

## Climate Change and its Relation to Environmental Sustainability Practice as Perceived by Staff Nurses

Shaimaa Hassan Mekawy

Lecturer of Nursing Administration, Faculty of Nursing, Cairo University, Egypt

### Abstract

**Background:** Climate change and environmental degradation are the "major threat" to the health care system in this century. Nurses oversee caring for patients who are suffering from diseases caused by climate change and environmentally irresponsible practices that degrade environments and contribute to climate change. Therefore, nurses must recognize this threat and participate in initiatives that encourage mitigation strategies. **Aim of the study:** To examine staff nurses' perceptions regarding climate change and its relation to environmental sustainability practice. **Design:** A descriptive correlational research design was used to achieve the aim of the current study. **Sample:** A convenient sample (n=150) of staff nurses who agreed to participate in the current study. **Setting:** The current study was conducted at one of the Egyptian Cairo University hospitals. **Tools:** Two questionnaires were used as follows; **I.** Nurses' perception toward climate change and **II.** Nurse's perception toward environmental sustainability. **Results:** Nearly half (47.06%) of staff nurses' perceived climate change in Egypt. While around half (50.40%) of staff nurses perceived all dimensions of environmental sustainability practice. Moreover, there was a highly statistically significant positive correlation at (p-0.0001, r- 0.42) between total nurses' perceptions about climate change and environmental sustainability practice in nursing. **Conclusion:** There was a highly statistically positive correlation between nurses' perceptions concerning climate change and sustainability practice in nursing. **Recommendation:** Nurse Managers should establish strategies to encourage environmental sustainability in the workplace. In addition, create support policies and practice aimed at reducing healthcare waste and related emissions and 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, Sustainability in nursing

### Introduction:

The most pressing risk to public health in the 21st century is climate change. For instance, climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil, and gas and which generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures

which lead to drought, heat waves, rain-related floods, storms, and hurricanes, which affect human lives and present threats to the health and wellbeing of populations on earth. These events can increase physical and mental injuries, which could lead to illnesses and even deaths (**United Nations, 2021;2022**).

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 (UNDP Egypt, 2020)**). 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. 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 centre for political & strategic studies, 2021**).

Consequently, nurses and other healthcare providers face significant challenges during the delivery of care from the impact of climate change (**USDA Climate Hubs, 2021**). 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**).

Nursing homes and other healthcare facilities must make significant contributions to this phenomenon, which has a detrimental effect on both human health and the environment's ability to sustain itself. Despite these alarming situations, climate change issues have not been integrated into clinical nursing practice. (**Mcalister et al, 2022**). The next major challenge results from the disruption in the supply of essential healthcare items due to resource scarcity during natural disasters and geographical events. The Arab world is at risk of healthcare resource depletion, which will pose a threat to human viability in the future and this situation could significantly affect the

delivery of safe and quality care (**El-Zein et al., 2014**).

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 not harm") (**Anåker et al., 2014**). 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 important to preserve resources like clean air, water, and wildlife for future generations (**Moustafa & Elsabahy, 2022**).

Environmental sustainability in nursing contributes to sustainable development, and its ultimate goal is preserving an environment that does not harm current and future opportunities for excellent health (**Anåker et al., 2014**). Nurses and other health care providers can contribute to sustainability efforts by adapting sustainability practices in health care (e.g., reduction in the health care sector's total waste volume, chemical waste minimization, and education focused on pollution prevention and toxics minimization; Nurses are required to possess a deep awareness and understanding of their role in delivering sustainable health care (**Richardson et al, 2016**).

Nurses' skills in minimizes the impact of climate change and providing a sustainable environment. Start a workplace green team: green teams advocate for environmental sustainability and focus on creating awareness through education and initiatives, Typically, green teams start by focusing on one or two actionable areas such as waste management,

utility management, transportation, or sustainable food production. Consider Place recycling and recyclable-sorting bins in high-access areas where garbage bins are present. Conduct workplace garbage and recycling audits implement a recycling and/or composting program (**Law & Joanna, 2021**).

Promote going paperless or printing double-sided when necessary. Turn off lights and unplug small appliances when not currently in use. Restore and donate old and unused materials and equipment. Reuses where applicable promote the use of glass and steel food and beverage containers. Ensure that heating, ventilation, and air conditioning (HVAC) units are well maintained and running optimally. Replace old light fixtures with high-efficiency bulbs. Run a green transportation campaign (**Martin, Vold, 2021**).

Grow a workplace garden that produces fresh, seasonal vegetables. Talk to patients and clients about climate change: nurses can aid patients in understanding their vulnerabilities to climate change as well as that of those around them. Consider: Hold periodic climate change and health learning sessions and invite patients to make an appointment or join a webinar to learn more. Share educational materials in a greener format also, add notes and memos to the calendar as a reminder to speak with patients about upcoming extreme weather events such as wildfires, heat waves, heavy rainfall leading to flooding (**UNDP Egypt, 2020; Law; Joanna, 2021 & Martin; Vold, 2021**).

Finally, Nurses as leaders in the community and health care, have a strong and valuable voice. By enacting sustainable practices and advocating for a more climate-resilient future, nurses can initiate meaningful action right now to help reduce the impact of

climate change, as it has a significant negative impact on humans and environmental sustainability (**United States Environmental Protection agency (EPA, 2021)**). Moreover, it is essential to train nurses and increase their knowledge of possible global health risks. Therefore, the study aims to assess the staff nurse's perception regarding climate change and its relation to environmental sustainability practice.

**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 also sought to host the Conference of States Parties to the United Nations Convention on Climate Change's (COP 27) 27th session in 2022 as a representation of the challenges, initiatives, and priorities facing the African continent 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," have an adverse impact on 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, it is crucial for nurses to 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 to acquire advanced competencies relevant to environmental sustainability practice. Our rigorous literature review shows that no study has been conducted on this subject among nurses in Egypt. Consequently, the purpose of this research was to explore nurses' perceptions of their roles in addressing climate change, and environmental sustainability, and their perceptions of the relationships between these issues.

#### **Aim of the study:**

The current study aimed to examine staff nurses' perceptions regarding climate change and its relation to environmental sustainability practice.

#### **Research questions**

- 1- What is the staff nurse's perception about climate change?
- 2- What is the staff nurse's perception about environmental sustainability practice?
- 3- Is there a relationship between climate change and sustainability as perceived by staff nurses?

#### **Subjects and Methods**

##### **Research design**

A descriptive correlational research design was utilized to carry out the study.

##### **Setting**

The current study was conducted at one of the Egyptian Cairo university hospitals. Data were collected from Medical, Surgical, Critical Care Units, Emergency Units, Obstetrics and Gynecology Unit, and Ophthalmology.

##### **Sample:**

A convenient sample of staff nurses who were working in the previously selected units at a university hospital constituted the study sample. The total sample size was (150) staff nurses out of (255) staff nurses 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:

##### **1. Nurse's perception toward climate change questionnaire contains two main parts:**

**First part:** Was a socio-demographic sheet designed to collect characteristics of the respondents such as age, gender, educational qualification, and years of experience in the nursing profession and working units.

**Second part:** Nurse's perception toward climate change questionnaire: it was developed by the researcher to collect data for the present study based on extensive review including the work of

(Buriro, et al.2018; La Torre et al ,2020&Anåker, Spante, & Elf 2021). It was used to assess the staff nurse's perception toward climate change and consists of one dimension covered by 16 items.

**Scoring system:**

Respondents answered items against a three-point Likert scale ranging from one to three as follows (I know = 3, Not sure =2, I don't know =1). The score of each dimension is summed up and converted to a percentage score. The nurses considered perceived climate change if the percentage score was  $\geq 60\%$  and nurses considered had low perception if the percentage score was  $<60\%$  about climate change.

2. **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 , Vold ,2021). It was used to assess the staff 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 (6 items).

**Scoring system:**

Respondents answered items against a three-point Likert scale ranging from one to three as follows (Agree=3, neutral =2, disagree=3). 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 total perceived score was summed up and converted into a percent to be considered: high perception  $\geq 60\%$  and low perception  $<60\%$ .

**Validity:**

The study questionnaires` content validity was tested by a panel of five experts (two professors and three assistant professors) from the Faculty of Nursing Cairo University. Each expert on the panel was asked to examine the questionnaire for content, coverage, clarity, wording, length, format, and overall appearance. Some modifications were done based on the experts' opinions.

**Reliability:**

Reliability was tested using Cronbach's Alpha Coefficient for the two questionnaires. Results for the questionnaires are as follow, nursing' perception toward climate change (0.78); environmental sustainability questionnaire (0.77).

**Ethical consideration**

Verbal 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 have the right to withdraw from the study at any time without any rationale. Also, they were informed that data will not be included in any further research without another new consent if they do not mind. The confidentiality and anonymity of each subject were assured through the coding of all data.

**Pilot study:**

The pilot study was carried out on (10%) of the current sample to ensure the clarity and applicability of the items, and to estimate the time needed to complete the questionnaire. The result showed that the time spent filling out the questionnaire ranged between 20-25 minutes.

Based on the pilot study analysis no modifications were done to the questionnaires. The pilot study sample was not included in the total number of the study sample.

**Procedure:**

Permission was obtained from the hospital administrator after explaining the work nature. The study aim and significance illustrated for every eligible nurse to get her acceptance to participate and to the administrator 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. Time spent completing questionnaires ranged between 20 and 25 minutes. Data were collected in 2022 from the beginning of January to the end of March.

**Statistical analysis**

Data entry and statistical analysis were done using computer software the Statistical Package for Social Studies (SPSS), version 21. Suitable descriptive statistics were used such as frequencies, percentages, means, and standard deviations for quantitative variables. The correlation coefficient (r) test was used to estimate the closeness association between variables for all the tests. For all statistical tests performed, the threshold of significance was fixed at the 5% level (significance of P-value at  $\leq 0.05$ ).

**Results:**

**Table 1:** Shows that more than half (52.7%) of staff nurses were in the age group 20-

29 years old with  $X + Sd$  (31.2 SD=7.9), and nearly half of them (53.3%) had technical nursing. besides 48.7% and more than half of the sample were female 62.7% and 58.7% of them were married. Moreover, data in the table illustrate that 44.7% of staff nurses had fewer years of experience in the nursing profession. Also (59.3%) of them had less than 5 years of experience in the current department.

**Table 2:** Indicates that the total average of climate change was perceived by more than two-thirds (70.7%) of staff nurses. Further 18.7% were not sure about their knowledge related to climate change, while 11.3% of them didn't know about climate change issues.

**Table 3:** Clarifies that the (x % = 47.06%) of staff nurses' perceived climate change. While around half (x % = 50.40%) of staff nurses' perceived all dimensions of environmental sustainability. Furthermore, more than half (x % = 60.4% and x % = 56.1%) of staff nurses had low perception regarding waste reduction and energy saving respectively. While slightly more than half of them had high perceptions regarding other dimensions.

**Table 4:** Shows that there was a highly statistically Positive correlation (p-0.0001, r-0.42) between nurses' perceptions of climate change and environmental sustainability practice in nursing.

**Table 5:** Shows that there are significant statistical differences (P=0.26, p=0.001) between respondents' age and all dimensions of sustainability. While there was an insignificant statistical correlation between participants' perception regarding climate change and sustainability and their gender, education, and years of experience.

**Table (1): Frequency distribution of studied subjects' demographic data (n=150)**

<b>Items</b>	<b>No.</b>	<b>%</b>
<b>Gender</b>		
Male	56	37.3
female	94	62.7
<b>Age</b>		
20-29	79	52.7
30-39	50	33.3
40-49	14	9.3
50-59	7	4.7
Mean=31.2 SD=7.9		
<b>Marital status</b>		
Single	58	38.7
Married	88	58.7
divorced	4	2.7
<b>Education</b>		
Nursing school	38	25.3
Technical institute	73	48.7
Bachelor	36	24.0
Postgraduate	3	2.0
<b>Years of experience in nursing profession</b>		
1-<5	67	44.7
5-<10	47	31.3
10-<15	14	9.3
15-<20	9	6.0
20+	13	8.7
<b>Years of experience in current work</b>		
1-<5	89	59.3
5-<10	33	22.0
10-<15	13	8.7
15-<20	5	3.3
20+	10	6.7

**Table (2): Frequency distribution of nurse's perception regarding climate change (n=150)**

Items	I know		Not sure		I don't know		Mean	SD
	No.	%	No.	%	No.	%		
1-Have you ever heard about Climate Change?	148	98.7	2	1.3	0	0.0	1.01	0.12
2-Do you know global warming can affect on environmental health?	143	95.3	5	3.3	2	1.3	1.06	0.29
3-Do you know global warming can affect human health?	124	82.7	19	12.7	7	4.7	1.22	0.52
4-Do you know that nurses can reduce the effect of climate change?	98	65.3	36	24.0	16	10.7	1.45	0.68
5- Do you know Climate change can threaten individuals' health and safety?	130	86.7	14	9.3	6	4.0	1.17	0.47
6- Do you know Climate change could affect daily life?	124	82.7	24	16.0	2	1.3	1.19	0.42
7-Climate change affects negatively the world.	112	74.7	32	21.3	6	4.0	1.29	0.54
8-Do you know about the climate change conference in Egypt?	115	76.7	18	12.0	17	11.3	1.35	0.68
9-Do you know that nursing curricula should cover climate change issues?	55	36.7	41	27.3	54	36.0	1.99	0.86
10- Do you worry about climate change?	89	59.3	50	33.3	11	7.3	1.48	0.63
11- Do you know Climate change could affect your work?	106	70.7	34	22.7	10	6.7	1.36	0.61
12- Do you know that recent floods in the country have been caused by climate change?	91	60.7	44	29.3	15	10.0	1.49	0.67
13- Do you know Humans are severely abusing the planet?	121	80.7	24	16.0	5	3.3	1.23	0.49
14- Did you know climate transformation can be catastrophic?	94	62.7	43	28.7	13	8.7	1.46	0.65
15-Did you know that the weather pattern is changing in general?	104	69.3	39	26.0	7	4.7	1.35	0.57
16- Do you know if you've suffered any water damage to your home or car in the last five years?	30	20.0	18	12.0	102	68.0	2.48	0.81
<b>Total</b>	<b>106</b>	<b>70.7</b>	<b>27</b>	<b>18.0</b>	<b>17</b>	<b>11.3</b>	<b>22.59</b>	<b>3.65</b>



**Table (3): Mean and Mean percentage of staff nurses' perception regarding climate change and environmental sustainability (n=150).**

Items	Min	Max	Mean	sd	Mean %
<b>I. Total nurses' perception regarding climate change</b>	<b>16</b>	<b>48</b>	<b>22.59</b>	<b>3.65</b>	<b>47.06</b>
<b>II. Environmental sustainability</b>					
Energy saving	6	18	7.9	0.58	43.89
Carbon Emission Reduction	4	12	6.4	0.7575	53.33
Waste reduction	2	6	2.44	0.53	40.67
Water recycling	2	6	3.71	0.92	61.83
Saving nurses	3	9	4.53	0.76	50.33
Economically sustainable practice	3	9	4.67	0.78	51.89
Energy Consumption Nurses	6	18	9.66	0.885	53.67
<b>Total sustainability</b>	<b>26</b>	<b>78</b>	<b>39.31</b>	<b>6.23</b>	<b>50.40</b>

**Table (4): Correlation between nurse's perception regarding climate change and environmental sustainability**

Items	Perception about climate change		Sustainability practice in nursing	
	r	p	r	p
<b>climate change</b>	<b>1</b>			
<b>Sustainability</b>	<b>0.42</b>	<b>0.0001*</b>	<b>1</b>	

\*Significant at p-value<0.05

**Table (5): Correlation between demographic data and dimension of climate change and sustainability**

Items	Climate change		total sustainability	
	r	p	r	p
<b>Gender</b>	<b>T=0.22</b>	<b>0.82</b>	<b>T=0.49</b>	<b>0.61</b>
<b>Age</b>	<b>-0.02</b>	<b>0.72</b>	<b>0.26</b>	<b>0.001*</b>
<b>Education</b>	<b>0.05</b>	<b>0.47</b>	<b>0.09</b>	<b>0.23</b>
<b>Experience in nursing</b>	<b>-0.08</b>	<b>0.29</b>	<b>-0.008</b>	<b>0.92</b>
<b>Experience in current work</b>	<b>-0.04</b>	<b>0.57</b>	<b>0.03</b>	<b>0.69</b>

\*Significant at p-value<0.05

**Discussion:**

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.

**The overall findings of the current study showed that** slightly more than half of staff nurses had a low perception about climate change in Egypt. Hence, slightly less than half of the staff nurses had a low perception regarding environmental sustainability practice. This result from a researcher 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. Moreover (**Anakar et al, 2015**) indicated that nurses need more information to

become involved in and support climate change mitigation efforts, adapt to preserve human health, and enhance nursing skills to be prepared to cope with situations evolving because of climate change.

Further, **Almulhim (2021)** found that around third of the study sample had inadequate awareness of the causes and effects of climate change beside a little more than a quarter of them reported high levels of knowledge, comprehension, and awareness regarding climate change. In contrast, research by **Anker et al. (2015) and 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.

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.

**Concerning nurses' perception regarding the effect of climate change**, the results revealed that the average overall responses to climate change were perceived by more than two-thirds of the nurses. While less than a quarter of them were not sure about their knowledge related to climate change, only less than a quarter of them didn't have knowledge about climate change issues. Thus, more than one-third of staff nurses didn't perceive their contribution to mitigating the effects of climate change. This might be related to the main sources of information regarding climate change

were social media, print, electronic media, and government sources so that discuss climate change on a general level rather than specific to nursing and health care in addition there no training courses from hospitals administrators the current largest threat around the world.

This result was similar to **(Buriro et al,2018)** which revealed that nurse's perception was 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. While was incongruent with the same study by **(Buriro et al, 2018)** who concluded that, the majority of nurses had insufficient knowledge and weak perception regarding the adverse health effects of climate change, and the main sources of information were social media.

The result is also, in contrast with the study carried out by **(Attia, Wagdy 2022)** which implement 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 CC, as well about half of the study sample improved in their indoor and outdoor daily life practices and activities, such as turning off lights and appliances when not in use; the majority of them were doing so by switching to more energy-efficient options; nearly half of them were doing so by limiting the use of air conditioners.

**Concerning mean and mean percentage of staff nurses' perception regarding environmental sustainability:** the present study clarified that slightly less than half of staff nurses had a low perception regarding

environmental sustainability practice dimensions. Additionally, more than half of staff nurses had a low perception regarding waste reduction and energy saving dimensions respectively. While slightly more than half of them had high perceptions regarding other dimensions of environmental sustainability practice.

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 of **(Tekbiyik & Celik, 2019)** who emphasizes that many disciplines and organizations should be responsible for promoting awareness of sustainable development and its sub-dimensions **(Tekbiyik & Celik, 2019)**. 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.

While 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)**, who 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 those 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 was potential for fewer environmental toxicants released into the community.

**Concerning the relationship between staff nurse`s perceived total climate change and their environmental sustainability practice**, the study revealed that there was a statistically positive significant correlation between total staff nurses' perceived climate change with their environmental sustainability practice in nursing. This result could be explained with that environmental sustainability practice was a 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**).

This result was in the same vein as that **Saleh & Elsabahy, (2022)** indicated there was a positive correlation between sustainable development and challenging practice among both Saudi nurses and Egyptian nursing interns. (**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 regarded 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 to implement

change management and sustainability development.

Concerning the relation between participants' perceptions regarding climate change and sustainability and their characteristics, the present study results confirmed that there were significant statistical differences between respondents' age and all dimensions of sustainability. While there was an insignificant statistical correlation between participants' perception regarding climate change and sustainability and their gender, education, and years of experience. This finding may be attributable to the fact that more than half of the participants were young adults (20–29), who are more likely to believe that global climate change will increase the prevalence of communicable diseases and that these diseases will last longer in the workplace and places of responsibility.

This explanation was compatible with United Nations (2022) Sustainable Development Goals (SDGs), which embrace a distinct set of goals for the healthcare sector, some of which are ensuring healthy lives and promoting well-being for all individuals of all ages. To deal with these consequences, society as a whole will need to undergo a major transformation, particularly in the domain of nursing and education, which must equip the entering nursing class to encounter and handle complex challenges (Anakr et al , 2015).

On the other hand, the results of this study are in line with the study conducted by (Buriro et al, 2018), who found that recent graduates and young nurses have more knowledge and strong perception. Moreover, there was a strong relationship between the educational level of the nurses and their knowledge and perception about the negative health effects of climate change. In

addition, the study results of Almulhim (2021) declared that one-third of the study sample had poor knowledge about the causes and effects of CC; besides just over a quarter of the study participants had a good level of knowledge, understanding and awareness of CC.

#### **Conclusion:**

According to the current study's findings, slightly more than half of staff nurses' had a low perception about climate change in Egypt. Hence, somewhat fewer than half of them had low perception concerning environmental sustainability in nursing practice. Alongside, the average overall responses to climate change were perceived by more than two-thirds of the nurses. While less than a quarter of them were not sure about their knowledge related to climate change, approximately half of the staff nurses had a low perception as regards environmental sustainability practice dimensions.

Furthermore, there was a statistically positive significant correlation between total staff nurses' perceived climate change with their environmental sustainability practice in nursing. Finally, there are significant statistical differences between respondents' age and all dimensions of sustainability. While there was an insignificant statistical correlation between participants' perception regarding climate change and sustainability and their gender, education, and years of experience.

#### **Recommendations:**

##### **The ministry of health should:**

- Take the initiative to carry out Sustainable Development Goal of addressing climate change. By reforming organizational policy and educating members of the health team on climate change and its effects

- Education intervention and workshops about sustainable development and its objectives should be updated and conducted continuously on regular basis for all nursing.

**Nursing leadership should:**

- 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.
- Create support policies and practices aimed at reducing healthcare waste and related emissions.
- Creating opportunities for staff nurses to engage with the topics of climate change, health, and nursing practice could be beneficial; formal sessions, interprofessional educational seminars, or even incorporating content into clinical competencies may be good opportunities for engagement.
- **Nurse Managers** should 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.

**References:**

**Al Ahram Center for Political & Strategic Studies (ACPSS 2021).** 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.

**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

**Anakar A, Nilsson M, Holmner A, Elf M. (2015).** Nurses' perceptions of climate and environmental issues: A qualitative study. *J Adv Nurs.*; 71(8): 1883 -91.

**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.

**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 View PDF -CrossRefView- Record in Scopus- Google Scholar.

**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

**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 Sci.* 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.

**Climate Hubs U.S. department of agriculture (USDA Climate Hubs. 2021).** Climate Conference Paper. December 2021. DOI: 10.2495/SC210471

**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>.

**El-Zein, A., Jabbour, S., Tekce, B., Zurayk, H., Nuwayhid, I., Khawaja, M. & Hogan, D. (2014).** Health and ecological environmental sustainability in the Arab world: A matter of survival. *The Lancet*, 383(9915), 458–476. [https://doi.org/10.1016/S0140-6736\(13\), 62338-7](https://doi.org/10.1016/S0140-6736(13)62338-7)

**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.

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

Acase study on one of the five-star hotel chain in Cairo. *Journal of Association of Arab Universities for Tourism and Hospitality*, 22(1), 200–220. <https://doi.org/10.21608/jaauth.2022.114975.1285>

**Ismail, I. H., & AbdElkhalek, A. M. A. (2021).** Insights from behavioral economics to enhance the environmental dimension of sustainable development. *New England medical monthly*, 09 (01). <https://doi.org/10.24052/IJBED/V09N01/ART-02>

**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.

**Martin, Wanda, and 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

<https://nursesunions.ca/wp-content/uploads/2019/05/CFNU-climatechange-web.pdf>.

**McAlister, S., McGain, F., Petersen, M., Story, D., Charlesworth, K., Ison, G. & Barratt, A. (2022).** The carbon footprint of hospital diagnostic imaging in Australia. *Lancet Regional Health-Western Pacific*, 24, <https://doi.org/10.1016/j.lanwpc.2022.100459>.

**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>

**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 A* 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/waste-0>

**Reinhart, R.J. (2020).** Nurses Continue to Rate Highest in Honesty, Ethics. Gallup. Retrieved from: <https://news.gallup.com/poll/274673/nurses-continue-rate-highest-honesty-ethics.aspxReport,2021>

**Richardson, J., Grose, J., Nelmes, P., Parra, G., & Linares, M. (2016).** 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., Ryan, K., & Desha, C. (2015).** Implementing a holistic process for embedding sustainability: A case study in first year engineering, Monash University, Australia. 159. *Journal of Cleaner Production*, 106, 229–238. <https://doi.org/10.1016/j.jclepro.2015.02.066>

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

**Ross SB, Jones K, Blanch B, et al. (2019).** A systematic review and meta-analysis of the prevalence of left ventricular non-compaction in adults. *Eur Heart J*, 41:1428–1436.

**Saad, L. (2015).** Americans' Faith in Honesty, Ethics of Police Rebounds. Gallup, December 21, 2015. Retrieved from: [http://www.gallup.com/poll/187874/americans-faith-honesty-ethics-police-rebounds.aspx?g\\_source=Social%20Issuesandg\\_medium=newsfeedandg\\_campaign=tiles](http://www.gallup.com/poll/187874/americans-faith-honesty-ethics-police-rebounds.aspx?g_source=Social%20Issuesandg_medium=newsfeedandg_campaign=tiles)

**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.2020.1860207>

**Sperstad, R. , Pehler, S.R. , Ackerson,S, Brunsell, Gyrog, Sisto., H. (2020).** Student voices during action research impact outcomes in nursing quality improvement project. *J. Nurs. Educ.*, 59 (1). 42-45. View PDF- Cross Ref 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>.

**The International Council of Nurses , (ICN,2022).** Importance of nursing in tackling the health effects of climate change, from <https://www.icn.ch/news/icn-commemorates-worldhealth-day-and-reiterates-importance-nursing-tackling-health-effects>.

**United Nation Environment Programme (UNEP, 2019).** Emissions Gap Report. Ways to bridge the emissions gap. Paris Agreement goals <https://www.unep.org/resources/emissions-gap-report-2019>.

**United Nations (2021).** Climate Change, Glasgow Climate Change Conference – October-November 2021 <https://unfccc.int/conference/glasgow-climate-change-conference-october-november-2021>

**United Nations Development Program (UNDP Egypt, 2020).** Enhancing Climate Change Adaptation in North Coast and Nile Delta in Egypt (GCF). <https://www.eg.undp.org/content/egypt/en/home/projects/enhancing-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/disabilities/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 and climate change: policy

responses to protect Public health. 386:1861–914. Available from: [https://doi.org/10.1016/S0140-6736\(15\)60854-6](https://doi.org/10.1016/S0140-6736(15)60854-6)

**World Health Organization (2022).** WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: World Health Organization; 2022. Licence: 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)** ‘Climate Change and Health.’ October 30, 2021.; World Health Organization. Available at <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

**World Health Organization (WHO), (2021).** WHO Health and Climate Change Survey Report. Available at <https://www.who.int/publications/i/item/9789240038509>. Accessed on 12/1/2022.

**World health organization (2022).** Sustainable development goals. Available at <https://www.who.int/europe/about-us/our-work/sustainable-development-goals>. Accessed on 10/12/2022.

## تغير المناخ وعلاقته بممارسات الاستدامة البيئية كما يراها افراد التمريض

شيماء حسن ميكاوي

يعتبر تغير المناخ والتدهور البيئي "التهديد الرئيسي" لنظام الرعاية الصحية في هذا القرن. والمرضات مسؤولون عن رعاية المرضى الذين يعانون من الأمراض الناجمة عن تغير المناخ والممارسات غير المسؤولة بيئيًا التي تؤدي إلى تدهور البيئات وتسهم في تغير المناخ. لذلك، يجب على الممرضات التعرف على هذا التهديد والمشاركة في المبادرات التي تشجع استراتيجيات التخفيف. إذا هدفت هذه الدراسة إلى فحص ادراك افراد التمريض فيما يتعلق بتغير المناخ وعلاقته بممارسات الاستدامة البيئية. وقد اجريت الدراسة الحالية بأحد المستشفيات الجامعية بالقاهرة ، وتضم المستشفى: وحدات العناية المركزة ، وحدات الطوارئ ، والوحدات الجراحية، وحدات العيون ووحدات النساء و التوليد. وتضمنت عينة الدراسة عينة متاحة عددهم = 150 من جميع الممرضون الذين يقدمون رعاية تمريضيه مباشره و وافقوا على المشاركة في هذه الدراسة وقت جمع البيانات . وقد اظهرت نتائج الدراسة الحالية أن ما يقرب من نصف (47.06%) الممرضين يدركون تغير المناخ في مصر. في حين أن حوالي نصفهم (50.40%) أدركوا جميع أبعاد ممارسات الاستدامة البيئية. علاوة على ذلك ، كان هناك ارتباط إيجابي ذو دلالة إحصائية عالية بين ادراك الممرضين الإجمالي حول تغير المناخ وممارسة الاستدامة البيئية في التمريض. وأوصت الدراسة بضرورة قيام مديري التمريض بوضع استراتيجيات لتشجيع الاستدامة البيئية في مكان العمل. بالإضافة إلى ذلك ، إنشاء سياسات وممارسات دعم تهدف إلى تقليل نفايات الرعاية الصحية والانبعاثات ذات الصلة وإنشاء استراتيجيات تعليمية لجعل الممرضات أكثر وعيًا بأهمية الاستدامة في ممارسة التمريض للتخفيف من تأثير تغير المناخ وعلاقته بممارسات الاستدامة البيئية كما يراها طاقم التمريض.