

# Analysis of the Dietary Balance and Eating Habits of the Haidian Foreign Language Academy Boarding-school Students in Campus

Yiyi Liu, Yuqi Shi, Chenshuo Guo, Chenyao Xu

Beijing Haidian Foreign International High School, Beijing, China

**Abstract:** This study aimed to investigate whether students at Haidian Foreign Language Academy (Haiwai) have an imbalanced diet or unhealthy eating behavior and then investigate the reasons behind it. Questionnaires were delivered to high school students in the Haidian Foreign Language Academy international department. They were being questioned about their dietary intake and eating behaviors. Afterwards, their dietary intake has compared with the standard nutrient amount provided by the Chinese Nutrition Society. Both male and female students had lower calorie intake, and higher fat and carbohydrate intake compared to the standard ( $P < 0.01$ ). Male students' protein intake has no statistical difference from the standard, whereas female students have significantly less protein intake compared to the standard ( $P < 0.01$ ). Less than half of the students cared about their calorie (33%), and more than half of the students cared about their dietary balance (65%). Most of the students had lunch daily, but less than half of the students eat breakfast and dinner daily (45% and 44% respectively), mainly due to lack of time and fasting. The majority of students have fruit intake daily (85%). Many students in Haiwai have an imbalanced diet, regardless of gender, and many engaged in unhealthy eating behaviors such as skipping breakfast or dinner. Future research shall be done to investigate how to improve the campus eating environment to reduce the frequency of unhealthy eating behaviors of students.

**Keywords:** Dietary balance, Boarding school students, Eating behaviors, Nutrition.

## 1. Introduction

### 1.1. Health Problems Related to Adolescents' Eating Behaviors

Unhealthy eating habits easily pave the road to prevalent illnesses in adolescence. Obesity and undernutrition are two of the most common condition brought about by the unhealthy eating habits of adolescents.

#### 1.1.1. Obesity

Overweight and obesity are the most impactful chronic disease faced by teenagers globally, especially in developing countries, which poses a threat to global health situations and concerns global health organizations (Kaur *et al.*, 2005). It has been recently proven that fat accumulated overweight, and obesity is related to mitochondria dysfunction, which has a severe negative impact that leads to neurodegenerative disease (Jellinger, 2009). Continuous high calories intakes will substantially induce the onset of metabolic syndrome, disturbing blood glucose and triglyceride levels in the human body. A study showed that it can cause serious impairment of disturbing cognitive processes that are crucial to the mental process of gaining knowledge and overall comprehension (Treviño *et al.*, 2015). When the cognitive process is compromised, students' academic performance will be affected and will have irreparable consequences for long-term competency development. In addition, obesity is also correlated with medical consequences that impair students' physical and mental health, such as type 2 diabetes (Klein *et al.*, 2022, Mayo Foundation for Medical Education and Research, 2023).

#### 1.1.2. Underweight

By the World Health Organization, being underweight is defined as having a low Body Mass Index for age ( $< -2$  standard deviation (SD)) (de Onis *et al.*, 2007). Kantaista's

study of worldwide adolescents showed that 11.6% of the 1702 female adolescents in his study were underweight, as well as 7% of the 1547 male adolescents (Kantanista A. *et al.*, 2017).

There were several probable reasons. First of all, it could be easy for female adolescents to frequently find themselves straying from societal expectations that promote thinness as attractive and desirable. Negative body image in female adolescents was frequently caused by an expanding gap between the cultural ideal and their body mass index (BMI) (Fenton *et al.*, 2010). Furthermore, Kantanista's study also showed that in his study, more female adolescents (44.8% of the 1702 female adolescents) showed body dissatisfaction and fewer girls showed high body satisfaction (17.6%) compared to males (28.5% and 29.0% of 1547 male adolescents respectively) (Kantanista A. *et al.*, 2017). Therefore, female adolescents are more willing to lose weight to fit their expectations of becoming thinner.

However, being underweight can lead to health problems. Dobner's study demonstrated that adolescents underweight are associated with increased risks of infection with diseases such as helminth and parasitic infections. Underweight children were also more susceptible to respiratory diseases compared to normal-weight or overweight adolescents (Dobner and Kaser, 2017).

What is more serious is that the underweight adolescents in China is the development of anorexia nervosa (AN), a kind of eating disorder (Dong *et al.*, 2019). AN is characterized by low BMI, fat, and lean mass. Patients are characterized as having an intense fear of being obese, having a disturbance of body image (they feel fat despite their normal weight), and refusing to eat an appropriate amount of food (Oliver *et al.*, 2012). AN is likely to develop as the result of extremely restrictive eating, and more than 50% of adolescents over the world endorse dieting that includes extremely restrictive

eating (Neumark-sztainer et al., 2012).

## 1.2. Factors That Contribute to Unhealthy Eating Behaviors

To alleviate the problem of unhealthy eating among adolescents, it is important to know why they are having unhealthy eating habits. Overall, food choice and eating habits of adolescents could be affected by various factors, including social media, school pressure, school food environment and insufficient nutrition knowledge.

### 1.2.1. Social Media

Due to the development of social media, short videos, and the label “thinner is prettier” promoted by the media have led teenagers to care more about how their bodies look. Yang found that through the numerous comments on short video platforms, adolescents are likely to presume that the popular aesthetic standard is that both men and women prefer taller and slimmer bodies (Yang, 2019). In addition, The Research suggests that long-term repeated exposure to certain types of video information can lead to long-lasting changes in individual behavior and psychological thoughts (Bushman, et al., 2006; Greitemeyer, 2009). As a result, adolescents are implanted with the notion that "obesity is wrong". Although they are not obese, they are pressured by social standards to feel ashamed about their weight, low self-esteem, and high shame to form an inferiority complex and unresolved psychological pressure. One survey showed that dissatisfaction with one's image can affect the self-esteem of adolescents (Furnham, et al., 2002). Therefore adolescents are more likely to engage in fasting or control their diet. However, restrained eaters who make conscious choices to limit food intake or food types are more likely to eat emotionally, which means that adolescents can have a greater risk to develop eating disorders and further leading to more severe problems (Wardle, et al., 2000; Pecoraro, et al., 2004).

### 1.2.2. School Pressure

The first type of school pressure students experience is peer dieting pressure. Homogeneity reflects the extent and tendency to choose to interact with people who share similar views and values. Students who attend the same school will not necessarily share exactly the same perceptions and values of treating certain things in life. In a diverse social environment, people can be easily influenced by people. In this environment, insecurities about weight and shape and the importance of achieving the thin ideal are magnified and highlighted, which means that more students will be influenced by this perception, leading to poor and unhealthy eating habits implicitly (Rayner et al., 2013)

The second factor in school that may induce students’

unhealthy eating behavior is the busy schedule. Due to the busy lifestyle that has been gradually adopted by adolescents, it now also serves as a factor contributing to unhealthy eating habits. According to study done by Mary L. Greaney and other scholars, the time-related limitation has been identified as a crucial barrier influencing individuals' healthy eating habits (Greaney et al., 2008). The perception of limited time among individuals can have a significant impact on their daily practices and routines. For instance, the perception of time constraints may lead people to prioritize certain activities over others, such as sacrificing the time spent on preparing and consuming healthy food in favor of other tasks (Jabs et al., 2007). Therefore, students in school might not be able to follow regular healthy eating habits in daily school day since they must fit into a busy schedule including a huge amount of homework assignments or preparation for various examinations.

### 1.2.3. School food environment

School food environment has been recognized as one of the main factors that affect students’ eating behaviors (Centers for Disease Control and Prevention, 1996). Previous study has been shown that students believed that it was important to consume healthy foods at school, but they preferred unhealthy foods more when those were available (Gosliner *et al.*, 2011). Similar result also has been found out that ‘fried potato’ was the most preferred vegetable choice by adolescents, and the offering of fried potatoes at school reinforced students’ preference for high-fat foods which is unhealthy (Kubik *et al.*, 2003). In conclusion, several studies have identified a positive association between reported student food choices and a modified food environment (Bevans *et al.*, 2011, Li *et al.*, 2022, Wordell *et al.*, 2012)

### 1.2.4. Insufficient nutritional knowledge

One prominent cause of an imbalanced diet is the unawareness of scientific methods of eating—mainly nutrition facts. Sometimes a prolonged period of relying on an imbalanced diet would lead to severe consequences such as malnutrition and obesity. Weerasekara has illustrated that the causes of malnutrition could be due to the unawareness and neglect of dietary diversity, which could cause a massive number of the population to demonstrate undernutrition and food insecurity (Weerasekara *et al.*, 2020).

## 1.3. Criteria for a balanced diet for adolescents given by Chinese Food Guide

The study focuses on comparing the dietary consumptions of boarding school students in campus with the dietary reference intakes provided by Chinese Food Guide (Chinese Nutrition Academy, 2022).

**Table 1.** Dietary reference intakes provided by Chinese Nutrition Society

POPULATION(AGE)	ESTIMATED ENERGY REQUIREMENT (EER)/ (KCAL / DAY)		ACCEPTABLE MACRONUTRIENT DISTRIBUTION RANGES		REFERENCE NUTRIENT INTAKE	
	Boy	Girl	Total Carbohydrates (g)	Total Fat (g)	Protein/ (g / day)	
14~17 YEARS OLD	2500	2000	50-65	20~30	Boy 75	Girl 65

## 1.4. Factors That Affect Food Intake Amount

### Gender, Weight and Height

Basal metabolic rate (BMR) is defined as the minimum rate of energy expenditure necessary to maintain the energy balance of resting, post-absorptive endotherms at thermoneutral conditions (Schmidt-Nielsen 1997). Individuals' BMR is principally affected by body size (height and weight), body composition, and age; each individual within different age groups with different heights and weights will have a different BMR. This means that the lowest need for calorie intake will be different in every individual, so in their daily intake of nutrients (WHO, 1985).

According to the WHO, in adolescents, men have a relatively greater muscle mass than women, which would tend to reduce their BMR when expressed in terms of lean body mass, since muscle has a low metabolic rate. However, the greater body fat content of adolescent women means that the observed BMR per unit total body weight is somewhat lower in women. Also, the BMR per unit weight varies with weight and height: within a given age range, BMR per kg is higher in short and light individuals and lower in tall and heavy ones (WHO, 1985).

## 1.5. Objective

The objective of the research is to investigate whether students at Haidian International School have an imbalanced diet or unhealthy eating behavior and then investigate the reasons behind it.

## 2. Materials and Methods

### 2.1. Study Sample

The study sample of this research included all high school students in the international department of Beijing Haidian Foreign Language Academy. The age of the students varies from 15-18 years old. This sample base included about 250 people.

### 2.2. Questionnaire

#### 2.2.1. Generation of Questionnaire

##### Dietary Assessment

Students will be asked to answer how much they eat per meal for 2 days. The amount will be specified to grams, and the weight will be measured using a digital kitchen scale (CAMRY EK3226, d=1g/0.1oz). To determine the calorie and the macronutrient amount (total carbohydrates, total fat, and total protein) of the meal, we will be using the statistics provided by Boohee (<https://www.boohee.com>) as reference.

In order to find out how well the participants knew about nutrition, they were asked if they cared about calories and if they cared about the nutritional ratios of their meals.

For the question about healthy eating habits, we focused on how well they ate their meals on time. To find out if the participants had unhealthy eating habits and the reasons behind them, they were asked to answer whether they ate breakfast, lunch, or dinner on time every day. If they did not answer every day, they were asked to fill in why they did not

eat on time (open-ended question). The students will also be required to answer how much water they drank daily.

##### Outcome Variables

The participants will be asked for their height and weight. Height will be divided into different ranges and the difference between the different ranges is five centimeters (i.e., 141 cm-145cm, 146 cm-150 cm). Weight will be divided into different ranges, and the difference between the different ranges is five kilograms (i.e., 36 kg- 40 kg, 41 kg- 45 kg).

##### Covariates

The sex of each participant will be collected through general questions in the questionnaire.

#### 2.2.2. Data Collection

The questionnaire will be printed and distributed to students in different grades and classes. Researchers will be on hand to monitor but not interfere with the participants' completion. The reference of the amount of food will be photographed and the researchers will display the photos on the big screen in front of the class for reference.

#### 2.2.3. Statistical Analysis

The amount of nutrients and food students consume per day will be compared with the standard amount suggested by the Chinese Nutrition Society in the Chinese Food Guide Pagoda 2022 for adolescence group rather than adults or overall population (Chinese Nutrition Society, 2022). Statistical analysis will be conducted through one sample t-tests for continuous variables to compare the dietary pattern of students at Haidian Foreign Language Academy with the standard provided by the Chinese Nutrition Society. A *P*-value <0.01 was regarded as statistically significant. All analyses were performed in the software R (R 4.3.0).

## 3. Results and Discussion

This study collected 418 responses to calculate the daily intake of students (226 male, 192 female) and collected 216 responses for the general questions about students' dietary behaviors (113 male and 103 female). The number of valid responses for the dietary intake is 313, with 163 male and 150 female. The number of valid responses for the general questions is 152, with 79 male and 73 female.

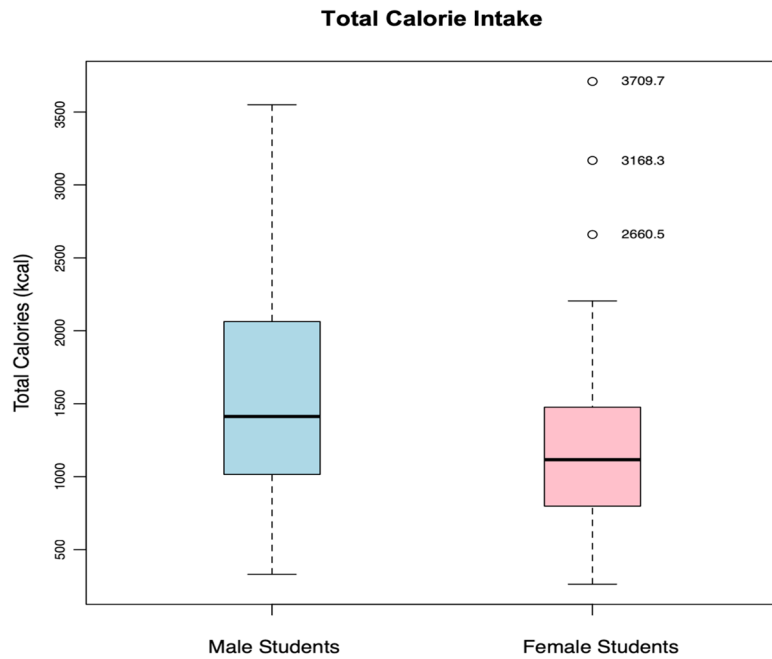
### 3.1. Inclusion and Exclusion Criteria

Invalid data are excluded for one or more reasons listed below

- Students chose the dish they ate but did not answer the serving size
- Did not complete all questions properly
- Did not follow the requirements to choose the dish you are most likely to eat and the serving size

### 3.2. Comparison of the amount of macronutrients in the diets of Haiwai students and the standard amount provided by the Chinese Nutrition Association

#### 3.2.1. Amount of Calories



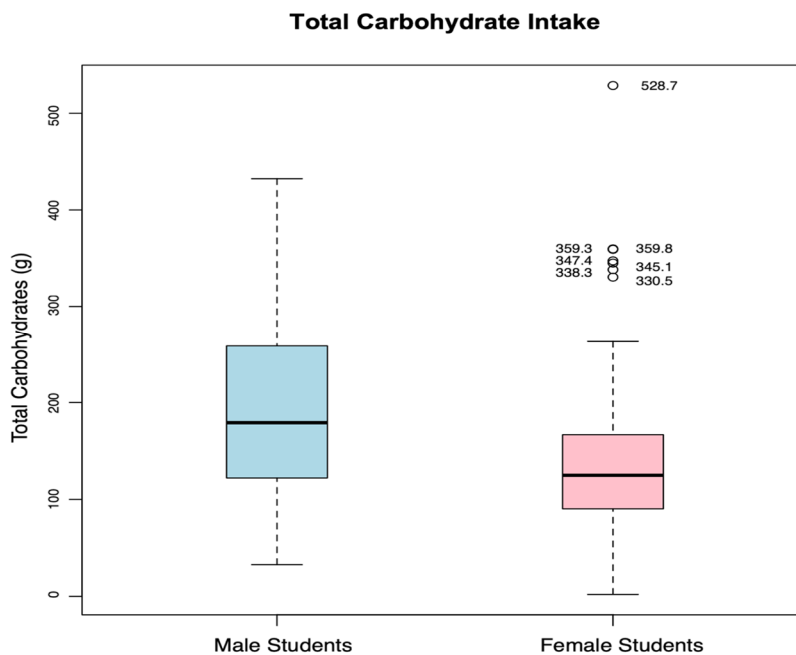
**Figure 1.** Daily total calorie intake of Haiwai students in campus

The results of the estimation of the calorie intake by Haiwai students showed that the total calorie intake per day of the male students population in Haiwai was  $1577.33 \pm 737.559$  kcal/day, with a difference of  $-922.67$  kcal from the standard of 2500 kcal/day provided by the Chinese Nutrition Society. The one-sample t-test suggested that the total calorie intake of the male student population in Haiwai was lower than the standard amount 2500 kcal/day provided ( $t = -15.97$ ,  $p$ -value  $< 0.01$ ), with a statistically significant difference.

As moving toward female students' intake, the results showed that the total calorie intake per day of the female student population in Haiwai was  $1177.413 \pm 535.778$  kcal/day, with a difference of  $-822.587$  kcal/day from the standard of 2000 kcal/day provided by the Chinese Nutrition Society. The one-sample t-test suggested that the total calorie intake of the female student population in Haiwai was lower than the standard amount of 2000 kcal/day provided ( $t = -18.804$ ,  $p$ -value  $< 0.01$ ), with a statistically significant difference.

Both male and female students in Haiwai were found to have a lower calorie intake than the standards recommended. There are several negative consequences of insufficient calories intake. Evidence regarding the relationship between diet and immune function indicates that the optimal approach appears to be balanced nutrition with moderate nutrient intake; however, malnutrition poses a risk to immune deficiency. Therefore, it is vital and imperative to recognize the potential negative consequences of nutrient excess and malnutrition and maintain a nutritionally adequate diet to support immune function and reduce the incidence of immune-related disorders (Daruna, 2012). In addition, restricted intake or shortage of calories intake may reduce estrogen and androgen level, ultimately weakening bones and elevating rate of being fractured (Manolagas et al., 2013).

### 3.2.2. Amount of Carbohydrates



**Figure 2.** Daily total carbohydrate intake of Haiwai students in campus

### 3.2.3. Amount of Protein

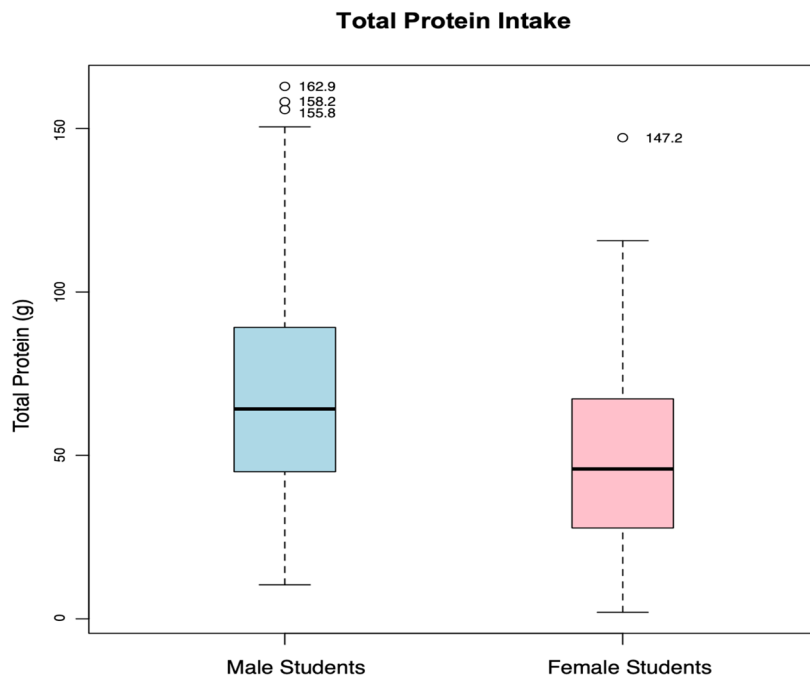


Figure 3. Daily total protein intake of Haiwai students in campus

The results showed that the total carbohydrate intake per day of the male student population in Haiwai was  $193.098 \pm 93.3$  g/day. The one-sample t-test suggested that the total calorie intake of the male student population in Haiwai was greater than the standard range of 50-65 g/day provided ( $t = -15.97$ ,  $p$ -value  $< 0.01$ ), with a statistically significant difference.

On the other hand, the results showed that the total carbohydrate intake per day of the female student population in Haiwai was  $138.511 \pm 75.977$  g/day. The one-sample t-test suggested that the total calorie intake of the female student population in Haiwai was also greater than the standard range of 50-65 g/day provided ( $t = 11.85$ ,  $p$ -value  $< 0.01$ ), with a statistically significant difference.

Both male and female students in Haiwai were found to have higher carbohydrate intake, compared with the standard level set by Chinese Nutrition Society. This phenomenon can be explained by Chinese eating culture and habit that wheat noodles and rice are the main staple in China (Pang, 2021). Gary Woods' study found out that these two dominant food sources can all contribute to high intake of carbohydrates (Woods, 2022). Similarly, noodles and rice are available each day during the week and students prefer one or another every day. However, several negative impacts could be triggered by excessive carbohydrate intake. Unhui Jo and Kyong Park found that excessive carbohydrate intake increases the risk of cardiovascular disease (Jo & Park, 2023). Additionally, carbohydrate intake makes increase the risk of individuals to developing metabolic disease and constructing vicious cycle of alertness and tiredness (Clemente-Suárez et al., 2022).

#### Male Students' total protein

The results showed that the total protein intake per day of the male students' population in Haiwai was  $69.011 \pm 32.548$  g/day, with a difference of  $-5.989$  g/day. The one-sample t-test suggested that the total protein intake of the male student's population in Haiwai was the same as the standard amount of 75 g/day provided ( $t = -2.3492$ ,  $p$ -value  $> 0.01$ ), with no statistically significant difference.

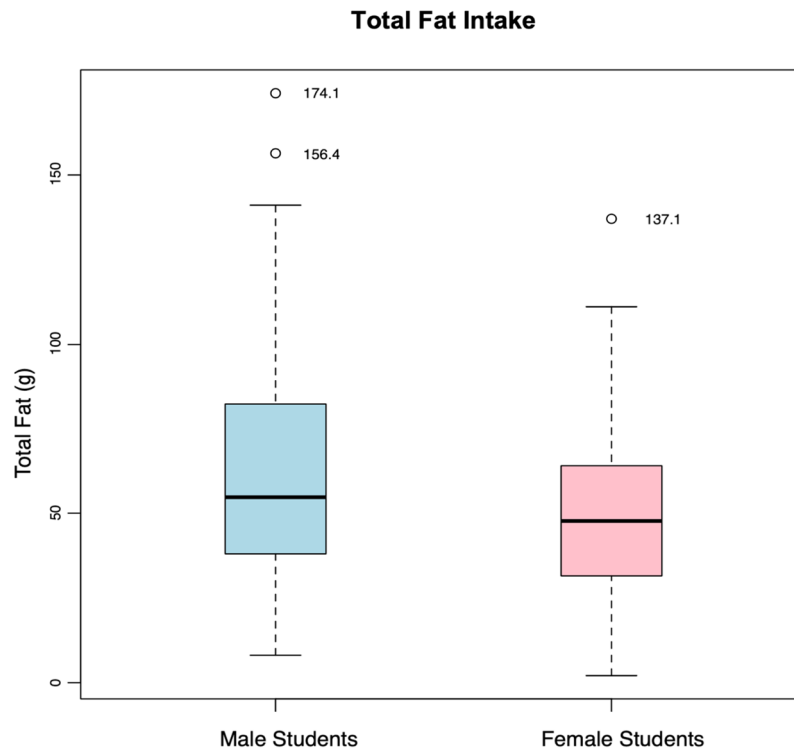
An adequate protein intake is beneficial to adolescents. Saner's study discovered that total daily calorie intake increased as the percentage of total energy derived from protein sources decreased, which proved that sufficient protein intake can be helpful for weight loss by adolescents (Saner C et al., 2020). Similar results were found in Wang's study. He discovered that high-protein breakfasts with eggs improve weight loss by increasing satiety and lowering subsequent food consumption (Wang et al., 2014), proving the importance of protein intake for adolescents and its benefit.

#### Female Students' total protein

The results showed that the total protein intake per day of the female students' population in Haiwai was  $50.199 \pm 26.365$  g/day, with a difference of  $-9.801$  g/day from the standard of 60g/day provided by the Chinese Nutrition Society. The one-sample t-test suggested that the total protein intake of the female student's population in Haiwai was lower than the standard amount provided ( $t = -4.5527$ ,  $p$ -value  $< 0.01$ ), with a statistically significant difference.

Inadequate protein intake may be detrimental to adolescents. Protein is a crucial macronutrient required for energy production, tissue growth, and repair, immune system defense and function, and cell activity coordination (Xu S.M. 2016). More serious problems may include bone development impairment. Bonjour et al. concluded that the pathogenesis of the delayed skeletal growth and decreased bone mass seen in undernourished children appears to be mostly protein deficiency (Bonjour et al., 2001). Budek's study bolstered this claim by finding out that there is a positive association between total protein intake and size-adjusted total bone mineral content in adolescents (Budek et al., 2007). On the other hand, Garcia et al. found that high protein intake may limit body fat gain over time, only among female adolescents (Garcia-Iborra et al., 2023). This meant that contrary to sufficient protein intake, low protein intake for female adolescents may cause higher body fat gain over time.

### 3.2.4. Amount of Fat



**Figure 4.** Daily total fat intake of Haiwai students in campus

The results showed that the total fat intake per day of the male student population in Haiwai was  $61.272 \pm 31.503$  g/day. The one-sample t-test suggested that the total fat intake of the male student population in Haiwai was greater standard range of 20-30 g/day provided ( $t = 12.674$ ,  $p\text{-value} < 0.01$ ), with a statistically significant difference. The results also showed that the total fat intake per day of the female student population in Haiwai was  $48.875 \pm 24.095$  g/day. The one-sample t-test suggested that the total fat intake of the female student population in Haiwai was greater standard range of 20-30 g/day provided ( $t = 14.677$ ,  $p\text{-value} < 0.01$ ), with a statistically significant difference.

The results revealed that students in Haiwai have higher fat intake in school day, compared with fat intake standard. This may be due to unchanged Chinese daily eating habit and components of daily food, which oil-based Chinese foods are mainly accepted by Chinese as regular foods and becomes a contributor that makes people to gain that much fat lipid (Cali, 2023). Additionally, Kubik et al. have concluded that when schools consistently provide fried potatoes as part of the fruit and vegetable options for students' school lunches, students will have a strong inclination towards consuming fried potatoes (Kubik et al., 2003). This phenomenon is common in Haiwai. School has a large variety of choices so that various foods containing oil like fried potatoes, fried chicken, and other components that contribute to high fat will eventually elevate students' body fat accumulation. Consequently, high fat intake is a highly recognized factor toward obesity. As we have mentioned, various psychological and medical illness and negative health effects can be induced, such as hypertension, cardiovascular disease, Type 2 diabetes and heart failure (2013).

### 3.3. General Questions

#### 3.3.1. Do you care about or count the calories in the food you eat?

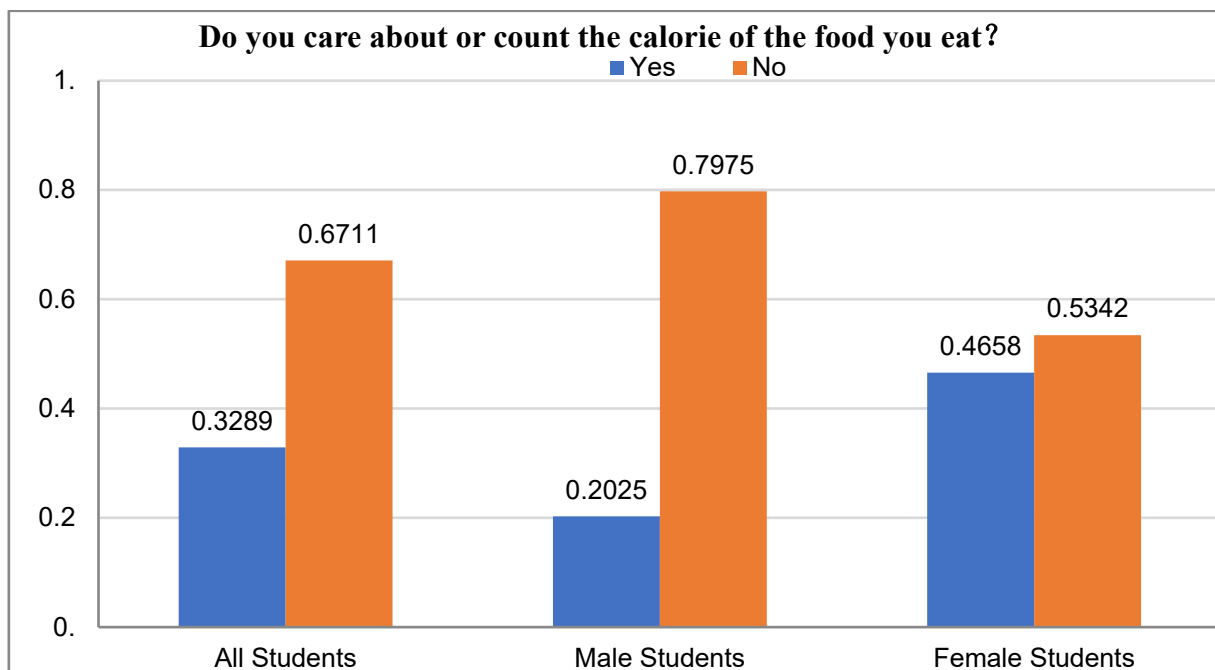
Out of 152 students who answered the question, 50 students answered that they care about the number of calories in the food they eat, which is 33% of the total population, whereas the rest 102 students (67%) answered that they do not care about calories.

However, when the data of male and female students' responses were separated, the percentages of the two choices being chosen by students of different genders were not the same. Among the 79 male students, the number of people who reported that they care about calories was 16 (20% of total male students), and all of them explained that is because they 'want to lose weight'. The rest 63 students answered 'No' (80% of total male students). On the other hand, of the 73 female students, 34 answered 'Yes' (47% of total female students). The majority of them (30 students) provided the reason that they 'want to lose weight' or 'body management', and the rest reported 'for health'. The rest 39 female students answered 'No' (53% of total female students).

According to our result, more female students care about their body image and wanted to lose weight than male students do, and they are more likely to be concerned about the amount of calorie intake in their diet. Several factors may explain this phenomenon. Generally speaking, this study by Brown revealed that female adolescents are more likely to be motivated to lose weight for factors such as looking better, becoming skinnier, or becoming healthier (Brown et al., 2015). Other more serious or specific reasons may include peer stigma at school, social media, or body image issues. The results of Pont's study showed that at school, weight-based bullying is among the most frequent forms of peer harassment reported by students. Negative weight-based stereotypes are common at school. Moreover, female students that are overweight are more likely to be bullied but less likely to get help at school, forcing them to lose weight and be stressed about their body image (Pont et al., 2017). As for social media, Sampasa Kanyinga's study demonstrated that female adolescents who use SNSs (social media) for more than 2

hours per day had a greater probability of dissatisfying their body image, were more likely to perceive themselves as overweight or obese and were more at risk of trying to lose weight. The reason may be that female adolescents may be more likely to concern about their own weight when they perceive a discrepancy between their friends' bodies representing an ideal body or accepted standard of female attractiveness and their own bodies. This likely offers adolescents more opportunity to compete against each other for a more attractive appearance, thus losing weight to win.

More importantly, their findings suggested that the connection between the use of SNSs and the weight-related attitude is stronger in female than male adolescents, which means female adolescents are more vulnerable to peer competition of body images compared to males (Sampasa Kanyinga H. et al., 2016). One other major reason reported by Ganesan is dissatisfaction with their own body images by adolescents. Among 1200 female adolescent participants 77.6%, reported body image dissatisfaction and wanted to lose weight (Ganesan, S. et al., 2018).



**Figure 5.** The percentage of students' answer to the question "Do you care about/ count the amount of calorie of the food you eat?"

However, for those who wanted to lose weight, there may also exist problems such as having excessive desire for low weight. The study of Ganesan also demonstrated that 23% of all 1200 adolescent female participants that are underweight wanted to reduce their weight further. Similarly, 71% of the normal BMI category was dissatisfied with their appearance of which 58.3% wanted to reduce their weight (Ganesan, S. et al., 2018).

This can be a very toxic phenomenon. It is found by Lampard that to lose weight, many adolescents engage in unhealthy weight control behaviors such as fasting, skipping meals, taking diet pills, and self-induced vomiting. Severe dieting (i.e., meal skipping, calorie counting, and food restriction) has been associated with a greater risk of eating disorder onset among adolescents (Lampard et al., 2016). Furthermore, Adolescents who have eating disorders were more likely to have later depression, anxiety disorders, and drug use compared to those who do not have the disorder (Jankauskiene R. & Baceviciene M., 2019). Thus, it can be important to guide adolescents to have a correct body image and educate them on healthy weight control practices to prevent them from developing further mental problems.

Admittedly, there are some benefits for adolescents to be engaged in weight control practices. The HSBC study discovered that adolescents who tend to lose weight are more likely to practice exercises and eat more fruit and/or vegetables (Ojala et al., 2007). These healthy weight control behaviors not only play a role in the prevention of excess

weight gain but also in reducing future risk for chronic diseases such as heart disease, stroke, and diabetes (WHO, 2002)

For the rest 102 students who answered that they don't care about calories, the two most frequently given reasons were that it is hard for them to become obese (17 students (16.5%); 16 males, 1 female) and they just simply don't care (41 students (39.8%); 28 male, 13 female). The remaining reasons include 'do not know how to precisely calculate the calorie they ate' (11 students (10.7%); 7 males, 4 females), 'like to do sports' (10 students (9.7%); 6 males, 4 females), and the rest answered other minor reasons or didn't report.

In fact, not counting calories can sometimes be beneficial for students. Dr. Fatima Cody Stanford, an obesity specialist and assistant professor of medicine and pediatrics at Harvard Medical School stated that "This idea of 'a calorie in and a calorie out' when it comes to weight loss is not only antiquated, but also just wrong." This was because careful calorie calculations don't always yield uniform results. How people's body burns calories depend on a number of factors, including the type of food students eat, the student body's metabolism, and even the type of organisms living in people's gut. Therefore, counting calories is not necessarily the best way to lose weight, but take a healthier approach such as improving diet quality and making sustainable lifestyle improvements (Harvard Health, 2020). Furthermore, the study by Saul showed that adolescents that care about calories or count calories daily are more likely to develop eating

disorders and be stressed about their weight or body image, which also causes more anxiety (Saul J.S., & Rodgers. R. F., 2018).

### 3.3.2. Do you care about the dietary balance of your meal?

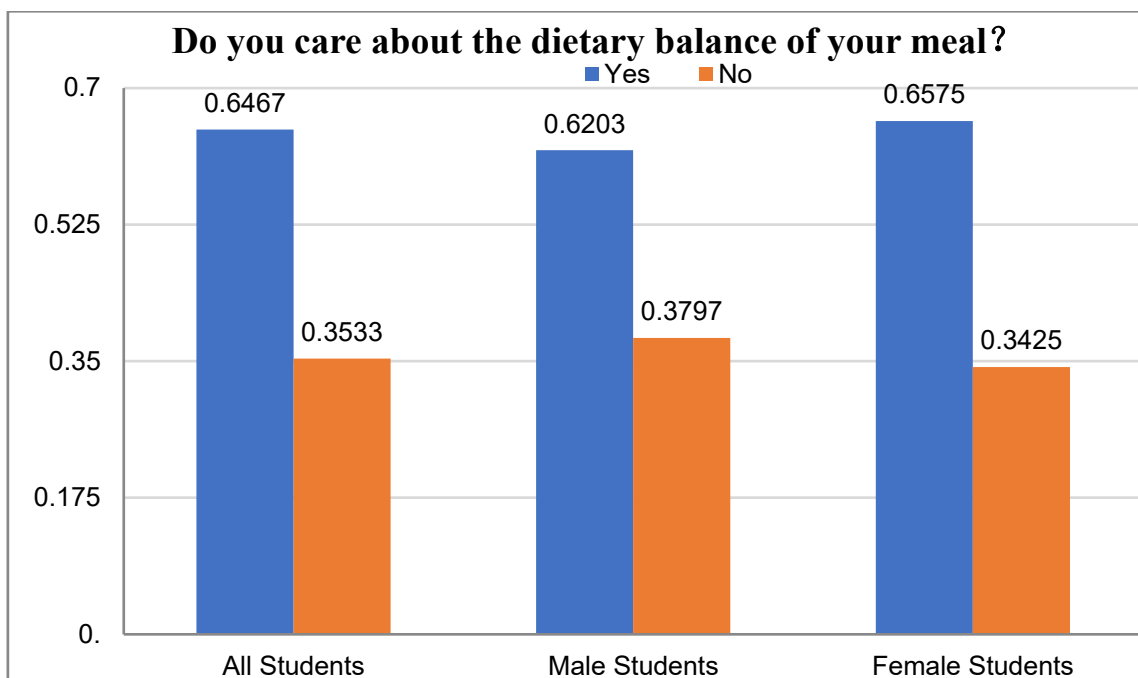


Figure 6. Responses of "Do you care about the dietary balance of your meal?"

The results showed that most of the students in Haidian Foreign Language School (97 students, 49 males, 48 females; 65% of all) care about the dietary balance of their meals, and only a few of the students (53 students, 30 males, 23 females; 35%) answered that they do not care. The main reason given by those who care is "for health", which accounted for 59%. For those who do not care, the reasons most frequently being reported are "taste of the food is the most important" (28%), and some just simply "do not care" (32%). It can be important for students to have a balanced meal, and students can learn about a healthy diet and its importance in many ways. Li's study analyzed the specific ways for high school students to acquire nutritional knowledge and found that the highest

proportion of students acquire nutritional knowledge from TV and the Internet, accounting for 80% of all ways (Li, et al., 2010). As for the importance, adolescents get energy and nutrition from food, to maintain the various functions and health of the human body, and the various nutrients that the human body needs are met in the diet. Having a healthy diet can improve the human body's physique, prevent the generation of various diseases, but also can enhance the overall physical quality of adolescents (Ma, 2022).

### 3.3.3. How frequent do you eat breakfast a week in campus?

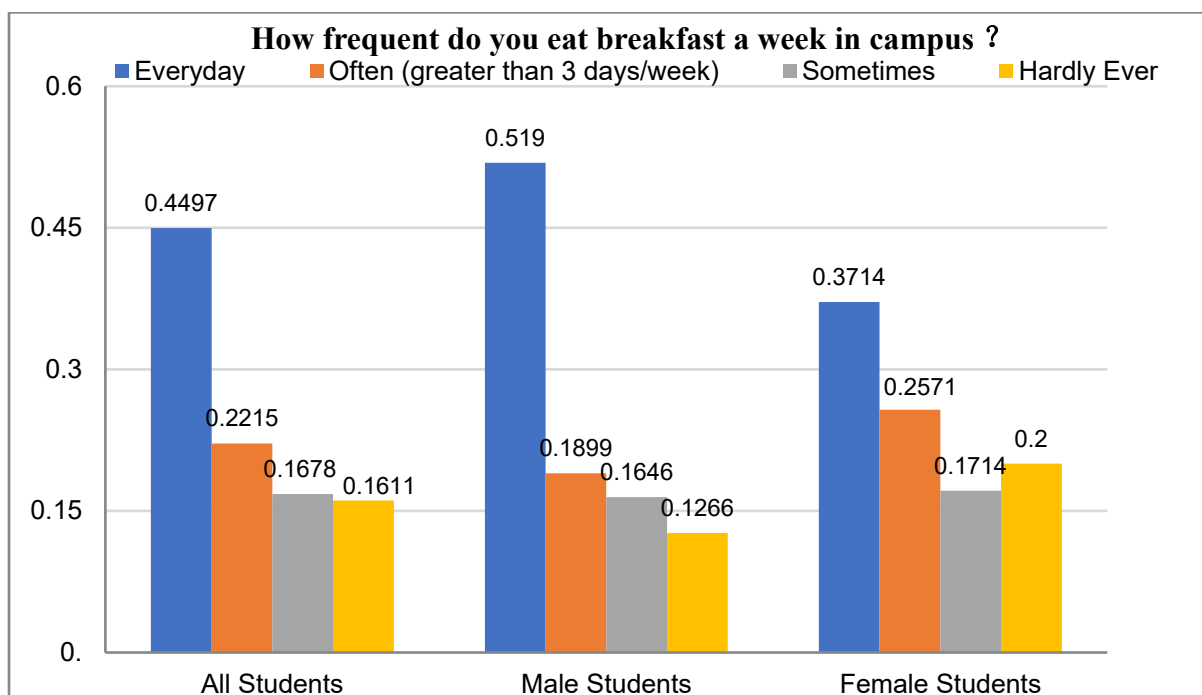


Figure 7. Responses of "How frequent do you eat breakfast a week in campus?"

The results showed that 67 students answered “every day” (45%, 41 males, 26 females); 33 students answered “more than three days per week” (22%; 15 males, 18 females); 25 students answered “sometimes” (17%; 13 males, 12 females); and 24 students answered “hardly ever” (16%; 10 males, 14 females). The biggest reason for HW students to skip breakfast being reported was the lack of time. This is probably due to getting up late in the morning. Ignoring breakfast for a long period may cause adolescents to develop the habit of not eating breakfast (Yang, 2020).

However, skipping breakfast can bring several negative health consequences to students. Skipping breakfast affects the body's energy and nutrient intake (Morgan, et al., 1986; Nicklas, et al., 1986). When adolescents skip breakfast, due to the changes in the body's metabolism, the nutrients provided to the brain will be reduced, which will have a certain impact on human learning, memory, and information-processing functions (Kanared, et al., 1997). Skipping breakfast will also reduce blood sugar, and if the blood sugar concentration is lower than the normal value, the brain's excitability will be reduced, people's response will be slow, will lead to inattention, affect the efficiency of learning and work (Miao et al., 2019)

Furthermore, skipping breakfast affect the secretion of stomach acid and bile discharge, thus weakening the function of the digestive system. At the same time, skipping breakfast means that students have a higher chance to eat more at lunch, which will cause a heavy burden on the stomach, resulting in gastritis, stomach ulcers, and other digestive system diseases (Yang, 2020). A study in PLOS ONE claims that skipping breakfast will slow down the activity of the liver, and the body will rest longer, this will cause fat to accumulate more, making it easier to develop a fat physique (Weiqi, 2023). This means that not eating breakfast cannot lose weight, but will become fat. On the contrary, a study in 1991 found that eating an adequate breakfast improved teenagers' short-term memory (Michaud, et al., 1991). A Swedish study also showed that children who ate more performed better in addition, to creativity and physical strength than those who ate less (Wyon, et al., 1997). In conclusion, skipping breakfast is bad for adolescents' physical health, and eating breakfast is good for their physical health.

### 3.3.4. How frequent do you eat lunch a week in campus?

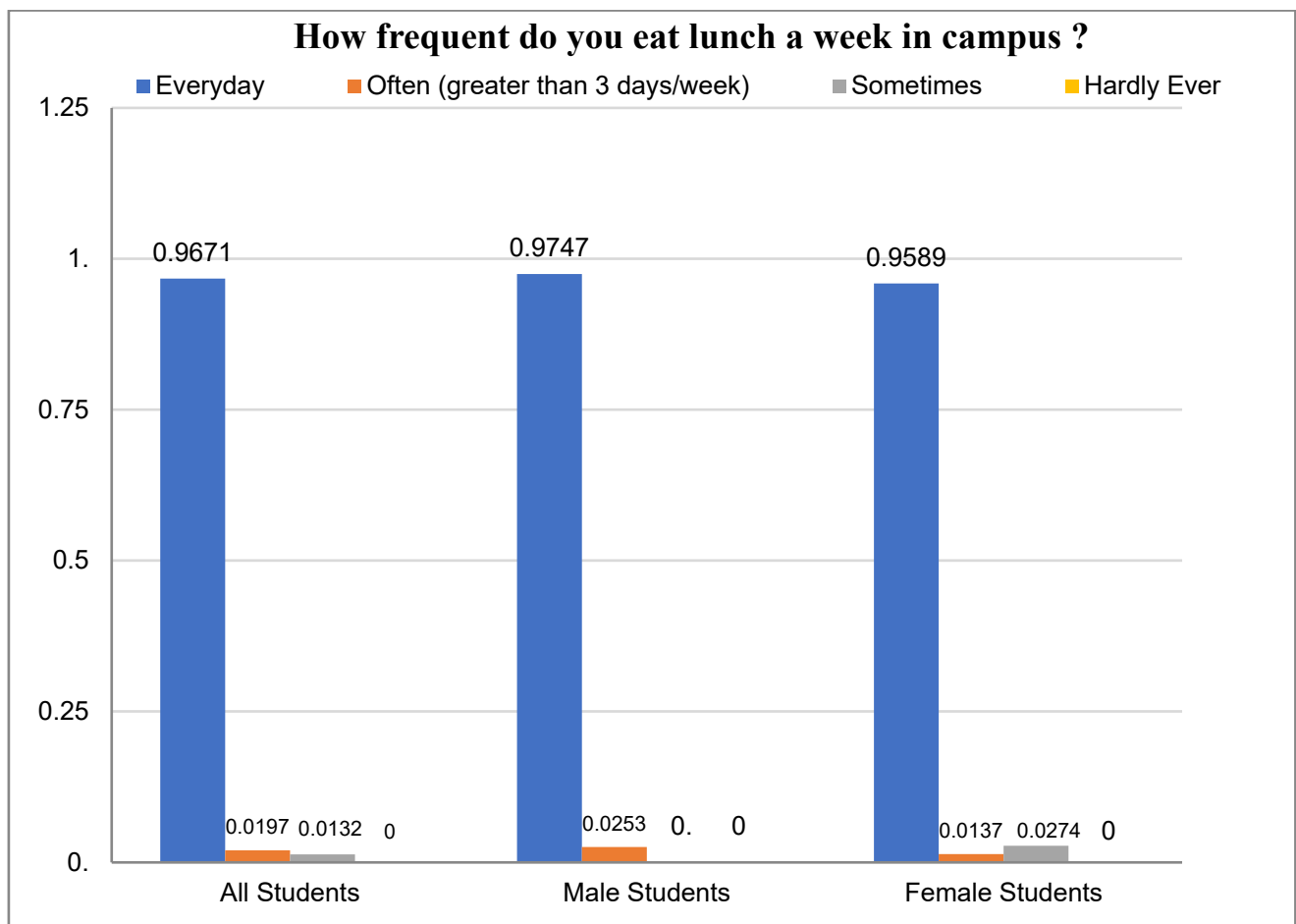
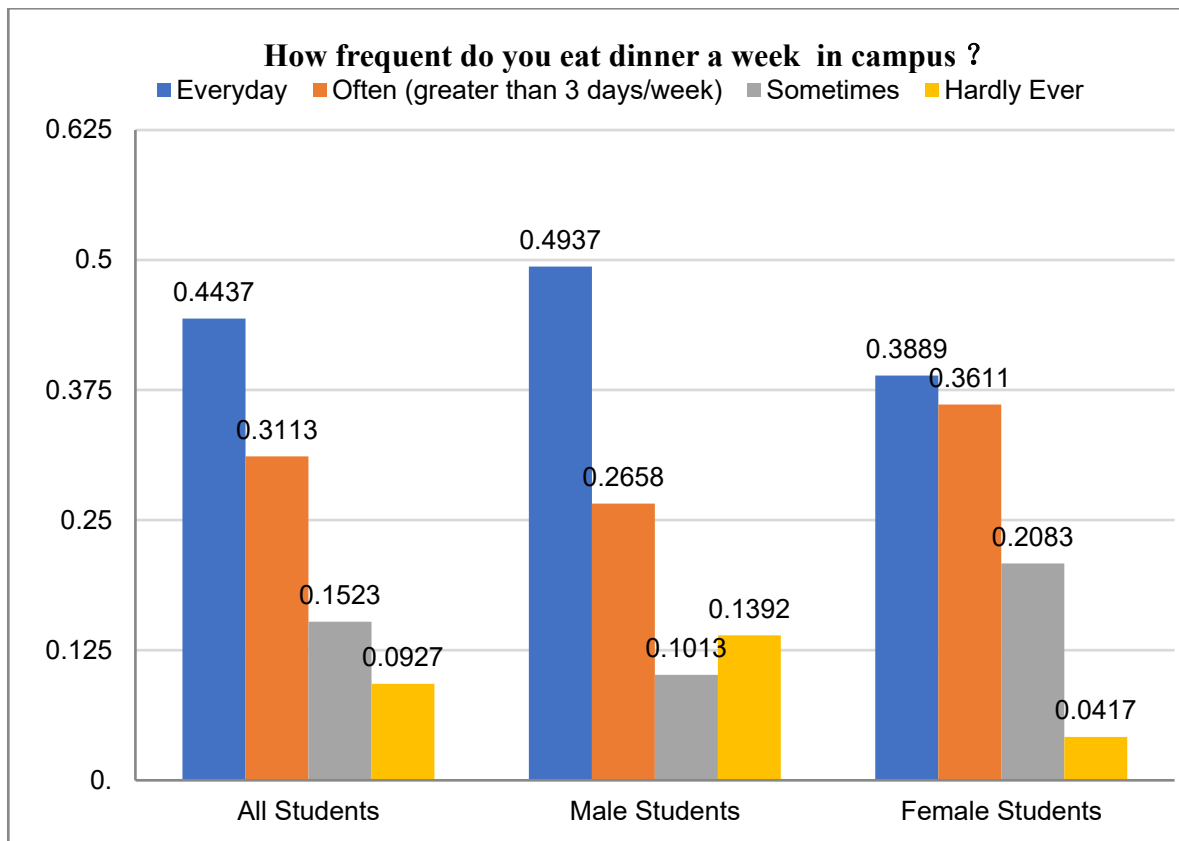


Figure 8. Responses of "How frequent do you eat lunch a week?"

For the question of “How frequent do you eat lunch a week?”, the majority (97%) of students answered “Everyday”, which is a good phenomenon. The most likely reason is because lunchtime is fixed at Haiwai and students have to go to the cafeteria at a together after class. There will also be supervision by the dormitory teachers, which whoever didn't

ate lunch will be reported and noted by the homeroom teacher. For all of the reasons, the frequency of having lunch for students will be higher compared to that of breakfast or dinner.

### 3.3.5. How frequent do you eat dinner a week?



**Figure 9.** Responses of "How frequent do you eat dinner a week?"

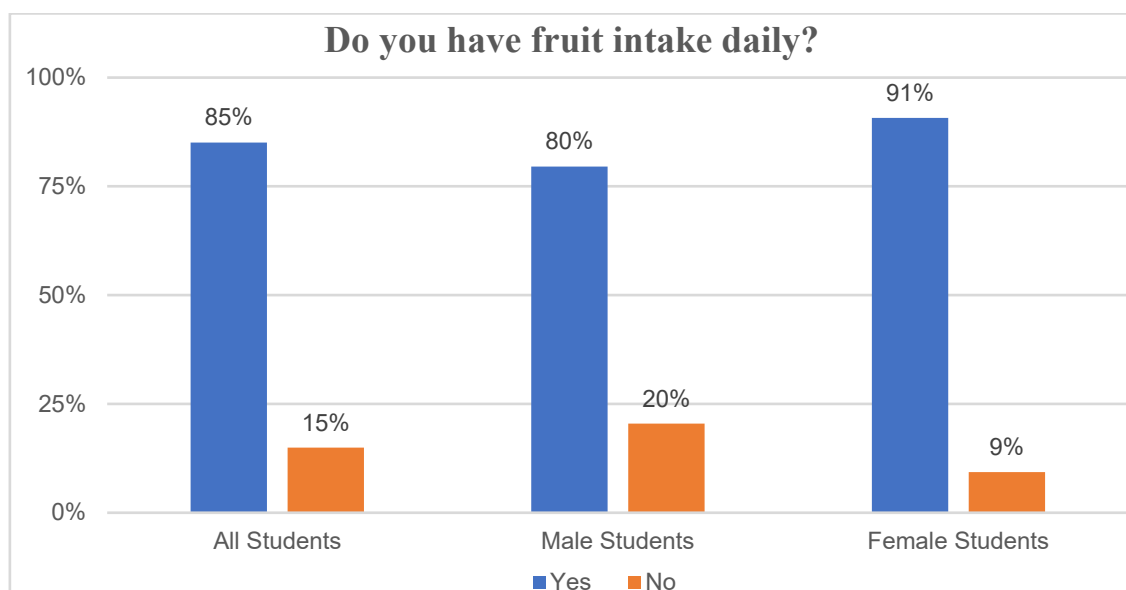
The results showed that 67 students answered "every day" (44%; 39 males, 28 females); 47 students answered "more than three days per week" (31%; 21 males 26 females); 23 students answered "sometimes" (15%; 8 males 15 females); 24 students answered "hardly ever" (9% 11 males 3 females). The major reason for HW students to skip dinner responded is "lack of time".

However, skipping dinner may have bad physical effects on students. Skipping dinner frequently can lead to insufficient secretion of glycogen and energy substances, which is easy to increase the response of glucagon in the body and increase the risk of diabetes (Zheng, 2016). Also, skipping dinner is easy to induce hypoglycemia, leading to insufficient nutrient supply to organs, and decreasing the

adolescent body's resistance (Batista, et al., 2016).

Among those who do not eat dinner daily, 14% of students reported that they "want to lose weight". However, skipping dinner is not helpful for weight loss. The mechanism of the relationship between dieting and weight gain is that after dieting people's appetite will increase, so they will be more eager to absorb higher calories, therefore the purpose of weight loss cannot be achieved (Chen, 2018). Moreover, the survey shows that women who skip dinner have a higher prevalence of obesity than men (Marín, et al., 2008). The harms and benefits of losing weight have also been discussed in the previous sections.

### 3.3.6. Do you have fruit intake daily?



**Figure 10.** Responses of "Do you have fruit intake daily?"

Out of the 87 responses, 74 students answered “Yes” (85%; 35 males 39 females) and only 13 students answered “No” (9%; 9 male 4 female). It is a good phenomenon that most students choose to eat fruit every day. In 2008, the University of Oxford and the Chinese Academy of Medical Sciences found that eating fruit can significantly reduce the risk of major cardiovascular diseases and prevent more non-fatal strokes and heart attacks (Du, et al., 2016). Eating fruits such as bananas, which are rich in dietary fiber, can promote gastrointestinal motility to prevent constipation (Li, 2022). Eating fruits can also maintain the skin and slow down aging, because fruits are not only rich in antioxidants and vitamin E, trace elements, but also have a large number of natural plant compounds can regulate the activity of detoxification enzymes (Zhao, 2014).

### 3.4. Limitations

There exist several limitations of this study.

1. Incomplete data. The statistics regarding the consumption of fruit are incomplete. The initial questionnaire didn't contain this question, which led to inaccuracy and incompleteness in the subsequent data collection and analysis part.

2. Inaccuracy of the estimation of the amount of calories and nutrients. First, our reference to the serving size of the dish may not be clear enough that students may not fully know the amount and may choose the serving size that deviated from what they ate. Second, the use of Boohee to estimate the caloric and macronutrient content of a dish may overestimate the amounts consumed. It does not take into account the fact that a person may not eat all components of a dish (including the remaining dish soup) when consuming it. Therefore, the caloric and fat content of a dish may be overestimated if such components are not consumed.

3. Inaccurate estimate for dinner. We let the students estimate their dinner amount by letting them choose multiples based on their lunch. The calories and macronutrients of dinner and lunch may not be the same, and students' preferences for dinner will also be different from lunch. For example, some students will not eat staple food in the evening, so using endorsement to estimate their intake of carbohydrates for dinner will be inaccurate.

## 4. Conclusion

This study compared the daily nutrient intake of Haidian Foreign Language Academy students to the standard amount provided by the Chinese nutrition society. The results showed that the amount of calorie intake of both male and female students is significantly lower than the standard amount suggested. However, the amount of carbohydrate and fat intake is significantly higher than the amount suggested. As for protein amount, male students' statistics did not show a significant difference when compared to the standard, whereas female students have a significantly lower protein intake compared to the standard.

This study also found that students in Haiwai engage in unhealthy eating habits. Less than half of the students responded that they care about the calories of the food they eat, but among those who answered 'yes', the percentage of girls is higher compared to boys. The main reason being reported for those who care is 'weight loss'. Moreover, this study also discovered that students in Haiwai frequently engage in unhealthy eating behaviors such as skipping

breakfasts or dinners, mainly for the reason of 'lack of time' or 'weight loss'. This can be detrimental to adolescent's growth. On the other hand, this study also found that most of the Haiwai students do care about their dietary balance for their health, and most of them eat fruits in their daily routine, which are beneficial eating behaviors for adolescents.

Given the high frequency of imbalanced diet and unhealthy eating behavior of Haiwai students, this study suggests that schools should consider adjusting the students' school schedules, change strategies, or make changes to the school cafeteria diet to eliminate Haiwai students' unhealthy eating behaviors so that Haiwai students can be more efficient and study better in school.

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