a lack of hospital resources, nurses must practice in more sustainable ways. Therefore, nurses must understand how climate

change impacts human health and how to deal with these possible health hazards.

Assessing climate change and sustainability awareness among staff nurses can help establish strategies to encourage environmental sustainability in their workplace and help them acquire advanced competencies relevant to environmental sustainability practice. Our thorough review of the literature reveals that no research has been done in Egypt on this topic involving nurses. In society, nurses are highly respected and trusted. They are also required by professional ethics and clinical practice to take patient care into account and prevent negative health effects. In order to assist the implementation of programs and policies that improve physical and social environments at the local, national, and international levels, public health nurses have worked to develop a wide perspective on population health. So, the researchers did this study to evaluate the effect of instructional guidelines regarding climate change on nurses' knowledge and its relation to environmental sustainability practice

Aim of the study:

The study aimed to evaluate the effect of instructional guidelines regarding climate change on nurses' knowledge and its relation to environmental sustainability practice through:

1.   Assess nurses' environmental sustainability practice
2.   Assess the nurses' knowledge regarding climate change pre-post program.
3.   Design instructional guidelines about climate change
4.   Implement instructional guidelines about climate change
5.   Identify the relationship between climate change and sustainability as perceived by nurses
6.   Determine the effect of instructional guidelines regarding climate change on nurses' knowledge and its relation to environmental sustainability practice

Research hypotheses:

Implementation of the instructional guidelines will improve the nurses' knowledge regarding climate change and their environmental sustainability practices.

Subjects and Method

Design:
Quasi-experimental research design one group pre & post-test was utilized.

Setting:
The current study was conducted in Port Said Hospital. Data were collected from Medical, Surgical, Critical Care Units, Obstetrics and Gynecology Unit Affiliated to Port Said Hospital.

Sample:
A convenient sample of 200 nurses who were working at the previously selected units in the hospital constituted the study sample who agreed to participate in the study at the time of data collection.

Tools for data collection:

Data were collected by utilizing the following two tools:

Tool (I): A structured interview questionnaire: It was developed by the researchers after a review of relevant recent literature (WHO), 2022; **Woodhall** et al., 2021; **AL-Mailam** et al., 2023). It is composed of two parts:

First part: Was designed to collect characteristics of the respondents such as age, gender, educational qualification, and years of experience.

Second part: The researchers created a pre-post knowledge evaluation questionnaire to gauge nurses' understanding about climate change, mostly drawing from the work of Liarakou et al. (2011) and a related review of the literature. It included 36 questions (16 true and false and 20 multiple-choice), covering topics such as basic facts about climate change and its occurrence (4 items), factors contributing to climate change, the effect of greenhouse gases and pollution on energy resources (15 items), the effects of climate change on the environment and people (8 items), and strategies for mitigating climate change and finding alternative energy sources (9 items).

Scoring system:

Concerning the pre- and post-instructional guidelines for nurses' knowledge assessment A right response received a score of 1, a wrong response received a score of 0, and knowledge that was less than 60% was deemed inadequate. A total score of 60% and higher was judged satisfactory.

Tool (II): Environmental sustainability practice questionnaire was developed by the researcher based on an extensive review including the work of **(Butterfield, et al, 2014; Kangasniemi et al, 2014; Martin et al., 2021).** It was used to assess the nurse's perception toward environmental sustainability practice, consists of seven dimensions covered by 26 items as follows; energy saving (6 items); carbon emission reduction(4 items); waste reduction(2 items); water recycling (2 items); economic sustainable practices (3 items); saving nurses (3items) and energy consumption nurses (6items).

Scoring system:

Respondents answered items against a three-point Likert scale ranging from one to three as follows (Agree=3, neutral =2, disagree=1). The scores of items were summed up, the total was divided by the number of items, and the calculation of the mean and standard deviation was done. The score was considered: high perception ≥60% and low perception<60%.

Procedure:

Field of work

From the beginning of February 2024 to the end of May 2024, actual data collecting took place over 4 months.

The study was done through the following three phases:

I: Preparatory phase:

Before starting up program design and planning, a review of the literature regarding current and past available literature was done to cover the "climate change and global warming" aspects. It also guided/directed the development of data collection tools and likewise the contents of the introduced educational program. It involved analysis of the collected data to identify the needs and demands of the participants and to identify the most important topics to be addressed in the educational materials.

Validity:

The study questionnaires` content validity was tested by a panel of five experts (two professors in the administration nursing department and three assistant professors in community health nursing) from the Faculty of Nursing. Each expert on the panel was asked to examine the questionnaire for content, coverage, clarity, wording, length, format, and overall appearance. No modifications were made based on the experts' opinions.

Reliability:

Reliability was tested using Cronbach's Alpha Coefficient for the two questionnaires. The results for the questionnaires are as follows, nursing knowledge about climate change was (0.79) and environmental sustainability practice questionnaire was (0.88).

Ethical consideration

The Scientific Ethics Committee of the Nursing Faculty of Port Said University granted ethical permission. Informed consent was obtained from the head nurses of the selected units. In addition, the nursing staff's agreements to be included in the study were obtained after an explanation of the nature and purpose of the study. Each nursing staff was free to either participate or not in this study and had the right to withdraw from the study at any time without any rationale. Also, they were informed that data would not be included in any further research without another new consent if they did not mind. The confidentiality and anonymity of each subject were assured through the coding of all data.

Pilot study:

Twenty nurses, or 10% of the current sample, participated in the pilot study to test the items' relevance and clarity as well as to gauge how long it would take to complete the questionnaire. The findings indicated that it took an average of twenty to twenty-five minutes to complete the questionnaire. The pilot study analysis was used to inform no changes to the questions. The number of study samples did not include the pilot study sample.

II: Implementation phase:

Permission was obtained from the hospital administrator after explaining the work nature. The study's aim and significance were illustrated for every eligible nurse to get her acceptance to participate and to theadministrator to ensure her cooperation during research implementation; also individual oral approval was gained from each participant after explaining the study's purpose. During data collection, the researcher handed the questionnaires individually to study participants at their units at different shifts and explained the answering way.

Based on the findings of the pre-test, the researchers first created the instructional instructions. The educational guidelines used to improve understanding of the following topics: the meaning of climate change, its occurrence, major environmental problems, factors contributing to climate change, health effects related to climate change, use of solar energy, accelerated global warming, gases that contributed to aggravating climate change, greenhouse gas effect and energy resources of pollution, dangers of increasing atmospheric carbon dioxide (CO_2), greenhouse gases' ability to reflect solar radiation back into space, methods of mitigating climate change, effects of climate change on the environment and humans, and methods of cur

Nurses' environmental sustainability practice, consists of seven dimensions as follows; energy saving; carbon emission reduction; waste reduction; water recycling; economic sustainable practices; saving nurses, and energy consumption nurses. by employing a range of instructional techniques, including brainstorming, group discussions, and lectures. Additional audiovisual tools include sharing images, posters, and movies.

III: Evaluation phase:

Nurses' knowledge and environmental sustainability practice were reassessed after the implementation of the instructional guidelines (posttest) using the previously mentioned tools and after one month to evaluate the effect of instructional guidelines regarding climate change on nurses' knowledge and its relation to environmental sustainability practice.

Administrative approval:

An official letter was issued to the Faculty of Nursing, Port Said University, and its ethical committee to obtain permission to conduct the study.

Statistical analysis

They use descriptive/qualitative statistics methods to determine the characteristics of the sample expressions/terms through obtaining/attaining frequencies and percentages, then Median, and IQR. Using statistical analysis methods to test the hypotheses of the study, which are Frequencies (Number& %) and "Z" parametric or "X2" "McNemar's Bowker", "Monte Carlo for Chi-square", and "Fisher Exact" non-parametric tests. Correlation between study variables through calculation of the correlation coefficient (Pearson) for the relationship between pairs of quantitative variables.

Results:

Table 1: Shows that more than half (50%) of staff nurses were in the age group 20-29 years old, and nearly half of them (46%) had technical nursing. besides 60% and more than half of the sample were female. Moreover, data in the table illustrate that 40% of staff nurses had fewer years of experience in the nursing profession.

Figure (1) illustrates that most nurses (90% of the studied sample) don't have any background knowledge about climate change.

Table (2) indicates that there was a significant ($P \le 0.001*$) difference and improvement between nurses' knowledge of pre- and post-instructional guidelines implemented regarding all items of climate change.

Table 3: Clarifies there was a significant at ($P \le 0.001*$) difference in mean scores between nurses' pre-, and post-instructional guidelines implementing regarding all dimensions of environmental sustainability practices.

Table (4) clarifies that 75% of the studied nurses had significant ($P < 0.001$) satisfactory knowledge of instructional guidelines implemented in comparison with

20% of instructional guidelines. Furthermore, high perception levels of Environmental sustainability practice significantly (P< 0.001) increased from 15% pre- to 64% post-instructional guidelines implementing.

Table 5 demonstrates the strong statistically significant positive connection (P<0.001*) found between nurses' views on climate change and their adoption of environmentally sustainable practices.

Table (1): Demographic data of the studied nurses (n=200)

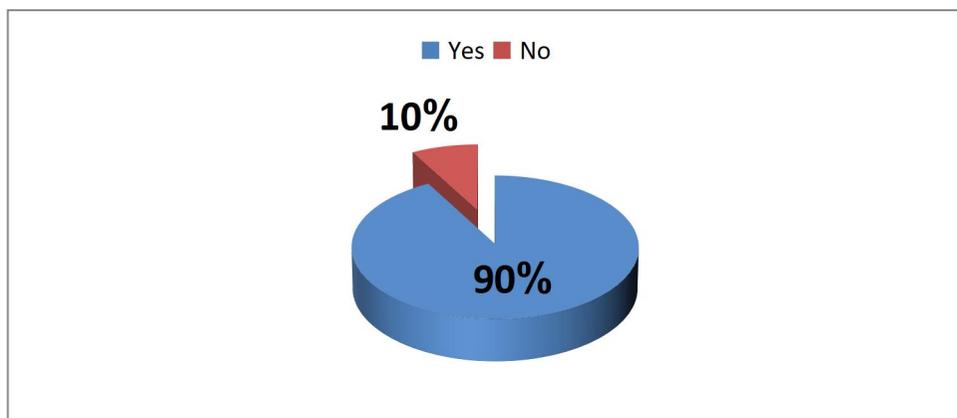| Items	No.	%
Gender		
Male	80	40.0
Female	120	60.0
Age		
20-29	100	50.0
30-39	70	35.0
40-49	16	8.0
50-59	14	7.0
Educational Qualification		
Nursing school	54	27.0
Technical institute	92	46.0
Bachelor	46	23.0
Postgraduate	8	4.0
Years of experience		
1-<5	80	40.0
5-<10	64	32.0
10-<15	18	9.0
15-<20	16	8.0
20+	22	11.0

Figure 1: Nurses' background knowledge regarding climate change

Table 2 Comparison between nurses' knowledge concerning climate change according to their correct answers pre and post-instructional guidelines implementing (n=200).

Items	Pre		Post		McNemar's
	N	%	N	%	P value
Climate change definition	60	30.0	160	80.0	≤ 0.001*
Causes of climate change	70	35.0	170	85.0	≤ 0.001*
Occurrence of climate change	50	25.0	174	87.0	≤ 0.001*
Effects of climate change on daily lives	52	26.0	156	78.0	≤ 0.001*
Effects of climate change on human health and the development of diseases?	66	33.0	140	70.0	< 0.001*
Factors contributing to Climate change	48	24.0	150	75.0	≤ 0.001*
Greenhouse gases effect	72	36.0	160	80.0	≤ 0.001*
Energy resources of pollution	56	28.0	166	83.0	≤ 0.001*
Governmental taking measures that would reduce global warming?	56	28.0	130	65.0	0.002*
Effects of Climate change on the environment and humans	60	30.0.	170	85.0	≤ 0.001*
Ways to reduce climate change	78	39.0	148	74.0	≤ 0.001*
Ways to protect ourselves from climate change	76	38.0	144	72.0	≤ 0.001*
Sources of alternative energy	64	32.0	160	80.0	≤ 0.001*

Significance level of P < 0.05.

Table (3): Mean scores differences of the studied nurses' environmental sustainability practices pre and post-instructional guidelines implementing (n=200).

Items	Pre	Post	P value
	Mean±SD	Mean±SD	
Environmental sustainability			
Energy saving	7.8±0.57	14.33±1.56	≤ 0.001*
Carbon Emission Reduction	6.5±0.78	10. 53±1.32	≤ 0.001*
Waste reduction	2.43±0.51	5.67±0.63	≤ 0.001*
Water recycling	3.6±0.93	7.83±0.76	≤ 0.001*
Saving nurses	4.54±0.74	8.33±0.22	≤ 0.001*
Economically sustainable practice	4.63±0.75	8.11±1.42	≤ 0.001*
Energy Consumption Nurses	9.64±0.85	15.89±3.42	≤ 0.001*

Table 4 Total Knowledge levels and environmental practices pre and post-instructional guidelines implementing (n=200).

Items	Pre		Post		Test P- value
	N	%	N	%	
Knowledge					
Unsatisfactory	160	80.0	50	25.0	≤ 0.001*#
Satisfactory	40	20.0	150	75.0	
Environmental sustainability Practice					
High perception	30	15.0	128	64.0	≤ 0.001*$
Low perception	170	85.0	72	36.0	

= Chi-squared test, pre-, and post-intervention; significance at P≤ 0.05.

Table (5): Pearson Correlation coefficients (r) between nurse's knowledge regarding climate change and environmental sustainability practice

Items	Knowledge regarding climate change		Environmental sustainability practice	
	r	P	r	P
Climate change	.638	0.001*		
Environmental sustainability practice	.737	0.001*	.759	_<0.001*

*Significant at p-value<0.05

Discussion

Nurses need to be prepared to work in a world where climate change is a reality and contribute to sustainable healthcare and society. Nurses' perspectives and experiences are critical to the continuous improvement of education. Understanding nurses' perspectives on sustainability, climate change, and their role in advocating for a more sustainable healthcare system is critical **(Anåker et al., 2021).** Climate change represents the single largest threat to global development with the potential to undermine the past 50 years of public health gains; conversely, nurses can make a powerful contribution to both mitigate climate change and support people and communities around the world to adapt to its impact's **watts et al, (2018).** Additionally, nurses are professionally obligated to practice in an environmentally safe and healthy manner, while promoting public health and advocating for the health and safety of all in our care. In addition to the many commitments nurses make, this obligation provides clear direction to reduce pollution from our practice.

Concerning the demographic data of the nurses, the current study discovered that more than half of the nurses were female. This could be explained by the fact that women make up the bulk of nurses employed in hospitals; nursing education used to be exclusively available to women

Regarding related qualifications, the current findings revealed that nearly half of nurses had technical nursing. This result may be explained by a lack of highly qualified nurses employed by hospitals who were always preoccupied with administrative tasks.

The current findings revealed that most nurses don't have any background knowledge about climate change. From the researchers' point of view, it confirmed the need for the studied nurses to implement instructional guidelines to improve their perceptions regarding climate change and environmental sustainability practices. This result from a researcher's perspective could be because they were unsure of nursing's precise role in mitigating climate change and there was a lack of clearly defined workplace policies for how to handle the effects of climate change and environmental sustainability practice. Furthermore, sustainability issues are not covered in nursing curricula, and the emphasis in nursing education is on saving lives rather than addressing climate change and sustainability. This current finding was congruent with the study of (**Otto et al., 2020; Shaw et al., 2021).** Who found that; most of the nurses have insufficient knowledge and weak perception regarding climate change and its impacts on health.

The current findings revealed that there was a significant difference and improvement between nurses' knowledge of pre-, and post-instructional guidelines implemented regarding all items of climate change. From the researcher's point of view, it reflected the positive effects of implementing instructional guidelines for nurses to improve their knowledge regarding climate change. Based on similar findings, a study by **Mulugeta et al., (2023)** showed that respondents' levels of awareness of the health effects of climate change were adequate. Similarly, **Álvarez-Nieto et al.'s** study **(2022)** showed that more than 95% of the studied sample had excellent or extremely satisfactory knowledge after completing a training program that used scenario-based learning and augmented reality related to sustainability, climate change, and health.

Further, **Almulhim (2021)** discovered that, in addition to the slightly over one quarter of

survey participants who claimed having high levels of knowledge, cognition, and awareness regarding climate change, almost a third of the sample had insufficient knowledge of the causes and impacts of the phenomenon.

. In contrast, research by **La Torre et al. (2017)** found that nurses perceived the nursing profession as having a clear role and responsibilities in engaging in the issue of climate change.

The result is also, matched with the study carried out by **(Attia, Wagdy 2022)** which implemented a training program regarding climate change and concluded that a highly statistically significant difference between the pre-test and post-test phases as a result of the observed rise in their level of adequate daily life activities for reducing climate change, as well about half of the study sample improved in their indoor and outdoor daily life practices and activities.

This result was similar to **(Buriro et al,2018)** which revealed that nurse's perceptions were strong about changing the climatic patterns that had harmful consequences on health and that diseases are sensitive to weather change, a huge number believed an increase in vector-borne, food-borne, water-borne and air-borne diseases may be due to global warming.

The current findings revealed that there was a significant difference in mean scores between nurses' pre and post-instructional guidelines implementation regarding all dimensions of environmental sustainability practices. From the researcher's point of view, it is related to the success of implementing instructional guidelines for nurses to improve their environmental sustainability practices. According to **Tiong et al., (2020)**, **Similarly, Reddy, et al., (2022) and Mulugeta et al.,** findings **(2023)**, revealed the same results.

This could be explained by the fact that nurses play a crucial role in implementing sustainable practices to maintain an environment that doesn't harm future generations, however, there are no clear workplace policies to guide them in this practice and they are unaware of their responsibility to reduce workplace environmental hazards to make the workplace more sustainable. Furthermore, hospital management did not conduct any training sessions for the staff nurses on the greatest threat the world is currently facing.

This was supported by **(Anåker, Spante, & Elf 2021)** whose findings declared that nurses have a fundamental need to address climate and environmental challenges, but that responsibility was overwhelmed by other job demands that seen as more significant than establishing an environmentally sustainable approach to providing care **Aronsson et al. (2020)** affirmed that climate change affects people's health and our ability to deliver healthcare, on both a practical and policy level, nurses will need to be prepared to adapt to new challenges.

Also congruent with the study **(Tekbiyik & Celik, 2019)** who emphasize that many disciplines and organizations should be responsible for promoting awareness of sustainable development and its sub-dimensions. Moreover, concurrence with **Ebrahim et al. (2022)** who concluded that a higher means scores of nursing knowledge, attitude, and behavior toward sustainability development post-training intervention for them.

It agreed with **Borges (2019)** who revealed that the results obtained showed the existence of positive awareness and attitudes concerning sustainable development. **Hence, Practice Green Health, (2020),** concluded that nurses could play an important role in the stewardship of patient supplies and ensuring that waste related to patient care, is placed in the proper receptacle. Regulated medical waste or "red bag trash" requires additional treatment in the form of chemical or heat sterilization or incineration. These treatments require additional energy use which results in additional costs to the hospital. Placing items that are required in the "red bag trash," hospitals' costs are reduced, there is a reduction in energy expenditure, and there is potential for fewer environmental toxicants released into the community.

According to **Cruz et al. (2018)** stated that raising nurses' awareness of sustainability and climate change may motivate them to engage in sustainable practices like waste disposal in the clinical setting **(Nichols & Mukonoweshuro, 2017; Aronsson et al., 2020)**. They also suggested that educational sessions highlighting the significance of sustainability and climate revolution to health and health care may inspire nurses to question unethical treatment practices.

The current findings revealed that three-quarters of the studied nurses had significantly satisfactory knowledge of instructional guidelines implemented in comparison with a fifth pre-instructional guideline implementation. Furthermore, high perception levels of Environmental sustainability practice significantly increased post-instructional guidelines implementation. This can be used as a trigger to get health science nurses talking about climate change and other environmental issues that may be more broadly related to public health. In the study area may be involved in environmental protection activities where they may learn about health issues associated with climate change, which could be a likely explanation for this this better knowledge could be related to the public awareness campaigns in our study region compared to the lower public awareness accomplished in Ghana, the counter-study area.

The current findings revealed that there was a highly statistically positive correlation between nurses' perceptions of climate change and environmental sustainability practice. This result could be explained with that environmental sustainability practice was crucial in reducing the impacts of climate change and can assist nurses in overcoming challenging unsustainable clinical practice. Along with that, staff nurses may be aware of the notion of global climate change, but they may not be aware of their specific responsibilities and their relationship to sustainability and climate change since they may lack the time or education to perceive it as the primary significance of nursing. This is congruent with Sustainable Development Goal 13 is climate action. This goal aims to combat the impacts of climate change by enhancing education and awareness of climate change and its effects **(EPA, 2021)**. **(Buriro et al, 2018)** Overall nurses' knowledge and perception were weak regarding climate and its adverse effects on health and institutional and government sources were lacking.

Added to that, contrasted with **(Anåker et al., 2021)** whose qualitative study concluded that there was an incongruence between environmental and climate change challenges and nurses' day-to-day responsibilities. Although being environmentally sustainable is not the main goal in lifesaving, hectic, and financially challenging situations, nurses regard their profession as including responsibility, opportunities, and a sense of personal commitment to positively impact the environment adequately. While contradicted by **Hassan et al. (2022)** who revealed that there was a significant and negative effect between the implementation of sustainable practices and the challenges of implementing sustainable practices.

Accordingly, staff nurses must be equipped to act in a world that is confronting climate change and to contribute to environmentally friendly healthcare and community **(Sperstad et al., 2020)**. Similarly, **Aronsson et al. (2020)** highlighted that sustainability training that was centered on sustainability can help nurses implement change management and sustainability development.

Conclusion:

From the findings of the present study, it can be concluded that Instructional guidelines regarding climate change have a positive effect on improving nurses' knowledge and environmental sustainability practice**.**

Recommendation:

Based on the current study findings, it can be recommended that:

- Develop workplace green teams, and influence workplace practices and policies.
- Educate nurses on climate change and health to help provide care that is climate and environment-friendly.
- Develop educational initiatives to increase nurses' awareness of the significance of sustainability in nursing practice to lessen the impact of climate change.
- Establish workplace policies that support environmental sustainability.
- Conducting the study again with a larger sample size in a different setting in order to confirm and generalize the findings.

References:

- **Al Ahram Center for Political & Strategic Studies (ACPSS 2021).** In the fourth edition of its annual report, 40

Egyptian and Arab experts and researchers offer their predictions for the future of the world, the Middle East, and Egypt. Available at https://english.ahram.org.eg / News /454391.Accessed on 1/1/2022.

- **AL-Mailam M., Arkesh, J. and Hamzawy A. (2023).** Climate Change in Egypt: Opportunities andObstacles.

- **Almulhim A., (2021).** Public knowledge and perception of climate change and global warming in the context of environmental challenges and policies in Saudi Arabia. Conference Paper· December 2021.DOI: 10.2495/SC210471

- **Álvarez-Nieto C., Álvarez-García C., Parra-Anguita L., Sanz-Martos S. and López-Medina I. (2022).** Effectiveness of scenario-based learning and augmented reality for nursing students' attitudes and awareness toward climate change and sustainability. *BMC Nurs*., 21, 245. https://doi.org/10.1186/s12912-022-01023-9.

- **Anåker, A., Spante, M., & Elf, M. (2021).** Nursing students' perception of climate change and sustainability actions – A mismatched discourse: A qualitative, descriptive exploratory study. *Nurse Education Today*, 105, 105028. https://doi.org/10.1016/j.nedt.2021.105028

- **Aronsson, J., Clarke, D., Grose, J., Richardson, J. (2020).** Student nurses exposed to sustainability education can challenge practice: a cohort study. Nurse Health Science Journal 22 (3), 803–811.

- **Attia, Z & Wagdy, A. (2022).** Impact of Awareness Program Regarding Health Consequences of Climate Change on Knowledge, Perception and Daily Life Practices among Nursing Students. Egyptian *Journal of Nursing & Health Sciences.3* (1). 2682-2563

- **Ayeni, O. (2019):** The influence of socio-demographic factors on environmental education. Awareness of first-year students at the Cape Peninsula University of Technology, South Africa. South Africa. *Int. J. Sci. Soc*. 5, www.sciencesociety.com, ISSN 1836- 6236.

- **Borges, F. (2019).** Knowledge, attitudes, and Behaviours concerning sustainable development: A study among prospective elementary teachers. Higher Education Studies, 9 (2), 22–32. https://doi.org /10.5539 /hes.v9n2p22.

- **Buriro NA, Mureed S, Kumar R, Ahmed F, Hussain K, Fatima A. (2018).** Nurses' Perception, Knowledge, and Information Sources on Climate Change and Health at Dow University Hospital Karachi. *J Liaquat Uni Med Health Sc*i. 17(04):265-71. doi: 10.22442/jlumhs.181740590

- **Butterfield, P, Schenk, E, Eide, P, Hahn, L, Postma, J, Fitzgerald, C, and Oneal, G. (2014).** Implementing AACN's Recommendations for Environmental Sustainability in Colleges of Nursing: From Concept to Impact. *Journal of Professional Nursing,* 30 (3). 196-202.

- **Cruz, J.P., Felicilda-Reynaldo, R.F.D., Alshammari, F., Alquwez, N., Alicante, J.G., Obaid, K.B., Silang, J., (2018).** Factors influencing Arab nursing students' attitudes toward climate change and environmental sustainability and their inclusion in nursing curricula. *Public Health Nurs*. 35 (6), 598–605.

- **Ebrahim Elshall, S., Samir Darwish, S., & Mohamed Shokry, W. (2022).** The effectiveness of educational interventions about sustainable development among nursing students. *Egyptian Journal of Health Care*, 13(1), 294–310. https://doi. org/ 10. 21608/ ejhc. 2022.216641.

- **Enterprise Ventures, (2022).** Economy, and reporting frameworks and guidelines Climate Change, Carbon, and Natural Resources Management. Retrieved from 3347-Article Text- 16394-2-10-20200302.pdf.

- **Eugene C., Cordero, Centeno D., Todd AM., (2020):** The role of climate change education on individual lifetime carbon emissions plus ONE 15(2):e0206266 DOI:10.1371/*journal.pone*.0206266, February 2020 https://doi.org/10.1371/journal.pone.0206266

- **Hassan, M., Wafy, O., Hewedi, M., & Ali, A. (2022).** Challenges of implementing sustainable practices in purchasing process management: A case study on one

of the five-star hotel chains in Cairo. Journal of Association of Arab Universities for Tourism and Hospitality, 22(1), 200–220. https://doi. org/10.2 1608 /jaauth. 2022.114975.1285

- **International Journal of Environmental Studies, (2019):** Population growth, electricity demand and environmental sustainability in Nigeria: insights from a vector autoregressive approach. *International Journal of Environmental Studies,* Volume 79, Issue 1 (2022)

- **Kangasniemi, M., Kallio, H., & Pietilä, A. M. (2014).** Towards environmentally responsible nursing: A critical interpretive synthesis. *Journal of Advanced Nursing*, 70 (7), 1465–1478. https://doi.org/10.1111/jan.12347

- **La Torre, G., Baer, A. D. P., Sestili, C., Cocchiara, R. A., Barbato, D., Mannocci, A., & Del Cimmuto, A. (2020).** Knowledge and perception about climate change among healthcare professionals and students: A cross-sectional study. Southeastern European *Journal of Public Health* (SEEJPH), 8, 1-19. DOI:10.4119/seejph-3347.

- Law, Joanna. (2021). Canadian Assn of Nurses for the Environment (CANE) and Canadian Coal. for Green Health Care (CCGHC). 'Health Care Green Teams in Canada: A National Picture' [video]. Available at https://greenhealthcare.ca/greenteam/. Accessed on 1/1/2022.

- **Liarakou G., Athanasiadis I. and Gavrilakis G. (2011).** What do Greek secondary school students believe about climate change? *Int. J. Environ. Sci.* Educ., 6 (1):79-98.

- **Martin, Wanda, Vold, & Lindsey. (2019).** Climate Change and Health: It's Time for Nurses to Act.' June 2019; Canadian Association of Physicians for the Environment (CAPE). 'Climate Change Toolkit for Health Professionals: Factsheet: Global Health Impacts of Climate Change. Canadian Federation of Nurses Unions (CFNU). Available at

- **Moustafa Saleh, M. S., & Elsabahy, H. E. s. (2022).** Integrating sustainability development education program in nursing to challenge practice among nursing interns in health care. *Journal of Nursing Management,* 1–11. https://doi.org/10.1111/jonm.13869

- **Mulugeta G., Malede A., Gizeyatu A., Adane M., Embrandri A., Keleb A., Berihun G., Kassa A., Wegayehu B., Abebe G., Zewde T., Debela S., Seyoum S., Luke A., Wondaya G., Kidie A.,Moges M. and Gebrehiwot M. (2023).** Knowledge towards the Health Impacts of Climate Change and its Associated Factors among Community of Amhara Sayint District, Northeastern Ethiopia, 2022. Research square: June 15th, 2. DOI: https://doi.org/10.21203/rs.3.rs- 3035805/v1.

- **Nicholas, P.K., Breakey, S., (2017**). Climate change, climate justice, and environmental health: implications for the nursing profession. *J. Nurs. Scholarsh*. 49 (6), 606–616

- **Otto, I.M., Donges, J.F., Cremades, R., Bhowmik, A., Hewitt, R.J., Lucht, W., Schellnhuber, H.J., (2020).** Social tipping dynamics for stabilizing Earth's climate by 2050. Proceedings of the National Academy of Sciences U S 117 (5), 2354–2365.

- **Practice Green health. (2020).** Waste: Understand hospital waste streams, how to measure them, and how to reduce waste at your facility. Retrieved from: https://practicegreenhealth.org/topics/waste/ was te-0

- **Reddy G., Rajamouli J., Arora K., Jothula K., Amaravadi S. and Boda A. (2022).** Knowledge, perceptions, and practices of medical students towards climate change and global warming: A cross-sectional study. *J Family Med Prim Care,* 11:2557-64.

- **Richardson, J., Grose, J., Nelmes, P., Parra, G., & Linares, M. (2019).** Tweet if you want to be sustainable: A thematic analysis of a Twitter chat to discuss environmental sustainability in nurse education. *Journal of Advanced Nursing*, 72(5), 1086–1096.

- **Rose, G. (2020).** Can nurses reduce the environmental impact of healthcare?, Clinical Practice Discussion Sustainability, 116 (9), 29 -31.

- **Shaw, E., Walpole, S., McLean, M.,**

Alvarez- Nieto, C., Barna, S., Bazin, K., Behrens, G., Chase, H., Duane, B., el Omrani, O., Elf, M., Farron Guzmán, C. A., Falceto de Barros, E., Gibbs, T. J., Groome, J., Hackett, F., Harden, J., Hothersall, E. J., Hourihane, M., Woollard, **R. (2021).** AMEE consensus statement: Planetary health and education for sustainable healthcare. Medical Teacher, 43(3), 272–286. https://doi.org/10.1080/0142159X.2020.1860 20 7

- **Sperstad, R., Pehler, S.R., Ackerson.S, Brunsell, Gyorog, Sisto., H. (2020).** Student voices during action research impact outcomes in the nursing quality improvement project.*J. Nurs. Educ.*, 59 (1). 42-45. View PDF- CrossRef View Record in Scopus Google Scholar.

- **Tekbiyik, A., & Celik, M. (2019).** Education for sustainable development in primary school: Improvement of students' ecocriticism skills. *Journal of Education in Science Environment and Health*, 5(2), 178-191. https://doi.org/10.21891/jeseh.568716.

- **Tiong C., Lean Q., Ming L., Abdullah A., Mahalingam S., Arshad K. and Hock L. (2020).** Knowledge, perceptions of risks, attitudes, and

- **United Nations Development Program (UNDP) Egypt, 2020).** Enhancing Climate Change Adaptation in North Coast and NileDelta in Egypt (GCF). https://www.eg.undp. org/content/Egypt/en/home/projects/enhanci ng- climate-changeadaptation-in-north-coast-and-nile-delt.html.

- **United Nations (2022).** Climate Change and Sustainable Development Goals, available at https://www.un.org/development/desa/disab ilities/envision2030.html

- **United States Environmental Protection Agency (EPA, 2021).** Greenhouse Gas (GHG) Emissions and Removals. Available at https://www. epa.gov / gemstones https://www.epa.gov/climate-change. Accessed on 10 /12/2022.

- **Watts N, Neil Adger W, Agnolucci P, et al, (2018)** Health a n d climate change: policy responses to protect Public health. 386:1861– 914. Available from: https://doi .org /10 .1016 / S0140-6736(15)60854-6

- **Woodhall S., Landeg O. and Kovats S. (2021).** Public health and climate change: How are local authorities preparing for the health impacts of our changing climate? *J Public Health* (Oxf.), 43(2):425-432. [Doi: 10.1093/PubMed/fdz098].

- **World Health Organization (2022).** Sustainabledevelopment goals. Available at https://www.who.int/europe/about-us/our-work /sustainable-development-goals. Accessed on10/12/2022.

- **World Health Organization (2022).** WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: World Health Organization; 2022. License: CC BY-NC-SA 3.0 IGO. Available at https://reliefweb.int /report/world/ who-guidance-climate-resilient-and environmentally-sustainable-health-care-facilities

- **World Health Organization (WHO) (2021).** Climatechange and health. URL: https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health. [accessed2023-01-09].