https://dx.doi.org/10.22161/ijaers.5.9.17 ISSN: 2349-6495(P) | 2456-1908(O)

Nutritional Transition of Riverine People from Puruzinho Lake in the Amazon Region. A Qualitative Study

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Abstract**—** *Scientific studies suggest that eating habits of traditional communities all over the world have been suffering changes as a result of gradual replacement of regional products with imported ones and also because of the increase of consumption of carbohydrates and trans fats. The nutritional state of populations, as riverine people in the Amazon region, has been widely affected by factors as changes in the eating and epidemiologic patterns. This study aims at the identification of the perception of dwellers of a riverine community the Brazilian Amazon region on their eating habits, their health and on the changes caused by development. This is a qualitative study, in which we used ethnographic semi structured interviews as a tool to collect data, conducted through a semi structured script, and applied to 16 dwellers/heads of families, in which 11 are men and 5 are women. The interviews were recorded in audio, full text transcribed and analyzed, and resulted in a descriptive system of categories and subcategories. As a result, we identified an increase of purchase capacity, greater participation in the market economy, lack of effective and continuous actions by the administrators of basic health services in the city. These joint factors contribute to the process of nutritional transition that is occurring in the community, as well as to the increase of health vulnerability of the dwellers.*

Keywords**—** ***Riverine. Amazon. Lifestyle. Eating habits. Nutritional Transition.***

I. INTRODUCTION

The Amazon region is geographically characterized as a river basin called Amazon basin, with an area of more than 7,000,000 Km^2 and a population of around 25 million inhabitants, considered as a reference of biodiversity in the world since it has the biggest potamic complexes of the planet. Its inhabitants who live by the banks of rivers and streams, generally, come from mixed ethnicities (indigenous, Europeans, Africans) and are called riverine peoples [1,2,3].

The traditional riverine people in the Amazon region dwell in homes built from forest raw material, as the straw (generally used to cover their houses), the wood (processed and used in walls and floors) and lianas (used to tie the roof and to the completion of walls). The economy of family subsistence of this people is based mainly on fishing, extractivism, hunting and small-scale farming [3,4].

The riverine people's knowledge in relation to their way of life in nature, their survival management techniques, legends, beliefs and religious rites are transmitted from generation to generation [5].

Nowadays, innumerous changes have affected the daily life of most of these traditional populations. We

https://dx.doi.org/10.22161/ijaers.5.9.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

can attribute these changes to a greater access to urban areas, to the means of communication, to the widening of market economy and to the benefits given by the Federal Government social programs, such as "BolsaFamília", "SeguroDefeso" and "Luz paraTodos" [6,7].

The result of these changes in the way of life of the Amazon riverine people has promoted the increase of consumption of industrialized products as canned food, sausages, trans fats, acidulants and food colorings, foods composed of a high amount of preservatives, trans fats and simple carbohydrates, which were formerly not available and that may be responsible by the loss of characteristic of their traditional customs and habits, which reveals the need of monitoring their nutritional state [7,8].

The nutritional state of traditional populations, as the Amazonian riverine peoples, has been affected by factors as noticed changes in their eating and epidemiologic patterns, characterized by the gradual replacement of natural products from their diet, such as fish, cassava flour and native fruits, with industrialized foods that are rich in preservatives and trans fats, creating the Nutritional Transition [4,9].

The Nutritional Transition (NT) may be understood as a group of changes in the diet patterns and modifications in the physical activity level [2,10,11], that impact the overweight rates and obesity and associated diseases. All of this may even lead to an Epidemiologic Transition process, which reveals cases of loss of health such as physical limitations and the increase of morbimortality by chronic non-transmissible diseases [3,4].

The worry about physiologic alterations related to health due to those changes in the nutritional state of the riverine person implies an increase of vulnerability of this population [10,12,13] and their association with a greater access to urban areas, lack of natural sources of food and/or to a higher capacity of purchase as a consequence of the increase in family income, or *per capita* [4,13,14].

This study aims to identify the perception of the dwellers of a riverine community in the Brazilian Amazon region on their relation to eating habits, perception on health and changes occurred due to development.

II. MATERIALS AND METHODS

The collection of data was conducted in the riverine community of Puruzinho Lake (located in the left banks of Madeira River, 20 kilometers downstream away from the urban area of the city of Humaitá, in the state of Amazonas). The collection occurred between February 16 and 27, 2017, through semi-structured interviews. The selection of participants was intentional. We conducted ethnographic-natured interviews [15,16] that allow us to study more accurately environment and subject in a group or community, specifically, from different points of view, aiming a more realistic understanding of the essence of a determined phenomenon.

The interviews were conducted based on a semi-structured script with 16 dwellers/heads of families – 11 men and 5 women. When collecting data, 25 families lived in the community, and were composed of 123 members. The choice of the people to be interviewed took into consideration how much time the person has lived in the community. We identified, then, the traditional riverine dwellers who live longer in the peri-urban area [17].

The ethnographic-based interviews took into consideration that data collection also involved observation, registered in field diary, and their analysis were made according to the context in which they were carried out [18].

The interviews were conducted in the homes of the riverine people (what allowed contact privacy), and lasted from 30 to 50 minutes each. Before and after the interview, the researcher remained in the residence (kitchen) of the interviewed ones (being invited by them), and then had the opportunity to see what food products they kept, as well as the garbage that contained food packets already used by them. The scheduling and conduction of the interviews were made personally by the researcher; with authorization of the president of the community and of the administration of the city health office, according to the time and availability of the dwellers.

The number of interviewed people was outlined according to the level of saturation of data obtained. As the interviews followed a script, it was possible to guarantee the process of comparison of the collected information, which allowed the systematization of analysis categories in order to organize each interviewed person's discourse [19].

Based on the interviews scripts, we collected sociodemographic data (family and work), social life (time spent on leisure, community events as religious and cultural parties, traditional customs), practice of physical exercises, nourishment (habits, customs and changes), perception of health (main diseases in the community, hygiene habits, actions towards health) and social programs of the Federal Government for the community. The interviews were recorded and later transcribed by the researcher.

The criteria of inclusion to choose the participants of the research were: a) to have permanent residence in the community; b) to be the representative of a family unit, indicated by the members of this family, and c) to be part of the group of dwellers who have been living longer in the community.

https://dx.doi.org/10.22161/ijaers.5.9.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

Taking into consideration the ethical requirements, the research was submitted and approved by the Ethics on Research Committee of the Federal Institute of Rondônia (IFRO), under the register number 1.423.049. Also, all the participants signed the Free and Informed Consent Form (FICF). The names and elements that could identify the participants of the study were omitted.

III. RESULTS AND DISCUSSION

3.1. Describing the riverine people

The Amazon region has been the topic of many discussions related to environment and health. It happens because of the vast and complex estuary of the Amazon region, and also because of its great potential of environment resources. In this context of discussions on the Brazilian Amazonian scenario, the riverine dweller has appeared as one of the main actors in this epilogue. However, in reality, he/she still is still limited to a figuration that needs to be better observed and oriented due to the real situation and needs [20].

The term "riverine" is used to describe traditional populations that live in small communities by the banks of Amazonian streams, lakes and rivers. Their way of life depends, in part, on the seasonable cycles of the region. Their homes are generally built with raw material available in the local surroundings, as wood for the walls and floor, and straw from the *babaçu* tree to cover their homes. These traditional populations mainly and, sometimes, almost exclusively, subsist on small scale agriculture, extractivism and fishing [3,5].

In the Puruzinho Lake, which is composed of dark waters and is located in an area away from the urban zone, the dwellers live in a community named after the lake and that was by its banks. Their homes were built from the forest raw material, and are generally formed by a kind of attachment (semi-detached house), where the kitchen and a type of living room are located and where hammocks are hanged, so that members of the family can rest during the day (also a place to receive visitors and where the interviews occurred).

Another characteristic of the Puruzinho riverine dwellers' homes is that they are located 20 to 100m away one from another and are strategically positioned next to the water, respecting the typical seasonal characteristics (periods of "floods" and "droughts" of waters). Therefore, their homes hardly go through flooding when the rivers are full, nor are too far from the waters during the dry season; this way, it is easier for them to get to water to bathe, to collect water, and to the fish, which are kept in big Styrofoam boxes to be consumed or sold in the city later.

The rapid expansion of commercial fishing in the Amazon rivers has affected the life of people who live in riverine communities, and it can bring harmful consequences to one of the main activities of subsistence of these people [21]. The interviews revealed that the riverine people are worried about the subsistence activities as hunt and fishing.

> Fish is becoming scarcer, they come from Madeira River. But now, before they get to the lake to spawn, the owners of the big boats who live in town follow the fish by the river and then throw their giant nets from one side to the other in the entrance of the lake and we end up with the few fish that manage to go through. Last week, for example, there was a boat that caught more than one ton of fish. To have a good hunt day is difficult now. Hunters from other places are "cleaning" the area and the animals are more and more distant from here. Our hunt is only good when we go by canoe with flashlights beams along the banks of the lake. Another problem is that the young ones don't want to hunt at night. There are some things that got better for us, but others aren't that good (interviewed person 4).

Another worry told by the interviewed people is related to the educational situation in the community. We noticed, by the information collected in the interviews, that great part of the population from Puruzinho Lake is illiterate. This situation may be justified in part by the poor conditions of the school, which contribute to the low political influence and difficulty in the social community organization.

According to the testimony of an interviewed person:

> There is a great worry about the kids that don't continue school, because we need teachers who do live here in the community, for we are distant from the city. Most of the teachers who come to teach here give up. We understand that because to come and back here from the city is not possible because the school boat doesn't come up here; it's too far. We have already had a meeting with some parents and talked to the woman from the city administration that takes care of schools in this entire region, but she said it's only possible to offer classes up to the 9th year. The only teacher here lives beside de school; she teaches together with her daughter who is finishing school. They divide de class in two halves and in one side stay the children from the 1st to the 5th year, and in the other side the ones from the 6th to the 9th. The only way we see for the children to continue studying is living in the city. But few of us have relatives in town, so they end up staying here (interviewed person 2).

https://dx.doi.org/10.22161/ijaers.5.9.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

We noticed that in many cases the riverine people are considered mistakenly as "rural workers". This mistake causes the members of the Puruzinho Lake community, who have their own way of life, to have their needs and social context neglected. This problem may turn them into more vulnerable victims of economic, social and health problems [4,5].

> Some people from the city administration think that we should enlarge the cultivated area of manioc, and plant more banana or even other things. But it's hard for us since it's not possible to get here by car on a road, and the boats that go by here are small, even when the river is high. And during the floods, the river goes up more than 10 meters and many lands get swamped; so what can we do? Just wait for the river to go down and work with what it's possible (interviewed person 5).

3.2 Food habits of the riverine people

The food habits of traditional communities around the world have been altered due to the gradual replacement of regional products with imported ones and even because of the consumption of carbohydrates and trans fats. In Brazil, we noticed that new nutritional scenario, allied to some public policies, has contributed to the prevalence of childhood malnutrition. On the other hand, we also noticed the increase of the overweight and obesity levels, which may be attributed to the great differences among social classes, to regionalism and socioeconomic contexts [4].

In the case of the traditional riverine person, the fish, the manioc flour, regional fruits and, in some more isolated communities, the game, are their staple food, being important sources of proteins, carbohydrates and vitamins. Around four decades ago (the 80's), the fishing activity of the traditional riverine person was artisanal, during the night or dawn periods, using hook and line, harpoon, bow and arrow. During those days, the amount of fish caught was enough for a family consumption and the rest was shared with neighbors [22].

The great abundance in the rivers allowed the riverine people to select the fish considered by them as nobles, as the Tambaqui (*Colossomamacropomum*), Pirarucu (*Arapaima gigas*), Jatuarana (*Brycon* sp.) and Tucunaré (*Cichla* sp.), for their consumption. The amount of fish in the rivers allowed the riverine people to conduct extractive and small scale agriculture activities during the day, and they still had time for leisure as playing soccer in the community fields, and for socialization, as visiting fellows and friends at sunrise. The fish consumption associated to the manioc flour used to compose around 70% of the traditional riverine person's diet [3,20,23,24].

The manioc flour consumed by the riverine people is artisanal and is produced from the bitter manioc (*Manihotutilíssima*). It is part of the staple food of the riverine people, with a daily consumption of up to 1 liter. This food is present in most of the meals, and is consumed as part of the trimmings of meat, fish and regional fruits. Riverine people usually consume the flour as a pap, *beiju* (a kind of baked cake covered by banana plant leaves), *chibé*(a mix of flour, water and sugar) and *gogó*(porridge prepared from the manioc starch, used as a complement to breastfeeding) [5,17,21,23].

As the interviews were conducted mostly in the kitchens of their homes, it was possible to identify the storing food products as: powdered milk, kitchen oil, chocolate-flavored powders, industrialized packaged snacks and soft drinks. The observation of this situation allows us to think about innumerous questions that are pointed out in the literature on the theme of nutritional transition.

> Here in Puruzinho, we, the oldest ones, still prefer the good fish broth, but the youngest ones prefer the fried fish, the fried chicken, and other foods, so, what they prefer is what is done. We get worried because it's not always that we can buy different food they like. One day there was a prom at school and they threw a party with foods the saw on TV. These children invent so many things, some of these foods they like may be good, and I think they have the right to eat the good things they see on TV (interviewed person 1).

The regional native fruits that compose the traditional riverine people's diet as *açaí* (*Euterpeoleracea*), Brazil nut (*Bertholletiaexcelsa*), *tucumã* (*Astrocaryumaculeatum*), *patoá* (*Oenocarpusbataua*) and *bacaba* (*Oenocarpusbacaba*), although highly nutritious, have their consumption regulated by the seasonality offer, what causes gaps in consumption along determined periods [1,23,25].

In the community of Puruzinho Lake, the cultivation of fruits like cashew, lemon and in some cases banana, are generally made in small quantities and without any production monitoring or care. Some families have a vegetable garden near their homes where they cultivate chive, pepper and some herbs used as seasoning or medicine.

Among the factors that may be attributed to the change of eating habits of the riverine people of Puruzinho Lake, we can highlight: the increase of access to the urban areas and means of communication as the TV. The accounts below exemplify that:

> Nowadays it is easier to go to town. In the past, not everybody had a motor in their boats and had

https://dx.doi.org/10.22161/ijaers.5.9.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

> to paddle for almost a whole day in order to get to town. Now we can come and back on the same day (interviewed person 5).
>
> The oldest children that go to school in town during the week and on the weekends come back home, bring with them a lot of fads and things they learn there. Even the prom party cake was similar to the soap opera one. They bet Cokes when they play soccer here. We still can control the small ones, but if we go out to do some work and they go and watch TV (interviewed person 7)

Considering the innumerous factors here pointed out, it is challenging to identify if the nutritional needs of the riverine people are satisfactory when compared to the essential nutrients and food security in order to allow a contribution to the prevention of health problems [21].

3.3 Public Policies to assist the riverine people

In the context of public policies, riverine communities are supported legally by the Federal Decree 6.040, from February 7th, 2007, that established the National Policy of Sustainable Development of Traditional Peoples and Communities (in Portuguese, PNPCT). In its 3rd article it defines:

> Traditional Peoples and Communities: groups that are culturally different and that recognize themselves as so, that have their own forms of social organization, that inhabit and use territories and natural resources as condition for their cultural, social, religious, ancestral and economic reproduction, using knowledge, innovation and practices created and transmitted by tradition [26].

Social programs such as BolsaFamília(PBF), SeguroDefeso(SD), Luz paraTodos(LPT), are part of the public policies that bring benefits, but may also offer risks due to the changes that they may cause in the life of the riverine traditional populations. This is a situation worth of more attention and actions by the public administration.

This situation of risk can be observed through scientific studies, with the increase of purchase and consumption of industrialized products such as foods and domestic appliances [7].

The narration of the interviewed persons and the observations of this researcher allow the confirmation of what was stated before. The excerpts bellow exemplify it:

> As almost every home now has a fridge and all have *rabeta* (motor canoe), the younger adults don't want to go anymore to the *castanhal* (part of the forest where there are many Brazil nut trees) because they don't want to walk all day long carrying weight and don't want to stay awake in order to spend all night fishing. They go to the mining areas or to the city and earn more money and faster, and there is still the SeguroDefeso and BolsaFamília. When they need something they just go to the city (interviewed person 3).
>
> …We are worried because when we are not home the younger ones only want to eat junk food, and then later get sick because of such many different things they eat (interviewed person 10).

The PBF created by the Federal Government by Decree nr 5,209, that regulates Law nr 10,836, from January 9th, 2004, has as its main objectives to mitigate inequalities beginning from the fight against poverty, to promote food and nutritional security and to provide more access to public services, especially to health, education and food security. Among the main conditioning factors demanded by the government is the one related to maintain children in school age regularly enrolled, guaranteeing for them at least 85 per cent of attendance [27, 28].

The SD Program is another benefit that is part of the social programs financed by the Federal Government, guaranteed by Ordinance nr8,287, from December 1991, of the Ministry of Labor. The amount of a monthly minimum wage is paid to the professional fishers in the fishing closure period – when spawning happens, during 3 to 4 months – and the payment of this benefit comes from the Fundo de AmparoaoTrabalhador (Worker Support Fund). In order to have the right to receive the SD, the fisher must have been registered for at least one year in a fishing colony, have a Fishing General Register (RGP, in Portuguese) at IBAMA (Brazilian Institute for the Environment and Natural Resources), state not to have any monthly income above R$ 171.38 and not be receiving any benefit from the welfare system, except accident assistance and pension for death [27,29,30].

> The entrance of money changed subsistence domestic activities and life style of riverine communities […]. Children no longer help their parents with chores and prefer to watch TV instead of practicing some activities or even play outdoors decreasing, then, their energy use. It happens the same with women, because they buy food, so housewives no longer need to make an effort so common before like, for example, to prepare manioc for the elaboration of flour [2].

The interviewed dwellers of the community say that during the months when they receive the SD their families purchase domestic appliances and furniture and

https://dx.doi.org/10.22161/ijaers.5.9.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

rebuild their homes and start to eat a greater variety of foods bought from town. In their perception, this is an opportunity given by the government to improve their lives and fight the poverty condition of the vulnerable population.

Life now is much better; in the past we suffered a lot, now we don't have to wake up at dawn or spend the night without sleeping in order to fish. My parents' life and mine when I was younger was very hard. The money we receive from the SD helps a lot and everyone in the community respects the period of closure so we don't catch some fish. A person who doesn't live here and says that this help from the government has to end doesn't know the reality of our daily life here, we and our children deserve to have a less suffered life (interviewed person 15).

Another social program that is part the public policies of the Federal Government destined to the poorer layers of the Brazilian population [31], and that reflects directly in the life of the riverine people in the community of Puruzinho Lake is Luz Para Todos (LPT). Created in November 2003 by the Law 10,762 and President Decree 4,873, the reflection of this government program may be noticed by the discourse of one of the interviewed people:

> From the moment we started having energy here in the community things have changed a lot, for you to have an idea, families used to live in both sides of the lake, and as energy arrived only in one side, people started living only on that side. Modernity is a very good thing for the community, because life was very hard, we worked hard sunup to sundown. Now, after electric energy we can get home and have some fun, without mentioning the cold water and food that don't spoil because of the fridge (interviewed person 11).
>
> One really good thing is to have a fan, the heat here tires us a lot, there is no way we come back to the past when we suffered before energy came here (interviewed person 16).

3.4 Health of the riverine people

Many studies have alerted for a series of changes that have been affecting the way of life of the traditional riverine people of the Amazon region [1,3,4,5,12]. One factor that is considered worrying and that reflects a worldwide problem is the Nutritional Transition [32] which is a series of changes in the eating habits mainly characterized by the dependency on processed food with high levels of preservatives, high consumption of oil in meal preparation and high consumption of carbohydrates and trans fats [33,34].

Health has been a constant cause of worry among the members of the community of Puruzinho Lake. Health problems because of parasitosis, non-transmissible diseases like hypertension and other problems related to obesity have been a cause of complaint. For one of the interviewed people, these are problems that require a better attention from the public administration.

> One thing that still worries a lot the community dwellers is the question related to people to take care of the community health. For you to have an idea, we haven't had a community health agent for more than one year. There is no kind of assistance. The community agent that used to stay here went away and we have no idea when another is coming. When we need medicine, we go to the health post in Humaitá (interviewed person 9).
>
> When people get sick they have to be treated with the medicine we sometimes get in the nearest city, or with the teas taught by the oldest ones. And if they are too bad, the only thing to do is take them by *rabeta* (a type of motor canoe) and see if they get alive to Humaitá (AM) (interviewed person 13).

The lack of health assistance in the community is one of the many factors that, associated to the changes in eating habits, may contribute in a serious way to the increase of health problems, as is the case of the so-called modern diseases, overweight, obesity, arterial hypertension, diabetes mellitus and cardiopathies. In the last decade, it was registered that around 80% of deaths in populations of low-income countries have a straight relation to the so-called modern diseases. This situation reveals a challenge to public managers, scientists, educators and all members of the community for them to plan and execute actions directed to education and prevention [35,36].

Additionally, according to the interviewed people the health situation in the community is not worse because of the help of researchers that develop studies that contribute to health, as is the case of a project from a university that helped in the malaria control, in the drinking water treatment and in orientation for the adoption of healthy habits of nutrition and hygiene.

> If the teachers weren't doing research here, the situation would have been harder. The guys from UNIR come and they bring researchers from other places to help us with blood tests, lectures and dental care. The people from the city administration say that will hire a Community Agent here, but until now nothing happened. (M 5).
>
> There are always lectures about the kind of food we must eat in order to improve our

https://dx.doi.org/10.22161/ijaers.5.9.17 *ISSN: 2349-6495(P) | 2456-1908(O)*

> health, but the people here got used to eat some things and I think they won't change a lot (interviewed person 13).

Scientific investigations have revealed a continuous increase in the number of riverine people who are dependent on a great variety of consumer goods from urban markets. Therefore, frequently abandoning their subsistence activities and starting to occupy a space in the formal wage labor market, this scenario of changes has been identified in a larger scale in younger populations of riverine communities, revealing a disturbing association resulting from the relation between market economy, eating habits and health [1,37].

IV. CONCLUSION

The study conducted with the community dwellers of Puruzinho Lake identified an increase in the purchase power, due to factors as: a greater access to the benefits of the federal government social programs like BolsaFamília and SeguroDefeso, a greater participation in the market economy. This situation has contributed to a series of changes in their eating habits, among them the most worrying are the increase in the consumption of industrialized products and a greater access to a whole diversity of options and commodities offered by modern life in an accelerated speed and without any orientation and prevention monitoring.

The codification of this study was conducted through theoretical references and basic concepts of Nutritional Transition. The interviewed people have limited knowledge about the topic and its developments in relation to health and the influence of the factors here pointed out reflect what Popkin, Bing and Guo (2012) conceptualize as process of nutritional transition, identified in the population if the Puruzinho Lake.

Regarding the perception of health we noticed the concern about the lack of effective and continuous actions by the administrators of health basic services in the city. We noticed the community dwellers are conscious of their vulnerability and difficulty in adopting habits that may promote a general improvement in the community health. They are also conscious of the actions being conducted out of the public management, as is the case of the health professionals that carry out scientific studies that end up leaving a legacy well seen by the dwellers.

We believe such situation should be observed under the perspective that it is necessary to adjust posture and orientation, with the objective of mitigating negative impacts as health worsening. It is important to point out here that this challenge does not belong only to the riverine people, mas to all society influenced by its own condition of susceptibility to convenience and seduction inherent to the development process of the modern world.

Similar studies on the topic of Nutritional Transition [11,33] indicate that this is a problem with harmful perspectives that, depending on how it is treated, may be devastating for the future. Factors like market participation, environment, and government support may be influencing riverine populations due to their great impact on local practices and habits. Their relation with the economic development process needs to be investigated deeply.

Initiatives by the administrator of the Ministry of Health, Ministry of Education and acting professionals of SistemaÚnico de Saúde (a health government public program) in order to meet the demands of the community and promote a better capacity building, information and communication about the process of Nutritional Transition identified in the local population, as well as scientific studies that approach the intervenient variables in this process as: socioeconomic status, quality of life and nutritional state.

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