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An applied study comparing awareness of the greenhouse effect from the perspective of Social Work among Sultan Qaboos University students in two periods (2009 and 2019)

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ABSTRACT

The objective of the study was to determine the level of awareness about the greenhouse effect (GHE) among students at Sultan Qaboos University between 2009 and 2019. The study employed a descriptive-analytical approach, conducting a survey on two randomly selected samples of students. Data was collected using a researcher-designed scale to measure the students' awareness of GHE issues. The study found that overall, between 2009 and 2019, there was a slight but statistically significant decrease in students' knowledge about the GHE, in their attitudes about these issues, and in their actions. Only, knowledge about local and international strategies and plans to tackle environmental problems increased over the decade, and there was almost no change in avoidance of personal behaviors that contribute to the GHE Recommendations are made by both participants and the researcher on strategies the university can devise to strengthen students' environmental awareness and inspire them to participate in climate action. The results of the current study can be used in all parts of the world, especially the African continent, which is responsible for ten percent of global thermal emissions. Still, it does not have the capabilities to confront it.

KEY TERMS: *environmental awareness, greenhouse effect, green social work, university students, Oman*
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INTRODUCTION

The current study was undertaken to assess the levels of awareness about GHE among students of Sultan Qaboos University and to examine how these evolved over the ten-year period between 2009 and 2019. The study compares data collected in those two years, among very similar student samples, seeking to provide insights into the effectiveness of environmental education and awareness-raising initiatives in Oman's leading higher education institution over the decade. It analyzes three key dimensions of awareness: students' knowledge about global warming and the GHE, their attitude towards the GHE and climate change, and their behavior and actions in dealing with these issues.

BACKGROUND

As environmental concerns have increased, national and international social work organizations have called on social workers to incorporate issues of the environment into their professional practice, but the profession has not fully embraced the need to incorporate these issues into social work education or practice (Shaw, 2013). Green social work is a nascent framework within the social work field that provides insights regarding social workers' engagement in disaster settings (Breen, Greig, & Wu, 2023). The social work profession now regards environmental concerns as social problems to be addressed, aware that the connection between social intervention and environmental problems becomes especially significant in relation to vulnerable communities (Belchior, 2018). The fact that environmental damage is often the result of human action means that the relationship between human behavior and the environment is thus at the core of social work studies. The number of publications that highlight the importance of integrating the natural environment into social work practice has grown exponentially (Ramsay & Boddy, 2017). Moreover, given that one aim of any university should be to develop environmentally aware and ecologically conscious students (Rogayan, Nebrida, & Eveyen, 2019) the study seeks to analyze SQU students' levels of awareness (knowledge, attitudes, and behavior) about GHE in both 2009 and 2019. It also seeks to identify ways in which the university might increase this awareness.

The primary objective of the study, then, was to compare SQU students' levels of awareness about the GHE in 2009 and 2019. This led to several sub-objectives: To compare students' knowledge levels about the GHE in 2009 and 2019. To compare the attitude of students towards the GHE in 2009 and 2019. To compare the behavior of students, the actions taken to deal with the GHE in 2009 and 2019. In addition, to identify ways in which the university can increase students' awareness of the GHE and ways to combat its negative impact.

The study's main question was as follows: How much difference was there in the level of awareness about the GHE among university students in 2009 and 2019? The sub-questions were: what is the difference in the level of knowledge about the GHE among SQU students in 2009 and 2019?, how did SQU students' attitudes toward the GHE change between 2009 and 2019?, how did SQU students' behavior in dealing with the GHE change between 2009 and 2019?, and what can the university do to increase students' awareness of the GHE and of ways to combat its negative impact?

LITERATURE REVIEW

The greenhouse effect (GHE)

Industrialisation, modernisation, and globalisation pose significant threats to human living conditions, including harmful environmental phenomena like GHE and climate change. (Adeleye & Ajobiewe, 2022). The challenge of climate change is very problematic because it impacts every aspect of human life and the earth's physical, socio-cultural, and biological systems, and does not appear to have a quick-fix solution (Marcellus & Ezegwu, 2024). It is important to clarify that the GHE, climate change, and global warming are often used interchangeably, but inaccurately. The distinction between them was made by Al-Mukhtar (2008), GHE is part of climate change caused by the intensified GHE. Global warming is defined as "an abnormal rise in the average temperature of the Earth and its atmosphere that the planet has not previously experienced" (Al-Mukhtar, 2008). To understand the global impact of climate change, the 2022 State of the Climate in Africa report highlights accelerated temperature increases and worsening climate-related hazards in recent decades (World Meteorological Organization, 2023). The planet absorbs half of the sun's energy, which is stored in layers of water vapor, clouds, and gases (Al-Mukhtar, 2008), which conserve it as if we were in a greenhouse, with water vapor having the most significant impact (Britannica, 2023). The melting of ice caps will raise sea levels, submerging low-lying islands and coastal cities. Other effects include increased floods, droughts, desertification, more intense storms, the spread of diseases, extinction of species, crop failures, and escalating forest fires (Al-Ajmi, 2008). In conclusion, the greenhouse

effect' has the potential to cause unprecedented global warming and climate change on the Earth leading to wide-spread destruction, catastrophe and changes on our plane (Okeke, Ajayi, & Lawal, 2023).

Environmental awareness

International awareness of the problem of global warming emerged in the late 1980s and attempts to reach an agreement date back to the Earth Summit in Rio de Janeiro in 1992, where 160 countries signed a treaty on climate change. Several conferences followed, resulting in the Kyoto Protocol of 1997, in which the international community committed to reducing emissions of greenhouse gases. Over the last twenty years, the promotion of environmental awareness has emerged as a major social objective, Scientists across various fields, recognizing that effective management of the climate crisis relies on measurable factors, have sought to find scientifically based criteria by which to measure environmental awareness. One example is a study conducted in 2004 which used an experimental survey to identify the attitudes to the environment among Andalusians, as well as their behaviour in dealing with the growing crisis. The authors defined environmental awareness as individuals' perception of the fragility of the environment; they must also be aware of the importance of conserving it by making use of natural resources with a minimum of degradation, destruction and pollution (Sánchez & Lafuente, 2010). and possession of the skills needed to take individual and collective steps to deal effectively with the environmental crisis is very essential (Saleh, 2010). Ham, Mrčela, & Horvat (2016) define environmental awareness as an attitude towards the environmental consequences of human behavior, indicating a predisposition to react to environmental issues (Ham, Mrčela, & Horvat, 2016). Given these global developments, it is crucial to understand their impact on young Omanis as future leaders. Despite the wide-ranging nature of literature related to the climate change crisis and the global response to it, there appears to have been little research done on the awareness of environmental issues among Omani university students. It is vital to understand what they know, think and do about these matters, as it is they who, as future leaders and decision-makers, will be responsible for addressing environmental issues, so social work cannot escape this process (Peeters, 2011).

Green social work

Despite social work having been delayed in engaging in ecological social work (Arkert & Jacobs, 2021), much effort has been made towards the development and implementation of policy for environmental education in Africa (Muraina, 2023). In this context, social work in Africa provides a framework for addressing complex modern challenges by integrating developments into the natural and social sciences, providing key insights into the social, economic and environmental contexts in practice. (*Mupedziswa*, Rankopo, & Kate, 2019), (Green & McDermott, 2010), (Shaw, 2013). It seems as if social work has not appropriately responded to the challenges of climate change, despite its humanitarian and social justice mission (*Noyoo*, 2020). Environmental social work (ESW) can thus be seen as a fundamental axis of professional practice, as it emphasizes not only ecological and environmental sustainability but also social justice within the framework of sustainable development. Furthermore, a study conducted at the University of Gävle, noted that the last decade has seen the emergence of the idea of green social work, it is widely recognized in the theoretical literature related to the profession (*Rambaree*, 2020). A key writer on the relationship between social work and the environment, Lena Dominelli, created the concept of GSW, claiming that a new model of social work is vital, not only to protect and save the environment but also to give a new and vital direction to social work thinking itself. Green social work is based on the realisation that social justice is impossible without ecological justice and sustainability, and that social workers must be deeply aware of the social consequences of global warming and climate change (Dominelli, 2013). In her view, green social work is a practice which focuses on improving the well-being of both individuals and their surroundings and thus plays a crucial role in achieving environmental justice. In addition, another study describes attempts to integrate social work and social justice practice with environmental sustainability efforts in Canada. It noted that GSW is a relatively recent method that recognizes the interconnection of social, economic, and environmental systems and seeks to address them holistically (Coates & Camilleri, 2015). "Cloughton" observed that GSW attempts to promote sustainable development and address the root causes of social and ecological problems by acknowledging their interconnection (Cloughton, 2021). Similarly, Saleh (2023) emphasized the role of Green Social Work in promoting environmental awareness and sustainability (Saleh & Almamari, 2023). Ntiwane & Coetzee (2018) recommended that planners apply environmental justice principles in planning to ensure fairness and inclusivity (Ntiwane & Coetzee, 2018). Ultimately, considering social work's social justice mission, it is imperative that social workers are prepared to practice competently in green social work, where socio-economic inequalities abound (*Noyoo*, 2022).

METHODOLOGY

A quantitative approach was selected as the most appropriate for achieving the objectives of the study, which used a descriptive-analytical methodology to conduct a social survey involving students at Sultan Qaboos University (SQU). The researchers designed a scale to measure the students' awareness of GHE, with the scale broken into questions about three main areas: students' knowledge about the GHE and its causes, their attitudes to it, and thirdly, their behavior, or actions taken related to its impact. The study sample included students from Sultan Qaboos University from all academic years, excluding foundation students, for both samples. (The first sample= 320 and the second sample =364). These two samples were randomly selected in 2009 and 2019, respectively. (The total number of university students in 2019/2020 was 16.018). The same questionnaire was used in both periods to assess the level of students' knowledge, attitudes and behaviors toward GHE. Keeping the demographic characteristics of the two samples as similar as possible is crucial.

Table 1: The sex distribution of the participants in the study's samples (2009 and 2019)

			Sex		Total
			Male	Female	
Period	2009	Count	164	156	320
		%	51.2%	48.8%	100.0%
	2019	Count	176	188	364
		%	48.4%	51.6%	100.0%
Total		Count	340	344	684
		%	49.7%	50.3%	100.0%

It is clear that the gender distribution ratios of the participants in both samples (2009 and 2019) are very similar, and therefore unlikely to influence the results of data obtained. The average age of the participants in the two samples was also very similar: 20.30 years of age in 2009, and 20.51 years in 2019. Both similarities allow for reliable statistical comparisons.

Table 2 below shows the distribution of students across colleges during the two periods studied. In both years, 56.6% were enrolled in Humanities colleges, and 43.4% in colleges of Applied Sciences. The identical nature of all these figures allows for reliable statistical comparisons to be made.

Table 2: The distribution of students across colleges during the study periods studied

			Colleges		Total
			Humanities	Applied Sciences	
Period	2019	Count	206	158	364
		%	56.6%	43.4%	100.0%
	2009	Count	181	139	320
		%	56.6%	43.4%	100.0%
Total		Count	387	297	684
		%	56.6%	43.4%	100.0%

Table 3 below shows the distribution of students according to the type of area where they lived: urban, rural or the desert. This was because their background area might well have influenced their knowledge, attitudes, and

behavior concerning the GHE. However, in both years of data collection, the area-type distribution was the same, with 50.6% living in rural areas, 44.4% in urban areas, and a relatively low 4.7% coming from desert areas. This again allows for reliable statistical comparisons.

Table 3: The distribution of students across areas of residence during the study periods

			Area of Residence				Total
			Desert	Rural	Urban	6.00	
Period	2009	Count	16	178	126	0	320
		%	5.0%	55.6%	39.4%	0.0%	100.0%
	2019	Count	16	168	178	2	364
		%	4.4%	46.2%	48.9%	0.5%	100.0%
Total		Count	32	346	304	2	684
		%	4.7%	50.6%	44.4%	0.3%	100.0%

RESULTS AND DATA ANALYSIS

The results below provide data about students' knowledge, attitude and behaviour concerning the GHE; their recommendations for future action within the university are given in the Recommendations Section.

Knowledge about the Greenhouse effect

The analysis of field data associated with the results of comprehensive knowledge about the GHE shows that the students in 2009 had a slightly higher level of knowledge of the GHE, its causes, and its adverse effects than did those in 2019. The 2019 sample, however, had a slightly greater knowledge of both local and international plans and strategies to address the phenomenon.

Table 4: Results of the two study groups' overall knowledge about the GHE

Hypothesis Test Summary- Independent-Samples Mann-Whitney U Test			
	Null Hypothesis Test	Sig. [a,b]	Decision
1	a: Knowledge related to the GHE and its causes	<.001	Rejected
2	b: Knowledge of the effects of the GHE.	.012	Rejected
3	c: Knowledge of strategies and plans to address the GHE	.155	Retained
Total	Knowledge of the GHE.	.003	Rejected

a. The significance level is .050.

b. Asymptotic significance is displayed.

The table shows that, overall, the 2019 group had less overall knowledge about the GHE than the 2009 group. When calculated as percentages, as shown in Section 4.4, overall knowledge in the 2009 sample was 71.83%, and 69.89% in the 2019 group, a drop of 1.94%.

The results of the Mann-Whitney U test to analyze students' general knowledge about the phenomenon of the GHE between the two study groups showed the following results:

1. There were statistically significant differences between the two groups in knowledge related to the GHE, where the significance value was ($p < .001$).

2. There were statistically significant differences between the two groups in Knowledge of the effects of the phenomenon of the GHE, where the significance value was ($p = .012$).

3. There are no statistically significant differences between the two groups in Knowledge of strategies and plans to address the phenomenon, as the significance value was ($p = .155$)

4. There are statistically significant differences between the two groups in knowledge of the GHE, where the significance value was ($p = .003$)

These findings highlight that although there were notable disparities in understanding the causes and impacts of global warming between the two groups, their knowledge of mitigation strategies and plans did not differ significantly.

Attitudes towards the greenhouse effect

The survey questionnaire contained statements related to both these aspects, as shown in Table 5 below which shows the mean and standard deviation for the responses of the two groups.

Table 5: Results for attitudes toward the greenhouse effect in both groups

Attitudes toward the greenhouse effect	2009		2019	
	Mean	SD	Mean	SD
The GHE is useful for the universe	2.62	0.65	1.37	0.62
It is a natural process, and we should do nothing to combat it	2.60	0.65	1.35	0.57
Humans should have a role in reducing the GHE	2.84	0.43	2.77	0.50
Smoking contributes to the GHE	2.48	0.70	2.41	0.64
I thought about advising those around me to quit smoking.	2.56	0.61	2.36	0.70
I started getting annoyed by cars that cause pollution.	2.58	0.60	2.47	0.64
I thought about participating in a seminar to raise awareness about the GHE.	2.06	0.69	1.90	0.69
I considered writing a scientific report or research paper on the GHE	2.02	0.74	1.80	0.76
I thought about finding a role for myself in raising awareness about the dangers of the GHE	2.08	0.73	1.95	0.77
I realized the danger of environmental pollution in our lives	2.77	0.49	2.72	0.53
I connected Islamic teachings with preserving the environment	2.65	0.55	2.65	0.57
Environmental pollution issues, in general, have become of interest to me	2.57	0.64	2.40	0.62
I felt the need to participate in events to raise awareness about the dangers of the GHE	2.29	0.72	2.11	0.69
I tried to identify the parties responsible for dealing with the GHE	2.23	0.67	2.05	0.67
I thought of a critical way to address the shortcomings in dealing with the GHE	2.24	0.72	2.11	0.65
I intended to contact responsible parties to join them in confronting the GHE	1.83	0.68	1.69	0.70
I have become aware of the importance of the environment in our lives.	2.77	0.48	2.70	0.55
I prefer using eco-friendly cars.	2.65	0.57	2.58	0.60
I prefer to use clean energy sources.	2.76	0.53	2.76	0.49

The first two statements are different from the others, in that a drop in the mean for these shows an increase in knowledge that indicates a positive development in attitudes. A fall in the mean for the other statements, in contrast, shows a drop in conviction about the climate crisis, a drop in motivation to fight it, and thus a negative development in student attitudes.

Overall, the mean for two of the statements is unchanged, while there were smaller or larger differences between the other means. When assessing the key statements, there was a small drop in "I realized the danger of environmental pollution in our lives" and "I have become aware of the importance of the environment in our lives", with a larger drop in "Environmental pollution issues, in general, have become of interest to me", suggesting that interest (and thus conviction) fell somewhat more than awareness.

Generally, then, the results showed that student attitudes and conviction about fighting the GHE had fallen from 2009 (average equivalent to 81.75%) to 2019 (average equivalent to 73.93% %). The SD values, however, remained mostly the same or decreased slightly, suggesting that the 2019 student responses were more consistent and less varied than those in the 2009 sample. The Independent-Samples Mann-Whitney U Test was also used to analyze the data; the results show a significance level of .000, confirming a statistically significant difference between the attitudes of the two samples.

Overall behaviour related to the greenhouse effect

In analyzing the data on students' behavior related to the GHE, the survey focused on four key areas. These areas encompass information seeking, awareness raising, behavior avoidance, and proactive actions.

Table 6: Differences in overall behaviour related to the greenhouse effect

Axes	2009		2019		T-Value	P-value	Decision
	Mean	SD	Mean	SD			
Searching for information about the GHE	13.58	3.43	12.76	3.27	3.183	.002	Rejected
Raising awareness about the dangers related to the GHE	14.43	3.76	13.75	3.84	2.328	.020	Rejected
Avoiding personal behaviours that contribeffect to the GHE	18.82	3.32	18.52	3.65	1.118	.264	Retained
Proactive actions taken to combat the GHE	23.39	4.34	22.28	4.71	3.181	.002	Rejected
Overall behaviour related to the GHE	70.21	12.30	67.31	12.78	3.104	.003	Rejected

The T-test was used to analyze differences between the responses of the two groups.

There were statistically significant differences between the two groups in Searching for information about the GHE, where the significance value was ($p < .002$). There were statistically significant differences between the two groups in Raising awareness about the dangers related to the GHE, where the significance value was ($p < .020$). There are no statistically significant differences between the two groups in in avoiding personal behaviours that contribute to the GHE, where the significance value was ($p <.264$). There were statistically significant differences between the two groups in proactive actions taken to combat the GHE, where the significance value was ($p <.002$). In terms of behavior related to the GHE. The mean for 2009 was 70.21, and that for 2019 was 67.31. The P-value was found to be 0.003, less than 0.05, confirming the presence of a statistically significant difference between the two groups, this means that the differences are in favor of the larger average, that is, in favor of the first group 2009.

Results show that 2019 students did less to seek information about the GHE and less to raise awareness about its dangers than did those in 2009; they also took fewer actions to deal with its impact, except for an increase in doing volunteer work that contributes to preserving the environment. The one area of behaviour that remained at the same level was the extent to which both groups avoided actions that would contribute to the GHE.

Overall, then, the results indicate that, despite the increasing global and local interest in the environment and climate change, students in 2019 were doing less to deal with the GHE than those in 2009.

When calculated as percentages, overall behaviour related to combatting environmental issues related to the GHE was 69.0% in the 2009 sample, and 66.0% in the 2019 group, a drop of 3.0%. This raises the same question as for knowledge and attitudes: why are there fewer and less frequent individual measures to deal with the GHE in the second group, despite the immense increase in global concern about the environment and the climate change affecting the planet?

Overall results

The following figure provides a summary comparison between the two study groups (2009 and 2019) in terms of their awareness of the phenomenon under study. It shows the full results in a bar graph, which makes it very clear that between 2009 and 2019 there was an overall decrease in all areas surveyed: students' knowledge, attitudes, and behaviour.

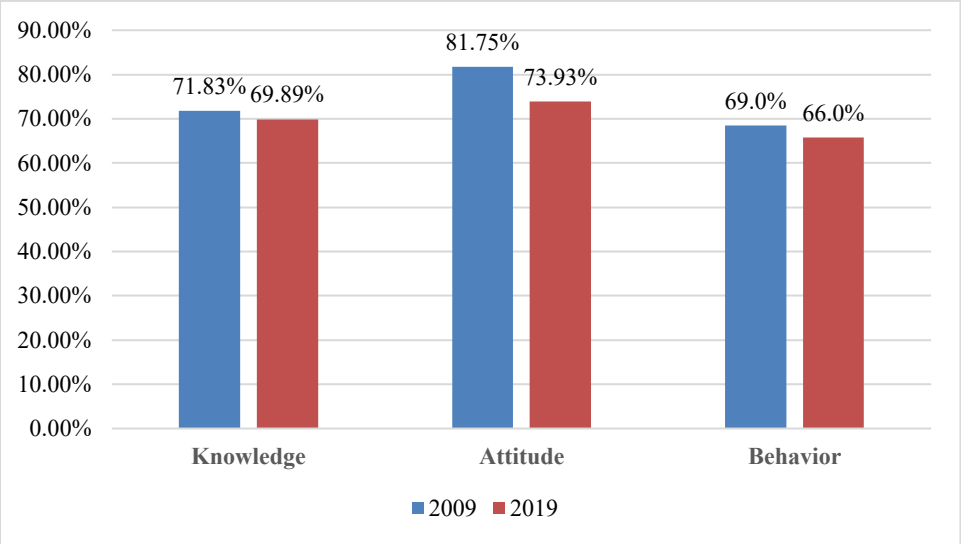

Figure 1. Shows the overall results from both groups (2009 & 2019)

Overall knowledge about the GHE crisis, as well as attitudes to it and behaviour aimed at fighting its impact, all decreased between 2009 and 2019. In both years, attitude had the highest mean values, followed by knowledge, with behaviour ranking lowest. The lowest fall was in knowledge (1.94%), suggesting that information on the issue remained fairly strong; behaviour fell by (3.0%), and attitude by the most (7.82%).

Table 7: The total results from both groups (2009 & 2019) on the axes of the scale

Axes	2009		2019		T-Value	P-value	Decision
	Mean	SD	Mean	SD			
Knowledge	53.88	6.49	52.42	5.87	3.858	0.002	Rejected
Attitude	46.60	5.43	42.14	5.03	11.154	0.000	Rejected
Behavior	69.89	12.20	67.01	12.74	3.009	0.003	Rejected
Scale	170.37	18.51	161.57	19.22	6.075	0.000	Rejected.

Results of the t-test for independent samples showed a significant difference in all axes between the means of the two groups. For knowledge, tests showed the P-Value = 0.002, for attitude, the P-Value <0.001, and for behavior the P-Value = 0.003. Not surprisingly, there was also a significant difference between the means of the two groups when looking at the overall scale, the P-value <0.001. In summary, then, the t-tests confirmed that there are significant differences in knowledge, attitudes, behaviors, and the overall response to the GHE between the years 2009 and 2019. These results have implications for public health interventions and policies and indicate a need for further investigation into the factors that influence this population.

Only two sub-sections had different results: knowledge about local and international strategies and plans to tackle environmental problems actually increased over the decade, while the avoidance of personal behaviors that contributed to the GHE decreased. These differences favor the group with the higher average, specifically the 2009 group, indicating that participants from the 2009 group had better awareness of the GHE phenomenon compared to those from the 2019 group.

DISCUSSION

The most perplexing question raised by the results of this research into SQU students and the GHE and climate change is this: why did the years between 2009 and 2019 see a decrease in almost every area of knowledge, attitudes and behavior queried in the survey/scale? This is especially surprising, indeed worrying, in the context of increased global concern about the environment, with young people often at the forefront of demands for change. A number of possible factors can be mooted, but it must be noted that they are purely speculative and need further research to investigate their validity.

Cyclone *Gonu*, which struck Oman on June 6, 2007, marked a turning point in how the country prepared for and responded to natural disasters. The widespread damage and loss caused by this event led Omani authorities to restructure institutions and improve disaster management strategies. By 2009, the memory of Cyclone Gonu was still fresh, potentially raising students' awareness of the environmental dangers linked to phenomena like the GHE. However, by 2019, with the government's continued efforts, including educational campaigns and improved infrastructure, students may have perceived the issue as less urgent. The reduced frequency of severe weather events and the fading memory of Gonu likely contributed to this shift in perception.

This is doubtless because of the increase in such strategies and actions over the decade; students are reflecting on the changed situation. This suggests that while they were less concerned with seeking information about appropriate climate behaviour, imparting this to others and campaigning on environmental issues, their personal behaviour had not changed.

Another point worth considering is that in 2009, overall percentages of knowledge, attitude, and behavior were already high (knowledge = 71.83%, Attitude=81.75%, Behavior= 69.00%), and by 2019 this had dropped (knowledge = 69.89%, Attitude=73.93%, Behavior= 66.00%), a decrease perhaps understandable in the light of changes made by local and international government and institutions. In other words, the measures taken and publicized by the government over the decade from 2009 to 2019 may have decreased people's sense of personal responsibility and their motivation to take individual action, in students and more widely in the country.

One of the reasons that may lead to the low awareness of university students about the GHE is the greater focus on traditional academic disciplines without sufficient emphasis on environmental science and climate change. In addition, there may be other educational and research priorities that capture attention at the university, reducing engagement in the study and understanding of environmental problems in general and global warming in particular The political context (Arab Spring) of the years between 2009 and 2019 and economic conditions and employment opportunities in the country and region may also have harmed the students' environmental awareness.

Finally, Green social workers can play an important role in raising awareness by drawing on the model based on South African experiences to provide some guidance on how best to mainstream gender dimensions into climate change interventions. This would promote social and environmental justice, social resilience, and equal participation in climate change discourse (Nyahunda, 2021). The most effective strategy for promoting environmentally responsible behavior and positive attitudes may simply be to increase exposure to direct messages that emphasize the importance of these issues (Ogunbode & Arnold, 2012). By integrating these strategies, efforts can be strengthened to enhance understanding and collective action on environmental issues, focusing on behavioral changes and eliminating social inequalities. This would enhance empowerment and build capacity to deal with environmental sustainability issues through social service practice and addressing climate change and other disasters (Dominelli, 2013).

RECOMMENDATIONS

- Incorporate educational courses in university curricula that focus on environmental issues.
- Revise the social work curriculum to include comprehensive information on environmental issues and emphasize (GSW), highlighting the role of social workers in addressing environmental and climate challenges.
- Provide training opportunities for social workers to enhance their ability to raise environmental awareness, utilizing successful international experiences such as those from South Africa.
- Encourage social organizations working in green social work to send direct messages on environmental issues to residents, fostering positive attitudes and behaviors towards the environment.
- Use social media to spread awareness of environmental issues, especially global warming.

CONCLUSION

A study conducted at Sultan Qaboos University in Oman compared students' knowledge, attitudes, and behavior towards the GHE between 2009 and 2019. The research used a quantitative approach and a descriptive-analytical methodology to conduct a three-part social survey. The results showed a slight decrease in students' awareness

and concern about the GHE and climate crisis between 2009 and 2019, with fewer actions taken to spread awareness and fight it. However, students in 2019 had greater knowledge about national and international efforts to address the crisis. The study highlights the need for further research to confirm the factors suggested and determine future actions to protect the environment from disasters.

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