

Original Article

Determination of Nursing Students' Awareness of the Health Effects of Climate Change

Halil Ibrahim Tuna, PhD, RN

Lecturer, Selcuk University, Nursing Department, Turkey

Pinar Tunk Tuna, PhD, RN

Lecturer, Selcuk University, Nursing Department, Turkey

Birsel Molu, PhD, RN

Lecturer, Selcuk University, Nursing Department, Turkey

Alev Yildirim Keskin

Assistant Professor, Selcuk University, Nursing Department, Turkey

Correspondence: Halil Ibrahim Tuna, PhD, RN, Lecturer, Selcuk University - Nursing Department – Turkey
e-mail: tunameister@gmail.com

Abstract

Background: Today's nursing students will always face the health effects of climate change in the coming years.

Methods: This research was carried out with students (N=148) between 1-May 2021 – 1 June 2021 and no sample selection was made. As a data collection form, a questionnaire containing the descriptive characteristics of the students and a questionnaire on climate change developed by the researchers were used.

Results: 19.6% of the students gave the answer of university education as a climate change information source. Students stated that they could take effective actions towards the effects of climate change on health ($p=0.038$) and that they should be well prepared for the effects of climate change on health ($p=0.032$).

Conclusions: Although nursing students have embraced their role in responding to climate change, they think that they are not adequately prepared at school.

Keywords: Climate change, Healthcare professional, Nursing student

Introduction

Climate change is accepted as the biggest global health problem that requires nurses to be ready today (Smith et al., 2014, Watts et al., 2015). The effects of climate change are also observed in our country, and future forecasts on this subject show that there is a very high destructive risk for human health (Kose, 2018). The impact of climate change is stated to be a serious threat to human health (Costello et al., 2009). The changing climate affects food production and the nutritional value of food, water security, and air quality, putting already vulnerable patient groups at greater risk. Specifically, these groups are stated to be pregnant women, older adults, the disabled, individuals with chronic medical and psychiatric disorders, and certain occupational groups (Kim, 2016). In addition, it is estimated that climate change may affect the availability of necessary resources for health services. For example, it is thought that

during floods or other climate-related disasters, health care institutions and individuals may experience problems in supplying materials (Richardson et al., 2014).

It has been reported that healthcare professionals have a duty and responsibility to lead efforts to protect health from climate change (Friedrich, 2017, Watts et al., 2015). Health professionals facing climate change can emphasize the interconnectedness of climate change and health, advocate environmentally sustainable approaches to health care, and promote the health benefits of carbon footprint reduction policies (Weaver et al., 2010).

In our country, public health activities are managed by health professionals who have received training in clinical medicine, preventive medicine, and nursing. Current nursing students will be in working life from the 2020s to the 2060s, the time when health impacts related to

climate change emerge. Their effectiveness in tackling this century's greatest challenge may depend on the expertise and skills they have gained from their current education (Watts et al., 2015). It is thought that understanding the perceptions and capacities of current nursing students about climate change and determining their awareness levels will also contribute to the education curriculum. For this reason, this research was planned to determine to what extent the nursing department students perceive climate change and its effects on health and to determine the education and training needs of students on the effects of climate change.

Material And Method

Type and Purpose of the Research: This study was conducted using a descriptive design to determine the extent to which nursing students perceive climate change and its effects on health and to determine the education and training needs of students on the effects of climate change.

Samples and Settings: The universe of this study included all first, second, third, and fourth-year students (301 students) continuing their education in the nursing department of a university. The study was carried out between 1-May 2021 – 1 June 2021. No sample selection was made in the study. The research was carried out with 148 students who agreed to participate in the research at the data collection dates. Among the criteria for inclusion in the study; being enrolled in the first, second, third, and fourth grades of the nursing department, being sufficiently informed about the study, and signing the informed consent form. Exclusion criteria included refusing to participate in the study at any stage of the study and wanting to quit.

Data Collection Tools: A questionnaire containing the descriptive characteristics of the students and a questionnaire on climate change developed by the researchers based on the literature were used to collect the data.

Descriptive Characteristics Questionnaire: A sociodemographic form consisting of 7 questions was created to determine the gender, age, class, economic status, family structure, where they live, and the current health status of the students participating in the research.

Climate Change Information Scale: It is a questionnaire consisting of 9 questions prepared by researchers based on the available literature. The questions in this survey are:

Question 1: What do you think is climate change?

In this question, students were asked to mark the most appropriate item for what climate change means to them.

Question 2: Indicate to what extent you agree with the following statements (Level of knowledge about climate change)

With this question, students' knowledge about the causes of climate change, their knowledge about the effects of climate change on our lives, and their knowledge about ways to combat climate change were questioned. No additional measurements were made in this question.

Question 3: What is your source of information on climate change? (Click on the 3 most suitable for you)

In this question, it was questioned where the students had access to climate change information.

Question 4: What are the causes of climate change (Choose the 3 most appropriate for you)

In this question, students marked 3 items closest to them from the individual and environmental factors that cause climate change.

Question 5: Do you think the health effects of climate change will worsen in the next 20 years?

Students answered "yes" or "no" to this question.

Question 6: What could be the health effects of climate change?

In this professionally related question, the students marked the items consisting of "yes", "no" or "I don't know" as an answer to the 11-item question of what could be the effects of climate change on health.

Question 7: What should nursing students themselves do when addressing the health effects of climate change?

In this question, the students gave the answers of "I agree", "I do not agree" or "I have no idea" to the answers given by the researcher.

Question 8: As a nursing student, do you think that you have enough equipment about the effects of climate change on health?

Students marked "yes" or "no" for this question.

Question 9: What are your educational needs regarding the effects of climate change?

In this question, the students gave the answers of "I agree", "I do not agree" or "I have no idea" to the answers given by the researcher.

Gulsoy and Korkmaz (2018) and Liao et al. (2019) articles were used. Gulsoy and Korkmaz (2018) stated that the internal consistency coefficient (Cronbach alpha value) of the questionnaire they prepared was 0.836 (Gulsoy, 2018, Liao et al., 2019).

Application of Research: The data is google docs on the internet. collected online through

questionnaires. The questionnaires were shared and distributed to the students in the school WhatsApp groups, and their informed consent was obtained by informing them online. The collected data were transferred to the statistics program online. With this process, mistakes are prevented in the processing of the data. In the study, data collection and data analysis were done by the same researcher.

Ethical Aspect of Research: Permission for the research was obtained from the Non-Interventional Research Ethics Committee of a university with the number 2021/206 and from the institution where the research was conducted, with the number E-19581359-300-48667. Since the participants were students, the data were collected through the online platform due to the COVID-19 pandemic measures. Informed consent was requested from each participant via the online system to indicate their voluntary participation. The research was conducted following the World Medical Association (WMA) Declaration of Helsinki (and/or the World Psychiatric Association HAWAII Declaration) Good Clinical Practices.

Data analysis: All statistical analyzes were performed using statistical software SPSS version 23.0. Frequency count, percentage, mean and standard deviation were used to fully describe the demographics of the respondents and appropriately examine their knowledge and attitude towards climate change and its impact on health. Pearson's chi-square, examining students' hardware and individual situations on climate change has been used. $p < .05$ was considered significant.

Results

It was determined that the mean age of the students participating in the study was 20.58 ± 1.42 and 83.3% of them were women. It was determined that the least participation in the study was from the 4th-grade students with 8.1% and the students

defined their current health status as good. In Table 2, it was determined that the students gave the answers to the climate change definition at most 64.9%, the change of seasons, 61.5% the deterioration of the natural balance, and 56.1% global warming. The number of students stating that climate change is temperature increase (10.8%), air pollution (10.1%) and environmental pollution (8.8%) was determined to be the lowest. Almost all of the students stated the causes of climate change as 99.3% air pollution, 98.0% increase in factories, 98% mixing of wastewater into rivers and seas, and 98% increase in fuel consumption. This question was answered as an increase of at least 54.1% in air travel.

It was determined that the information sources of the students on global warming and climate change were 64.2% television and 63.5% internet. 19.6% of the students answered university education as a source of information. It was determined that the students responded to the health effects of climate change as 97.3% increase in air quality-related diseases, 91.9% increase in food-borne diseases and 89.9% increase in water-borne diseases.

When the findings regarding the determination of the education and training needs of the students participating in the research about climate change are examined; Clinical knowledge and skills related to climate change should be increased (94.6%), students should be informed about legal and ethical frameworks (93.9%), emergency planning and management should be made for extreme weather events (93.2%), and emergency care should be expanded (90.5%) were found to give answers. Although the students did not think that they had sufficient curriculum equipment related to climate change, they stated that they could take effective actions for the effects of climate change on health ($p=0.038$) and that they should be well prepared for the effects of climate change on health ($p=0.032$).

Table 1. Data on students' sociodemographic characteristics and current health status

Variables		n	%
Gender	Female	124	83.8
	Male	24	16.2
Class	1	38	25.7
	2	57	38.5
	3	41	27.7
	4	12	8.1

Graduated high school	Vocational high school	23	15.5
	Anatolian high school	115	77.7
	Science high school	10	6.8
Where the family lives	Village	26	17.6
	District	52	35.1
	City center	70	47.3
Economic situation	Income less than expenses	25	16.9
	Income equal to expenses	110	74.3
	Income more than expenses	13	8.8
Current state of health	Very good	24	16.2
	Good	79	53.4
	Normal	44	29.7
	Bad	1	0.7
Age	20,58 ± 1,42 (min: 18, max:24)		

Table 2. Students' perceptions of climate change and its causes

What do you think is climate change?*	n	%	What are the causes of climate change?*	n	%
Change of seasons	96	64.9	Air pollution	147	99.3
Disruption of the natural balance	91	61.5	Increasing number of factories	145	98.0
Global warming	83	56.1	Mixing of wastewater into streams, rivers and seas	145	98.0
Absence of four seasons	46	31.1	Increased fuel consumption	145	98.0
Drought/ thirst	38	25.7	Depletion of the ozone layer	145	98.0
Bad weather conditions	33	22.3	Increase in greenhouse gases	143	96.6
Depletion of the ozone layer	29	19.6	Deforestation	143	96.6
Decreased precipitation	19	12.8	Increase in the number of cars	142	95.9
No winter season	17	11.5	Urbanization and migrations	131	88.5
Increase in temperature	16	10.8	Increase in individual consumption	124	83.8
Air pollution	15	10.1	Population growth	123	83.1
Environmental pollution	13	8.8	Increasing air travel	80	54.1

*More than one option is marked.

Table 3. Distribution of the answers given by the students to the questions about the sources of information on global warming and climate change and the effects of climate change on health

What are your sources of information?*	n	%	What are the health effects of climate change?*	n	%
Television	95	64.2	Increasing air quality related diseases	144	97.3
Internet	94	63.5	Increasing foodborne illness	136	91.9
Scientific studies	82	55.4	Increasing waterborne infectious diseases	133	89.9
family members, close friends	33	22.3	Mental health adversely affected	131	88.5
Official institutions (government etc.)	30	20.3	Disruption of health services during extreme weather events	114	77.0
University education	29	19.6	Increase in vector-borne infectious diseases	113	76.4
non-governmental organizations	21	14.2	Flood-related displacements	109	73.6

Table 4. Examination of the answers given to the education and training needs of the students regarding climate change

		n	%
Health impacts of climate change should be integrated into nursing education curriculum	I agree	128	86.5
	I do not agree	7	4.7

	No idea	13	8.8
	I agree	140	94.6
Clinical knowledge and skills on climate change should be increased	I do not agree	3	2.0
	No idea	5	3.4
	I agree	129	87.2
Extended clinical application should be made	I do not agree	7	4.7
	No idea	12	8.1
	I agree	134	90.5
Emergency care needs to be expanded	I do not agree	6	4.1
	No idea	8	5.4
	I agree	139	93.9
Information on legal and ethical frameworks should be provided.	I do not agree	6	4.1
	No idea	3	2.0
	I agree	127	85.8
Local geographic and climatic information should be given.	I do not agree	11	7.4
	No idea	10	6.8
	I agree	138	93.2
Contingency planning and management for extreme weather events	I do not agree	5	3.4
	No idea	5	3.4

Table 5. Examination of students' hardware and individual conditions on climate change

Nursing students themselves when addressing the health effects of climate change		As a nursing student, do you think you have enough equipment about climate change?				N=148	
		Yes		No			
		n	%	n	%	X ²	p
Should take responsibility	Yes	25	18.5	110	81.5	3.745*	0.154
	No	4	64.3	9	35.7		
	Total	29		119			
Can play an important role	Yes	25	18.4	111	81.6	3.680*	0.159
	No	4	25	8	75		
	Total	29		119			
They must have sufficient expertise and skills	Yes	25	20.2	99	79.8	2.09*	0.352
	No	4	37.1	20	62.9		
	Total	29		119			
Can take effective actions	Yes	21	16.7	105	83.3	6.545*	0.038
	No	8	46.2	14	53.8		
	Total	29		119			
Must be well prepared	Yes	26	19.1	110	80.9	6.907	0.032
	No	3	28	9	75		
	Total	29		119			

* Pearson Chi-Square

Discussion

This research helps to clarify the level of awareness and knowledge gaps of future nurses who will face the effects of climate change. In our study, the majority of nursing students stated that they are aware of what climate change is and the causes of climate change. Yang et al. (2018) reported that nursing students have a lower level

of knowledge about the effects of climate change on health than their colleagues in the field of medicine and public health (Yang et al., 2018). In contrast, Liao et al. (2019) stated that students in China are aware of climate change (Liao et al., 2019). Findings obtained from a study conducted on health science students point to similar results (Nigatu et al., 2014). It is not clear whether the

differences in research results are due to differences in educational programs or differences in professional functions and cultures.

This research shows that the awareness of climate change varies according to the countries and even the region where the participants live. In our research, it was determined that the students gave the most answers to the change of seasons, deterioration of the natural balance, and global warming for climate change, respectively. The number of students stating that climate change is temperature increase, air pollution, and environmental pollution is very low. Almost all of the students stated that the cause of climate change is air pollution, increase in the number of factories, mixing of wastewater into rivers and seas, and increase in fuel consumption. Liao et al. (2019) stated that participants living in the western and eastern regions of China perceive climate change differently (Liao et al., 2019). In a similar study conducted in Turkey, the order of students' answers to the causes of climate change changes (Faruk and Erik). It has been stated in the literature that these differences may be due to unmeasurable social, cultural, or economic factors. One study suggests that personal experience is an important determinant of people's awareness of climate change (Broomell et al., 2015).

In this study, it was determined that the students obtained information about climate change mostly with the help of television and the internet. It has been determined that university education is very low as a source of information on climate change. At the same time, it was determined that the students had very good knowledge about the effects of climate change on health. Previous studies in China (Liao et al., 2019), California (Bedsworth, 2009), and Malaysia (Rahman et al., 2014) have reported similar results (TV and internet) to our research (Bedsworth, 2009, Liao et al., 2019, Rahman et al., 2014). Our finding highlights the critical role of the mass media in addressing climate change and guiding climate change-related education. Today, the dramatic increase in internet use and the increasing role of social media show that students can increase their knowledge about the effects of climate change and prepare themselves. However, this finding also shows that there may be a knowledge gap in the education of nursing students and that the subject needs to be comprehensively addressed in the Turkish nursing curriculum.

In this study, students reported that the effects of climate change on health should be included in school curricula. It has been stated that the need to increase clinical knowledge and skills on climate change is the most desired issue. In addition, students think that they can get information on legal and ethical issues and emergency and first aid from the nursing education curriculum. Developing the curriculum for the effects of climate change on health may also bring some difficulties. While the lack of funding is the biggest problem in the USA (Watts et al., 2015), the curriculum is overcrowded, different pedagogies must be applied in teaching for health professionals, and there is a serious shortage of academic staff in nursing schools who are competent in teaching and research in the field of climate change. Such shortcomings are also mentioned (Friedrich, 2017, Hamel Green et al., 2009). These problems can be considered common for Turkey as well. These statements show that there are different barriers to the implementation of climate adaptation measures in different countries. To better cope with climate change, Turkey should prepare its curriculum for climate change and health clinically and increase the number of instructors trained on these subjects.

In this study, although the students think that they do not have sufficient curriculum equipment to prevent or manage the effects of climate change on health, they stated that they can take effective actions against the effects of climate change on health and that they should be well prepared for the effects of climate change on health. While this is important to raise awareness and generate motivation to take action, it may be far from sufficient to encourage health professionals to take action on climate change. Research into the mechanisms underlying the health effects of climate change needs to be strengthened. There is also a need to develop clinical application areas. It has been reported that health professionals on this issue should see themselves as an integral part of the global action on climate change (Varela-Losada et al., 2016). It is also clear that it should be integrated into vocational education programs at a higher education level beyond the boundaries of professional knowledge and skills. In our research, it is a promising result that students think that they should be prepared for the effects of climate change on health.

Limitations of the Research: To the best of our knowledge, this is the first study investigating the knowledge and education needs of nursing

students on climate change in Turkey. Similar studies are also limited in the international literature. Data collection forms were developed based on the limited literature available. Further examination should be done for the reliability and validity of the questionnaires. A descriptive design was used in the study. No causal relationship can be deduced from the results and the results; It can be shaped by many factors such as culture, values and religious belief. In addition, this study was conducted in Turkey. The research does not reflect the general nursing students in our country and is limited only to the nursing students studying at the nursing school where the study was conducted. Precautions should be taken in attempts to generalize the findings to other countries. However, Turkey's nursing education system is becoming compatible with European norms.

Conclusion: This research reveals that most nursing students are aware of climate change and its effects on health. Although nursing students have embraced their role in responding to climate change, they think that they are not adequately prepared at school. In addition, students state that the nursing curriculum does not prepare them for the health effects of climate change. Students think that they can take positive actions towards the effects of climate change. A high level of awareness and concern, in general, can serve as a strong foundation in nursing education, and efforts to integrate climate change into the nursing curriculum, in particular, should be considered. Future research should be used to explore effective ways to incorporate climate change content into nursing curricula. In addition, there is a need to develop a more comprehensive tool to assess the competencies of health professionals in tackling climate change and its impacts on health.

References

- Bedsworth, L. (2009). Preparing for climate change: a perspective from local public health officers in California. *Environmental health perspectives*, 117, 617-623.
- Broomell, S. B., Budescu, D. V. & Por, H. H. (2015). Personal experience with climate change predicts intentions to act. *Global environmental change*, 32, 67-73.
- Costello, A., Abbas, M., Allen, A., Ball, S., Bell, S., Bellamy, R., Friel, S., Groce, N., Johnson, A. & Kett, M. (2009). Managing the health effects of climate change: lancet and University College London Institute for Global Health Commission. *The Lancet*, 373, 1693-1733.
- Faruk, A. Y. & Erik, N. Y. (2020). University students' levels of knowledge and perception on global warming and climate change. *Cumhuriyet University Faculty of letters journal of social sciences*, 44, 1-18.
- Friedrich, M. J. (2017). Medical community gathers steam to tackle climate's health effects. *Jama*, 317, 1511-1513.
- Gulsoy, E., Korkmaz, M. (2018). The effects of the socio-economic characteristics of university students on global warming and climate change perceptions. *Turkey forestry journal*, 21, 428-437.
- Hamel Green, E. I., Blashki, G., Berry, H. L., Harley, D., Horton, G. & Hall, G. (2009). Preparing Australian medical students for climate change. *Australian family physician*, 38, 726-729.
- Kim, E. J. (2016). US Global Change Research Program: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Washington, DC: Author. 312 pages. Available online at <https://health2016.globalchange.gov/downloads>. Taylor & Francis.
- Kose, I. (2018). Climate change negotiations: the process of Turkey's signing agreement in Paris. *Aegean strategic studies journal*, 9, 55-81.
- Liao, W., Yang, L., Zhong, S., Hess, J. J., Wang, Q., Bao, J. & Huang, C. (2019). Preparing the next generation of health professionals to tackle climate change: Are China's medical students ready?. *Environmental research*, 168, 270-277.
- Nigatu, A. S., Asamoah, B. O. & Kloos, H. (2014). Knowledge and perceptions about the health impact of climate change among health sciences students in Ethiopia: a cross-sectional study. *BMC Public health*, 14, 1-10.
- Rahman, M. S., Mohamad, O. B. & Bin Abu Zarim, Z. (2014). Climate change: a review of its health impact and perceived awareness by the young citizens. *Global journal of health science*, 6, 196.
- Richardson, J., Grose, J., Jackson, B., Gill, J.-L., Sadeghian, H. B., Hertel, J. & Kelsey, J. (2014). Effect of climate change and resource scarcity on health care. *Nursing standard*, 28, 44.
- Smith, K., Woodward, A., Campbell-Lendrum, D., Chadee, D., Honda, Y., Liu, Q., Olwoch, J., Revich, B., Sauerborn, R. & Aranda, C. (2014). Human health: impacts, adaptation, and co-benefits. *Climate Change 2014: impacts, adaptation, and vulnerability. Part A: global and sectoral aspects. Contribution of Working Group II to the fifth assessment report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.
- Varela-Losada, M., Vega-Marcote, P., Perez-Rodriguez, U. & Álvarez-Lires, M. (2016). Going to action? A literature review on educational proposals in formal Environmental Education. *Environmental education research*, 22, 390-421.

- Watts, N., Adger, W. N., Agnolesci, P., Blackstock, J., Byass, P., Cai, W., Chaytor, S., Colbourn, T., Collins, M. & Cooper, A. (2015). Health and climate change: policy responses to protect public health. *The Lancet*, 386, 1861-1914.
- Weaver, H. J., Blashki, G. A., Capon, A. G. & McMichael, A. J. (2010). Climate change and Australia's healthcare system—risks, research and responses. *Australian health review*, 34, 441-444.
- Yang, L., Liao, W., Liu, C., Zhang, N., Zhong, S. & Huang, C. (2018). 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. *International journal of environmental research and public health*, 15, 2650.