Effect of Health Promotion Program Regarding Environmental Literacy and Climate Change Health Risks among
Newly Nursing Students

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Abstract

Background: Climate change has an impact on human health, so, healthcare institutions must address this problem and its worldwide repercussions, so environmental literacy promotion is important which make individuals to take appropriate measures to protect or improve the health of environmental health system. **The study aimed** to evaluate the effect of health promotion program regarding environmental literacy and climate change health risk among newly nursing students. **Research design**: A quasi-experimental research (one group, pre/posttest) design was used. **Setting:** Faculty of Nursing- Kafr Elsheikh University. **Sample**: A purposive sample of 930 students. **Tools:** Three tools were used in this study, **first tool**: A Self-Administered Questionnaire, consisted of two parts, sociodemographic characteristics and students' knowledge questionnaire regarding environmental health and climate change, **second tool**: Students' perception questionnaire assessing perception regarding environment and climate, **third tool:** Students self-reported practices questionnaire regarding environmental health and climate change health risk. **Results:** 64.3% of students were female students from rural areas, 39.7% among students reported that social media is the most common source of information about climate change and 90% of studied sample had satisfactory total score knowledge of environmental literacy and climate change in the post promotion program with a statistically significant difference. There were 22.8% of studied sample had satisfactory total reported practices preprogram that improved into 83.7% post promotion program. The total nursing students' participant positive perception was 92.8% post promotion program with a highly statistically significant improvement at P<0.001. **Conclusion:** The current study indicated that the study findings showed an increase in the satisfactory knowledge total score level of the nursing students by almost of them after the implementation of promotion program with a highly statistically significant difference. **Recommendations:** Nursing programs should be developed to include sustainability and climate change into the curricula to provide students with the knowledge, abilities, and incentive to comprehend and address health risks posed by climate change.

Key words: Environmental Literacy, Climate Change, Health Risk, Nursing Students

Introduction

Environmental literacy has been defined as an individual's degree of environmental knowledge and awareness that is needed to develop abilities in problem-solving, planning, and teamwork, in addition to the behavior, and sensitivity needed for literacy, as well as the significance of education about the environment. Nursing students who are knowledgeable about the environment understand how human activities such as farming, science, and technology affect the way that natural systems function and are able to make responsible environmental decisions that promote environmental sustainability *(Ors, 2022).*

The environment is crucial to maintaining life on Earth. Other issues exist, however, with adverse living conditions and otherworldly ecosystems. These issues affect all Earth's inhabitants, not just the environment. The primary

causes of these issues are Pollution, global warming, greenhouse gases, and other environmental issues as air, water, and soil pollution *(Wood & Toronto, 2020).*

These environmental problems led to climate change which has a major health risk to human health. Healthcare systems must address this issue and its worldwide repercussions. It is one of the biggest threats to world health in the twenty-first century. Raising knowledge of livelihoods affected by climate change will address major health issues. So, the healthcare workforce has a crucial role to address climate change and the health hazards it poses. *(Sambatha et al., 2022)*.

Climate change has an effect on the most fundamental aspects of health, such having access to food and water, clean air, and a secure environment *(Anaker et al., 2021).* In addition to the effects on human life and several aspects of health. It poses a threat to factors fundamental to good health and has the potential to reverse decades of advancement in global health (**CDC**, *2022).*

Climate change health risks include impairment to physical health and mental well-being, forced migration, altered patterns of infectious disease, and air pollution.; Impacts most likely to have an impact on vulnerable people, include rising incidence of cancer, hunger, respiratory and heart diseases, and vector-borne illnesses *(Aronson et al., 2020).*

Nursing students are expected to participate actively in social and professional life after graduation because one of their key responsibilities is to apply the knowledge, abilities, attitudes, and values they acquired during their academic careers to their professional and personal environment. Consequently, regardless of major, one of the objectives of the institution is to help all students

become ecologically knowledgeable *(Marcos et al., 2020).*

The students are agents of change who have the potential to modify attitudes and work styles in their everyday work, which will enhance people's health. Therefore, knowledge and skills connected to sustainability in the nursing profession and the effects of environmental issues will make it possible *(Karasar, 2020).*

The healthcare sector has a well-defined objective to fulfill the Sustainable Development Goals (SDGs). This will necessitate a significant transformation in society, especially in the field of nursing education, which must prepare the next generation of nurses to face and resolve complex problems in order for them to address the effects of climate change and contribute to sustainable healthcare. *(Cruz et al., 2018).*

Nursing makes up a large proportion of the healthcare sector, providing an opportunity to significantly participate in population awareness regarding climate change health risks, including direct participation in public health initiatives to mitigate climate change. Education has been identified as one of the social transformation interventions needed to stabilize Earth's climate by 2050 *(Otto et al., 2020).* Therefore, nursing students must be equipped for a new professional position taking into account climate change and its risks to health; climate change should be an integral part of education to promote environmental literacy among nursing students to take the initiative and lead in creating climate-safe health systems *(International Council of Nurses, 2018).*

Nurses working in various settings have a great responsibility in preventive care and wellness *(Alshuwaikhat & Mohammed, 2019).* They have an active

role in environmental literacy promotion through education environmental literacy regarding climate change is being acknowledged as a crucial area of nursing practice, and experts have urged nurses to take on leadership, advocacy, and activism responsibilities in the field of environmental health as part of their daily work. *(Van et al., 2020).*

Significant of the study

The World Bank Group estimates that by 2030, globally, more than 100 million people could be drawn into negative impacts on population health due to climate change. Low- and middle-income countries are also expected to be the most affected because they are disproportionately vulnerable, and also because of inadequate adaptability of infrastructure, including health systems *(Torre et al., 2020).*

The World Health Organization predicts that climate change is predicted to result in an additional 250,000 annual fatalities from hunger, malaria, diarrhea, and heat stress between 2030 and 2050. By 2030, it is anticipated that the direct health harm expenses will range from $2 to $4 billion USD annually *(World Health Organization, 2022).*

Egypt was the third most populated country with a population of 102.3 million. According to Global Data, capita (CAPMAS, 2021). Furthermore, it is the 87th most climate change susceptible nation. But when it comes to being unprepared for climate change, it comes in at 73rd place globally *(Climate Change Profile, 2018).*

The high rates of urbanization and population increase, as well as the effects of climate change. The majority of Egypt's infrastructure and 98% of its people are concentrated along the Nile River, its delta, and its northern and eastern beaches, making the country particularly vulnerable to the detrimental consequences of climate change. *(Abutaleb, 2018).*

Aim of The Study

The study aimed to evaluate effect of Health promotion program regarding environmental literacy and climate change health risk among newly nursing students.

1- Assessing newly student knowledge regarding environmental health and climate changes health risk.

2- Assessing newly student perception regarding environmental health and climate changes health risk.

3- Assessing newly students reported practices regarding environmental health and climate changes health risk.

4- Develop health promotion program regarding environmental literacy and climate change health risk.

5- Evaluate the effectiveness of promotion program on newly nursing students' knowledge, perception and self-reported practices.

Research hypotheses:

H1- Nursing students who receive the promotion program will have improvement in their knowledge, perception, and reported practices regarding environmental health and climate change health risk.

Materials and Methods

Research Design:

A quasi-experimental (one group pre/posttest) design was used in the study, assigning subjects of the study group using pre-test and post-test. The dependent variable was measured once prior to the intervention and once after it was carried out in order to compare study group pre/post-education program. *(Rogers & Revesz, 2019).*

Setting:

The study was conducted at the faculty of nursing at Kafr Elsheikh University in Kafr Elsheikh city, Egypt.

Sample Size:

A purposive sample was used in the study. The total number of nursing students enrolled for the first semester in first year academic year 2022/2023. The total number of students was 930 students.

Based on data from literature *(Elshall, 2022)*, considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula *(Charan and Biswas, 2013)*: $n = \frac{2(Z\alpha/2 + Z\beta)^2 \times p\,(1-p)}{(d)^2}$

Where, p = pooled proportion obtained from previous study; d = expected difference in proportion of events; $Z_{\alpha/2}$ =1.96 (for 5% level of significance) and Z_β = 0.84 (for 80% power of study). Therefore.

$n = \frac{2(1.96 + 0.84)^2 \times 0.807\,(1-0.807)}{(0.05125)^2}$ = 929.8 accordingly, the sample size required is 930

Inclusion Criteria:

- Both genders
- Didn't Attend seminars or training related to climate change in the past 12 months

Tools for Data Collection:

Three tools were used in this study.

Tool I: *A Self-Administered Questionnaire:* The researchers developed it after reviewing pertinent recent literature., it was in Arabic language and it was designed to assess the following two parts:

Part 1: Student Personal Characteristics: gender, residence, family size, income, crowding index.

Part 2: Students' knowledge questionnaire: which designed by the researcher in the Arabic language assessing newly nursing students' knowledge regarding environmental health and climate change health risk after studying the relevant literature *(Nzeobi et al., 2020) (Khamees et al., (2018), (Noor, & Karami, (2017) and (Wardekker et al., (2012).*

It consisted from (36) MCQ questions. The questionnaire covered different categories of questions: questions related environment (17 questions), climate change (5 questions), factors (3 questions), causes (5 questions), health risks of climate change, and source of information (6 questions). It was used in pre- and post of promotion program.

Scoring system:

Related to nursing students' knowledge assessment pre & post promotion program; a correct answer scored one and each incorrect answer scored zero, the whole knowledge questions scored 36 points, a total of 60% and above were considered satisfactory knowledge level and less than 60% were considered unsatisfactory knowledge level.

Tool II: Students perception scale which assessing student environment literacy and climate change health risk. All questions had close-ended responses, it was adopted from literature *(Wei et al., 2020 and Yang et al., 2018).* It was used in pre- and post of promotion program.

The Scoring system:

Students' responses were measured on a 3-point Likert scale ranging from zero to two distributed as the following; Agree =2, sometimes = 1, Disagree= 0. The total score were summed and converted into percentage and categorized as follows: Positive perception: 60% or more of the total score. Negative perception: less than 60% of the total score.

Tool III: Students reported practices questionnaire:

Which assess environmental health and climate change health risks used pre- and post of promotion program? It was developed by researcher after reviewing literature. It consists of items related to students' practices regarding climate change health risk such as Heat stroke, hypotension, respiratory problems, skin problems and spring conjunctivitis (*Hinkle et al., 2021 and Elsawy et al., (2022).*

The Scoring system:

The students' reported practices assessed pre & post promotion program; a correct reported practice scored one and each incorrect reported practice scored zero, making a total of 14 scores. The total score ranged from 0 to 14. Total scores were classified as follows: Satisfactory reported practices 60% or more of the total score. Unsatisfactory reported practices less than 60% of the total score.

Procedures

Validity and Reliability: Content and face validity were performed by 3 professors of Family and community health nursing specialty of Nursing Faculty and two professors from Medical surgical nursing, Faculty of Nursing, Kafr Elsheikh and Ain Shams university. The reliability test was established using the Cronbach alpha and Pearson correlation, which demonstrated good internal consistency the first instrument (Knowledge questionnaire) with Cronbach alpha is (α=0.88), Internal consistency of the second instrument (perception scale) with Chronbach alpha coefficient is (α = 0. 80), and Internal consistency of the third instrument; self-reported questionnaire is (α = 0.70)

Pilot Study: A pilot study was conducted on 10% of the total study sample (93) nursing students to assess the study feasibility and to assess each study tool's clarity and usefulness and to determine how long it will take to complete each one. Since no tool adjustment was made, the pilot research sample was incorporated into the larger study sample.

Operational Design:

Administrative and Ethical Considerations:

The approval was obtained from Scientific Research Ethical committee in Faculty of Nursing at Kafr Elsheikh University before starting the study. Then an official permission was granted from the dean of the Faculty of Nursing. The researchers to gain their consent to participate in this study, researchers introduced themselves to nursing students and explained the goal of the investigation. Researchers made sure that the study did not present any risks or hazards to their subjects. Additionally, they chose to take part in the study voluntarily. Researchers addressed nursing students who expressed an interest in taking part in the study and requested verbal confirmation of their approval. All activities related to data collecting were treated in confidence.

Field work:

After receiving official approval to conduct the study. The subjects were informed of the study's aim. The study was carried out over a period of 3 months started from beginning of October 2022 to the end of December 2022. The newly nursing students were informed to complete electronic sheet of promotion environmental literacy and climate change health risk Questionnaire using the Google application website, This was distributed via clinical what's up, Facebook groups, student emails, and other online communication channels to all students who participated in the

current study. The researchers gave the undergraduate nursing students assurances that all information acquired would be used solely for study. All study subjects had the choice to take part in the investigation willingly. The previously mentioned setting was visited by the researchers three days/week (Saturdays, Mondays & Wednesdays) from 9.00 a.m. to 2.00 pm.

The questionnaires (electronic sheet posttest) was distributed to the nursing students twice, before and after the promotion program to identify the effect of the program on newly nursing students' knowledge, perception and reported questionnaire regarding environmental literacy and climate change.

Promotion program regarding environmental literacy and climate change health risk among newly nursing students divided into four stages: assessment, planning, implementation, and evaluation.

Promotion program aim to engage and empower nursing students in healthy behaviors, and make changes that reduce the risk of developing chronic diseases and other climate change related morbidities.

I. Assessment: The researchers started to assess level of knowledge, perception and reported practices regarding climate change among newly nursing students' pre promotion program for student need assessment (questionnaires) have been used in this study:

- **A Self-Administered Questionnaire** to assess level of students' knowledge regarding environmental health and climate change.
- **Perception scale** of climate change and student reported practices Questionnaire.

II. Planning: The aim of promotion program for newly nursing students was to improve their knowledge, perception and practices regarding climate changes. Based on the findings among newly nursing students and their degree of agreement prior to intervention, the promotion program was applied. Electronic questionnaires were sent for studied students at two different times; the first time was administered prior to the intervention, and the second time was done one month later to evaluate the effectiveness of the promotion program.

The researchers develop promotion program about environmental literacy and climate changes health risks. The following were in the topics covered in educational empowerment:

- The concept and Type of climate changes.
- Factors, Causes contributing to climate changes
- Environmental literacy about climate changes
- Ways of reducing health risks of climate changes
- The nursing role regarding climate changes

III. Implementation: The program sessions were held in the lecture hall of Kafr Elsheik University's faculty of nursing., the total number of nursing students was 930 of study group. So, study group was divided into ten groups to be effective and each group involved 93 nursing students. The total duration (10 hours theory) for each group, it was divided into five sessions with two hours for each session. The promotion program implemented in 5 sessions for each group and two sessions was conducted weekly for five consecutive weeks. Studied students received two lectures about climate change weekly.

The promotion program contents conducted in 5 sessions for each group as the following:

First session: The students were introduced to one another and informed of the session's structure and methodology. The subjects' expectations from the promotion program were identified, then demonstrating the intervention objectives for studied group and completing the pretest *https://forms.gle/ RD6JHMJ JTqkAF8wM8* (electronic sheet for studied questionnaires). **The second session**: covered the concept of climate change, different definitions, environmental literacy and a brief introduction to it. At the end of the session, the students were given the opportunity to ask questions after they had been clarified and discussed with the subjects.

Third session: provide information on factors and causes of climate change, as well as lead a group discussion with nursing students

Fourth session: provide information on health risks of climate change and Ways of reducing health risks of climate change and demonstrating scenario-based situations on health risks of climate change.

Fifth session: Nurse role related to climate change were taught to the participants. After the educational program was ended, the participants were requested to complete the questionnaire. *https://forms.gle/SqczDzfcnuBDWXBo6* (electronic sheet posttest).

After answering the students' questions, the sessions came to an end. In order to promote learning, researchers gave papers, charts, PowerPoint presentations, laptop-based films, simulation-based training, and other illustrative materials to the participants during the session. From October 2022 to December 2022,

three months were required for data collection. During the data gathering process, all infection control measures pertaining to COVID 19 were taken into account.

IV. Evaluation:

- The same study questionnaires were used for the pre- and post-tests in order to assess similarities, differences, potential improvement areas, and flaws.

- It also used to assess level of nursing students' knowledge about environment, health risks of climate change pre and post educational intervention for studied students.

- To evaluate the effectiveness of promotion program about environmental literacy and climate change health risks of climate change for study group at the end of the three months post-program using the same tools before and post implementing program.

Results

Table (1) shows that, 64.3% of students were female students from rural areas, 46.5% had middle income, 59.6% of them had more than five members in their families and 65.5% of students had overcrowded home.

Table (2) represents that, there were 10.2% of students had satisfactory knowledge regarding environmental literacy pre promotion program, these percentages improved to 86.8% after conducting promotion program with a statistically significant difference between the two study phases at 0<0.001.

Table (3) clarifies that, there were 7.6% of students had satisfactory knowledge level pre promotion program regarding climate change that improved to 93.3% post promotion program

implementation with highly significance at **P value <0.001.**

Figure (1) clarifies that, there were 8.9% of studied sample had satisfactory total score knowledge in the pre promotion program, while there were 90% of studied sample had satisfactory total score knowledge of environmental literacy and climate change in the post promotion program.

Figure (2) illustrates that; social media is the most common source of information about climate changes with 39.7% among student's participants.

Table (4) illustrates the difference between pre and post promotion program nursing students' perception of climate change in items, waste of resources contributes to climate change, climate change will be serious in Egypt, and diseases are sensitive to climate change 5.3%, 10.9%, 9.6% through pre-promotion program to 90.9%, 98.4% and 94.3% subsequently for post-empowerment, with a highly statistically significant difference at p <0.001 regarding all items of the perceived climate change.

Table (5): reveals the difference of students' perception regarding health problems as cold-related illness, hypertension, typhoid, kidney stones, urticarial and mood changes, it was 11.7%,7.2%, 9.9%, 9.6%, 12.9%, 10.6% through pre promotion program

respectively, changed to 96.7%, 86.6%, 85.5%, 84.5%, 96.6%, 84.9% Post promotion program. Also, shows that the total nursing students' participant positive perception from 15.3% to 92.8% post promotion program with a highly statistically significant improvement at P<0.001.

Table (6): displays the difference in nursing students 'reported practices pre and post promotion program regarding heat stroke as provide fluid as possible as from13.1% pre promotion program to 86.2% post promotion program. Also, student's participant considers a semi-Fowler's position, avoid outside in case of storm, dust, avoid exposure to sun in midday, clean eye with warm water regularly in case of spring conjunctivitis pre promotion program from,9.7%, 12.2%, 9.6%, 8.4% respectively through to, 94.5%, 96%, 94.5%, 87% Post promotion program with a highly statistically significant difference at p <0.001. Also, the total reported practices scores regarding climate change health risks there were 22.8% of studied sample had satisfactory total reported practices pre program that improved into 83.7% post promotion program.

Table (7): shows that there were significant statistically association between total Knowledge score with perception and reported practices pre (pre association is insignificant as p= 0.185 and 0.423 >0.05, please revise) and post promotion program.

Table (1): Frequency and Percentage Distribution of Studied students' sociodemographic characteristics (N=930)

Items	N	%
Gender		
Female	598	64.3
Male	332	35.7
Residence		
Urban	332	35.7
Rural	598	64.3
Income		
Low	201	21.6
Middle	432	46.5
High	297	31.9
Family Size		
2 – 4	376	40.4
> 5	554	59.6
Crowding Index		
Not crowded (<3)	321	34.5
Over Crowded (>3)	609	65.5

Table (2): Comparison of students' knowledge of Environmental literacy pre and post promotion program (No= 930)

Items	Pre		Post		Chi – Square	
	N	%	N	%	X^2	P value
Definition of Environment	246	26.5	879	94.5	901.323	<0.001**
Types of environments	183	19.7	915	98.4	1191.181	<0.001**
Major environmental problems	159	17.1	843	90.6	1012.208	<0.001**
Factors affecting the environment	198	21.3	756	81.3	670.046	<0.001**
Impact of environmental problem	113	12.2	908	97.6	1372.33	<0.001**
Type of pollution	98	10.5	828	89	1146.042	<0.001**
Type of pollution is worst for our health	73	7.8	718	77.2	915.120	<0.001**
How do people damage the environment?	47	5.1	795	85.5	1214.105	<0.001**
What do people do to protect the environment?	68	7.3	812	87.3	1193.850	<0.001**
What can the government do to protect the environment?	39	4.2	634	68.2	824.292	<0.001**
What is more important than recycling?	27	2.9	738	79.4	1122.474	<0.001**
What is the symbol for recycle?	16	1.7	879	94.5	1603.925	<0.001**
How does Reuse and recycle help the environment?	48	5.2	658	70.8	849.497	<0.001**
Does recycling save energy?	118	12.7	892	95.9	1297.939	<0.001**
Does recycling help reduce climate change?	92	9.9	918	98.7	1478.198	<0.001**
Is it better to reduce or recycle the environment?	57	6.1	804	86.5	1206.661	<0.001**
How can waste be recycled?	34	3.7	748	80.4	1124.822	<0.001**
Total Environment Knowledge Score						
Unsatisfactory Knowledge	835	89.8	123	13.2		
Satisfactory Knowledge	95	10.2	807	86.8	1091.191	<0.001**

Table (3): Comparison of Students' Knowledge about Climate Change pre and post promotion program (N=930)

Items	Pre		Post		Chi – Square	
	N	**%**	**N**	**%**	**X^2**	**P value**
Type of change in climate	54	5.8	786	84.5	1163.203	<0.001**
Factors contributing to climate changes	88	9.5	911	98.0	1464.684	<0.001**
Causes of climate change	73	7.8	843	90.6	1275.342	<0.001**
Health risks of climate change	48	5.2	897	96.5	1550.513	<0.001**
Practices of Preventive measure	91	9.8	902	97.0	1420.974	<0.001**
Total Knowledge Score regarding climate change						
Unsatisfactory Knowledge	859	92.4	62	6.7		
Satisfactory Knowledge	71	7.6	868	93.3	1366.168	<0.001**

Figure (1): Distribution of studied sample regarding their total score knowledge of Environmental literacy and Climate change (N=930).
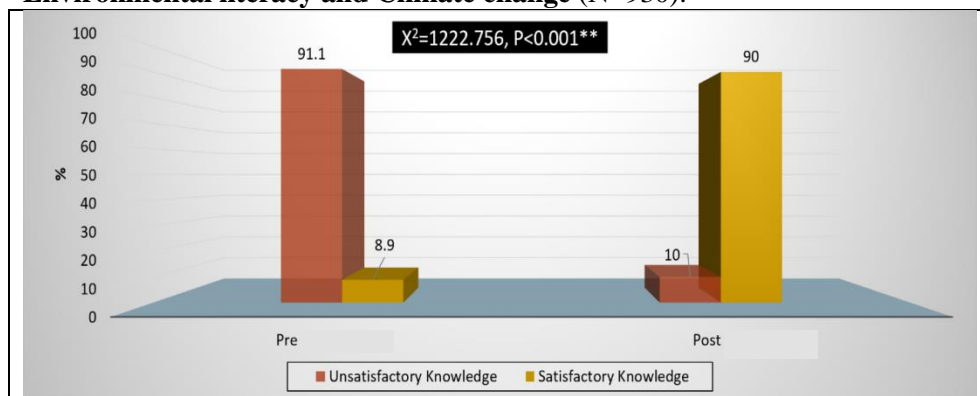

Figure (2): Percentage Distribution of studied sample's source of information on Environmental literacy and Climate change (N=930).
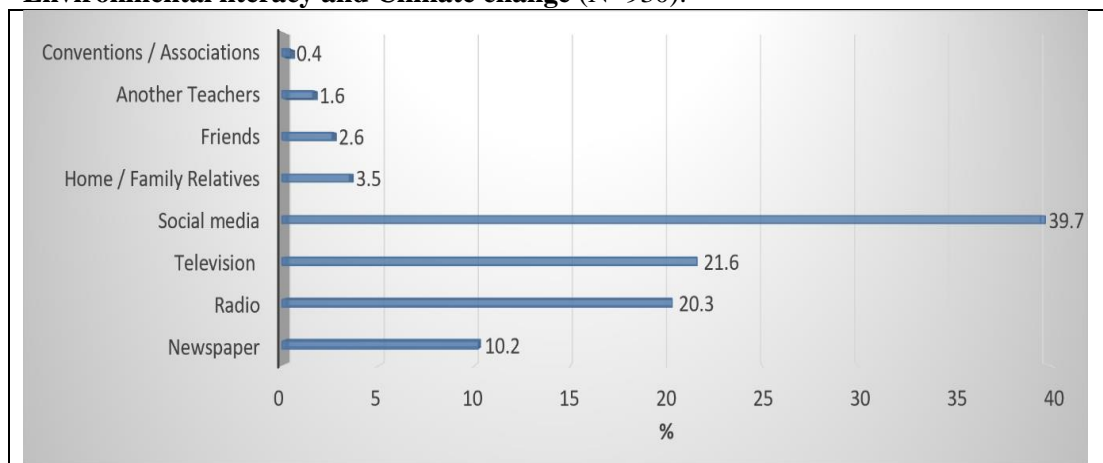
Table (4): Comparison of Nursing Student's perception regarding Climate Change pre & post promotion program

	Pre		Post		Chi – Square	
	N	%	N	%	X^2	P value
Climate change is man-made.	17	1.8	579	62.3	779.816	<0.001**
Climate change is contributing to rapid changes and creating environmental problems.	66	7.1	709	76.2	914.541	<0.001**
Waste of resources contribute to climate change.	49	5.3	845	90.9	1364.659	<0.001**
Climate change is controllable	15	1.6	768	82.6	1250.620	<0.001**
Climate change is bad for human health.	30	3.2	698	75.1	1007.135	<0.001**
Climate change will be serious in my local community.	47	5.1	687	73.9	921.803	<0.001**
Climate change will be serious in Egypt	101	10.9	915	98.4	1437.227	<0.001**
Climate change will be serious in the world	55	5.9	857	92.2	1383.752	<0.001**
Disruption of health services by extreme weather events	30	3.2	756	81.3	1161.339	<0.001**
Diseases you think are sensitive to climate change?	89	9.6	877	94.3	1337.367	<0.001**

Table (5): Comparison of Nursing Students' perception regarding Climate Change health risks pre & post promotion program

	Pre		Post		Chi – Square	
	N	%	n	%	X^2	P value
Respiratory problem						
Cold-related illness	109	11.7	899	96.7	1351.658	<0.001**
Asthma	55	5.9	785	84.4	1156.855	<0.001**
Pneumonia	49	5.3	734	78.9	1034.943	<0.001**
Cardiovascular disease						
Hypertension	67	7.2	805	86.6	1175.850	<0.001**
Heart disease	27	2.9	789	84.8	1267.745	<0.001**
Gastrointestinal problem						
Food borne diseases	70	7.5	815	87.6	1196.403	<0.001**
Gastritis	88	9.5	757	81.4	970.604	<0.001**
Diarrheal diseases	68	7.3	654	70.3	777.371	<0.001**
Typhoid	92	9.9	795	85.5	1065.092	<0.001**
Malnutrition	53	5.7	806	86.7	1226.522	<0.001**
Urinary system diseases						
Nephritis	55	5.9	820	88.2	1262.965	<0.001**
Kidney stones	89	9.6	786	84.5	1048.417	<0.001**
Skin problem						
Urticarial	120	12.9	898	96.6	1313.446	<0.001**
Eczema	77	8.3	914	98.3	1513.109	<0.001**
Frost bit	57	6.1	834	89.7	1300.629	<0.001**
Heat stroke	78	8.4	798	85.8	1118.610	<0.001**
Conjunctivitis and eye problem	113	12.2	689	74.1	727.273	<0.001**
Anxiety, depression, and mood changes	99	10.6	790	84.9	1028.840	<0.001**
Total Perception Score						
Negative Perception Score	863	92.8	142	15.3		
Positive Perception Score	67	7.2	788	84.7	1125.255	<0.001**

Table (6): Comparison of the nursing students' reported Practices regarding climate change health risks pre and post promotion program **(N=930)**.

	Pre		Post		Chi-Square	
	N	%	n	%	X^2	P
Heat stroke						
Be in a cool, shaded area.	100	10.8	789	84.8	1022.893	<0.001**
Remove and loosen clothing	99	10.6	919	98.8	1459.085	<0.001**
Placing cold compresses and ice packs on the thigh underarms, or soaking clothes in cold water.	115	12.4	790	84.9	980.547	<0.001**
Provide fluids (preferably water) as soon as possible	122	13.1	802	86.2	994.449	<0.001**
Hypotension						
Position comfortably in a semi-Fowler's position.	90	9.7	879	94.5	1341.113	<0.001**
Encourage drinking plenty of fluids	87	9.4	909	97.7	1460.439	<0.001**
Respiratory Problems						
Avoid timing of grains	99	10.6	789	84.8	1025.963	<0.001**
Avoid outside in case of storm, dust	113	12.2	893	96.0	1317.183	<0.001**
Skin problems						
Apply sun cream	63	6.8	905	97.3	1527.203	<0.001**
Wearing cotton clothes	55	5.9	892	95.9	1507.103	<0.001**
Avoid exposure to sun in midday	89	9.6	879	94.5	1344.395	<0.001**
Cool skin with a wet towel in sunny day	24	2.6	807	86.8	1333.583	<0.001**
Close the curtains or blinds when the sun is out	77	8.3	828	89.0	1213.782	<0.001**
Spring Conjunctivitis						
Wear sun glass in storms and dust area	66	7.1	796	85.6	1152.181	<0.001**
Clean eye with warm water regularly	78	8.4	809	87.0	1151.625	<0.001**
Total reported practices scores regarding climate change health risks						
Satisfactory Score	212	22.8	778	83.7		
Un Satisfactory Score	718	77.2	152	16.3	691.817	<0.001**

Table (7): Association between total Knowledge score with Perception and reported practices

Items	Pre –promotion program				Post – promotion program			
	Unsatisfactory (n=847)		Satisfactory (n=83)		Unsatisfactory (n=93)		Satisfactory (n=837)	
	N	%	N	%	N	%	N	%
Perception Score								
Negative	783	92.4	80	96.4	78	83.9	64	7.6
Positive	64	7.6	3	3.6	15	16.1	773	92.4
Chi – Square	X^2=1.757, P=0.185				X^2=375.896, P<0.001**			
Reported practices								
Unsatisfactory	651	76.9	67	80.7	79	84.9	73	8.7
Satisfactory	196	23.1	16	19.3	14	15.1	764	91.3
Chi – Square	X^2=0.641, P=0.423				X^2=355.679, P<0.001**			

**Highly significant at p<.001

Discussion

Nursing students must be ready to act in a world affected by climate change and to contribute to healthcare and a sustainable society. The evolution of education depends critically on the viewpoints and experiences of students. *(Sperstad et al., 2020).*This study aims, to evaluate the effect of promotion program regarding environmental literacy and climate change health risk among newly nursing students.

Findings of the current study reveals that more than half of them were females and living in rural areas. Near half of them were in a middle socio-economic class and near two thirds were lived in overcrowded home, and these findings were lined with *Abdallah & Wagdy. (2022)* in the study named Impact of Awareness Program Regarding Health Consequences of Climate Change on Knowledge, Perception and Daily Life practices among Nursing Students, *Who reported that* half of their study lived in rural outside the Cairo and in middle socioeconomic level, but it contradicted with *Kah et al., (2021),* cross-sectional study conducted to assess the causes, impact and solutions to global warming among undergraduate students from different schools in the University of the

Gambia, who reported that more than two thirds of them were males

As regard to student knowledge level regarding environmental literacy, the study results reveal a statistically significant increase in the satisfactory total knowledge score of the nursing students by almost of them after the implementation of promotion program with a highly statistical significant difference, this result was disagree to the study of *Marcos, (2020),* who found that a statistically significant difference between taking an environment-related course while teaching nursing students and pre promotion program test scores for the overall dimensions of the Environmental Literacy. Although taking environment-related courses has an effect on environmental attitude, use, and anxiety, while taking environment-related courses had no effect on environmental knowledge. it emphasized the importance of education as one of the key environmental literacy strategies, and promote learners' knowledge.

The current study reveals that the majority of nursing students had satisfactory knowledge post promotion program implementation with highly significance this study lined with *Nigatu et al., (2020)* which study entitled (Knowledge and perceptions about the

health impact of climate change among health sciences students in Ethiopia) who founded that about two-thirds of study had adequate knowledge to respond to climate change. But it contradicted with *Freije et al., (2016)* study which assess Bahrain University students' global warming awareness, reported that compared to other students without any promotion program, the faculty's fourth-year students knew more about the causes, impacts, and various solutions to climate change.

As concerning to source of information about climate changes, the present study presents that more than one third of study participant had their information from social media which was the main source. It reflects the importance of giving the nursing students the correct and reliable information through a formal study course or at least the inclusion of environmental literacy and climate change in their nursing course, also highlighted in a survey conducted by *Maran, and Begotti, (2021),* they mentioned that climate change knowledge is derived from indirect exposure to information transmitted through the media and social media networks. Also, it disagrees with *Torre et al., (2020)* cross-sectional study, Knowledge and perception about climate change among healthcare professionals and students who found in their study that the main sources of information resulted in TV source.

There were enhancing in the nursing students' perception regarding climate change in items as waste of resources contributes to climate change, climate change will be serious in Egypt, and diseases are sensitive to climate change post promotion program. This increasing in the nursing students' perception more than two third of studied student posttest may be depend on their overall improvement in knowledge and healthy practices regarding environmental health and climate change which enhancing and appreciating the behaviors, it was similar to *Abdallah, Wagdy, (2022)* Who noticed that improving in their study participant positive perception regarding climate change concern, after the implementation of the awareness program, with a highly statistically significant difference between the pre-promotion program and post- promotion program t of perception results. The present study also showed that students' participant positive perception from Post promotion program, it was lined with *Al Nozha & Fadel, (2017)* who reported the majority of nursing students perceived the environmental literacy as being more positive than negative

This change in the nursing students' perception may be due to their general advancement of practices and knowledge regarding environmental health and climate change which assist in changing their behaviors towards environmental activities and understanding the environmental challenges. These findings are supporting the first research hypothesis.

The current study shows that the minority of student's participants reported healthy practices regarding heat stroke as provide fluid as soon as possible, respiratory problems as, hypotension as a semi-Fowler's position, spring conjunctivitis pre promotion program while the majority of them reported preventive measures post promotion program with a statistically significant difference between the two study phases, its emphasis the importance of promotion program. It was lined with *Alebaji et al., (2022),* who study the Knowledge, Prevention, and Practice of Heat Strokes among the Public in the United Arab Emirates. Most

participants believe that avoiding outdoor activities can prevent heat strokes, also showed that a huge proportion of the population in the UAE did not have sufficient knowledge about heat stroke, prevention, and management. This improvement may due to the awareness and ability of nursing students to face projected environmental challenges to human health after implementation of promotion program. Studies by *Parker et al., (2019)* found similar results, with the majority of respondents indicating they were observing the impacts of climate change on the health, most commonly as increased in respiratory conditions due to air pollution or allergies.

The current results were congruent with those of *Rye et al., (2014),* whose study entitled changes in outdoor workers' sun-related attitudes, beliefs, and behaviors and found that around one third of study participants using sunscreen and the minority of them wearing thin clothing covering the whole body. The study findings were in agreement with that of *Tuladhar & Gurung, (2020)* who studied " Knowledge of conjunctivitis among high school students in Pokhara valley of Western Nepal " and reported majority of the students correctly respon ded to the practices regarding eye conjunctivitis. From researchers' point of view health education to the students and proper management can help in prevention of the eye conjunctivitis that result from climate change. These findings are supporting the second research hypothesis.

The finding highlighted the importance of this promotion program on the knowledge, perception and reported practices regarding climate change health risks among newly nursing students. As Post intervention shown a highly significant improvement (p<0.0001).

These results approve the study hypothesis of this study which stated" There will be a significance difference between pre and post promotion program regarding perception and reported practices toward climate change health risks among study group.

As regard shows that there were statistically significant association between total Knowledge score with Perception and reported practices post promotion program. This study's results showed that scores of the environmental knowledge had a positive, and significant correlation with perception and it was similar to the study result of *Makki et al., (2022) and Kahyaoglu, (2022)* revealed a correlation between environmental knowledge and Perception. Environmental education in higher education is crucial in a developing country, where there is a significant demand for natural resource use, consumption, and production.

Conclusion

The current study concluded that an increasing in the satisfactory knowledge total score level of the nursing student's knowledge, perception and reported practices by almost of them after the implementation of promotion program with a highly statistically significant difference.

Recommendation

Based on the findings of this study, the following recommendations were suggested:

1- Nursing programs should be developed to include sustainability and climate change into the curricula to provide students with the knowledge, abilities, and incentive to comprehend and address health risks posed by climate change.

2- Increase awareness of university students by conducting educational program of environmental health among higher education faculties.

3- Students should be involved in programs of environmental activities which encourage people to protect environment in order to reduce climate change health risks.

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