

# The Current Situation and Influencing Factors of Dietary Structure among Chinese College Students

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**Abstract.** Poor dietary structure has brought some negative impacts to Chinese college students. Although many literature has pointed out some defects and causes in the dietary structure of Chinese college students, there is still a lack of summary of these research results. The author searched multiple literature on the dietary structure problems of Chinese college students since 2021, classified them based on the causes of the mentioned dietary structure defects, and summarized several major reasons that lead to the current poor dietary structure of Chinese college students. At the same time, based on the relevant survey results of diet self-management (DSM) and some literature, the author attempts to provide suggestions that can improve the current situation. The reasons for the poor dietary structure of Chinese college students can be simply classified into four categories: excessive personal taste, poor dietary habits, lack of knowledge about healthy eating, and lack of a healthy eating environment. There is a phenomenon of mutual promotion and deterioration among these four types of reasons. A college student's DSM is a comprehensive result of multiple factors. Inducing positive factors that have a high impact on DSM can improve the DSM of college students and improve their dietary structure. In the future, the government and universities can mainly solve this problem from two aspects. On the one hand, it is to improve the personal nutritional literacy of students; On the other hand, it is to create a better dining environment.

**Keywords:** College students; poor dietary structure; diet self-management.

## 1. Introduction

As an important part of improving the living standards of residents, ensuring the nutrition and health of citizens has become one of the increasingly important issues that countries around the world are paying attention to. To achieve the goal of eliminating all forms of malnutrition by 2030 [1], governments around the world have increased their efforts to address various forms of unhealthy diets and malnutrition. At present, China has made some progress in achieving global nutrition goals, but the progress of this cause is not satisfactory, and one of the reasons for this result is the poor national dietary structure. Dietary structure refers to the quantity and proportion of various foods in a diet. According to data from the Global Nutrition Report website, the intake of red meat and fish by Chinese adults aged 20 and above is higher than the target range, reaching 750% and 135% of the highest target intake, respectively; However, the intake of whole grains, legumes, nuts, and fruits is still insufficient, accounting for 5%, 15%, 37%, and 45% of the minimum target intake, respectively; Only the intake of vegetables and dairy products is within the target range, which is 102% of the minimum target intake and 25% of the maximum target intake, respectively [2].

Poor dietary structure has brought some negative impacts to Chinese college students, such as obesity and weakened immunity [3,4]. A survey shows that 21.64% of male and 26.35% of female college students in China are overweight ( $BMI=24.0-27.9\text{kg/m}^2$ ) or obese ( $BMI\geq 28.0\text{kg/m}^2$ ) [3]. The deficiencies in the dietary structure of Chinese college students are the result of a combination of multiple factors. Exploring the causes of these deficiencies is crucial for achieving China's nutritional goals and for the learning and life of college students. Although many literature has pointed out some defects and causes in the dietary structure of Chinese university students, there is still a lack of summary of these research results. This article aims to summarize the discovered deficiencies and their causes in the dietary structure of Chinese university students, and attempt to propose countermeasures.

## 2. Status

University period is a critical stage of growth and development, during which students gradually develop and mature in physical and intellectual abilities. Significant changes have occurred in both physical and social development during school, making them susceptible to nutritional disorders. In addition, college students find it difficult to keep a lifestyle that is good for health due to various factors such as excessive stress, busyness, and lifestyle changes, [5]. The nutritional components in food are essential substances for human growth, development, and maintenance of bodily functions. A reasonable dietary structure and good lifestyle habits are of great significance to an individual's physical and mental health [6]. It can be seen that inappropriate dietary patterns and dietary quality may become key issues affecting the physical health of adolescents.

According to the Dietary Balance Pagoda released in the Chinese Dietary Guidelines (2022), Chinese residents should consume no more than 5g of salt, 25-30g of edible oil, 300-500g of milk and dairy products, 25-35g of soybeans and nuts, 120-200g of animal food, 300-500g of vegetables, 200-350g of fruits, 200-300g of grains, 50-100g of tubers, and 1500-1700g of water per day [7]. However, this dietary structure has not been well promoted among Chinese college students. A questionnaire survey on the daily dietary habits of medical students from three universities in Shanxi Province, China collected 6903 valid samples, including 1128 males (16.34%) and 5775 females (83.66%), with an average age of 20.29 years old. The results showed that regardless of the type of food, most or even more than half of the students (about 30% -60%) did not reach the recommended intake of the Chinese Dietary Guidelines for Residents (2022) (Table 1) [8]. This data partially reflects the inappropriate dietary structure of Chinese university students today. Considering that medical students have a better academic atmosphere in nutrition compared to their peers, the situation of other university students may be more pessimistic than shown in this data.

**Table 1.** The compliance rate of dietary structure among college students in three medical universities in Shanxi Province [8]

| Food category           | Recommended intake (g) | Number of unqualified personnel (n=6903) |
|-------------------------|------------------------|------------------------------------------|
| Salt                    | <5                     | 2049(29.68%)                             |
| Edible oil              | 25-30                  | 3234(46.85%)                             |
| Milk and dairy products | 300-500                | 4102(59.42%)                             |
| Soybeans and nuts       | 25-35                  | 4153(60.16%)                             |
| Animal food             | 120-200                | 3673(53.21%)                             |
| Vegetables              | 300-500                | 3179(46.05%)                             |
| Fruits                  | 200-350                | 3736(54.12%)                             |
| Grains                  | 200-300                | 3727(53.99%)                             |
| Tubers                  | 500-100                | 4151(60.13%)                             |
| Water                   | 1500-1700              | 3259(47.21%)                             |

Shaojie Liu et al. assessed the dietary quality of Shanghai medical students using the supplemental food frequency questionnaire (SFFQ) and the Chinese Healthy Eating Index (CHEI) in a study. According to the CHEI score, the scores for fruits, soybeans, fish, seafood, seeds, and nuts for both males and females are not optimistic; Compared to men, women score lower in whole grains; Compared to women, men score lower in tubers, total vegetables, dark vegetables, fruits, fish and seafood, dairy products, and red meat. This finding clearly shows that college students' diets are critically lacking in several essentials, most notably the extremely low intake of fish and seafood. Even 1.80% of boys and 1.16% of girls scored zero in this aspect [9].

### 3. Analysis

#### 3.1. Excessive Personal Taste

Compared to high school students, college students have more freedom in their dietary choices. University canteens have more dishes than high school canteens, and dining choices are not limited to canteens. In the case of having more choices, college students may tend to follow their personal taste preferences when dining, and place the reasonable combination of food in a secondary position, laying hidden dangers for poor dietary structure. A study on a vocational college in Nanning city surveyed 526 students, including 229 males and 297 females. According to the survey, only 48.3% of students prefer a light diet, 17.9% of students prefer salty and mouthful foods, 28.9% of students prefer sour and spicy foods, and 4.9% of students prefer sweet foods. This indicates that less than half of the students prefer a light diet. At the same time, this survey also showed that 30.0% of students like steaming and boiling, 16.2% of students like stewing and simmering, 40.1% of students like pan-frying and stir frying, and 13.7% of students like deep frying and grilling. Steaming, boiling, stewing, and simmering are considered relatively healthy cooking methods, while pan-frying, stir frying, deep frying, and grilling are considered unhealthy cooking methods. Less than half (46.2%) of students who prefer healthy cooking methods [10].

For Chinese college students, among all the diseases caused by dietary deficiencies currently observed, overweight and obesity are particularly frequently mentioned, and the factors that lead to these students having poor dietary structures often include personal tastes that lean towards high calorie diets. In a random sampling survey (n=1148) targeting college students in Nantong City, Jiangsu Province, there were a total of 499 males and 649 females, of which 108 males were overweight or obese, accounting for 21.64% of all males; 171 girls are overweight or obese, accounting for 26.35% of all girls. The survey results also found that overweight and obese college students consume significantly more fat, protein, and carbohydrates per day than the recommended daily intake of Chinese Dietary Nutrients Reference Intake. They consume less or severely less vitamins, minerals, and fiber per day than the recommended daily intake [3].

A survey conducted by Hongrui Li et al. targeting college students in Beijing divided participants (n=488, male 127, female 361) into four types based on their dietary patterns. Foods heavy in calories and salt, such as fried foods, sweets and desserts, red meat, flour-based meals, chicken, oil, and sugar-and rice-based drinks, were the hallmarks of one of these dietary patterns. This study found a positive correlation between this dietary pattern and BMI, and the incidence of overweight and obesity in young male college students is more likely to be related to this pattern being strongly inclined to unhealthy eating habits [11].

#### 3.2. Poor Dietary Habits

Poor dietary habits are a relatively broad concept, mainly reflected in three situations among Chinese college students: irregular dining, lack of moderation in diet, and consumption in shops with health risks.

Among the phenomenon of irregular dining, skipping breakfast is the most representative. A study conducted by Huiran Wang on 532 students from a certain university (without mentioning gender ratios) showed that a simple survey of these students showed that up to 27.8% of students often skip breakfast, 49.3% of students occasionally skip breakfast, and even 0.9% of students never eat breakfast. Only 22.0% insist on eating breakfast every day. The study mentioned that there are three main reasons why these students do not eat breakfast: first, time is tight, and some students are accustomed to going to bed late and waking up late in the morning, choosing not to eat breakfast or hastily taking a bite on the way to the classroom; Secondly, students who missed the first two classes in the morning are unwilling to go to the cafeteria for meals or buy breakfast; The third issue is that college students lack awareness of nutrition and health, fail to fully recognize the importance of breakfast, and are unable to arrange their daily meals and routines reasonably [12].

The lack of moderation in diet, namely overeating or eating too little, is related to psychological factors. A study conducted by Chenwei Fang on college students from various universities in Kaifeng City (n=371, male 116, female 255) showed that 24.26% of college students would choose to overeat when in a bad mood, while 49.06% of college students would choose not to eat or eat too little, indicating that emotions are an important factor leading to uncontrolled eating [13].

In China, food stores with health risks are mainly concentrated in takeout and roadside stalls. Huiran Wang's research shows that 12% of students often order takeout (>3 times/week), 62.8% of students occasionally order takeout (<3 times/week), and 25.2% of students never order takeout [12]. Chenwei Fang's research shows that 23.18% of students enjoy roadside stalls and frequently consume them, 56.06% of students feel that roadside stalls are not hygienic but sometimes consume them, 19.41% of students rarely consume at roadside stalls, and only 1.35% of students strongly oppose roadside stalls [13]. Both studies have pointed out that these shops with health risks often have high oil and salt content and unhygienic raw materials, and long-term consumption is not conducive to physical health. The reason why college students generally hold a tolerant attitude towards these shops is partly because they want to change flavors or seek convenience, and partly because they do not fully realize the harm that long-term consumption in these shops can bring to their bodies.

There are various factors that contribute to the formation of these unhealthy habits. According to a questionnaire survey targeting college students in the Pearl River Delta region (n=210, 67 males, 143 females), among the sub healthy college student population, the three factors that have the greatest impact on their dietary habits are busy academic work, lack of family supervision, and being influenced by those around them, and these situations are becoming increasingly common [14].

### 3.3. Lack of Knowledge about Healthy Eating

The lack of knowledge related to healthy eating is also one of the reasons for the poor dietary structure of Chinese college students. Certain difficulties, such as the nutrients contained in different fruits, the advantages of eating raw vegetables, meals that cannot be ingested concurrently, and foods that are damaging to human health, are not well understood by certain college students when it comes to dietary nutrition and health. [15]. Yali Tang et al. conducted a college nutrition questionnaire survey on vocational college students at Jiangmen Vocational College of Traditional Chinese Medicine, and obtained 331 valid samples, including 71 males and 260 females. The survey found that 75.83% of the students had paid attention to the knowledge of food health, and they would obtain this knowledge through short videos, official account, lectures, school publicity activities and other ways, which reflects the high attention of these students to food health knowledge. However, these students still have a very limited understanding of the Chinese Dietary Guidelines for Residents, with 51.36% of students answering correctly about the recommended intake of salt; 32.02% of students answered correctly about the recommended intake of edible oil; 39.27% of students answered correctly about the recommended intake of fruits; 31.12% of students answered correctly about the recommended intake of vegetables [16]. This data indicates that these students have a serious lack of mastery of basic knowledge in healthy diets.

Wenjing Deng et al. obtained 273 valid samples through recruitment in a questionnaire survey aimed at college students across China, and the distribution of participants' hometowns was consistent with the population proportion in each region of China. The results of the survey demonstrated a small but statistically significant negative association between participants' overall nutritional knowledge score and their attitude toward eating ( $r=-0.128$ ,  $p<0.05$ , where  $r$  is the relationship between nutritional knowledge score and dietary attitude), meaning that the likelihood of developing dietary disorders decreases with increasing nutritional knowledge [17].

### 3.4. Lack of a Healthy Eating Environment

College students are often exposed to unhealthy eating environments because canteens sometimes provide unhealthy food, and nearby shops and vending machines also sell unhealthy snacks and drinks. Additionally, college students often engage in alcoholic beverages in social activities. Xingbo Li et

al. investigated the food service environment of 52 food stalls and 3 food squares in a university campus in Shijiazhuang, China, in a study. They used a verified tool called Chinese version of the Nutritional Environment Measurement Survey for Stores (C-NEMS-S) [18] to score the food environment of these stalls. The results showed that only 5 out of 52 stalls sold fruits, and the stalls selling fruits and seafood were significantly fewer than those selling vegetables, livestock, and poultry. In one of their interviews, the cafeteria manager stated that this is due to the short shelf life of fruits and seafood, which are prone to decay, resulting in limited supply of these foods. In addition, in terms of health choices, the dietary environment of these stalls tends to provide whole grains and lean meat, while Western universities tend to provide skim milk, sugar free soft drinks, juice, and non fried vegetables. China's grain-based food culture and the restricted selection of beverages offered in university cafeterias have an impact on these discrepancies. However, the high cost of healthy foods such as whole grains and lean meat limits healthy choices [19].

#### 4. Suggestions

The above four types of reasons are interrelated, and the occurrence of one situation can induce the occurrence of others. For example, if a person lacks nutritional knowledge, it can lead to a decrease in their health awareness, leading to a decrease in self-control and the development of unhealthy eating habits. On the contrary, if a person does not restrain their unhealthy eating habits, their attention to nutrition and health-related knowledge will also relax. This will create a vicious cycle. There is a concept that may encompass these four types of reasons, namely diet self-management (DSM), which refers to an individual's control over dietary behavior. Intervention in students' DSM can improve their dietary structure [20].

Li Zhou et al. recruited 33 college students from different universities in China, including 13 males and 20 females. These students were asked which factors may affect their DSM, and ultimately divided the DSM influencing factors into four categories: personal factors, family factors, school factors, and social factors [20]. At the same time, this study also counted the frequency at which these influencing factors were mentioned, from which the magnitude of the influence of a certain influencing factor can be seen.

The personal factors mentioned more frequently are DSM knowledge, preferences, self-discipline, and mood. Schools can be used as a driving force to carry out intervention plans to strengthen students' self-regulation and self-discipline skills in diet, such as promoting health questionnaires that have passed reliability and validity tests among college students [21] to remind them to learn about health knowledge, or using college student clubs to carry out promotional activities [15]. These intervention plans should focus on the dissemination of knowledge and strengthen students' self-restraint.

The most frequently mentioned family factors are family supervision and family dietary habits. Elders will pass on their dietary attitudes during the growth process of their offspring, affecting their self-management of diet in adulthood. Therefore, it is necessary for the government to encourage family members to play a positive role in the dietary management of offspring, in order to improve their dietary behavior in adulthood [20].

The school factor mentioned more frequently is the variety of cafeteria dishes. As the main place for most of the time for college students to study and live, schools play an important role in helping students form a good DSM. School canteens should strengthen control measures, adopt a scientifically reasonable mixed diet, ensure an appropriate supply of various nutrients, and meet the requirements of college students for food color, aroma, and flavor as much as possible. At the same time, attention should be paid to controlling the amount of oil, salt, and other seasonings, and providing more light meals [15].

The social factors mentioned more frequently are cultural customs and food advertising. These socio-cultural factors play a crucial role in influencing diet [22]. It is necessary for the government to increase efforts to maintain and promote a healthy food culture, and resist unhealthy food culture. At

the same time, the government can impose certain restrictions on advertisements for unhealthy foods to prevent them from misleading college students and forming harmful DSM [20].

In summary, these suggestions can be summarized into two aspects. On the one hand, focusing on the transformation of students from their own perspective; On the other hand, starting from the outside world, creating a more conducive environment for students to form a good DSM. Both of these are intervention directions that the government should consider in the future.

## 5. Conclusion

From the analysis results, the reasons for the poor dietary structure of Chinese college students can be classified into four categories: excessive personal taste, poor dietary habits, lack of knowledge about healthy eating, and lack of a healthy eating environment. These four types of reasons are mutually causal and may form a vicious cycle. Poor dietary structure has led to the occurrence of various diseases, seriously endangering the health of Chinese university students and affecting the future development of Chinese society. Therefore, it is necessary for Chinese society to take countermeasures. The measures taken should focus on college students themselves, with the ultimate goal of providing every Chinese college student with basic knowledge of healthy eating, self-control in controlling their diet, and an environment for obtaining healthy eating.

This article summarizes the discovered deficiencies and their causes in the dietary structure of Chinese university students from numerous previous research results. It ought to serve as a resource for studies on the dietary habits of Chinese college students and the creation of relevant regulations. In addition, it can also help students recognize the possible deficiencies in their dietary structure and serve as a reminder.

The limitation of this article mainly lies in the research object. Different research focuses on different objects, and they are mostly limited to a certain region or a few universities. This may result in one research result not being applicable to the subjects in another study, ultimately leading to some of the conclusions in this article being only applicable to specific regions.

In the future, the government and universities can use various means to intervene in the dietary structure of college students, mainly from two aspects. On the one hand, it can improve the personal nutritional literacy of students, such as promoting health questionnaires among college students or conducting promotional activities through college student clubs, in order to reverse the erroneous understanding of nutrition and healthy eating among college students and strengthen their health awareness; On the other hand, it is to create a better dietary environment, such as strengthening the control of cafeterias or resisting unhealthy dietary culture, to meet the nutritional needs of college students and promote the formation of good DSM.

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