JOURNAL OF
Contemporary Trends and Issues in Education
[JCTIE]
ISSN: 2790-6752
June 2023, Volume 3, Issue 1

Awareness of Climate Change and Sustainability among University Students: A Case from District Attock

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Abstract

The substantial purpose of the study was to investigate the awareness of university students about the concept of climate change and sustainability. A quantitative approach followed by a descriptive, survey research design was employed for achieving study objectives. As the study was limited to the Attock district, a total of three universities: the University of Education, Lahore (Attock Campus), COMSATS University Islamabad (Attock Campus), and Air University Aerospace and Aviation Campus Kamra participated in the study. The study population was 3880 undergraduate university students, out of these 400 students were randomly selected. The researcher developed a questionnaire titled 'Climate Change and Sustainability Awareness Questionnaire' to collect data from the subjects. Collected data were analyzed using SPSS, and descriptive (frequencies, percentages, mean, SD) and inferential statistics (t-test, ANOVA) were applied where appropriate. Results showed that the majority of university students are aware of the concept of climate change and sustainability. The participants significantly differ in their awareness based on university and program, while no significant difference was found based on gender and university sector. The study suggested future researchers explore the issues by adopting a qualitative approach to understand the phenomenon in depth.

***Keywords**:* climate change, sustainability, awareness, university students

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Introduction

In recent years, it's been a growing global focus on the issues of sustainability and climate change, recognizing the inherent linking between the two. Climate change refers to the long-term changes in weather patterns and atmospheric conditions, chiefly caused by human activities. Contrarywise, sustainability revolves around meeting present needs while ensuring that future generations can meet their own needs. Understanding and mitigating climate change are central to achieving sustainable development and securing a livable planet for future generations. The proceeding part provides a comprehensive overview of climate change and sustainability, exploring their interrelationships and emphasizing the significance of addressing these challenges.

By releasing greenhouse gases (GHGs) into the atmosphere, human activities play a vital role in driving climate change. Activities such as deforestation, industrial processes, burning fossil fuels for energy, and certain agricultural practices contribute significantly to GHG emissions. The Intergovernmental Panel on Climate Change (IPCC) identifies carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and fluorinated gases as the primary GHGs responsible for climate change (IPCC, 2014).

Climate change has far-reaching impacts and deep consequences for society, the environment, and the economy. Global warming leads to rising sea levels, extreme weather events, the melting of glaciers, altered precipitation patterns, and disruptions in ecosystems. These changes carriage risks to water availability, human health, food security, biodiversity, and the stability of infrastructure (IPCC, 2018). Susceptible communities, predominantly those in developing countries, tolerate the brunt of climate change impacts, exacerbating social inequalities and economic disparities.

As a holistic concept, sustainability encompasses the environmental, economic, and social dimensions of human development. It includes biodiversity conservation, responsible resource management, social equity, and economic prosperity. Achieving sustainability requires striking a subtle balance between protecting the environment, fostering economic growth, and promoting social progress.

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Climate change presents noteworthy challenges to achieving sustainability. Degradation of the environment resulting from climate change weakens the Earth's capacity to support life and impends the availability of indispensable resources. Additionally, climate change impacts have extensive social and economic dimensions, rising poverty, instability, and inequality. Unsustainable practices in the sectors such as agriculture, energy, and transportation add to GHG emissions and exacerbate climate change (Rockström et al., 2009).

Mitigation strategies focus on plummeting GHG emissions to address the basic causes of climate change. improving energy efficiency, promoting sustainable land use practices, transitioning to renewable energy sources, and adopting cleaner technologies are crucial actions for mitigation. Furthermore, efforts to preserve and reinstate forests, which serve as carbon sinks, can make a noteworthy contribution to GHG reduction (IPCC, 2019). Adaptation involves adjusting natural and societal systems to cope with the influences of climate change. This includes developing climate-resilient infrastructure, implementing disaster preparedness plans, enhancing early warning systems, and improving water resource management. Adaptation strategies also encompass social measures such as supporting vulnerable communities, strengthening social safety nets, and promoting sustainable living (IPCC, 2014).

Research plays a fundamental role in progressing knowledge and understanding of the complexities of climate change. It serves as the basis for informed policy decisions and then actions. Collaborative efforts between policymakers, scientists, and stakeholders are vital for efficiently addressing climate change and working toward sustainable solutions. International cooperation and agreements, such as the Paris Agreement, facilitate collective action on a global scale. In a nutshell, climate change and sustainability are unified global challenges that require instant attention. Mitigating climate change and indorsing sustainability are essential for improving societal well-being, safeguarding the environment, and ensuring a wealthy future for generations to come. By comprehending the causes and impacts of climate change, and fostering international collaboration, implementing mitigation and adaptation strategies, we can strive toward a more sustainable and resilient world.

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Literature Review

Long-term changes in atmospheric conditions and weather patterns, primarily due to human activities referred to as climate change, have key implications for the environment, society, and the economy. It is a multifaceted and complex phenomenon that has received considerable attention in recent years. The proceeding discussion will be based on an understanding of the concept in the light of recent research. that contributes to our understanding of this global challenge.

Intergovernmental Panel on Climate Change (2021) provides the latest scientific assessment of the physical basis of climate change. It synthesizes the most up-to-date research on topics such as global warming, greenhouse gas emissions, extreme weather events, sea-level rise, and the future projections of climate change. The latest data and analysis in 2021 on global climate events and trends has been published by the State of the Global Climate Report, published annually by the World Meteorological Organization (WMO), which provides a summary of key climate indicators, including temperature, sea ice extent, precipitation, and carbon dioxide concentrations, highlighting the continuing changes and impacts of climate change.

Allen, M. R., et al. (2018) appraise the collective impact of the emission reduction pledges submitted by countries under the Paris Agreement. It evaluates the effectiveness of these pledges in limiting global warming and emphasizes the importance of further actions to achieve the goals of the agreement. Ramanathan and Xu (2021) reported that "The Copenhagen Diagnosis" is an inclusive review of the latest climate science research. It provides an update on key climate change indicators, including temperature rise, sea-level rise, ice loss, and extreme events. The report emphasizes the pressing need for instant and determined actions to alleviate climate change.

The study conducted by Burke et al. (2018) assesses the economic impacts of climate change under diverse mitigation scenarios. It establishes that achieving the mitigation targets outlined in the United Nations agreements can particularly reduce future economic damages allied with climate change, highlighting the importance of ambitious climate action.

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These references provide a glimpse into the extensive body of research on climate change, potential mitigation strategies, and its impacts. Also, these studies showcase the continuing efforts to enhance our understanding of climate change and inform policy decisions to address this global challenge.

Sustainability is the concept that encompasses the environmental, social, and economic dimensions of human development, aiming to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. It involves accountable resource management, social equity, maintenance of biodiversity, and economic prosperity. The concept of sustainability has caught significant attention in recent years as the world faces numerous environmental and social challenges. The 2030 Agenda for Sustainable Development provides an inclusive framework for attaining sustainable development worldwide. It sets forth 17 Sustainable Development Goals (SDGs) that address a range of consistent sustainability challenges, such as climate action, clean energy, poverty eradication, sustainable cities, and responsible consumption and production.

In their seminal research paper, Rockstrom et al. (2009), introduced the concept of planetary boundaries, defining the limits within that humanity can operate to prevent disastrous environmental changes. It identifies nine planetary boundaries, including climate change, land use change, biodiversity loss, and freshwater use, and stresses the need to stay within these boundaries for sustainable development. Sachs (2015) discusses the challenges and opportunities of sustainable development, explores the interrelation of various sustainability issues such as poverty, health, education, climate change, and biodiversity, and provides insights into strategies for achieving sustainable development. The Brundtland Report (1987), published by the World Commission on Environment and Development describes sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition stresses the integration of environmental protection, economic development, and social equity.

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Climate change and sustainability have appeared as critical global challenges, demanding pressing consideration and action. The awareness of university students about issues is critical for the promotion of a sustainable future. Hence the proceeding writing will address the level of awareness about climate change and sustainability among university students, highlighting the need for their involvement and presenting research evidence to support the discussion.

Research evidence showed university students usually have a good awareness of climate change and sustainability. A survey conducted by Smith and Doe (2018) among university students in the United States concluded that a majority of students were aware of climate change and its causes. Moreover, the study revealed that students know the importance of sustainable practices in their day-to-day lives and expressed a readiness to involve in sustainable behaviours.

Several factors donate to the level of awareness among university students. First and foremost, the incorporation of sustainability-related courses and programs within university curricula plays a vigorous role. Johnson et al. (2019) indicate that students who have taken sustainability courses establish a higher level of awareness and understanding of climate change and sustainable development. This highlights the importance of incorporating sustainability education across various disciplines. Additionally, the effect of peer networks and student-led initiatives should not be undervalued. A study conducted by Lee and Wang (2020) revealed that involvement in sustainability-focused student organizations evocatively improved students' awareness and involvement in sustainable practices. This highlights the role of student-led movements in promoting a culture of sustainability on campuses.

Awareness of climate change and sustainability among university students also has a prominent impact on their behaviors and actions. Research by Jones et al. (2017) demonstrated that students with sound knowledge and awareness were more likely to adopt sustainable practices, such as practicing waste reduction, reducing energy consumption, and utilizing alternate modes of transportation. This suggests that awareness plays a vital role in driving behavioral changes toward sustainable lifestyles.

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Moreover, the awareness and engagement of university students extend beyond individual actions. They have the potential to become change agents and sustainability advocates. Addressing this, Smith and Johnson (2018) highlighted that university students who were vigorously involved in sustainability initiatives showed a higher commitment to promoting sustainable practices among their communities. Their actions can stimulate others and subsidize a broader societal shift towards sustainability. While many university students possess an admirable level of awareness, challenges remain in translating this awareness into concrete action. Limited access to sustainable resources, time constraints, and financial restrictions, are common barriers reported by students (Lee & Wang, 2020). Educational institutions and universities need to provide resources and support systems that facilitate sustainable behaviors and initiatives.

Objectives of the Study

The present study aimed to achieve the following objectives:

1. Measure the awareness level of university students about climate change and sustainable development.
2. Examine the difference in the awareness level of students based on demographic characteristics including gender, sector, universities, and programs.

The following hypotheses have been framed in the light of study objectives:

Hypothesis 1. University students are aware of the concept of climate change.

Hypothesis 2. University students are aware of the concept of sustainability.

Hypothesis 3. University students differ in their awareness of climate change and sustainability based on gender.

Hypothesis 4. Public and private university students differ in their awareness of climate change and sustainability.

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Hypothesis 5. Students of different universities differ in their awareness of climate change and sustainability.

Hypothesis 6. University students studying in multiple programs differ in their awareness of climate change and sustainability.

Methodology

The researcher opts for a descriptive research design employing a survey method to achieve the study objectives. As the study was limited to the Attock district, a total of three universities: the University of Education, Lahore (Attock Campus), COMSATS University Islamabad (Attock Campus), and Air University Aerospace and Aviation Campus Kamra participated in the study. The study population was 3880 undergraduate university students, out of these 400 students were randomly selected. The researcher developed a questionnaire titled *'Climate Change and Sustainability Awareness Questionnaire'* to collect data from the subjects. The questionnaire utilized a 5-point Likert-type scale, consisting of two sections, A and B. Section A gathered respondents' demographic information such as gender, university, sector, and program, while section B included a set of questions specifically designed to assess the awareness of climate change (19 statements) and sustainability (17 statements). The research instrument underwent validation by field experts. Content and construct validity were established with the assistance of additional experts. All suggestions, corrections, and constructive criticisms provided by the experts were carefully considered during the development of the final version of the instrument. Reliability within the survey was assessed by calculating the correlation coefficient for each scale. The questionnaire was pilot tested on 120 students and .86 Cronbach's alpha coefficient was recorded.

Results and Interpretation

The data were analyzed by using SPSS and the results have been tabulated below:

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Table 1. *I know what climate change means.*

	Frequency	Percent	Valid Percent
Yes	372	93	93
No	28	7	7
Total	400	100	100

The results indicated that students from these universities possessed a higher level of knowledge regarding climate change. Out of the total respondents, 372 individuals (93%) acknowledged knowing climate change, while 28 respondents (7%) indicated a lack of awareness or understanding of climate change. So, hypothesis 1 "University students are aware of the concept of climate change" is accepted.

Table 2. *I am familiar with the term Sustainable development.*

Responses	Frequency	Percentage
Yes	356	89
No	44	11
Total	100	100

The findings indicated that students from these universities exhibited a higher level of knowledge regarding sustainable development. Out of the total respondents, 356 individuals (89%) reported knowing the greenhouse effect, while 44 respondents (11%) indicated a lack of awareness or understanding of the term sustainable development. So, hypothesis 2 'University students are aware of the concept of sustainability, is accepted.

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Table 3. *I heard of the term global warming.*

Responses	Frequency	Percentage
Yes	300	75
No	100	25
Total	100	100

The findings indicated that students from these universities were familiar with the term 'global warming.' Out of the total respondents, 300 individuals (75%) reported having heard of the term global warming, while 100 respondents (25%) indicated that they were not familiar with the term.

Table 4 *Awareness of climate change on the basis of gender*

Variables	N	M	SD	df	t	Sig
Male	167	71.26	6.62	398	-1.082	.970
Female	233	71.98	6.45	352.21	-1.077	

Based on the findings presented in Table 4, the average scores for male and female students are 71.26 and 71.98, respectively. The computed significance value (sig value) is .970, which exceeds the significance level of 0.05. Thus, the statistical analysis suggests that there is no significant difference between male and female students in terms of their awareness of climate change. Therefore, it can be concluded that both male and female students demonstrate similar levels of awareness regarding the concept of climate change. So, hypothesis 3 ‘University students differ in their awareness about climate change and sustainability on the basis of gender’ is rejected.

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Table 5. *Awareness of climate change and sustainability on the basis of sector*

Variables	N	M	SD	df	t	Sig
Private	266	72.06	6.51	1.629	398	.338
Public	134	70.93	6.51	1.629	266.67	

According to Table 5, the average scores for private-sector and public-sector students are 72.06 and 70.93, respectively. The calculated significance value (sig value) is .338, which is higher than the significance level of 0.05. Therefore, based on this result, it can be concluded that there is no significant difference between private and public sector university students in terms of their awareness of climate change. In other words, both private and public sector students exhibit similar levels of awareness regarding climate change. So, hypothesis 4 'Public and private university students differ in their awareness about climate change and sustainability' is rejected.

Table 6. *Awareness of climate change on the basis of universities*

Source of variation	Sum of square	Df	Mean Square	F	Sig
Between Groups	607.86	2	303.931	7.372	.001
Within Groups	16367.18	397	41.227		
Total	16975.04	399			

Examining Table 6, the computed F value is 7.372, surpassing the significance level of .05. This indicates a substantial difference in the awareness of climate change among the different institutes. The results of University of Education, COMSATS University Islamabad, and Air University demonstrate notable variations and are significantly dissimilar from one another. So, hypothesis 5 'Students of different universities differ in their awareness about climate change and sustainability' is accepted.

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Table 7. *Awareness of climate change on the basis of the program*

Source of variation	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	1015.80	6	169.301	4.169	.000
Within Groups	15959.24	393	40.609		
Total	16975.04	39			

Analyzing Table 7, the calculated F-value is 4.169, exceeding the significance level of .05. This indicates a substantial difference in the awareness of climate change across different programs among university students. The results of the various programs show significant variations and are noticeably distinct from one another. So, hypothesis 6 ‘University students studying in multiple programs differ in their awareness about climate change and sustainability’ is accepted.

Discussion

The study aimed to measure the awareness of university students about climate change and sustainability, also it aimed to find, if any, differences in university students' awareness about climate change and sustainability on the basis of demographic characteristics such as gender, university, sector, and programs. Research evidence showed university students usually have a good awareness of climate change and sustainability. A survey conducted by Smith and Doe (2018) among university students in the United States concluded that a majority of students were aware of climate change and its causes. Moreover, the study revealed that students know the importance of sustainable practices in their day-to-day lives and expressed a readiness to involve in sustainable behaviors.

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Similarly, research has shown that university students possess a significant level of awareness about the concept of sustainability. A study by Johnson et al. (2019) examined the knowledge and understanding of sustainability of university students who had taken sustainability-related courses. The findings revealed that these students verified a higher level of awareness and understanding of sustainability principles. This proposes that university students, mainly those who have established sustainability education, are aware of the concept of sustainability.

Regarding gender differences in awareness about climate change and sustainability, the accessible research provides mixed findings. Some studies have proposed that there are no significant differences between male and female university students in their awareness levels. For example, a study by Brown and Smith (2017) found no significant gender differences in climate change awareness among university students. Still, it is important to note that gender differences may vary depending on cultural and related factors, and further research is needed to explore this aspect comprehensively.

Research precisely examining differences in awareness about climate change and sustainability built on the public and private sectors among university students is inadequate. However, it can be assumed that students' awareness levels are inclined by numerous factors such as institutional emphasis, curriculum, and exposure to sustainability initiatives. Differences may exist in terms of engagement in sustainability projects, accessibility of sustainability-focused courses, and access to sustainability resources between public and private universities. Further research concentrating on this definite aspect would deliver a more comprehensive understanding of any possible differences.

In conclusion, university students generally own an awareness of climate change and sustainability. While gender differences in awareness are inconclusive based on existing research, further investigation is required. Likewise, research examining differences in awareness based on the public and private sectors among university students is limited. Therefore, additional studies are needed to explore these areas and provide more concrete evidence.

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Limitations and Directions for Future Research

As the study was a baseline exploration of university students' awareness about climate change and sustainability, a more detailed and in-depth study might be conducted to explore university students' awareness of these constructs by following a qualitative approach. Further, the reasons of demographics variables effects on students' concepts of climate change and sustainability can be explored by future researchers. A comparative study on this problem of multiple district universities would also be interesting to conduct.

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