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Sustainable habits among post graduate students in West Bengal: An exploration of categorical variables

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Abstract
This enchanting study sets out to discover the current state of Sustainable Habits among the post graduate students of West Bengal. Using the power of statistical analysis, the aim is to delve into the differences of Sustainable Habits based on gender, domicile status, family type, environmental education, economic status and NSS certificate of the students.
With the help of a descriptive survey method, an online survey was conducted among 132 post graduate students of West Bengal state. The data was then analysed using both descriptive and inferential statistics.
The findings of this delightful study reveal that the mean score of Sustainable Habits among all students is delightfully above moderate (174<212.5378788<232). In addition, the results showcase that there are no significant differences (t<Critical Value) of Sustainable habits with reference to all categorical variables.
Overall, this study is a charming example of the importance of Sustainable Habits, and highlights the wonderful potential of post graduate students in West Bengal to embrace and incorporate them into their lives.

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Keywords: Sustainable Habits, Post Graduate Students, Categorical Variables

Introduction

'Sustainability is about ecology, economy and equity'

French philosopher Jean-Paul Sartre expressed that life is all about B (Birth) to D (Death). In between B and D, C is the alphabet that exist and C means choices (Liao, 2021) [3]. We have no control over B and D but we have 100% control over C. We can consciously make our choices to live more happily as well as secure a healthy world for our future generation. Most of the time, we make wrong choices that negatively affect the environment, society and the economy. We know that the United Nations has set 17 goals to achieve by 2030 that improve health and education, reduce inequality, and spur economic growth (United Nations, 2023) [6]. To achieve these goals, we have to make healthy choices, adopt healthy habits or behaviours. Sustainable habits are actions or behaviors that promote sustainable living and reduce our impact on the environment (UNEP). These habits are centered around using resources responsibly, reducing waste and pollution, and preserving natural resources for future generations. We can practice sustainable habits in all areas of life, from the way we consume energy and food to the products we use and the way we travel. Examples of sustainable habits include reducing energy consumption, using eco-friendly products, reducing water usage, recycling, composting, using public transportation or carpooling, and adopting a plant-based diet. Adopting sustainable habits can have a significant positive impact on the environment and contribute to a more sustainable future for all (Hindustan Times, 2022) [8]. As individuals, we have a responsibility to reduce our environmental footprint, preserve natural resources, and maintain a healthy lifestyle to make the world a better place for future generations.

Background of the study

The world is facing a growing number of environmental challenges, including climate change, resource depletion, and biodiversity loss.

These challenges are caused by a range of factors, including industrialization, overconsumption, and unsustainable practices in agriculture, transportation, and energy production (UNEP, 2022). The negative impacts of these environmental challenges are being felt across the globe, from rising sea levels and extreme weather events to food and water scarcity and public health issues (WHO, 2021).

As a result, there is a growing urgency to adopt sustainable habits and practices that can help reduce our impact on the environment and promote a more sustainable future. Sustainable habits are actions and behaviors that aim to minimize our negative impact on the environment and promote long-term sustainability. These habits include reducing energy consumption, minimizing waste and pollution, supporting local and sustainable businesses, and being mindful of the environmental impact of our food choices (UNDP, 2019) [4].

However, despite the importance of sustainable habits, many individuals and communities struggle to adopt them due to a variety of factors, including lack of knowledge, access, and resources, as well as social norms and cultural beliefs (Dietz et al., 2007) [1]. Therefore, there is a need for research that examines the effectiveness of different strategies for promoting sustainable habits, as well as the barriers and challenges that individuals and communities face in adopting them.

Significance of the study

Sustainability is a critical issue facing the world today, and it is becoming increasingly important for individuals to adopt sustainable habits in order to mitigate the negative impact of human activity on the environment. Postgraduate students are a key group who are in a unique position to make a positive impact on sustainability, as they are often leaders in their respective fields and have the potential to influence others. The findings of this study will be of great significance to educators, policymakers, and researchers interested in promoting sustainable living among postgraduate students. The results of this study will provide insights into the factors that influence sustainable habits among postgraduate students, as well as the challenges associated with promoting sustainable living in this population. This research paper will also contribute to the broader understanding of sustainable living and its impact on society and the environment. Overall, this study will be contributing to a more sustainable future for all.

Operational Definition

Postgraduate: A postgraduate is a student who has successfully completed an undergraduate degree course and is undertaking further study at a higher level in tertiary education. In this study, the researcher defines postgraduate students as those who are officially enrolled in master's level programs pursuing general stream higher education at UGC-recognized universities in West Bengal.

Student: A person who is studying in school, college or university is called a student. In this study, the researcher denotes students as general postgraduate students in university.

Sustainable Habits: According to the United States Environmental Protection Agency (2022, November 14), sustainability is the ability to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations. In this study, sustainable habits refer to curbing people's habits of excessive consumption and promoting recycling in order to protect our social, economic and environmental resources, and to ensure the health and happiness of current and future generations without compromising the health and happiness of others.

Objectives

1. To know present status of Sustainable Habits among Post Graduate Students of West Bengal.
2. To investigate the differences of Sustainable Habits of Post-Graduate Students of West Bengal in terms of their Gender.
3. To measure Sustainable Habits of Post Graduate Students of West Bengal in terms of their Domicile Status.
4. To analyse Sustainable Habits of Post Graduate Students of West Bengal in terms of their Family types.
5. To find out Sustainable Habits of Post Graduate Students of West Bengal in terms of their Environmental Education.
6. To study Sustainable Habits of Post Graduate Students of West Bengal in terms of their Economic Status.
7. To assess Sustainable Habits of Post Graduate Students of West Bengal in terms of their NSS certificate.

Hypotheses

All the hypotheses for this study are stated in null form:

$H_0$1. There is no significant difference of Sustainable Habits of Post Graduate Students of West Bengal in terms of their Gender.

$H_0$2. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their Domicile Status.

$H_0$3. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their Family types.

$H_0$4. There is no significant difference of Sustainable Habits of Post Graduate students of West Bengal in terms of their Environmental Education.

$H_0$5. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their Economic Status.

$H_0$6. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their NSS certificate.

Delimitation of the study

The present study is delimited to post-graduate level students general streams from universities belonging to the state of West Bengal, India.

Variables of the study

Categorical Variables: Gender (Male & Female), Domicile Status (Rural, Semi-Urban & Urban), Family Types (Nuclear & Joint), Environmental Education (Environmentally educated & environmentally non-educated), Economic Status (Annual Income below 3 Lakhs & Annual Income above 3 Lakhs), NSS certificate (Certificate Holder & Non Certificate Holder).

Major Variable: Sustainable Habits.

Methodology

- **Design of the study:** Keeping the nature of the problem

in mind, the study has followed quantitative research design, Descriptive Survey method has been followed to continue the study.

- **Population:** The post graduate students of general steams of West Bengal have considered as population of the study.
- **Sample Size & Sampling Technique:** 132 samples have been collected from different universities of West Bengal through random sampling method.
- **Tools:** Student Information Schedule has been used to collect demographic data and information related categorical variables and Standardised Sustainable Habits Scale (SHS–DSKL) which was developed by Sona Dixit and Laxmi Khandelwal has also used to collect data related to sustainable habits. This scale consists 58 items under three dimensions e.g., Environmental Sustainable Habits, Social Sustainable Habits and Economic Sustainable Habits.
- **Data Collection:** All the data have been collected only from primary source through online survey method by using google form.
- **Data Analysis:** Descriptive statistics like Mean, Median, Mode, Kurtosis, Skewness, Variance, Standard Deviation and Inferential statistics like t-test, ANOVA have been used to analysis all the data by using excel 2019 and SPSS 2023.

Results & Discussions

Normality of Data

In the statistical table below, it is observed that Mean, Median, Mode is likely very close to each-other and the Skewness value -0.106 indicates that the data is relatively symmetrical, with the majority of the scores clustered around the mean. From 0.263 to 0.3 Kurtosis value is assuming normal data, here the kurtosis value 0.378 is very close to the normal value. Thus, Parametric Test have been used to analyse the data.

Table 1: Normality of Data

Statistics on Total Score	
Mean	212.5378788
Median	213
Mode	222
Kurtosis	0.37802442
Skewness	-0.106205107

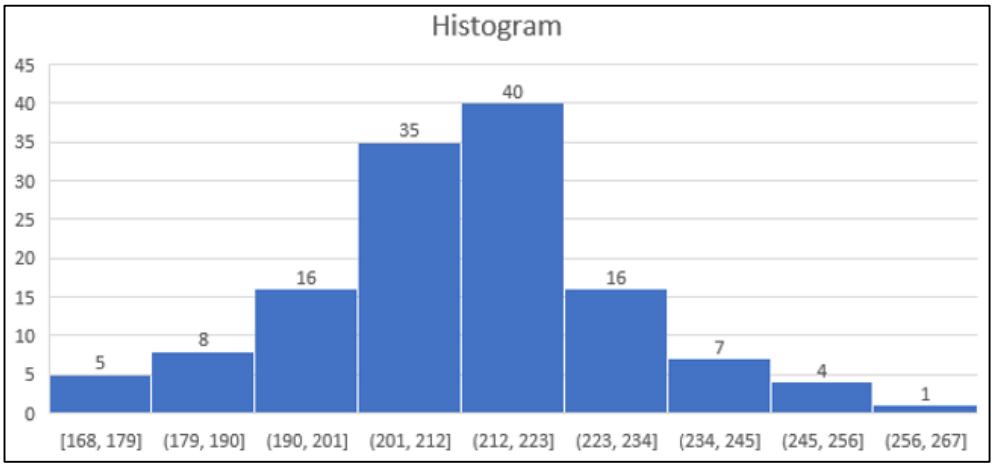

Fig 1

The graphical representation of the data also shows that the distribution although not fully normal but likely to normal.

Sustainable Habits Status

This study used a 5-point scale to collect data, which included a total of 58 items. If a student scores 1 on each item, they will get a total score of 58, and if they score 2, their total score will be 116, and so on. Based on this scoring system, if the mean score of all students is 58, we can say that their level of Sustainable Habits is very poor. If the mean score is 116, we can say that their Sustainable Habits is poor. If the mean score is 174, we can say that their Sustainable Habits is Moderate. If the mean score is 232, we can say that they have good Sustainable Habits, and if the mean score is 290, we can say that their level in terms of Sustainable Habits is very good. The calculation is like: [(58x1=58=Very Poor), (58x2=116=Poor), (58x3=174=Moderate), (58x4=232=Good), (58x5=290=Very Good)].

Table: 2

Descriptive Statistics of Total Score	
Mean	212.5378788
Standard Error	1.446373711
Median	213
Mode	222
Standard Deviation	16.61756879
Sample Variance	276.1435924
Range	89
Minimum	168
Maximum	257
Count	132

So according to the statistics we can say that the overall sustainable status of the P.G students comprising science, social science and language streams of West Bengal is above moderate and very close to the good level.

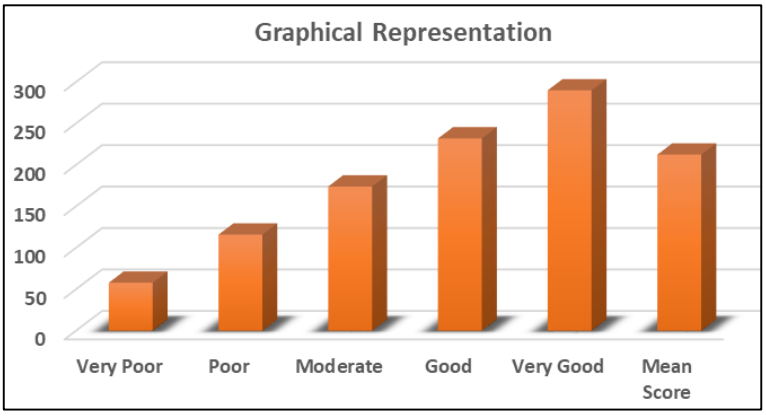

Fig 2: Overall Sustainable Habits Status

Sustainable Habits Status of Male and Female

Now this is the descriptive statistics of Male & Female on their total score separately. There are 72 female students and 60 male students out of 132 samples.

Table 3

Descriptive Statistics of Females			Descriptive Statistics of Males	
Mean	212.4166667		Mean	212.6833333
Standard Error	1.946742996		Standard Error	2.178411237
Median	213.5		Median	212
Mode	222		Mode	212
Standard Deviation	16.51866209		Standard Deviation	16.87390088
Sample Variance	272.8661972		Sample Variance	284.7285311
Range	88		Range	79
Minimum	169		Minimum	168
Maximum	257		Maximum	247
Sum	15294		Sum	12761
Count	72		Count	60

From the above table: 2, we can see that the mean score is almost same of male and female students in terms of their sustainable Habits. Both of them have above moderate level of Sustainable Habits. Maximum score of female student(s) is little bit high than male student(s) but the minimum score is almost same.

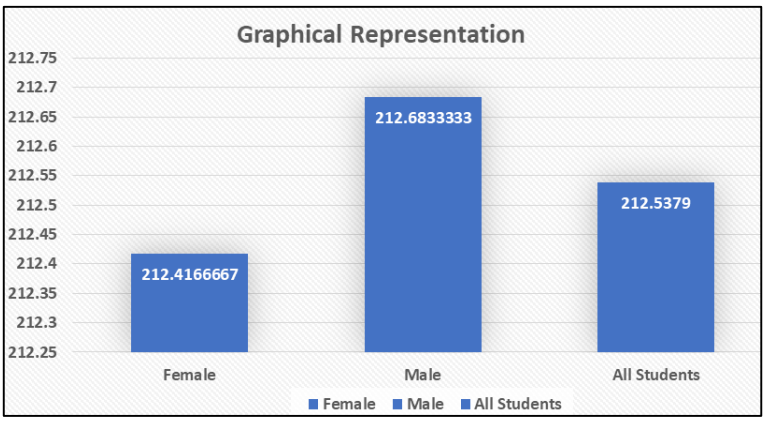

Fig 3: Mean Score of Female & Male Students and all students

Sustainable Habits Status in terms of Domicile Status

In terms of the domicile status, 84 students from rural areas, 23 students from semi-urban areas and 25 students from urban areas out of total 132 samples. We can see from the statistics table that the mean score of semi-urban students is higher than the mean score of rural and urban students. On the other hand, urban students mean score is little higher than the rural students mean score **(semi-urban>urban>rural)**.

Table 4

Rural		Semi-Urban		Urban	
Mean	210.7619048	Mean	217.4347826	Mean	214
Standard Error	1.770269795	Standard Error	3.622408348	Standard Error	3.370459909
Median	212	Median	219	Median	214
Mode	211	Mode	236	Mode	222
Standard Deviation	16.22479068	Standard Deviation	17.37246015	Standard Deviation	16.85229955
Sample Variance	263.2438325	Sample Variance	301.8023715	Sample Variance	284
Range	82	Range	72	Range	66
Minimum	168	Minimum	185	Minimum	182
Maximum	250	Maximum	257	Maximum	248
Count	84	Count	23	Count	25

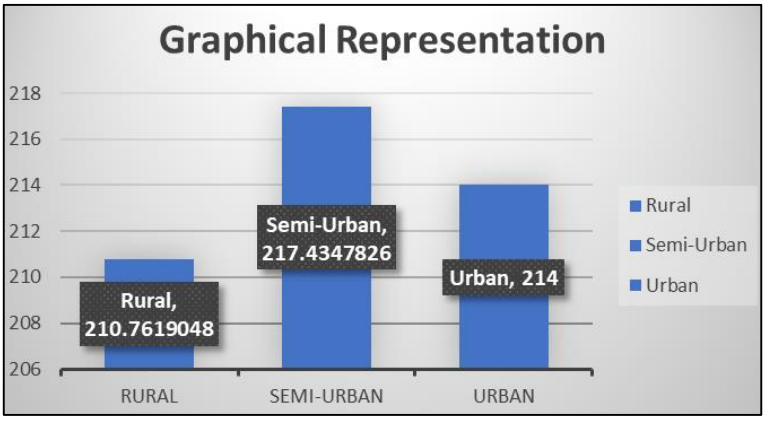

Fig 4: Mean score in terms of Domicile Status

Sustainable Habits Status related to Family Types

The descriptive statistics on the family types has showed that the mean is almost same for Nuclear and Joint Family. Range of Nuclear Family is higher than the range of Joint Family, but it is natural as the sample size of Nuclear Family is larger than the Joint Family.

Table 5

Nuclear Family		**Joint Family**	
Mean	212.3545455	Mean	213.4545455
Standard Error	1.537281287	Standard Error	4.113501827
Median	213	Median	210.5
Mode	222	Mode	187
Standard Deviation	16.12314216	Standard Deviation	19.2940338
Sample Variance	259.9557131	Sample Variance	372.2597403
Range	89	Range	65
Minimum	168	Minimum	185
Maximum	257	Maximum	250
Count	110	Count	22

Sustainable Habits Status in terms of Environmental Education

Descriptive statistics of table no. 5 has expressed that Environmentally Educated students have slightly higher mean score than Environmentally Non-Educated students and all others statistics values are also slightly mismatch, otherwise more or less same. 40 students have environment course or project or programme and 92 students have never done any course like this out 132 students.

Table: 6

Environmentally Educated		**Environmentally Non-Educated**	
Mean	213.425	Mean	212.1521739
Standard Error	3.034816663	Standard Error	1.612254106
Median	214	Median	212.5
Mode	222	Mode	213
Standard Deviation	19.19386587	Standard Deviation	15.46419813
Sample Variance	368.4044872	Sample Variance	239.1414238
Range	88	Range	79
Minimum	169	Minimum	168
Maximum	257	Maximum	247
Count	40	Count	92

Sustainable Habits Status with reference to Economic Status

Economic Status of the students have been categorised in two categories Annual Income Below 3 Lakhs and Annual Income Above 3 Lakhs. 106 responses are found from 1st category and 26 responses have been found from 2nd category. The mean of 1st category is higher than the mean score of 2nd category expresses that lower income indicates the lower Sustainable Habits mean score and Higher Income has higher level of mean score.

Table: 7

Annual Income Below 3 Lakhs			Annual Income Above 3 Lakhs	
Mean	210.8490566		Mean	219.423077
Standard Error	1.480923466		Standard Error	3.96724011
Median	212		Median	222.5
Mode	222		Mode	218
Standard Deviation	15.24704028		Standard Deviation	20.2290347
Sample Variance	232.4722372		Sample Variance	409.213846
Range	89		Range	74
Minimum	168		Minimum	176
Maximum	257		Maximum	250
Count	106		Count	26

In a graphical representation of mean scores for two categories of Economic Status, it was shown that students with a family income of below 3 lakhs secured lower mean score than students with a family income above 3 lakhs. This means that on average, students from higher-income families performed slightly better than those from lower-income families in term of Sustainable Habits.

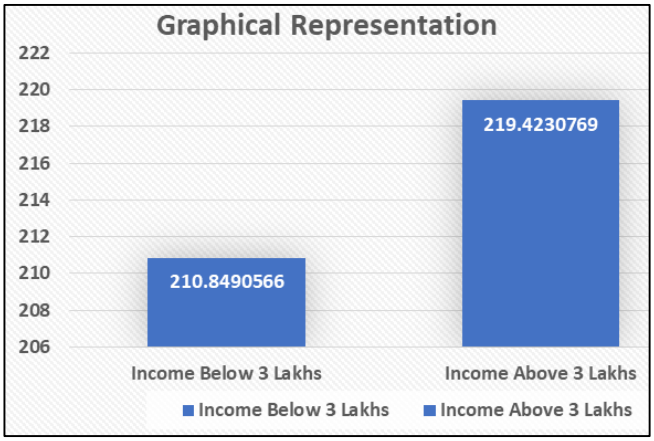

Fig 5: Mean Score of Sustainable Habits on the Bases of Economic Status

Sustainable Habits Status of NSS Certificate Holder & Non-Holder

There is a slightly difference on mean score between NSS certificate holder and non-holder we have seen from the descriptive statistics' table. NSS certificate holders mean score is slightly lower than the Non NSS certificate holder on their Sustainable Habits. Although total samples count of NSS certificate holders is only 17 and on the opposite side non-certificate holders sample count is 115. Median of both the categories are almost same.

Table 8

NSS certificate holder			Non NSS certificate holder	
Mean	208.4117647		Mean	213.1478261
Standard Error	4.649524662		Standard Error	1.511776476
Median	210		Median	213
Mode	203		Mode	222
Standard Deviation	19.17048129		Standard Deviation	16.21199658
Sample Variance	367.5073529		Sample Variance	262.828833
Range	79		Range	89
Minimum	169		Minimum	168
Maximum	248		Maximum	257
Count	17		Count	115

Hypotheses Testing

$H_0$1. There is no significant difference of Sustainable Habits of Post Graduate Students of West Bengal in terms of their Gender.

Based on the given t-test results, it appears that there is no significant difference in Sustainable Habits between male and female postgraduate students in West Bengal. The calculated t-value of -0.0913 is smaller than the critical value of 1.9791

at a 0.05 significance level for 125 df, leading us to accept the null hypothesis. Therefore, we can conclude that gender does not seem to have a significant impact on Sustainable Habits among postgraduate students in West Bengal.

Table 9

t-Test: Two-Sample Assuming Unequal Variances		
	Female	Male
Mean	212.4166667	212.6833
Variance	272.8661972	284.7285
Observations	72	60
Hypothesized Mean Difference	0	
df	125	
t Stat	-0.091276662	
t Critical two-tail	1.979124109	

$H_0$2. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their Domicile Status.

Based on the ANOVA results, we can conclude that there is no significant difference in Sustainable Habits scores among postgraduate students in West Bengal based on their Domicile Status, which includes three levels: Rural, Semi-Urban, and Urban.

Table 10

One-way ANOVA					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	869.920	2	434.960	1.589	.208
Within Groups	35304.890	129	273.681		
Total	36174.811	131			

The F-value of 1.589 and the p-value of 0.208 indicate that the observed differences in means between the groups based on Domicile Status are not large enough to reject the null hypothesis. Therefore, we can conclude that Domicile Status, whether Rural, Semi-Urban, or Urban, does not significantly affect Sustainable Habits scores among postgraduate students in West Bengal.

$H_0$3. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their Family types.

The t-test results suggest that there is no significant difference in Sustainable Habits scores among postgraduate students in West Bengal based on their Family types, which include Nuclear Family and Joint Family.

Table 11

t-Test: Two-Sample Assuming Unequal Variances		
	Nuclear Family	Joint Family
Mean	212.3545	213.4545
Variance	259.9557	372.2597
Observations	110	22
Hypothesized Mean Difference	0	
df	27	
t Stat	-0.25049	
t Critical two-tail	2.051831	

The calculated t-value of -0.25049 is less than the critical t-value of 2.051831 at a 0.05 significance level, indicating that the difference in means between the two groups based on Family types is not statistically significant. Therefore, we can conclude that there is no significant difference in Sustainable Habits scores among postgraduate students in West Bengal based on whether they come from a Nuclear Family or a Joint Family.

$H_0$4. There is no significant difference of Sustainable Habits of Post Graduate students of West Bengal in terms of their Environmental Education.

Table 12

t-Test: Two-Sample Assuming Unequal Variances		
	Environmentally Educated	Environmentally Non- Educated
Mean	213.425	212.1522
Variance	368.4045	239.1414
Observations	40	92
Hypothesized Mean Difference	0	
df	62	
t Stat	0.370385	
t Critical two-tail	1.998972	

The calculated t-value of 0.370385 is much smaller than the critical t-value of 1.998972 at a 0.05 significance level, which suggests that the observed difference in means between the two groups is not significant. Therefore, we can infer that there is no significant relationship between Environmental Education and Sustainable Habits scores among postgraduate students in West Bengal.

$H_0$5. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their economic status.

Table 13

t-Test: Two-Sample Assuming Unequal Variances		
	Annual Income Below 3 Lakhs	**Annual Income Above 3 Lakh**
Mean	210.8490566	219.4230769
Variance	232.4722372	409.2138462
Observations	106	26
Hypothesized Mean Difference	0	
df	32	
t Stat	-2.024736857	
t Critical two-tail	2.036933343	

From the observed t-test table it can be stated that there is no significant difference of sustainable habits in terms of post graduate students' economic status at 0.05 level of significance as critical value is very higher than the calculated value (2.036933343>-2.024736857).

$H_0$6. There is no significant difference of Sustainable Habits of Post Graduate Students in West Bengal with reference to their NSS certificate.

This study aimed to investigate whether there is a significant difference in sustainable habits among postgraduate students in West Bengal based on their NSS certificate status. Our analysis, which used a t-Test assuming unequal variances, found that there was no statistically significant difference between the mean sustainable habits score for certificate holders (208.4118) and non-certificate holders (213.1478261).

Table 14

t-Test: Two-Sample Assuming Unequal Variances		
	Certificate Holder	**Non-Certificate Holder**
Mean	208.4118	213.1478261
Variance	367.5074	262.828833
Observations	17	115
Hypothesized Mean Difference	0	
df	20	
t Stat	-0.96869	
t Critical two-tail	2.085963	

Therefore, it can be concluded that holding an NSS certificate does not seem to have a significant impact on sustainable habits among postgraduate students in West Bengal. This finding challenges the common assumption that NSS certificate holders are more likely to engage in sustainable behaviors. Further research could explore other factors that may influence sustainable habits in this population, such as education level or socio-economic status.

Conclusion

Present study aimed to explore the current state of Sustainable Habits among post graduate students of West Bengal and to analyze the differences based on various categorical variables. The findings of this study indicate that the mean score of Sustainable Habits among all students is above moderate, highlighting their potential to embrace sustainable habits. Moreover, the results revealed no significant differences in Sustainable Habits with reference to all categorical variables. These results emphasize the need for promoting sustainable habits among all individuals, regardless of their demographic characteristics, to create a more sustainable and equitable future. Overall, this study contributes to the growing body of research on sustainable living and highlights the role of post graduate students in adopting and promoting sustainable habits.

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