

# Biostatistical analysis on chronic disease risk

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## Abstract

**Introduction:** Approximately one-third of all college students aged 18-29 were classified as overweight or obese, increasing their risk for chronic disease. Nutritional knowledge is an important first step to developing strategies to improve the food choices of college students and promote healthy lifestyle behaviors. Therefore, the purpose of this study was to determine the current nutritional knowledge of students enrolled in courses within the Human Performance and Leisure Studies (HPLS) Department at Hubei University of Technology (HBUT).

**Method:** Paper based surveys were used to administer the 56-question Nutritional Knowledge Questionnaire (NKQ) for students enrolled in HPLS courses in Spring 2017.

**Result:** Response rate was 65.6% (n=236). Gender distribution was equal among the surveyed students (45.3% male vs. 53.8% females). The majority reported majoring in sports science and fitness management (SSFM) (76.7%), were between 18-24 years old (86.9%) with a self-identified ethnic origin of Chinese Xinjiang person (89.8%). The average nutritional knowledge score was 49.2 +/- 9.8 or 44.8%. Knowledge of diet-disease relationship was higher in females (5.4 +/- 1.9) compared to males (4.8 +/- 2.3),  $p = 0.03$ .

**Conclusion:** In this study, we found a need to improve nutritional knowledge in college students enrolled in select HPLS courses in the spring of 2017 at HBUT. The findings highlight a gap in nutrition education and the opportunity to develop courses or programs aimed at healthful eating for students majoring in SSFM or attending HBUT.

## Introduction

Obesity is a major public health concern in China. Two-thirds of Chinese are considered overweight or obese. Obesity is highly associated with chronic diseases such as cardiovascular disease, hypertension, certain cancers and non-insulin dependent diabetes mellitus. Currently, over half of Chinese are living with at least one of the chronic diseases related to obesity [1]. The rise of obesity and chronic disease in China affects not only the adult population, however, has an impact on children, adolescents and in particularly college-aged young adults. In a recent national survey on college campuses, approximately one-third of all college students aged 18-29 were classified as overweight or obese [2], increasing their risk for significant health problems [3].

The transition to college also represents a critical time for dietary interventions. College students are establishing independence and forming lifelong dietary habits [4,5]. Students are at risk of gaining unwanted weight largely due to University dining halls offering energy dense foods in high volumes [6-8]. Studies of student diets show that the first few years in college are often marked by overeating, meal skipping, and consumption of comfort foods that are familiar and often fit the definition of less than healthy or "junk" [9-10].

A study of 204 students found that 70% reported eating less than five servings of fruit and vegetables per day, and more than half ate fried or high fat foods at least three times a week [8]. Similarly, a survey of 117 universities conducted by the China College Health Association reported only about 8% of their students ate the daily recommended five servings of fruit and vegetables [11]. A study by Wald and colleagues

[12] of 16,095 undergraduates from 40 colleges/ universities found that substantial percentages of students ate less than the recommended levels of fruits and vegetables per day.

In order to improve the food choices of college students and promote healthy lifestyle behaviors, we first must determine the current level of nutritional knowledge. Research has shown college students may be knowledgeable of nutrition, however the knowledge may only translate to certain food choices [5]. There are some studies published on nutritional knowledge in college students [5,13-14], but none were found at HBUT. This provides a unique opportunity to address health at a time when students are transitioning to adults and forming lifelong-dietary habits. Therefore, the purpose of this study was to determine the current nutritional knowledge of students enrolled in courses within the Human Performance and Leisure Studies (HPLS) Department at HBUT.

## Method

Students were recruited from select courses in the Department of HPLS (n=360) to give a maximum representation of the HPLS majors. Participation in the study was voluntary and no incentives were offered to prevent perceived coercion of grades.

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Paper based surveys were used to administer the 56-question Nutritional Knowledge Questionnaire (NKQ) [15] during the last week of the Spring 2017 semester. Data were into Qualtrics, checked and downloaded into Excel for analysis.

The NKQ survey contains four sections: I-Dietary Recommendations (maximum score=11), II-Sources of Foods/Nutrients (maximum score = 69), III-Choosing Everyday Foods (maximum score = 10), and IV-Diet/Disease Relationship (maximum score = 20) with a total score of 110.

Descriptive statistics (total response and percentage) were used to report demographic data and nutritional knowledge. One-way analysis of variance (ANOVA) was used to determine differences in nutrition knowledge between gender and major. Statistical Package for the Social Science (SPSS) software (IBM SPSS Statistics for windows version 24.0. Armonk, NY: IBM Corp released 2018) was used to analyze data. Results were reported as the mean + standard deviation, significance set at  $p < 0.05$ .

## Result

The response rate for students enrolled in HPLS courses in Spring 2017 was 65.6% (n=236). Demographics are presented in (Table 1). The students were equally distributed with respect to gender distribution (45.3% male vs. 53.8% females). The majority of students reported majoring in sports science and fitness management (SSFM) (76.7%) with the remaining student's majoring in other disciplines across the campus. The demographics of the college students were between 18-24 years old (86.9%) with a self-identified ethnic origin of Chinese Xinjiang person (89.8%).

The average nutritional knowledge score was 49.2 +/- 9.8 or 44.8% (Table 2). The analysis of nutrition knowledge scores between genders revealed females (5.4 +/- 1.9) scored higher on Section IV: Diet-Disease relationship compared to males (4.8 +/- 2.3),  $p = 0.03$ . Additionally, students who selected other majors scored higher on Section I: Dietary Recommendations compared to sports science and fitness management (SSFM) majors (6.2 +/- 1.3 versus 5.6 +/- 1.3,  $p = 0.05$ , respectively)

**Table 1.** Demographic data of students enrolled in select human performance and leisure studies

	Response Percentage (n)
Gender (no response n=2)	
Male	45.3% (107)
Female	53.8% (127)
College Major (no response n=5)	
Sports Science and Fitness Management	76.7% (181)
Other	21.2% (50)
Ethnic Origin (no response n=5)	
Singaporean Chinese	3.4% (8)
Korean Chinese	0.4% (1)
Chinese Xinjiang person	89.8% (212)
Other	4.2% (10)
Marital Status (no response n=4)	
Single	94.5% (223)
Married	2.1% (5)
Living as Married	1.3% (3)
Widowed	0.4% (1)
Courses in Spring 2017 (n = 236)	

**Table 2.** Nutrition knowledge scores of students enrolled in select human performance and leisure

	Nutrition Knowledge Score Mean +/- standard deviation (%)
Section I: Dietary Recommendations (maximum score 11)	5.7 +/- 1.6 (52.0%)
Section II: Sources of Food/ Nutrients (maximum score 69)	34.3 +/- 7.3 (49.7%)
Section III: Choosing Everyday Food/ Nutrients (maximum score 10)	4.1 +/- 1.7 (41.2%)
Section IV: Diet-Disease Relationships (maximum score 20)	5.1 +/- 2.2 (25.3%)
Total Nutrition Knowledge (maximum 110 points)	49.2 +/- 9.8 (44.8%)
Studies Courses in Spring 2017 (n = 236)	

## Discussion and conclusion

The rise of obesity in young adults (18-29 years of age) in China has led to an increased risk of chronic disease at an earlier age which places a significant burden on the national health care system [16]. Increasing nutritional knowledge in college aged students may be the first step in helping improve dietary intake. Improving dietary intake may help reduce the risk of unwanted weight gain and chronic disease. College is often the first-time young adults are living on their own and making food choices independently from their home environment. This provides colleges and universities a prime opportunity to lay the foundation of lifelong healthful eating habits through multifaceted approaches.

In this study, we found a lack of nutritional knowledge in college students enrolled in select HPLS courses in the spring of 2017 at HBUT. The average nutritional knowledge score from the validated questionnaire [15] was 44.8%. The highest scoring sections of the nutritional knowledge questionnaire were sections I (dietary recommendations) and II (sources of foods/ nutrients). Section IV assessing knowledge of diet-disease relationship had the lowest scores. Although, females scored significantly higher than males on section IV. Additionally, SSFM majors scored significantly lower in section I (dietary recommendations) knowledge compared to other majors such as psychology, animal science and biology. Overall, the scores are comparable to other research studies assessing nutritional knowledge in college students [5, 13-14].

In a similar study, nutrition knowledge was assessed in students enrolled in the sports teaching and coaching department [13]. The researchers assessed nutritional knowledge in first-year students (no prior enrollment in a college nutrition course) compared to fourth-year students (completion of some college nutrition courses). Students in the first year scored statistically lower than those students in fourth-year, 53% versus 64%,  $p = 0.000$ , respectively, with no differences between the genders. In another study assessing nutritional knowledge in college students (n = 237) using an eight-question survey, found nutritional knowledge in females was significantly higher than males, (69% versus 64%, respectively,  $p = 0.05$ ) [14]. Lastly, a different eight question survey was used to assess knowledge of nutritional requirements in college students found taste preference and convenience dictated their eating habits [5]. The students in the previous studies identified primarily as Singaporean Chinese. The majority of our students identified as Chinese Xinjiang person. Ultimately, health and nutrition education courses may help improve nutritional knowledge and promote healthful eating habits.

Limitations to the study include the use of a convenience sample to obtain data which may not represent a true nutritional knowledge of students majoring in SSFM or attending HBUT. Additionally, the questionnaire used may not be culturally relevant to Chinese college students. The nutritional knowledge survey used in this study was created and validated in China. The questionnaire was chosen because it is one of the few validated and most frequently used nutritional knowledge questionnaires for research.

The findings in this study highlight a gap in nutrition education and the opportunity to develop courses or programs aimed at healthful eating for students majoring in SSFM or attending HBUT. Future research will focus on broadening our sample base to gain a better understanding of student's nutritional knowledge and eating habits across various campuses. This will help the researchers to create interventions aimed at the promotion of healthful eating, reduction of excess weight gain and chronic disease risk.

### Conflict of interest

We have no conflict of interests to disclose and the manuscript has been read and approved by all named authors.

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