

Ethnonutrition

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ABSTRACT

Ethnonutrition, also known as nutritional anthropology and cultural nutrition, is a discipline that studies diets of different peoples and cultures using a social-ecological approach. Research in ethnonutrition analyzes the effect of cultural variables in nutritional outcomes under the following topics: (i) socio-cultural processes, (ii) social epidemiology, (iii) idea systems, (iv) gene-culture coevolution, (v) food biodiversity. By addressing the cultural bias to which diets are embedded, ethnonutrition science sheds light on how nutrition can (i) promote diets that can contribute to the well-being of people of different cultures, (ii) while protecting all forms of life, and (iii) ensuring the sustainability of the planet.

Keywords: Nutrition; Food Security; Food Systems; Sustainable Development.

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INTRODUCTION

Ethnonutrition is the study of nutrition in different cultural contexts. And what does nutrition studies? Undoubtedly, the subject of diets is at the core of nutrition. In nutrition, diets refer to the dietary pattern of a given group, established by the relationship between people and edible resources available in a food system. The cultural approach in nutritional analysis is fundamental to understanding the complex context in which people build their diets. The anthropologist Igor de Garine (1972,144) argued that “nutritional patterns [i.e., diets] are subject to what might be called ‘a cultural bias’, in which the nutrition and dietary factors are but a few of the determining factors influencing a choice.” Therefore, the analysis of dietary patterns needs to consider cultural

variables to better inform about nutritional outcomes. Take as an example the study developed by Drouin-Chartier et al. (2020) to analyze whether egg consumption is related to the risk of developing type 2 diabetes. The conclusion of the authors was: it depends. The result showed a positive relationship of 18% between egg intake and increased risk of diabetes in the United States, null effect in Europe, and protective effect in Asia (-18%). What do we conclude from this example? In a nutshell, nutritional data of foods, detached from cultural variables, are a reductionist way to analyze diets. As we will see here, the conceptual and practical proposal of ethnonutrition seeks to address the need for a social-ecological approach to food. Therefore, in this primer article, we (i) define what ethnonutrition is, (ii) bring a brief history of this discipline, and, finally, (iii) present the

leading research approaches in the field.

What is Ethnonutrition?

Ethnonutrition is a discipline that studies the diets of different peoples and cultures using a social-ecological approach. We present below three scenarios to illustrate ethnonutrition scope.

Scenario 1. In the 30s, local governments in northeastern Brazil saw sisal farming with great optimism. At that moment, sisal (*Agave sisalana* Perrine) represented the hope of economic development and better quality of life for people in the region by improving family livelihoods. However, forty years later, around the 70s, nutritional data of the children of sisal workers showed a delay in the growth rate. Daniel Gross and Barbara Underwood (1971) were interested in this controversy and, therefore, they analyzed the human energy required to transform sisal into an exportable fiber. They concluded that the energy use of sisal workers was very high, the incomes in the household were low, and the consequence was the systematic deprivation of calories for non-productive household dependents. Due to the development stage, children were especially affected.

Scenario 2. Nutritionists in an intervention to combat child malnutrition in rural areas of Guatemala found that indigenous families were not adhering to the health program (Adams 1955). After analyzing why it could be happening, researchers discovered a severe communication failure between health professionals and the population. Health workers did not inform local people about the objectives and procedures of the program. As a result, people felt unsafe to participate. For example, some families believed the purpose of the nutritional program was to fatten their children, kidnap them, and send them to the United States to serve as food to the Americans. These concerned parents imagined that nutritionists were running blood tests to decide whether the children were fat enough to be sacrificed. For these people, not joining the program meant protecting their children.

Scenario 3. People living in the Rendille community in northern Kenya classify their food into soft and hard. Examples of soft foods in this classification include rice, corn porridge, and tea; in the local system, these foods are ideal for women. While meat, blood, and legumes represent hard foods, these ones are suitable for men. The nutritional effect of this system is that, since childhood, foods rich in energy, protein, and iron are potentially offered to boys, negatively impacting the nutritional status of girls. For example, a study conducted in Rendille, Shell-Duncan and McDade (2005) demonstrated a significant correlation between female gender and malnutrition sta-

tus, revealing that girls, even in families with sufficient economic conditions, were 2.4 times more likely to have iron deficiency than boys.

These three scenarios present clear examples of situations in which the ethnonutrition approach helps understand how sociocultural processes, such as the transition to a productive model shown in scenario 1, can lead to adverse nutritional outcomes. This discipline also helps us to improve our ability to communicate with the people for whom the actions of nutritional programs are designed, avoiding situations such as scenario 2. In addition, ethnonutrition identifies cultural beliefs and behaviors that affect the nutritional status of people, as we observed in scenario 3. In summary, ethnonutrition help us to understand in which ways culture influences diet and, consequently, human nutrition.

Ethnonutrition debate appears in the scientific literature for the first time under the label of nutritional anthropology and later as cultural nutrition. For Jerome *et al.* (1980), nutritional anthropology is a discipline that seeks to understand the relationships between social and biological forces that shape food use and the nutritional status of individuals and populations. Similarly, Louis Grivetti (1981) characterizes cultural nutrition as a discipline that draws associations between human behavior, food consumption, and nutritional status. Thus, ethnonutrition comprises two main fields of knowledge, nutrition and anthropology, focusing on understanding nutritional outcomes.

In this primer article, we justify the choice of the term ethnonutrition because, in our opinion, it is more precise in informing the focus on the nutritional problem. The prefix *ethno-* clearly indicates the reference to an ethnoscience. The fields of research called *ethno-x* (e.g., ethnonutrition, ethnobiology, ethnozoology, etc.) are interested in studying different emic views within the scope of a given discipline *x*. Thus, ethnonutrition would be the study of nutrition in diverse cultures; ethnobiology, biology in various cultures, etc. With this definition, it is evident that the mother discipline to which ethnonutrition is linked is nutrition itself. In summary, like other ethnoscience, ethnonutrition is interested in describing and analyzing local knowledge related to the field of interest (i.e., nutrition), in order to broaden the understanding of this field through comparisons and articulations between emic views and the knowledge that is practiced and accepted in the field (Albuquerque and Alves 2010). Besides, the lack of clarity concerning the outcomes can be an issue when we adopt terms like the anthropology of food or even anthropology of nutrition. For example, analyzes of anthropology of food have their primary focus on anthropological outcomes. Anthropology has four main

subfields: archeology, linguistic, physical (or biological), and cultural anthropology, the latter also known as sociocultural or social (see Kehoe 2013). However, since its emergence, anthropology of food has a predominant focus in analyzing sociocultural outcomes (see Mintz and Du Bois 2002). Outcomes of biological anthropology would have great possibilities to intersect or even be confused with nutritional outcomes. However, these intersections are rarer with the sociocultural subfield, which is predominant in food anthropology analyses. The Brazilian scenario also confirms this bias. In Brazil, anthropology itself is often synonymous with sociocultural anthropology (Gaspar Neto 2017). As a result, in the country, even the field so called anthropology of nutrition sticks to this bias. For example, the book “Anthropology and Nutrition: a potential dialogue” (Canesqui and Garcia 2005) was, without a doubt, a milestone in the articulation of anthropology and nutrition nationally. However, the analysis proposed by the book has a clear sociocultural bias. See, for example, this fragment written by the leading authors under the Introduction section: “this collection brings together research and reflections that elucidate multiple anthropological understandings of food as a historically derived sociocultural phenomenon” (Canesqui and Garcia 2005, p. 9). Even counting with the massive participation of nutrition professionals (Silva *et al.* 2010), the approach of anthropology of nutrition in Brazil focuses more on social than on nutritional outcomes. Therefore, we think ethnonutrition is a term that clarifies the kind of analysis relating to food and culture we should pursue when analyzing nutrition problems.

Modern History of the Discipline

The first mention to ethnonutrition in academic literature occurred in 1984 in a text entitled “Anthropological Perspectives on Diet”, written by the American anthropologist Ellen Messer (1984). Before that, however, we highlight the work of the English anthropologist Audrey Isabel Richards, who conducted the first systematic research on nutrition in anthropology (Richards 1948). For this reason, scholar peers consider Dr. Richards as “the great founding lady of the field of cultural nutrition” (Grivetti 1978,10). In “Hunger and Work in a Savage Tribe”, 1932, by using the case of the Bemba people in Zambia, Richards argued that the satisfaction of hunger is a fundamental element in the organization of human societies. In the field, she counted with an interdisciplinary team, with professionals from anthropology, botany, nutrition, and biochemistry working together. As a result, the final ethnography permeates the entire local food system, including edible resources, food uses, and a detailed calendar of agricultural cycles. With

this research, she concluded that the reasons why the natives could not work more hours (a primary concern for British mining and other economic agents) was not a matter of laziness but malnutrition. “Land, Labor, and Diet in Northern Rhodesia” (Richards 1995), 1939, a work on economic anthropology, was her second book. In this book, Richards shows that by analyzing diets, we can examine several cultural aspects of human lives, such as time allocation, gender roles, social inequalities, and poverty.

The 70s was the most fruitful period in establishing the field of ethnonutrition as a scientific discipline. At that time, the Western world began to understand the consequences of the agricultural production model set by the Green Revolution and the controversial scenario of growing malnutrition in an overproductive food system. This context and the incentives of institutions such as the “United Nations International Emergency Fund for Children”, the UNICEF, stimulated several anthropologists to engage in nutritional analyses. In response to this growing interest, ethnonutrition gained its first institutional space with the Council on Nutritional Anthropology (CNA) in 1974. The nutritionist Christine Wilson, from the University of California, was one of the people involved in founding the CNA at that time. With a solid background in biochemistry, nutrition, epidemiology, and anthropology, Dr. Wilson became a reference in establishing ethnonutrition as an independent science committed to improving the health of the people and the planet. For example, in a communication published in the Medical Anthropology Newsletter (Wilson 1978), she talks about her role as an author of the report “The World Food and Nutrition Study”, presented to the government of the Democrat Jimmy Carter. This report aimed to influence decision-making in the subjects of food production, climate change, funding for research in nutrition, among others. Dr. Wilson, in her lifetime, explored in detail how food beliefs affected the nutritional status of Malaysian fishers. In her articles, she argued that health professionals willing to learn about idea systems that shape food consumption would succeed when advising people about nutrition (Wilson 1971).

In the following years, the launch of two books connected various researchers conducting investigations worldwide in the ethnonutrition scope. The first was “Nutrition and Anthropology in Action”, published by the American anthropologist Thomas Fitzgerald, University of North Carolina (Fitzgerald 1977). Three years later, in 1980, Caribbean nutritionist Norge Jerome (University of Kansas), American sociologist Gretel Pelto (Cornell University), and US-born anthropologist Randy Kandel (New York University) launched the book “Nutritional Anthropology: Contemporary Approaches to Diet and Cul-

ture" (Jerome *et al.* 1980). This book resulted from symposia organized by the publishers at the annual meetings of the Anthropological Association between 1973 and 1974.

We also highlight two scientists that present a robust approach of ethnonutrition in their research. The first is Harriet Kuhnlein, an American nutritionist and retired professor at the School of Human Nutrition at McGill University, Montreal, Canada. Dr. Kuhnlein has worked with indigenous peoples in Canada (the First Nations), such as the Nuxalk Nation, also called the Bella Coola Nation in British Columbia. Still in the 70s, she was one of the first researchers to recognize that nutritionists should analyze indigenous food systems before conducting dietary assessments or health promotion activities in these communities (Kuhnlein 2014). Another researcher was the American biologist Nina Etkin (*in memoriam*). In her career, Etkin analyzed edible plants with medicinal potential from a multidisciplinary approach, mainly among the Hausa people, Nigeria. While she recognized the role of science in highlighting the nutritional profile of plants, Etkin (2006) stressed that the narrow focus on nutrients devoid of cultural context would offer only an incomplete perspective on the medicinal potential of foods. Her criticism is still helpful today in a context in which superfoods uncritically dominate the agenda of some nutrition sectors, often bringing harmful consequences to human and environmental health.

Research Approaches in Ethnonutrition

We present five research approaches in ethnonutrition (see Figure 1), providing examples of the primary investigation questions for each case. Peltó *et al.* (2000) proposed four of these lines of investigation in "Nutritional Anthropology: Biocultural Perspectives on Food and Nutrition". In this paper, we describe these lines with minor adaptations, besides adding the fifth point to this list, item "e".

a. Sociocultural Processes

The focus of this approach is to comprehend the effect of changes in social organization for producing or obtaining food on nutritional outcomes. The most significant long-term change in human food systems was the transition from hunting and gathering-based models to agricultural models (Peltó *et al.* 2000). Currently, the industrialization of agriculture is also related to significant changes in the global dietary pattern. In summary, the fundamental question that researchers can ask about the relationship of sociocultural processes with nutrition is as follows:

What is the impact of X [process or event related to the food system] on Y [nutritional outcome]?

Ekesa and colleagues (2020), studying rural communities in Uganda, gave a clear example of how to analyze the effect of sociocultural processes in nutrition problems. Their research question was: what is the impact of land tenure on the food diversity consumed by people? In this research, the authors started from two premises: (i) land tenure is central to agrobiodiversity (i.e., cultivated biodiversity), which is, in turn, crucial to dietary diversity; (ii) dietary diversity correlates with diet quality. The researchers worked with two types of families: those that had the perception to be secure concerning the land tenure, and those that had the perception to be insecure. In their study, the perception of being insecure about land tenure reduced the diversity of the diet consumed by 26%. The authors also demonstrate a positive relationship between agrobiodiversity and dietary diversity: a unitary increase in the number of species accessed for food was likely to increase dietary diversity by up to 18%. From this conclusion, the authors argue that land policy reforms to strengthen land tenure security will likely contribute to food diversity, leading to better food and nutrition security for vulnerable communities in rural areas.

b. Social Epidemiology

This approach is very similar to studies on sociocultural processes. However, the difference in social epidemiology is that the problem starts from the nutritional condition (e.g., malnutrition, food insecurity, micronutrient deficiency, growth deficit, obesity), and the investigation will seek to identify the role of sociocultural factors in the etiology of this condition. In this case, the basic structure of the survey question is this:

What are the determinants [or associated factors] on result Y [nutritional outcome]?

An excellent example of the application of this approach comes from the studies developed at Nupens, a group of studies in nutritional epidemiology led by Dr. Carlos Monteiro and Dr. Patrícia Constante Jaime, at the University of São Paulo, Brazil. One of the central questions that guide the projects of this group has to do with the growing trend of overweight and obesity (nutritional outcome), especially in countries in the global south (Latin America, Africa, and developing countries in Asia and Eastern Europe). What are the determinants of the growing incidence of overweight and obesity in these countries? Researchers at Nupens have systematically shown that traditional food systems in the Global South have been replaced by modern food systems rich in ultra-processed products (see Monteiro *et al.* 2013). The so-called Big Food

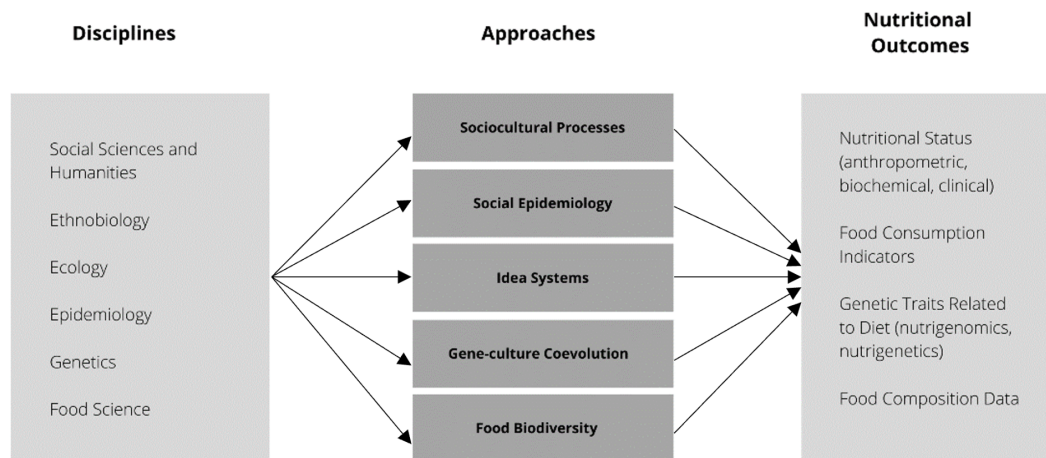


Figure 1. Research approaches in ethnonutrition, related disciplines, and main nutritional outcomes analyzed.

or Big Snack, transnational food companies that increasingly control the production and distribution of food around the world, have been very successful in exploring the democratic fragilities of these countries, predominantly permeable to the logic of market deregulation (Cannon and Monteiro 2012). Political and economic measures have strengthened transnational corporations, allowing for a rapid increase in the sale of ultra-processed products and, therefore, their production and consumption in the Global South (OPAS 2018). Transnational corporations establish themselves in these countries to explore the weaknesses in the national governance systems, producing harmful impacts on public health.

c. Idea Systems

Studying cultural belief systems and their relationship to nutritional outcomes is another focus of research in ethnonutrition. We present below the basic structure of the question in this approach.

What is the effect of X [belief or behavior] on Y [nutritional outcome]?

An example that translates this approach into research comes from the study developed by Sarri *et al.* (2004), who analyzed the impact of the fasting ritual promoted by the Greek Orthodox Christian Church on the health profile of the Cretan believers. The population of Crete has become internationally known for the positive health outcomes associated with their diet, also called the "Crete diet" or, popularly, the "Mediterranean diet." How did the researchers proceed? In a one-year study, they analyzed 120 Orthodox Christians, dividing them into two groups: fasting (experimental) and non-fasting (control). Researchers applied 24-hour recalls before and after the fasting

day. Compared to non-fasters, fasters had lower consumption of dietary cholesterol, total fat, saturated fat, trans fat, and protein. This group also had a 180 kcal decrease in energy intake on fasting days compared to a 137 kcal increase in controls. In addition, fasters had decreased calcium intake and increased dietary fiber and folate, attributed to their increased consumption of fruits and vegetables during these periods. Based on these results, the authors argue that beliefs related to the Orthodox Christian dietary regulations are an essential component of the Mediterranean diet of Crete characterized by low levels of dietary saturated fatty acids, high levels of fiber and folate, and high consumption of fruit, vegetables, and legumes.

d. Gene-culture Coevolution

One of the primary focuses of the study of ethnonutrition is the adaptive potential of diets. In this approach, researchers are interested in understanding the relationship between environmental pressures, the effect of these pressures in diets, and the consequent impact on genetic traits of a given population. Therefore, in this approach, we have the gene-culture coevolution problems related to diet, both in the nutrigenomics and in the nutrigenetics perspective. In nutrigenomics, the intent is to analyze how the diet modifies gene expression. In nutrigenetics, the goal is to comprehend how genetic factors influence our food perception or even food consumption. We present below the two basic structures of the question in this proposal. The first considering the nutrigenomics perspective; the second, the nutrigenetics.

What are the determinants [cultural change related to diet] of the distribution of Y [genetic trait

or other nutritional condition] within a given population?

What is the role of X [genetic trait or other nutritional condition] in modifying Y [food perception or food consumption]?

Under this approach, we will give an example from the perspective of nutrigenomics. In a broad sense, changes in culture and in the environment, leads to transition within food practices, making diets a primary source of gene selection among humans (Laland *et al.* 2010). For example, high starch consumption is a feature of agricultural societies, especially when compared to hunter-gatherer and pastoralist groups. This behavioral variation suggests that different selective pressures acted on salivary amylase, the enzyme responsible for starch hydrolysis. Perry *et al.* (2007) found that individuals from agricultural societies - that historically have had high starch diets - have more copies of *AMY1*, the salivary amylase gene. Higher *AMY1* copy numbers improve the digestion of starchy foods and may buffer against the fitness-reducing effects of intestinal disease. In addition to this example, investigations related to lactase persistence, fire control, favism, and bitter perception are classic studies under this approach.

e. Food Biodiversity

In this line, the main objective is to analyze the impacts of food biodiversity (i.e., plants, animals, fungi, algae) available in a given sample (i.e., farm, forest, diet) on nutritional outcomes. The fundamental question structure in this approach is as follows:

What is the relationship between edible resources X [available or consumed food biodiversity] in the aspect Y of diet [consumption assessment indicator] of a given population?

An exciting example of how to translate this approach into research is the study conducted by Lachat *et al.* (2018) that analyzed the contribution of diversity within food consumption of women and children (n=6226) in rural areas of seven low- and middle-income countries. They found a positive association between dietary species richness, or the count of the number of different species consumed per day, and the nutritional adequacy of diets (e.g., mean adequacy ratio, nutrient adequacy ratios). The most interesting aspect of this paper is that the authors proposed and tested the indicator dietary species richness (DSR) to evaluate the quality of diets and biodiversity conservation simultaneously. Given the conflicts in reconciling environmental and nutrition policies, the DSR is a valuable tool that integrates biodiversity, food, and health. In addition, DSR provides more specific details at the species level than classic indicators that focus on food groups. This characteristic allows a

more accurate analysis at the nutrient level.

The study of Lachat *et al.* is also a good example because it highlights the role of ethnobiology in providing accurate data about biodiversity in dietary intake surveys. Ethnobiology is one of the sciences most dedicated to studying the use of biodiversity by human populations. Therefore, we can say that ethnobiology is a sister science of ethnonutrition because it helps us (i) to expand our knowledge about edible species, their cultural uses, and the cultural meanings attributed to these foods by human populations; and also support us (ii) to test hypotheses that elucidate the relation between nutritional health of families and populations and the level of conservation and use of the surrounding food biodiversity.

CONCLUSION

This article summarizes the definition, history, and leading research approaches in ethnonutrition, a scientific discipline interested in understanding the effect of cultural variables on different nutritional outcomes. Nutrition science has its roots in Europe, and its practice remains largely a Eurocentric cultural expression. These facts may produce reductionist readings about diet. Ethnonutrition analyzes are helpful because they reveal assumptions about diets rooted in our professional, personal, and cultural experiences.

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CONFLICT OF INTEREST

The authors declare to be free of any commercial or financial relationships that could be construed as a potential conflict of interest.

CONTRIBUTION STATEMENT

MCMJ wrote the first draft of the manuscript. All authors have made important contributions in the research conception and by reading and approving the final manuscript.

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