



# **Systematic Application of the Qualitative Evaluation of Cardápio Preparations (Aqpc) as an Instrument for the Analysis of two Food and Nutrition Units in Belém, Pa, Brazil**

**Hanna Karyna Pinheiro de Oliveira<sup>1,2\*</sup>, Suenne Taynah Abe Sato<sup>1</sup>  
and Rosa Beatriz Monteiro Souza<sup>1,2</sup>**

<sup>1</sup>*Department of Nutrition, Higher School of the Amazon - ESAMAZ, Pará, Brazil.*

<sup>2</sup>*Department of Specialization in Management of Food and Nutrition Units,  
Faculty Amazon Amazonia - FIBRA, Pará, Brazil.*

## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author HKPO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors STAS and RBMS managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The qualitative assessment of preparation menu (AQPC) consists of a qualitative analysis of the menu composition regarding colors, preparation techniques, combinations, leafy offerings, fruits, sweets, types of meat and foods rich in sulfur. It is an important aid tool in the development of healthy and balanced menus. The objective of this study is to evaluate the quality of the menu of Food and Nutrition Units (UAN) through the AQPC method, to evaluate the main cooking methods of the main dishes, the main side dishes and types of proteins served and to classify the results of the application of the method. The data were tabulated in relation to the total days of the analyzed menus. The results showed percentages indicative of the nutritional quality of the menus. There

\*Corresponding author: Email: [hanna.2020oliver@gmail.com](mailto:hanna.2020oliver@gmail.com);

was a high frequency of leafy leaves (59.1%) in both, being classified as “Regular”; with respect to colors, the university restaurant (UR) was classified as “Regular” (27.3%) and the RP as “Good” (18.2%); both restaurants were “Regular” in terms of sulfur-rich food, but “Great” in terms of fruit. Sweets were offered only in the RP, but at a low frequency (4.5%). There was no appearance of sweet + frying on both menus. In both restaurants, a high frequency of fried foods (59.1%) and fatty meats (40.9%) was observed. Regarding the meat preparation techniques, the roast and boil forms were verified only in the UR (31.8% and 4.5% respectively) and grilled and steamed only in the RP (4.5% and 9.1% respectively). The RP had a higher frequency of fried preparations (54.5%), stew (27.3%), whereas the stew was more frequent in the RP (40.9%). Regarding the types of proteins served, red meat was the most served type (UR, 72.7% and RP, 59.1%), chicken and fish were served more frequently in RP (40.9% and 4.5%, respectively). The main side dishes were rice, beans and flour, and most often they were served together both in the UR (72.7%) and in the RP (81.8%). It is concluded that the menus offer leafy and fruit in ideal quantities, but there is a high frequency of fatty meats and fried foods. In general, the AQPC method is a good tool to assist the nutritionist in the global and qualitative assessment of menus.

*Keywords: Collective food; quality of life; popular restaurant; University restaurant.*

## 1. INTRODUCTION

Food practices are related to what we eat, food selection and aspects related to food preparation. Feeding behavior, on the other hand, encompasses the actions of eating, methods, reactions and ways of proceeding with food [1]. Still according to the same author, food consumption refers to food intake, which implies aspects that follow swallowing, such as the relationship between food and metabolism, its digestion, absorption and storage.

Several factors influence diet and these range from the production of food to its transformation into meals and availability for consumption, which are generally available on menus. The menu is the planning tool used by the nutritionist in the Food and Nutrition Units (UAN) to structure the production, in addition, through it one can contribute to the offer of healthy foods and the construction of adequate eating habits [2]. The menu should stimulate as much as possible the sensory characteristics of food, seeking to promote pleasure and satisfaction at the time of the meal [3].

The Food and Nutrition Units (UANs) aim to provide balanced and healthy meals for employees of companies, industrial complexes, schools, philanthropic institutions, among others [4]. Thus, to provide quality meals, the management and administration of the UANs must be carried out by a nutritionist, whose function is to plan, organize, direct, supervise and evaluate all stages of the food system that make up the production process [5].

To assist the nutritionist in the elaboration of the menu, the method of qualitative assessment of the menu preparations (AQPC) was formulated by Veiros and Proença in [6], which aims to diagnose and improve the perception of nutritional balance in addition to building a more adequate menu. nutritional and sensory point of view within the scientifically recommended health parameters.

However, inadequate planning interferes with the quality of the food offered, resulting in monotonous preparations, nutritionally unbalanced and unattractive [7]. In view of the above, the AQPC method was created aiming to assist the professional in the adequate elaboration of the menu by the nutritional and sensory aspect within the parameters of health, and must be qualitatively and quantitatively adequate to the eating habit and capable of promoting a healthy life, which prevents the appearance of diseases [8].

For this, the AQPC proposes the evaluation of the menus, where the items for analysis are pointed out, such as preparation techniques, repetitions, color combinations, presence of sweets, offer of leafy fruits and types of meat, in addition to analyzing the number of preparations with sulfur-rich foods [9]. Thus, the present study aimed to qualitatively evaluate the menus of two food and nutrition units, using the Qualitative Assessment Method of Menu Preparation (AQPC), in order to evaluate the main cooking methods and proteins served in the food units. study.

## 2. LITERATURE REVIEW

### 2.1 History of Food and Nutrition Units

The history of food begins in the Middle Ages, at the time the cooks had an important role within the nobility and religion. At that time there had been the custom of eating food outside the home environment, the only places where it is consumed away from home food were the inns, taverns, inns and monasteries themselves. In Europe, specifically in France, through the French Revolution, the cooks were faced with a resulting adverse reality of the fall of the nobility. No work, some professionals have undertaken and structured their own businesses [10].

Actual changes in production and distribution of food systems were initiated motivated by specific epic moments, such as the European Industrial Revolution (XVIII century), Consolidating its position with the First World War (1914-1918), when the formulation was required nutritionally adequate supplies for combatants [10].

In the period of the 2<sup>nd</sup> World War there were several innovations in meal production system for a large number of people for this, greater systematization and standardization of shares was created [11].

In this sense, the Food and Nutrition Units (UAN's) were created to satisfy an audience, recognizing all the variables at the time of planning the menus. In addition to the customer's characteristics, operating conditions and supply market, the guarantee of minimum consumption of energy and nutrients, promote healthy eating habits and offer pleasant and appetizing meals, appropriate to the public-target. Are some aspects that are previously analyzed for the preparation of decisions to be served in establishments that provide meals [12].

### 2.2 Meal Away from Home

The habit of daily meals outside the home environment has become a reality in recent times because of the many activities that people have to play on a daily basis [13].

In Brazil it is estimated that, out of five meals, is made outside the home, in Europe and two in six in the US, one in two. These figures indicate that there may still be a large increase and development of sites that produce food for

immediate consumption in the country. Such establishments include sized production units and types of organization different from each other as commercial restaurants, hotel restaurants, motels services, coffee shops, buffets, cafeterias, industrial kitchens, fast food, catering and hospital kitchens [14].

All this need of people of food outside the home, opens an unlimited range of possibilities of different businesses and with it various food segments can be explored, making it a great source of income. Thus, the food industry and trade is changed both in technological apparatus, as the supply of food and especially in human relations. Companies every day have been adapting to this market in order to also reduce its manufacturing costs to lower the product, recycling, improving their conservation techniques, transport conditions, among others [13].

The UAN's had to adjust to the new reality, because they deal the need to rebuild concepts and restructure itself facing a new market. Some factors such as the location and the service of practicality are some of the features that will govern the choices of the urban citizen [15].

### 2.3 Menu Planning

In UAN's nutritionist is the qualified professional to provide the preparation of quality meals in all its aspects. The function of this professional is to plan, organize, direct, supervise and evaluate the entire production process, in addition to the implementation of assistance activities and nutrition education [11]. Some important aspects for planning menus are described below.

#### 2.3.1 Administrative aspects

Planning menus, the administrative aspects are very important. Among these aspects include the planning, coordination, direction and control. The end result should be the service according to a certain pattern, respecting eating habits and the proposed establishment itself [12].

According to Venus and Petrovic [16], as an essential activity for quality assurance, planning is the first task inserted in the routine of UAN's, as in any organization. Considered as a construction tool and defining a given situation, the planning should be based on the choice between alternatives and setting goals that guide the actions.

According, Mezomo [12] the planning includes grouping standards and direct actions to improve the use of material and human resources in the unit that is called rationalization. The goal is to raise the service productivity with cost reduction, ie increase efficiency through better use of resources.

Please observe the relationship between availability of required inputs for current preparations and the actual proposal of the menu to be planned, even considering the offer of products from sustainable agricultural practices, ie, to minimize environmental degradation [14].

Overall, the UAN's are responsible for the quality of customer service. And this quality requires a highly standardized and controlled production from food handling to managing people.

The quality of the meals should provide for the nutrition, health and legal sense. However, there are several limiting factors for the supply of this quality, especially among many of the clientele, the physical and functional structure, supply and, in the case of outsourcing services, the agreement governing the parties involved in the process [15,16].

### **2.3.2 Nutritional aspects**

Several studies show the commitment of the nutritional quality of meals eaten outside the home environment. Thus, the menu planning must have a central focus on health.

Some steps are indispensable for the nutritional quality of the meals, the choice of preparations, as well as the criterion adopted portions of, we can also highlight the selection of ingredients that serve as sources of nutrients and how we can make the most of each food.

The menu items can be selected after the nutritional assessment, which is the nutritional diagnosis of the individual or ascertained population through direct indicators (biochemical, anthropometric) and indirect (food consumption, income, food availability, etc.), where from the results it is possible to estimate the nutritional needs and develop intervention strategies, among them a consistent menu with the observed reality [17].

To better meet the nutritional needs, it is necessary for planning menus, as well as diets usually aimed at groups of individuals, divided into four stages:

- Determination of the objectives of planning;
- Definition of desirable goals distribution of usual intake;
- Selection of preparations which comprise the menu; and
- Evaluation of the results by means of actual consumption.

The definition of goals is defined by the characteristics of meals and the target audience, the goals correspond to the group's usual intake in relation to the nutrients that were defined in the first action. The second stage, refers to the selection of preparations, which is crucial for the previous activities to correspond to the actual consumption of the target population.

It is important to note that for proper menu planning, the supervision of nutrition professionals is extremely necessary, as this professional is the most qualified to act in the prevention of nutritional deficiencies in the population.

### **2.3.3 Cultural and sensory aspects**

Local cuisine is represented by the food systems of each location that are distinguished from the others by flavors, manners, styles, etc. [18].

Globalization and its effects also promote standardization deterritorialization taste. In Brazil, the presence of food as industrialized soft drinks and snacks, among the main items consumed outside the home, demonstrates this fact [19]. However, the supply of rice and beans in the popular dishes such as traditional dishes in the dish of the day to day of Brazilians, shows some resistance to standardization of taste.

Sensory acceptance of preparations has always guided the actions of UAN's. Moreover, the convenience and practicality are often treated as a priority in many components of the menus. The garrison consists of pastas, pastries and choice of desserts, for example, can compromise not only the cultural quality, but also the nutritional menus. Portanto, administrative aspects should be used to promote the nutritional and sensory aspects, essential for the acceptance of the offered and actual menu health promotion [20].

## **2.4 University Restaurant and Popular Restaurant**

With the end of the 2<sup>nd</sup> war and return of troops, feeding programs have been created in the

affected countries to mitigate the effects of malnutrition, acquired through conflict [21].

In Brazil, popular restaurants (PR) of the Social Welfare Food Service - SAPS represent the institutional power, which comes in 1940 with the first nutrition courses [11].

Popular restaurants are food and nutrition services aimed at the preparation and marketing of healthy meals, offered at affordable prices to the population, which should preferably be located in large urban centers to its easy access. These restaurants should provide food supplementation for vulnerable groups who, for lack of time or resources, can not have access to a healthy meal at least once a day [22].

In addition to the RP's, the school context has become the enabling environment to reach a large number of people, with a proposal to offer a healthy meal [21].

The university restaurants (UR) is to provide quality purposes, serving nutritionally balanced and safe hygienic meals, affordably, thus promoting basic conditions necessary for the proper performance of the teaching-learning activities and labor (servers); disseminate good eating habits through varied and balanced diet, trying to correct possible eating disorders and to contribute to the basic task of the institution that is training people [23].

## 2.5 Food and Health

Time has become a great villain of people who work all day, thinking about it, in the 70s, the United States created a new concept of food in relation to the principle of fast eating, with time this concept expanded to the rest the world, in different countries and in different cultures [24]. The fast food attracted a variety of colors, aromas and flavors, able to meet the gastronomic needs of anyone who is looking for a fast food. This new concept brings as main features: ease, physical and financial access, combined with the convenience and variety of offers [13].

In contrast, excessive consumption of these types of food can contribute to the acquisition of numerous diseases, such as obesity and therefore the diseases associated with overweight and obesity, such as type 2 diabetes, cardiovascular disease, some cancers, and other chronic diseases not transferable, which have increased their prevalence, becoming the focus of numerous public health actions [13].

Observing this context, it created a overall strategy for Diet, Physical Activity and Health, which includes the participation of institutional foodservice, actions to combat these diseases. The institutional foodservice create menus with innovative and healthy options with stimulating consumption of low energy density foods, which reflect the reality of these places to change the food environment, promoting healthy choices, fundamental in the actions related to the adequate supply of nutrients.

## 2.6 Qualitative Assessment of Preparation Menu (Aqpc)

In order to help the professional in designing an appropriate menu of nutritional and sensory point of view, the Qualitative Assessment method of Menu Preparations (AQPC) analyzes the preparations that comprise providing a global view of it [25].

The AQPC method analyzes the cooking technique, the supply of leafy and canning in the salad, mix of colors in the salad and all menu preparations, number of preparations with foods rich in sulfur (supply of two or more rich preparations sulfur excluding beans), supply of fruit and sweets as dessert, combination of sweet and fried in the same menu, fried food supply, the classification of the menu in a few or many amounts of fat according to the fat content of the preparations food especially meat, or the preparation technique (frying) the menu of the composition and the color repetitions preparation techniques, combinations, leafy supply, fruits, sweets, meat types and foods high in sulfur [9]. According [13] this method is more suited to institutional restaurants, which has a menu with fewer options and control the number of servings.

## 3. METHODOLOGY

This is a qualitative study with descriptive characteristics, where the research was carried out in two units of food and nutrition (UAN): being a popular restaurant (PR) and a university restaurant (UR). Both located in the city of Belém - Pará, lasting 22 days.

### 3.1 Characterization of the Food and Nutrition Unit

The UR study is part of the Federal Public Service, medium size that provides lunch from Monday to Friday, serving an average of 500 daily meals. The menu offered at the University

Restaurant (RU), was composed of a type of salad a day with single or mixed her, three side dishes (rice, beans and manioc flour) or (pasta, beans and manioc flour), a trim and every other day, a main course, and fruit for dessert, there was no juice offer on site or soft drinks.

The RP studied is part of the great Municipal Utility size that provides from Monday to Friday, serving on average 1000 daily meals. The menus offered in the People's Restaurant (RP), was composed of two single or mixed salads, three side dishes (rice, beans with pumpkin and flour) or (pasta, beans with pumpkin and flour), a main course and that on Friday always had two main course choices and fruit as only sweet dessert in a day's menu, no juice to supply the establishment or soft drinks. The steaks were offered menus in beef, chicken and fish.

### 3.2 Evaluation of the Main Side Dishes, Types of Proteins and Main Cooking Methods of the Main Dishes

The main dishes served in the UAN's were rice, beans, pasta and cassava flour. For this work were evaluated for their daily frequency and grouped according to the combination used. With this base, the group consisted of two groups of dishes:

- Rice, beans and flour.
- Pasta, beans and flour.

The main types of proteins served in both UAN's were red meat, chicken and fish. the frequencies were calculated for each type of protein, among the total of 22 evaluation days.

The cooking methods were selected from the sum of all the methods used in each UAN. To get all kinds of cooking, we calculated the use of frequencies for each UAN.

The menus are contained in Appendix A.

### 3.3 Qualitative Assessment of the Menu Preparations

The qualitative assessment of the menu of the preparations was performed in accordance with the methodology adapted by several authors [9,6], which analyzes the following: supply of leafy; fruits; the presence of the same color; Preparations rich in sulfur (S); fatty meat; frying; sweet; sweet and frying on the same day.

#### 3.3.1 Criteria for the evaluation of preparations rich in sulfur (S)

Were considered and accounted for as sulfur flatulent foods: avocado, Swiss chard, celery, garlic, peanuts, sweet potatoes, broccoli, nuts, onions, Brussels Sprout, cauliflower, peas, ginger, guava, jackfruit, lentils, apple, watermelon, cantaloupe, corn, mustard, turnip, nuts, egg, radish, cabbage and grape [13].

The menus that offered two or more of the aforementioned foods were considered high sulfur content. The beans, present in daily meals, was not considered in this analysis.

#### 3.3.2 Criteria for evaluating the color of preparations

As for color, the menus were considered monotonous when preparations had with similar colors on the same day as, for example, salad of carrot, sweet potato, papaya and mango for dessert juice, except meats and beans.

#### 3.3.3 Criteria for evaluation of fatty meat preparations

Fatty meats were considered those in which the fat content exceeded 50.0% of the total energy [13].

### 3.4 Classification of the Results of the Application of the AQPC Method

The classification of AQPC results consider the menu items of positive and negative aspect of items and assigns each aspect a rating.

#### 3.4.1 Positive aspect of menu items

Were considered as positive the menu offering leafy and fruit, and from their percentage distribution on the menu, were classified as "Good", "Good", "Fair", "Poor" and "Terrible", according to Table 1.

**Table 1. Classification criteria of the positive aspects of the menu**

Classification	Category
Great	≥ 90%
Good	75-89%
Regular	50-74%
Poor	25-49%
Terrible	<25

### 3.4.2 Negative items of the menu

The presence of the same colors, two or more preparations rich in sulfur, fatty meat, fried, sweet and supply of fresh and frying on the same day were considered negative aspects of the menu and classified according to Table 2.

**Table 2. Classification criteria of the negative aspects of the menu**

Classification	Category
Great	≤ 10%
Good	11 a 25%
Regular	26-50%
Poor	51 a 75%
Terrible	> 75%

### 3.5 Statistical Analysis

The data obtained were previously recorded (Appendix A) and Excel® tabulated. Descriptive statistical analysis (simple and relative frequency) and figures for the expression of results were performed using Microsoft Office Excel® software.

## 4. RESULTS AND DISCUSSION

### 4.1 Evaluation of Menus According to the AQPC Method

The results of applying the method to the two AQPC UAN's are arranged in Fig. 1.

#### 4.1.1 Leafy

The results (Fig. 1) show that the leafy offer in both was the same (59.1%). Other authors report that the leafy presence is 82.6% and 94.2% [25]. In the units analyzed, this category of food is delivered twice a week.

In the study by [26], a significant inverse relationship was observed between the intake of pectin and the progression of the narrowing of the intima and media. For pectin, it is the primary soluble fiber and is present in vegetables and fruits. For [27], states that a high intake of fiber reduces the risk of cardiovascular diseases, some cancers, controlling blood pressure, blood glucose, cholesterol and reduce obesity.

#### 4.1.2 Color

Regarding color, the UK menus showed more identical colors (27.3%) than PR (18.2%) (Fig. 1).

When preparing a menu, it is important to observe the combination of colors to avoid monotony, in addition to ensuring the intake of various nutrients for health promotion [25].

The mixture of shapes, colors, texture makes the refection positive, opening an appetite and increasing salivation [28]. In addition, a good menu should have two basic principles: variety and harmony [29].

#### 4.1.3 Foods rich in sulfur

Another item discussed was the presence of foods rich in sulfur, excluding beans, since it is a typical and daily dish in Brazilian menu. The menus were classified foods rich in sulfur when there were two or more source preparations of this mineral daily. Sulfur in excess causes abdominal discomfort diners in the presence of sulfur compounds that produce gases [13].

The presence of sulfur food RU was higher in the menus (45.5%) (Fig. 1). This result can be improved, seeking replacement of these foods, which mainly comprise the salads being the major contributors salads (such as cabbage, cauliflower, spinach beet and cucumber) with other minor amount of sulfur. The menu analyzed by [25], the presence of sulfur-rich food was high (65%) of the reasons why the diners to complain of abdominal discomfort.

#### 4.1.4 Fruits and sweets

Fig. 1 shows that 100% of UR's menus have fruits, which are provided as a dessert. In PR, the percentage was 95.5% of the menus. The results of this study are different from those found in the literature [25], which considered the offer of sweets as desserts (66.1%) than fruits (33.9%).

Adequate intake of fruits and vegetables is essential for a healthy diet. According to the WHO, the daily consumption of fruits and vegetables should be at least 400g per day, equivalent to five servings. The consumption of vegetables is associated with a reduced risk of chronic diseases, such as cardiovasculares disease and some types of cancer [30].

#### 4.1.5 Fried food

The supply of frying occurred in 59.1%, both in the UR and in the PR (Fig. 1). As this preparation technique is fast, it is usually chosen to develop the preparation of some foods, remembering that the high consumption of lipids is a risk factor for cardiovascular diseases.

Previous studies show that 22.1%, 40% and 49.5% of fried foods predominate as menu items.

#### 4.1.6 Fatty meats

In this study, a higher incidence was observed to supply the fatty meats RP (45.5%) and lowest in the UR (40.9%). However, the results of both restaurants were higher than those found by [25] (15.6%), [31] (37.5%) and [32] (40.0%).

It is important that these foods are reduced on the menus due to excessive consumption that can lead to obesity, atherosclerotic disease and cancers.

#### 4.2 Evaluation of the Main Cooking Methods for Main Courses

Fig. 2 shows the different cooking methods used in the preparation of meat analyzed the menus.

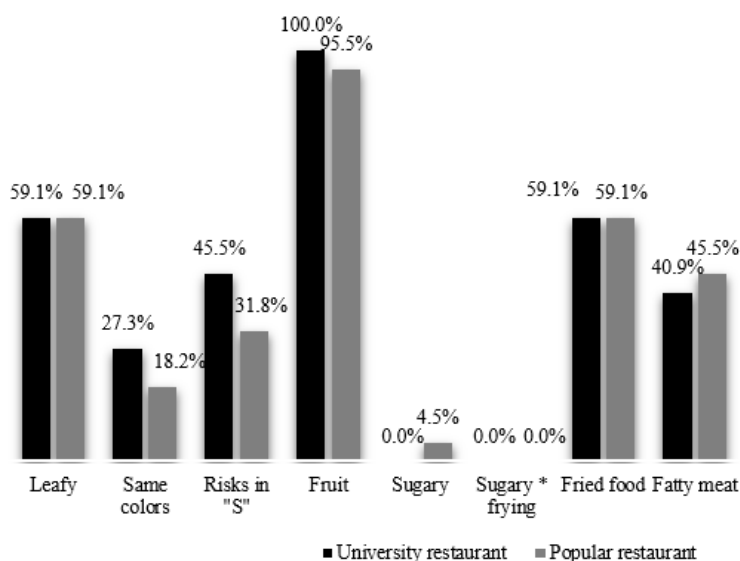


Fig. 1. Analysis of the menus according to the method of qualitative analysis of the preparations of the menu - AQPC of 22 two Food and Nutrition Units in Belém - PA

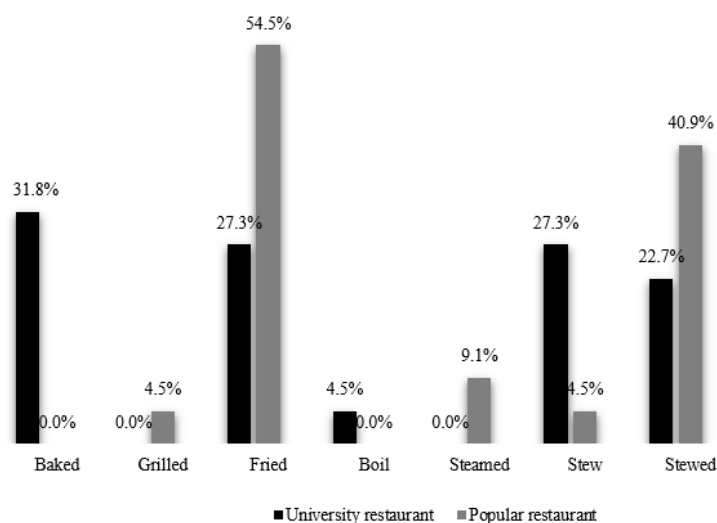


Fig. 2. Evaluation of the main cooking methods of the main dishes served in 22 days in two Food and Nutrition Units in Belém-PA



In the UR showed the predominance of baked preparations (31.8%), and secondly, fried and soaked (27.3%). Preparations stewed comporam 22.7% of menus, 4.5% boil and steam cooking grilled and was not used as a cooking technique.

In the PR, fried foods (54.5%) and stew (40.9%) predominated. Steamed foods accounted for 9.1%, grilled and soaked foods 4.5%. The preparations cooked in UR were predominant (26.0%), followed by immersion (21.1%) and frying (11.5%). Steam cooking (7.7%) was similar to the PR in this study and boiling (5.8%) was similar to the United Kingdom. Cooked preparations (3.9%) were lower than the results found for UR and PR [31].

The menus of the evaluated UANs still have a high rate of frying (UR 27.3% and 54.5% PR). It is suggested, therefore, to replace this preparation technique, otherwise making it possible for customers to have a more adequate and healthy diet. The healthiest techniques that should be valued at UAN are grilled, sautéed, cooked, baked and boiled [13,33].

#### 4.3 Evaluation of the Main Types of Proteins

Fig. 3 are disposed the evaluation results of the major types of proteins served in UAN's. It can be observed that red meat supply prevailed in both the evaluated properties. But in the UR, the supply of red meat was higher (72.7%) than in the RP (59.1%).

The increase in the supply of red meat in the UR can be explained by the low supply of fish (4.5%). In PR, the variety of proteins was more diversified, but it influences a greater quantity of oily meat in the UR (40,9%) and in the RP (45.5%).

#### 4.4 Evaluation of the Main Follow-ups

In the present study we observed that the consumption of rice and beans was prevalent both in the UR as RP (Fig. 4).

However, a considerable percentage presented by the replacement of rice noodles, which is more frequent replacement in the UR (27.3%). De acordo com o guia alimentar para a população brasileira, recomenda-se o consumo diário de arroz e feijão, com proporção de 2: 1, respectivamente, ou torna-se a combinação completa nos aminoácidos essenciais [33].

In addition, the combination of rice and beans as traditional foods can exercise power protection against obesity, possibly because it is a combination of low energy density and low in fat, and good fiber content and iron, especially the beans [13]. From the results, there is still the daily consumption of cassava flour in both stores searched.

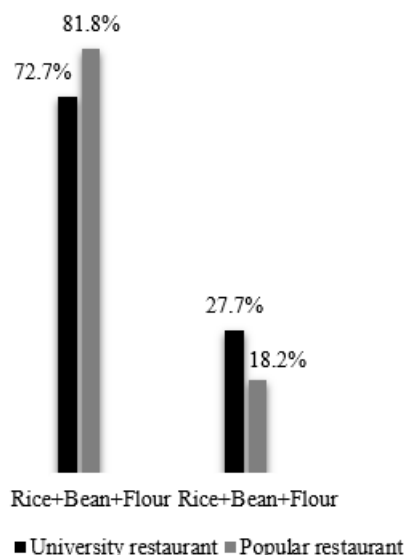


Fig. 3. The main types of proteins rating served 22 days in two Food and Nutrition Unit in Belém - PA

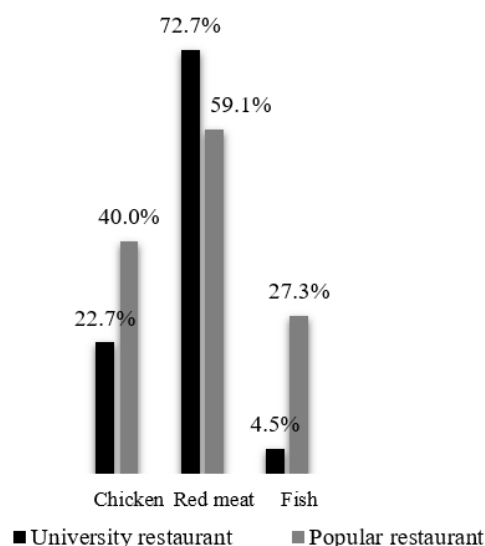


Fig. 4. Evaluation of the main dishes served in 22 days in two Food and Nutrition Unit in Belém - PA

**Table 3. Classification of items analyzed the menu preparations in 22 days in two food and nutrition unit in Belém – PA**

Items	UR		PR		
	% de occurrence	Classification	% de occurrence	Classification	
Positives	Leafy (days)	59,1	Regular	59,1	Regular
	Fruits (days)	100.0	Great	95,5	Great
Negatives	Cadies (days)	0.0	Great	4,5	Great
	Cadies + Fried (days)	0.0	Great	0.0	Great
	Same colors (days)	27,3	Regular	18,2	Good
	Rich in "S" (days)	45,5	Regular	31,8	Regular
	Fatty meat (days)	40,9	Regular	45,5	Regular
	Fried food (days)	59,1	Worse	59,1	Worse

Cassava is prepared in different ways, flour, its main product, is used by all sections of the population [34]. In the analyzed UAN's, daily consumption of carbohydrates is observed. Since foods rich in carbohydrates are those that have a high glycemic index, their excessive intake increases the risk of diabetes, obesity and heart disease [35].

#### 4.5 Classification of the Results of the Application of the Method AQPC

The classification of the results of the evaluation of the menus where were consider positive and negative aspects of the menus are shown in Table 3.

Regarding the positive items of the menus (leafy and fruit) for both the UR and for the RP, the frequency of supply of fruit was considered "Great" and leafy "Regular", demonstrating the need to increase the frequency of this type food.

Regarding the negative items from menus (color, foods rich in S, and fatty meat, sweets, sweet + frying and fried foods), it was classified as "Great" the frequency of sweets and candy along with fried foods, for both UAN's. And this result is very important, considering that excess sugar They tend having high energy density and fiber shortage, features proven to increase the risk of obesity, diabetes, cardiovascular diseases and certain types of cancers [36,37].

As the classification of the evaluation of color, the UR was rated "Fair", while the RP was "good". However, these results can be further improved by increasing the planning and attention to the food that can be inserted and can promote reduction in the monotony of the menus.

Among these foods, you can mention the vegetables that make up the salad because the salad is a healthy item and should be more attractive by the possibility of color variation and establishment of fiber and micronutrientes [38,24].

The frequency of foods rich in S and also preparations containing fatty meat was raised to the two units so it was classified as "Fair". For the embodiment of such items in the rating "Good" it is necessary to replace foods rich in sulfur (broccoli, chard, garlic, cauliflower, cabbage, onion, sweet potato, apple, melon and watermelon), other than containing in lower content such as eggplant, pumpkin, carrot, cucumber, pear, tangerine, orange; and increase the frequency of lean meats, and white as birds and fish, which have less fat and therefore lower energy density [39,24].

The unsatisfactory result, as was the frequency of fried foods on menus. For both the UAN's classification was "Poor". This is due to the predominance of use as a cooking technique, using moist heat frying. In this sense, the results of this survey point to a greater need for change in the type of cooking, because the frequent intake of fried foods It is a risk factor for cardiovascular diseases, cancers and hypertension [40].

Overall, these results demonstrate that the menus of the establishments analyzed, can still be improved and seeking better quality of life for diners. For the supply of unhealthy foods may be unavoidable when the menus are designed with limited financial resources, however, should be avoided to Nutrition professional combination of

these foods in one day, minimizing excess fat and simple sugars.

Food and nutritional education activities with employees should be conducted in order to promote the adoption of healthy eating habits and better acceptance of different types of fruits and vegetables.

## 5. CONCLUSION

The results of this research showed that the main cooking methods of the main dishes were fried for both UAN's, which allowed the menus were classified as "Ruins" because the high frequency of fried preparations. It is suggested, therefore, increase the frequency of types of cooking that require less oil and fat.

The combination of rice and beans were the main dishes on menus, however there was a considerable frequency in rice noodles replacement by the UR. It is therefore important to increase the frequency of the combination of rice and beans to keep the essential amino acid intake.

Red meat proteins were served more often in both UAN'S, which may have contributed to that received a rating of "Regular" as the supply of fatty meats; thus it is suggested offering more often other types of proteins, such as white because they contain less fat content.

It was found that there is the need to replace foods high in S by others cause less abdominal discomfort and increase the supply of leafy framework for the classification of "Great".

Although there was a sweet offer in one of the menus, both the UR and the RP were considered "Great" as the supply of fruit.

In general, the AQPC method was presented as a great tool, easy to use, able to assist the registered dietitian on global and qualitative evaluation, and can be used to evaluate the menus before being executed, thus providing the possibility of offering healthier and attractive menus.

## CONSENT AND ETHICAL APPROVAL

For the study, there was no need for submission to the Ethics Committee (CEP) by treating preparations analysis. However, the units studied were previously contacted, informed about the objectives of the work and responsible signed the document of authorization to carry out the work.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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## APPENDICES

### Appendix A - Worksheet for qualitative data collection

Day	Month of the menu							
	Salad 1	Salad 2	Salad 3	Main course	Garrison	Rice	Bean	Dessert
1								
2								
3								
4								
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27								

### Appendix B - Menus of food and nutrition units

#### Monthly Menu of the University Restaurant

**Day 1** - Chopped lasagna / mixed salad1 / jalo beans / farofa / dessert: watermelon;

**Day 2**- Chicken fillet on the plate / raw salad 1 / seasoned pasta / brindle beans / flour / dessert: melon;

**Day 3** - Meat and vegetable stew / white rice / flour / brindle beans / flour / dessert: papaya;

**Day 4** - Pot steak / vegetables on the plate / seasoned rice / black beans / farofa / dessert: tangerine;

**Day 5** - Meat barbecue / vegetable puree 1 / vinagreti sauce / seasoned rice / carioca beans / farofa / dessert: banana;

**Day 6** - Chopped with eggs / mixed salad 4 / seasoned rice / jalo beans / farofa / dessert: melon;

**Day 7** - Steak on the plate / Mashed vegetables2 / seasoned rice / jalo beans / farofa / dessert: melon;

**Day 8** - Soup / roasted chicken / raw salad 2 / spiced pasta / jalo beans / farofa / dessert: banana;

**Day 9** - Liver steak / vegetable gratin / seasoned rice / jalo beans / farofa / dessert: papaya;

**Day 10** - Feijoada complete / cabbage from Minas Gerais / white rice / farofa / dessert: orange;

**Day 11** - Chopped with noodles / raw salad3 / brindle beans / farofa / dessert: melon;

**Day 12** - Soup / chicken stew / vegetable puree 3 / seasoned rice / jalo beans / farofa / dessert: banana;

**Day 13** - Roasted meat / mixed salad 2 with mayonnaise / seasoned rice / black beans / farofa / dessert: papaya;

**Day 14** - Fried fish / mixed salad 3 / vinagreti sauce / seasoned rice / black beans / farofa / dessert: watermelon;

**Day 15** - HOLIDAY

**Day 16** - Chopped with vegetables / seasoned rice / brindle beans / farofa / dessert: watermelon;

**Day 17** - Steak on the plate / vegetable puree 1 / seasoned rice / brindle beans / farofa / dessert: melon;

**Day 18** - Pot steak / mixed salad 3 / seasoned rice / black beans / farofa / dessert: tangerine;

**Day 19** - Chicken risotto / raw salad 4 / carioca beans / farofa / dessert: papaya;

**Day 20** - Meat and vegetable stew / white rice / brindle beans / flour / dessert: banana.

### Monthly Menu of the Popular Restaurant

Popular restaurant - 1 <sup>a</sup> week										
	Monday		Tuesday		Wednesday		Thursday		Friday	
Main course	Roast beef with sauce		Bait mixed (chicken and pepperoni)		jerked beef stew		Fillet Of Fish Fry		chicken breast the fried calamari	
Option									Oxtail	
Side dish	White rice, brown beans with pumpkin and flour		Pasta, brown beans with pumpkin flour		White rice, black beans with pumpkin and flour		White rice, black beans and cassava and flour		White rice, brown beans with pumpkin and flour	
raw salad			Chard, tomato and grated				vinaigrette		Lettuce, tomato and cucumber	
Cooked salad	cooked beets				Potatoes, carrots and green beans					
desserts	Apple		melon		banana		orange		watermelon	

<b>Popular restaurant - 2<sup>a</sup> Week</b>					
	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
Main course	Steak with onions	Chicken salami	Jerked beef stew	Fillet Of Fish Fry	Chicken breast the fried calamari
Option					Oxtail
Side dish	White rice, brown beans with pumpkin and flour	White rice, brown beans with pumpkin and flour	spaghetti, black beans with pumpkin and flour	White rice, black beans with pumpkin and flour	White rice, brown beans with pumpkin and flour
raw salad		Chard, tomato and carrot, grated		Lettuce, tomato and cucumber	Tomato, cabbage and grated carrot
cooked salad	Potatoes, carrots and parsley		festive salad		
desserts	Apple	melon	banana	orange	gelatine
<b>Popular restaurant – 3<sup>a</sup> week</b>					
	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
Main course	Meat bait	chess chicken	stew paranese	Fried fish fillet seared	Chicken stew cubes
Option					Bait liver with onions
Side dish	White rice, brown beans with pumpkin and flour	pasta, brown beans with pumpkin and flour	White rice, black beans with pumpkin and flour	White rice, brown beans with pumpkin and flour	White rice, brown beans with pumpkin and flour
raw salad	Tomato, cabbage and grated carrot			Lettuce, tomato and cucumber	Chard, tomato and carrot, grated
cooked salad		Potatoes, carrots and green beans	cooked beets		
desserts	Apple	banana	melon	orange	watermelon
<b>Popular restaurant - 4<sup>a</sup> week</b>					
	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
Main course	Roast beef with sauce	Old skirt (shredded beef with egg)	Chicken in tucupi with jambu	Fillet of fried fish in red sauce	-
Option		Oxtail			-
Side dish	White rice, brown beans with pumpkin and flour	White rice, brown beans with pumpkin and flour	White rice, black beans with pumpkin and flour	White rice, brown beans with pumpkin and flour	-
raw salad			Tomato, cabbage and grated carrot	Lettuce, tomato and cucumber	-
cooked salad	plated salad	Potatoes, carrots and green beans			-
desserts	Apple	melon	banana	orange	-

<b>Popular restaurant 5<sup>a</sup> week</b>					
	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
Main course	Beef stew	Bait mixed (chicken with pepperoni)	Stew beef jerky	Fried fish fillet seared	Chicken breast on the plate
Option					Tongue in sauce
Side dish	White rice, brown beans with pumpkin and flour	pasta, brown beans with pumpkin and flour	White rice, black beans with pumpkin and flour	White rice, brown beans with pumpkin and flour	White rice, brown beans with pumpkin and flour
Raw salad	Tomato, cabbage and grated carrot	Chard, tomato and carrot, grated		Lettuce, tomato and cucumber	
cooked salad		Potatoes, carrots and green beans	cooked beets		Potatoes, carrots and green beans
desserts	Apple	banana	melon	orange	gelatine

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