

## Prevalence and factors associated with nutritional status among female university students in Florianópolis, SC

### *Prevalência e fatores associados ao estado nutricional de universitárias ingressantes em Florianópolis, SC*

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**Abstract** – University admission provides the adoption of new behaviors, which can affect the health of students. The objective of this study was to identify the characteristics and factors associated with the nutritional status of female university students in Florianópolis, SC, and to assess their prevalence. Socioeconomic and behavioral variables were obtained by a structured questionnaire. Nutritional status was assessed based on body mass index, waist circumference and body fat percentage. Food consumption data were obtained through the application of a 24-hour food recall. The chi-square test was used to select independent variables associated with body mass index. Response rate in this study was 86.6% (total of 220 students). Most students were teenagers (57.7%), lived with parents (69.5%), were sedentary (55.9%), and eutrophic (72.3%). The prevalence was 15.9% for underweight and 11.8% for overweight. Breakfast was the main meal most frequently omitted (16.9%), and most students (79.0%) had an energy intake below 2,200 kcal. Energy intake was the only variable inversely associated with nutritional status ( $p = 0.0358$ ). There is a need to implement educational health measures in universities in order to establish healthier lifestyle and eating habits.

**Key words:** Feeding behavior; Nutritional status; Students.

**Resumo** – O ingresso no meio universitário proporciona a adoção de novos comportamentos, que podem repercutir na saúde dos estudantes. O objetivo do presente estudo foi avaliar o perfil e fatores associados ao estado nutricional de universitárias ingressantes em uma universidade pública de Florianópolis, SC. As variáveis sociodemográficas e comportamentais foram obtidas por meio de entrevista com aplicação de questionário estruturado. O estado nutricional foi avaliado com base no índice de massa corporal, circunferência da cintura e percentual de gordura corporal. Os dados de consumo alimentar foram obtidos por meio da aplicação de inquérito recordatório alimentar de 24 horas. O teste Qui-quadrado de Pearson foi aplicado para selecionar as variáveis independentes associadas ao índice de massa corporal. A taxa de resposta obtida no presente estudo foi de 86,6%, totalizando a participação de 220 universitárias. As estudantes, em maioria, eram adolescentes (57,7%), residiam com os familiares (69,5%), eram sedentárias (55,9%) e eutróficas (72,3%). A prevalência de baixo peso foi de 15,9%, enquanto a de excesso de peso foi de 11,8%. O desjejum foi a refeição principal de maior omissão entre as universitárias (16,9%) e a maioria delas (79,0%) apresentou consumo energético inferior a 2.200 quilocalorias. O consumo energético foi a única variável associada, inversamente, com o estado nutricional ( $p = 0,0358$ ). Faz-se necessária a implantação de medidas educativas de saúde na universidade, a fim de estabelecer hábitos de vida e de alimentação saudáveis.

**Palavras-chave:** Comportamento alimentar; Estado nutricional; Estudantes.

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## INTRODUCTION

Admission to higher education is considered an outstanding moment in the psychosocial development of young students, because new behavior patterns are adopted in this period, as well as social and affective experiences<sup>1</sup>. The transition occurs simultaneously with a number of other changes in the student's life. For many youngsters, the university is the first time that they will have to be responsible for managing their housing, feeding and finances<sup>2</sup>.

In other words, in addition to the significant psychosocial instability characteristic of adolescence and young adulthood, entering the university environment provides new social relations and the adoption of new behaviors, such as different eating patterns, physical activity, alcohol consumption and smoking, which can interfere with the physical, social and biological formation of this group and may make these individuals vulnerable to health problems<sup>3</sup>.

Research has revealed that college students show low prevalence of healthy eating, with a high intake of fat and added sugar and a low intake of fruits and vegetables<sup>4</sup>. Such practices, associated with a low level of physical activity, may contribute to the increasing prevalence of obesity in this population<sup>5</sup>.

It is known that obesity and the incidence of eating disorders has been increasing in recent decades, particularly reaching teenagers and young female<sup>6-8</sup> adults. Notwithstanding, few studies have investigated the nutritional profile of university students and factors associated with such profile. Such data could be useful in guiding the planning and implementation of health interventions at the university - an institution considered to be important in forming students' habits<sup>9</sup>.

Therefore, the objective of this article was to describe and investigate factors associated with the nutritional status of female college students at a Brazilian public university in Florianópolis, SC, Brazil.

## METHODOLOGICAL PROCEDURES

This is a cross-sectional study conducted with a probability sample of 220 entrant female students in 55 graduate courses at the Federal University of Santa Catarina (UFSC) in the first semester of 2006. It is also an integral part of a research project that sought to identify the prevalence of abnormal eating behaviors<sup>10</sup>.

Considering the total of students enrolled in the semester during which this research was conducted ( $n = 935$ ), the minimum sample size was calculated using the following parameters: confidence level of 95%, sampling error of 2.85% and prevalence of abnormal eating behaviors of 5.5%<sup>11</sup>, yielding a minimum sample of 212 students. In order to compensate for possible losses or refusals, the minimum size was increased by 20%, totaling 254 students.

The selection of students was conducted randomly, from a systematic sample, always considering the third subsequent student in an alphabetical list of students from UFSC courses. The first student was chosen from a

list of random numbers generated by EPI INFO 6.0 software. The sample included female students entering university at UFSC in the first semester of 2006 and excluded male students, female students who were not attending the first half of their course, pregnant women and people with special needs that made it impossible for them to participate in the research.

Data collection was carried out between June 5, 2006 and December 8, 2006, including socio-demographic (age, parents' educational level in years of study, monthly household income), behavioral (people with whom the student lives, physical activity, omission of meals) and nutritional (food consumption and nutritional status) variables.

### Socio-demographic and behavioral variables

The students were divided into two age groups: adolescents aged 19 years or less and adults aged 20 years or more<sup>12</sup>.

Maternal and paternal educational levels were expressed in years of study and categorized for association analysis into: 1 to 8 years of schooling and 9 or more years of schooling.

Net monthly household income, reported by the students, was expressed in absolute values (in Brazilian Reais). For association analysis with the outcome, the monthly household income was converted into minimum wages (MW) and distributed into quartiles.

The variable that evaluated with whom the students lived was categorized into: live alone, with parents or with roommates. Physical activity referred to the practice of habitual leisure activities and was assessed by the presence or absence of physical activity and by the frequency of physical activity in days and hours.

### Food consumption

Food consumption and omission of meals were investigated with a 24-hour food recall, applied in a single day by the research team, with the help of tools for taking photographic records and measuring food portions, both of them developed by the Ministry of Health<sup>13</sup>.

Food consumption was evaluated by calculating energy consumption in kilocalories and macronutrient consumption in grams (proteins, lipids and carbohydrates). These amounts were recorded in Nutwin version 2.5 software, in which the daily intake of each nutrient was obtained. The daily intakes of nutrients were analyzed following FNB/IOM recommendations<sup>14</sup>.

The results of energy consumption were grouped into two categories according to the Recommended Dietary Allowances (RDA)<sup>15</sup> for females in the age group from 15 to 50 years: energy consumption < 2,200 kcal and energy consumption  $\geq$  2,200 kcal.

### Anthropometry

Weight, height, waist circumference (WC), and biceps, triceps, sub scapular and suprailiac skinfolds were measured according to the recommendations of Lohman et al<sup>16</sup>.

Students' weight and height were used for the calculation of Body Mass Index (BMI), assessed with the criteria recommended by the World Health Organization (WHO)<sup>17</sup>, which considers individuals with BMI < 18.5 kg/m<sup>2</sup> as underweight, between 18.5 kg/m<sup>2</sup> and < 25.0 kg/m<sup>2</sup> as eutrophic, between 25.0 kg/m<sup>2</sup> and 30.0 kg/m<sup>2</sup> as overweight, and ≥ 30.0 kg/m<sup>2</sup> as obese.

WC was measured at the midpoint between the last rib<sup>17</sup> and iliac crest and classified according to criteria based on Han et al<sup>18</sup>, suggested by the WHO<sup>17</sup>, which establish that WC < 80 cm represents absence of risk of abdominal obesity and WC ≥ 80 cm represents risk of abdominal obesity.

Biceps, triceps, sub scapular, suprailiac skinfold thickness were measured three times in order to estimate body fat percentage (%BF) from the formula of Durnin and Womersley<sup>19</sup>, considering the average of the three measurements, and the classification followed the criteria proposed by Lohman<sup>20</sup>: malnourished %BF ≤ 8%; eutrophic %BF > 8% and 32% <; obese %BF ≥ 32%.

### Statistical analysis

Statistical calculations were performed with the support of Epi info version 3.5.1. In order to characterize the sample, variables were described as measures of central tendency and dispersion (median and standard deviation). The Pearson's chi-square test was applied to select independent variables associated with the outcome. Significance level was set at 5% ( $p \leq 0.05$ ).

The outcome of this study was BMI categorized into: underweight, entropy and overweight (overweight and obesity), and the independent variables were: age, maternal and paternal education, monthly household income, people with whom the student lives, physical activity, and energy consumption.

### Ethical aspects

This study was approved by the Committee of Ethics in Research with Humans at the Federal University of Santa Catarina (Protocol 047/06). The data were collected after obtaining written consent from the coordinators of the courses, as well as from the selected students.

## RESULTS

The response rate obtained in this study was 86.6%, totaling 220 female university students, with a 13.4% loss. The reasons for the losses were: refusal to participate in the research and withdrawal of some students who initially accepted to participate but were absent on the days of data collection or refused to participate in any part of the collection process.

Table 1 presents the general characteristics of the sample. It can be observed that the average age of the female university students was 20.2 years, with a minimum age of 17.2 years and a maximum age of 39.5 years.

The average monthly household income was 4.469,90 Brazilian Reais (equivalent to 12.8 minimum wages at the time of research), with a variation

amplitude of 1.3 MW to 74.3 MW. When MW were distributed quartiles, it was observed that the 25% lowest income students presented a monthly household income of up to 5.7 MW, while the 25% highest income students had a monthly household income of at least 20 MW.

Mean BMI was 21.3 kg/m<sup>2</sup>, mean waist circumference was 69 cm, and mean body fat percentage was 28%. Mean energy consumption of the students was 1,780.86 kcal, with protein, carbohydrate and lipid consumption corresponding to 16.2, 53.7% and 31.4% of total energy consumption, respectively.

**Table 1.** Distribution of values of central tendency and dispersion for the socioeconomic, demographic and anthropometric variables and dietary intake of female university students. Florianópolis, Brazil, 2006.

Variable	n	Mean	Median	Standard deviation
Age (years)	220	20.2	19.5	2.8
Maternal education §	219	12.3	11.0	4.1
Paternal education §	217	12.6	13.5	4.5
Monthly household income - R\$	190	4,469.9	3,000.0	3,807.1
Monthly household income - MW	190	12.8	8.6	10.9
Weight (kg)	220	57.2	55.3	10.0
Height (cm)	220	163.7	163.4	6.5
BMI (kg/m <sup>2</sup> )	220	21.3	20.7	3.4
WC (cm)	220	69.0	67.5	7.2
BF (%)	220	28.0	28.4	4.1
Energy consumption (kcal)	219	1,780.9	1,667.0	748.0
Protein intake (g)	219	72.2	66.1	36.7
Carbohydrate intake (g)	219	239.0	219.0	113.1
Lipid intake (g)	219	62.1	58.0	35.8

R\$ = Brazilian Reais; MW = minimum wages; § = years of schooling; BMI = body mass index; WC = waist circumference; BF = body fat.

Table 2 shows frequency distribution of demographic, socioeconomic, behavioral and anthropometric variables and of energy consumption.

A high frequency of teenage students (57.7%) was observed, as well as of students whose fathers and mothers had an educational level equal to or greater than 9 years of study (78.3% and 82.6%, respectively) and whose monthly household income was greater than 6 minimum wages (72.1%) and of students who lived with the family (69.5%), were sedentary (55.9%), eutrophic (72.3%), and consumed four meals per day (36.1%).

The study also found a high number of students living on their own or with roommates (30.4%) and a high prevalence of underweight (15.9%).

Obesity measured by body fat percentage was present in 16.8% of the participants, while overweight and obesity assessed by BMI amounted to 11.8% and obesity rates estimated by waist circumference reached 6.4%.

Table 3 shows the association between nutritional status according to BMI and socioeconomic variables, practice of physical activity, and energy consumption. The only variable that showed association with nutritional status was energy consumption, which was inversely related to BMI ( $p = 0.0358$ ).

**Table 2.** Frequency distribution of demographic, socioeconomic, behavioral, anthropometric variables and energy consumption in female university students. Florianópolis, Brazil, 2006.

Variables (n total)	n	Distribution among samples (%)	95% CI
<b>Age (years) (n = 220)</b>			
< 20 years	127	57.7	50.9 – 64.3
≥ 20 years	93	42.3	35.7 – 49.1
<b>Maternal education (n = 219)</b>			
1 to 8 years of schooling	38	17.4	12.6 – 23.0
≥ 9 years of schooling	181	82.6	77.0 – 87.4
<b>Paternal education (n = 217)</b>			
1 to 8 years of schooling	47	21.7	16.4 – 27.7
≥ 9 years of schooling	170	78.3	72.3 – 83.6
<b>Monthly household income (MW) (n = 190)</b>			
1 <sup>st</sup> quartile (1.3 – 5.7)	52	27.4	21.2 – 34.3
2 <sup>nd</sup> quartile (6.0 – 8.6)	53	27.9	21.6 – 34.8
3 <sup>rd</sup> quartile (10 – 17.1)	42	22.1	16.4 – 28.7
4 <sup>th</sup> quartile (20.0 – 74.3)	43	22.6	16.9 – 29.2
<b>Lives (n = 220)</b>			
With family	153	69.5	63.0 – 75.6
With roommates	46	20.9	15.7 – 26.9
Alone	21	9.5	6.0 – 14.2
<b>Current physical activity (n = 220)</b>			
Does not practice	123	55.9	49.1 – 62.6
Practices < 3 days per week	37	16.8	12.1 – 22.4
Practices ≥ 3 days per week	60	27.3	21.5 – 33.7
<b>Nutritional status (n = 220)</b>			
Underweight (BMI < 18.5 kg/m <sup>2</sup> )	35	15.9	11.3 – 21.4
Eutrophic (BMI ≥ 18.5 and < 25 kg/m <sup>2</sup> )	159	72.3	65.9 – 78.1
Overweight (BMI ≥ 25 and < 30 kg/m <sup>2</sup> )	19	8.6	5.3 – 13.2
Obese (BMI ≥ 30 kg/m <sup>2</sup> )	7	3.2	1.3 – 6.4
<b>Body fat (%) (n = 220)</b>			
Malnourished (BF ≤ 8%)	-	-	
Eutrophic (BF > 8 and < 32)	183	83.2	77.6 – 87.9
Obese (BF ≥ 32%)	37	16.8	12.1 – 22.4
<b>Waist circumference (n = 220)</b>			
Absence of cardiovascular risk *	206	93.6	89.6 – 96.5
Cardiovascular risk **	14	6.4	3.5 – 10.4
<b>Energetic consumption (n = 219)</b>			
< 2,200 kcal	173	79.0	73.0 – 84.2
≥ 2,200 kcal	46	21.0	15.8 – 27.0
<b>Number of meals (n = 219)</b>			
2	10	4.6	2.2 – 8.2
3	41	18.7	13.8 – 24.5
4	79	36.1	29.7 – 42.8
5	66	30.1	24.1 – 36.7
6	23	10.5	6.8 – 15.3

\* = waist circumference <80 cm; \*\* = waist circumference ≥80 cm.

Breakfast consumption was observed in 83.1% of the students (n = 182), morning snack in 33.3% (n = 73), lunch in 97.7% (n = 214), late snack in 79.9% (n = 175), dinner in 94.5% (n = 207), and supper in 35.6% (n = 78).

**Table 3.** Association of nutritional status according to BMI with socioeconomic and behavioral variables and food consumption. Florianópolis, Brazil, 2006.

Variables	Underweight (%)	Eutrophic (%)	Overweight (%)	p*
Age (years)				0.7005
< 20 years	15.7	70.9	13.4	
≥ 20 years	16.1	74.2	9.7	
Maternal education §				0.8506
1 to 8 years	18.4	68.4	13.2	
≥ 9 years	15.5	72.9	11.6	
Paternal education §				0.7639
1 to 8 years	17.0	74.5	8.5	
≥ 9 years	15.9	71.8	12.4	
Monthly household income (MW)				0.6474
1 <sup>st</sup> quartile (1.3 – 5.7)	15.4	73.1	11.5	
2 <sup>nd</sup> quartile (6.0 – 8.6)	17.0	71.7	11.3	
3 <sup>rd</sup> quartile (10 – 17.1)	9.5	73.8	16.7	
4 <sup>th</sup> quartile (20,0 – 74,3)	18.6	76.7	4.7	
Lives				0.1026
With family	13.1	76.5	10.5	
Alone/ with roommates	22.4	62.7	14.9	
Physical activity				0.5254
Practices	16.5	69.1	14.4	
Does not practice	15.4	74.8	9.8	
Energetic consumption				0.0358
< 2,200 kcal	12.7	74.6	12.7	
≥ 2,200 kcal	28.3	63.0	8.7	

§ = years of schooling; MW = minimum wages; \* Pearson's chi-square test

## DISCUSSION

The socioeconomic profile of the female university students revealed that most of their parents had an educational level equal to or higher than 9 years of schooling. Comparing the average income of the first quartile (1.5 MW) with those of the remaining quartiles, it was observed that this average was approximately five times lower than that of the second quartile (7.9 MW), nine times lower than that of the third quartile (13.4 MW), and nineteen times lower than that of the fourth quartile (29.0 MW), which demonstrates important differences in the distribution of income among the population studied.

The literature points out that the access to higher education is still influenced by the socioeconomic level of youngsters<sup>21</sup>. According to Baloch and Gurgel<sup>22</sup>, 61% of students from free public university education belong to the 20% richest families and only 3% of them come from low-income families.

Concerning the practice of physical activity, the predominant finding was the absence of this practice. In a study with entrant university students of both sexes, Vieira et al<sup>4</sup> also found that more than half of students showed

lack of physical activity. These results can be explained by the busy routine of the students, who end up abandoning physical activity after entering university<sup>4</sup>.

In relation to the results obtained in this study for the nutritional status of female university students based on BMI, the percentage of low weight was 15.9% and of overweight 11.8%. This prevalence of underweight is considered high when compared to data from the 2008-2009 Survey of Family Budgets (POF) and is consistent with the results of national and international studies conducted with university students<sup>23,24</sup>. According to data from the 2008-2009 POF, the prevalence of underweight in teenagers from 16 to 19 years was 2.5% and of overweight was 15.1%; additionally, in adult women aged between 20 and 24, the prevalence was 8.3% for underweight and 24.2% for overweight. However, when analyzing the evolution of the prevalence of overweight and obesity in relation to socioeconomic level in the period from 1974-75 to 1989 and in 2002-3, Giant et al<sup>25</sup> found that there was an increase in the occurrence of obesity only among poorer women. On the other hand, among higher income individuals, there was a decline in the prevalence of obesity and overweight.

Considering that the population of this study showed higher socioeconomic characteristics, it is possible to understand why underweight rates were higher than those of overweight, corroborating the mentioned research. This fact can be attributed to a greater concern with body image among individuals from the most privileged<sup>26</sup> economic strata.

In summary, the results of this study and of the mentioned literature related to BMI point out high rates of underweight, which requires specific attention to the health of these female university students.

In turn, the evaluation of nutritional status based on %BF found a prevalence of 16.8% of obese women. This result reveals that, despite being classified as eutrophic or underweight by BMI, some students showed high body fat percentage and abdominal adiposity, which may occur, among other reasons, due to the lack of physical activity, which was present in most of the studied female university students (55.9%).

The higher prevalence of obesity evaluated by body fat percentage can also be explained by the fact that BMI does not measure body composition but measures individual's body ratio<sup>27</sup>.

In this study, nutritional status was classified by means of three anthropometric measurements, BMI %BF and WC, because they are measures that complement each other. BMI, a quantitative measure, identifies body proportion, %BF, a qualitative measure, identifies body composition, and WC, a qualitative measure, identifies body fat distribution.

The results of food consumption are in accordance with the recommendations set out by international organizations of the area<sup>14</sup>, which states that 10 to 35% of total energy consumption should come from proteins, 45 to 65% from carbohydrates, and 20 and 35% from lipids. However, the minimum and maximum values showed us that there may have been deficiencies and excesses in the dietary intake of female university students,



due to the extreme values of energy consumption found (minimum of 331 kcal and maximum of 13,337 kcal). In view of these values, it is important to note that the initial context of the research was to identify abnormal eating behaviors, with the outcome of symptoms of anorexia and bulimia in students, so these results are of major relevance to the research, as they may indicate the presence of such practices.

When energy consumption was evaluated according to the RDA recommendations<sup>16</sup> (2,200 kcal/day), it was observed that 79% of the students obtained less than the recommended consumption, which reinforces caution regarding deficiencies in the diet.

It should be noted, however, that energy consumption was the only variable associated with nutritional status according to BMI, showing an inverse association, in which underweight was higher in the group with energy consumption equal to or greater than 2,200 kcal, while obesity was more present in the group that consumed less than 2,200 kcal. It is suggested that overweight students sought to reduce their food intake due to their condition of obesity, while underweight students were not concerned with food amount or composition, resulting in higher energy consumption.

Among the three main meals of the day, the breakfast showed the highest rate of omission. This is a fact that deserves attention, because it can compromise students' health, since skipping breakfast metabolically implies undergoing a period of fasting of more than twelve hours, in general, during which the body does not receive nutrients. Thus, breakfast is recognized as the most important meal of the day due to its role in the health context and in the understanding of human physiology<sup>28</sup>.

Some studies have investigated the omission of this meal among teenagers and young adults, such as that of Aguilar et al.<sup>29</sup>, which found that omission of breakfast was observed in 35.4% of schoolchildren in Florianópolis.

The present study is limited by the fact that sample calculations were performed for another outcome (abnormal eating behaviors) and for the study of prevalence and not for association analysis. However, the sample size was estimated to assess nutritional status. Considering a confidence of 95%, a sampling error of 5% and a prevalence of outcome of 15.9% (prevalence of underweight observed in the sample), the number of individuals being investigated would be 169 students, a value contemplated by the present study. In addition, the study power was also evaluated in order to test the associations with overweight; considering a power of 80%, a level of confidence 95% and the *n* of each category of the independent variables, this study could detect differences between 18.2 and 25.3% among exposed groups when compared to unexposed groups.

Another limitation concerns obtaining food record for just one day, by reason of the short time students have available. A single day of application of 24-hour recall probably does not represent the habitual intake of female university students, due to the high variability of nutrient intake on different days. In addition, overweight people, mainly women, and with

higher educational level, may underestimate food consumption, relative to what would be expected. However, this method has advantages, such as the recent recall of consumption, meaning that, due to the proximity of recall, the respondent tends to remember more easily and provide less change in feeding behavior compared to other methods<sup>30</sup>.

And finally, another limitation refers to the use of the RDA to the assessment of students' energy intake. Because the RDA meets the nutritional needs of almost all (97 to 98%) healthy individuals in a particular group of same sex and stage of life, its use in this study may have overestimated the energy needs of the students.

It is suggested that further studies should be conducted, using new variables, such as students' concern about health, use of alcohol and tobacco, and comparing changes students undergo when entering universities, with the evaluation of not only entrant university students but also senior students, in order to know the contribution that the university experience has on students' health.

## CONCLUSION

The results found in this study allow us to conclude that the female university students studied had mostly high socioeconomic condition and showed high prevalence of underweight and physical activity. The results of food consumption have appropriate values, but with important variations between minimum and maximum values.

It highlights the need to implement health education activities, focusing especially on body satisfaction, whose attention should be given on the results identified in this study. Students need to know the principles of healthy eating and to be motivated to practice them and thus be ready to make appropriate nutrition and health choices in their day to day life. This study contributes to the socioeconomic framework and nutrition knowledge on university students, which, besides ensuring the internal validity of data, can also reflect the reality of other places in the country. Such knowledge can be important to implement educational health measures and to provide more effective energy supply at universities.

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