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## Poor Food Consumption in Middle Aged and Elderly Indigenous People in Southern Brazil

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### Abstract

**Introduction:** Considering the food as one of the basics for healthy aging, we identified important gaps in the knowledge of food habits and nutrition of southern Brazilian indigenous people.

**Objective:** This study evaluated the dietary intake of Kaingang and Guarani ethnic indigenous living in Porto Alegre and Planalto, Brazil.

**Methodology:** A cross-sectional, descriptive and analytical study, with the participation of 150 indigenous people, aged between 40 and 104 years. Dietary intake was estimated by a 24-hour recall, conducted between July and August 2009.

**Results:** There was excessive consumption of foods rich in simple carbohydrates (candy and soda), and high intake of lipids of animal origin (lard as a base for some preparations), which is related to the increase risk of heart diseases. There was a low consumption of fruits and vegetables (sources of vitamins, minerals, fiber and bioactive compounds), foods that can reduce the risk of diseases.

**Conclusions:** The lack of one or more nutrients, called hidden hunger, is considered an important nutritional problem, as the stage prior to the appearance of detectable clinical diseases. Thus, the poor food choices or lack of access to good quality of food may be influencing the health status of these indigenous. It is noteworthy that food as a source of pleasure and cultural identity and family also may be necessary to approach health promotion respecting the food culture of this population.

**Keywords:** Indigenous health; Aged; Middle aged; Food consumption; Indigenous population

### Introduction

Brazil, according to the most recent census of the population in 2010, has a significant number of indigenous people, corresponding to 0.4% of the total population (approximately 818,000). In the state of Rio Grande do Sul, 32,989 in the rural area and 13,830 in the urban area declared themselves indigenous people [1].

Most indigenous people are restricted to seven ethnic groups (Guarani, Kaingang, Makuxi, Guajajara, Terena, Tikuna, and Yanomami). These peoples and communities present particular configurations of customs, beliefs and language, which affects the ways of insertion with the environment. They are considered to be distinct from other sectors of Brazilian society, are imbued with preserving, developing and transmitting to their future generations their ancestral territories and their ethnic identity, their own cultural patterns and legal systems as the basis of their continued existence as peoples [2,3].

The vast majority of indigenous peoples live on collective lands, called indigenous lands, declared by the Brazilian government for the exclusive usufruct of indigenous peoples. The scarce availability or absence of land has caused enormous impacts on the daily life of

indigenous societies, affecting not only subsistence food patterns, but also dimensions of symbolic character in the ethnicity plane [1,2].

The analysis of the indigenous food culture helps to deepen the reflection on the subsistence issue, since this is the organizing principle of the relationship of the indigenous society with the nature and, at the same time, seeks to verify the quality of the food of this population. Thus, there is an economy subordinated to the limits that nature establishes for its exploitation, being respected its limits of sustainability [4].

Knowledge about the health, nutrition and feeding conditions of indigenous peoples in Brazil is still very superficial. However, the whole of these studies shows an accelerated trend of epidemiological and nutritional transition among indigenous people. In parallel to malnutrition and anemia, recent studies have drawn attention to the rapid emergence of overweight and obesity in the indigenous population of indigenous adults and elderly, and chronic diseases such as hypertension and diabetes mellitus. In this context, to study the food consumption of this population refers us directly to considerations about the environment where these populations settled and built their relations of reciprocity and survival. The environmental conditions define the capacity of support, sustainability and quality of life in the establishment of a society in a determined territory [4,5].

Considering food as one of the bases for healthy aging, there are important gaps in the knowledge about food and nutrition of southern Brazilian indigenous people. In order to identify possible determinants and determinants of the food and nutritional situation of this population, this work evaluated the food consumption of Kaingangs and Guarani from Porto Alegre and Planalto.

## Methodology

It is a cross-sectional, descriptive and analytical study. One-hundred fifty indigenous people from the Kaingang and Guarani ethnic groups, aged between 40 and 104 years, who agreed to participate in the study, signed an informed consent form. The inclusion criteria were to be resident in the selected villages and able to recall the foods ingested in the past day. Volunteers with non-indigenous first or second-degree kinship and those whose age could not be verified were excluded.

The research was approved by the Research Ethics Committee of the Pontifical Catholic University of Rio Grande do Sul, Brazil (08/04374) and by the national ethics research committee (CONEP 136/20099). The research took into account the requirements of resolution 196/96 of the national health council and its complementary ones. The research was also approved by the national indian foundation (FUNAI) responsible for scientific studies and research (1918/08) and by the district council of Indigenous Health of Rio Grande do Sul, FUNASA-RS. The study was conducted through the Indigenous special

sanitary district (DSEI). The collection was performed at the Public Health Services or their residence in both regions located within the villages of the study.

The food consumption was estimated by the 24-hour recall, carried out between July and August 2009. The "24-hour recall" method was used because it consists of quantifying the preparations and food ingested during the day prior to the interview, based on home measurements. The data was collected by a trained Registered-Nurse who used a standard form with the help of a book showing to the participant's pictures of the portion sizes of each food item, minimizing the difficulty of assessing home measurements. As for dietary intake, dietary variables were: carbohydrates, proteins, lipids, vitamins A, B1, B2, B6, niacin, E, C, and the minerals potassium, copper, phosphorus, calcium, iron, magnesium and zinc.

During the data collection, a photographic album was used, with food, portions and visual objects exemplifying homemade measures to identify the portions and quantities that the participant had consumed.

The data were scanned in a database developed by the TeleForm program; Analyzed using the Epi Info, Version 3.5.1 program to obtain the average energy consumption of macronutrients (proteins, carbohydrates and fat) and micronutrients (vitamins and minerals), as well as the percentage distribution of macronutrients and the percentage adequacy of the other dietary variables.

	Inadequate (%)			Adequate (%)			p
	Female	Male	Total	Female	Male	Total	
Sex							
Carbohydrate	0(0)	0(0)	0(0)	83(100.0)	67(100.0)	150(100.0)	-
Protein	18(21.7)	6(9.0)	24(16.0)	65(78.3)	61(91.0)	126(84.0)	0.0344
Food Fiber	19(22.9)	7(10.4)	26(17.3)	64(77.1)	60(89.6)	124(82.7)	0.0453
Vitamin A	82(98.8)	65(97.0)	147(98.0)	1(1.2)	2(3.0)	3(2.0)	0.4197
Vitamin C	59(71.1)	51(76.1)	110(73.3)	24(28.9)	16(23.9)	40(26.7)	0.4881
Vitamin B1	70(84.3)	45(67.2)	115(76.7)	13(15.7)	22(32.8)	35(23.3)	0.0134
Vitamin B2	82(98.8)	64(95.5)	146(97.3)	1(1.2)	3(4.5)	4(2.7)	0.2340
Vitamin B6	82(98.8)	66(98.5)	148(98.7)	1(1.2)	1(1.5)	2(1.3)	0.6954
Niacin	54(65.1)	34(50.7)	88(58.7)	29(34.9)	33(49.3)	62(41.3)	0.0767
Potassium	0(0.0)	4(6.0)	4(2.7)	83(100.0)	63(94.0)	146(97.3)	0.0378
Copper	2(2.4)	0(0.0)	2(1.3)	81(97.6)	67(100.0)	148(98.7)	0.3045
Phosphor	2(2.4)	0(0.0)	2(1.3)	81(97.6)	67(100.0)	148(98.7)	0.3045
Calcium	80(96.4)	65(97.0)	145(96.7)	3(3.6)	2(3.0)	5(3.3)	0.6005
Iron	3(3.6)	0(0.0)	3(2.0)	80(96.4)	67(100.0)	147(98.0)	0.1666
Magnesium	23(27.7)	11(16.4)	34(22.7)	60(72.3)	56(83.6)	116(77.3)	0.1005
Zinc	19(22.9)	4(6.0)	23(15.3)	64(77.1)	63(94.0)	127(84.7)	0.0042

**Table 1:** Distribution of indigenous people as regards the adequate or inadequate consumption of nutrients according to DRI or RDA.

A descriptive analysis of the characteristics of the food habit and the comparison with the sociodemographic parameters (sex and

socioeconomic level) and nutritional risk were performed. Averages were calculated for daily nutrient intake, with their comparison using

the test t-Student and Fisher Exact test. The daily intake of nutrients was compared to the daily parameters recommended by Institute of Medicine/Food and Nutrition Board using the DRIs (Dietary Reference Intakes), and the RDA (Recommended Dietary Allowances) [6]. Nutrients were then classified as adequate or inadequate consumption. The frequency of nutrients with adequate consumption was compared between nutritional risk, sex and economic classification, and tested by Chi-Square. Levels of significance lower than 0.05 were considered statistically significant and between 0.05 and 0.1 were considered indicative of significance.

## Results

One-hundred-fifty indigenous people participated, of which 67 were male and 83 were female. The sample consisted of 119 (79.2%) Kaingang and 31 (20.8%) Guaranis individuals, of which 136 (90.7%) were rural indigenous and 14 (9.3%) were urban indigenous. As for marital status, 126 were married and 24 were not married. The study included 58 indigenous people under the age of 50, 35 indigenous people aged between 50 and 59 years, 25 indigenous people between 60 and 69 years old and 32 indigenous people over 70 years old. The analysis of the food consumption estimated by the 24-hour recall is described in Table 1 in macronutrients and micronutrients.

We observed in Table 1 that the consumption of carbohydrates by the Indians of both genders was within the recommended one. The protein recommendation was reached by 84%, this frequency was higher in men, since 91% had adequate intake, contrasting with 78.3% of the indigenous women, with a significant difference of  $p=0.034$ .

Regarding fiber consumption, 82.7% had adequate consumption, this frequency was higher among men, since 89.6% had ingestion within the recommended one, but among the women, consumption was lower, since 77.1% had adequate intake.

Regarding the intake of potassium 97.3% of the indigenous people made adequate intake of this micronutrient according to the recommendation. All women had adequate intake. Among men, 6% did not make adequate intakes. The difference in adequate intake between the sexes was significant ( $p=0.037$ , Fisher Exact Test).

When analyzing the intake of copper and phosphorus of the Indians, both had the same distribution with 98.7% doing adequate intake of these micronutrients. These frequencies were lower in women, as 2.4% did not reach the recommended intake levels of these micronutrients, contrasting with the adequate intake of 100% of the men for these two micronutrients, but this difference was not significant.

Regarding Calcium consumption, a low consumption of foods rich in this nutrient was observed, since 96.7% of the Indians did not reach the recommendation. This frequency was even higher in men, since 97% had lower than recommended intake, contrasting with 96.4% of women, but this difference was not significant.

Iron intake was adequate in 98% of subjects. The frequency was higher in men with 100% adequate intake, contrasting with 96.4% in women, but this difference was not significant.

Considering the evaluation of the intake of vitamins, the consumption of vitamin A, C, B1, B2, B6 and Niacin was analyzed. We observed in Table 1 that the Indians had a low consumption of food sources of these vitamins, since most of the natives did not reach the recommendation for these nutrients. It is known that aging is

influenced by genetic, nutritional and cultural factors. Healthy eating, including leafy vegetables, legumes, fresh fruits, whole grains, lean meats, eggs and dairy enhances the immune system and fights free radicals and their harmful effects on the body. The human antioxidant defense system is composed mainly of the antioxidant enzymes [7].

When analyzing the consumption of vitamin A, 98% of the natives did not have an adequate consumption for this vitamin, being the greater frequency among the women with 98.8% with intake below the recommended one. Studies have suggested that carotenoids play an important protective role against cardiovascular diseases and certain types of cancers [8].

For vitamin C, 73.3% had an inadequate intake, with a higher prevalence among men with a frequency of 76.1%, when compared to the consumption of women (71.1%). According to Hermida et al. [9] the intake of vitamin C can minimize the effects of aging, mainly through its antioxidant action in the fight against oxidative stress.

The results point to a significant difference in vitamin B1 intake,  $p=0.0134$ , where 76.7% consumed this nutrient improperly, with a higher frequency in the female gender with 84.3% with inadequate consumption, when compared to the male gender in 67.2%.

Similarly, consumption below recommended levels was observed in 97.3% of indigenous people for B2 vitamins and 98.7% for vitamin B6. This frequency was higher in the female gender, since 98.8% had low intake for vitamin B2, contrasting with 95.5% of men, similarly for vitamin B6 the frequency of inadequacy was greater in the female gender with 98.8%, contrasting with 98.5% of inadequate consumption in the male gender.

Regarding the consumption of niacin, a low consumption of foods rich in this nutrient was observed, since 58.7% of the natives did not reach the recommendation. This frequency was even higher in women, since 65.1% had lower than recommended intake, contrasting with 50.7% of men, but this difference was not significant.

Table 2 shows that 84% of the Indians had high sodium intake. This frequency in men was higher, 85% had high intake, contrasting with 83% of women, but this difference was not significant.

	Sodium (%)			Lipids (%)		
	Female	Male	TOTAL	Female	Male	TOTAL
Low	6(7.2)	5(7.5)	11(7.3)	2(2.4)	1(1.5)	3(2.0)
Normal	8(9.6)	5(7.5)	13(8.7)	5(6.0)	1(1.5)	6(4.0)
High	69(83.1)	57(85.1)	126(84.0)	76(91.6)	65(97.0)	141(94.0)
	$p=0.8950$			$p=0.3368$		

**Table 2:** Indigenous distribution of low, normal or high consumption of Sodium and Lipids according to the DRI or RDA.

Likewise, from the analysis of the 24-hour recall, a high consumption of lipids was observed by 94% of the Indians who participated in the study, with a higher frequency among men, since 97.0% consumed a high, contrasting with 91.6% of women who also had a high consumption of lipids. This high consumption of lipids is because indigenous people in the rural area make use exclusively of lard for the preparation of their food. Some preparations, for example, the so-called rolled up (beans with lard and cassava flour, often

ingested in the morning with crackling), or even used lard in fried foods.

## Discussion

The manuscript brings a never published assessment of food intake on middle-aged and elderly Brazilian Indians. The international literature about food consumption in indigenous populations are scarce. Most studies with this population have an anthropologic and qualitative approach, thus without a quantitatively assessing of their food habits. The 24hr recall was used to collect the food items with the help of a picture book of home measurements to minimize incorrect data input. This approach has its weakness, since the researchers need to rely on participant's ability to recall all foods ingested a day before. Participants unable to recall the foods and quantities were not included in this analysis. Although this disadvantage, this approach is used as gold standard to validate other food intake methods like food frequency questionnaire [10], which was not applicable to our study since Indians food habits were different from the general population.

We observed that only carbohydrate intake was within the adequate range. Higher intake of carbohydrates is related to obesity. Gimeno et al. [11], studying Aruák Indians aged  $\geq 20$  years living in the Upper Xingu, Central Brazil, observed that most participants were overweight or obese. Indigenous populations are undergoing a rapid and accelerated process of changes in cultural, social and economic patterns, especially in relation to eating habits, bringing therefore the emergence of pathologies associated with obesity, such as diabetes mellitus and cardiovascular diseases [11].

For the production of antioxidant enzymes that protect the human body, it requires the presence of adequate levels of minerals such as zinc, copper and selenium, as well as sufficient amounts of high quality proteins and vitamins. Both vitamin C and B-complex vitamins are required for the production of extra catalase (it captures hydrogen peroxide and decomposes it into oxygen and water before it can form hydroxyl radicals). Without sufficient vitamin B6 (pyridoxine), for example, the body has no way of producing glutathione peroxidase. In this way, the regular consumption of certain minerals and vitamins is indispensable for the proper functioning of the body's antioxidant system [7].

In some regions, where the indigenous population has a closer relationship with the regional population. There are new health problems related to changes in their way of life and especially in food, with a higher consumption of food rich in sodium and sugar leading to diseases such as: hypertension, diabetes and cancer, increasingly frequent in various communities [12].

Traditionally, indigenous families have survived from hunting, gathering, fishing and growing small orchards, raising small animals (pigs and birds), fish farming and beekeeping, and over the decades, they have been introducing new crops into their subsistence production. However, due to the precariousness of these areas, many families live in food insecure situations [13].

The results point to a low consumption of vegetables, fruits and vegetables. Although indigenous people, especially those residing in rural areas, had access to fruits, since in the reserve there were many fruit trees, such as oranges or bergamots, most of the participants used artificial juices industrialized rather than natural juices (for lack of habit). These customs corroborate with the results found from the analysis of the food recall, reinforcing the low-consumption food

sources of vitamins, nutrients of major deficiencies of the populations of this study. However, there was a consumption of industrialized foods, introduced by the contact with the surrounding society, causing a change in the food standard, reinforcing an acculturation of the Indians, both urban and rural. Poor food quality on indigenous people has also observed, recently in Australian Indians [14].

## Conclusion

The lack of one or more nutrients, called hidden hunger, is considered an important nutritional problem, and the stage before the onset of detectable clinical signs. The cultural, social and economic rescue of indigenous populations helps to ensure the wellbeing of the health, rescuing the ritualization and the traditions of the ancestors related to the good feeding. Thus, food choices or lack of access to food may be influencing the quality of health of these individuals. Support and articulation by developing complementary livelihood strategies, with the effective participation of local indigenous populations, can contribute to food security and nutrition. It is important to emphasize that food is a source of pleasure and cultural and family identity, and can be an instrument of approach necessary for health promotion, respecting the food culture of these individuals.

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