Lose Your Belly, Feed Your Brain: A Correlational Study on Food Habits and Academic Achievements of Secondary Level Students

Nasir Uddin[1], Kaustuv Bhattacharyya[2]

[1]Assistant Professor; Education College, Murshidabad, West Bengal -742406, India.
[2]Assistant Professor (Stage 3); Life Science Laboratory, Department of Teacher Education, Baba Saheb Ambedkar Education University [erstwhile David Hare Training College],25/3 Ballygunge Circular Road, Kolkata, West Bengal – 700019, India.

Abstract

Purpose

The purpose of this study was to find out the nature of the association between Food Habits and Academic Achievements of Secondary level students from the Baranagar Municipality in the state of West Bengal, India.

Method

The investigators used a correlational method for this study. A cross-sectional survey of a sample of 404 Secondary level students was done. Different types of statistical techniques (like- t-tests, ANOVA, Pearson's correlation, and Simple Linear Regression analysis) were subsequently used for necessary inferences from the data analyses.

Results

At 0.05 level of significance, a statistically significant difference was found between male and female Secondary levels students' food habits while no statistically significant difference was found between the groups' academic achievements. However, statistically significant differences were found among the male and female students with respect to the sub-categories of their food habits and also with respect to the sub-categories of their academic achievements. However, an overall highly positive association between food habits and the academic achievements of those Secondary level students was found where the values of the Pearson's correlation had been 0.792 and R^2 had been 0.63. Hence, from this study, it has also been found that a variation in Food Habits of the Secondary level students as an independent variable can explain collectively about 63% of variations in Academic Achievements of the same group of students as a dependent variable.

Conclusion

Food is human's one of the basic needs. It is one of the most important factors for students' Academic Achievement also at the Secondary level as at this stage, adolescent students grow and develop rapidly. For everyone, food-taking is important but overmuch food-taking is also a cause for poor academic achievements.

Introduction

"Education and food have become the means of controlling man".

-JidduKrishnamurti

Food is one of the most important basic human needs (Chikwere, 2019). In our daily life, food is the basic source of all energy and is also important for our daily living (Usha & Deepika, 2016). However, there exists a huge variation in the food habits of human beings. Hence, food and food consumption-related habits are very important for our overall fulfillment. It affects physical health, mental health (psychological well-being, mental processes, etc.), educational activities, and, also the activities of our daily living. Now, education is the pillar of nation-building and also the development of self. It is a constitutional right for everyone. However, an education system is effective only when students achieve the pre-determined objectives of a specific discipline, learn some new skills, etc. Those specific objectives were measured by teachers after specific periods by adopting different evaluation techniques.

Food habit is a significant factor related to student's cognitive and academic achievement or performance (Alqahtani et al., 2020). Food habits of Secondary level students depend on their family's socioeconomic status and sometimes also on their religious beliefs, ethics, family-nutritional practices, environmental conditions, doctors' suggestions, etc. (Ishaq et al., 2020, Vivek, 2018, Taha & Rashed, 2017, Wijtzes et al., 2015).

Based on these factors, for this study, the investigators categorised the food habits of Secondary level students into two broad categories - vegetarian and non-vegetarian (as referred by Vivek, 2018). In normal day-to-day life, foods are taken in three phases only - breakfast in the morning, lunch at noon, and dinner at night. Sometimes in between lunch and dinner, snacks in the evening are also consumed (Usha & Deepika, 2016). As already mentioned, food habit influences different activities, like- mental health, academic achievements, and mental processes (e.g., thinking, problem-solving, motivation, emotions, etc.). For students who take proper food or whose food habit is appropriate, their academic achievements are better and are normally found to be more focused than those who do not take or, cannot take proper food or whose food habits are not appropriate (Cristuta et al., 2019).

Operational definition of the key terms
A. Food Habits

The term 'food habit' here means the pattern through which individuals consume food that is necessary for their daily living. During the day, morning to night we eat different types of foods, vegetables, milk, fruits, seeds, rice, junk foods, etc. This various type of food-taking practice is called food habit. u
Human beings eat three meals a day to live healthily. These are better known as breakfast, lunch, and dinner. Breakfast is widely acknowledged to be the most important meal of the day (Adolphus et al., 2013). In the morning, regular breakfast taking is a healthy food habit. At the start of the day, breakfast gives us sufficient energy, power, and motivation to work well in every place. There is evidence that breakfast positively affects learning in children in terms of behaviour, cognitive, and school performance (Hoyland et al., 2009). After that, at noon we take lunch. In India, after the implementation of Sarva Shiksha Abhiyan or SSA (2000-2001), a mid-day meal is mandatory for all students of elementary level

(classes I - VIII) in government or government-aided schools in West Bengal, India. In the Secondary section (classes IX - X), all students are expected to bring their own food for their lunch in the school. After that, students take their dinner at night. However, they may eat snacks several times during these three periods. In addition, we can easily classify two types of food habits, namely- vegetarian and non-vegetarian.

Eating a healthy diet helps the brain by providing the necessary vitamins and minerals that are needed to function well (Uwannah and Lotachi, 2018). Good eating habits not only promote physical well-being but academic health as well (Naillon, 2007).

B. Academic Achievement

Academic achievement/academic performance refers to the results of students after the completion of a particular class. In other words, academic achievement is a measurable and observable behaviour of students in a particular situation and it is a combination of curricular and co-curricular activities. Students' academic achievement is assessed through different types of examinations. Principal methods used to evaluate students' academic achievements at present are formative, summative, or continuous evaluations.

In other words, Academic achievement refers to a student's success in meeting short or long-term goals in education. In the larger picture, academic achievement means completing high school or earning a college degree (Usha and Deepika, 2016). In unit tests or year-end final examinations, good results mean a student is a good academic achiever.

C. Secondary Level Students

The secondary level is a part of the adolescent period of human development. The elementary level is the first level of the formal education system. After completing elementary education students enrolled in the secondary level. The second level of the formal education system is the secondary level. The age of the students at this level is 15-16 years and the class is IX and X. Secondary education is compulsory all over the world including in India. Indian Education Commission (1964-66) spoke of this level of education. Secondary education means education about class IX and class X and such other classes as may be declared by the Government to be classes for Secondary Education. In other words, Secondary education means formal education (other than technical education, training for teachers, or further education) suitable for persons who have completed a course of primary/elementary education. As per the National Education Policy, 2020 - Secondary education is the last part of the school education system where the duration of education is 4 years (IX-XII). It is an integrated system.

Reviews of related literature

Related literature reviewed for this study is mentioned below:

A. Food Habits and Academic Achievement

Lopez-Gil et al. (2022) found a positive correlation between food habits and academic achievement. Their findings suggest that adolescents who intake more vegetables and those who consume fewer sweets or soft drinks achieve greater academic excellence. Regular breakfast and dinner taking is a good habit and it is highly correlated to their academic achievement. All these conclusions are based on adolescent students. Alqahtani et al. (2020), reported a moderate correlation is there between food habits

and academic achievements. As opined by the aforementioned authors, all the students, who consistently intake their breakfasts, received better academic achievements compared to the inconsistent ones. Besides, the study of Kristo et al.(2020) concludes with the identification that there is a positive association between the food habits of adolescents and their success rates at the school level. Peter et al. (2020) claimed that healthy food habits usually have a positive effect on students' academic performance. However, other parts, such as sleep habits, may also hold relevant significance in the academic development and achievements of learners. On the other hand, Chikwere (2019) opined that food habits have a positive association with students' academic achievements in various subjects at the school level. Similar to this context, Burrowa et al. (2017) have also enunciated that in most cases, there is a positive correlation between food habits and academic achievements among college and university-level students as well. Furthermore, Usha and Deepika (2016) have articulated that food habit has a positive correlation with academic achievement, while Acham et al. (2012) have stated that there is a clear connection observed between the consumption of regular meals and children's academic achievements.

B. Food Habits, Academic Achievement, and Gender

Lopez-Gil et al. (2022) conducted a cross-sectional study in this area among boys and girls and found that those with good food habits also have better academic achievements. Uwannah and Lotachi (2018) mentioned that gender-based food habits have a significant impact on students' academic achievement, especially those female students who do not take breakfast have less educational skills compared to their male counterparts. Besides, while focusing on the variable of awareness, the study of Usha and Deepika (2016) establishes the fact that female students are more conscious of their food habits than male students. As a result, in most cases, female students are more advanced in attaining necessary academic progress and achievements than their male counterparts.

Objectives

Based on the relevant literature review cited before, the followings were the objectives of this study:

Objective 1: To study the Food Habits of the Secondary-level students of the Baranagar Municipality in West Bengal, India with reference to their genders.

Objective 2: To study the Academic achievements of the Secondary-level students of the Baranagar Municipality in West Bengal, India with reference to their genders.

Objective 3: To study the different subcategories of Food Habits of Secondary-level students of the Baranagar Municipality in West Bengal, India with reference to their genders.

Objective 4: To study the different subcategories of Academic Achievement of Secondary-levelstudents of the Baranagar Municipality in West Bengal, India with reference to their genders.

Objective 5: To study the nature of the association between Food habits and Academic Achievements of the Secondary-level students of the Baranagar Municipality in West Bengal, India

Hypotheses

Based on the stated objectives, the hypotheses that have been tested in this study are mentioned below:

$H_0$1: There is no statistically significant difference between Male and Female Secondary level students with respect to their Food habits.

$H_0$2: There is no statistically significant difference between Male and Female Secondary level students with respect to their Academic achievements.

$H_0$3: There is no statistically significant difference among different Subcategories of Food Habits ofSecondary level students with respect to their Gender.

$H_0$4: There is no statistically significant difference among different subcategories of Academic Achievements of Secondary level students with respect to their Gender.

$H_0$5: There is no statistically significant association between Secondary level students' Food habits and their Academic achievements.

Design

The present study was done through a correlational research design with the help of a cross-sectional survey.

Variables

In this study, the investigators mainly focused on two types of variables. Those two variables were the major variable and categorical variable.

A. Major variable

Here two types of major variables had been considered - Independent Variable and Dependent Variable.

(I) Independent Variable (IV): Food Habits (FH) of the Secondary level students of the Baranagar Municipality in West Bengal, India was considered as the Independent variable with its two levels - Better Food Habits (BFH) and Poor Food Habits (PFH) – as defined (discussed later) by the investigators.

(II) Dependent Variable (DV): Academic Achievement (AA) of the Secondary level students of the Baranagar Municipality in West Bengal, India was considered as the dependent variable with its two levels - Above Average Academic Achievement (AAAA) and Below Average Academic Achievement (BAAA) as defined (discussed later) by the investigators.

B. Categorical variable

Here, the gender of Secondary-level students of the Baranagar Municipality in West Bengal, India was only considered as the single type of categorical variable with two levels - Male and Female.

Sample and sampling technique

In this study, the researchers used a stratified random sampling technique (Creswell, 2012)for the selection of the sample elements.

I. Schools

In the Barahanagr Municipality area, 28 Government and/or Government aided Secondary or Higher Secondary schools were situated during the period of January to June 2022 when the data were collected for this study. All of these schools were under the West Bengal Board of Secondary Education (WBSE) and/or the West Bengal Council of Higher Secondary Education (WBCHSE). For this research, out of those 28 schools, only a total of 8 schools [vide *Figure 1*] were finally selected by using the lottery

method as a type of random sampling technique after sequentially numbering the schools from 01 to 28 arbitrarily.
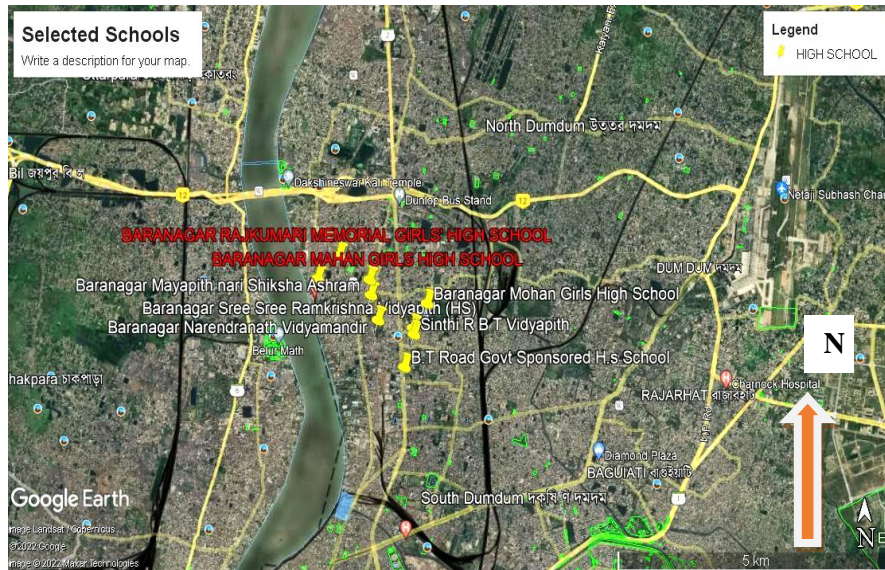

Figure 1: Selected schools of the Baranagar Municipality in West Bengal, India
[Source: Google Earth Pro, 2022 (edited by the investigators)]

II. Gender

After the completion of the selection of the 8 schools as mentioned before, a total of 404 Secondary level students of Class/Grade IX were selected as a sample by the researchers. Out of those 404 sample elements, 204 Male students (50.50 %) and 200 Female students (49.50%) were randomly sampled being independent to each other. In Table 1 the sample frame regarding the genders of the surveyed Secondary level students has been presented while the same is diagrammatically presented in *Figure 2*.

Table 1: Sample frame for the Genders of the surveyed Secondary-level students

| Categorical variable: Gender Levels	Numbers of Sample elements	Percentage	Total Sample
Male Secondary level students surveyed	204	50.50	404
Female Secondary level students surveyed	200	49.50	
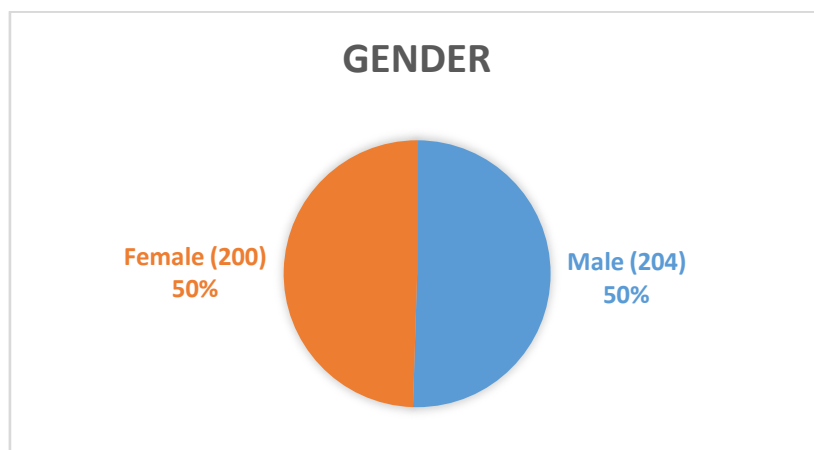
Figure 2: Pie chart of total Male and Female sample elements

III. Academic achievement (AA)

A total of 404 Secondary level students' (who were studying in Class/Grade IX during the course of data collection) data, on their academic achievements in their last Summative Evaluations, were collected and subsequently grouped into two different parts. The first group was with Above Average Academic Achievement (AAAA) with more than 74.82 scores and the second group was Below Average Academic Achievement (BAAA) with less than 74.82 scores as that (i.e., 74.82) was the Average score obtained regarding Academic Achievements of the surveyed Secondary level students. Out of the 404 Secondary level students surveyed, 217 students (53.71%) were found to have Above Average Academic Achievements (i.e., AAAA) while 187 students (46.28%) were found to have Below Average Academic Achievements (i.e., BAAA). In Table 2, the relevant sample frame regarding the academic achievements of the surveyed Secondary level students has been presented while the same is diagrammatically presented in *Figure 3*.

Table 2:Sample frame for the Academic Achievements of the surveyed Secondary level Students

Academic achievements (Average = 74.82)				
Numerical values	**Above Average (AA)**		**Below Average (BA)**	**Total**
Counts	217 [53.71%]		187 [46.28%]	
	Male	**Female**	**Male**	**Female**	404
	113 [28%]	104 [26%]	91 [22%]	96 [24%]	
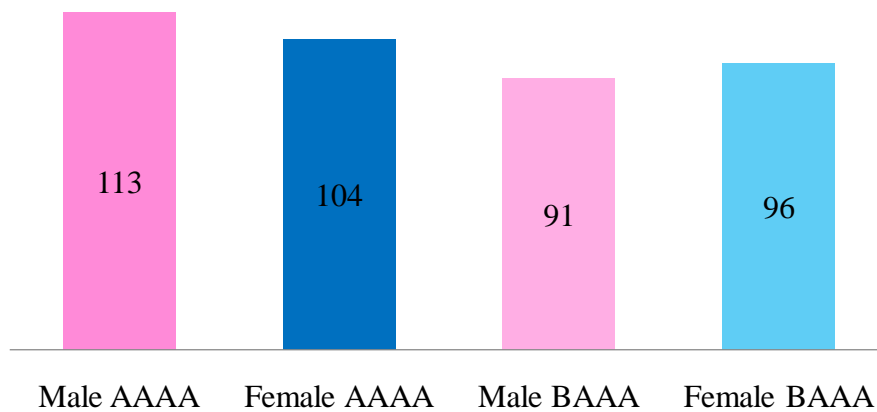
Figure 3: Bar diagram of Academic Achievements (Above - and Below Average)of surveyed Secondary level students

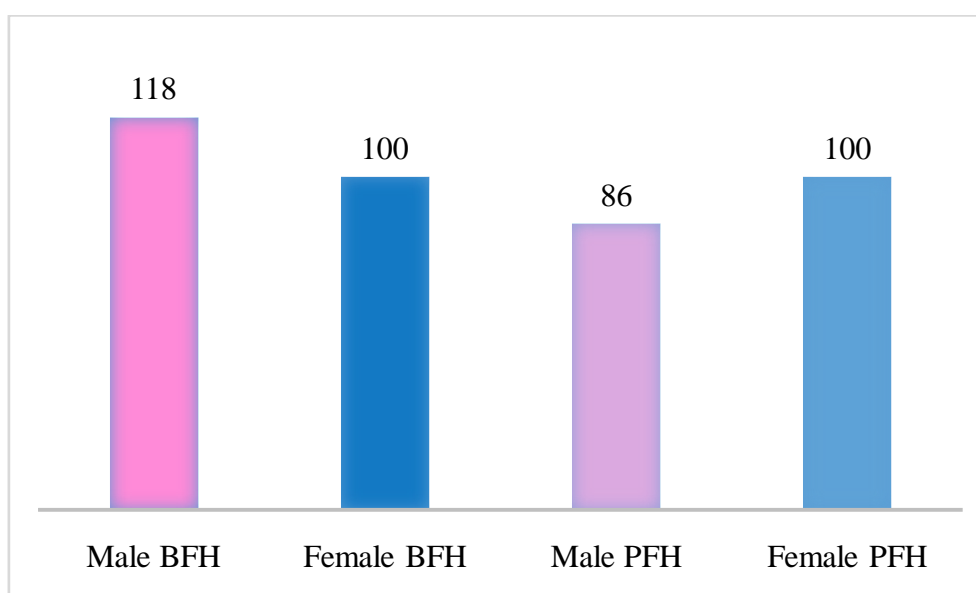## IV. Food habits (FH)

A totalof 404 students' data on their normal food habits were collected and subsequently grouped into two different cohorts i.e., Secondary level students with Better Food Habits (BFH) and Secondary level students with Poor Food Habits (PFH) depending on a cut-off score of 73.15 on the Food Habit scale [adopted and modified version of Johnson, Wardle, and Griffith (2002)20 as pre-fixed by the investigators as that (i.e., 73.15) was the Average score obtained from the surveyed Secondary level students. Out of the 404 Secondary level students surveyed, 218 students (53.96%) were found to have Better Food Habits while 186 students (46.04%) were found to have Poor Food Habits. In Table 3, the

relevant sample frame regarding the food habits of the surveyed Secondary level students has been presented while the same is diagrammatically presented in *Figure 4*.

Table 3: Sample frame for the Food Habits of the surveyed Secondary level students

Food Habits (Average score = 73.15)				
Numerical values	**Better Food Habits (BFH)**		**Poor Food Habits (PFH)**		**Total**
Counts	218 [53.96%]		186 [46.04%]		404
	Male	**Female**	**Male**	**Female**	
	118 [29%]	100 [25%]	86 [21%]	100 [25%]	

Figure 4: Bar diagram of Food Habits (Better and Poor Food Habits) of surveyed Secondary level students

Tools

(I) In this study, the "ADOLESCENT FOOD HABITS CHECKLIST" (AFHC) by Johnson, Wardle, and Griffith (2002) was used. Considering the local situation at the study site, the researchers modified and translated the original AFHC into the Bengali language (i.e., 'বাংলা') from English as per the suggestions provided by some language experts who were consulted by the investigators.

(II) As already mentioned, for measuring the Academic achievements of the Secondary level students, the researchers used the marks of the last summative evaluation of the students assuming the standards of the Summative Achievement Tests across the surveyed schools to be identical.

Software used

All collected data had been tabulated in Microsoft-2007 and were subsequently analysed in both Microsoft-2007 and IBM SPSS 23 versions, as per requirements

Data Analysis and Interpretations

(I) Test of Ho1:

Table 4: Descriptive statistics regarding Gender-wise Food Habits (FH)

Gender-wise Food Habits	Levels	N	Mean	Std. Deviation	Std. Error Mean
	Male	204	73.84	6.66	0.47
	Female	200	72.45	7.35	0.52

It is observed from Table 4 that there exists a difference in the mean scores between male students' Food Habits (73.84) and female students' Food Habits (72.45). To determine whether between these two means - any statistically significant difference exists or not, the investigators used a t-test: Two samples assuming unequal variance. The result is presented in *Table 5*.

Table 5: t-test: Two samples assuming unequal variance for Gender-wise Food Habit (FH) scores

	Male Food Habit scores	Female Food Habit scores
Mean	73.84	72.45
Variance	44.12	53.97
df	402	
t Stat	1.99	
t Critical two-tail	1.96	

Interpretations:

The result of Table 5 shows that in case of the t-test: Two samples assuming unequal variance of Male and Female Secondary level students surveyed independently, the Variance value is 44.12 and 53.97. Table 5 also shows that in the case of Secondary level students' Food Habits between Male and Female students, the calculated t Stat is 1.99 and the t-Critical value (df 402) is 1.96. Hence, at a 0.05 level of significance, H01 is rejected, because the calculated t value (1.99) is greater than the t-critical value (1.96). So, it can be inferred that there is a statistically significant difference at the 0.05 level of significance in the mean scores of Food Habits between male and female Secondary level students surveyed from the study site.

(II) Test of Ho2:

Table 6: Descriptive Statistics Regarding Gender-wise Academic Achievements (AA)

Gender-wise Academic Achievements	Levels	N	Mean	Std. Deviation	Std. Error Mean
	Male	204	74.77	12.76	0.89
	Female	200	74.73	12.28	0.87

It is observed from Table 6 that there exists no difference in the mean scores between male students' Academic Achievements (74.77) and female students' Food Habits (74.73). To determine whether between these two means - any statistically significant difference exists or not, the investigators used a t-test: Two samples assuming unequal variance. The result is presented in *Table 7*.

Table 7: t-test: Two samples assuming unequal variance for Gender wise Academic Achievement (AA) scores

	Male Academic Achievement scores	Female Academic Achievement scores
Mean	74.77	74.73
Variance	162.86	150.79
df	402	
t Stat	0.03	
t Critical two-tail	1.96	

Interpretations:

The result of *Table 7* shows that in the case of the t-test: Two samples assuming unequal variance of Male and Female Secondary-level students surveyed independently, the Variance value is 162.86 and 150.79. Table 7 also shows that in the case of Secondary level students' Academic Achievements between Male and Female students, the calculated t Stat is 0.03 and the t-Critical value (df 402) is 1.96. Hence, at a 0.05 level of significance, H02 is not rejected, because the calculated t-value (0.03) is smaller than the t-Critical value (1.96). So, it can be inferred that there is no statistically significant difference at the 0.05 level of significance in the mean scores of Academic Achievements between male and female Secondary level students surveyed from the study site.

(III) Test of Ho3:

Table 8: Descriptive statistics regarding Gender-wise Better Food Habits (BFH) scores and Poor Food Habits (FPH) scores

Descriptive Statistics	Better Food Habits (BFH)		Poor Food Habits (PFH)	
	Male	**Female**	**Male**	**Female**
N	118	100	86	100
Mean	78.38	78.4	67.60	66.5
Std. Deviation	3.86	3.87	4.18	4.69
Std. Error Mean	0.35	0.37	0.45	0.47

It is observed from *Table 8* that there exists no difference in the mean scores between male students' Better Food Habits (BFH) 78.38, female students' Better Food Habits (BFH) 78.4, while there exists a difference in the mean scores between male students' Poor Food Habits (PFH) 67.60, and female students' Poor Food Habits (PFH) 66.5. To determine whether among these four means - any statistically significant difference exists or not, the investigators used ANOVA: Single Factor as the inferential statistics. The result is presented in *Table 9*.

Table 9: One-way ANOVA for Gender-wise Better Food Habits (BFH)and Poor Food Habits (PFH)

Source of Variation	SS	df	F	F critical value
Between Groups	13052.39	3	252.60	2.63
Within Groups	6889.40	400		
Total	19941.79	403		

Interpretations:

It is observed from *Table 9* that the Between-group variance is 13052.39 and df is 3, and the Within-group variance is 6889.40 and df is 400. Therefore, the total variance is 19941.79 and df is 403. It is also observed that the calculated F-value is 252.60 and F critical value is 2.63. Therefore, the null hypothesis is rejected at a 0.05 level of significance. Now, as *Table 9* shows the F value (252.60) is greater than the F critical value (2.63). So it can be inferred that there is a statistically significant difference among male students' Better Food Habits (BFH), female students' Better Food Habits (BFH), male students' Poor Food Habits (PFH), and female students' Poor Food Habits (PFH).

(IV) Test of Ho4:

Table 10: Descriptive statistics regarding Gender-wise Above Average Academic Achievement (AAAA) scores and Below Average Academic Achievement (BAAA) scores

Descriptive Statistics	Above Average Academic Achievement (AAAA) scores		Below Average Academic Achievement (BAAA) scores	
	Male	Female	Male	Female
N	113	104	91	96
Mean	84.33	84.29	62.90	64.37
Std. Deviation	6.44	6.49	7.66	7.86
Std. Error Mean	0.60	0.64	0.80	0.80

It is observed from *Table 10* that there exists no difference in the mean scores between male students' Above Average Academic Achievement (AAAA) 84.33, female students' Above Average Academic Achievement (AAAA) 84.29, while there exists a difference in the mean scores between male students' Below Average Academic Achievement (BAAA) 62.90, and female students' Below Average Academic Achievement (BAAA) 64.37. To determine whether among these four means - any statistically significant difference exists or not, the investigators used ANOVA: Single Factor as the inferential statistics. The result is presented in *Table 11*.

Table 11: One-way ANOVA for Gender wise Above Average Academic Achievement (AAAA) and Below Average Academic Achievement (BAAA)

Source of Variation	SS	df	F	F-crit
Between Groups	42936.91	3	284.36	2.63
Within Groups	20132.84	400		
Total	63069.75	403		

Interpretations:

It is observed from *Table 11* that the Between-group variance is 42936.91 and df is 3, the Within-group variance is 20132.84 and df is 400, and the total variance is 63069.75 and df is 403. It is also observed that the calculated F-value is 284.36 and F critical value is 2.63. *Table 11* shows that the F value (284.36) is greater than the F critical value (2.63). Therefore, the null hypothesis is rejected at a 0.05 level of significance. So it can be inferred that there is a statistically significant difference among male students' Above Average Academic Achievement (AAAA), female students' Above Average Academic Achievement (AAAA), male students' Below Average Academic Achievement (BAAA), and female students' Below Average Academic Achievement (BAAA).

(V) Test of Ho5:

Table 12: Pearson's Product Moment correlation between Food Habit scores (FH) and Academic Achievement scores (AA) of the Secondary level students
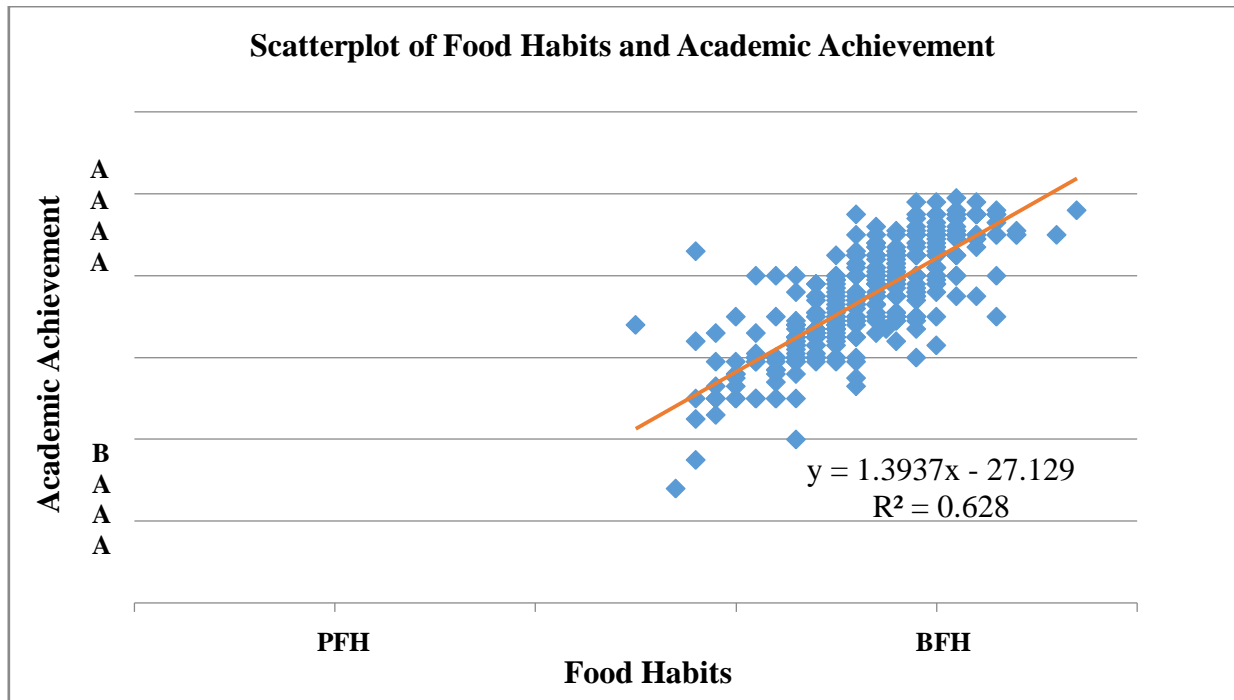
		A. Achievement	F. Habit
A. Achievement	Pearson Correlation	1	.792**
	Sig. (2-tailed)		.000
	N	404	404
F. Habit	Pearson Correlation	.792**	1
	Sig. (2-tailed)	.000	
	N	404	404

** = Correlation is significant at the 0.01 level (2-tailed).

Interpretations:

It is observed from *Table 12* that the total N is 404. The correlation between Food Habits (FH) and Academic Achievement (AA) is 0.792 whereas the Sig. (2-tailed) value is 0.000. Therefore, the null hypothesis H05 is rejected at the 0.01 level of significance. It can also be seen that there exists a highly positive correlation between Food Habit scores and Academic Achievement scores of the Secondary level students surveyed from the study site. This also fits with the result obtained earlier by A.K. Singh. (2021). So, it can be concluded that there is a highly significant positive relationship between Food Habits (FH) and Academic Achievement (AA) of Secondary level students of Baranagar Municipality.

Further discussions on the findings related to the relationship between Food Habits and Academic Achievements of the Secondary level students

From the present study, a statistically significant high positive correlation of 0.792 was found between Food Habits and Academic Achievement of Secondary level students at Baranagar Municipality in North 24 Parganas district of the state of West Bengal, India. Now, to find out the extent to which those two variables were associated, a simple linear regression analysis was performed by the investigators. The derived value from the regression analysis was R = 0.79.

Figure 5: Scatter diagram with the best-fit line for depicting the association between Food Habits and Academic Achievements of the surveyed Secondary Level students

Figure 5 depicts the Scatter diagram with the best-fit line for depicting the association between Food Habits and Academic Achievements of the surveyed Secondary Level students where the value of R2 is almost = 0.63. Therefore, a variation in Food Habits of the Secondary level students as an independent variable can explain collectively about 63% of variations in Academic Achievements of the same group of students as a dependent variable. The relationship between the two variables i.e., Academic Achievement of the Secondary level students (y) and Food Habits of them (x) is further expressed by the following equation as evolved from the Simple Linear Regression Model: $y = 1.3937x - 27.129$. Looking at this equation, we can easily understand that this is a negative linear regression. Based on this result, it is clear that better food-taking habits are an important indicator of good academic achievement. But excessive food-taking habits also cause poor academic achievement.

Discussion

In the present study, the researchers wanted to explore the correlation between Food Habits and the Academic Achievements of Secondary level students and to critically comment on the general assumption that only a healthy belly leads to better academic achievement by an adolescent student at the Secondary level!

However, from the findings of the present study, it can be ascertained that gender variation does not make any statistically significant difference in students' food habits (from testing of the **H01**). This result did not support previous studies done by Uwannah and Lotachi (2018) who mentioned that gender-based food habits have a significant impact on students' academic achievements, especially those female students who do not take breakfast have less educational skills compared to male students. Besides, while focusing on the variable of awareness, the study of Usha and Deepika (2016), tried to

establish the fact that female students are more conscious of their food habits than male students. As a result, in most cases, female students are more advanced in attaining necessary academic progress and achievement than their male counterparts.

The present study also revealed that academic achievements did not differ by gender among the surveyed sample elements. Based on the statistical analyses of the collected data, the researchers here conclude that academic achievement is a vital part of the formal education system, which was found to be similar in males and females from the surveyed site (from testing of the **Ho2**). This finding does not support previous studies by Uwannah and Lotachi (2018) who found that female students' academic achievement is better than male students. Usha and Deepika (2016) also found that in most cases, female students are more advanced in attaining necessary academic progress and achievement than their male counterparts.

The present study revealed that in different sub-categories of food habits like- Male and female students' Better Food Habits (BFH) and Male and Female students' Poor Food Habits (PFH), there is a significant difference in their habits (from the testing of the **H04**). And also found that there is a significant difference in different sub-categories of academic achievements like - Male and female students' Above Average Academic Achievement (AAAA) and Below Average Academic Achievement (BAAA) (from the testing of the **H05**).

The present study also revealed that food habit is one of the most vital factors for academic achievements at the Secondary level. After analysing the collected data, the researchers concluded here that there is a very high positive correlation between the Food Habits and Academic Achievements of the students at the Secondary level (from the testing of the **Ho5**) in the Baranagar Municipality of West Bengal, India. This finding perfectly corroborates with the previous studies by Lopez-Gil et al. (2022) which found a positive association between food habits and academic achievement. Kristo et al. (2020) concluded with the identification that there is a positive association between the food habits of adolescents and their success rates at the school level. Chikwere (2019) opined that food habits have a positive association with students' academic achievement in various subjects at the school level. Burrowa et al. (2017)have also enunciated that in most cases, there is a positive association between food habits and academic achievement among college and university-level students as well, while Acham et al. (2012) stated that a definite link can be observed between the consumption of regular meals and children's academic achievements.

This study also shows that there is a negative regression between food habits and academic achievements. It means food-taking habits are important for all students, but excessive or excessive food-taking habits are not good for our academic achievements.

Conclusions

At the end of the study, the researchers would like to conclude that Food Habit is one of the most important influencing factors in Secondary level students' Academic Achievements. Consumption of Food is a human's basic need as it is important for survival and daily living and also for pupils' academic or scholastic achievements. In the present context, it is to be mentioned that people's food habits are different across the globe and they are customized at individual levels due to innumerable factors. Some students prefer to eat junk foods, carbonated drinks, ice-creams, butter, sweets, etc. while

some other students like to prefer homemade foods, fruits, vegetables, etc. But, from the findings of this study, it is being advised that there should be an overall unity in diversity among the day-to-day food habits of the Secondary level students where attention must be given towards the nutritional values as well as digestibility of the consumed foods by them.

Limitations

In every investigation process, there exist some limitations. The present study is also no exception. The limitations of the present study are given below:

i.   For reviewing Food habits and Academic Achievement, the articles and journals, and references were consulted as far as possible to their availability.
ii. A very small area has been selected for the study considering time.
iii. Only government and Government-aided schools were selected for sample collection. Non-government schools were not selected for convenience of work.
iv. A small number of schools were selected for data collection.
v.   The number of samples might be increased.
vi. Secondary-level students had been selected for the research work. Therefore, the data collection questionnaire was translated from English to Bengali. This might have resulted in some undesirable noise in the data collection tools.

Suggestions for further studies

Based on the findings reported here from this study, further studies can be done in the following areas:

i.   There is a scope for researching the Food Habits, Academic Achievements, and Mental Well-being of school students.
ii. The study can be replicated in bigger geographical areas.
iii. Both quantitative and qualitative (mixed methods) approaches can be adopted to find more holistic results.

References

1. Acham, H., Kikafunda, J. K., Malde, M. K., Oldewage-Theron, W. H., & Egal, A. K. A. (2012). Breakfast, midday meals and academic achievement in rural primary schools in Uganda: Implications for education and school health policy. Food and Nutrition Research, 56, 11217.
2. Adolphus, K., Lawton, C. L., & Dye, L. (2013). The effects of breakfast on behaviour and academic performance in children and adolescents. Frontiers in Human Neuroscience, 7, 425.
3. Alqahtani, Y., Assiri, Ohood A. A., Al-Shahrani, Nouf S. S., Alyazidi, Noha S. S., & Alshahrani, Malak S. H. (2020). Relationship between nutritional habits and school performance among primary school students in Asser Region. Journal of Family Medicine and Primary Care, 9(4), 1986-1990.
4. Balyan, Vivek., (2018). Food Habits in India: A Study of Under Students.
5. Burrows, T. L., Whatnall, M. C., Patterson, A. J., &Hutchesson, M. J. (2017). Associations between Dietary Intake and Academic Achievement in College Students: A Systematic Review. Healthcare (Basel, Switzerland), 5(4), 60.
6. Chikwere, P. (2019). Diet, a factor for academic performance in school-aged children: a systematic review of recent studies. All Nations University Journal of Applied Thought (ANUJAT), 7(1), 76-90.

7. Creswell, J W. (2017). Research Design: Quantitative, Qualitative, and Mixed Method Approaches. London: SAGE Publications.

8. Cristuta, A.M., Berongan, E.J., Radam. D.M., Saladaga, A.M., Miranda, M. (2020). Nutrition and Academic Achievement of Filipino Learners: A Literature Review. International Journal of Trend in Scientific Research and Development (IJTSRD), 4/1, e-ISSN: 2456 – 6470.

9. Hoyland, A., Dye, L., and Lawton, C.L. (2009). A systematic review of the effect of breakfast on the cognitive performance of children and adolescents. Nutrition Research Reviews (2009), 22, 220–243.

10. Ishaq, F., Khan, R., Dar, M., Basharat, S., Ali, M., Yameen, Z., Ilyas Rana, A., Ashraf, M., Abbas, A., & Zahid, S. (2020). Assessment of eating habits and knowledge regarding daily nutritional requirements among university students. Journal of Nutritional Health & Food Engineering, 10(1), 38-41.

11. Johnson, F., Wardle, J., & Griffith, J. (2002). The Adolescent Food Habits Checklist: reliability and validity of a measure of healthy eating behaviour in adolescents. European Journal of Clinical Nutrition (2002), 56, 644–649.

12. Kristo, A. S., Gültekin, B., Öztağ, M., &Sikalidis, A. K. (2020). The Effect of Eating Habits' Quality on Scholastic Performance in Turkish Adolescents. Behavioral Sciences, 10(1).

13. López-Gil, J. F., Mesas, A. E., Álvarez-Bueno, C., Pascual-Morena, C., Saz-Lara, A., & Cavero-Redondo, I. (2022). Association Between Eating Habits and Perceived School Performance: A Cross-Sectional Study Among 46,455 Adolescents From 42 Countries. Frontiers in Nutrition, 9, 797415.

14. Nailon, Buffy., (2017). Proper eating Habits vs Academic Performance.

15. Reuter, P. R., Forster, B. L., & Brister, S. R. (2020). The influence of eating habits on the academic performance of university students. Journal of American College Health, 69(8), 921–927.

16. Singh, A. K. (2021). Tests, Measurements and Research Methods in Behavioural Sciences, New Delhi: Bharati Bhawan publishers and Distributors.

17. Taha, Z., & Rashed, A. S. (2017). The Effect of Breakfast on Academic Performance among High School Students in Abu Dhabi. Arab Journal of Nutrition and Exercise (AJNE), 2(1), 40-49.

18. Usha, A., & Deepika, K. (2016). A Study on Food Habits and Academic Achievement among Class IX and XI Students in Kancheepuram District. In International Journal of Science and Research, 5(12), 1833-1834.

19. Uwannah, N.C., &Lotachi, M.A., (2018). Eating Habit and Academic Performance of Secondary School Students in Ikenne, Ogun State. International Journal of Humanities and Social Science Invention (IJHSSI) ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 771.

20. Wijtzes, AI, Jansen, W, Jaddoe VWV, Franco, OH, Hofman, A, van Lenthe, FJ. (2015) SocialInequalities in Young Children's Meal Skipping Behaviors: The Generation R Study. PLoS ONE 10(7):e0134487.https://doi.org/10.1371/journal.pone.0134487