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Combating the Climate Change Challenge: A Student Survey

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Abstract
The students' response to climate change and their approach to this crisis are best studied through a survey of their daily life habits and practices. The study was conducted on the college and University students of various streams within the 18 – 24 age group from different districts of West Bengal. An information schedule cum questionnaire was formulated and standardized by the researchers for collecting data. The study was designed on a survey-based descriptive research methodology. Students realize climate change is one of the greatest threats to the planet and hence are taking active measures in their daily lives and lifestyles to combat it.

Keywords: Sustainability; Carbon Footprint; Resource Management; Conservation; Plantation.

Introduction

The students are the backbone of any nation attempting to tackle major challenges in the global scenario. Climate change is possibly the biggest environmental crisis in the current situation having a profound impact on student education (Hussaini, 2023). Students' awareness and teaching-learning of climate change are thus very significant and vital (Mebane *et al.*, 2023, Newsome *et al.*, 2023). The student's response to climate change and their approach to tackling this challenge is best studied through a survey of their daily life habits and practices. This survey was carried out precisely with this objective on students from various academic institutions in and around Kolkata from different neighboring districts. The present study aims to assess whether the students conserved energy; to survey the students' dietary habits and preferences; to find out whether the students regulate their water consumption; to survey their mode of transport and frequency of air travel; to assess whether students buy new clothes often; and to assess whether the students encouraged greening and were committed to sustainable living and lifestyles.

Materials and Method

Population: The study was conducted on the college and University students of various streams [18 – 24 age group] from different districts [viz. Hooghly, Howrah, Kolkata, South 24 Parganas and North 24 Parganas] of West Bengal for acquiring an overall idea about their awareness level and activities performed to tackle the threat of climate change.

Sample: The sample comprised 215 students out of which 206 [95.8%] were female students and 9 [4.2%] were male students in the age group of 18 - 24 years. An incidental sampling technique was adopted in this study.

Variables:

- **Dependent Variable:** Awareness of Carbon footprint and climate change [including six (6) components viz. concept of energy conservation, dietary habits and preferences, attitude towards monitoring of water consumption, preferences towards the mode of transport and communication, clothing purchase and greening and sustainable living]
- **Independent Variable:** Gender (male and female students)

Delimitations:

The data was limited to only 5 districts and 215 students [both male and female] from different urban, semi-urban and rural colleges of Hooghly, Howrah, Kolkata, South 24 Parganas and North 24 Parganas of West Bengal.

Research Area: Carbon footprint and climate change.

Research Period: From July 2023 to December 2023 [Six (6) months].

Tools:

1). A **Personal Information Schedule** was developed by the researchers.

2). A Scale on Carbon Footprint Analysis – It is a scale cum questionnaire that was formulated and standardized by the researchers through expert validation for collecting data. Reliability was measured by using Cronbach's Alpha based on standardized items and was found to be 0.784 and the range of coefficient of content validity was .78 to .84 and the average was 0.82. According to the scoring pattern of the above-mentioned scale, a high score is an indicator of being more resilient and aware of carbon footprint and climate change.

Methodology

The study was designed on a survey-based descriptive research methodology. The questionnaire was administered to the selected sample to collect data and the data was further analyzed quantitatively by percentage analysis and Independent Sample Mann- Whitney U Test using SPSS-20 to come to further conclusions (as the scores obtained were not following the nature of the normal probability curve the researchers had to adopt non-parametric test). To describe the data, the mean was also calculated.

Hypotheses of the Study

H_0 1: There is no significant difference between the male and female students regarding their concept of energy conservation [carbon footprint and climate change].

H_0 2: There is no significant difference between the male and female students regarding their dietary habits and preferences [carbon footprint and climate change].

H_0 3: There is no significant difference between the male and female students regarding their attitude towards monitoring water consumption [carbon footprint and climate change].

H_0 4: There is no significant difference between the male and female students regarding their preferences towards modes of transport and communication [carbon footprint and climate change].

H_0 5: There is no significant difference between the male and female students regarding their clothing purchase [carbon footprint and climate change].

H_0 6: There is no significant difference between the male and female students regarding greening and sustainable living [carbon footprint and climate change].

H_0 7: There is no significant difference between the male and female students regarding their overall concept of carbon footprint and climate change.

Results

Percentage Analysis: The students' response to energy conservation is shown in Table 1. The recorded responses reveal that most students were aware of the need for energy conservation and hence followed the necessary rules of switching off lights and gadgets when not in use (Table 1A & 1B). This is an extremely positive finding which proves that most students possess pro-environmental behavior.

Table 1. Students' Response to Energy Conservation

Table 1A			**Table 1B**		
Students switch off lights when they leave the room			**Students switch off gadgets when not in use**		
Opinion	**No. of Students Responded**	**Percentage**	**Opinion**	**No. of Students Responded**	**Percentage**
Always	175	81%	Always	144	67%
Seldom	8	4%	Seldom	11	5%
Sometimes	25	12%	Sometimes	40	19%
Uncertain	0	0	Uncertain	3	1%
Not at all	7	3%	Not at all	17	8%

The students' dietary habits and preferences are illustrated in Table 2**.** It was observed that 64% always opted for home-cooked food which proves that the majority of students are health conscious (Table 2A & 2A). Since most of the students hail from West Bengal the percentage of students and opting for dairy-based or vegan diets was very low. The low percentage of consumption of dairy-based diet will contribute to a low carbon footprint which is again a significant contribution to environment quality.

Table 2. Students' dietary habits and preferences

Table 2A			**Table 2B**		
Students prefer home-cooked food			**The kind of diet the students prefer [Non-Veg/meat-based**		
Opinion	**No. of Students Responded**	**Percentage**	**Opinion**	**No. of Students Responded**	**Percentage**
Always	137	64%	Always	105	49%
Seldom	48	22%	Seldom	23	10.2%
Sometimes	22	10%	Sometimes	8	3.7%
Uncertain	3	2%	Uncertain	7	3.3%
Not at all	5	2%	Not at all	72	34%

Similarly, Table 3 shows student monitoring of water consumption. The student responses to water consumption for daily life use such as the closing of taps and showers when not in use, repair of leaking pipes, and wastage of drinking water are not very encouraging. With the availability of pure drinking water becoming a rarity and water pollution on a steep rise, the

students are expected to be more sensitive to this crucial life resource. Judicious water management and conservation must be repeatedly emphasized. Academic institutions have a vital role to play in environmental or sustainability education and they may be suggested to initiate students more into this aspect of resource conservation and management (Sen, 2018).

Table 3. Student monitoring of water consumption

Students prefer home-cooked food		
Opinion	**No. of Students Responded**	**Percentage**
Always	96	44%
Seldom	27	13%
Sometimes	65	30%
Uncertain	12	6%
Not at all	15	7%

The students' mode of transport is shown in Table 4. Most avail of public transport (62%) while 34% either walk or cycle to their respective destinations. This again is a sign of pro-environmental behavior and environmental consciousness. Air travel is also significantly low among students revealing that only 8% always opt for air travel.

Table 4. Students' Mode of Transport

Table 4A			**Table 4B**		
Students' mode of transport			**Frequency of air-travel**		
Opinion	**No. of Students Responded**	**Percentage**	**Opinion**	**No. of Students Responded**	**Percentage**
Walk	44	20%	**Always**	18	8%
Cycle	29	14%	**Seldom**	14	7%
Public Transport	133	62%	**Sometimes**	37	17%
Car Pool	2	1%	**Uncertain**	26	12%
Own Vehicle	7	3%	**Not at all**	120	56%

The student response to clothing purchases is shown in Table 5. Most students opted for new clothes only sometimes and the tendency to always buy new ones is quite low -7.4%. This also shows the students' environmental awareness and concern as they try to reduce their consumption and make the best of available resources. This is another evidence of students' attempts to reduce their carbon footprint.

Table 5. Student response to clothing purchase

Student response to clothing purchase		
Opinion	**No. of Students Responded**	**Percentage**
Always	18	8%
Seldom	29	14%

Sometimes	142	66%
Uncertain	18	8%
Not at all	8	4%

Student response to greening and sustainable living is illustrated in Table 6.

Table 6. Student response to greening and sustainable living

Table 6A			**Table 6B**		
The students engaged in plantation			**The students committed to a sustainable lifestyle**		
Opinion	**No. of Students Responded**	**Percentage**	**Opinion**	**No. of Students Responded**	**Percentage**
Always	49	23%	**Always**	156	73%
Seldom	20	9%	**Seldom**	14	6%
Sometimes	112	52%	**Sometimes**	34	16%
Uncertain	17	8%	**Uncertain**	6	3%
Not at all	17	8%	**Not at all**	5	2%

Table 7 shows the differences in students regarding their concept of energy conservation [carbon footprint and climate change] due to gender variation.

Table 7. Differences in Students regarding their Concept of Energy Conservation

Null Hypothesis	**Test**	**Sig.**	**Significance Level**	**Decision/ Inference**	**Interpretation**
H_0 1: There is no significant difference between the male and female students regarding their concept of energy conservation [carbon footprint and climate change].	Independent Sample Mann-Whitney U Test	.001	Significant at .05 level (Asymptotic Significances are Displayed)	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their concept of energy conservation [carbon footprint and climate change].

The differences in students regarding their dietary habits and preferences [carbon footprint and climate change] due to gender variation are shown in Table 8.

Table 8. Differences in Students regarding their Dietary Habits and Preferences

Null Hypothesis	Test	Sig.	Significance Level	Decision/ Inference	Interpretation
H_0 2: There is no significant difference between the male and female students regarding their dietary habits and preferences[carbon footprint and climate change].	Independent Sample Mann-Whitney U Test	.001	Significant at .05 level (Asymptotic Significances are Displayed)	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their dietary habits and preferences[carbon footprint and climate change].

Similarly, Table 9 shows the differences in students regarding their attitude towards monitoring water consumption [carbon footprint and climate change] due to gender variation.

Table 9. Differences in Students regarding Their attitude towards Monitoring of Water Consumption

Null Hypothesis	Test	Sig.	Significance Level	Decision/ Inference	Interpretation
H_0 3: There is no significant difference between the male and female students regarding their attitude towards monitoring water consumption [carbon footprint and climate change].	Independent Sample Mann-Whitney U Test	.001	Significant at .05 level (Asymptotic Significances are Displayed)	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their attitude towards monitoring water consumption [carbon footprint and climate change].

The differences in students regarding their preferences towards modes of transport and communication [carbon footprint and climate change] due to gender variation are shown in Table 10.

Table 10. Differences in Students regarding their Preferences towards Mode of Transport and Communication

Null Hypothesis	Test	Sig.	Significance Level	Decision/ Inference	Interpretation
H_0 4: There is no significant difference between the male and female students regarding their preferences towards modes of transport and communication [carbon footprint and climate change].	Independent Sample Mann-Whitney U Test	.001	Significant at .05 level (Asymptotic Significances are Displayed)	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their preferences towards modes of transport and communication [carbon footprint and climate change].

Table 11 shows the differences in students regarding their clothing purchase [carbon footprint and climate change] due to gender variation.

Table 11. Differences in Students Regarding Their Clothing Purchase

Null Hypothesis	Test	Sig.	Significance Level	Decision/ Inference	Interpretation
H_0 5: There is no significant difference between the male and female students regarding their clothing purchase [carbon footprint and climate change].	Independent Sample Mann-Whitney U Test	.001	Significant at .05 level (Asymptotic Significances are Displayed)	The null hypothesis is rejected.	There is a significant difference between male and female students regarding their clothing purchase [carbon footprint and climate change].

The differences in students regarding greening and sustainable living [carbon footprint and climate change] due to gender variation are illustrated in Table 12.

Table 12. Differences in Students regarding Greening and Sustainable Living

Null Hypothesis	Test	Sig.	Significance Level	Decision/ Inference	Interpretation
H_0 6: There is no significant difference between the male and female students regarding greening and sustainable living [carbon footprint and climate change].	Independent Sample Mann-Whitney U Test	.001	Significant at .05 level (Asymptotic Significances are Displayed)	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding greening and sustainable living [carbon footprint and climate change].

Table 13 shows the differences in students regarding their overall concept of carbon footprint and climate change due to gender variation.

Table 13. Differences in Students regarding Their Overall Concept of Carbon Footprint and Climate Change due to Gender Variation

Null Hypothesis	Test	Sig.	Significance Level	Decision/ Inference	Interpretation
H_0 7: There is no significant difference between the male and female students regarding their overall concept of carbon footprint and climate change.	Independent Sample Mann-Whitney U Test	.001	Significant at .05 level (Asymptotic Significances are Displayed)	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their overall concept of carbon footprint and climate change.

Similarly, the differences in students regarding their concept of energy conservation [carbon footprint and climate change] due to gender variation are shown in Table 14.

Table 14. Differences in Students regarding their Concept of Energy Conservation

Null Hypothesis	Gender	N	Mean	Decision/ Inference	Interpretation
H_0 1: There is no significant difference between the male and female students regarding their concept of energy conservation [carbon footprint and climate change].	Male	9	35.35	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their concept of energy conservation [carbon footprint and climate change]. By comparing the means it can be said that male students possess less concept of energy conservation than female students.
	Female	206	38.44		

Table 15 shows the differences in students regarding their dietary habits and preferences [carbon footprint and climate change] due to gender variation.

Table 15. Differences in Students regarding their Dietary Habits and Preferences

Null Hypothesis	Gender	N	Mean	Decision/ Inference	Interpretation
H_0 2: There is no significant difference between the male and female students regarding their dietary habits and preferences[carbon footprint and climate change].	Male	9	36.42	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their dietary habits and preferences [carbon footprint and climate change]. By comparing the means it can be said that male students possess less concept of dietary habits and preferences than female students.
	Female	206	38.44		

Similarly, Table 16 shows the differences in students regarding their attitude towards monitoring water consumption [carbon footprint and climate change] due to gender variation.

Table 16. Differences in Students regarding Their attitude towards Monitoring of Water Consumption

Null Hypothesis	Gender	N	Mean	Decision/ Inference	Interpretation
H_0 3: There is no significant difference between the male and female students regarding their attitude towards monitoring water consumption [carbon footprint and climate change].	Male	9	36.09	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their attitude towards monitoring water consumption [carbon footprint and climate change]. By comparing the means it can be said that male students possess less positive attitudes towards monitoring water consumption than female students.
	Female	206	38.88		

The differences in students regarding their preferences towards modes of transport and communication [carbon footprint and climate change] due to gender variation are shown in Table 17.

Table 17. Differences in Students regarding Their Preferences towards Mode of Transport and Communication

Null Hypothesis	Gender	N	Mean	Decision/ Inference	Interpretation
H_0 4: There is no significant difference between the male and female students regarding their preferences	Male	9	34.28	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their preferences towards modes of transport and communication [carbon

towards modes of transport and communication [carbon footprint and climate change].	Female	206	36.48		footprint and climate change]. By comparing the means it can be said that male students possess less concept of mode of transport and communication than female students.

Table 18 shows the differences in students regarding their clothing purchase [carbon footprint and climate change] due to gender variation.

Table No: 18. – Showing Differences in Students Regarding Their Clothing Purchase

Null Hypothesis	Gender	N	Mean	Decision/ Inference	Interpretation
H_0 5: There is no significant difference between the male and female students regarding their clothing purchase [carbon footprint and climate change].	Male	9	36.27	The null hypothesis is rejected.	There is a significant difference between male and female students regarding their clothing purchase [carbon footprint and climate change]. By comparing the means it can be said that male students possess less concept of purchasing clothing than female students.
	Female	206	38.86		

Table 19 shows the differences in students regarding greening and sustainable living [carbon footprint and climate change] due to gender variation.

Table 19. Differences in Students Regarding Greening and Sustainable Living

Null Hypothesis	Gender	N	Mean	Decision/ Inference	Interpretation
H_0 6: There is no significant difference between the male and female students regarding	Male	9	35.21	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding greening and sustainable living

greening and sustainable living [carbon footprint and climate change].	Female	206	38.46		[carbon footprint and climate change]. By comparing the means it can be said that male students possess less concept of greening and sustainable living than female students.

Similarly, the differences in students regarding their overall concept of carbon footprint and climate change due to gender variation are illustrated in Table 20.

Table 20. Differences in Students regarding Their Overall Concept of Carbon Footprint and Climate Change due to Gender Variation.

Null Hypothesis	Gender	N	Mean	Decision/ Inference	Interpretation
H_0 7: There is no significant difference between the male and female students regarding their overall concept of carbon footprint and climate change.	Male	9	213.62	The null hypothesis is rejected.	There is a significant difference between the male and female students regarding their overall concept of carbon footprint and climate change. By comparing the means it can be said that male students possess less concept of carbon footprint and climate change than female students.
	Female	206	229.56		

Discussion

The recorded responses reveal that most students are aware of the need for energy conservation and hence follow the necessary rules of switching off lights and gadgets when not in use. This is an extremely positive finding which proves that most students possess pro-environmental behavior. While surveying the dietary habits of students it is observed that 64% always opt for home-cooked food which proves that the majority of students are health conscious. Since most of the students hail from West Bengal the percentage of students opting for dairy-based or vegan diets is very low. The low percentage of consumption of dairy-based diet will contribute to a low carbon footprint which is again a significant contribution to environment quality. The dairy industry is a chief source of greenhouse gases. A sustainable diet from sustainable food systems is gradually gaining attention (Arnaudova *et al.*, 2022, Irazusta-Garmendia*et al.*, 2023) and could be an effective means of combating GHG.

However, the student responses to water consumption for daily life use such as closing taps and showers when not in use, repair of leaking pipes, and wastage of drinking water are not

very encouraging. With the availability of pure drinking water becoming a rarity and water pollution on a steep rise, the students are expected to be more sensitive to this crucial life resource. Judicious water management and conservation must be repeatedly emphasized. Academic institutions have a vital role to play in environmental or sustainability education and they may be suggested to initiate students more into this aspect of resource conservation and management (Sen, 2018).

Tables 4A & B revealed the students' mode of transport and communication. Most avail of public transport (62%) while 34% either walk or cycle to their respective destinations. This again is a sign of pro-environmental behavior and environmental consciousness. Air travel is also significantly low among students revealing that only 8% always opt for air travel. With the aviation industry responsible for nearly 5% of global warming and 2.4% of CO_2 emissions, the low percentage of air travel is beneficial for environmental quality. However, the family income and economic background i.e. the socio-economic status of the surveyed students could be a major factor determining sustainable lifestyle choices (Pal and Sen, 2017). In this case, low air travel. Whatever the underlying reason, low air travel and greater use of public transport accompanied by walking or cycling will significantly lower the carbon footprint.

Carbon footprint is chiefly determined by food, transportation, and household energy consumption besides consumption of clothes and other goods, and can be significantly reduced by sustainable and pro-environmental habits and lifestyle choices (Dash *et al.*, 2023, Pinar and Taseli 2023).

Most students opt for new clothes only sometimes and the tendency to always buy new ones is quite low -7.4%. This also shows the students' environmental awareness and concern as they try to reduce their consumption and make the best of available resources. This is another evidence of students' attempts to reduce their carbon footprint.

Most students as evidenced supported and actively participated in greening and sustainable living which is a promising outcome of all environmental activities and programs initiated by the Government and different academic institutions in the form of compulsory environment/sustainability education, eco/green clubs, plantation drives, eco-tours, awareness campaigns, seminars/webinars, greening of surroundings, gardening activities etc. (Mitra and Sen, 2016, Sen 2023). Irrespective of gender, location, socio-economic background, and academic discipline, students feel the need for 'green' drives and initiatives to combat climate change and the associated disasters (Biswas and Sen, 2020). Green spaces promote mental well-being and many other health benefits among college students according to Liu *et al.* (2022) and hence the urge for greening can be understood. The contribution of green spaces in teaching-learning, attention, and mental health during and post COVID-19 has been profound (Ray *et al*. 2022, Biswas and Sen 2023, Sun *et al.* 2023). A low percentage (8%) showed no interest in greening and an even lower percentage (2%) remained unaffected by sustainable lifestyles and living.

From the mean value (Tables 14 – 20) and hypotheses testing (Tables 7 – 13) it can be seen that all the hypotheses were rejected which indicates that there lies a difference between male and female students regarding their concepts and attitude towards carbon footprint and climate change and from the mean values it can be concluded that the female students have more depth regarding the knowledge and issues of carbon footprint and climate change than the male students.

Conclusion

The study presents an overall survey of student concern, commitment and consciousness of various aspects of the environment which profoundly influence or affect Climate Change. It is heartening to note that the students consider climate change as one of the greatest challenges of this century to the planet and are responsive by taking active measures in their daily lives

and lifestyles to combat it. Climate change education is now in focus globally due to mental health and overall wellness and the student efforts and concern are noteworthy. However, the responses to water management are not satisfactory. Water is a vital resource for life and existence must be judiciously managed, stored, used, replenished and harvested. Water conservation, harvesting, purification, quality assessment and management activities may be encouraged at all levels including academia and community. Students may be guided and mentored to conduct awareness programs, execute plantation drives, plan projects on various aspects of sustainable resource conservation and management, initiate considerable changes in lifestyle patterns and consumption of non-renewable resources and vital support like water etc. There is still a certain percentage of students who seem to be unaware and unaffected by these environmental threats and challenges. It is the necessary duty of the educators and administrators to convince and include them henceforth in all attempts to environmental health and sustainability.

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References

Arnaudova M, Brunner TA, Götze F.(2022) Examination of students' willingness to change behaviour regarding meat consumption. *Meat Sci.*, 184:108695. https://doi.org/10.1016/j.meatsci.2021.108695.

Biswas, R. And Sen, S. (2023)Impact of COVID- 19 Pandemic on Undergraduate Life ScienceTeaching Learning: A Gender- Based Qualitative Student Survey.*Int J Adv Life Sci Res, 6(1) 25-34.* https://doi.org/10.31632/ijalsr.2023.v06i01.004

Biswas, R., & Sen, S. (2020). City Greens, Post Amphan: A Gender-Education-Profession Based Qualitative Survey. *Int J Adv Life Sci Res*, *3*(4), 37-50.*https://doi.org/10.31632/ijalsr.2020v03i04.005*

Dash, D.Pradhan, P. & Kumar, R. (2023). Awareness and Practices of Carbon Footprint Reduction: A Survey among Postgraduate Students. *Current Research Journal of Social Sciences and Humanities,* 6, 122-131. https://doi.org/10.12944/CRJSSH.6.1.10.

Hussaini, M. (2023). Impact of Climate on Student Education and Their Future Development. *International Journal of Integrative Sciences,* 2, 525-534. https://doi.org/10.55927/ijis.v2i4.3951.

Irazusta-Garmendia A, Orpí E, Bach-Faig A, González Svatetz CA. (2023) Food Sustainability Knowledge, Attitudes, and Dietary Habits among Students and Professionals of the Health Sciences. *Nutrients*, 15(9):2064. https://doi.org/10.3390/nu15092064.

Liu W, Sun N, Guo J, Zheng Z. (2022). Campus Green Spaces, Academic Achievement and Mental Health of College Students. *Int J Environ Res Public Health,*19(14):8618. https://doi.org/10.3390/ijerph19148618.

Ma, T., Moore,J. &Cleary,A. (2022). Climate change impacts on the mental health and wellbeing of young people: A scoping review of risk and protective factors.*Social Science & Medicine*,301,114888, https://doi.org/10.1016/j.socscimed.2022.114888.

Mebane, M.E., Benedetti, M., Barni, D.,Francescato, D. (2023). Promoting Climate Change Awareness with High School Students for a Sustainable Community. *Sustainability15(14)*, 11260. https://doi.org/10.3390/su151411260

Mitra, B. &Sen, S.(2016). Towards Awareness of Sustainable Life-Styles: A Comparative Survey Between Urban-Rural Secondary Students. *The Beats of Natural Sciences* 3(2),1-10.

Newberry Le Vay J, Cunningham A, Soul L, Dave H, Hoath L and Lawrance EL (2024) Integrating mental health into climate change education to inspire climate action while safeguarding mental health. *Front. Psychol*. 14, 1298623. https://doi.org/10.3389/fpsyg.2023.1298623

Newsome D, Newsome KB, Miller SA. (2023).Teaching, Learning, and Climate Change: Anticipated Impacts and Mitigation Strategies for Educators. *Behav. Soc*. 12,1–23. https://doi.org/10.1007/s42822-023-00129-2.

Pal, S.&Sen, S. (2017). Gender-Based Awareness Towards Biodiversity And Sustainable Development-A Survey on Rural Students. *Harvest*, *2*(1), 63-74.https://ssrn.com/abstract=3635427

Pinar, R. U., and Taseli, B.K.(2023).Perspective Chapter: Quantifying the Carbon Footprint of a High School: A Three Part Study. Global Warming - A Concerning Component of Climate Change [Working Title], IntechOpen, https://doi.org/10.5772/intechopen.1001883.

Ray, R., Rudra, P., Bhattacharjee, A.K., Chaudhuri, S., Mukherjee, N. and Sen, S.(2022).Teaching-Learning During The Pandemic And After: A Multi-Disciplinary Approach in The Covid 19 Pandemic: Facing the Challenge, Asutosh College Publication Cell, ISBN 978-81-956797-1-3 pp. 15-26.

Sen, S. (2018). Education for Sustainability: Bridging Academia & Society. *Education, Research and Analysis*, *5*(1.3), 70-73.

Sen, S.(2019). Blueprint for Sustainability: Reviewing the Indian Scenario. Lambert Academic Publishing; ISBN 978-620-0-23781-1

Sen, S. (2023).Towards Sustainable Afforestation: Greening an Indian Metropolis.*Indian Forester,* 149(5), 506-512, https://doi.org/10.36808/if/2023/v149i5/168804

Sun N, Liu W, Zheng Z. (2023). Campus outdoor environment, learning engagement, and the mental health of college students during the COVID-19 pandemic: From the perspective of students in different grades. *Front Public Health*,11:1143635. https://doi.org/.3389/fpubh.2023.1143635.

Wang JX, Liu XQ. (2024). Climate change, ambient air pollution, and students' mental health. *World J Psychiatry* 14(2), 204-209 https://doi.org/10.5498/wjp.v14.i2.204