

## Comparative anthropometric study of the food profile for students of four University in Morocco, before and after correction

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### ABSTRACT

The malnutrition is a major health problem among schoolchildren. Our objective is to study the nutritional profile of students from different Moroccan universities. The study was carried out on Moroccan university students aged 18 to 25 years. The sample consists of 55.13% female students and 44.87% male students. More than half, or 57.06%, are between 18 and 20 years of age. The prevalence was therefore 10.45%, very abundant among female students. A great variation in the students' diet during the meals of the day. A better assimilation of the advice proposed and a clear improvement of the regime in the majority of the respondents after the correction phase.

**Kew word:** Malnutrition - Students - Correction - Prevalence - diet

### INTRODUCTION

The food pyramid of the Moroccan Society of Nutrition and despite the great variability in food to consume the balance of food remains to be discussed and seek to eliminate bad habits inherited [1]. The lower floors of this pyramid constitute the food to be consumed in greater quantity, while those at the top are to be consumed in moderation.

For any age group, a balanced diet is a good indicator of good health and physical fitness. University students occupy a rather important position in the Moroccan demographic hierarchy [2-4]. Moreover, a nutritional balance is of great importance for these students because it allows optimizing their capacities of reflection and concentration during their university course.

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Indeed, a 2007 study of the effects of diet on cognition of young adults (Hoyland. et al., 2008) [5] and another study of Deliens et al. (2014) [6] have showed that memory is heavily influenced by macronutrient intake. This may also play a role in verbal fluency, attention, reaction time, psychomotor skills, and problem solving. Additionally, according to a study of carbohydrates and cognitive performance in 2012 by Benton [7], it is accepted that people who do not eat breakfast are in a less good mood and have a poorer memory End of the morning than those who take one. Another study conducted by Benton & Jarvis (1997) [8] and by Benton (1998) [9] demonstrated that memorization is directly related to the concentration of glucose in the blood. However, the impact of carbohydrates depends on their quality. For example, a sweetened beverage does not perform as well as a breakfast made of toast, cereal and milk.

A multitude of studies show that the diet of students can experience different changes depending on several factors [10,11]. It can be modified by:

- Socio-economic factors
- Time and transport constraints
- Fear of weight gain:

Particularly among female students. Among the 1,744 students in the Rouen conurbation questioned in a study evaluating the perception of weight (Grigioni, 2007) [12], 11.8% of women and 4.6% of men reported having episodes of food restriction.

Our research consists of an anthropometric study of students belonging to four Moroccan universities that of Rabat, Marrakech, Tangier and Kenitra and in a second part comparing the anthropometric state before and after correction.

## MATERIAL AND METHODS

### Sampling and Place of Study

The surveys were carried out among university students in the cities of Rabat, Marrakech, Tangier and Kenitra during the period from 28 February to 10 May 2013. The sample is determined on two levels: Of cities, it is based on a non-probabilistic sampling method with reasoned choice and the second is relative to the target population: the students, it relies on an accidental probabilistic sampling method.

### Methodology and Tools

Data collection was done using a completed questionnaire with students leaving university campuses. The questionnaire consists of 82 questions, some of which are multiple choice, others are "open" or "closed". These allow faster data processing. The questionnaire consists of three parts:

- Information and personal elements of the student:
- Student feeding:
- Perception of food by the student:

The purpose of the questions asked is to briefly assess the student's knowledge of food in general and its impact on health. The objective is to know, in the case of an unbalanced diet, whether the student is aware of the risks to his health.

## RESULTS

### Socio-demographic characteristics

The study focuses on Moroccan university students aged 18-25. The sample consists of 55.13% female students and 44.87% male students. More than half, or 57.06%, are between 18 and 20 years of age. Among the students surveyed, 1.85% are married. The majority of students, 55.40%, live with their families, 22.89% in the university campus and 20.8% in a studio or flat. Of all respondents, 43.69% are students of science and technology institutions, 22.89% belong to faculties of commerce, management and / or economics. 42.9% are in first year, 28.3% in second year, and then the number decreases to 2.4% in year 5 or more. 39.1% of the

**Table-1. Uncorrected BMI study and selected demographic characteristics**

Parameters	Modalities	Uncorrected Body Mass Index				Total	Chi-square (P value)
		<18,5	[18.5-25]	[25-30]	>=30		
Sex	Female	57	357	49	7	470	14.78 (p<0,002)*
	Male	22	321	61	6	410	
With who do you live?	Other	1	6	1	0	8	4.67 (p<0.86)
	University campus	15	177	21	3	216	
	Family	46	351	60	7	464	
	Studio / apartment	17	144	28	3	192	
Specialty	Other	39	320	48	3	410	6,90 (p<0.33)
	Health / care	9	73	14	4	100	
	Science and technology / sport	31	285	48	6	370	
Scholarship	Yes	45	409	67	8	529	0,38 (p<0.94)
	No	34	269	43	5	351	
Comment You find yourself ?	Coated	1	80	60	11	152	234.80 (p<0.000)**
	Slim	48	160	3	0	211	
	Normal	26	406	45	2	479	
	Without answer	4	32	2	0	38	
		79	678	110	13	880	

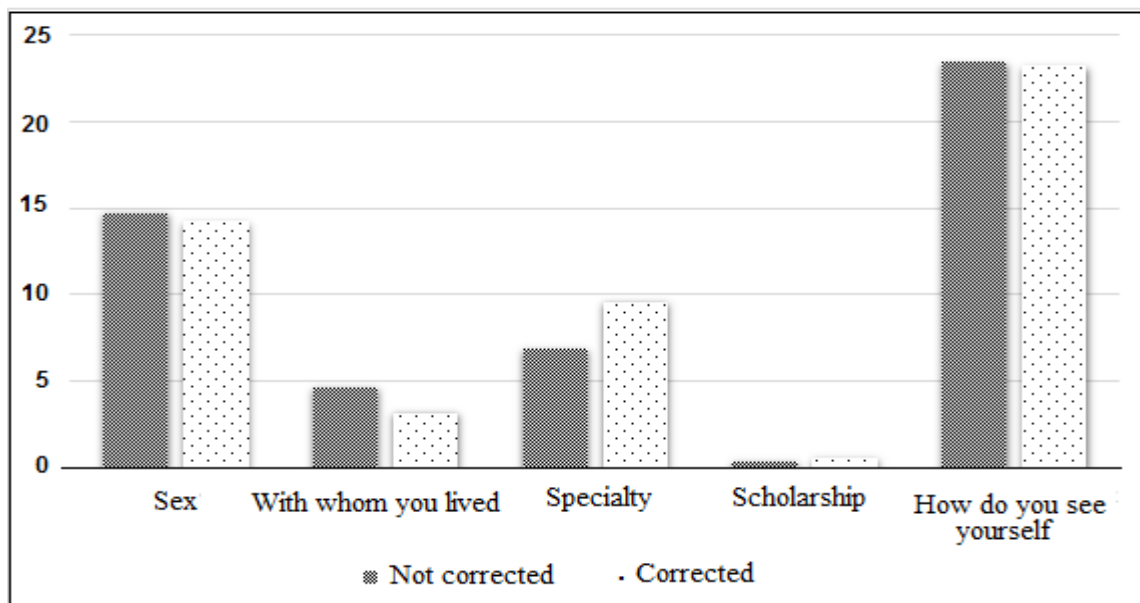
\*: Highly significant difference; \*\*: very highly significant difference

**Table-2. Study of corrected BMI and selected demographic characteristics**

Parameters	Modalities	Corrected body mass index				Total	Khi-square (P value)
		<18.5	[18.5-25]	[25-30]	>=30		
Sex	Female	57	494	49	7	607	14.26 (p<0.003)*
	Male	22	405	61	6	494	
With who do you live?	Other	1	8	1	0	10	3.23 (p<0.94)
	University campus	15	213	21	3	252	
	Family	46	497	60	7	610	
	Studio / apartment	17	181	28	3	229	
Specialty	Other	39	421	48	3	511	9.63 (p<0.14)
	Health / care	9	82	14	4	109	
	Science and technology / sport	31	396	48	6	481	
scholarship	Yes	45	551	67	8	671	0.57 (p<0.9)
	No	34	348	43	5	430	
Comment You find yourself ?	Coated	1	119	60	11	191	232.66 (p<0.000)**
	Slim	48	206	3	0	257	
	Normal	26	529	45	2	602	
	Without answer	4	45	2	0	51	
		79	899	110	13	1101	

\*: Highly significant difference; \*\*: very highly significant difference

**Figure-1. Comparative presentation between uncorrected BMI and corrected BMI**



respondents are scholarship holders and 38.24% believe they have financial difficulties.

On the other hand, 25.4% of students have no feeling of stress at all, 48.7% have it during examinations, and 25.2% have it. It is observed that more than half (56.1%) of the students surveyed used to borrow public transport to go to university, 34.4% went there on foot or by bicycle and 16.8% by car. More than half of the students (57.86%) engage in daily physical activity (including walking) with an average duration of 30 minutes to 1 hour. 9.9% of students sleep less than 6 hours per night, almost three-quarters (71.57%) sleep between 6 and 8 hours and 14.08% sleep more than 8 hours.

Note that the socio-demographic and economic situation of the student influences his diet and could be the main cause of the equilibrium, or imbalance, of this diet [13].

### Meals and structure

43.05% of students drink more than 1.5 liters of water per day, while 55.77% consume 1.5 liters or less. Water consumption is generally outside meals. 16.3% of respondents take two meals a day or less, more than half of students (57.8%) take three meals a day, 23.2% eat four meals a day and others %) Take six per day. 64.3% nibble between meals. 84.64% of the students used to take at least one snack a day; among them, 48.90% take one per day, 30.44% take two per day and 5.30% take three per day. The afternoon snack is the most frequently taken, accounting for 50.3% of the three snacks. 56.58% of students reported taking the time to cook. 35.14% of students never eat outside, 16.15% eat 1 or 2 times a week in snack bars and / or restaurants and almost half (48.72%) are used to Eat at least 3 times a week. 64.9% take their daily breakfast, 21.4% do not take it daily and 13.4% do not take it at all. In the study population, there is a slight preference for sugary foods (39.6%), 30.4% prefer salty and 24.8% have no preferences.

1.49% of the students surveyed do not consume fruits and vegetables, 66.45%, or two thirds, eat less than 5 per day, 28.45% consume between 5 and 10 and 3.6% consume More than 10. 8.41% of the students do not consume eggs, 44.17% consume 1 to 3 times a week and 47.42% consume more than 4 per week. 13.19% do not consume red meat and almost three-quarters of the population (64.10%) consume 1 to 3 times a week, while others (22.71%) consume 4 times a week or more. The distribution of chicken consumption follows the pattern of consumption of red meat. 18.56% of students do not consume fish, one-third, 33%, consume them once a week and half (48.44%) consume them at least twice a week. 3.86% of students do not consume dairy products, almost half (48.53%) consume 1 to 2 per day, 1/3 or 34.28% consume 3 to 4 per day, and Rest (13.33%) consumes 4 times or more per day. 13.70% of students do not eat French fries, more than half, or 54.61%, consume 1 to 3 times a week and 31.69% consume more than 4 times per week. 19.6% of

students do not eat pastries, almost half (46.07%) consume 1 to 3 times a week, while others (34.83%) consume 4 or more per week.

However, a quarter of the students surveyed (25.84%) consume sodas once a week or less, more than half (59.54%) consume 1 to 6 times a week and about 14.61% consume 1 Times a day or more. For the consumption of coffee, 27.51% of students do not consume at all, 30.46% take on average less than one drink a day, 22.58% take a drink a day and the rest (19.45%) take more than one drink a day. For the consumption of tea, 13.30% of students do not consume at all, 27.92% take on average less than one drink a day, 29.91% take a drink a day and the others (28, 87%) take more than one drink a day. 13.18% of students smoke tobacco and 6.21% consume alcohol regularly (from 1 glass per week).

In order to better situate the nutritional status of the students surveyed, we first determined the body mass index (BMI) for each respondent and looked for possible links between this anthropometric behavior and certain socio-demographic factors [14]. The results of this analysis (Table-1) show that the prevalence is 10.45% (92/880), with 8.98% being undernourished and 1.48% being obese. The statistical linkage search was verified by the 5-percent chi-square independence test. The results are shown in the table below. Indeed, the frequency of malnutrition is much higher among the students; it is of 57 investigated against 22 only in the masculine ones. The chi-square test represents a risk factor for this behavior (chi-square = 14.78,  $p < 0.002$ ). Concerning the distribution of malnutrition according to the question "with whom do you live?", The results show that of those who reported living in the university campus ( $n = 216$ ), 15 students are in a state of statistical and weight Represents 6.94%. For students who live in families, 9.91 are in a pathological condition and 8.85% of students with an inadequacy choose to live alone or with a group of students. The chi-square test shows no significant difference. There was a strong association between the BMI and how these respondents assessed their behavioral status (chi-square = 234.8,  $p < 0.000$ ). However, 22.75% of these respondents reported their anthropometric status as thin [15].

The survey conducted among Moroccan students made it possible to make an inventory of their diet and to realize the change in habits that operate with the development of the country.

We found two types of nutrition among Moroccan students: some retain a traditional diet, others, mostly those living away from their families, are divided between traditionalism and new modes of food such as fast food or snacking. The main objective is to provide Moroccan students with food information so that they have access to the knowledge needed to balance food: 1 / To make students aware that food has an impact on health, 2 / Give advice adapted to Moroccan food habits, 3 / Correct certain ideas received during the surveys? While choosing to realize informative documents realized on a support Word.

Our action consisted in providing information to the students. In this context, the Internet was the most appropriate mode of communication. The sending of the documents was easy to set up, free and we kept a means of exchange to answer the questions of the students. However, there were some disadvantages: students who did not have an electronic box or no Internet access did not have the opportunity to receive the information. On the other hand, we do not know if all students open their e-mails.

Indeed, we observed the development of a new feeding mode characterized by the frequentation of snacks and the consumption of biscuits in parallel with a traditional diet. Note that this new food mode is based on fast-food or this type of food is harmful for health [16,17]. So, as we saw earlier in the survey, some students could adopt a diet that tends to be unbalanced without really being aware of it; it is primarily for this reason that we believe it is essential to create information for students. Because they did not all have the same knowledge of nutrition, we tried to give the basic information necessary for proper nutrition. We would have liked to set up workshops at universities, but for reasons of time and logistics, we did not have the opportunity to do so.

Nevertheless, the results before and after correction already allowed us with this initiative to find differences in nutritional behavior. This is reflected in the difference in the meaning of certain variables by the chi-square test of independence (Figure-1).

## CONCLUSION

The study carried out on students of different Moroccan universities on the nutritional status of these surveys and also on the receptive state of the latter about the proposed advice. The sample assumed chosen on well-described probabilistic bases with a fairly large number and a very balanced structure (sex ratio). The results are very important and it remains to be exploited better to make definitive decisions. The prevalence was therefore 10.45%, very abundant among female students. According to a study carried out by Grigioni (2007) [12] of 1,744 students in the Rouen area, the prevalence of underweight defined here by a BMI <18.5 kg / m<sup>2</sup> is 1.1% for men and 11.1% for women. Among those with a BMI <18.5 kg / m<sup>2</sup>, 63% believe they have a normal weight, and 8% consider themselves "too big". A similar study by Isabelle Jaeger (2008) on BMI shows that 4% of female students and 7.5% of boys meet obesity criteria. It is also seen that nearly 16% of girls and 8% of boys report being below demand

## Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

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