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Effect of Educational Guidelines on Nursing Students' Knowledge toward Sustainable Developmental Goals related to the Environment and Health at Assiut University

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Abstract:
Background: The importance of sustainable development in healthcare is evident in its contribution to environmental challenges that affect people's health and lives. **Aim:** To evaluate the effect of Educational Guidelines on nursing students' knowledge toward Sustainable Developmental Goals related to the environment and health at Assiut University. **Subjects and methods:** A quasi-experimental study design was used. This study was carried out in the Faculty of Nursing at Assiut University, with a total number (277) students. A self-administered questionnaire was used to collect data which includes two tools, tool I included a socioeconomic scale and tool II included questions to assess students' knowledge about sustainable development goals related to the environment and health **Results:** The current study findings revealed that 70% of studied students were aged > 20 years, 61% were female, 50.2% of students had poor knowledge in pre-test but after post-test 71.5% had good knowledge with a statistically significance differences p-value <0.001. Also, the result stated that there weren't statistically significance differences between students' age and academic year with knowledge Scores in pre-and post. Moreover, there were statistically significance differences between gender as well as socioeconomic levels with knowledge Scores in pre and post-test **Conclusion:** Educational guidelines improved nursing students' knowledge toward sustainable developmental goals related to the environment and health. **Recommendations:** Education programs about sustainable development related to the environment and health should be conducted regularly and added to the curricula for all nursing students.

Keywords: ***Educational Guidelines, Environment, Health, Nursing Students & Sustainable Developmental Goals.***

Introduction
The United Nations General Assembly approved the 2030 Agenda for Sustainable Development on September 25, 2015. The Sustainable Development Goals have a more comprehensive agenda than the Millennium Development Goals, consisting of 17 goals, and 169 targets. these goals constitute an all-encompassing global action approach to tackle significant global issues like social exclusion, environmental degradation, poverty, and attaining sustainable development for all by 2030, Achieving the SDGs requires a collective commitment from academic institutions, governments and non-governmental organizations, commercial sector, and people at the local, national, as well as international levels **(Zainal Abedin et al., 2023).**

In 1987, the World Commission on Environment and Development defined sustainable development as "development that meets the needs of today without compromising the ability of future generations to meet their demands." Adopting sustainable development practices is crucial to safeguarding our planet against any advancements that can endanger both the environment and people. There are three fundamental aspects of sustainable development that have a major impact on people's quality of life: social, environmental, and economic. Because these factors are essential in determining human well-being, they should be given top priority in all activities **(Mokski et al., 2023).**

The SDGs include an extensive range of goals such as ending poverty, ending hunger, advancing well-being and health, guaranteeing high-quality education, achieving gender parity, ensuring access to renewable energy, encouraging respectable employment and economic expansion, fostering infrastructure, industry, and innovation, lowering inequality, developing sustainable communities and cities, encouraging conscientious consumption and production, addressing climate change, protecting underwater and terrestrial life, advancing justice, peace, and robust institutions, and cultivating collaborations to achieve these goals **(Cutter, 2020).**

Environmental aspects have a significant impact on human health and well-being, with poisonous or imbalanced environments reducing quality of life and increasing mortality rates. Several factors are

contributing to the degradation of the natural environment, including dangerous pollution, climate change, deforestation, overuse and misuse of water and other natural resources, and loss of biodiversity. Numerous scientists have issued warnings that the planet is heading closer to environmental collapse because of unsustainable human activity, which could result in the extinction of natural biodiversity and the loss of human life. Environmental sustainability helps reduce the likelihood of these environmental impacts **(Ziaul & Shuwei, 2023).**

Human health and the healthcare system in general are significantly impacted by complex and cumulative global concerns. Global hunger and poverty, the climate crisis, rising living expenses, pandemics, and an increase in infectious and non-communicable diseases threaten the health of people and the planet **(Fields et al., 2024).**

SDGs are an extensive plan that considers the interactions between environmental factors, social aspects of health, and the steps that must be taken to improve both individual and global health. The primary objective of the SDGs is to enhance the well-being of individuals. The COVID-19 pandemic serves as a significant example, highlighting the interconnectedness of social, economic, and health issues. Achieving the SDGs is crucial because individual well-being cannot be achieved without considering all aspects of health **(Dolu & Bozkurt, 2023).**

The idea of sustainable development is essential to health systems, and nurses must understand sustainability and the environment and how they relate to people's well-being and health. Because nursing is an agent of change with the potential to enhance health and control the utilization of health resources. awareness regarding sustainability and the effects of environmental issues in the nursing field will allow nurses to change their daily work habits and attitudes, ultimately improving the health of others **(Örs, 2022).**

The World Health Organization (WHO) states that in many nations, the nursing profession is still essential to attaining sustainable development goals **(Agyepong & Okyere, 2024).** Community health nursing helps promote health and prevent disease, ensure access to high-quality care, and encourage healthy behaviors. In addition, their work addresses issues such as health education, gender equality, and reducing inequalities, among others, in accordance with the principles and goals set by the Sustainable Development Goals (**Venturini&Bezerra, 2024).**

Significance of the study

The concept of SD has gained significant traction among national and international organizations and countries. Everyone should be aware of the SDGs. The skills and knowledge nurses require to address global sustainability issues have received little attention. In academic settings, sustainability-related topics have not been covered in nursing. Future nurses must be prepared to tackle sustainability concerns and take an active role in building a sustainable healthcare system. This planning is essential to help them comprehend how these problems affect public health, educate people about environmental health, and provide wise counsel **(Elshall et al., 2022).**

In order to enable nurses to take on leadership positions in promoting sustainable practices and spearheading efforts about sustainable development in healthcare institutions, the International Council of Nurses (ICN) emphasizes that SD should be incorporated into nursing curricula and ongoing education **(Mohamed et al., 2024).** Therefore, the current study will be conducted to raise awareness among nursing students about the sustainable development goals related to the environment and health.

Aim of the study

The study aims to evaluate the effect of Educational Guidelines on nursing students' knowledge toward Sustainable Developmental Goals related to the environment and health at Assiut University.

Research hypothesis

Null hypothesis

- Guidelines will not improve nursing students' knowledge toward sustainable development related to the environment and health.

Alternative hypothesis

- Guidelines are expected to improve nursing students' knowledge toward sustainable development related to the environment and health.

Subjects and Methods

Research design:

A quasi-experimental study design (pre- and post-test) was used in this study.

Setting:

This study was carried out in the Faculty of Nursing at Assiut University.

Sample and sampling:

The total number of students enrolled in the Faculty of Nursing - Assiut University during the academic year 2023-2024 were 3,645 students, with using the software EPI/Info, version 3 with a 90 %confidence interval (CI), the predicted sample size was 252 students. (10%) was added to the sample size to make up for the dropout, making the final sample size 277.

The students were selected by a stratified random sample, a proportional sample was used to calculate the number of students in each grade by using the following formula.

$$\frac{\text{The actual number of students in each grade}}{\text{Total number of students in the faculty}} \text{ X estimated sampling size by EPI/Info}$$

(Khalaf et al.,2022)

This sample is divided into the following table:

Academic year	Total	Sample selected
First-grade students	488	37
2nd grade students	908	69
3rd grade students	1049	80
4th grade students	1200	91
Total	**3,645**	**277**

After that the students in each grade were selected by random sample to complete the sampling process.

Tools of the study

After reviewing related literature, a self-administered questionnaire was included two tools:

Tool (I): The socioeconomic scale was created by **(Abd El- twab, 2012)** It included personal characteristics of the students as name (optional), age, gender, academic year, residence, parents' educational level, parents' occupation, and family income.

Tool (II): This tool included questions to assess student's knowledge about sustainable development goals related to the environment and health, it divided to 3 parts.

Part (1): It included (9) questions related to sustainable development goals such as definition, year launched the SDGs, previous name of SDGs, number of SDGs, dimensions of SD, name of the organization that launched SDGs, and year of achieving the SDGs. **(Jati et al., 2019)**

Part (2): It included (26) questions about sustainable development goals related to the environment (goals number 6,7,11,12,13,14,15) such as definition of environment, environmental sustainability, and environmental pollution, causes, and types of environmental pollution, initiatives and ways that reduce environmental pollution, effect of environmental pollution on human health, environmentally friendly products, sustainable alternative energy sources, ecosystem services that are highly affected by human activity, 3 Rs (recycling, reusing, and reducing), protection from climate change, protecting water resources from pollution, and maintaining the diversity of living organisms. **(Gericke et al., 2019, Ahamad & Ariffin, 2018)**

Part (3): It included (8) questions about sustainable development goals related to health (goal number 2,3) such as a definition of sustainable nutrition, ways local food consumption contributes to sustainable nutrition, eradication of hunger to achieve SD, major infectious diseases must be stopped to achieve SD, improving people's opportunities to enjoy a long and healthy life contributes to SD. **(Yuksel & Yilmaz, 2021and Gericke et al., 2019)**

Scoring system of tool II:

The total knowledge scores were 120; one grade was given for each correct answer and zero for an incorrect answer and I don't know. There is more than one answer to some questions. The grades for each correct item were summed and subsequently transformed into a percent score as the following:

Poor Knowledge: < 50 % of the total score

Fair knowledge: 50 % to < 75% of the total score

Good Knowledge: ≥ 75% of the total score

(Elshall et al., 2022)

Validity of tools:

The face validity of the tools was reviewed by (5) specialists in the family and community health nursing field at Assiut University to evaluate the tools for clarity, understanding, comprehensiveness, relevancy, and applicability. all comments and suggestions were considered.

Reliability of tools:

Reliability was determined by utilizing Alpha Coefficient test (Cronbach's alpha) for test the internal consistency of tool II, it was (0.85).

Methods:

Administrative phase:

Before implementing the study, a formal approval letter was acquired from the Dean of the Faculty of Nursing and the Vice Dean for Education and Students Affairs at Assiut University. This letter included permission to carry out the study and a description of its purpose and nature.

Pilot Study:

Before beginning data collection, a pilot study was conducted on 10% of the students (27 nursing students) to evaluate the tools' clarity, applicability, and time needed to fulfill all the study tools. Based on the results of the pilot study, some changes were made to the tools, so these students were not included in the total study sample.

Data collection phases:

The data was collected through the following phases:

Assessment phase

Data were collected from the beginning of March until the end of May 2024. The researchers took one group/day and worked two days per week (two groups/week). The researchers obtained verbal consent from the instructors responsible for the required lectures or sections and asked them about the preferred time to collect data, whether at the

beginning or end of the selected lectures or sections. the researchers introduced themselves to the students with an explanation of the purpose and nature of the study. Then took agreement for participation.

The researchers described the main parts of the questionnaire to the students. After that, the questionnaire was distributed to assess the nursing students' knowledge about SDGs related to the environment and health by using pre-test tools (tools I &II). The typical amount of time needed to finish questionnaires was around 20-25 minutes. Subsequently, the researchers gathered the questionnaires with focusing to incomplete answers to be completed by the students. Based on the assessment phase the researchers started the planning phase for organizing the educational guidelines and subsequently implemented the educational guidelines.

Planning phase:

This phase included the arrangement for the implementation of the educational guidelines (teaching place, methods and materials, Session, and Time).

Teaching place: the educational guidelines were given in the laboratories, lecture halls, and classes of the Faculty of Nursing according to the students' presence.

Teaching methods and materials: The researchers used simple teaching methods (lectures, and Power Point presentations). The used media were data shows and handouts (brochures) prepared by the researchers.

Session: the educational guidelines were provided in one session

Time: The teaching time was decided according to the student's time and coordination between the researchers and the instructors responsible for the required lectures or sections

Implementation phase

The total number of the studied sample was 277 students which separated into smaller subgroups (21 groups) every group ranging from 12 to 15 students. According to the number of students in each grade, the first-grade students were divided into (3) groups, 2nd-grade students were divided into (5) groups, 3rd-grade students were divided into (6) groups, and 4th-grade students were divided into (7) groups.

The educational guidelines have been implemented for one group/day, each group received one session. The session took about 2 hours. This session included the following topics: sustainability and sustainable development concept, sustainable development dimensions & Goals, SDGs related to environment and health and its targets.

Finally, the researchers distributed (brochures) to the students as a handout at the end of the session and then their knowledge was assessed immediately "post-test" after the implementation of the educational guidelines.

Evaluation phase

The impact of the educational guidelines was evaluated by doing an immediate post-test using the previous tool (II) to assess the nursing students' knowledge about sustainable development goals related to the environment and health.

Ethical considerations:

The research proposal was approved by the Ethical Research Committee of the Faculty of Nursing, Assiut University (Approval Number: 1120240758). The researchers adhered to all ethical guidelines in conducting the research. There wasn't risk for studied students during application of the study. Oral consent was obtained from the studied students who were ready to participate in the study. Students were told that participation in the study was completely voluntary, and they could leave at any moment without providing a reason. The aim of the study was explained to all students by the researchers, and they reassured students that any information gathered would be kept completely confidential.

Statistical Analysis

Statistical Package for Social Science (SPSS version 22) was used for data entry and data analysis. Data was presented as frequency, percentages, Mean ± SD, Chi-square test was carried out to compare qualitative variables. Paired samples t-test was performed to compare quantitative variables between the two groups. The P-value is considered statistically significant if it is < 0.05.

Results

Table (1): Distribution of socio-demographic characteristics for the studied students, Faculty of Nursing - Assiut University, 2023-2024 (N= 277)

Students' characteristics	No. (n= 277)	%
Age:		
≤ 20 years	83	30.0
> 20 years	194	**70.0**
Mean ± SD (Range)	**21.13±1.22(19-23)**	
Gender:		
Female	169	**61.0**
Male	108	39.0
Academic year:		
1st year	37	13.3
2nd year	69	24.9
3rd year	80	28.9
4th year	91	**32.9**
Residence:		
Rural	177	**63.9**
Urban	100	36.1

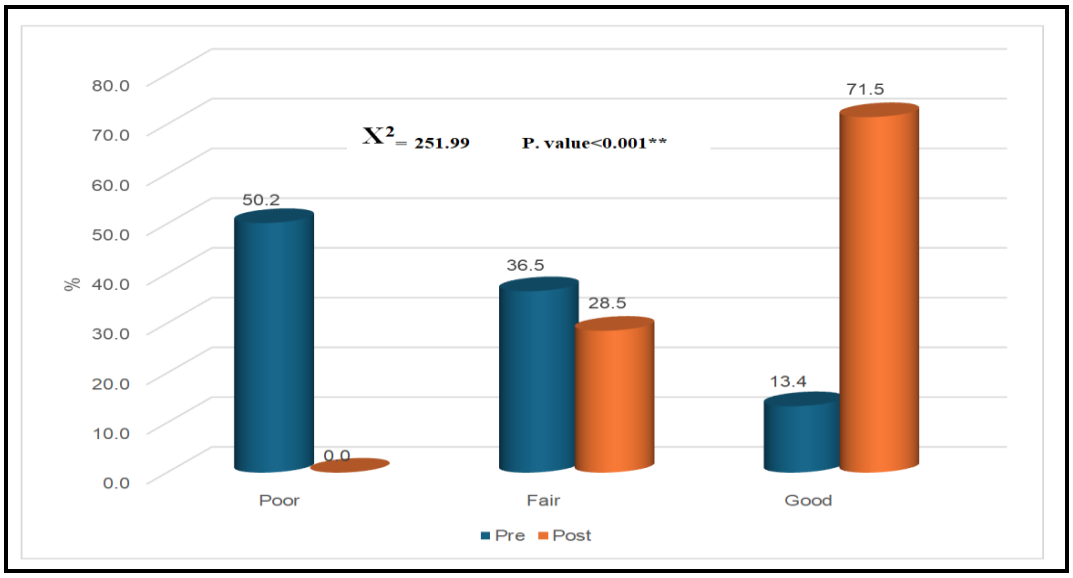
Table (2): Distribution of socio-demographic characteristics among the students' parents, Faculty of Nursing - Assiut University, 2023-2024 (N= 277)

Parents characteristics	No. (n= 277)	%
Father educational level:		
Illiterate	28	10.1
Read and write	22	7.9
Basic education	42	15.2
Secondary	91	**32.9**
University	85	30.7
Postgraduate	9	3.2
Mother educational level:		
Illiterate	46	16.6
Read and write	26	9.4
Basic education	33	11.9
Secondary	102	**36.8**
University	66	23.8
Postgraduate	4	1.4
Father job:		
Employee	139	**50.2**
Skilled	35	12.6
Unskilled	29	10.5
Farmer	24	8.7
Free Business	30	10.8
Dead	20	7.2
Mother job:		
Housewife	180	**65.0**
Employee	97	35.0
Socioeconomic level:		
Low	58	20.9
Middle	169	**61.0**
High	50	18.1

Table (3): Distribution of studied students' knowledge subdomains level about sustainable development goals in pre- and post-test (N= 277)

Knowledge domains	Pre		Post		X2	P. value
	No	%	No	%		
General knowledge about SDGs						
Poor	152	54.9	7	2.5		
Fair	110	39.7	85	30.7	279.94	0.000*
Good	15	5.4	185	66.8		
Knowledge related to the environment						
Poor	148	53.4	0	0.0		
Fair	95	34.3	90	32.5	254.06	0.000*
Good	34	12.3	187	67.5		
Knowledge related to health						
Poor	108	39.0	5	1.8		
Fair	60	21.7	31	11.2	152.91	0.000*
Good	109	39.4	241	87.0		

**Chi-square test* ** Statistically significant difference (p value<0.05)*



**Chi-square test* ** Statistically significant difference (p value<0.05)*

Fig (1): distribution of total scores regarding studied students' knowledge about SDGs related to the environment and health in pre-and post-tests (N= 277)

Table (4): Relation between students' knowledge level related to SDGs and their socio-demographic characteristics in pre and post-test (N= 277)

Variable	Knowledge level (pre-test)						Knowledge level (post-test)			
	Poor		Fair		Good		Fair		Good	
	No = 139	%	No = 101	%	No = 37	%	No = 79	%	No = 198	%
Age:										
≤ 20 years	49	35.3	22	21.8	12	32.4	25	31.6	58	29.3
> 20 years	90	64.7	79	78.2	25	67.6	54	68.4	140	70.7
P value	**(0.070)**						**(0.700)**			
Gender										
Male	76	54.7	30	29.7	2	5.4	53	67.1	55	27.8
Female	63	45.3	71	70.3	35	94.6	26	32.9	143	72.2
P value	**(0.000*)**						**(0.000*)**			

Variable	Knowledge level (pre-test)						Knowledge level (post-test)			
	Poor		Fair		Good		Fair		Good	
	No = 139	%	No = 101	%	No = 37	%	No = 79	%	No = 198	%
Residence										
Rural	97	69.8	63	62.4	17	45.9	62	78.5	115	58.1
Urban	42	30.2	38	37.6	20	54.1	17	21.5	83	41.9
P value	**(0.025*)**						**(0.001*)**			
Academic year:										
First-year	23	16.5	11	10.9	3	8.1	13	16.5	24	12.1
2nd year	40	28.8	18	17.8	11	29.7	20	25.3	49	24.7
3rd year	41	29.5	28	27.7	11	29.7	29	36.7	51	25.8
4th year	35	25.2	44	43.6	12	32.4	17	21.5	74	37.4
P value	**(0.072)**						**(0.058)**			

**Chi-square test* ** Statistically significant difference (p value<0.05)*

Table (5): Relations between students' knowledge level related to SDGs and their parents' socio-demographic characteristics in pre and post-test (n= 277).

Parents characteristics	Knowledge level (pre-test)						Knowledge level (post-test)			
	Poor		Fair		Good		Fair		Good	
	No=139	%	No= 101	%	No= 37	%	No= 79	%	No=198	%
Father educational level:										
Illiterate	19	13.7	8	7.9	1	2.7	13	16.5	15	7.6
Read and write	16	11.5	5	5.0	1	2.7	12	15.2	10	5.1
Basic education	28	20.1	10	9.9	4	10.8	20	25.3	22	11.1
Secondary	52	37.4	29	28.7	10	27.0	26	32.9	65	32.8
University	23	16.5	44	43.6	18	48.6	8	10.1	77	38.9
Postgraduate	1	0.7	5	5.0	3	8.1	0	0.0	9	4.5
P value	**(0.000*)**						**(0.000*)**			
Mother educational level:										
Illiterate	32	23.0	11	10.9	3	8.1	19	24.1	27	13.6
Read and write	18	12.9	7	6.9	1	2.7	13	16.5	13	6.6
Basic education	20	14.4	10	9.9	3	8.1	16	20.3	17	8.6
Secondary	53	38.1	37	36.6	12	32.4	25	31.6	77	38.9
University	16	11.5	34	33.7	16	43.2	6	7.6	60	30.3
Postgraduate	0	0.0	2	2.0	2	5.4	0	0.0	4	2.0
P value	**(0.000*)**						**(0.000*)**			
Father job:										
Employee	49	35.3	66	65.3	24	64.9	19	24.1	120	60.6
Skilled	27	19.4	6	5.9	2	5.4	17	21.5	18	9.1
Unskilled	20	14.4	5	5.0	4	10.8	11	13.9	18	9.1
Farmer	17	12.2	6	5.9	1	2.7	11	13.9	13	6.6
Free Business	19	13.7	7	6.9	4	10.8	15	19.0	15	7.6
Dead	7	5.0	11	10.9	2	5.4	6	7.6	14	7.1
P value	**(0.000*)**						**(0.000*)**			
Mother job:										
Housewife	109	78.4	55	54.5	16	43.2	64	81.0	116	58.6
Employee	30	21.6	46	45.5	21	56.8	15	19.0	82	41.4
P value	**(0.000*)**						**(0.000*)**			
Socioeconomic level:										
Low	41	29.5	12	11.9	5	13.5	28	35.4	30	15.2
Middle	86	61.9	67	66.3	16	43.2	47	59.5	122	61.6
High	12	8.6	22	21.8	16	43.2	4	5.1	46	23.2
P value	**(0.000*)**						**(0.000*)**			

**Chi-square test* ** Statistically significant difference (p value<0.05)*

Table (1): Shows the distribution of socio-demographic characteristics for the studied sample, it was found that 70% of studied sample were aged > 20 years with mean ± SD 21.13±1.22, 61% was female, 32.9% were in the 4th academic year, and 63.9% of them were from rural areas.

Table (2): Presents that 32.9% of students' fathers and 36.8% of students' mothers had a secondary level of education,50.2% of students' fathers were employed, while 65% of students' mothers were housewives, as well as the table illustrated that 61% of students had a middle level of socioeconomic status.

Table (3): Clarifies that 54.9% had poor knowledge in pre-test in the general SDGs knowledge domain, this value decreased to 2.5% in post-test. Also, 5.4% of them had good knowledge in the pre-test, this percentage improved to 66.8% in post-test. Regarding the knowledge domain related to the environment, it was observed that 53.4% had poor knowledge in pre-test, while this result decreased to 0.0% in post-test. Also, 12.3% of them had good knowledge in the pre-test, this value increased to 67.5% in post-test. In addition, the table illustrated that 39.0% had poor knowledge at pre-test in knowledge domain related to health, while this percentage decreased to 1.8% in post-test and 39.4% of them had good knowledge at pre-test, this result improved to 87.0% in post-test with statistically significance differences in the three domains at pre-and post-test (P= 0.000).

Figure (1): Observed that 50.2% of students had poor knowledge related to SDGs while 13.4% had good knowledge in pre-test. On the other hand, the finding improved to 71.5% of the students had good knowledge in the post-test with a statistically significant difference between pre and post-test (P -value= 0.001)

Table (4): Cleared that there weren't a statistically significant differences between students' age as well as academic year and knowledge levels in pre-and post-tests with p-values (0.070, 0.700) for age and (0.072 and 0.058) for academic year respectively. Moreover, there were statistically significance differences between gender as well as residence of students and knowledge levels in pre and post-test with p-values (0.000, 0.000) for gender and (0.025 and 0.001) for residence respectively.

Table (5): Shows that there were statistically significance differences between students' knowledge level and their parents' characteristics (parents' educational levels, jobs, and socioeconomic levels) in pre and post-test with a P-value (0.000).

Discussion

Today, human society is facing various environmental challenges, not only at the local level but also at the global scale; Sustainable development is the main way to solve these challenges. Nursing is a crucial aspect of sustainable development because they act as health promoters and health care providers and can achieve advanced environmental health efficiency by developing positive attitudes towards sustainability. **(Alcaraz et al., 2024)**.

The current study aimed to evaluate the effect of educational guidelines on nursing students' knowledge toward sustainable developmental goals related to the environment and health at Assiut University.

The present study showed that the mean age of the studied students was 21.13 ± 1.22, this result similar to **(Ahmed et al., 2023)** who conducted a study in Egypt entitled"effect of educational programs on knowledge, attitude, and practice of nursing students toward sustainable development goals " who found that mean age of the students was 20.4 ± 1.3 years. Also, this study concurred with **(Aly et al., 2024)** who implemented a study on "effect of awareness programs regarding climate change and sustainability development on nursing internship students' knowledge" which mentioned that the mean age of nursing internship students mean age was 22.44 ± 0.56 years.

The current study findings demonstrated that slightly more than three-fifths of nursing students were female. This might be due to the male enrollment rate in nursing colleges is still relatively low, and females dominate the nursing workforce. This finding is consistent with **(Örs, 2022)** who conducted a study about "measurement of the environmental literacy of nursing students for a sustainable environment" and said that three-fifths of nursing students were females. Also, the findings of the present study agree with **(Alcaraz et al., 2024)** who conducted a study entitled "the environmental awareness of nurses as environmentally sustainable health care leaders: a mixed method analysis" and found a about three-quarters of studied sample were females.

The current study results disagreed with **(El-Razek & Author, 2023)** who applied a study about " awareness of maternal and newborn health nursing students towards sustainable development goals" and reported that majority of study's participants were males. In addition to, **(Yuan et al., 2021)** who conducted a study entitled "awareness of sustainable development goals among students from a Chinese senior high school" and found about half of the students were males.

In accordance to the residence, it was observed that more than three-fifths of the studied samples from rural areas. These results agreed with **(Aly et al., 2024)** who reported that more than half of the studied students were from rural areas. Also, the results of

the current study in the same line with **(El-Razek & Author, 2023)** who mentioned that more than half of the studied students were from rural areas.

Regarding socioeconomic level, the present study illustrated that about three-fifths of the students had a middle level of socioeconomic status. This finding aligns with **(Mohamed et al., 2024)** who carried a study on Sustainability consciousness among nursing students in Egypt, which revealed that more than three-fifths of the students belonged to socioeconomic level II.

The present study showed that there was a statistically significance differences of students' total knowledge score between pre and post-tests (P value= 0.001). The current findings present that half of the students had poor knowledge and only more than one-tenth of them had good knowledge in the pre-test, while their knowledge level was enhanced in the post-test to less than three-quarters of students had good knowledge. This may be due to using simple and clear methods in explaining the educational guidelines and using simple media containing clear pictures such as data presentations and brochures.

This result is congruent with **(Saleh & Elsabahy, 2022)** who conducted a study about " integrating sustainability development education programs in nursing to challenge practice among nursing interns in health care" who reported that there are poor knowledge level pre-educational programs among Egyptian and Saudi nursing interns. While the post implementation of program revealed that students had good knowledge with statistically significant improvement (P value < .0001). Also **(Nieto et al., 2024)** who applied a study entitled "sustainability education in nursing degree for climate-smart healthcare: a quasi-experimental study and found that the students' knowledge level improved after educational sustainability intervention with a statistically significance differences (P value< 0.009).

In addition, the present study findings supported by **(Koçulu & Topçu, 2024)** who implemented a study about "development and implementation of a sustainable development goals (SDGs) Unit: exploration of middle school students' SDG knowledge." Who stated that following the unit's implementation, the majority of students had good and developed knowledge of the SDGs, with a statistically significant difference (P value <.0001).

Moreover, these findings disagree with **(Afroz & Ilham, 2020)** who implemented a study regarding "assessment of knowledge, attitude and Practice of university students towards sustainable development goals" who found majority of studied students had a high score of knowledge regarding sustainable development goals.

The current study showed that there was a statistically significance differences between students' gender and their knowledge level in pre- and post-tests. which referred that female students had a good level of knowledge about SDGs related to the environment and health than males. These differences may be due to females are more likely and interested to learn, know about SDGs and engage in environmentally friendly activities than male students.

This result was in line with **(Leal et al., 2024)** who conducted a study entitled "Exploring sustainable development perceptions among higher education students and found statistically significant differences between students' gender and their knowledge level about SDGs.

On the other hand, this finding disagrees with **(Cachero et al., 2023)** who conducted a study entitled "Perception of the sustainable development goals among university students and mentioned that there weren't significant differences between gender and level of knowledge among participants.

The present study clarified there was a statistically significance difference between students' residence and their knowledge level about sustainable development goals in pre- and post-tests. Rural students were found to be more knowledgeable than urban students, this may be due to the rural students grow up in environments that require resilience and resourcefulness, qualities that contribute to their ability to overcome challenges and think creatively and absence of distractions typically found in urban areas, such as constant exposure to technology, social media, and entertainment, allows rural students to focus more on their studies and personal growth.

The same results were concluded by **(Veeran et al., 2024)** who applied a study entitled "assessment of students' awareness, knowledge, and accessibility of sustainable development goals" which found there was a statistically significance differences between students' residence and their knowledge level regarding sustainable development goals.

The results of the current study revealed that there not a statistically significance differences between the academic year of students and their knowledge level regarding SDGs related to the environment and health in pre- and post-tests, this may be due to the sustainable development goals are still unfamiliar for the students and not know more details about it. This finding was like **(Rhonda et al., 2021)** who conducted a study entitled "promoting education for sustainable development in the Maldives: " who illustrated that there are no noticeable variations among students' academic standing and knowledge of sustainable development.

The present study was shown that there was a statistically significance differences between the

educational level of students' parents and their level of knowledge in pre-and post-tests, which revealed that students whose parents have a high educational level are more knowledgeable than those with a low educational level. This may be attributed to the fact that parental education is crucial in enhancing children's cognitive cultures, which in turn influences their knowledge.

This finding is consistent with **(Samy, 2021)** who found that students' knowledge of SDGs and environmental sensitivity was positively impacted by their parents' educational attainment and that there were statistically significance differences between the educational level of students' parents and their knowledge level.

In the current study, significant differences were observed between students' level of knowledge and their socioeconomic level in pre and post-tests. This result was like to **(Mohamed et al., 2024)** which found statistically significant differences between students' socioeconomic status and their knowledge levels in pre-and post-tests.

Conclusion

The results of the present study indicated that 50.2% of students had poor knowledge toward sustainable development goals related to the environment and health in pre-test, which significantly improved after implementation of the educational guidelines to good= 71.5% with a statistically significant difference p value <0.001. Also, the research hypothesis two was accepted.

Recommendation

Based on the findings of the present study, it was suggested that:

- Education programs about sustainable development related to the environment and health should be conducted regularly and added to the curricula for all nursing students.
- Increase academic staff awareness of sustainable development and update their competencies in this regard to encourage students to adopt a sustainable development mindset and implement periodic training programs for them to provide them with the necessary updated information.
- Educate students to embrace environmentally friendly behaviors to decrease the effect of environmental pollution.
- Providing information resources on sustainable development and environmental sustainability in all nursing college libraries
- Encouraging cooperation between Ministry of Health, and Ministry of Education as well as Ministry of Agriculture to conduct training programs for students from primary school to university to raise the level of students' awareness about environmental issues.

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