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Upgrading Pediatric Nurses' Awareness about Sustainable Development, Climate Change and its Effects on Children's Health

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Abstract
Background: Environmental climate change are the core of sustainable development paradigm taking into account recent global challenges. Pediatric nurse must understand the escalating nature of these threats; anticipate their effects on children's health. **Aim**: to upgrading pediatric nurses' awareness about sustainable development, climate change and its effects on children's health. **Subjects and Method:** The pre–posttest quasi-experimental research design was used. **Sample:** A convenient sample of 100 pediatric nurses at Assiut Children's University Hospital. **Tools:** Sustainable development and climate change questionnaire form, pediatric nurses' knowledge about sustainable development and climate change, and a modified Likert's scale of pediatric nurses' attitudes. **Results:** Reveals a highly statistically significant differences were observed between the pre and post program intervention related to total pediatric nurses' knowledge and level of attitude about sustainable development and climate change as majority (80.0%) of them had satisfactory level of knowledge and (86.0%) of them had positive attitudes in the post program test. **Conclusion:** Significant differences were clearly identified for pediatric nurses in pre-and post-program implementation about sustainable development, climate change and its effect on children's health as the majority of the studied nurses had satisfactory level knowledge and positive attitudes in the post-test after the program application. **Recommendations:** It is important to update pediatric nurses' knowledge regarding sustainable development, climate change through continuing educational programs. There is a need for explicit sustainability education within nursing education curricula.

Keywords: Awareness, Children, Climate Change, Health, Pediatric Nurses & Sustainable Development.

Introduction
Sustainable development is a multifaceted process that includes complex, comprehensive, and multiple developments based on the recognition of local identity and involvement. Environmental issues are at the heart of the sustainable development paradigm, taking into account recent global challenges linked to climate change. It is among the objectives of the sustainable development goals, which the United Nations approved in 2015 as a global call to action to eradicate poverty, safeguard the environment, and guarantee that everyone lives in peace and prosperity by 2030 **(Williams et al., 2021).**

Climate change is a long-term shift in meteorological conditions identified by changes in the temperature, precipitation, winds and extreme weather occurrences. Nowadays, human activity is primarily to blame for climate change. These include the usage of land, deforestation, coal-fired building heating, and fossil fuel-based energy production. With major effects on human health and possible long-term repercussions, climate change is one of the primary causes of health emergencies globally **(Singh et al., 2020).**

As healthcare professionals, nurses have the power to advocate for action and reduce the negative consequences of climate change on an individual and group level. In the course of their work, nurses use a wide range of products, including pharmaceuticals, nutritional supplements, and care items. Many times, medical supplies go unused, are only partially used, or expire and are thrown away. Additionally, a large portion of medical gadgets and equipment are designed to be used only once. The excessive packaging of some products raises the carbon footprint of healthcare **(Barraclough et al., 2019).**

The direct and indirect negative health effects of climate change are likely to disproportionately affect children, making them a particularly vulnerable group. Pediatric health care professionals need to be aware of the growing threats, predict how these will affect children's health, and act as children's advocates for effective mitigation and adaptation measures at all levels, from local to global **(Ahdoot & Pacheco, 2018).**

Significance of the study

One of the major causes of health crises around the world is climate change. The awareness of environmental sustainability can serve as a springboard for illustrating how climate change, healthcare delivery, and environmental sustainability are related **(WHO, 2023)**. Its potential to enhance child health outcomes by equipping nurses with the knowledge needed to address environmental factors affecting children's well-being. By fostering a deeper understanding of these issues, the study empowers nurses to implement sustainable practices, advocate for effective health policies, and educate families, ultimately promoting a healthier future for children in the face of climate challenges. Pediatric nurses play a crucial role in understanding and improving children's comprehension and effectively encouraging them to adjust their practices and behaviors that can assist in avert negative social and impacts of climate change on health and to protect their own well-being **(Ryan et al., 2020).**

The Study Aim: The study aimed to upgrading pediatric nurses' awareness about sustainable development, climate change and its effects on children's health.

Objectives of Study

- Assess of pediatric nurses' knowledge about sustainable development, climate change and its effects on children's health before and after the program intervention.
- Assess of pediatric nurses' attitudes toward sustainable development, climate change and its effects on children's health before and after the program intervention.
- Comparison between pre and post-test levels of pediatric nurses' knowledge and attitudes toward sustainable development, climate change and its effects on children's health

The Study Hypotheses

Null Hypothesis: No differences would be notable between pre-and post- program implementation for pediatric nurses' knowledge and attitudes levels toward sustainable development, climate change and its effect on children's health.

Hypothesis

1. Nurses' awareness is expected to be improved after implementation of an awareness program about sustainable development.
2. Significant improvement in nurses' awareness about climate change and children's health is expected to be found after implementation of the awareness program as compared to pretest.

Subjects and Method

The study Design

This study was carried out by using a pre-posttest quasi-experimental research design.

The Study Setting

The study was conducted across multiple specialized units at Assiut Children's University Hospital which affiliated to ministry of health, focusing on the Emergency, Intensive Care, Dialysis, Surgical, and Rehydration units. These units were chosen to provide a comprehensive overview of pediatric care and its relationship with sustainable development and climate change. To ensure an unbiased selection process, a simple randomization method was implemented. This involved assigning each unit a card with either an odd or even number. Units that received odd card numbers were included in the study, allowing for a representative sample from the different pediatric care environments. In contrast, units assigned even card numbers were excluded from participation. This methodical approach aimed to enhance the validity of the study's findings while minimizing selection bias.

Study Subjects

A convenience sampling of (100 nurses) who were working during the study period at the selected units and agreed to took apart in the study.

Sample Size Calculation

The necessary sample size for the investigation was determined based on the calculations outlined by **Steven and Thompson (2012).** N= total number of nurses, Z= confidence level is 0.95 and is equal to 1.96, D= the error ratio is = 0.05, P= the property availability ratio and neutral = 0.50.

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

The study indicated that a minimum of 100 randomly selected nurse from the total participants were required to ensure adequate statistical power.

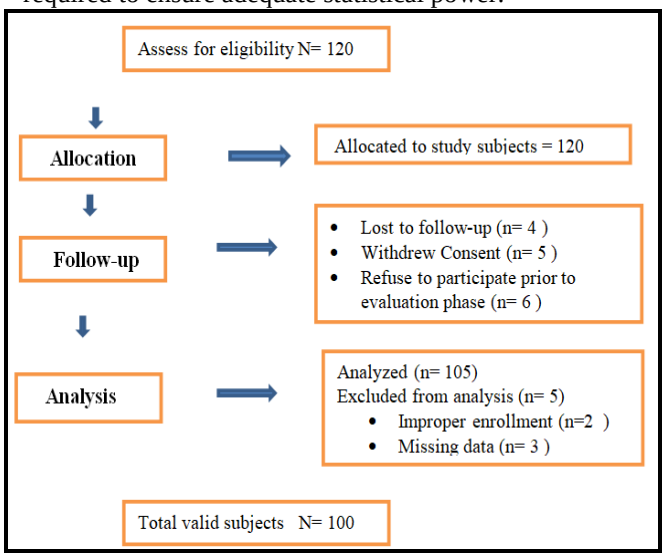


Figure (1): Diagram of Study Flow

Tools of Data Collection

Tool (I): Sustainable development and climate change interview questionnaire: it was developed by the researchers after conducting a thorough evaluation of the relevant literature and it composed of one part:

Part (1): Personal data of the studied pediatric nurses: It included date such as nurses' age, sex, educational level, years of nurses' experience, marital status, residence and sources of information about sustainable development and climate change

Tool (II): Pediatric nurses' knowledge about sustainable development and climate change: This tool was self-administered structured questionnaire that the researchers developed to assess pediatric nurses' knowledge about sustainable development, climate change and its effects on children's health. It was composed 30 questions; one mark awarded for each correct answer and it contained three parts as following:

Part (1): Sustainable development issues: It included 10 true or false questions (Sustainability is the capacity to grow and thrive without consuming too many natural resources for future generations; sustainable nursing practice is not essential to the future of healthcare sector ; sustainability does not mean performing the right thing ; cooperation and global responsibility are components of sustainability ; sustainability is about social fairness and human rights; the concept of sustainability includes equitable care ; sustainability foundation is based on the useful to a good life; There are 17 goals of sustainable development; nurses play a significant part in this effort work around sustainability; Good health is one of the goals of sustainable development).

Part (2): Climate change and environmental issues: It included 10 true or false questions (climate change means long-term changes in weather patterns and temperatures; climate change affects all world regions; climate change is not a significant concern for the medical field; nurses have a responsibility toward climate change mitigation and adaptation; climate change is not affected by human activity; nurses must understand how human health is impacted by climate change; health field cannot contribute to greenhouse gases that impacts climate; the effects of climate change are not harmful to human health; the climate change is affected by the way of using our resources ; resource waste is a contributing factor of climate change).

Part (3): Climate change and children' health interview questionnaire: It included 10 true or false questions as (climate change has not adverse health effects on health of children; climate change could not affect the daily life of the children; mortality rates are expected to be increased due to climate change; and so on).

Scoring system of knowledge:

The total knowledge consisted of 30 items with total 30 grades ranged from (0-30) scores. Each complete, accurate answer received one grade, while an improper answer received a zero. According to the researchers' cut of point, the knowledge scores were categorized into two levels as:

- Satisfactory level (high and moderate) >60%
- Un-satisfactory level (low) was ≤60%

Tool (III): A modified Likert's scale of pediatric nurses' attitudes: This tool was adopted from **Netravathia, (2014),** it composed of 17 sentences to assess pediatric nurses' attitudes toward sustainable development and climate change. It contained two parts:

Part (1): Pediatric nurses' attitudes toward climate change and environmental sustainability: It involved 10 items : (the regular work with children does not prioritize climate challenges; time is a barrier to considering the environment; concerns about the environment influenced by choice of hospital policy; climate change evidence is not convincing; feeling fear and anxiety of climate change; the environment is harmed by medications that are discharged into it; a healthy lifestyle is useful for the environment; everyone has their own responsibility; and so on.)

Part (2): Pediatric nurses' attitudes of suitability and children's health: It involved 7 items (the economy is significant barrier to tackling sustainability challenges in the health sector; for nurses, sustainability is a crucial issue; nurse should practice sustainability principles at home; everyone is responsible for their own actions; it is challenging to understand the function that nurses play in sustainability work; nurses are vital actors, but they require further education; promoting sustainable development could be connected to a number of lifestyle programs)

Scoring system of attitudes:

The attitude comprised of 17 elements with a total 85 grades and minimum 17 grads. This tool employed a 5-point Likert scale from 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree and 1 for strongly disagree. Each item's grades were added up and then transformed into a percentage score. According to the researcher's cut of point, the attitude scores were categorized into two levels as:

- Positive attitude ≥ 60 %
- Negative attitude <60 %

Method of Data Collection

The director of Assiut Children's University Hospital granted formal consent and permitted the current study. Following an explanation of the study's

purpose and an assurance that nurses involvement would only be used for scientific purposes, nurses gave their written and verbal consent to participate in the study. Strict measures were taken to guarantee confidentiality and anonymity.

The pilot study

The pilot study was applied to ten percent of the nurses (10 nurses) to assess the clarity, feasibility and completeness of the tools and to determine the time involvement and accordingly no modifications were done so, nurses were again included in the study sample.

Tools validity and reliability

Five pediatric nursing specialists evaluated the study tools' content validity index. The experts referred some changes to make the information clearer and more accurate. The tools were modified according to expert evaluations and recommendations for clarity of writing and order of items. Cronbach's alpha test was used to the reliability of the tool II. The result was highly reliable and equaled 0.79.

Ethical considerations:

After being approved by the Faculty of Nursing's Ethical Committee number of ethical approval was 1120240742, the researchers would draft a study proposal. Once the nature and aim of the study were explained to the nurses who were willing to participate, their written and verbal agreement was obtained. There was no risk to the research participants while it was being applied. Data collection was conducted with privacy in mind. There was assurance of anonymity and confidentiality. The study's adherence to the standard ethical guidelines for clinical research was also certified by the researchers. Study participants were free to withdraw from the study at any moment and without explanation, or to refuse to take part.

Field work:

A three-month period was taken to collect the data of the current study; from the beginning of September 2024 to the end of December 2024.

Procedure

The researchers based their design of the instructional program on relevant literary materials. It was implemented in four stages as follows:

Assessment phase: In this phase; the personal data of nurses were collected. These data included their age, sex, educational level, years of experience, marital status and residence. Also, the pediatric nurses' sources of information about sustainable development and climate change were assessed. Then, pre-test self-administered structured questionnaire was distributed on nurses to fulfill.

Planning phase: In this phase; Planning for the educational sessions, Preparation of the content and Preparation of the educational strategies and educational materials. Putting in place the necessary arrangements for the execution of the educational program, including the time and length of the sessions, using of audiovisual aids and the handouts. Time of the educational program was decided according to the available time of the nurses and researchers. The work was completed in the nurse's room at the chosen pediatric units at Assiut University Children's Hospital. The researchers used a variety of educational strategies and resources, including lecture, discussion, brain storming, using Power point, illustrated media, posters, short films, and booklet handouts were given to all pediatric nurses upon program completion.

Implementation phase: In this phase; the developing educational program content was implemented to improve the nurse's knowledge and attitudes about sustainable development and climate changes. To create a line of communication, the researchers first introduced themselves and gave a thorough explanation of the program's objectives. The consent of nurses was received. Two sessions were performed as following:

First Session

The session included knowledge regarding sustainable development as a multidimensional process of economic, social, and environmental issues. The goals (17 goals) of sustainable development and the crucial role nurses in the work around sustainability. Information about the facts of climate change, such as its definition and causes, as well as their roles in addressing it and its effects on children's health, were covered in the session. Then, each nurse was interviewed individually(Individual interviews were conducted alongside the questionnaire to gain deeper insights into pediatric nurses' knowledge) to assess Pediatric nurses' knowledge about sustainable development, climate change and its effects on child's health by using Tool (II). The interview lasted about (20 to 30) minutes; approximately five nurses were interviewed every three days.

Second Session

The session focused on evaluating the attitudes of pediatric nurses regarding climate change and environmental issues. It included a questionnaire consisting of 10 items specifically addressing their perceptions and beliefs about these topics. Additionally, there was a separate section that assessed the nurses' attitudes towards the suitability of various practices, which comprised 7 items. This session lasted approximately 30 minutes, during which each pediatric nurse independently filled out the questionnaire, ensuring that their responses reflected their individual views and experiences.

Evaluation stage:

In this phase; four weeks after the pretest, nurses' knowledge, and attitudes, about sustainable development, climate change and its effects on child's health were evaluated (posttest) to gauge the impact of the program.

Statistical analysis:

The collected data was arranged, categorized, coded, tabulated, and analyzed using the Statistical Package for Social Sciences (SPSS) V.26. Tables and charts were used to display data using numbers, percentages, averages, and standard deviations. To demonstrate differences before and after the intervention, the McNemar test was employed. The Chi-square test was used to demonstrate the relationship between the variables. Variable means were compared using the t-test. The P-value was deemed statistically significant at 0.05.

Results

Table (1): Personal data of the studied pediatric nurses (n=100)

Personal Data	N	%
Age:		
Less than 25 years	40	40.0
25- <35 years	42	42.0
35 or more years	18	18.0
Age (mean±SD)	**27.86±6.78**	
Gender:		
Female	86	86.0
Male	14	14.0
Residence:		
Rural	48	48.0
Urban	52	52.0
Marital status:		
Single	62	62.0
Married	38	38.0
Educational level:		
Diploma	4	4.0
Nursing institute	36	36.0
Bachelor degree	40	40.0
Master degree	20	20.0
Years of experience:		
Less than 5 years	62	62.0
5- 10 years	26	26.0
More than 10 years	12	12.0

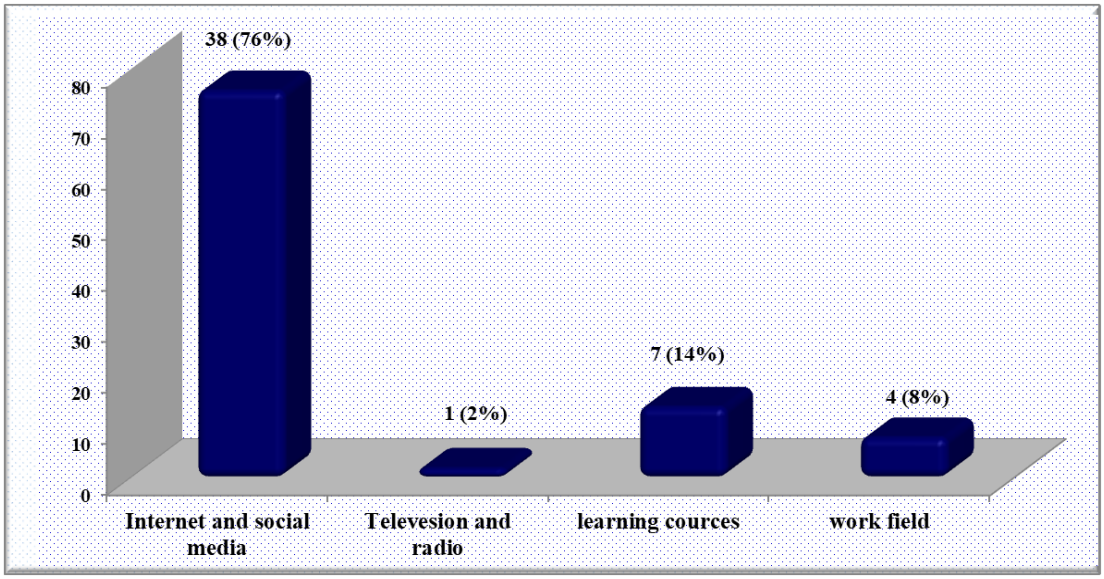
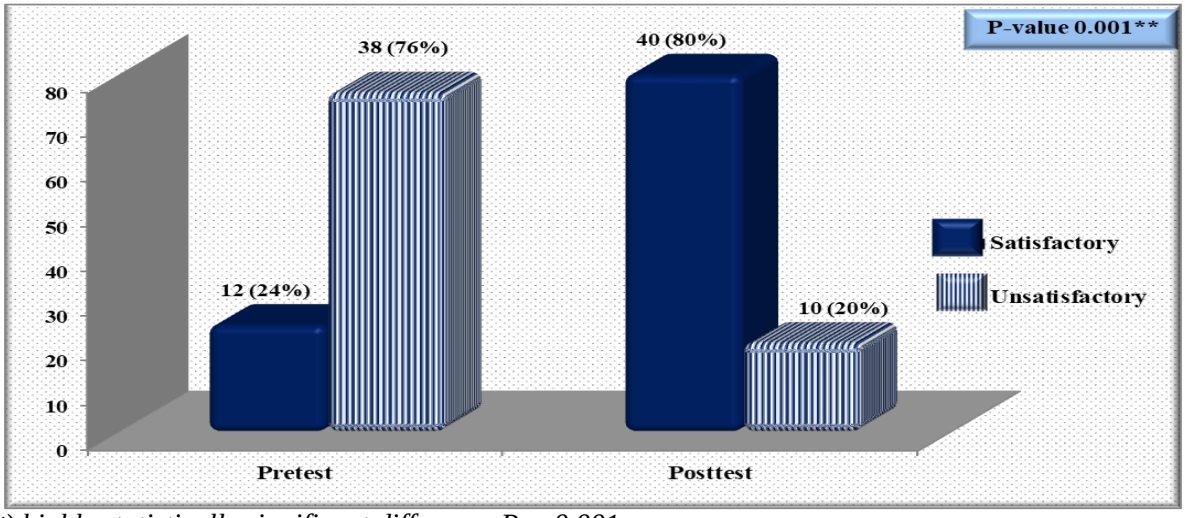


Figure (2): The pediatric nurses, source of knowledge about sustainability and climate change (n=100)

Table (2): Mean of nurses' knowledge regarding about sustainable development, climate change and its effects on children's health pre and post educational intervention (n=100)

Items	Mean ±SD of knowledge score		P-value
	Pre intervention	Post intervention	
Climate change and environmental issues.	11.12±2.182	17.16±3.448	0.001**
Sustainable development issues.	11.08±2.538	17.18±3.305	0.001**
Effects of climate change on children's health	10.86±2.680	17.14±3.332	0.001**
Mean ±SD of total knowledge	**10.08±6.627**	**10.48±9.637**	**0.001****

(**) highly statisticalhy significant difference p = 0.001



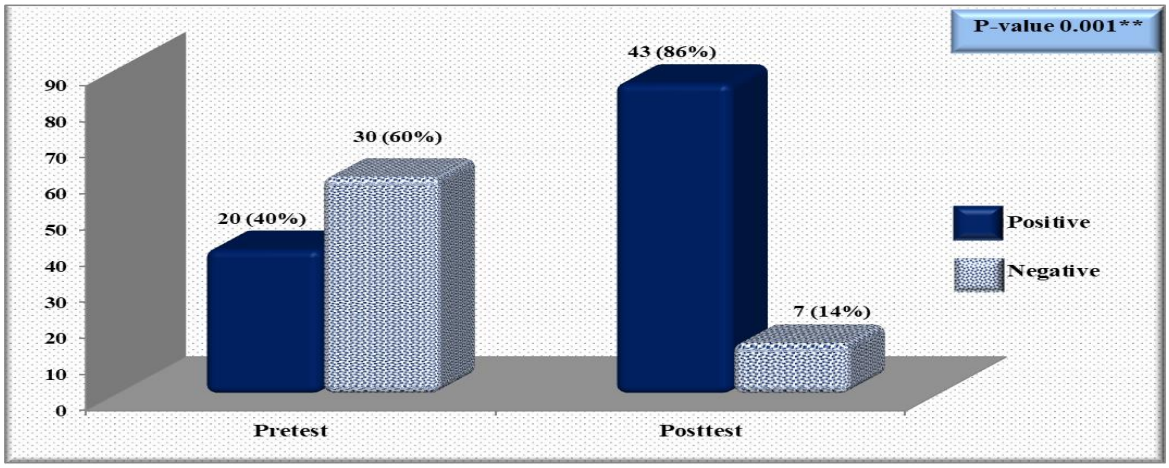
(**) highly statistically significant difference P = 0.001

Figure (3): Total level of knowledge about sustainable development, climate change and its effects on children's health in the pre and post program intervention (n=100)

Table (3): Total nurses' attitude about sustainable development, climate change and its effects on children's health in the pre and post program intervention (n=100)

Items	Mean ±SD of attitude score		P-value
	Pre intervention	Post intervention	
Climate change and environmental issues (4 items)	21.84±5.027	26.46±5.007	0.001**
Sustainable development issues (2 items).	16.86±4.300	21.82±2.753	0.001**
Mean ±SD of total attitude	**38.70±7.913**	**48.28±6.925**	**0.001****

(**) highly statistically significant difference P = 0.001



(**) highly statistically significant difference P = 0.001

Figure (4): Total level of pediatric nurses' attitudes in the pre and post program intervention about sustainable development, climate change and its effects on children's health (n=100)

Table (4): Relation between the studied pediatric nurses' personal data and their total knowledge about sustainable development, climate change and its effects on children's health (n=100)

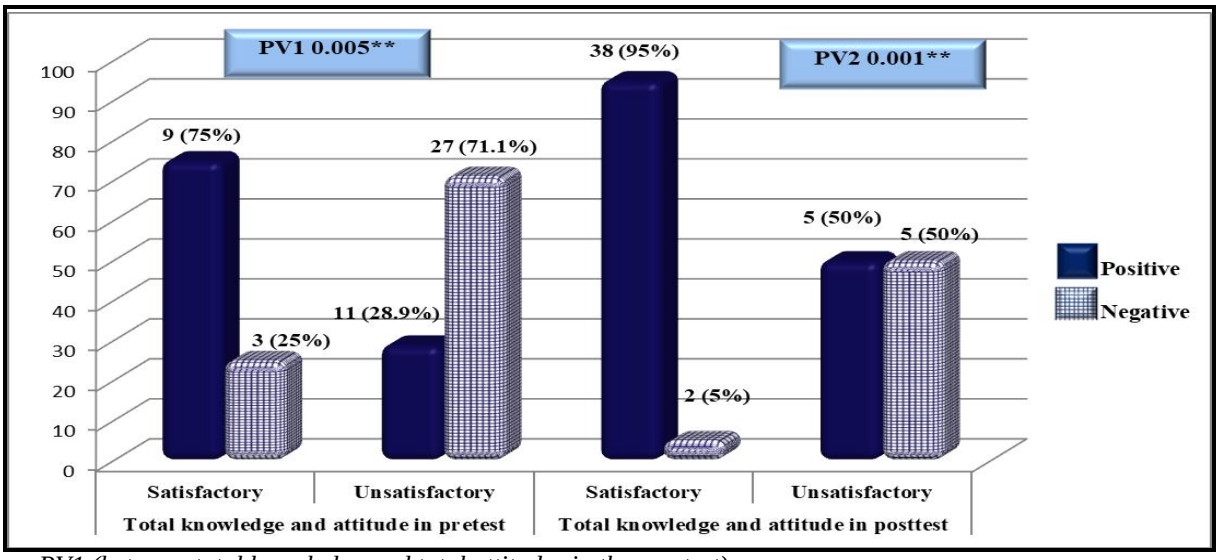
Personal data	Total knowledge									
	Pre intervention				p-value	Post intervention				p-value
	Satisfactory (24)		Unsatisfactory (76)			Satisfactory (80)		Unsatisfactory (20)		
	N	%	N	%		N	%	N	%	
Age										
< 25 years	18	75.0	22	28.9	0.011*	36	45.0	2	20.0	
25- <35	2	8.3	40	52.7		28	35.0	7	70.0	0.133
35 or more	4	16.7	14	18.4		16	20.0	11	11.0	
Gender										
Female	24	100	62	81.6	0.109	74	92.5	12	60.0	0.008**
Male	0	0.0	14	18.4		6	7.5	8	40.0	
Residence										
Rural	12	50.0	36	47.4	0.874	36	45.0	12	60.0	0.369
Urban	12	50.0	40	52.6		44	55.0	8	40.0	
Marital										
Single	18	75.0	44	57.9	0.287	52	65.0	10	50.0	0.382
Married	8	25.0	30	30		28	35.0	10	50.0	
Educational level										
Diploma	0	0.0	4	5.3		4	5.0	0	0.0	
Nursing institute	0	0.0	20	26.3	0.044*	16	20.0	4	20.0	
Bachelor degree	8	33.3	32	42.1		24	30.0	16	80.0	0.019*
Master degree	16	66.7	20	26.3		36	45.0	0	0.0	
Years of experience										
> 5 years	8	33.3	54	71.1	0.001**	54	67.5	8	40.0	
5- 10 years	6	25.0	20	26.3		16	20.0	10	50.0	0.151
> 10 years	10	41.7	2	2.6		10	12.5	2	10.0	

(*) statistically significant difference P= 0.05 level (**) highly statistically significant difference P = 0.001

Table (5): Relation between the studied pediatric nurses' total attitude about sustainable development, climate change and its effects on children's health (n=100)

Personal data	Total levels of attitudes									
	Pre-test				p-value	Post-test				p-value
	Positive (40)		Negative (60)			Positive (86)		Negative (14)		
	N	%	N	%		N	%	N	%	
Age :										
Less than 25 years	16	40.0	24	40.0	0.888	34	39.5	6	42.9	
25- <35	18	45.0	24	40.0		34	39.5	8	57.1	0.382
35 or more	6	15.0	12	20.0		18	21.0	0	0.0	
Gender:										
Female	30	75.0	56	93.3	0.067	74	86.0	12	85.7	0.981
Male	10	25.0	4	6.7		12	14.0	2	14.3	
Residence:										
Rural	22	55.0	26	43.3	0.419	42	48.8	6	42.9	0.769
Urban	18	45.0	34	56.7		44	51.2	8	57.1	
Marital status:										
Single	32	80.0	30	50.0	0.032*	54	62.8	8	57.1	0.775
Married	8	20.0	30	50.0		32	37.2	6	42.9	
Educational level:										
Diploma	0	0.0	4	6.7		4	4.7	0	0.0	
Nursing institute	6	15.0	14	23.3	0.004**	14	16.3	6	42.8	0.417
Bachelor degree	28	70.0	12	20.0		36	41.9	4	28.6	
Master degree	6	15.0	30	50.0		32	37.1	4	28.6	
Years of experience:										
Less than 5 years	22	55.0	40	66.7	0.493	50	58.1	12	85.7	0.342
5- 10 years	14	35.0	12	20.0		24	27.9	2	14.3	
More than 10 years	4	10.0	8	13.3		12	14.0	0	0.0	

(*) statistically significant difference P= 0.05 level (**) highly statistically significant difference P = 0.001



PV1 (between total knowledge and total attitudes in the pre-test)
PV2 (between total knowledge and total attitudes in the post-test)
(**) highly statistically significant difference P = 0.001

Figure (5): Relation between the pediatric nurses' total knowledge and total attitudes about sustainable development, climate change and its effects on children's health (n=100)

Table (1): Illustrates that more two fifths (42.0 %) of nurses were in (25- <35) age group; Mean ±SD of age was 27.86±6.78. Majority of them (86.0%) were female and more than half of them (52.0% and 62.0% respectively) were from urban and single respectively. As regarding to educational level; two fifths (40.0 %) of nurses had bachelor degree in nursing and more than half of them (62.0%) had an experience of less than 5 years.

Figure (1): Shows that internet and social media were the most common sources of knowledge about sustainability and climate change among three quarters (76.0%) of pediatric nurses.

Table (2): Indicates highly statistical significant differences between pediatric nurses' pre and post program intervention knowledge about sustainable development, climate change and its effects on children's health (P= 0.001). There was a highly statistical significant difference between pre and post program intervention total knowledge with mean ±SD (10.08±6.627and 10.48±9.637 respectively).

Figure (3): Shows that the majority of pediatric nurses (80.0%) had a satisfactory level of knowledge in the post-program test, indicating a highly statistically significant difference between the total level of knowledge pre and post program intervention regarding sustainable development, climate change and its effect on children's health (p-value of 0.001).

Table (3): Shows a highly statistically significant difference (P=0.001) in the attitudes of pediatric nurses toward about sustainable development, climate change and its effects on children's health pre and post program intervention. Additionally, the mean ±SD of the pre- and post-program intervention total attitude was 38.70±7.913 and 48.28±6.925, respectively, indicating a highly statistically significant difference.

Figure (4): Displays a highly statistically significant difference between total level of attitudes in the pre and post program intervention about sustainable development, climate change and its effects on children's health with p- value of (0.001); that majority (86.0%) of the pediatric nurses had positive attitudes in the post intervention test.

Table (4): Demonstrates a statistically significant difference between personal data of pediatric nurses and their total knowledge about sustainable development, climate change and its effects on children's health in pre-program intervention based on nurses' (age, educational level and years of experience) with p- value of (0.011 &0.044& 0.001 respectively) and in the post program intervention related to gender and their educational status with p-value of (0.008 & 0.019 respectively) .

Table (5): Shows a statistical difference between personal data of pediatric nurses and their total attitudes about sustainable development, climate change and its effects on children's health in pre-program intervention based on their marital and educational status with p- value of (0.032 & 0.004 respectively).

Figure (5): Indicates that the level of knowledge and attitudes of pediatric nurses in the pre-program intervention (p1-value = 0.005) and the post-program intervention (p2-value = 0.001) was highly statistically different.

Discussion:

Health, nursing, and the environment investigate the effects of environmental risks on global health. In order to support planetary health nursing practice, nurses must integrate their sustainable practices and adjust their practice to this reality. They should also become effective change agents that help with climate change adaptation and mitigation. So, the current study upgrading pediatric nurses' awareness about sustainable development, climate change and its effects on children's health pre and post program intervention.

The study results showed that regarding pediatric nurses' source of knowledge about sustainable development, climate change and its effects on children's health; the present study indicated that about three quarters of pediatric nurses, their source of knowledge was from internet and social media. **Reddy et al, (2022)** supported these results with report of internet and social media as the main source of knowledge and with the report in the Lancet Countdown 2022 by **Napoli et al, (2022)**. However, this result was inconsistent with **Ibrahim et al. (2018),** who found that newspapers accounted for nearly one third of the participants' primary sources of information on health and climate change, with television coming in second at more than one quarter and social media at less than one fifth%.

On one hand, from researchers' point of view; this finding about showing the great role of media in our life todays even as sources of scientific information that exposed directly into general population with the risk of false or fake information. On the other hand, nurses are heath team members so; the researchers found this nothing is fact as general raises the question about the role of healthcare organizations, professionals or experts in community health, and educational institutions as the only trustful organizations to share knowledge and to generate policy and professional practices guidance for public and can an effectively to propagate and provide the appropriate information that is especially suited to nurses by using the media. However, misinformation about climate change or even denial of climate change may be presented to people via news websites and social media, which does not necessarily provide scientific proof **(Al-Rawi et al., 2021).** This reaffirms the necessity of a curriculum grounded in knowledge derived from research.

The current study found a highly statistically significant difference between the total level of pediatric nurses' knowledge about sustainable development, climate change and its effects on children's health pre and post program intervention, with a p-value of (0.001); the mean ±SD of the pre and post program intervention total knowledge scores were 33.08±6.627 and 51.48±9.637), respectively; as the majority of the pediatric nurses had satisfactory level of knowledge in post intervention test compared to about one quarter of them in before intervention test.

pre intervention program pediatric nurses, about three quarters of nurses had unsatisfactory level of knowledge regarding about sustainable development, climate change and its effects on children's health which indicated the essential need to apply the intervention program to upgrading pediatric nurses' awareness and evaluate its impact which clearly improve their knowledge level.

In line with this result **Abd Alfatah et al, (2023)** showed a p-value (0.001) indicating a statistically significant difference between the nurses under study in terms of their level of knowledge pre and post program intervention. Furthermore, **Mekawy (2023)** assured the current results and stated that prior to receiving interventional education about climate change and environmental sustainability, the majority of the staff nurses under study possessed poor level of knowledge and practice.

Regarding to pediatric nurses' attitudes about sustainable development, climate change and its effects on children's health; the study disclosed that there was a highly statistically significant difference between pre and post program intervention total attitudes with mean ±SD (38.70±7.913 and 48.28±6.925 respectively). Also, it displayed a highly statistically significant difference between total level of attitudes in pre and post program intervention with p- value of (0.001); that majority of the pediatric nurses had positive attitude in post program intervention test compared to two fifths percent of them in the pre-program intervention. It can be attributed to enhanced knowledge and skills gained during the training, which boosted their confidence. The program likely fostered a supportive environment, encouraging collaboration and shared experiences among nurses.

To date, few presented reports and articles discussed the attitudes of nurses about sustainable development, climate change and its effects on children's health in Egypt, especially Assiut governorate which make only less than half of nurses had positive attitudes is predictable preprogram intervention because of the limited feedback about sustainability practices and climate change impacts and adaptation. This was the inspiration of the researchers as most of the nurses were juniors with less than five years of work experience and a bachelor's degree in nursing education and represented the young generations of nurses with more interesting, energy and passion to learn and advocate for environmental issues and planetary health. That's explained why the majority

of the pediatric nurses had positive attitude in post program intervention. In their a study carried out by, **Xiao et al. (2019)** supported the present findings regarding the beneficial influence of the awareness educational program on nurses' attitudes; they found that, following the intervention, the nurses' attitudes toward climate change were positive, with a statistically significant difference in the p-value (0.001).

The current study confirmed a statistically significant difference between personal data of pediatric nurses and their total knowledge about sustainable development, climate change and its effects on children's health in preprogram intervention based on their age, educational level and years of experience and in post intervention related to gender and their educational status.

From researchers' point of view; this can be explained as younger nurses that just graduated from faculty of nursing and registered for master degree already have fresh information and awareness about sustainable development and its goals that in response to Egypt Agenda for 2030; definitively after COP27 that held in Sharm-El SheiKh in Egypt and contributed to public orientation about climate change issues (cause, impacts and consequences, adaptation and mitigation). The more numbers of females than males in the present study reflected on the higher level of their knowledge. Consequently, explicit sustainability teaching in nursing education is required.

The results showed only a statistically significant difference between personal data of pediatric nurses and their total attitudes in preprogram intervention based on their marital and educational status with p-value of (0.032 & 0.004 respectively). The majority of nurses be female and more than half were single give a share in the current statistical difference with the urgent need of the future mothers to safeguard her coming children and assuring for them clean air, safe food, safe water, and wellbeing; that's lead them to have a responsibility to work sustainably and mitigate climate change also, change their negative attitudes and practices to better ones.

The results showed that, with a p1-value of 0.005, there was a statistically significant difference was observed between pediatric nurses in the preprogram intervention knowledge and attitudes levels. With a p2-value of 0.001, there was a statistically significant difference was found between pediatric nurses' knowledge and attitudes after the intervention. According to the researchers, nurses who knew enough knowledge about climate change demonstrated more ecologically friendly actions than who didn't know enough.

This finding was consistent with those of **Kalogiro et al. (2020) & Abd Alfatah et al. (2023),** who found a significant correlation between the overall attitude score and the level of information known by the physicians and nurses under study prior to the intervention.

With a patient-centered approach, nurses should be able to use their understanding of climate change and diseases linked to it to institutional, organizational, and political decision-making. They will guarantee the prudent use of resources and means to facilitate adaptation and mitigation **(Neal et. al, 2019).**

Finally**,** nurses face a significant challenge and need to respond to this worldwide issue in the best possible way. It is important to raise nurses' awareness of climate change and its effects so they may become change agents and enhance their roles as educators, influencers, and knowledgeable advocates for children, families, and communities.

Conclusion:

The implementation of the awareness program is anticipated to significantly enhance nurses' awareness of sustainable development and its implications for climate change and children's health. The expected improvements highlight the program's potential effectiveness in equipping nurses with essential knowledge and skills

Recommendations:

- Update nurses' knowledge about climate change and sustainable development through continuous educational programs.
- Sustainable development and climate change approach must be included in the pediatric nursing courses
- Ensure a universal commitment to sustainability life day practices at work and home to help in the mitigation of climate change.
- Future research with a larger sample size is required to examine how educators and nursing staff perceive sustainability and climate change themes.

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