

Association between sources of information used by nutrition students and their perception of the function of food

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Priscila Koritar*
Helena Maria Afonso Jacob**
Marle dos Santos Alvarenga***

Abstract

The performance of nutritionists can be based on their perception of what healthy eating is, which is in turn influenced by training and different sources of information. This study aims to identify the sources of information that Nutrition students use to update themselves and their association with their perception of the function of food, their academic stage, and type of educational institution. The participants were 497 students from 41 institutions in the state of São Paulo – Brazil – who answered online what the main sources of information used to update themselves are, what the main function of food is, and questions about the characterization of the sample. The answers were coded and the association between the information sources and the other variables were evaluated using Pearson's chi-squared test. Scientific articles were cited by 51.7% of students as the main source of information. The main function of food was referred to as exclusively biological by 72.4% of students. The use of the media as the primary source of information was more frequent among those who reported only biological aspects such as a function of eating ($p=0.024$). The source of information was associated with perception of healthy eating, type of educational institution and academic stage. Information from the media must be critically discussed, especially in the present current of controversies in nutrition.

Keywords: Food. Nutrition sciences. Students. Information.

INTRODUCTION

Nutritionists are responsible for acting in several areas involving the "promotion, maintenance and recovery of health through food"¹. Their actions must be supported by the science of nutrition^{2,3} and, therefore, they must have a solid basic knowledge and critical ability to interpret, accept or reject

the information they receive from the most diverse sources – using reliable information sources with scientific evidence.

It is also known that concepts concerning nutrition, health, food, and the human body will influence the behavior of professionals in the area, first as Nutrition students and, later,

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*Prefeitura de Barueri – Barueri/SP, Brasil.

**Faculdade Cásper Líbero – FCL. São Paulo/SP, Brasil.

***Universidade de São Paulo – USP. São Paulo/SP, Brasil.

E-mail: prikoritar@gmail.com

as nutritionists^{4,5}. Although an undergraduate education in Nutrition is responsible for professional training, students' knowledge about food, health and nutrition is also influenced by information from several other sources².

Food and Nutrition are topics of great interest today, and a lot of information is disseminated by the media, and many are actually "food and nutrition misinformation", with errors, incomplete or misleading information without any scientific basis^{2,6,7}. This type of misinformation can influence the perception of what healthy eating is, leading to dysfunctional beliefs and biases^{2,6} – even among Nutrition students and nutritionists.

Studies on the main sources used to obtain information are more focused on consumers^{8,9}. Hiddink *et al.*¹⁰ state that the sources of information used by primary care professionals to promote nutritional guidance were mainly scientific journals, postgraduate courses, conferences, and symposiums. Some studies have discussed the use of social media by nutritionists, but without dealing with social media as a source of information^{11,12}. No studies were found that assessed which sources of information are used by Nutrition students or nutritionists in their process of continuing education.

It is known that information, of any nature, can be conveyed in the media¹⁵ through channels such as magazines, newspapers, radio, television, websites, and social networks. Due to the rapid and intense reach of digital information, often produced and disseminated by health professionals, their influence on the formation of the nutritionist's repertoire must be considered as a decisive factor. In addition, the means of media communication not only carry information, but also structure and regulate the conditions

of interaction with such information¹⁶, which can be incorporated into other systems, such as healthy eating. Considering the role of these networks in disseminating information about food and nutrition, each profile can become a set of rules imposed by a unified language of fitness worship and the pursuit of perfection, conveying information without the necessary research foundation¹⁷. Thus, such sources end up reaching the Nutrition student and, therefore, can also affect their future professional performance.

Additionally, few studies discuss the perception of healthy eating among Nutrition students. Recently, a survey carried out with Nutrition students in the state of São Paulo found that although the main factors for healthy eating indicated are in line with guidelines and consensus, attitudes towards food, the body, and nutritionists - involving beliefs and behavior - revealed that these issues should be better addressed throughout academic training⁵.

Aiming to fill a gap, this study sought to elucidate the sources of information used by Nutrition students to update themselves and the possible association between the type of source and perception of the function of food, academic stage, and type of educational institution. Such a discussion can be useful in the current food and nutrition scenario, as well as in the development of nutritionists, especially in relation to the sources used for daily information searches. Furthermore, it may highlight the importance of scientific evidence and information sources in the field of nutrition for the training process of the nutrition professional so that they have a broader view and develop a reflective critical sense, as well as an interdisciplinary and integrated approach with a view towards person-centered care.

METHODS

This cross-sectional study is part of the "Nutritionists' Health Cohort Study - NutriHS" conducted by the Faculty of Public Health of the University of São Paulo – FSP/USP¹⁸. Participants, undergraduate students in Nutrition from public and private educational institutions with courses registered at the Ministry of Education in the State of São Paulo (SP), were invited to participate online after the course coordinators' consent. The Nutri-HS was approved by the Research Ethics Committee of FSP/USP, protocol 44576515.0.0000.5421. Participants received information on the first page of the online survey and gave their consent to participate by marking "accepted".

The sample size calculation was performed taking into account the institutions with a degree in Nutrition in SP recognized by the Ministry of Education (MEC) totaling a minimum required sample of 360 students based on a 95% confidence coefficient and an estimation error of 0.015 5. It is noteworthy that all participants who met the inclusion criteria were accepted in the research.

Undergraduate Nutrition students aged between 18 and 30 years old, of both sexes and enrolled in educational institutions recognized by the MEC were included in the study. The exclusion criterion was referring to any chronic disease. To characterize the sample, they answered: type of educational institution (classification as public or private); semester of the course (classified as beginning: 1st and 2nd year; end: 3rd, 4th, and 5th year); age (year), sex (male and female), weight (kilograms), height (meters). Weight and height information were used to calculate the Body Mass Index (BMI) and classification of nutritional status. Students were asked: "What are the three main sources of information used to update yourselves beyond being in an undergraduate program in Nutrition?" and "What is the main function

of food for you?". Data collection was performed online during 2015 and 2016 from the NutriHS website: <http://www.fsp.usp.br/nutrihs/>^{5,18,19}, thus all information is self-reported.

The answers given by university students about the 3 main sources of information used to update themselves were coded in the following categories: scientific articles; Regional or Federal Council of Nutrition (RCN or FCN, respectively); courses or events; documentaries; college; internet or websites; books; organizations; social networks; newsstand magazines; television, radio and newspapers; professionals and faculty colleagues; and videos on youtube.

From the above categories, the information sources were categorized into two large binary categories from the initial coding, one with a more formal and traditional characteristic, called "Scientific" and the other with a more mediatic characteristic, called "Media" as shown below:

- Scientific: articles; books; college; documents generated by the RCN or FCN; documents published by organizations such as guidelines, manuals and documentaries.

- Media: television; radio; newspapers; newsstand magazines; Internet; social networks (apps, blogs, instagram, facebook, snapchat, whatsapp); and professionals.

The function of feeding was also categorized into two large analytical categories based on an initial codification, one of them called "biological function", composed of individuals who declared only biological aspects of food, and the other called "biopsychosociocultural function", composed of individuals who declared both biological and psychosocial aspects of food, as shown in the examples:

- Biological function: well-being; energy; aesthetics; body functioning or physiological need; nurture; quality of life; satiety; health; survival; treat or prevent

disease.

- Biopsychosociocultural function: soul; spiritual, cultural, political and ethical, psychological, social and social aspects; welfare; energy; aesthetics; happiness; body functioning or physiological need; nurture; pleasure; quality of life; satiety; health; survival; and treat or prevent disease.

Data analysis was performed using SPSS software version 21.0 (IBM Corporation, Armonk, NY, (USA). A 5% significance level was adopted. The characterization questions are presented in response frequency or mean and standard deviation. The answers to the open questions were analyzed and coded into multiple and binary analytical categories based on Content Analysis²⁰.

The three main sources of information, after coding in multiple categories, are presented as frequency by category. Then, after coding this data into binary categories (scientific versus media), they are presented as response frequency, comparing frequencies by type of educational institution (public versus private) and academic phase (beginning versus end) using the chi-squared test.

The perception of the function of food coded into binary analytical categories (biological versus biopsychosocial) is presented as a frequency. Pearson's chi-squared test was used to assess the association between the three main sources of information encoded in binary categories and the type of educational institution, the academic phase, and the perception of the function of feeding.

RESULTS

A total of 497 Nutrition students from 41 educational institutions (from 25 cities in the state of São Paulo) were evaluated, 4 of which were public. The characteristics of the sample can be seen in Table 1. Of the students, 92.8% were

female, 80.9% were enrolled in private institutions; and 50.5% were at the end of their study course. The mean age was 23.4 years (SD=2.98); the mean BMI was 22.8 kg/m² (SD=3.96), and 69.2% were classified as eutrophic.

Table 1 – Characteristics of the sample regarding gender, nutritional status, type of educational institution and academic stage of the Nutrition students in the State of São Paulo (N=497).

Characteristics		N	%
Sex	Female	461	92.8
	Male	36	7.2
Nutritional Status	Low weight	37	7.4
	Eutrophic	344	69.2
	Overweight	89	17.9
	Obese	27	5.4
Type of Institution	Public	95	19.1
	Private	402	80.9
Academic Phase	Beginning course	246	49.5
	Finishing course	251	50.5

The answers from university students about the 3 main sources of information used to update can be seen in Table 2. Scientific articles were cited by 51.7% of students as the first source used to update themselves, followed by internet/sites (15.5 %).

Table 2– Information sources (first, second, and third) used to update themselves reported by Nutrition students from the State of São Paulo (N=497).

Information sources	1 st source N (%)	2 nd source N (%)	3 rd source N (%)
Scientific articles	257 (51.7)	165 (33.2)	128 (25.8)
RCN	22 (4.4)	22 (4.4)	12 (2.4)
Courses / Events	26 (5.2)	61 (12.3)	71 (14.3)
Documentaries	0 (0.0)	2 (0.4)	2 (0.4)
College	18 (3.6)	15 (3.0)	23 (4.6)
Internet/sites	77 (15.5)	79 (15.9)	79 (15.9)
Books	27 (5.4)	46 (9.3)	46 (9.3)
Organizations / guidelines	17 (3.4)	27 (5.4)	32 (6.4)
Social networks	25 (5.0)	30 (6.0)	35 (7.0)
Magazines	12 (2.4)	20 (4.0)	23 (4.6)
Television / Radio / Newspapers	13 (2.6)	22 (4.4)	36 (7.2)
Professionals and colleagues	1 (0.2)	4 (0.8)	8 (1.6)
Youtube	2 (0.4)	4 (0.8)	2 (0.4)

Considering the binary categories “Scientific” and “Media”, the use of scientific sources to update oneself was more frequent than media sources (72.2% versus 27.8%). There were no significant associations between response frequency and type of educational institution for the first and second source reported (p= 0.104 and p= 0.071, respectively), which only occurred for the third source -

with scientific sources being more frequent among those from public institutions (73.7% versus 60.7%, p= 0.018). Associations were observed between the frequency of responses to the information sources used for updating (1st, 2nd, and 3rd) and their academic stage - of which scientific sources were most frequent among those at the end of their education (Table 3).

Table 3 – Use of scientific and media sources of information (first, second and third) referred to by Nutrition students in the State of São Paulo (N=497), according to type of educational institution and by academic stage.

Variables	1 st source			2 nd source			3 rd source	
	Scientific N (%)	Media N (%)	p	Scientific N (%)	Media N (%)	p	Scientific N (%)	Media N (%)
General	359 (72.2)	138 (27.8)		305 (61.4)	192 (38.6)		314 (63.2)	183 (36.8)
Type of Institution	Public	75 (78.9)	20 (21.1)	66 (69.5)	29 (30.5)	0.071	70 (73.7)	25 (26.3)
	Private	284 (70.6)	118 (29.4)	239 (59.5)	163 (40.5)		244 (60.7)	158 (39.3)
Graduation Phase	Beginning	157 (63.8)	89 (36.2)	132 (53.7)	114 (46.3)	0.000	133 (55.4)	113 (45.9)
	Finishing	202 (80.5)	49 (19.5)	173 (68.9)	78 (31.3)		181 (72.1)	70 (27.9)

Of the total number of students, 72.4% (N=360) highlighted only biological aspects in their answers, and 27.6% (N=137) also highlighted psychological, social, and cultural aspects of food. Associations were observed between the categorization of the function of food and the type of educational institution, and the academic stage - with students from public institutions and those at the end

of their study course reporting more frequently aspects for biopsychosociocultural categorization.

An association was observed between the first source of information reported and the category of food function. The use of media sources was more frequent among those who reported only biological aspects as the function of food (Table 4).

Table 4– The function of food according to the type of educational institution, academic stage, and information sources (classified as scientific and media) of Nutrition students in the State of São Paulo (N=497).

Variable		Function of Food		p
		Biological (N=360) N (%)	Biopsychosociocultural (N=137) N (%)	
Type of Institution	Public institution	31 (32.6%)	64 (67.4%)	0,000
	Private Institution	329 (81.8%)	73 (18.2%)	
Graduation Phase	Beginning Course	193 (78.5%)	53 (21.5%)	0,000
	Finishing Course	167 (66.5%)	84 (33.5%)	
1 st source	Scientific	250 (69.6)	109 (30.4)	0,024
	Media	110 (79.7)	28 (20.3)	
2 st source	Científico	219 (71.8)	86 (28.2)	0,691
	Mídia	141 (73.4)	51 (26.6)	
3 st source	Científico	219 (69.7)	95 (30.3)	0,079
	Mídia	141 (77.0)	42 (23.0)	

DISCUSSION

This study explored the responses of Nutrition students in relation to the sources they use to update themselves, and possible associations with type of institution, academic stage, and their perception of the function of food. It was found that the main sources cited were scientific articles, but the second was the internet and websites.

Although it can be conjectured that because they are having a university education, students receive scientific and current information, it should be considered that the content presented in undergraduate courses is quite heterogeneous among

institutions, and that many students do not read scientific articles. It is noteworthy that the question of the study was concerning the main sources used to update themselves and not concerning access to information or what they received in their courses.

Digital sources were found to be the second cited source, which refers to the present day, but raises concerns. The level of adequacy of information on the internet is extremely variable, but either way, even considering the breadth of information in the media, there was an association between the main source of information used and the

category of defining food function, which points to the possibility that the view of healthy eating may perhaps be related to the information used.

In the case of this sample of students from São Paulo, those who reported the media as their main source of information had a higher response frequency for the function of food in the exclusively biological category. The fitness language, very present in social networks, especially explores this issue: food as a source of energy and nutrients (when not able to define the body and overall health), disregarding the cultural sphere, as well as the psychological and social ones. Thus, students who use this type of media the most may end up replicating this concept of these networks²¹.

The media, far from being just the technical support for transmitting informative messages, is the channeling and atmosphere of communicational messages²². Thus, messages are not direct, but belong to a construction conditioned by author and receiver, among many other variables. As the media is the most frequent source of information about food and nutrition reported by people in general⁸, social networks represent the main means by which people currently receive information¹². Therefore, those looking for information are impacted, even if they don't know it, by the way the media constructs these messages, which may contain commercial agreements, for example, not always clear to the general public.

As people are currently hungry for information about food and health and there is a movement for "self-care"²³, seeking information in the media has become common, even among health professionals. One must also consider the speed and reach of the internet, which means that information that has not yet been validated by research and without a scientific basis is disseminated very quickly - and myths and distortions can be consolidated as truths even before they are proven.

Information on food and nutrition is disseminated in the most diverse ways, under the most diverse types of media, through the food industry, government, health professionals - including nutritionists - and lay people⁸. Even if the information is transmitted in the media by health professionals and nutritionists, there is no guarantee of the quality and scientific basis of the information.

Another challenging issue in this scenario is the characteristic of beliefs acquired concerning food-related issues in the contemporary world. In liquid and volatile times, when religion ceased to be a central issue, replaced by consumption²⁴, the passion for beliefs and truths did not subside and was replaced, in many issues, by the creation of identity groups led by beliefs, which is the case of "fitness tribes". The use of tags such as #strength, #focus, and #faith contemplates those who follow the precepts of this philosophy and are, therefore, ready to fight for it, regardless of what researchers and specialists in the field consider¹⁷.

In the case of general media, it capitalizes on preliminary poll results in an effort to increase its audience and profit. Despite the ease of access, information from mass media, such as social networks, is not controlled by any regulatory agency, which can result in food and nutritional misinformation, involving errors, incomplete or misleading information without any scientific basis².

Even if inserted in the same society, and submitted to the same appeals from the media, it is expected that students in the health area will use scientific information sources to develop their knowledge, without falling into the appeal of beliefs and the like. The search for information with scientific support is encouraged during academic training as it is considered a fundamental prerequisite for professional practice². Using the science of nutrition is included in the Nutritionist's oath "I promise that, when exercising the profession of nutritionist, I will

do it with dignity and efficiency, making use of the Science of Nutrition, for the benefit of a person's health."³. In addition, Nutrition students and nutritionists must be trained in reading and critically evaluating articles and research results, because they have the responsibility to clarify and demystify the Nutrition messages aimed at consumers².

The impact of nutrition information on promoting healthy lifestyles depends on how effectively Nutrition messages are communicated and how well people are able to discern science-based guidance from poor food and nutrition information, which consists of errors, incomplete information or is misleading²⁵. Therefore, it is necessary to take into account that the effects of communication are mediated by social determinants, influencing the access and use of information sources, as well as affecting the ways in which people process and retain information about food and nutrition²⁶.

In the current scenario, it is necessary that academic training is concerned with discussing the students' knowledge, beyond what they see in the classroom. The controversies that appear in the media must be discussed and elucidated, so as not to feed the scenario in which everyone thinks and interprets differently, which is normal in society life, but which can feed distortions on food and nutrition.

The high frequency of students who declare only biological aspects as the main function of nutrition seem to reflect the history of nutrition itself as a science and profession in Brazil which is guided by the discovery of nutrients, their role in the functioning of the body, as well as the need for dealing with malnutrition and deficient diseases. This has directed the current curriculum guidelines in this direction in order to minimize the economic and social impacts^{27,28}. The perception of the function of nutrition centered on nutrients in biological aspects is also a reflection of the environment in which we are inserted,

which understands food as a vehicle for the nutrient which is capable of taking care of the physical body, preventing and treating diseases or shaping the body^{29,30,31,32}. Thus, the nutritionist's training curriculum, which is very biologically focused, also needs to be reconsidered. The importance of including (and/or greater valuing) interdisciplinarity, expanded clinical practice and socio-anthropological discussions on food is urgently needed.

With this scenario and the information from the media focusing essentially on the biological aspects of food, it would be expected to find an association between source information and vision about food – which is what happened. Moreover, if such an association was found for Nutrition students, one can imagine that the general population – more informed by the media than by professionals and scientific sources⁹ – also has a reduced view of food and nutrition. The information environment around this content is very complex and often confusing^{6,7,26,31}, distancing people from the range of aspects involved in eating – especially the social, cultural, and emotional ones⁵.

In addition to the association between source of information and vision about nutrition, the association found with their academic stage can be partly expected, as the process of seeking scientific support evolves throughout the course, becoming more common and frequent in the final years (such as part of academic development and becoming a nutritionist). On the other hand, the difference between the main sources of information and the type of educational institution was not expected, since there are curricular guidelines to standardize academic education in Nutrition, and these should guarantee an equal education regardless of whether they are public or private institutions. However, we know that the profile of freshmen entering public and private colleges is quite different in Brazil, which in itself can have an impact as well as

the training received at the institution. Even so, this difference was observed only for the third declared source of information.

In addition to the advances and development of nutrition science, the dissemination of news and messages about food and health, mainly focused on nutrients and the biological role of food, continues to be a challenge, which affects both Nutrition students and the population^{2,7,31}. The findings of this study point to the need to better explore the theme of the impact of information sources other than college – such as media and culture – on the vision and performance of nutritionists. The media often ends up representing healthy eating, disregarding the sociocultural dimension, by propagating, for example, that certain types of food are better than others²¹. However, it is known that the perception of healthy eating can be influenced by several other factors, whether they are conscious or unconscious, and work on this topic should also be encouraged.

It should be considered that this study used declared responses, and these may be driven by the desire for social acceptance, which may

be involved in the participation in a survey called “Nutritionists’ Health Study” disclosed in the educational institution itself. Regardless of that, this study brings to light important results for the current moment of nutrition and the direction of Nutrition education which is facing new challenges. Moreover, as the study was carried out with students from São Paulo, it is not possible to generalize the findings to all students in the country.

This study brings new data and draws attention to current themes that have been little explored or not explored. Future studies should continue to investigate the perception of healthy eating, the factors that influence this perception, including the different sources of information and even the content of academic training. Nutrition students (future nutritionists) will also act based upon their understanding of what healthy eating is. Even if this understanding is not built exclusively upon their academic training, the undergraduate course in Nutrition should have a prominent role in professional training, encouraging a critical and reflective sense based on information received from the most diverse sources.

CONCLUSION

The main sources of information used for updating, according to the Nutrition students in this study, were scientific articles followed by information obtained through the internet. The source of information used for updating was associated with the perception of the function of food, the academic stage, and the type of institution. Moreover, the use of the media as the first source of information was more frequent among those who reported only biological aspects as the function of food. Students from private educational institutions more frequently reported the use of media sources as the third main source of information

and undergraduate students at the end of their study course more frequently reported the use of scientific sources as the main source.

Considering the importance of concepts about Nutrition, health, food, and the human body in professional practice, as well as the role of education in Nutrition and the sources of information used, the findings of this study reveal the need for more emphasis during academic training concerning the scope of the function of food, as well as on Nutrition as a science and an expanded discussion on how to get informed along with the critical process of acquiring knowledge.

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