

Effect of Didactic Program about Health Care Providers' Role in Facing Climate Changes and Its Effects on Children Health

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Abstract

Background: One of the most important health issues and global injustices of our age is climate change. Health-care professionals represent the main stone in creating an international effort to deal with the factors that affect health and reduce the inequalities brought on by climate change.

So, this study aimed to: Evaluate the effect of didactic program about health care providers' role in facing climate changes and its effects on children health.

Research Design: Quasi-experimental design was utilized in this study.

Subjects: Included a convenience sampling of 50 physician and 50 nurses who are working at Assuit university children's hospital.

Tools of data collection: Four tools; **Tool (I):** Personal data and sources of knowledge about climate change,

Tool (II): A structured interview sheet about physician and nurses' knowledge regarding climate changes.

Tool (III): Health care provider's attitudes toward climate changes.

Tool (IV): Daily life practices questionnaire.

Results: It noticed that the studied nurses had good knowledge, adequate reported practices, and positive attitudes toward climate change in pre & post intervention with statistically significant differences.

Also, the studied physicians had good knowledge, adequate reported practices, and positive attitudes toward climate change in pre & post intervention with a statistically significant difference.

Conclusion: Implementation of the program about role of health care providers in facing climate changes and its effect on children health improve their knowledge, attitudes, and reported practices.

Recommendations: Continuing educational programs should be provided for health care professionals about environmentally sustainable health care services, practices, and behaviors to improve their knowledge and practices.

Keywords: Climate changes, Children, Health care providers, Role

Introduction

One of our generation's biggest health issues as well as a global injustice is climate change. Climate change is a "wicked" problem that places vulnerable people and societies at risk of regressive exposure, the possibility of experiencing its direct and indirect health impacts is highest among people who have contributed the least to the planet's harm. Children of today's and tomorrow's generations are the group most at risk from the consequences of climate change. If climate mitigation methods are not put in place by 2030, there would be 131,000 more child fatalities annually because of the convergence of a rise in the incidence of infectious diseases, lack of access to food and instability in politics⁽¹⁾.

A significant intergenerational ethical conundrum will arise if we don't take immediate steps to reduce and adapt to climate change, which might harm current and future generations with worse mental and physical health than earlier generations. Currently, more than half a billion children live in places where extreme weather events are more likely to occur⁽²⁾. The most important risk to children's health today requires professionals who work with children's health to support actions to combat climate change that consider the intricate ethical, ecological, and health challenges that must be resolved. Children's health now and in the future is at danger if prompt action is not taken⁽³⁾.

Egypt is one of the most vulnerable nations, facing numerous challenges to its energy, water, and food security as well as to its economic, social, and environmental assets. According to a report from the Egyptian Meteorological Service, temperatures in summer 2021 increased by an astonishing 3–4

degrees Celsius above average, five years earlier than usual⁽⁴⁾. 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 several economic sectors⁽²⁾.

One of the key factors contributing to Egypt's high vulnerability to climate change is its excessive population. Additionally, the populated Nile delta is extremely vulnerable to sea level rise. The health of people will be impacted by the effects of global warming⁽²⁾. Over 95% of Egypt's population and agricultural production are concentrated in the delta, a narrow dip of the Nile that comprises 5% of the country. The following areas are the most vulnerable in terms of severity and the likelihood of results: agriculture, coastal zones, aquaculture and fisheries, water resources, human surroundings and settlements, and human health⁽⁴⁾.

The long-term and cumulative character of the effects of climate change necessitate considering future exposure as well as evaluating numerous indirect rather than direct dangers that are unequally distributed within and between communities⁽⁵⁾. The effects of climate change on children are determined by global inequities between and within nations; obviously, underprivileged children will experience a disproportionately high and unjustified health burden⁽⁵⁾.

In addition to the immediate physical consequences of heat stress, weather disasters, poor air quality, and food and water insecurity, the wide consequences of climate change on children's health also include the psychological toll of global instability, mass changes, and growing conflicts over limited resources⁽⁶⁾.

The immediate, indirect, and long-term consequences of climate change on children's health are made worse by the socioeconomic context. The increase in infectious illnesses brought on by climate change, which will be made worse by the dynamic condition of starvation, will affect children the most ⁽⁶⁾.

Health-care professionals represent the main stone in creating a worldwide movement to address the factors that affect health and reduce the inequalities brought on by climate change ⁽⁷⁾. Those involved in child health work must comprehend the challenges at hand and appreciate them in light of the Committee on the Rights of Children and the political system in which they are embedded and should use their position of power as "the voice" for today's children and future generations to engage policy makers and the general public ⁽⁷⁾.

Pediatric and community health nurse play a vital role in increasing understanding among children and actively encouraging them to adjust their behavior can assist prevent climate change and to safeguard their own health ⁽⁸⁾. The significance of behavior changes by large populations to avert negative social and health effects, the significance of prevention as a response to climate change, and the unique position and function of nurses and doctors as educators ⁽⁹⁾.

Significance of the study:

By 2030, malaria, diarrheal illness, heat stress, and hunger alone will be responsible for almost 250.000 annual fatalities due to climate change ⁽²⁾. In addition, both in developing and wealthy nations, climate change is a major contributor to Disability Adjusted Life Years (DALYs) ⁽¹⁰⁾. People living in poor nations or cities, those who are already ill or disabled, children, and the elderly are most at risk due to

climate change, which will lead to an increase in already existing health disparities ⁽¹¹⁾. The World Health Organization forecasts that if climate change mitigation policies are not implemented, there would be up to 131, 000 more child deaths per year by 2030. The world's children are the innocent victims of our - and previous generations' - damage to planetary health ^(3&5).

Aim of the study:

The study aimed to evaluate the effect of didactic program about health care providers' role in facing climate changes and its effects on children health.

Research hypothesis:

H1: There will be significant differences between pre-and post- program applications for physician and nurses' knowledge, attitude and reported practices scores regarding their role in facing climate changes and its effect on children's health.

H2: There will be a significant association between physicians' and nurses' knowledge, their reported practices and attitude.

Null Hypotheses: There will not be significant differences between nurses' & physician' knowledge and reported practices in pre- and post- program applications.

Subjects and Method:

Research design:

A quasi-experimental (Pre and posttest) research design was used in this study.

Setting:

The research was conducted at the Assiut University Children's Hospital.

Subjects:

A convenience sampling of 50 physicians and 50 nurses who are working in (emergency, medical, ICU, surgery, rehydration department) at Assiut University Children Hospital. The sample was calculated by using

power analysis at confidence interval 95% with precision levels 5% and $p \leq 0.05$.

-The study subjects were selected according to the following criteria:

- Inclusion criteria:

- Both sex
- Willing to participate in the study.

- Exclusion criteria

- Nurses & physicians who are working in premature department.

Tools of the study:

Four tools utilized for data collection in this study:

Tool (I): Structured interview sheet developed by the researchers based on extensive review of related literature and consultation of the experts and composed of two parts:

Part one: Personal data of physicians and nurses such as age, sex, educational level, years of experience, marital status, and residence. **Part two:** Sources of information about climate change.

Tool (II): A structured interview sheet about physician and nurses' knowledge regarding climate changes: It adapted after review of literature from previous research. It consisted of two parts: **Part one:** Included 17 multiple choice questions about basic facts about climate change and its occurrence such as main source of climate change information, risk group affected by climate change health problems.

Scoring system:

It consisted of questions (17 multiple choice that involved 77 items as many of them had a multiple answer). Each correct item was given one and incorrect item was given zero. The total score ranged from 0-77. Poor knowledge <50% (<39), average knowledge 50-70% (39-54), good knowledge >70% (>54). **Part two:** Contained of seven (7) questions about

physician' role to manage the effect of climate changes on child health.

Scoring system:

It covered seven (7) questions. Each correct item was given one and incorrect item was given zero. The total score ranged from 0-7. Poor knowledge <50% (<4), average knowledge 50-70% (4-5), good knowledge >70% (>5).

Part three: Consisted of 17 questions Nurses' role to manage the effect of climate changes on child health.

Scoring system:

It involved 17 questions. Each correct item was given one and incorrect item was given zero. The total score ranged from 0-17. Poor knowledge <50% (<9), average knowledge 50-70% (9-12), good knowledge >70% (>12).

Tool (III): A modified Likert's scale adopted from **Netravathia, (2014)** ⁽¹²⁾ consisted from 11 items to assess health care provider's attitudes toward climate changes.

Scoring system:

It composed of 11 questions. Agree scored (2), uncertain (1) and disagree (0). The total score ranged from 0-22. The respondent's attitude considered positive if $\geq 70\%$ (16) and negative if 70% (16) or less.

Tool (IV): Daily life reported practices questionnaire adopted from **Netravathia, (2014)** ⁽¹²⁾ covered 17 items to assess the health care providers' daily life practices which can lead to climate changes.

Scoring system:

It included 17 questions. "do" was scored (1) and "undo" was scored (0). The total score ranged from 0-17. "Inadequate practices $\leq 70\%$ (12), Adequate practices >70% (12).

Method of data collection:

- After explaining of the study aim, the Dean of the Faculty of Nursing granted official

approval to the manager of Assiut University Children Hospital to gather data.

- The ethical agreement was gotten from the Ethical Committee at the Faculty of Nursing Assiut University.

- The researchers prepared a systematic interview sheet.

- The validity index of the tools was judged by a jury of five university professors in the field of pediatric and community health nursing to examine the contents validity (covering, clarity, wording, length, format, and overall appearance) it was 94% for tool II, 96% for tool III and 93 for tool IV.

- The study instruments' reliability was examined by quantifying their internal consistency with Cronbach's alpha. This turned to be ($\alpha = 0.678$) to study tool I& tool II. 0.850 for tool III and 0.825 for tool IV.

- The goal and nature of the study clarified to the health care professionals, as well as their right to agree or disagree to participate in the study. Oral permission to engage in the study was obtained from each physician and nurse and they informed that the information obtained would be confidential and used only for the purpose of the study. The pilot study was done on 10% (10) of physician and nurse to test the clarity and applicability of the tools and to estimate the time needed for filling the sheet. The result of the pilot study confirmed that the study was feasible and there was no modification done in the tools. Physician and nurses who participated in the pilot study were included in the total sample size.

- **The educational program:** The researchers developed it based on the relevant literary source. It was used in four stages, as the following:

-**Assessment phase:** The researchers assessed the physician and nurses' personal data as; age,

sex, level of education...etc. Test applicability of tools by taking a pilot study of the study sample to determine exactly all information needed to be included in the program.

-**Planning phase:** This phase covered planning for the program's implementation, such as the program's aim of improving health care professionals' understanding, attitudes, and practices concerning their roles in dealing with the effects of climate change on child health. The instructional environment, sessions, audiovisual aids, handouts, and pictures

- **Teaching Time:** The program's timing was determined by the rest intervals of physicians and nurses working in hospital departments.

- **Teaching place:** This work was done at the nurse's and physicians' room in the pediatric department of Assiut University Children's Hospital.

- **Teaching methods and materials:** As a teaching strategy, the researchers employed lectures, discussions, films, and booklet handouts that were provided to all medical professionals at the conclusion of the program.

Sessions: The purpose and anticipated results of the current study were clearly explained to them. The study received the verbal consent of healthcare professionals, who were also promised anonymity and informed that they might withdraw from the study at any moment.

Implementation phase: Two sessions were created from the program's contents: It was composed of:

Session (1): Included knowledge regarding facts of climate changes occurrence e.g., definition of climate changes, causes of climate changes and knowledge regarding their roles in facing climate changes and its effects on child health such as increase children' understanding of how climate change

affects their health. Physicians and nurses have a role in mitigation of climate changes through encouraging environmentally sustainable health care services. The researchers presented themselves and described the nature and goals of the program to establish a channel of contact. Each physician and nurse was then interviewed separately after the researchers had explained the purpose and methodology of the study. The interview lasted 20 to 30 minutes, and the researchers recorded the responses in the questionnaire. Six (6) physicians and 6 nurses were interviewed on two days weekly.

Session (2): Included attitudes towards climate change. In this session, the researchers asked each physician and nurse personally about their attitudes about climate change. The questionnaire was filled out during this session, which lasted 30 minutes.

Session (3): Included daily life reported practices to solve the problem and limiting causes that lead to occurrence of climate changes. It included two items such as indoor daily life practices e.g. switching-off lights when not in use & outdoor daily life reported practices as minimum use of papers. In this session the researchers interviewed each physician and nurse individually and asked them about daily life reported practices. This session took 15 minutes to fill the sheet. The educational program lasted three months, and it each physician and nurse took three sessions over the course of two days to finish it.

Fieldwork: From the beginning of February 2023 to the end of April 2023, a three-month period during which the data were collected from emergency, medical, ICU, surgery, rehydration department at Assiut University Children's Hospital. The researchers introduced themselves to the physicians and

nurses, explained the purpose of the study, and discussed its nature with them. During two meetings, the pretest was completed. In the first, the pre-structured form was completed. The second section of the study included an explanation of the educational program's contents through handout booklet for the participants. About 3 nurses and 3 physicians were interviewed/day two times/week (total number of nurses was 6 and there were six physicians in total every week. Depending on their responses, each form's total completion time ranged from 15 to 30 minutes. The brochure, which featured pictures, posters, and information on the program, covered its contents. For each form, it took an average of 15 to 30 minutes to complete the post-test form. The post-test was administered a week following the pretest.

Evaluation stage: To measure the impact of the educational program, the knowledge, attitudes, and daily life practices were examined once after one week following the pretest.

Statistical analysis:

Data entry and data analysis were done using statistical package for the social science (SPSS) version 26. Data were presented as number, percentage means and standard deviation. Mc Nemar test was used to show difference between variables in pre and posttest, Pearson Chi-square was used to show relation between variables. P-value considered statistically significant when $p < 0.05$ and highly statistically significant when $p < 0.01$.

Results:

Table (1): Illustrates that (82%) of studied nurses were in the age group (≤ 35 years) compared to (66%) of studied physicians. As regarding sex (100%) of studied nurses were female compared to (44%) of studied

physicians were male. Also, (56%) of studied nurses were from urban areas compared to (96%) of studied physicians. According to marital status more than two thirds of studied nurses were married while more than two fifths of studied physicians were single. Regarding educational level (40%) of studied nurses had nursing institute while the (80%) of studied physicians had master's degree. Also, the table shows (80%) of studied nurses had more than 5 years of experience in the opposite (48%) of studied physicians had ≤ 5 years.

Figure (1): Shows that (74%) of studied physicians the internet / social media was the main source of knowledge while (68%) of studied nurses the internet / social media was the main source of knowledge about climate change in pre intervention. Moreover, (30%) of studied nurses work was the source of their knowledge compared to (16%) of studied physicians.

Figure (2): Demonstrates that there was a statistically significant deference among studied nurses according to their level of knowledge in pre and post intervention p1-value (0.001). There was a statistically significant deference among studied physicians according to level of knowledge in pre and post intervention p2-value (0.001). There was a statistically significant deference among studied nurses& studied physicians according to level of knowledge in pre and post intervention p3-value (0.001).

Figure (3): Illustrates that (76%, 94%) of studied nurses had adequate level of practices in pre and post intervention respectively with statistical significant deference p- value (0.001). While (80%, 100%) of studied physician had adequate level of practices in pre and post intervention respectively with statistical significant deference p- value (0.001). There was highly a statistically significant deference between studied nurse and studied physicians in their practices in pre& post intervention p-value (0.001).

Figure (4): Reveals that (78%, 96%) of studied nurses had positive attitude toward climate change in pre &post intervention with a statistical significant differences p- value (0.001). As well as (88%, 98%) of studied physicians had had positive attitude toward climate change in pre &post intervention with a statistical significant differences p – value (0.003). There was a highly statistically significant difference between studied nurse and studied physicians in their attitude pre& post intervention p – value (0.002).

Table (2): Demonstrates that there was a significant correlation between studied nurses & physicians level of knowledge in pre-intervention and total practices.

Table (3): Reveals that there was a significant correlation between studied nurses & physicians level of knowledge in pre-intervention and total score of attitude.

Table (1): Distribution of the studied health team (pediatricians and nurses) according to their personal data (n=100)

Personal data	Nurses (50)		Pediatricians (50)	
	N	%	N	%
Age group/ years:				
• ≤ 35 years	41	82.0	33	66.0
• More than 35 years	9	18.0	17	34.0
Mean ± SD of age	31.78±5.23		35.80±10.78	
Sex:				
• Male	0	0.0	22	44.0
• Female	50	100.0	28	56.0
Residence:				
• Urban	28	56.0	48	96.0
• Rural	22	44.0	2	4.0
Marital status:				
• Single	13	26.0	24	48.0
• Married	35	70.0	25	50.0
• Widowed	2	4.0	1	2.0
Educational level:				
• Diploma	11	22.0	0	0.0
• Nursing institute	20	40.0	0	0.0
• Bachelor degree	16	32.0	10	20.0
• Master degree	3	6.0	40	80.0
Years of experience:				
• ≤5 years	10	20.0	24	48.0
• More than 5 years	40	80.0	26	52.0
Mean ± SD of years of experience	10.36±6.16		10.28±9.97	

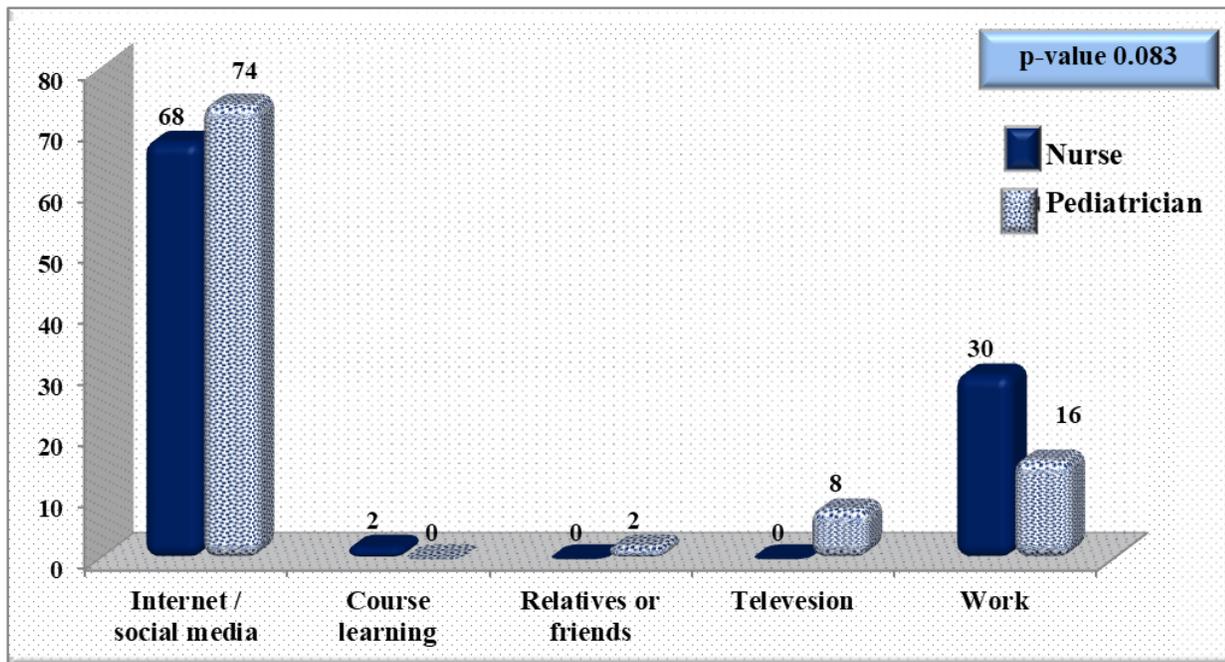
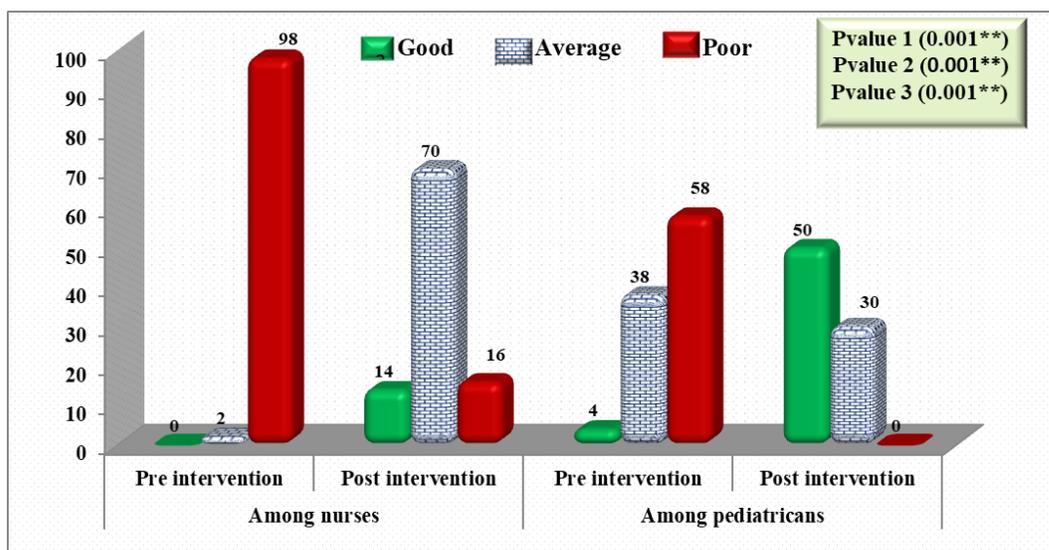


Figure (1): Distribution of the studied health team (pediatricians and nurses) according to their source of knowledge about climate changes in pre intervention (n=100)



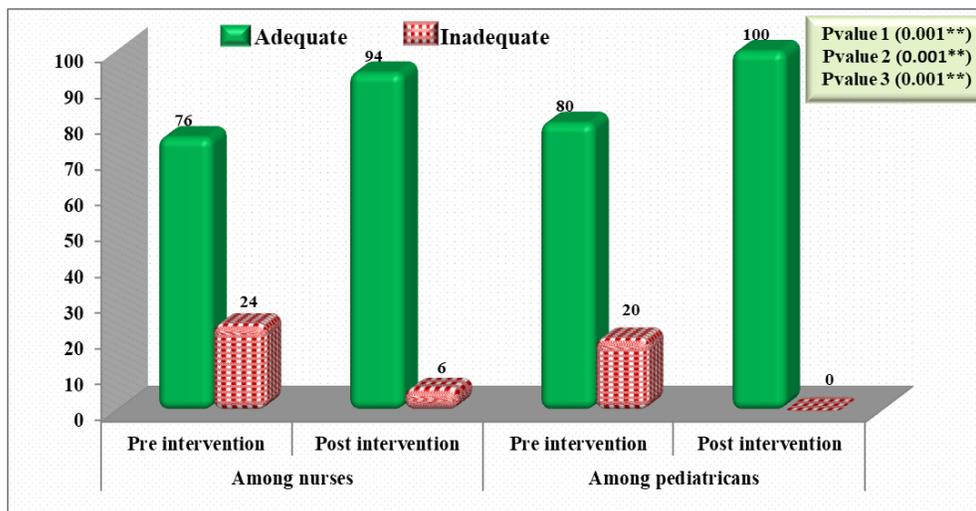
p-value1 between nurses in pre and post intervention

p-value2 between pediatricians in pre and post intervention

pvalue3 (between pre and post intervention among studied nurses and physician)

(*) Statistical significant difference (p<0.05) (**) Highly statistical significant difference (p<0.01)

Figure (2): Distribution of the studied health team (pediatricians and nurses) according to their level of knowledge about climate changes in pre and post intervention (n=100)



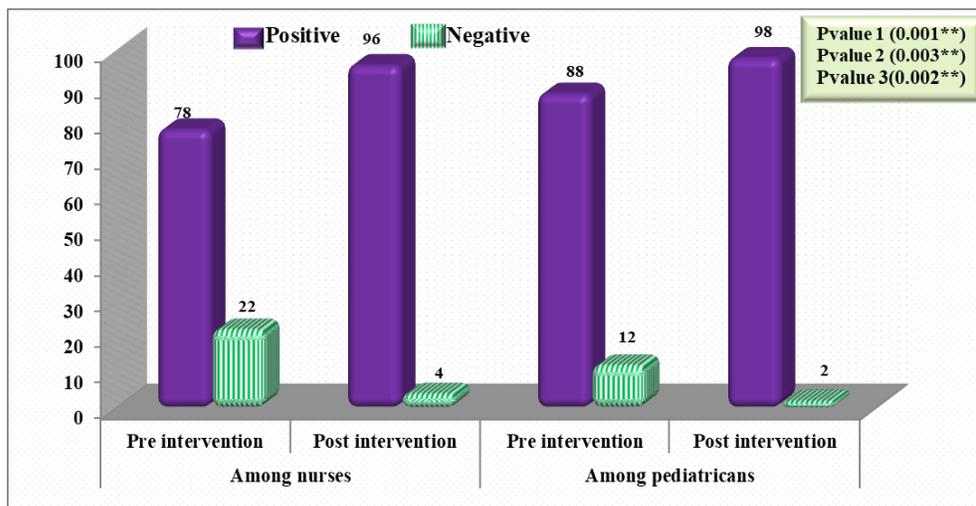
p-value1 between nurses in pre and post intervention

p-value2 between pediatricians in pre and post intervention

pvalue3 (between pre and post intervention among studied nurses and physician)

(*) Statistical significant difference ($p < 0.05$) (**) Highly statistical significant difference ($p < 0.01$)

Figure (3): Distribution of the studied health team (pediatrician and nurses) according to their level of practices about climate changes in pre and post intervention (n=100)



p-value1 between nurses in pre and post intervention

p-value2 between pediatricians in pre and post intervention

pvalue3 (between pre and post intervention among studied nurses and physician)

(*) Statistical significant difference ($p < 0.05$) (**) Highly statistical significant difference ($p < 0.01$)

Figure (4): Distribution of the studied health team (pediatricians and nurses) according to their attitude level toward climate changes in pre and post intervention (n=100)

Table (2): Correlation between the studied health team (pediatricians and nurses) knowledge level regarding climate changes in pre and post intervention and total practices (n=100)

Items		Knowledge level regarding climate changes			
		Nurses		Pediatricians	
		Pre intervention	Post intervention	Pre intervention	Post intervention
Total practices level	Pearson Correlation	.595	.076	.483	.2699
	Sig. (2-tailed)	.000**	.600	.001**	.059

(**) Correlation is significant at the 0.01 level (2-tailed).

(*) Correlation is significant at the 0.05 level (2-tailed).

Table (3): Correlation between the studied health team (pediatricians and nurses) knowledge level regarding climate changes in pre and post intervention and attitude toward climate changes (n=100)

Items		Knowledge level regarding climate changes			
		Nurses		Pediatrician	
		Pre intervention	Post intervention	Pre intervention	Post intervention
Total attitude	Pearson Correlation	.410	.121	0.391	.091
	Sig. (2-tailed)	.003**	.403	.007**	.530

(**) Correlation is significant at the 0.01 level (2-tailed).

(*) Correlation is significant at the 0.05 level (2-tailed).

Discussion:

One of the biggest risks to people's health is climate change. The World Health Organization estimates that environmental causes account for 23% of all deaths worldwide and that by 2030, climate change-related deaths would increase to 250,000 per year⁽¹³⁾. Few medical and nursing schools include climate education in their official curricula, despite pleas for action from numerous groups. Healthcare professionals need to be trained to recognize the problems caused by climate change because they are vital in informing patients about a range of health dangers⁽¹⁴⁾.

The study aimed to evaluate the effect of didactic program about health care providers' role in facing climate changes and its effects on children health.

It was observed that most of studied nurses and more than half of physician were in the age group (≤ 35 years) this was in contrast with **Ibrahim et al, (2018)**⁽¹⁵⁾ who recorded that the average age of the participants was 33 years. As regarding sex all of the studied nurses were female. This observation was the same as **Polivka et al, (2022)** and **Sambath et al, (2012)**^(16 & 17) who said that the majority of samples were female. This was illustrated by that it well known that nursing is female job in nature even that male being part of the profession recently.

In addition, about half of the physicians in the study were male. Also, more than half of studied nurses were from urban areas compared to the majority of physicians. As regards educational level, two-fifths of nurses had nursing institute. This was Contrary to **Polivka et al, (2022)**⁽¹⁶⁾ who found that the majority of nurses had baccalaureate degree or higher.

While the majority of studied physicians had master's degree. It will know that Higher

education plays an important part in promoting sustainability awareness and influencing young people's attitudes and behaviors.

The majority of nurses had more than 5 years of experience in the opposite nearly half of physicians had ≤ 5 years of experience this was opposite to **Ibrahim et al, (2018)**⁽¹⁵⁾ who reported that nearly one-quarter and more than half of physicians and nurses had < 5 years of experience. Additionally, according to **Polivka et al, (2022)**⁽¹⁶⁾ reported that more than one-third of nurses had >10 years of experience.

It was noticed that nearly three-fifths of studied physicians the internet / social media was the main source of knowledge while more than two-thirds of studied nurses the internet/social media was the main source of knowledge about climate change in pre intervention. We cannot, however, ignore social media's importance in this subject. It has evolved into a very valuable forum for discussion of scientific matters, with climate change now ranking among the most popular topics. This result was similar with those of **Reddy et al, (2022)** and **Polivka et al, (2012)**^(18 & 17). On the other hand this was incongruent with **Ibrahim et al, (2018)**⁽¹⁵⁾ who reported that newspapers (28.2%), television (25.8%) and social media (18.1%) served as the main source of information on climate change and health for the respondents. On the same line **Salem et al, (2022)**⁽¹⁹⁾ recorded that main sources of information were TV and school/university.

There was a statistically significant difference among studied nurses according to their level of knowledge in pre and post intervention. This was the same as the results of⁽²⁾ Also, **Sambath et al, (2022)** and **La Torre et al, (2020)**^(16 & 20) who revealed that knowledge concerning the health-related impacts of climate change by respondents was minimal.

Moreover, **Mekawy (2023)** ⁽²¹⁾ disclosed that most of the studied sample had poor level of knowledge and practice related to climate change. **Mohammed et al, (2022)** ⁽²²⁾ confirmed on the positive effect of the awareness program on the knowledge level. There was a statistically significant deference among studied physicians according to level of knowledge in pre and post intervention. This observation further highlighted an important educational gap in our traditional medical and nursing school curriculum during an era of rapid and significant climate change. These findings agreed with **Netravathia (2014) and Casson et al, (2023)** ^(12 & 14) who stated that there were low pre-intervention survey responses suggested a baseline lack of knowledge. Also, **Ghazy and Fathy, (2023)** ⁽²³⁾ reveled that there was low level of knowledge about the climate change among the respondents. **Yang et al, (2018)** ⁽²⁴⁾ disclosed that the majority of the medical practitioners have concluded that they are knowing the health impacts of climate change in their practice. In the same regard **Sarfaty et al, (2014)** ⁽²⁵⁾ recorded that the studied physicians aware about climate change and its effects. Additionally, this result wasn't consistent with **Ibrahim et al, (2018), Salem et al, (2022) and Boland and Temte, (2019)** ^(15, 19 & 26) who reported that there was higher awareness about climate change elements and its effects. **Reddy et al, (2022)** ⁽¹⁸⁾ observed that more than two-thirds of the participants were knowledgeable regarding climate change and **Kircher et al, (2022)** ⁽²⁷⁾ who conducted a study in Philippines and assessed knowledge and attitudes of future physicians towards climate change and revealed that the majority had fair knowledge of climate change. Likewise, **Domantay et al, (2021)** ⁽²⁸⁾ found that awareness,

knowledge, and concern about climate health impacts were high.

There was a significant improvement in nurses' practices following the intervention about practices regarding climatic changes in pre and post intervention. This agreed with **Abdallah and Farag, (2022)** ⁽²⁾ However, this result was contrast with **Mekawy, (2023) and La Torre et al, (2020)** ^(21 & 20) who observed that approximately half of the staff nurses had a low reported practices dimension.

The majority of studied physicians had proper practices in pre and post intervention respectively with statistically significant deference. There was a highly statistically significant deference between studied nurses and studied physicians in their practices in pre& post intervention. This was in congruent with **Ibrahim et al, (2018)** ⁽¹⁵⁾ who recorded that there was high level of reported practices. Similarly, **Mohammed et al, (2022)** ⁽²²⁾ indicated that the awareness program has a significant positive effect on the respondents' daily life reported practices regarding climate change. While **Polivka et al, (2012)** ⁽¹⁷⁾ recorded that lesser proportion of the study participants had proper practice. Most of nurses who were evaluated had favorable attitudes about climate change in before and post intervention, and there were statistically significant variations between these views **Abdallah and Farag, (2022)** ⁽²⁾ reported the same observation.

According to the current study, differences between the pre- and post-intervention were statistically significant, that showed that most doctors had a favorable attitude towards climate change. These findings are positive because they demonstrate that the health sector has a role to play in addressing climate change and its implications on public health. This was consistent with the findings of **Netravathia, (2014)** ⁽¹²⁾ who observed that

after completion of the educational intervention, median agreement level on survey responses significantly increased. This was agreed with **Casson et al, (2023)** ⁽¹⁴⁾ who stated that the majority of studied sample had a positive attitude toward global warming as an example of climate change. As well as, **Ibrahim et al, (2018)** and **Boland and Temte, (2019)** ^(15& 26) reported that most of the health workers had positive contributes toward climate change. In the same regard **Casson et al, (2023)** ⁽²⁹⁾ recorded that nearly the majority of health professionals agreed that they have responsibility to climate changes measures in their workplace. On the opposite side, **Reddy et al, (2022)** ⁽¹⁸⁾ stated participants must receive the information in a new way if they are to have a constructive attitude towards the mitigation of climate change issue.

There was a significant correlation between studied nurse's educational level and their knowledge regarding climate change. These findings highlighted the crucial role that education plays in the problem of climate change, the value of include it in the curriculum, and the urgent steps that need be taken to lessen its negative effects. In the same regard this finding was supported by **Reddy et al, (2022)** ⁽¹⁸⁾. On the other hand this observation wasn't agreed with **La Torre et al, (2020)** ⁽²⁰⁾ who claimed that there wasn't significant association between knowledge level and education.

The degree of knowledge of the nurses and doctors under study in both the pre-intervention and overall practices was significantly correlated. It was discovered that individuals with sufficient understanding of climate change exhibited more environmentally friendly behaviors than those with insufficient information. This observation was agreed with **Polivka et al, (2012)** ⁽¹⁷⁾.

Conclusion:

The program's implementation about the role of healthcare professionals in addressing climate change and its impact on children's health enhanced their knowledge and practice. In addition, statistically significant differences were identified between the studied nurses and the studied physicians in terms of their knowledge, practices, and attitudes before and after the program's implementation. These results were aligned with the study hypothesis.

Recommendations:

1. Mass media, including TV, pamphlets, and educational campaigns, has a major role to play in raising awareness of health issues about effects of climate changes on children health and the importance of inclusion of health care professionals to cooperate with policy decision makers to face the problem and reduce its effects.
2. Continuing educational programs should be provided for health care professionals about environmentally sustainable health care services, practices and behaviors.
3. Encourage health care professionals to participate in public health initiatives such disease surveillance, vaccinations, vector control, nutritional supplements, food safety, and public education.
4. Further researches on larger sample size for generalization of the findings.

References:

1. **Williams, P., Marais, B., Isaacs, D., & Preisz, A.** Ethical considerations regarding the effects of climate change and planetary health on children. 2021; 57 (11): 1775–1780. <https://doi.org/10.1111/jpc.15704>.
2. **Abdallah Z., Farag A.** 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
EJNHS. 2022; 3 (1): 367-390.

3. World Health Organization (WHO). Quantitative Risk Assessment of the Effects of Climate Change on Selected Causes of Death, 2030s and 2050s. Geneva: The World Health Organization; 2014.

4. Centers for sickness management and interference (CDC). Gillespie E, Schramm P, Hsu J. “U.S. public health response to climate change for allergist immunologists external icon.” ANNALS OF ALLERGY, ASTHMA & IMMUNOLOGY, 2020.

5. Ahdoot S., Pacheco S. Global climate change and children's health. Pediatrics 2015; 136: 992–997.

6. Xu Z., Etzel R., Su H., Huang C., Guo Y., Tong S. Impact of ambient temperature on children's health: A systematic review. Environ. Res. 2012; 117: 120–31.

7. Waterston T. Advocacy and the paediatrician. Paediatr. Child Health 2016; 26: 179–84.

8. Ryan E., Dubrow R., Sherman J. Medical, nursing, and physician assistant student knowledge and attitudes toward climate change, pollution, and resource conservation in health care. 2020.

9. Ryan, A. & Crowley, B. Climate Change and Health: A Position Paper of the American College of Physicians. Annals of Internal Medicine. 2016 doi:10.7326/M15-2766.

10. Costello, A., Abbas, M., Allen, A., Ball, S., Bell, S., Bellamy, R., Lee, M. Managing the health effects of climate change. The Lancet. 2009; (9676)373, 1693-1733.

11. Michael, E., Jeremy J. Hess. Climate Change. Impacts on and Implications for Global Health. Elsevier on behalf of

American Journal of Preventive Medicine. 2008; 35(5), 527–538.

12. Netravathia G. A Scale to Measure Attitude of Research Scholars towards Climate Change Studying in Agricultural Universities, Indian Res. J. Ext. Edu. 2014; 14 (1).

13. Gomez J., Goshuaa A., Pokraja N., Ernye B., Auerbach P., Nadeau K., Gisondi M. Teaching medical students about the impacts of climate change on human health, The Journal of Climate Change and Health. 3 (2021) 100020, P.p. 1-5.

14. Casson N., Cameron L., Mauro I, Friesen-Hughes K., Rocque R. Perceptions of the health impacts of climate change among Canadians, BMC Public Health. (2023) 23:212; P.p. 1-13. <https://doi.org/10.1186/s12889-023-15105-z>.

15. Ibrahim A., Fahmy H., Mahmoud S. Knowledge and Attitude regarding Global Warming Phenomenon among Assiut University Students, Assiut Scientific Nursing Journal. 2018; 6 (14): 1-13.

16. Sambath V., Narayan Sh., Kumar P., Kumar P., Pradyumna A. Knowledge, Attitudes and Practices Related to Climate Change and its Health Aspects among the Healthcare Workforce in India –A Cross-Sectional Study. The Journal of Climate Change and Health. 2022; P.p. 1-40.

17. Polivka B., Chaudry R., Crawford J. Public Health Nurses’ Knowledge and Attitudes Regarding Climate Change, Environmental Health Perspectives. 2012; 120 (3): 321-325.

18. Reddy G., Rajamouli J., Arora D., Jothula K., Amaravadi S., Boda A. Knowledge, perceptions and practices of medical students towards climate change and global warming: A cross sectional study, Journal of Family Medicine and Primary Care| Published by Wolters Kluwer – Medknow. 2022; 11 (6): 2557-2564.

- 19. Salem M., Hegazy N., Mohammed A., Hassan E., Abdou M., Zein M.** Climate change-related knowledge and attitudes among a sample of the general population in Egypt, *Front. Public Health, Sec. Environmental health and Exposome*. 2022; Vol. 10, P.p. 1-10. <https://doi.org/10.3389/fpubh.2022.1047301>.
- 20. La Torre, G., De Paula Baer, A., Sestili, C., Cocchiara, R., Barbato, D., Mannocci, A., Del Cimmuto, A.** Knowledge and perception about climate change among healthcare professionals and students: A cross-sectional study. *South East Eur J Public Heal* 2020; 13:1–19. <https://doi.org/10.4119/SEEJPH-3347>.
- 21. Mekawy Sh.** Climate Change and its Relation to Environmental Sustainability Practice as Perceived by Staff Nurses, *Journal of Nursing Science-Benha University*. 2023; 4 (1): 1226-1243.
- 22. Mohammed E., Abd El-Mouty S., Ameen N.** Nursing Students knowledge, Attitude, And Practice Regarding Health Effect of Climate Change, *Mansoura Nursing Journal (MNJ)*. 2022; 9 (2): 589-601.
- 23. Ghazy H. & Fathy D.** Effect of Awareness Program Regarding Climate Change on Knowledge, Attitudes and Practices of University Students, *International Egyptian Journal of Nursing Sciences and Research (IEJNSR)*. 2023; 3 (2): 186-203.
- 24. Yang, L., Liao, W., Liu, C., Zhang, N., Zhong, S., Huang, C.** Associations between Knowledge of the Causes and Perceived Impacts of Climate Change: A Cross-Sectional Survey of Medical, Public Health and Nursing Students in Universities in China. *Int J Environ Res Public Health*. 2018; Vol. 15, P.p.2650 15:2650. <https://doi.org/10.3390/IJERPH15122650>.
- 25. Sarfaty, M., Mitchell, M., Bloodhart, B., Maibach, E.** A survey of African American physicians on the health effects of climate change. *Int. J. Environ. Res. Public Health* 2014, 11, P.p. 12473–12485. [CrossRef] [PubMed].
- 26. Boland, T., Temte, J.** Family Medicine Patient and Physician Attitudes toward Climate Change and Health in Wisconsin. *Wilderness Environ. Med.* 2019, 30, 386–393. [CrossRef] [PubMed].
- 27. Kircher M., Doheny B., Raab K., Onello E., Gingerich S., Potter T.** Understanding the Knowledge, Attitudes, and Practices of Healthcare Professionals toward Climate Change and Health in Minnesota, *Challenges*. 2022; 13 (57): 1-17.
- 28. Domantay, J., Leochico, C., Salvador, P., Ciriaco, V., Abad, P., Cruz, G., Torres, C.** Knowledge and attitudes of future physicians in the Cordillera region of the Philippines towards climate change: A prepandemic cross-sectional study. *The Journal of Climate Change and Health*. 2021; 4, 100063.
- 29. Casson N., Cameron L., Mauro I, Friesen-Hughes K., Rocque R.** Perceptions of the health impacts of climate change among Canadians, *BMC Public Health*. 2023; 23:212, P.p. 1-13. <https://doi.org/10.1186/s12889-023-15105-z>.
- 30. Ryan E., Dubrow R., Sherman J.,** Medical, nursing, and physician assistant student knowledge and attitudes toward climate change, pollution, and resource conservation in health care. *BMC Med Educ*. 2020. <https://doi.org/https://doi.org/10.1186/s12909-020-02099-0>.
- 31. Ryan, A. & Croweley, B.** Climate Change and Health: A Position Paper of the American College of Physicians. *Annals of Internal Medicine*. 2016. doi:10.7326/M15-2766.