

**Current livelihood strategies and its effect on dietary diversity among Amazonic  
*Ticuna* indigenous people**

**The case of three *Ticuna* households in the Amazonic indigenous *Resguardo San Antonio de los Lagos* (Leticia, Colombia)**



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By

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*To all Ticuna people who fortunately still do not intend to summarize, operationalizate or conceptualize their world.*

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## ABSTRACT

*Key words: livelihood strategies, dietary diversity, Ticuna, indigenous people, Resguardo*

Livelihoods of Colombian *Ticuna* indigenous people are increasingly incorporate in a market-oriented production and consumption system as a result of processes of globalization and urbanization in the last fifty years (Palacio, 2010). The effects of this phenomenon, either positive or negative on diets of the indigenous people are not well known. A better understanding of the complexity of the phenomenon is required to adjust and improve local food security plans and interventions.

For that purpose, the current research aims to generate information regarding the effect of current livelihood strategies on dietary diversity among three households situated within the Amazon *Ticuna Resguardo San Antonio de los Lagos*. The households showed different levels of incorporation in natural (NR) and non-natural resources (NNR) based activities. Using an ethnographic approach for collection of qualitative and quantitative information, an analysis of their livelihoods strategies and dietary diversity during fifteen days was carried out. Qualitative and quantitative information was collected whereby semi-structured interviews, direct observation and daily food intake recording. Data was analyzed applying three of the six categories considered within the Sustainable Rural Livelihoods Framework (Ellis, 2000): activities, assets and access.

Results show a diversification process towards both, on-farm diversification and non-farm diversification. Agricultural diversification and undertake of temporal wage-earning jobs are the main livelihoods strategies followed by the households. Farming and fishing activities contributed to household's subsistence food consumption between 5 to 64% of total food consumption during eleven days while purchase of food contributed 37 to 68% of total food consumption in the same period. Households engaging predominantly NNR activities had higher dietary diversity. The reliance on consumption of fish and *fariña* as staple foods still remain in all households as well as a low consumption of vegetables. Evidence of dietary transition was shown from an increasing consumption of non-traditional food such as rice, pasta, bread, potato and artificial soft-drinks.

Local policies to strengthen local marketing systems have limited benefit for household which have prevalence as net purchaser or net seller. Increase of cash crops production might jeopardize households' food security if their ability to ensure subsistence consumption is compromised by the requirements of these types of crops. Some interventions recommended are: increase of local vegetables production, provision of microcredits for setting out fruit processing small business, research on nutritional potential of local fruits and information campaigns for improvement of dietary diversity and quality.

## 1. INTRODUCTION

Livelihood strategies of contemporary Amazon *Ticuna* indigenous people living in the Colombian Amazon are changing as a result of ongoing globalization, from traditional natural resources- based activities into a growing engagement to non natural resources based activities. These communities have been steadily incorporating the predominant way of life among non-indigenous Colombian people into their society, which lead to evidenced changes in their food systems and dietary patterns. Literature has documented a negative impact on food diversity for cases where the variety of species cultivated decreased (Hammond *et al.*, 1995 *cited in* Trujillo, 2008). An increasing intake of “western” food, often with lower nutritional quality has been also reported (Correal, 2009). On the other hand, a positive effect of such a shift is the accessibility to more diversified food when closeness to cities and incomes increases. Nutritional status of Amazon population shows considerable levels of undernutrition, and deficit in nutrients intake. The Colombian Institute for Amazonic Research (SINCHI), an organization addressing the food security dimension in the Region, has concluded that some of the contemporary *Ticuna* indigenous settlements are facing a decrease in access to productive land, changes in their diet patterns, poor nutritional conditions and low accessibility to food. SINCHI considers that contemporary *Ticunas* households are not homogenous entities, so the effectiveness of food security local policies depends on proper identification of different types of households’ livelihoods strategies and the possible effects that such strategies have upon dietary diversity. Research on this phenomenon contributes to generate new information on adjustment of local food security plans and future interventions.

In the current paper the results of a case study involving three different *Ticuna* households of the Amazon *Resguardo San Antonio de los Lagos* during a fifteen days period of the month of August are reported. In order to get descriptive, holistic, in- depth information, an ethnographic approach was applied as a research strategy. The main objective was to generate information on the effect of adopted livelihood strategies by these households on their dietary diversity. This was accomplished by mean of analysis of households with differences in their level of incorporation to natural resources based activities (NR) and non-natural resources based activities as predominant ones to display their livelihoods. Inquiring on activities which factors influence the pursuing choice, the adopted strategies and their resultant derived dietary diversity was accomplished. The exploration of the issue using the livelihood strategy framework allowed revealing the complexity behind the current *Ticunas* life options. Next chapter introduces the reader to the context upon this phenomenon is occurring through a look of current globalization process as being manifested in the Colombian Amazon. Chapter three offers the conceptual framework supporting the research whereas the chapter four point out the design of it. Main findings and results are presented in Chapters five and six. A final analysis of the effects of livelihood strategies on dietary diversity of households studied was addressed in chapter 7. Last chapter was devoted to draw conclusions and generate recommendations.



## 2. THE *TICUNA* INDIGENOUS PEOPLE UNDER THE INFLUENCE OF A GLOBALIZED AMAZON

Following the definition provided by Kuhnlein, Erasmus and Spigelski, indigenous people encompass those who retain knowledge of the land and food resources rooted in historical continuity within their region of residence (Kuhnlein, H., Erasmus, B. and Spigelski, D; 2009). The also so-called Amerindians are defined in Colombia as those who belong to an ancient ethnic group that formerly inhabited the current territory before the arrival of Spanish people. The majority of national indigenous people inhabit rural areas with scarce roads and far from the biggest economic and taking-decision core cities of the country.

Kuhnlein and colleagues (2009) have pointed out a several issues faced by indigenous people under the current globalization context all over the world. Although each group experience different circumstances and therefore, particular problematic, the overall situation of these groups is shaped by decreasing access to their resources as well as to conditions of extreme poverty, discrimination and marginalization. At national level, this population is considered one of the most prone to be under food insecurity situation. The main causes of such risk have been described as the loss of natural resources within their territories as well as the loss of the knowledge involved in traditional management of these systems. In turn, these are increasing their vulnerability.

The Amazon River Mega basin has an approximate area of 7.352.112 km<sup>2</sup> (Gutiérrez et al. 2004 *cited in* Peña-Venegas *et al*, 2009) which comprises portions of eight South American countries: Bolivia, Colombia, Perú, Ecuador, Brazil, Guyana, Venezuela and Surinam.

Map N°1. The Amazon River Mega basin. (Green: virgin forest; yellow: deforestation up to 1997; red: deforestation since 1998 to 2006). Source: FAO/USDA. Taken from <http://news.bbc.co.uk>



The condition as strategic biodiversity spot, world's climate buffer, water reservoir and carbon sink has placed the Amazon in the environmental international agenda. In Colombia, the globalization *of* and *in* the Amazon, as expressed by Palacio (2010) entails two types of development strongly differentiated: one based on its biodiversity, environmental services and green markets, and a second one pulled by interests of private investors, land owners, non-residents and government domestic policies on oil extraction, forest deforestation, mining, land clearance for pasture and cropping and eventually for setting out of agroprojects for biofuel production. The production of illegal crops also appears as a phenomenon generating social and environmental particular dynamics. On this scenario there is a convergence of a set of actors playing a role in the different named forces: indigenous organizations, local and international NGOs, government, multinationals, subversive groups and narcotrafficants. As a result, indigenous groups and small producers have been drawn into market economies and pushed aside by settlers and land buyers (Robbins, 2004).

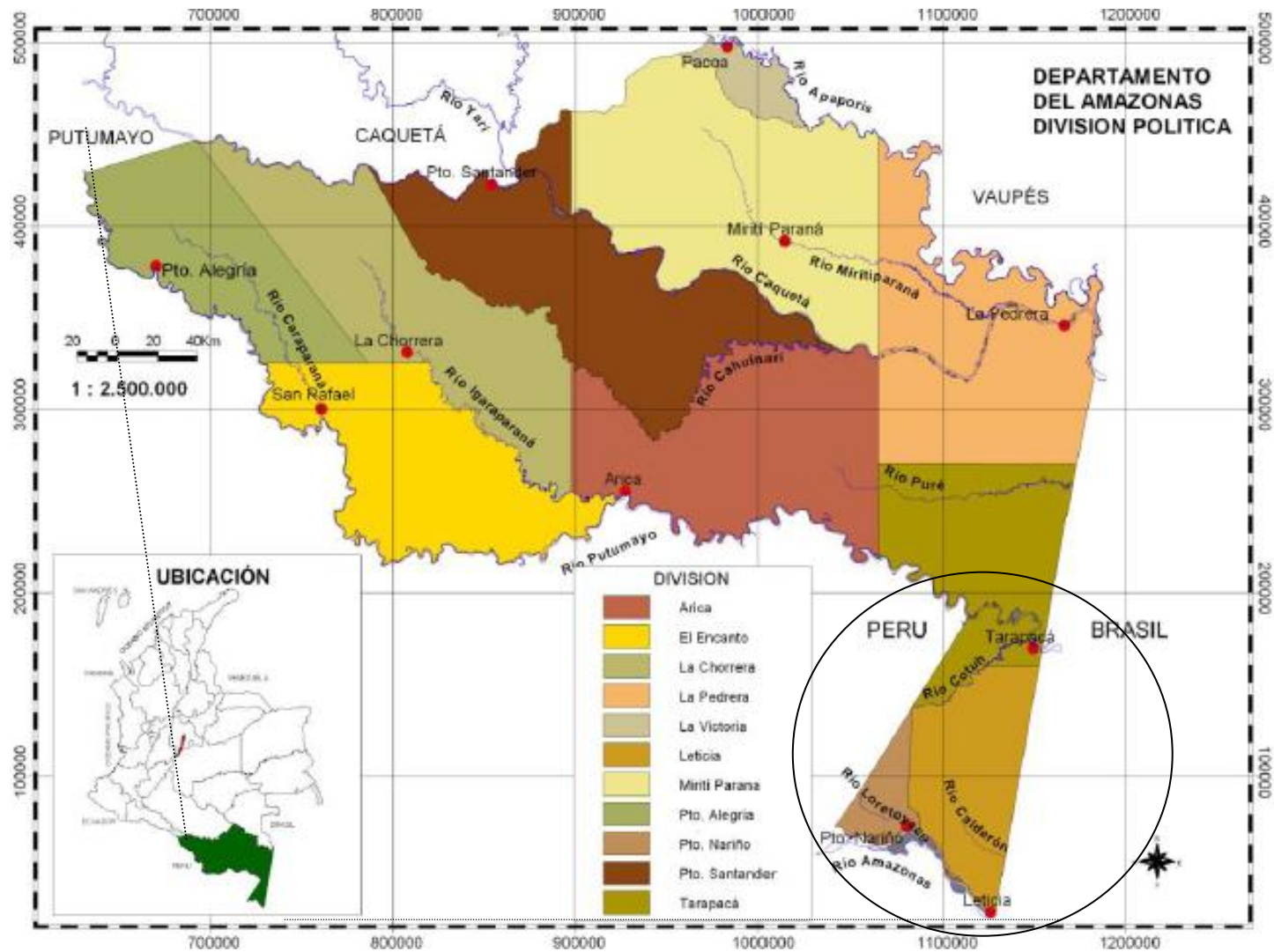
The Colombian Amazon Department<sup>1</sup>, located at middle-western part of the Amazon River basin in the so-called Amazonian Trapezium<sup>2</sup>, occupies an area of 109.665 km<sup>2</sup>, which represents 10% of the national territory (Peña-Venegas *et al*, 2009). The region is distributed in indigenous *Resguardos*, National Natural Parks and Forest Reserve Areas. Different authors have pointed out that these three areas together encompass more than 90% of the territory whereas only 1% is private land for agricultural purposes (Palacio, 2010; Peña-Venegas *et al*, 2009) (See further Map N°3). Colombian Amazon Region has been faced with fast and differentiated processes of settlement, privatization, agricultural development and urbanization during the last twenty five years. The last issue is particularly evident in the so-called Amazonic Trapezium where the capital Leticia, shares the frontier with Brazil and Peru. (See Map N° 2).

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<sup>1</sup> Department: [Colombia](#) is an [unitary republic](#) formed by thirty-two [departments](#) (Spanish: *departamentos*, sing. *departamento*) and a Capital District (*Distrito Capital*). Departments are [country subdivisions](#) and are granted a certain degree of autonomy. Each department has a Governor (*gobernador*) and a Department Assembly (*Asamblea Departamental*), elected by popular vote for a four-year period. (Wikipedia: [http://en.wikipedia.org/wiki/Departments\\_of\\_Colombia](http://en.wikipedia.org/wiki/Departments_of_Colombia)) [Accessed at 4<sup>th</sup> july 2011]

<sup>2</sup> The Amazonian Trapezium is the southern-most region of Amazon Department of Colombia. It is located between 03°12' and 04°13' South latitude and between 70°42' and 69°30' West longitude, on the Amazon right riverbank. The region limits in the south and west to Peru and in the east to Brazil (Trujillo, 2008).

Map N° 2. Colombian Amazon Department and the Amazon Trapezium. The approximate area of the so-called Amazon Trapezium is encircled. It shows the location of Leticia, Puerto Nariño, Tarapacá and La Chorrera; important locations dwelling Ticuna communities. Source: SINCHI Institute.



Leticia is located on the left bank of the Amazon River and is the largest and most important urban centre of the region. Along with its surrounding areas, it shapes an area of 6176 km<sup>2</sup>, which represents 7% of total territory of the Department (Acosta and Salazar, 2002 *cited in* Peña-Venegas *et al*, 2009). In a ratio of 40 km from Leticia; there is 31% of total rural Department's population and 68% of the total population of the Amazonic Trapezium (Trujillo, 2008). The rural area harbours different types of dwellers: settlers, indigenous and *mestizos*. Currently, there exist nine ethnic indigenous groups sorted in settlements scattered along Amazon riverside or located in one of the fifteen Indigenous *Resguardos*. As the same time as migration processes were occurring to outside, intra-regional population movements were taken place from rural to nucleated centres, which have led to the regional urban growth. The urbanization trend is expressed by Arcila (2011) who asserts that almost half (49,9%) of the population who inhabited the Amazon in 2008, was living in towns (municipalities). Either natural or forced, tribal movements throughout the territory, settlements of peasants and typical cross-border migration, have shaped this area as an heterogeneous and complex urban locus inside the tropical forest.

## **2.1. The Amazon Resguardo *San Antonio de los Lagos***

Since 1991, the National Constitution recognized the right of indigenous peoples to have self autonomy upon their territories. The management of these areas was granted through the creation of areas called *Resguardos* (reserve). The *Resguardo* is a territorial division of legal nature that guarantees a particular indigenous group through a collective title, the ownership of a jointly owned territory inhabited by them (OAS, 1993). The total twenty six existing *Resguardos* located in the Amazon Department are pluriethnic, political and socio-cultural autonomous identities with a total population of 18.673 inhabitants (40% of total population Department) covering 7.749.503,3 Ha or 71,4% of the Department's territory (Combariza *et al*, 2008; DANE, 2005 *cited in* Peña-Venegas *et al*, 2009). The *Resguardos* are civilly managed by a governor called *curaca* who exerts the authority among each community mainly according formal civil laws and regulations.

The *Resguardo* San Sebastián / San Antonio de los Lagos was set up since 1982 and covers an area of 188 ha and 7500 m<sup>2</sup> (INCORA, 1982). It is located to the north between 6 and 9 km from the urban area of Leticia, in the area known as "Los Lagos" (The Lakes), along the *Yahuaracaca* stream. It owns its double name to the merging of two different indigenous settlements distant around forty minutes by walking from each other. According to the last census carried out in 2011 by the community itself, there are eighty eight families, around 384 people currently living in this community. About 82% of them belong to the *Ticuna* ethnic group, whereas the rest belongs to other ethnic groups such as *Cocama* and *Huitoto* or they are *mestizos*. All families are well-known between them and their kinship relationships are easily identified through the prevalence of mainly two last names: Jordan and Parente.

Map N° 3 shows the areas location of San Antonio de los Lagos and other Amazonic *Resguardos*.

Land in *San Antonio* has the typical characteristics exhibit throughout the Colombian Amazon: mostly flat, subject to flooding in the lowlands during the season of water level rising of the Amazon River. It is at 300 m.a.s.l high and the primary vegetation is almost non-existent due to the already long period of agriculture exploitation. The climate is typical Amazonian, with average temperature of 27°C, rainfall averaging from 2500 mm and 3000 mm per year and relative humidity above 90%. Soils are sedimentary and have low fertility in areas that are not *varzeas*, especially due to a high acidity, low base saturation values, low presence of calcium and high aluminium content (INCORA, 1982).

## 2.2. The *Ticuna* ethnic group

The origin of the word *Tikuna* comes from the root “tic” meaning man or human being and refers to “black” due to the renowned tradition of this group of paint their faces with huito<sup>3</sup> (*Genipa americana*) (Goulard, 1994 cited in Gómez, 2009). This indigenous group was originally located all over the actual Colombian, Brazilian and Peruvian territories; however, today they are seen as different from each other. Those who inhabit the trapeze understand themselves as Colombians, despite being born in any of the other two countries. So, within the actual territory the border draws a line for Colombian towns located on the north side and Peruvians in the south side. Current settlement patterns are determined by the rivers, the settlers land, the *varzea*<sup>4</sup> and the mainland.

Formerly *Ticunas* used to live together as kinship groups in *malocas*<sup>5</sup>, isolated from each other. The kinship ties extend to several families, making a group of people related to each other an only entity (Font 1986 cited in Gómez, 2009). At the present day, they live in smaller families, in hamlets with a similar structure than showed by *mestizo* people. However, unlike the land, within the *Resguardo* houses can be sold or exchanged. Riaño (2003) explains that for *Ticuna* the house is an object more like the boat, and therefore they not based on the fact of owning one, all the efforts of life. Instead, that effort is devoted to the *chagra*. Today, despite the disappearance of the *malocas* and the creation of river settlements, it is still keeping the concept of clan or *kiá* as a way to establish kinship linked to the territory, although various clans can be found in the same hamlet.

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3 Amazon fruit whose juice is extracted to dye skin in black (Gómez, 2009)

4 The forest which is partly submerged for several months due to the Amazon River seasonal water level fluctuations. These flooded forests, make up less than two percent of the Amazon basin's forested land. But their alluvial soils, which support wild grasses that can grow six inches a day, are much fertile than those being cleared for farming in the terra firme forest (National Geographic Magazine, August 1992)

5 Ancestral long house used by the natives of the Amazon, notably in Colombia and Brazil. Each community has a maloca with its own unique characteristics. Several families with patrilineal relations live together in a maloca, distributed around the long house in different compartments. In general, the chief of the local descent group lives in the compartment nearest to the back wall of the long house. As well, each family has its own furnace. During festivals and in formal ceremonies, which involve dances for males, the long house space is rearranged; the centre of the long house is the most important area where the dance takes place. (Wikipedia; <http://en.wikipedia.org/wiki/Maloca>)



Map N°3. Protected areas and Indigenous Resguardos of the Amazon Trapezium. The arrow sign out San Antonio de los Lagos location. Legend from below to top: National Natural Park and Resguardo; Resguardo; Natural National Park and Forestry Reserve. Source: SINCHI Institute.



Nowadays, the hamlets are governed by the *curaca*, authority who is in charge of coordination community activities and institutional relations. The authority of the shaman (traditional male chief and healer) is disappearing, although if does exist, often he is consulted together with the elders for decision making processes within the community (Gaitán, 1998). The *Ticunas* have suffered a roughly process of acculturation which is easily seen through their growing engagement in *mestizos*<sup>6</sup> religious practices and the declining in the use of their dialect.

### **2.2.1. Complexity of traditional Ticuna food systems**

Indigenous people's ways to get and to produce food may vary from wild-food collection and harvesting, harvesting of crops and plants inside agricultural plots and lastly, food purchasing. Traditionally, Amazon indigenous people do not perform only one of these activities but they combine them in what can be considered a diversification mechanism in order to obtain a variety of resources.

Different authors agree on the sophistication of Amazon indigenous food production systems. Acosta and Juragaro (2010) deem that production systems are based on the interaction and complementarity between four natural resource (NR) - based activities: farming, fishing, hunting and forest collection; activities historically made according traditional cultural guidelines. It is highlighted that these systems are adapted to specific environmental offer, which determines the resources availability. Arango and Zuluaga (2007) consider that an understanding of indigenous food systems requires considering the social and cultural aspects linked with stability and conservation of ecosystems, so access to natural resources and territories play a key role.

Socio- cultural guidelines have to be followed in order to accomplish these activities and men and women are involved differentially in carry out them. While male most common activities are fishing, hunting, chopping, wild-food collection and harvesting of sacred plants for ritual purposes (such as tobacco, coca and yage); women and their children are in charge of *chagras* cultivation and maintenance as well as in processing of some food products (Acosta, L.E., Juragaro, L.A., 2010).

- *Farming system: The Chagra*

The agriculture farming system of *Ticuna* Amazon indigenous people is based in the so-called slash- and- burn, shifting or swidden cultivation combined with home gardens and/or backyards. The so-called *chagra* is the name given to cultivation

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<sup>6</sup> Mestizo is a term traditionally used in Latin America and Spain for people of mixed [European](#) and [Native American](#) heritage or descent. During the colonial period, mestizos quickly became the majority group in much of what is today Latin America, (Wikipedia: <http://en.wikipedia.org/wiki/Mestizo> [Accessed at 23 September 2011])

land and it consists in a policulturing system where there exist seasonal crops which last between 2 and 3 years, stubbles resulted after harvesting of short-cycle crops where fruit trees are also sown, and areas for cultivation of sacred and caring or protecting plants. Within indigenous beliefs, each *chagra* has a duration of 2 to 4 years and after this period is returning to spirit owners who become it in a forest again (Cabrera, 2004 cited in Acosta, L.E., Juragaro, L.A., 2010; Rodríguez, 2010; Reyes-García, 2008).

The *chagra*, is a system based on the use of nutrients of forest soils or fallows. Except for the ashes, traditionally people do not perform practices that increase or maintain soil fertility, so as soon as nutrients are depleted, *chagra* is left for natural recovery and a new space in the forest or in stubble is cleaned to make a new one.

*Ticunas* settled on the banks of major rivers practice horticulture in two types of terrain. They use the river valleys or lowland floodplains, which are flooded when the river water level rises and receive the sediments from the Andes (*varzeas*), and the land on terra firme, the so-called “middle” which remains dry even during periods of high water level (Camacho González 1996 cited in Gómez, 2009). The *chagras* are located near the villages, although nowadays distances to them may vary broadly. Besides the *chagra*, they have gardens around the houses where they grow crops such as fruits and aromatic herbs.

- *Fishing*

Together with hunting, fishing has been one of the activities carried out for protein obtaining. Fishing is ruled by water-level seasonality of the water bodies, therefore the techniques and the fish vary by time of high and low waters. This activity is doing exclusively by men and nowadays it constitutes the main source of protein for *Ticuna* communities, as concluded by Ochoa and colleagues (Ochoa, 2006 cited in Gómez, 2009), who found that 80% of households of *Ticuna* households of Macedonia community in the Amazon, regularly consume an average of 1,5 daily daily string (*sarta*<sup>7</sup>). Same author documented for this Amazon area that months of greatest abundance of fish extend from July to October when the level water is falling and reaches the lowest. (Ochoa *et al.* 2006 cited in Gómez). Fishing was used to be carried out using a rod or throwing arrows, however current techniques have changed to the use of several methods such kites, a nylon rod, nets and cast nets (Cifuentes 1986 cited in Gómez, 2009).

- *Hunting*

It is also an exclusively male activity which contributes to protein intake; although it is less practiced since the forest areas where game is located are more distant to the settlements. At the present it has been substantially replaced by fishing. *Ticunas* traditional method consisted of a long and thin tube made of a special palm timber where an arrow smeared with *curare*, a poisonous substance made from a mix of different plants, was introduced and blew to the prey (Cifuentes 1986 cited in Gómez, 2009). Although in the past the *curare* was a product highly

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<sup>7</sup> The group of several fished individuals of the same specie tied up together for carrying it. The size varies according to the season.



bargained with other ethnic groups, it has been replaced by shotguns or trained dogs.

- *Collecting*

Gathering of wild products is an activity that complements the resources got from the *chagra*, either for feeding purposes or for making of crafts and ornaments. This activity can take place by the entire family, in abandon swiddens, which are left to grow back, but also certain plants can be purposively planted. One of the main materials removed from the forest is wood for stove; however this practice is also changing due to the increased use of electricity devices.

### 3. DIETARY DIVERSITY, FOOD SECURITY AND LIVELIHOODS OF AMAZON *TICUNA* PEOPLE

This chapter gathers the relevant concepts whereby the research was addressed. It introduces to the theoretical framework designed for the research.

#### 3.1. Dietary diversity and nutrition of *Ticuna* indigenous people

Hoddinot and Yohannes (2002) defines dietary diversity as “the number of different foods or food groups consumed over a given reference period” (Hoddinot, J; Yohannes, Y, 2002, pp 1). Dietary diversity is seen as a key component for healthy, high quality diets since it is associated with an increased likelihood of meeting nutrient requirements (den Hartog, van Staveren and Brouwer, 2006). Uusitalo, Peitinen and Puska (2002) assert that an increasing variety of foods and within food groups improves nutritional condition due to an adequate nutrition intake. Nutritional condition concerns to whether energy consumption is enough but also about the adequacy of nutrient intake that helps to body proper function. Literature reports evidence about increasing deficiencies in iron, vitamin A and iodo as well as micronutrients and fatty acids all over the world (Ruel, 2001 cited in Hartog, van Staveren and Brouwer, 2006). Frison and colleagues (2003) found a link between lack of dietary diversity to the growing incidence of chronic diseases. At the same time increases in fats, refined sugar and salt is also leading to undernutrition and over nutrition under the influence of globalization and urbanization processes.

Due to the weather conditions, which are favorable to either spontaneous growing or cultivation over the entire year, is considered that human groups living in the tropics usually have had diets broadly diverse in terms of the variety of foods. Among indigenous people, dietary diversity is related with food supply relying on biodiversity. For hundreds of years, Amazon indigenous groups have based their diets on bitter cassava (*Manihot esculenta*) prepared as bread (*casabe* or *beiju*), or meal (*fariña* or *mañoco*), and fish (Dufour, 1991). *Ticuna* communities, as majority of other Amazon ethnic groups, base much of their subsistence and economy in the cultivation, processing and trade of this tuber.

Nowadays, many of the current cultivated species are plants from other regions which have been adapted to new environmental conditions and therefore, are part of the diets. Among communities of southern Amazonian Trapezium, it has been recognized the cultivation of 39 varieties of cassava, used for various purposes, each one with a set of characteristics that differ from each other (Arias et al, 2005). A study carried out in La Chorrera, in the north-west Colombian Amazon, found that out of all chagras on production; there were a total of 70 useful species either cultivated or spontaneous. About 83% of them were used as food (Acosta and Juragaro, 2010). Fish remains as the main source of protein as the reduction on quantity of game fetched. Peña-Venegas and colleagues (2009) stated that for Amazon indigenous communities of Leticia fish is

included in more than 50% of the dishes made. The main dish used to be fish soup served with cassava, *fariña* or rice. Trujillo (2008) also reported daily fish consumption on diet of 100% of 98 indigenous households located alongside the Amazon River between Leticia and Puerto Nariño. Together with eggs, fish is an important source of animal protein providing nutritional security since they content vitamin D, n-3 fatty acids and iron and zinc in readily assimilable forms (Wahlqvist, 2005).

Dufour (1991) asserts that diets of native Amazonians in tropical forest environments appears adequate in energy and protein since they are based on cassava and plantains/bananas (which contributed between 76% and 87% of the energy) with high quality protein coming from wild fauna. The diets are high in bulk and low in caloric density. After the starchy staple, fish and game are the second most important source of food energy. According to the findings in four Amazonic ethnic groups he studied, dietary intake appears adequate, and the nutritional status of adults is generally good. Children, however, were small for their age, and in some groups many would be classified as undernourished in the basis of weight-for-height, height-for-age, and/or clinical signs of undernutrition. The author explains the delayed growth and relatively poor nutritional status due likely to the combination of diet with disease stress. But recently it has been by raised dietary diversity in developing countries might be no adequate since diets are predominantly based on starchy staples often including little or no animal products and few fruits and vegetables (Ruel, 2002).

So, dietary diversity does not imply necessarily dietary quality. The latter concept entails adequacy of nutrients intake and can be measured through a broad type of indicators such as food and nutritional quality indices or percentage of energy from animal sources (Ruel, 2002). However, an implicit link between both is often assumed regarding food security improvement.

The National Nutritional Situation Survey ENSIN carried out in 2010 pointed out the Amazon-Orinoquía<sup>8</sup> Region as one with the highest levels of malnutrition of the country, namely deficit and overweight among different population groups (Fonseca *et al* 2010). The same survey deployed in 2005 (cited in WFP-Bienestar Familiar, 2008), showed for the Amazon Department a condition of undernutrition expressed in high indices in the prevalence of deficit in protein intake (50,3%) , deficiency in calcium (96,8%) and vitamin A intake (51,5%) compared with the rest of the country Departments. Levels of anemia and iron deficiency among children are 39,2 and 12%, respectively (Peña-Venegas *et al.*, 2009)

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<sup>8</sup> The Orinoquía Region ([Spanish: Región de la Orinoquía](#)) is one of the five [natural regions](#) of [Colombia](#). It is also known colloquially as Eastern Plains from the Spanish Llanos Orientales. The region covers most of the area of the [departments](#) of [Meta](#), [Arauca](#), [Casanare](#) and [Vichada](#).

### 3.2. Livelihood strategies and food security of *Ticuna* indigenous people

In his Sustainable Livelihood Framework (SLF) for analysis of rural livelihoods, Ellis raises the concept of livelihood strategies as the resulted status of households' assets after process of adoption and adaptation taken under social factors and exogenous trends or shocks over time. Consequently, these strategies are dynamic as they are adapted accordingly to changing pressures and opportunities (Ellis, 2000).

Livelihood strategies are the outcome from the interaction between three main components: the assets, the activities and the access mediated by institutions, social relations and organizations. Ellis (2000, pp 41) defines two large types of activities shaping the household's means of survival: the natural resource (NR) and non-natural resource (non-NR) based activities. The former, "includes collection or gathering, food cultivation, non-food cultivation, livestock keeping and pastoralism, and non-farm activities such as brick making, weaving, thatching and so on. The Non-NR activities include rural trade, rural services, rural manufacture, remittances and other transfers such as pensions".

Ellis livelihood strategies were used as conceptual basis for the aim stated in this research. Given the range of possible assets, types of activities and factors mediating the access that can be found in a specific rural area, a high number of different livelihood strategies can be also expected. For that reason, in this research this number was narrow down by choosing type of households fitting in Ellis classification of activities (see limitations of this adoption further in Chapter 4, numeral 4.2.1.1)

Adaptation to a changing environment has not been an unknown process for Amazon indigenous communities. They have undertaken adaptation processes that nowadays show resilience in regard to their livelihoods strategies. Thus, they used to combine both: the traditional subsistence activities, based on natural resources use, and activities oriented to integration with the existing markets and hence for income generation. Trujillo (2008), accounts the increasing integration of indigenous societies to the "western" markets through agricultural products selling, the labour or services supply, the pursuing of independent economic initiatives (i.e. handicrafts manufacturing) and the salary employment as a classic diversification process but remarks on natural resources as still the main source of survival for communities within the *Resguardos*. Gómez (2009) also accounted this processes among *Ticuna* communities of Macedonia locality, standing out that interactions and interrelationships of different economic strategies now let people to be employed in the community. The author concluded that subsistence horticultural systems are intertwined with dynamics of local market share and those households with a more active role in the modern market are able to buy or consume more goods from it, than a family that keeps their mean of life from subsistence. Access to these products is the result of constant and stable sales of some local products, or a salary for the provision of any service, resulting in increased availability of cash.

The differential performance of natural resources or non-natural resources activities by contemporary indigenous households and the consequent outcome or livelihood strategy, has an effect on household ability to produce food and/or purchase food. At the same time, the variation in those factors has an impact in livelihood strategies, in a feedback effect.

Therefore, it is imperative to introduce food security as a variable influencing dietary diversity.

Food security is determined by four factors: food availability, access to food (accessibility), food consumption and nutritional status (utilization) (Deveraux, 2001). The former and second can be considered as the same assets and access identified by Ellis.

Regarding availability, within indigenous people, traditional food is considered as those they have access to locally, without having to purchase them, obtained from the natural environment either through farming or wild harvesting by using the traditional knowledge. (Kuhnlein, H., Erasmus, B. and Spigelski, D; 2009). Seasonality as a factor having an effect in diversity of diet has been addressed through the ancestral management of food systems. For instance, cultivation and selection of varieties of cassava ensures the harvest, even if an environmental change or plague comes to affect any particular type. Moreover, by growing varieties with different maturation times can get a continuous supply of the product.

As stated by Dufour (1991) Amerindian diets must be defined in terms of ecological variables, the characteristics of food resources, patterns of food selection and use, and the implications that these have for dietary adequacy, nutritional status and health. Supporting it, Montenegro and Stephens (2006) raise if environmental destruction takes place, and especially in combination with acculturation into mainstream society, indigenous' ability to access to food and traditional medicines will collapse. Wahlqvist also pointed out that "a diversified food supply is contingent on underlying biodiversity in the locality where one lives or at a distance from it, if trade routes are established. Indigenous people generally settled at the water's edge so that aquatic foods made up part of their diversified diet, with the rest of the diversity dependent on how much they hunted and gathered, on herded animals, engagement in subsistence agriculture, the ability to process and preserve food and/or food commodities traded" (Wahlqvist, 2005). Following this idea, in the First Meeting of Indigenous Authorities of the Amazon held in Colombia in 2004, were identified as issues impacting communities' food security: the loss of harvesting varieties, the decrease on fishing and food products and the little knowledge about processing and preservation of fruits (Peña- Venegas, *et al* 2009).

Although economic independence can be lightly seen as a mean to reduce pressure on natural resources, the growing integration to markets can also steer a high competence for access to them. As appreciated by Thrupp (2000), the replacement of local knowledge by uniform industrial agricultural technologies and food markets, jeopardizes food security if there is a decrease in sustainability and productivity of the farming systems. Supporting this idea, Tonneijck, Hengsdijk and Bindraban (2006) argue that changes in agricultural production systems might affect directly or indirectly loss of species diversity depending on the level of conversion of natural habitats to low or high intensity production systems.

Notwithstanding possible negative impacts of incorporation into non-traditional, market-oriented activities on food availability, a different perspective is also addressed in literature referring to food accessibility. Hartog and colleagues (2006), account that compared with rural areas, cities are supplied with a much greater variety of food throughout the year and seasonality in the food supply is less profound. In a research made among households from rural and urban areas belonging to ten low and middle income countries, Hoddinot and Yohannes (2002) point out that change in food consumption resulting from higher incomes may be evidenced by improved quality of foods rather than consumption of

different food groups. The authors found an association between dietary diversity and food security since there was a strong correlation between dietary diversity and food access.

Household food insecurity is considered one of the basic causes of malnutrition (UNICEF, 1990 cited in Young, 2001). Conversely of nutritional indicators cited previously, ENSIN of 2005 mentioned that together with Orinoquia Region, the Amazon had the lowest percentage of households under food insecurity (31,9%) when it was compared with the other four regions of the country (ENSIN, 2005 *cited in* WFP-Bienestar Familiar, 2008). The apparently contradiction in the indicators might be understood if considering that dietary diversification among indigenous people has had a clear connection with the variety of resources available around their territories and hence, on the different activities performed to get them. Peña-Venegas and fellows (2009) reported variation in food availability and poor sanitation as reasons of nutritional deficiencies and incidence of diarrheal and respiratory diseases among Amazon *Ticuna* communities. .

Dietary diversity expressed as the variable “per capita dietary energy supply” was established as one of the three indicators of food security in FAO’s “Aggregate Household Food Security Index” (AHFSI) (Deveraux, 2001). They concluded that changes in dietary diversity are a good indicator of changes in per capita consumption and per capita caloric acquisition, both access measures of household food security.

Taking in consideration the previous theories, the growing integration to income generation activities could be rising the variety of food consumed by the Amazon indigenous households which are much more engage on new livelihoods whereby they can increase their accessibility to food. This hypothesis was used in the research as point of analysis in order to justify or contradict the rational assumed in the definition of the research problem (see further information in chapter 4).

### **3.3. Linking livelihood strategies and dietary diversity: dietary transition**

As a result of existent globalization and urbanization processes, the effects of shifting of traditional subsistence activities to an increasing participation in marketing activities among Amazon indigenous *Ticuna* communities in Colombia, Hammond and colleagues showed: a reduction in crop diversity, an increase of cassava monoculturing for processing and commercialization of *fariña*, a reduction in fallow periods thus intensifying pressure on soils and the replacement of traditional food sources of protein and minerals by industrial food (Hammond *et al.*, 1995 *cited in* Trujillo, 2008). In a study carried out among 98 indigenous households of the Leticia-Tarapacá region, Trujillo (2008) found that diversification of non natural-resources based activities contributes 39,7% to total household income whereas 64 % of the income came from natural resources-based activities for both, self consumption (33% in kind) and income generation by sales (31%). From the total inputs obtained in kind, 56% are provided by traditional farming systems and 25% by fishing.

Peña-Venegas and colleagues (2009) documented decrease in *chagras* diversity and intensification of cassava and plantain cropping for selling and the increase in both, frequency and capture effort on fishing journeys among *Ticuna* communities surrounding

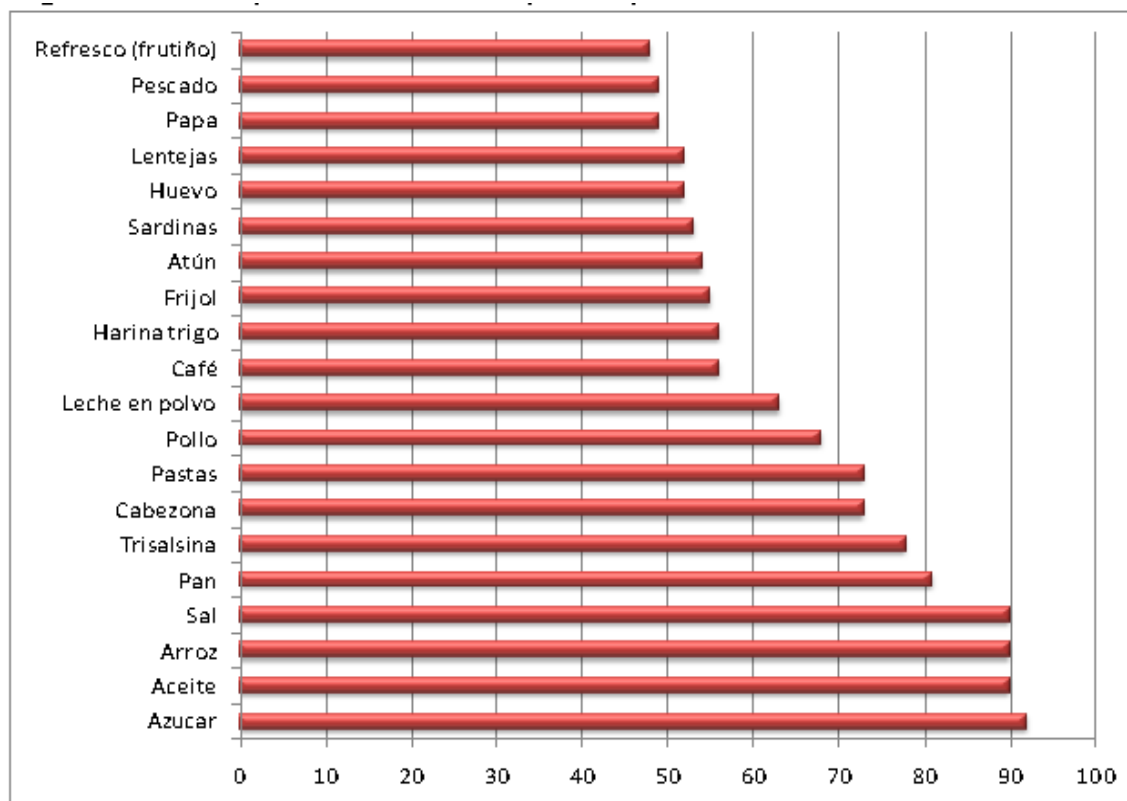
Leticia. Besides, they found a reduction in time and labour devoted to farming due to an increase in incorporation in wage employment. Decrease on food obtained from traditional farming systems, fishing, hunting and forest collection is an effect already evidenced in the *Resguardo* km 6-11. This type of impact is described through the concept of “dietary transition” which refers to the changes in production, processing, availability, and consumption of foods as well as changes in nutrient intake. In developing nations, this process begins with major increases in domestic production and imports of oilseeds and vegetable oils. (Uusitalo, Peitinen and Puska, 2002).

Hartog and colleagues (2006), define five main factors having impact in food habits: population growth, urbanization, rural transition, a rise in the standard of living and education. Changes in food habits can be either induced or autonomous and comprise three categories: changes in the use of already known food, new foods previously unknown in the food pattern and changing attitude towards a food. In the same way, FAO (2004) defines this phenomenon as dietary acculturation. Within this, two distinct trends can be recognized: dietary convergence and dietary adaptation. The former is defined as “the increasing of dietary similarities in energy and nutrient composition between those of the industrialized countries and the diets of the emerging middle classes of developing countries”. The second one refers to “the change of diet under pressures from the urban lifestyle. It is characterized by a greater reliance on staple grains such as wheat and rice, as well as the increased consumption of meat, dairy products, edible oils, salt and sugar, and a low intake of dietary fibre.” (FAO, 2004 *cited in* Hartog, Staveren and Brouwer, 2006. p 44).

Changes in traditional ways to get food leading to modification on diets and food habits was evidenced in the western Colombian Amazon among communities of *Ingano* ethnic group. Correal and colleagues (2009) concluded that the contact with the outside world has had a negative impact on *Ingano* diets. This was reflected in changes in eating habits due to a considerable supplant of traditional species by commercial cornmeal or white refined rice as well as an increase on consumption of low-quality food as carbonated drinks and refined flour. A decrease in protein sources was also evidenced.

Similarly, Peña-Venegas *et al* (2009) found among *Ticuna* communities living in Leticia Municipality that the type of non-self produced food bought the most was, according to its importance, sugar, salt and rice. Protein-foods, flours, beverages and oils were also significant (Figure N°1). They conclude that indigenous families from rural and semi-rural areas near to Leticia are becoming less self-sufficient and increasing their reliance on markets to the detriment of their life quality. So, as they have opportunity to practice natural resources based activities, they obtain food of excellent quality whereas when they buy food, they access to lower-quality food which is affecting their health and well being (Peña-Venegas *et al*, 2009).

Figure N° 1. Food products most often purchased by indigenous households of Leticia surroundings. (left axe from bottom to top: sugar, oil, rice, salt, bread, condiments, onion, pasta, chicken, powder milk, coffee, wheat flour, beans, tuna, sardines, eggs, lentails, potato, fish, artificial soft drink)



Source: ReSa Program surveys 2005. Taken from Peña-Venegas et al. 2009.

Summarizing the insight offered by this chapter, findings of mentioned literature and research consulted suggest two antagonist propositions relevant to address the analysis and further conclusions:

- The lower is the level of incorporation in natural-resources based activities, indigenous dietary diversity decrease and loss quality.
- An increased accessibility to food through rising of purchasing power derived from non-natural resources activities, contributes to improvement of dietary diversity.



## 4. RESEARCH DESIGN

This section concern to the way in which the content of the research was modelling (conceptual design) and how the research was implemented (technical design).

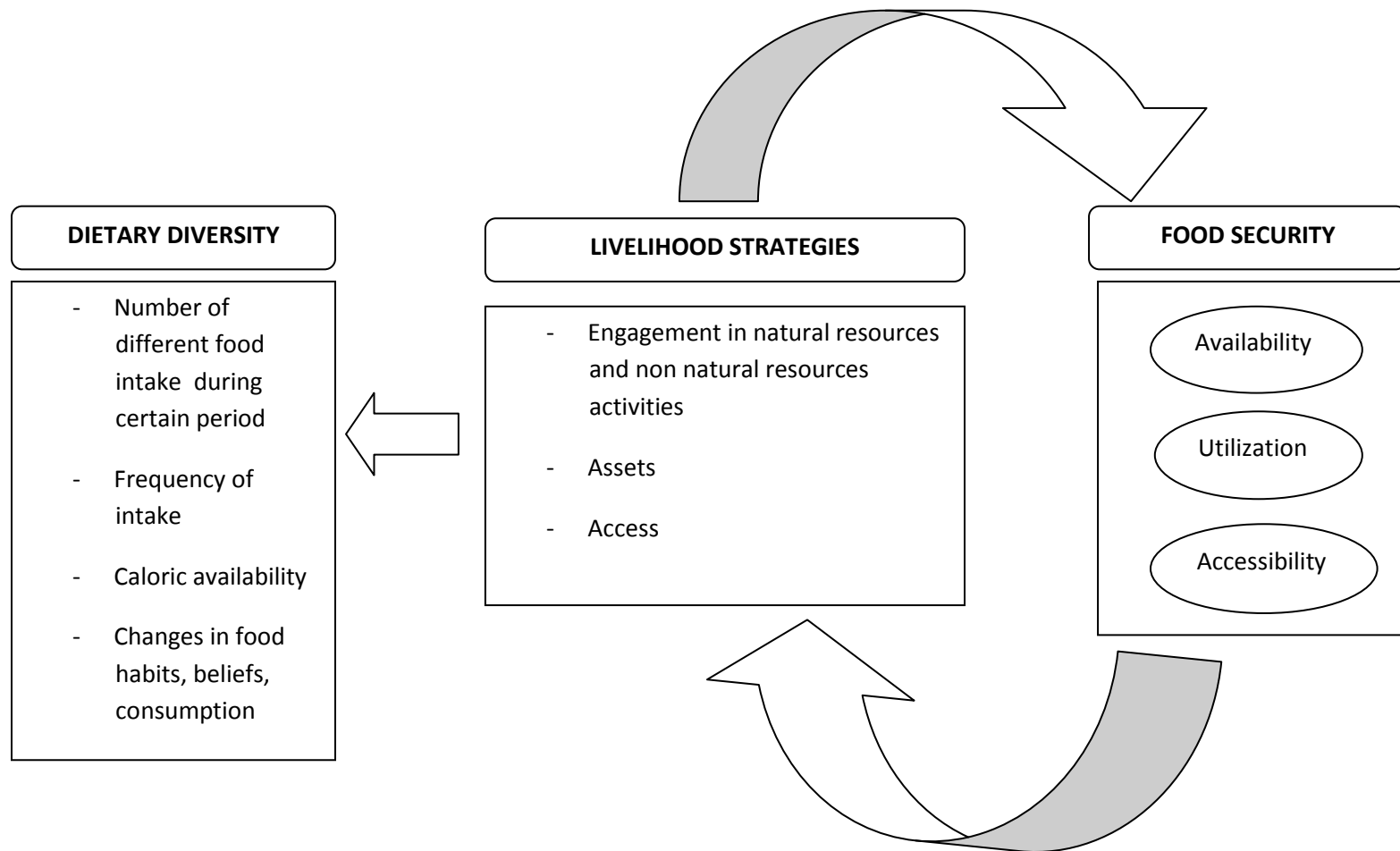
### 4.1. Conceptual design

Chapter three presented the concepts used as core for designing the research: food security, livelihood strategy and dietary diversity. Given the information provided by literature review, it was assumed that livelihood strategies have a feedback effect on food security. For getting an idea of the complexity of the connection of these variables as a whole, it was narrowed down through the selection of one or more dimensions of them. Among all dimensions encompassed by livelihood strategies, this research addressed the activities (natural resource (NR) and non natural resource based (NNR) activities), the assets and access as factors influencing a certain dietary diversity. It is important to highlight that some terms vary according to the different theories, so the assets and access mentioned in livelihood strategies were considering overlapping concepts of food security concepts availability and accessibility. Similarly, dietary diversity can be including under the food security utilization dimension since somehow is the resultant output of the way people use and consume food. Given that consideration, for the purpose of this research changes regarding food habits and consumption were put under dietary diversity concept. The design of the research conceptual model is shown in Figure N° 2.

#### **4.1.1. Research background: The SINCHI Institute and the ReSa Program**

The SINCHI Institute (Colombian Amazon Institute of Scientific Research), is an non- profit civil organization, with public character but subject to the rules of private law and linked to the Ministry of Environment. The main goal of SINCHI is to carry out and to divulge high level scientific research on biological, social and ecological issues relating to the Amazon Rainforest, the Amazon River and the Amazon Region of Colombia in the quest for better understanding, protection and sustainability. For the accomplishment of this purpose SINCHI has set out five research programs. Within the Socio-environmental Dynamics Program, the institute addresses three areas: creation of base-line information; strengthening of government institutions for sustainable development and capacity building for formulation and interventions on public policies.

Figure N° 2. Research-specific conceptual model “Effect of livelihood strategies on dietary diversity”. It is used as the framework rationale behind the research. It was breakdown in factors to be considered for designing of the main research question and sub questions)



Together with the Department Government and the Presidential Agency for Social Action and International Cooperation, SINCHI has deployed four ReSa projects since 2005. ReSa (Food Security Network) is the largest government Program whose aim is to improve people's access to food throughout the country. The projects focused on the identification of local problematic of nearly ten ethnic groups regarding their food security situation in Amazon and Guaviare Departments. Through ReSa Program, SINCHI deployed training activities for improvement of farming and livestock management systems, and preservation of traditional agrobiodiversity knowledge among these communities.

#### **4.1.2. Research problem definition**

The communities of the indigenous *Resguardos* surrounding Leticia are considered highly influenced by city dynamics of expansion and development. As a result, they have increasingly been shifted to diversification on natural resource based productive activities to those related to income generation. In turn, their dependency on income generation and consequently in food acquisition through purchasing of it in markets is rising. The transition from traditional livelihoods to those derived of market-oriented activities, is considered one of the causes of disappearances of traditional harvested species, and therefore, a decrease of food obtained from traditional subsistence activities and changes in diets (Peña-Venegas *et al*, 2009).

Overall data about nutritional condition of Amazon Department shows high levels of malnutrition, high prevalence of chronic and acute undernutrition, deficiencies in protein, calcium, vitamin C and vitamin A intake, when it was compared with other departments of the country. The nutritional situation of Leticia municipality is marked by a high incidence of chronic and acute malnutrition, especially among children, due to scarce healthy dietary practices and few actions to promote food security in terms of access, acquisition and consumption (Acosta-Muñoz; Peña-Venegas and Mazorra, 2006). Nevertheless, indicators of food security show the Amazon Region as one with lowest percentage of households under food security (ENSIN, 2010 *cited in* Fonseca *et al*, 2010; ENSIN 2005 *cited in* WFP-Bienestar Familiar, 2008). Available information about the mentioned up to standard food security condition among the *Ticunas* is few. During the first phase of ReSa program carried out between 2005 and 2006 among indigenous communities of Leticia, La Chorrera and Puerto Nariño localities, SINCHI concluded that indigenous families are becoming less self-sufficient and increasing their reliance on markets to the detriment of their life quality. So, as they have opportunity to practice natural resources based activities, they obtain food of excellent quality whereas when they buy food, they access to lower-quality food which is affecting their health and well being (Peña-Venegas *et al*, 2009). SINCHI interventions for improvement of food security have targeted mainly households carrying out livelihoods based on subsistence activities.

However, under the increasingly adoption of production-oriented and trade activities, current food security policies are in consequence focus on strengthening these types of activities. The departmental policy on food security aims to set out territorial policies of food production and commercialization that enable strengthening of local markets, boosting of local productive chains and transferring of technology packages for improvement of processing processes (Gobernación del Amazonas, 2006). Whether an increasing access to food through the rising incomes in agriculture would lead to a much more diversified diet and/or a better nutritional status has not been fully investigated.

In order to shed some more light about this issue, the aim of this research is to have deeper comprehension of the different livelihood strategies display by indigenous people who are increasingly embedding in not indigenous life style and the associated changes in their diets in the ongoing context. Within its participation as an adviser in the generation of food security policies for the area, SINCHI considers this knowledge will contribute to creation of accurate indicators, target-oriented policies and further interventions regarding food security.

#### **4.1.3. Research objective**

To generate information about the effect that current *Ticuna* indigenous people livelihood strategies is having on dietary diversity by analyzing three households with different degrees of incorporation to NR and non-NR activities in the *community* of Amazonic *Resguardo San Antonio de los Lagos*.

#### **4.1.4. Research question**

How the engagement in current livelihoods strategies is influencing dietary diversification among three households with different levels of integration on NR and non-NR activities of Amazonic *Resguardo San Antonio de los Lagos*?

#### **4.1.5. Research sub questions**

- Which NR and non-NR based activities are the households currently carrying out in order to obtain food for household self-consumption?
- What are the assets upon households undertake their livelihoods strategies?
- What are the factors mediating access to households livelihoods strategies?
- What are the differences between dietary diversity among the three households?
- What changes have been occurred in regard to food habits and consumption during the last twenty years?

#### **4.2. Technical design**

The activities concerning how, where and when the research was realised, are considered as follow in this section. The scope and limitations of the research are also posted.

#### 4.2.1. Research strategy

A case study design was carried out within the indigenous *Ticuna* community of the *Resguardo* San Antonio de los Lagos. Such strategy was chosen for several reasons:

- a. The topic focuses on changes on dietary diversity under globalization as a contemporary phenomenon whose understanding demands the establishment of links between it and the context rather than frequencies or incidence.
- b. The main research question requires more explanatory approach since is suggesting links to be traced over the time.
- c. It can offers (or not) support to the existing evidence from previous research. So verification or new explanation of presumed causal links of the phenomenon requires more in depth approach in order to elaborate more accurate indicators regarding food security local policies.
- d. The relationship concerning the changes in contemporary *Ticuna* people livelihoods and its effect on dietary diversity under globalization, was the object of the research. During the first stage of the research it was identified a discrepancy between the indicators pointing out deficiencies in nutritional conditions and indicators of fairly food security for the Region. Certainly, this was a clue to realize that several variables were involved for understanding the phenomenon. Household food security has a feedback effect over livelihood strategies. But any livelihood strategy is also the outcome mediated by a specific assets and access. The boundaries between the phenomenon as such and the context are difficult to draw, so it was decided to get a more profound insight in function to study this object as a whole, in a more holistic way.

In order to make a descriptive, holistic, in depth analysis; an ethnographic-interactive approach was used. This methodological approach was found suitable for the purpose of the research since it considers a specific food system from a cultural perspective. As such, emphasizes in detailed, observational evidence. Moreover, it fitted properly in indigenous people worldview as a whole. More specifically, it was used the food ethnography approach. As described by den Hartog, van Staveren and Brouwer (2006) this methodology can provides an analysis of the food system as well as food habits of a population, community, household or a group of persons. It can be adapted in order to include the ways in which individuals, groups, households or communities choose, prepare, consume and make use of the available food in response to social, cultural and economic pressures (den Hartog, van Staveren and Brouwer, 2006).

The food ethnography approach establishes three components to be studied: food availability, utilization and beliefs, habits and attributes. For the purpose of the research, the three of them were addressed. Food availability was understood as all the foods present and consumed among the research units at the moment the registers were taken up. Utilization of food, taken in this research as dietary diversity, was measured by register of each food consumed per day by all members of the household. In order to get information about changes on food habits and attributes the third component was also examined.

#### 4.2.1.1. Research units

As research units, three households of *San Antonio de los Lagos* were used. The selection of the research site was made during one and a half week through negotiation between SINCHI and the indigenous authorities, especially with the chairman of AZCAITA (see deeper information in chapter ) in order to ask for approval and permission to carry out the research. The so-called “Three frontier” festivity<sup>9</sup> was running during the arrival week, so delay to have meetings with the contacts either from SINCHI or outside it, was experienced. The early suggestion pointed out to do it in one of the communities belonging to the so-called *Resguardo* Km 6-11, all of them located alongside the main road leading from Leticia to Tarapacá (See Map N° 3). However, many studies had been already deployed among those and the extremely close location and good access to Leticia might have seen as a remarkable bias since population in some cases is largely engaged in non-natural resources activities. An initial conversation with a leader of *Santa Sofía-El Progreso* community was made. The small number of households and the position upper on the River and furthest from Leticia of this *Resguardo* were considered positive aspects for the research implementation, however due to *curaca* availability limitations; it was not possible to arrange a meeting. Meanwhile, SINCHI had started conversations with other *curacas* from the area surrounding Leticia. During a second meeting with the *curacas* of *Los Lagos* area, it was decided by them to be *San Antonio de los Lagos* the placement to be chosen. The reason provided had relation with the community interest in get some information in order to improve their diets. Afterwards, a meeting with the community members was held in order to make them know the objective and implications of the research and ask them for approval.

The concept of household was not considered as the conventional one that entails the head members of a family and their children living in only one place. Due to their ethnic original social structure, the configuration of the families who participated in the research does not fall into such concept. Although in each household there was a couple composed by one male and one female as the heads; two of the studied households shared the food and used to be together during the feeding time with either their grandparents, married children or/and grandchildren during all the period. Therefore, the term household was used in this research as the group eating food acquired from any of its members even though it may have composed by two families living in different houses.

A strategic selection of the research units was made by meeting the criteria of showing the maximum differences between the NR and non-NR based activities pursued among its current livelihood strategies for obtain food for self-consumption. That was the main criteria for households' selection. To identify these type of households, it was resorted to the advisement of the *curaca*, who has deep knowledge of the activities made by the families in the community. Then, visits to 6 households suggested by him were made the first two days. After not-deep initial consultations about the main ways to earning their livings, a selection of three households was made taken the secondary criteria regarding similar household composition, time availability and willing to participate in the research. Finally,

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<sup>9</sup> A big festivity carried out jointly by Colombia, Brazil and Peru for celebration of the common ethnicity. It lasts one week.

the group was constituted by one household whose activities matched predominantly with the first group, one which was only involved in non-NR activities and one which share both kinds of activities.

Some remarks and limitations in the household's selection must be mentioned:

- Following strictly the concept about differences between natural resources based (NR) and non natural resources based (NNR) activities, there was a realization that there were no households which filled the requirement of being entirely dependent on natural resources based activities since the marketing of farming surpluses is a common activity for survival in the whole community even among households that were just engaged in farming and fishing activities.
- At the beginning four households were selected, but the realization that one household belonging to the NR group also had a small store, lead to remove it from the group.
- Although the research presents results regarding *Ticuna* people as the ethnic group studied, some members of the households belong to the also Amazonic *Cocama* ethnic group and *Mestizos*.

Appendix 1 shows the composition and some basic data of the households sampled.

The household were classified according to their incorporation either to NR or NNR based activities as follows: NR (predominantly pursuing natural resources based activities) HH (due to incorporation in both types of activities) and NNR (not performing any NR based activity).

#### 4.2.1.2. Data collection

The purpose of find out deep, qualitative information regarding livelihoods among small number of research units in a short time during a specific season is challenging. However, this limitation was rather overcome due to the ability to establish a good rapport which facilitated the procurement of information. Previous experiences in the use of similar techniques and with indigenous people were useful as well. This contributes to be aware of the importance of observe as much as accurately possible the activities and dynamics of daily life. The obvious limitation has to do with the representativeness of the households. Being a case study, technically this not represent a sample (since is not a survey), so the aim was not generalisation to populations. Besides, the goal was to analyze the phenomenon in order to offer evidence for supporting previous/existent theoretical propositions. Such propositions are inputs for definition and adjustment of indicators on food security policy.

Combined, qualitative and quantitative information were collected. Knowledge for creation of theoretical design was made through desk study. This was initiated previously to travel to the research place but it was completed during the field work. The first source used was the available institutional documents resultant of the deployment of ReSa Program. Complementary information was obtained through an internet based searching. Once in the field, to other institutional documents and others based on researching from the Colombian National University located in Leticia were accessed. A third source of information was gathered from local documents like the census, the legal document of

establishment of the *Resguardo* and the growing and nutritional reports of children of the *Resguardo*.

Field work was carried out during four and half weeks between July 25 and August 15. The first ten days were devoted to searching for the research place and to do observation about objects and processes relevant to the research topic. For instance, a couple of visits to the central market of Leticia were carried out.

The data was collected through three methods: semi-structured interviews; observations and recording of daily food intake:

- Semi-structured interviews: These were planned in order to get an insight of predominant activities carried out by the selected households, as well as availability and accessibility of food. The availability expressed as the food produced through farming (understood as present crops in *chagras*, backyards and gardens) and fishing. The accessibility was explored through the income (it was narrowed down to cash earnings and food purchasing). For data recording, a topic checklist and two forms for the activities and the inventories of the farming plots were designed (see Appendix 2). The last one registered the number, type, size and food crops and species present in each plot at that moment. In addition, taking of notes was carried out. It was intended to make the interview with any of the household members involved the most with those activities. For that reason, the respondents were only men, but also a limitation had to do with time availability among women since at least one was not present in the place during the day and another was busy taking care of the children and attending farming tasks. A total of five interviews were made to three respondents; two for each member corresponding to households NR and HH and one with a member of the household NNR. The former ones were made along with visits to the farming plots (2 visits to 2 different plots in both cases). Contributions of the wife of household NNR were made in a daily basis through coexistence at her place.
- Record of daily food intake: This method estimates the current food intake during one or more days (den Hartog, van Staveren and Brouwer, 2006). For this research, it was adjusted through a form to be filled daily by either male or female head members of the household. It included information regarding meal participants, time meal pattern of consumption, type of food or variety; methods of preparation, measures and origin or way of acquisition (see Appendix 3). The recording was carried out to get data about dietary diversity in terms of number of different foods and frequency of intake consumption but also for define the contribution of NR and NNR activities to household subsistence. Other items added in the form were posted to complement information regarding changes in food patterns (i.e. meal participants, time, type of food, preparation).The Appendix 4 shows the Tables summarizing the recording for each household.

It was asked them to include all the foods consumed during the day, including snacks. Liquid food like soups and beverages were included as well. For estimation of sizes/portions it was suggested to the respondents to do it in terms of the measure of commonly preparation tools (glass,cup,spoon), the number of pieces eaten and/or the approximate size (i.e for fish). The data collection was made



during eleven days. The recording of the daily household food intake had several limitations summarised as follows:

- Gender / researcher bias. Despite at the beginning of the process women were encouraged to participate on this activity, they found it difficult since their education level is lower compared with the males, so their writing skills were not enough to fill in the daily forms. Consequently, the task was assumed by men in two of the households but having suggested them to try to do it with their wives help. Besides, there is a persistence of the cultural pattern that rules men to establish institutional-organisational relationships and therefore, historically they have been involved the most in projects, programs or similar activities. In household NNR, the recording was carried out by the wife supported by the researcher, so a bias on the information collected is also predictable.
- Adjustment of the method. Due to time shortage only the first day of recording was used as a test in order to try to identify whether the format was clear enough. This information was not taken into account. However, it was not enough time, so further adjustments were made when recording was ongoing. Efforts to persuade collectors to do it immediately after each meal were not sufficient since usually they can have lunch time while they are working in the *chagras*. As such, they had to resort to memory very often and filled in the form at the end of the day. To try to overcome this limitations, a following up was made daily at the end of the day in order to check the reliability of the information and make clarifications.
- Standardization of measures. It was relatively easy to standardize tools like glasses, cups and plates because regular sizes normally can content the same amount. But when it applied to measure amounts and sizes for food like fish, plantain, *fariña*, rice, etc a lot of subjectivity was included since the use of a scale was not planned. Although informants provide values like big, medium or small for the case of the fish, it was quite difficult to observe daily the fishes fetched in order to compare between households. Only in household NNR was possible to check out the size of fishes.
- Registration of food obtained by children at school. Given the short age of the children of household NR, this data was not was registered for this household.
- Period of data collection. Due to the short period of data collection, validity of the data must be put in the context of a specific time of the year in which availability of a resource like fish varies with respect to other time of the year.
- Focus group/key informant discussions: To have a better insight about the changes and trends on diet, two semi-structured discussions were held. One with the group of community male and female elders where they were asked about food habits,

beliefs and changes in the past twenty years A second one was carried out with the school principal, who is in charge to provide the lunch to the students. Since he holds this position ten years ago, his knowledge and perception about transition on children diet, especially among children were considered relevant for the research. (see Annexe 5).

- Direct and participant observations: In order to gather detailed, emphasized evidence in the real-life context, permanent observation and interaction were conducted. Not in all cases these observations were made purposively, in a pre-structured way. For instance, incidental participation in ongoing processes of the community, as well as casual dialogues contributed to grasping of information. In other cases participant observations were carried out (i.e. *fariña* production, selling of groceries)

#### **4.2.2. Data analysis**

The qualitative results were organized and presented in a descriptive way. Elements of the Sustainable Livelihood Framework (SLF) were used as the chosen approach to analyse the role of livelihood strategies in dietary diversity. The initial emphasis of this analysis was going to be focused on the activities (NR and non-NR) carried out by households. However, the conceptual design suggested including variables likely playing a role in the context. Therefore, the factors related with the assets and the access become part of the analysis. Based on the linkages between assets, access and activities and the information collected in the semi-structured interviews, were defined the livelihood strategies carried out by households.

The information gathered through the inventory of the farming systems was used to better understood of households' diets in function of availability of food in that period. In addition, quantitative information provided by the food intake recording was used to compare the diets based on their diversity, understood in this research as the number of different food consumed over the recording period and the frequency of intake. Derived from the information collected it was also computed the contribution in percentage of NR and NNR activities to household subsistence.

Data about quantities was used to estimate the contribution of the staples to total subsistence consumption of each household. Also was estimated the minimum caloric availability per capita derived from households' diets according to available data of nutritional composition of Colombian food in terms of amount of calories contented in 100 grams of food.

As an analytical strategy it was used the relying on theoretical propositions (Yin, 2009). This strategy helped out to find associations and effects of each livelihood strategy in diversity of household diets based on existent assumptions and propositions made by SINCHI and previously researching.

## 5. FINDINGS I: A LOOK TO LIVELIHOODS OF THREE HOUSEHOLDS OF SAN ANTONIO DE LOS LAGOS DURING THE DRY SEASON

This section considers the results concerning the livelihood strategies of the three researched households. First part mentions the assets and access which are influencing ongoing of certain livelihoods. This information was obtained mainly through field observation, interaction in daily life and it was enriched with information from literature. The second part captured information of activities and resultant outcomes given by mean of semi-structured interviews and farming inventories. The third part focuses on dietary diversity and is derived from the daily food intake registration, the focus group discussion and the key informant semi-structured interview. The data is presented mainly in a descriptive way, sometimes including some perceptions/appreciations of the researcher.

### 5.1. The framework: activities, assets and access

Accounting the assets, access and activities, although the initial scope of the research intended to deal only with the activities carried out (either, natural resource based or non natural resource based) by households, to have ignored the last two factors would have limited the understanding of the research object, since they are contributing to support the analysis by offering a complementary platform. As such, data related with them was included in function of look at the context and to explain how complexity of the relationship between these three factors is influencing dietary diversity. This adjustment was made once the research was already going on. Information was captured by direct and participant observation, daily interaction and from literature. The semi-structured interviews also contributed to find out this information even if it was not included as part of the checklist at the beginning. Due to these reasons, likely is not a complete picture of all the dimensions making part of the assets and access. In some cases it is an overall perspective while sometimes is more household detailed. Nevertheless, it was intended to point out complexity and capture determinant linkages of households' livelihoods.

#### 5.1.1. Assets

Defined as “stocks of capital that can be utilised directly, or indirectly, to generate the means of survival of the household” (Ellis, 2000: p 31), assets among *San Antonio* households were identified following the classification used in Ellis livelihood analysis.

##### ❖ *Natural capital: land, water, forest and climate*

The first remark which is important to highlight is the land tenure pattern: land is a collective property. As such, it cannot be sold neither among community members, nor to people from outside. Like other indigenous settlements surrounding Leticia, *San Antonio de los Lagos* faces a constraint concerning land availability, since currently each family has around 2,4 ha of arable land. Nowadays, the *Resguardo* is becoming a spot between private property, sharing borders with a National Army Base and a big cattle farm, so the possibilities to extend the area further are quite few. The land is a highly valued asset among *Ticunas*, hence majority of the community members has their land and this is inherited from parents to children. Such important land is that if there is a case in which

somebody from outside without kinship relationship with any member of the community wants to settle down in the *Resguardo*, an agreement made between the *curaca*, the elders and the rest of the members of the community must be done in order to authorize the entrance of that people. If there is an approval, the *curaca* must give a piece of land to the new members.

People in *San Antonio* identify two areas according to the proximity of *chagras* to the housing area. The farmland area known as “el centro” (in English: “the middle”) refers to the furthest area where *chagras* are set out and it is slightly hilly. The original vegetation is technically called “Forest of terraces without flooding influence”. The plain terrains are located surrounding the *Yahuharcaca* stream and correspond to the so-called *varzeas* or flooding forests. Daily routine of *San Antonio* takes place in the *chagra*. Majority of the community members used to go to farming since early in the morning up to 2:00 p.m. in the afternoon.

*View of Yahuharcaca stream bordering the entrance to the community settlement.*



The stream belongs to a complex of water bodies called “*Los Lagos*” and is the main source of fishing supply but also for hygiene and recreational purposes. The Amazon River shore is also accessible from the hamlet in south-west direction. During the period this research was carried out, middle July and beginning of August, water level was starting to decrease, following the pattern of the Amazon River and its tributaries, whose waters reach the lowest level at the end of August. The weather was rather drier compared with April and May, the wettest months. Life in the hamlet is strongly influenced by the

seasonality, so shocks linked to it cannot be disregarded. A variation in rainy pattern, for instance, has implications in people livelihoods since drinkable water comes from this source. Last year exceptional flooding caused by “El Niño” intense rainfalls experienced throughout the country brought about shortage of plantain in the area, which still persists. The amount of fish is also increasing at this moment of the year due to the decrease of water level; however this avail is a disadvantage for navigability of the stream. Once the water reaches the lowest level, boats cannot go further certain point and since then access to Leticia must be done only by walking.

The original ecosystem, the tropical humid forest is not found it anymore. Vegetation shows different ecologic succession stages but stubbles are predominant. A secondary forest patch is located on the way to *San Juan de los Parentes*, a smaller community in south-east direction. People perceptions indicated hunting activity has decreased as long as the forest has been chopped. In order to find game is required to go to the “real” forest, distant from *San Antonio*, 8 hours by walking.

Overall among the community, farming system is managed in the traditional way. There is no use of farming inputs as fertilizers, seeds or pesticides. The staple crops like cassava and plantain and others like pineapple are entirely adapted to agroecological conditions. Forest offers a variety of food plants that demand little agronomic and cultural management, basically these species only require to be harvested.

Within the renewable natural resources available in the hamlet, it is important to stand out fishery stocks, rainfall and firewood given its role in community livelihoods. Fishery resources and rainfall water play an outstanding role in food availability. Firewood is becoming a scarce resource, according to some people. They consider that nowadays is even more difficult to find good quality firewood nearby the hamlet, instead of this, as same as happens with wild fauna it is also needed to go furthest.

#### ❖ *Physical capital: the house and the boat*

It can be said that the easiest identifiable physical capitals among the households are the house and the boat. The average area of the housing terrain is approximately 15 meters width and 20 meters length. Houses are wood made, with aluminium roofs. Out of the all observed ones, the majority have children and parents separate spaces for resting while others have an entire family-shared space for this purpose. The traditional kitchen is a broad open space located outside sheltered by a roof weaving with palm leaves. In there, the wooden stove is placed in the middle and the family sit down around it. Two of the households sampled, already had electric stoves which are right now placed inside. Although they still keep the original, this is not used as often as the new ones. Three of them also had a fridge, which means the capacity to stock and preserve food.

The boat has also a significant role since it is the basic equipment for fishing and quite often is used as the main transportation mean. It is possible to access to Leticia by boat following the stream until it connects with the River. All sampled households had a boat either wood-made with rowing or modern ones made of carbon fiber with an engine locally called “pequepeque”.

Together with boat and fishing gear, the next most recognizable productive capital are the appliances used for cassava processing to obtain *fariña*. A firewood oven and a machine for grate have been improved through changes in the materials and addition of engines (in



the case of the grate machine), however, other remains as “man-made” since they are manufactured with natural resources as plant fibers and wood.

In regard to infrastructure, the hamlet has power line but there is no water pipe line. According to the *curaca* the process to obtain a tube water system in the community was managed by him and is already going. He expects to have it next year. Meanwhile, drinkable water is caught from rainfall and stored in plastic tanks of 100 lt set out around 30 cms high above ground and cover with a net for filtering. The toilet is placed also outside and consists in a basin associated to an underground latrine.

*View of current San Antonio typical use.*



Although it is placed only 8 km from Leticia, there is still not road to access *San Antonio*. The stream stands as a natural barrier between the road and the hamlet, so to reach Leticia by different transport than boat is needed to take a path which communicates the hamlet with the main road connecting Leticia to Tarapacá by walking around 20 minutes; once got this place a bus or a “mototaxi” (service of taxi motorcycles) is taken over around 10 to 15 minutes. This condition can still be considered as a constraint factor when it comes to marketing of products since during the dry season there is not as easy to have a constant flow of products due to the disruption of transportation by boat. By the time of this research

Collective physical capitals are the school house, a room for community meetings, a basketball and a soccer fields. Two churches are also raised up. One, belonging to the Catholics is yet not finished.

❖ *Social capital: kinship and ethnic networks*

The kinship ties are still quite strong among community. During the stay it was noticed that the community is composed by five or six kinship groups. As such, it was often to come across with blood ties between neighbours and still is common that married children live one or two houses next to their parents'. Such family configuration allows preserving practices related to food acquisition like the borrowing and gift at family level. Even in one of the households, although the husband parents live in La Chorrera location, he used to be gifted with food products coming from their *chagras*.

A traditional reciprocity activity like the so-called *minga* is still practiced although less often. The *minga* occurs when a member of the community wants to start to do a new *chagra*, so he/she ask to collective labour to help it out. The caller has to offer food and get committed to help the others back when they require it. Nowadays, some people perceptions rise that in order to carry out a *minga* is mandatory to offer "fine" food like chicken; otherwise people will not attend it.

Additional reciprocity practices were also drawn from the interactive observation. One, especially interesting because is carried out between communities, is barter. During the season when the fish is scarce, people from *San Antonio* interchange *fariña* with people from *San Juan de los Parentes*, whose preferential location over a bigger water body let them have better fishing offer.

The strengthening of social ties is promoted by traditional ritual ceremonies, which still are practiced. The "*pelazón*"<sup>10</sup> the most important among the *Ticunas* is carried out to celebrate the girl become a woman by tearing out or cutting down all her hair as a symbol of purification. The parents offer a party to all community members, so they have to gather food enough for a big amount of guests. Traditional dances are performed and the offered food is not consumed daily but special meals elaborated for that occasion, as well as wild meat. A big "*pelazón*" was going to be released collectively by various *Ticunas* communities of the areas in September.

Social follow up was also clearly evidenced. Nobody outside the *Resguardo* is authorized to enter in or to stay without the community agreement in advance. Out of the authorities *curaca* is the most prone to be criticised since his position as a chief can benefit one's or other's interests. Nonetheless, trust derived from social ties is being missed as much as community become embedded in *mestizos* society, so now the claims about robbery, especially in crops are rising up.

❖ *Human capital: students and farmers*

Out of the 384 inhabitants registered in *San Antonio* last census, 145 are enrolled in one formal educational degree (official Colombian formal education establishes eleven levels

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<sup>10</sup> Pelazón: in Spanish, refers to the act of peeling.

including elementary and high school). The next largest part of the population is classified as “farmers” and 27 fall in the category “various occupations” referring to their engagement in temporal, usually unskilled jobs or activities for income generation. Only one was classified as fisherman. Currently, there are four official salary paid jobs: three teachers and the “health promoter”. These are paid by the government whereas the engagement of a couple of women as cooks in the school is a temporary occupation also paid, but the money comes from the *Resguardo* transferences. Other occupations are: construction worker, guard and pastor.

Last fifty years national trend leads to promote education among all population sectors, so the indigenous were not the exception. Education provided is based on “*mestizo*” society educational system and structure. Efforts to include traditional indigenous worldview approach remains as the teacher initiative. Children attending school receive one meal that supplement their feeding but it is not officially considered a lunch itself.

At the present time, children and youth of *San Antonio* have access to the primary school, which provides education from first to third level since the fourth and fifth degrees were removed this year given the lack of infrastructure and number of teachers required. After have completed the fifth degree, children have to be send to the school distant 2.5 km over the main road to Leticia.

Although unmarried children are labour force in the *chagra* and/or are engaged in fishing, they attend the school as well. Youth people who finished their high school claim for jobs which actually the labour market in Leticia barely can provide to them. Conversely to traditional *Ticuna* farming pattern, woman is not only anymore who is in charge of cultivation and harvesting the *chagra*; right now both male and female, participate similarly in the labour and women are increasingly staying at home.

### **5.1.2. Access**

Regarding the mediating processes whereby assets turn in to a specific livelihood strategy, some aspects have already been slightly raised. This part considers the mediating factors namely social relations, institutions and organizations which are considering having or have had a relevancy in *San Antonio* studied households and community livelihood strategies. Three aspects encompassing the also called conditioning factors (endogenous-exogenous) were identified as follows:

#### **i) Meaning of ethnicity from a political perspective:**

Under the aim to attain integration to national politic and legal platforms, indigenous people have adopted measures concerning empowerment and politic representativeness. Since 1991, national law established the right of indigenous people to receive funds from the current revenues of the nation. This money is managed by the municipality (in this case, Leticia) through the indigenous organizations and given to the *Resguardos* in a yearly-base. Since *San Antonio* and *San Sebastián* are legally a single *Resguardo*, money is shared proportionally to their population. Here is important to remark that financial capital is partially collective. Although community members do not have direct access to these funds in terms of cash, it is converting to other forms of capital through investment



decisions taken collectively. The housing construction and the wages paid to school cooks are examples of this.

*San Antonio* makes part of AZCAITA, (Asociación Zonal de Consejo de Autoridades Indígenas de Tradición Autóctona) an indigenous organization created since 2004 which legally represents indigenous people located in Leticia and its area of influence. Nowadays it gathers ten *Resguardos* surrounding the rural area of Leticia. Coupled with ACITAM<sup>11</sup> and indigenous organizations at national level currently they are supporting the launching of AZCAITA chairman as the indigenous candidate to Leticia's mayor. Initiatives to gain empowerment, autonomy and governance are also evidenced through the presence of the "Indigenous Guard" in the zone, an indigenous no armed force created for conflict solving and security provision. Recently, the community dealt with the trespassing of *Resguardo* borders by buffalos belonging to the Army Base. Such invasion meant the loss of sugar cane crops among several community members and a conflict between authorities from each side. Soldiers visiting community are not always welcomed since then, so indigenous guard reinforced its role.

ii) State presence:

During the research was evident that State framework expressed as regulations, institutions and programs have notable influence in the access to certain assets. Some are underpinned deeply due to its close influence in households access to food:

- "*Familias en Acción*" (Families on Action) Program. Under the aim to take over the poverty the National Government deployed a Program since 2002 whose goal is to give money subsidies for nutritional or educational purposes to children under seven years old who are in the lowest level of the health system classification (the system classifies according to class stratification based on income level). The Program main goal is "to contribute to increasing income among families under extreme poverty so hence, they can access to marketing transactions and improve their life quality" (taken from Agencia Presidencial para la Acción Social y la Cooperación Internacional<sup>12</sup> Website). The Program provides two types of grants:

- Nutrition subsidy: its aim is to help families to improve nutrition and health of children under 7 years. It pays \$COP 50.000 (aprox. €19 - €20) monthly per child six times a year. In order to receive the payment, family must demonstrate commitment to take care of feeding and bring children to follow-up appointments for checking growth and development measures. These appointments are scheduled in health centres, hospitals or as the case of *San Antonio* through the "health promoter". This position is part of the national health system structure at the first basic level. He/she provides basic health services. By the time this research

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<sup>11</sup> Asociación de cabildos indígenas del Trapecio Amazónico (Association of indigenous Boards of Amazon Trapezium)

<sup>12</sup> The Presidential Agency for Social Action and International Cooperation is the entity in charge to tackle with the issues regarding the overcoming of extreme poverty, the national reconciliation and to lead the International Cooperation agenda.

was going on, the current health promoter had withdrawn after ten years having this position. Community was intended to find a solution coupled with Department Health Secretary but several limitations were hindering an agreement due to the clash between regulations and procedures own to the public service and procedures established within the community. Community was concerned about the issue since the disruption of registration of children growth and nutritional condition, would lead to a failure in the subsidies delivering.

- Education subsidy: its aim is to support families having children enrolled in elementary and secondary school for allow them to stay in the educational system and complete their studies. It pays \$COP 15.000 (aprox. €5,5 – €6) per month for each child enrolled in primary school, from the second grade, and \$COP 30.000 (aprox. €11- €12) a month for high school students. Money is delivered during ten (10) months of the school calendar. No allowance is paid during the school vacation months, namely June and December. For procurement of this subsidy is mandatory to certify that students have no unexcused absences in excess of 20% of scheduled classes during a two-month period or cycle of two months.

- Colombian Institute of Family Welfare (ICBF). Belonging to the Ministry of Social Protection, this organization aim is to promote the development and welfare of family, and especially of childhood. It assesses and addresses national nutritional issues. In *San Antonio* ICBF has a so-called “jardín comunitario” (community kindergarten) where children under five years old are cared. Unlike the school, personnel are encouraged to speak the *Ticuna* dialect. The role of ICBF in food provision as well as in the establishment of the menus at school is relevant. Both, the community kindergarten and the school, receive *Bienestarina*<sup>13</sup> a nutritional product used as supplement food for babies since 6 months of age, pregnant and milking women, elderly and malnourished. It is composed by a mixture of vegetable flour, fortified with skim milk powder and enriched with vitamins and minerals.

iii) NGO's , institutions and academic initiatives for environmental conservation:

Organizations presence was evidenced through programs and projects whose main objectives address environmental conservation. These have had an impact in access to assets. A French NGO deployed a reforestation project during the previous year. People were encouraged to sow native fruit trees in their plots. They were paid COP\$1500 (€0,5) per plant. Some of the participants in the project received significant amount of money from it.

Similarly, a national university along with the government entity in charge of natural resources management (CorpoAmazonas) are also carrying out a project for monitoring

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<sup>13</sup> *Bienestarina* is the resultant word of the Spanish words: *bienestar* (welfare) and *harina* (flour)

fishing stocks. One of the household 's member was hired as a research assistant, so this meant an extra income for his household.

## 5.2. Households' survival: activities

This session reports the data collected regarding the activities carried out by the households researched upon, either natural resource based (NR) or non natural resources based (NNR) defined by the livelihood framework of Ellis. The results are based on the information obtained through the semi-structured interviews and the farming plots inventory.

A descriptive narration of the life dynamics of each household is offered. Through this, the interviewees portrayed an insight about activities, availability and accessibility to food. A summary about the types of NR and NNR activities performed by the three households are presented in Table N° 1.

### HOUSEHOLD NR1: "I WANT A BANK LOAN"

*W.* has lived twenty two years in *San Antonio*. He is a shy man. He is married with *M*, who is even shyer than him. Their home is composed by 9 people. They have 6 children of ages between 11 months and 18 years. The eldest daughter (17) has a 6 months child. Three of them, as same as *W.*, completed the fifth level of primary school. *M.* unlike them, did not go to school.

They have currently 4 farming plots; three *chagras*, one located in the *varzea*, distant 15 minutes from their house, sailing by the stream. The two *high chagras* are located in the so-called "centre", around 30 minutes from the house by walking. The fourth is rather a plot placed in the back area of the housing terrain bordering the stream. The activities pursued by *W* and his family are farming, fishing, *fariña* elaboration and sales of cassava, plantain, pineapple and seasonal fruits. They work in the *chagras* daily, one time in the *varzea*, one in the higher. Farming is carried out by the parents and the older son while fishing is an activity carried out by the two men.

*W.* explains that bitter cassava grows faster in the *varzea*, lasting between 6 to 8 months to be ready for harvesting. Also plantain reaches this moment at 9 months in this type of soil while in the higher *chagra* takes longer; one year and 14 months for cassava. In the field visits were registered and or reported a total of 17 currently available crops, all cultivated for consumption or sales purposes. Table N°3 shows information regarding the type, size and diversity of crops found in each of the plots. Around 75 % of the lower *chagra* was cultivated with two varieties of sweet cassava (green and purple) and a little amount of plantain that survived to the unusual flooding that brought about last year heavy rainfall period. Nowadays is a scarce product and therefore the sale price has increased; a bunch used to cost \$COP 1000 (aprox. € 0,38) during the harvesting period while by that time it was raised twice (\$COP 2700= €1). One of the higher *chagra* also seems to be

View of the chagra located in the varzea belonging to household NR1



cultivated with more than 50% of bitter cassava. The backyard plot was 100% cultivated with this specie. There is no use of any type of fertilizers and *W* mentioned that he leaves the plots on fallow during 5 or 6 years. He did not participate in the reforestation project. He looked motivated by the maize price: \$COP 15.000 (€ 5,5) per kilogram. However, he claimed lost of native maize seed by rats presence.

Fishing is an activity carried out each two days. He has two boats; the wooden canoe and one with engine. That gives him the possibility to fishing in either, the stream and the River. Fishing gear is a 100 meters length mesh (3 inches) and one hook. Most part of the catching is sold.

Backyard poultry is keeping by *M*, the wife. At the moment they had 7 chickens, which are sold from time to time. When they are not another source of meat, they slaughter it for home consumption. They can collect fruits produced by the wild growing trees like “Umarí”, “Asaí”, “Bacaba” y “Milpesos” but this is not a permanent activity. Hunting is not practicing in the household.

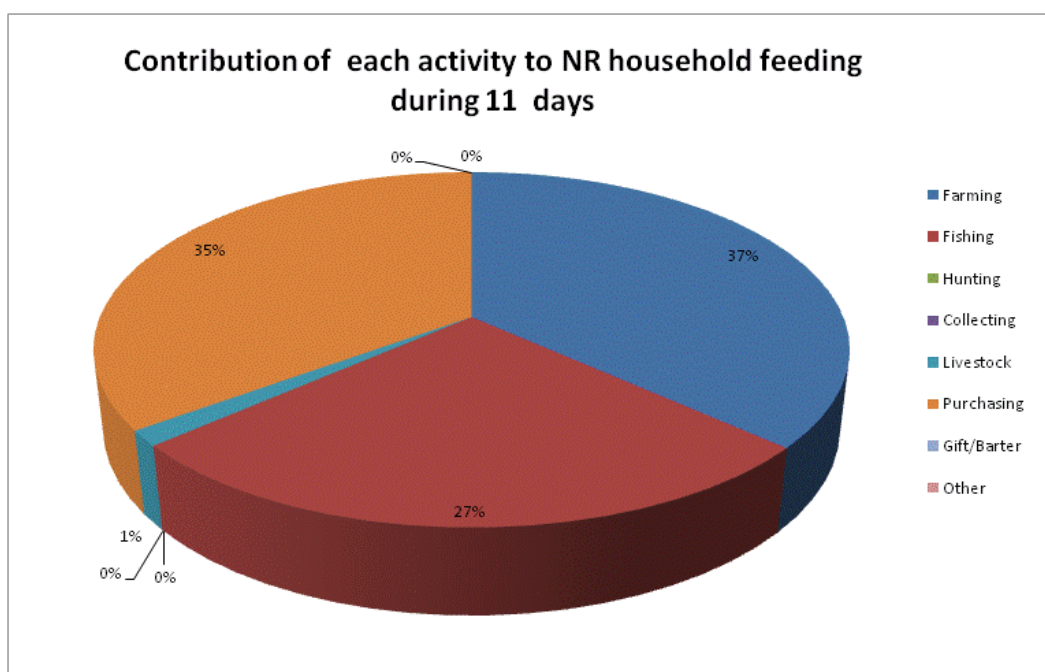
Looking at sales of farming and fishing outputs it is possible to have an idea of the household income. They used to sell sweet cassava, *fariña*, plantain, pineapple and seasonal fruits like Amazon grapes and “caimo”. Last year there was a production of 40 bundles (50 kg each) of sweet cassava. Half of the production met the requirements for household consumption during 6 months. The cost of each bundle is \$COP 25.000 (aprox. € 9,5). Assuming that 20 bundles were sold, the revenue was \$COP 500.000 (aprox. € 190). Bitter cassava harvest produces 6 bundles each fifteen days. With that amount they produce 3 bundles of *fariña*, from which, two are sold and one goes to self-consumption. The sale cost of one kilogram of *fariña* is \$COP 3000 (€ 1,1), so the total revenue of 100

kg is \$COP 300.000 (€ 110). According to W., other products like pineapple, plantain and seasonal fruits have low selling prices, the first one is sold according size, a bunch of plantain costs between € 0,4 to € 1 depending on whether is harvesting time, whilst a bunch of grapes costs \$COP 2000 (€ 0,7).

Fishing also generates income to this household. The most common species catch are “bocachico”, “cucha”, “pintadillo”, “dormilón”, “yaraquí” and “dorado”. The fish abundance starts in July, so there is still considerable amount available. The price of a *sarta* of fish varies according with the specie. “Bocachico” (6 pieces) and “Carawazú” belong to the expensive group, costing \$COP 10.000 (€ 3,7), but when there is shortage the price can raise between \$COP 12000 to \$COP 15000 (€ 4,5 to € 5,7). The most expensive is “Pirarucú”, the giant fish of the Amazon River and endangered specie. A kilogram cost is \$ COP 8000 (€ 3,00). It was not mentioned the average amount of fish sold. Fishing journeys are long, sometimes lasting the entire day. They buy the gas in the Peruvian side, since is cheaper than in Colombia.

An idea of how these activities are contributing to subsistence consumption of the household is shown in Figure N° 3.

*Figure N° 3. Distribution in percentage of activities carried out by household NR according to its contribution to subsistence consumption during 11 days.*



Every fifteen days they go to Leticia to purchase what is considered by him, basic staff: sugar, salt, rice, soap among others. He asserted that only buy in the hamlet small stores when there is an “emergency”. The value of fortnightly groceries expenditures is \$ COP 150.000 (aprox. € 56). Although W. said their children do not receive subsidies from “Families on Action” Program, two of them are listed in the monthly register for monitoring nutritional and growing development among children. It classified one of the household’s babies (1 year old) under normal condition in February, whereas in April is placed under the category: “undernutrition risk” since he did not increase in weight and increased two

centimetres in height during that two months. *D.*, the 6 years old girl, decreased from 18 kg to 13 kg during the same period and growth 1 cm.

*W.* favourite food are fish, mature plantain fried or cooked and cooked maize. He thinks “ñame” and “chontaduro” are not very common nowadays. He thinks may be is due to those are not cultivated anymore. He does not look worried about the future, he still relies on the natural capital they have. His decision to cultivate some fruits and a bigger area of bitter cassava are clearly commercial-oriented. (Appendix N°6) The improvement of his fishing gear is also a coming purpose. When he was asked about what he would like to have in the future, he revealed he said: “to have a credit from a bank”.

### HOUSEHOLD HH: “I WANT TO MIGRATE”

This household is unique in preserving both, a traditional livelihood and a more “modern” one. The grandparents of *M.* share the house with him, his wife and children. The little girl looks a bit fat compared with other children of the hamlet. Grandma raised up *M* since he was still a child, after his mother death. Together they have three *chagras* but *M.* also fishing and currently have a job as a project assistant for monitoring fish stocks in the area and providing of environmental education conducted by a recognized national university and CorpoAmazonia. The job will last one year and his main responsibility is the coordination of ten fishermen in the area. His Brazilian wife works in a clothing store in Leticia. For this reason she is not present in the house and only participates in the dinner time. Grandpa is a little sick, and unable to attend the *chagra* daily, although he would like because he is bored at home. The grandmother on the other hand, usually goes early each day. *M.* take care of the children, the youngest is not yet attending school but the girl attends the big school. Every morning *M* brings her and other children of the community to the school by boat. In total, they have 3 *chagras* (Table N° 3). His is close to the house, only 15 minutes by walking. Grandparents’ are furthest, in the “centre”. He relates that the buffalo belonging to the Army ate the sugar cane that was planted in his *chagra*. They were already one year and between one and two meters high. He did not reveal the amount, but apparently already he was compensated with cash for the damage. The plantain of his *chagra* is 14 months but due to past flooding it will not produce this year. Fruit trees the French NGO project gave him are younger than six months. Among them, “mango” and “guayaba” are the only no-native trees. They also provided cal, boron and N-P-K for fertilization for the first stages of growth. *M.* explains this is necessary since this is a clay soil.

Table N°1. Natural resources (NR) and non-natural resource based activities (NNR) activities pursued by the three studied households during the period of the field work.

HOUSEHOLD	NR BASED ACTIVITIES						NNR BASED ACTIVITIES						
	Farming (food cultivation)	Fishing	Sales of farming surpluses	Livestock /poultry keeping	Collecting	Informal wage employment	Exchange labour	Services supplier	Marketing of other goods/inputs	Studying	Trade of consumption goods	Food gifts /food borrowing	
NR													
HH													
NNR													

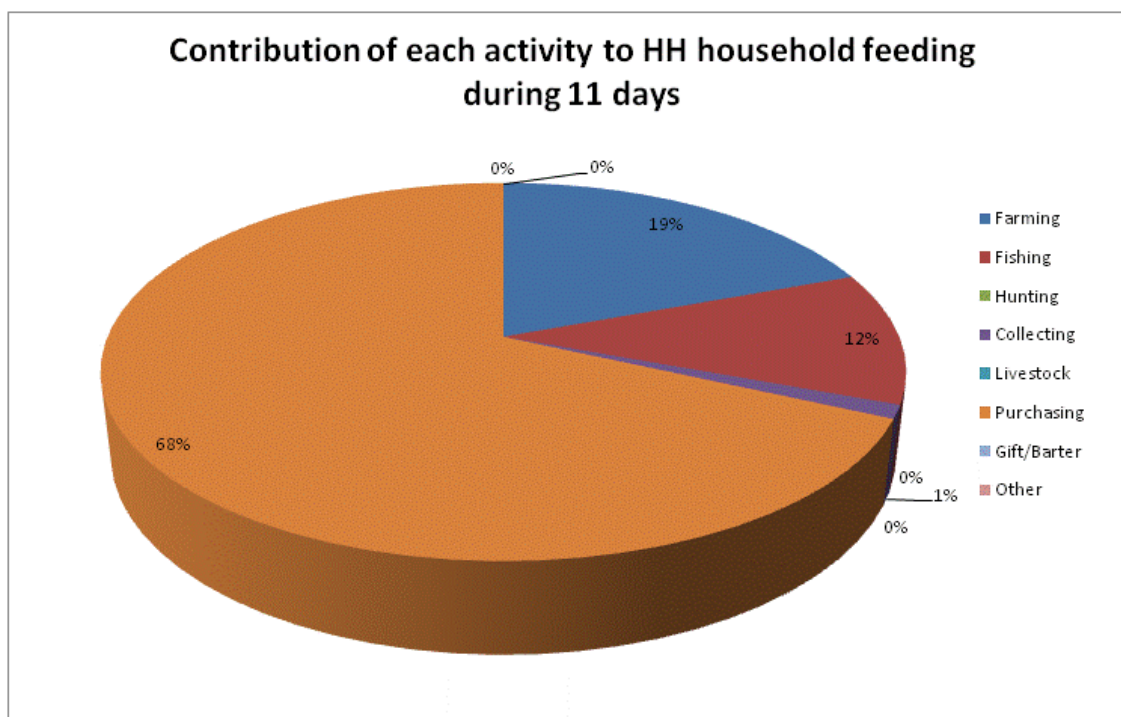


Grandparents have complained about recent stealing of pineapple of their *chagras*. They contribute to household food requirements in kind but they also sell *fariña*, pineapple, Amazon grapes, “arazá” and “chontaduro” in Leticia market. They can go twice a month although *M* can go more often (two times per week) depending on *fariña* availability. He explains that from 40 m<sup>2</sup> cultivated it can be produced 100 kg. During the attendance of a *fariña* making, he and grandma produced 80 kg in 5 hours (two bundles of 40 kg each). Commonly they sell between 20 kg to 50 kg twice a month. He pointed out that the total income from *fariña* sells is \$COP 300.000 / month (€ 110) although is not clear if this number refers only to production of his *chagra* or encompasses also grandparents *chagra* production. Backyard poultry caring is grandmother’s task, she sell any from time to time.

*M.* go fishing twice a week. Even though he has an engine boat he fishes more often in *Yahuaraca*, since this activity is carried out for household subsistence. But from time to time he also catches in the River. Over there he can fetch “pirabotón”, “bagre” and “picalón” whereas in the stream he finds preferably “bocachico” and “branquiña”. The best period for fishing is when water level is going down. In a good day he catches 5 or 6 *sartas* of fish.

The contribution of the performed activities to subsistence consumption of the household are shown in Figure N° 4.

Figure N° 4. Percentage distribution of activities carried out by household HH according to its contribution to subsistence consumption during 11 days.





The total household income per month ranges \$COP 700.000 to \$COP 950.000 (€ 260 to € 350). They go to buy groceries to Leticia twice a month and that expenditure is \$COP 150.000 (€ 56), or \$COP 300.000 (€ 122) monthly. That represents 35% of the total monthly income. The figure coincides with that one *M.* offered when he was asked about the percentage of the total income devoted to purchase food: around 40%, he said.

*M.* is rather an adventurer. It was recently that he came back from Leticia, when he used to live and work. Before that, he had already tried to migrate illegally to Venezuela but he was deportee. Anyway, he wants to try again and even he is curious about how easy is to request for an American visa. He and his wife completed all levels of high school. Constantly he is remarking that his dream is to study at the University. Last year he tried to apply and he has not loss his hope to do it again yet. However, he is also eager for any opportunity to find a job in the capital or wherever he can send remittances to their family. His last dream is to set up a groceries store in *San Antonio* where he can offer a broad variety of products, and then might be, people would not have to go to Leticia anymore.

*Grandma making fariña.*



## HOUSEHOLD NNR: "I WANT A JOB"

*L.* and *N.* are a young couple who increasingly seems to be less identify with an indigenous ethnic group. *L.* says that "he was not born" to work the land, even though their place of origin, Puerto Nariño, is a small hamlet embedded Amazon River upstream distant from Leticia 3 hours by speedboat. His parents still live there and every time they visit them, they bring different products of their *chagras*, which according to *L.* are rather large. He gets excited when he says his parents also raise chickens and "piscos"<sup>14</sup> there. *L.* graduated from high school in a famous school from a catholic religious community in the middle of the jungle fifty or more years ago. After that, he learned some skills like timber manufactures and construction in the SENA<sup>15</sup>. Leo is currently working in a nearby construction project. This job will take four months; previously he worked at one in the road. *N.* shares her position as cooker in the school in one month turns. So far, she had not received 6 months' wages. She is concerned about it because the rumor is transference money was already delivered. She is a young woman who daily early in the morning is cooking and going to the stream for clothes washing. She seems bored after ending housework. From time to time she makes a refreshment beverage from fruit and milk, known locally as "*puriche*" which she refrigerated and sold frozen in bags. Each bag costs \$COP 200 (€ 0,07). She likes to make it of coconut or guava. With selling from 40 bags she earns between \$COP 10.000 (€ 3,7) and \$COP 13.000 (€ 4,8). The soldiers often come to buy this product.

*B.* and *D.* the two children, attend the school. They use to have lunch there, so *N.* sometimes does not care so much about lunch for herself. She suffers gastritis. Years ago when she was very young still, she went to Bogota and Medellin, where she worked as a maid. She did not dare to stay. Now she thinks that she should have done it at that time because now she does not dare to go having such young children. *D.*, the younger (6) receive both subsidies provided by *Families in Action* Program, while the older (9) the educational only. Once the money was received, she bought them new t-shirts and shorts. After school, children come out to play with the neighbours. They are constantly going home searching for drinks and food since some during this season the hot is unbearable. Quite often they do not find something additional to eat but they resort to collect fruits like "mariramba" or "pomaroso" from grandmother's backyard. The growing assessment of *D.*, according to the nutritional and growing registers, is normal although he lost weight (1,5 kg) between March and April. *B.* also likes to go fishing. Although his catching usually consists of small fishes, sometimes these become the meat consumed at dinner.

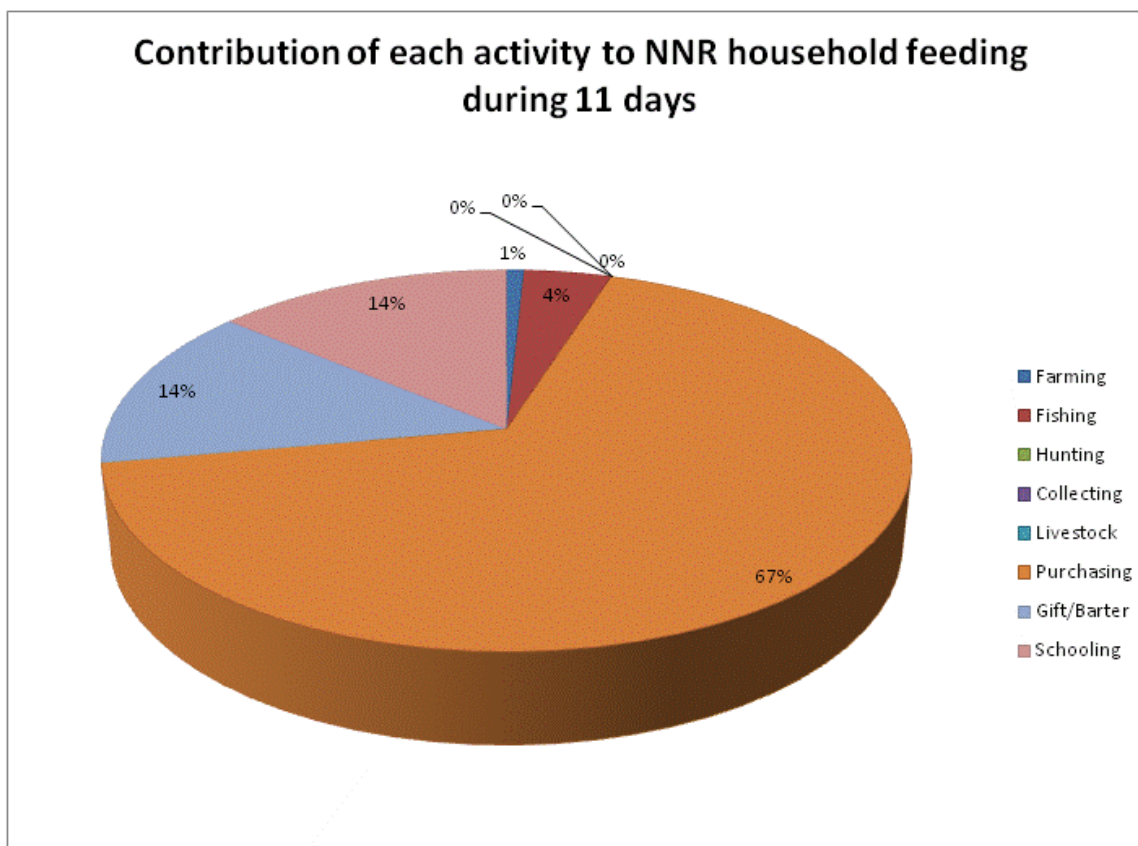
*N.* has a piece of land but nobody is currently working it. Her parents live in front of them and her sister as well. She regularly buys fish from her sister's husband and receives food as a gift provided by his mother. In the house backyard there are some fruit trees:

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<sup>14</sup> Pisco: A local name for a turkey.

<sup>15</sup> SENA (National Service of Learning) is the government Institution providing technical education, most of the cases for free.

Figure N° 5. Distribution in percentage of activities carried out by household NNR according to its contribution to subsistence consumption during 11 days.



“copoazú”, “arazá”, avocado and coconut (green and yellow). They also have a small plant nursery where paprika, tomato and “andiroba”<sup>16</sup> seeds are growing.

L. almost does not go for fishing even though he has an engine boat which has a cost of \$COP 1.000.000 (€ 370). He mentions he is able to earn \$COP 450.000 (€ 167) twice a month if the patron pays a good salary, which means around \$COP 35.000 (€ 13) per day. But that depends on each patron. Once, a former patron offered him a job as touristic guide in nearby private Reserve. He thinks the salary was low and he did not like enough that kind of job. He looks a bit worried about find a new job before the current one is over.

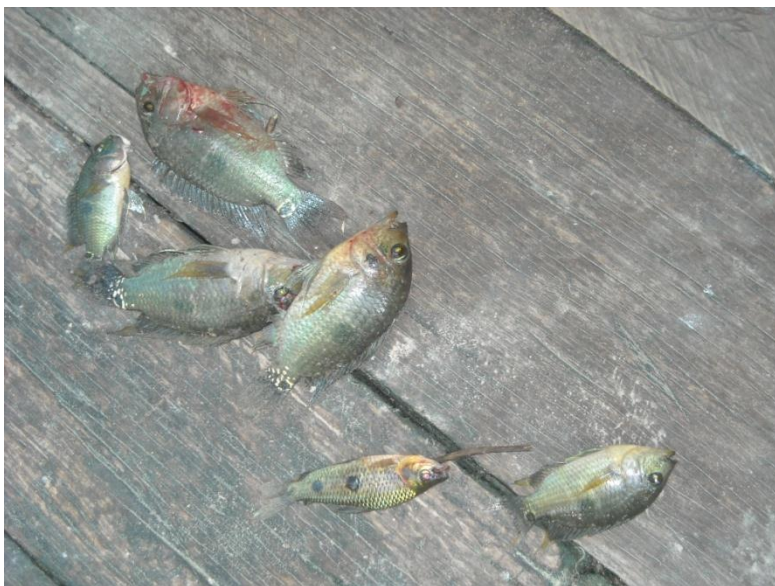
L. received his bi-weekly salary and had to pay some debts from it. They used to buy groceries twice a month in Leticia and last time, L. had to be thrifty, so N. was a bit disappointed; she wanted cloths for her. They bought groceries for \$COP 80.000 (€ 29). Within the products purchased, Brazilian sausages, rice, and chicken as well as Peruvian boxed milk are quite more affordable. N. bought yogurth for children. L. loves rice more than *fariña*, which instead, is B. ’s favorite food.

<sup>16</sup> An Amazon timber tree.

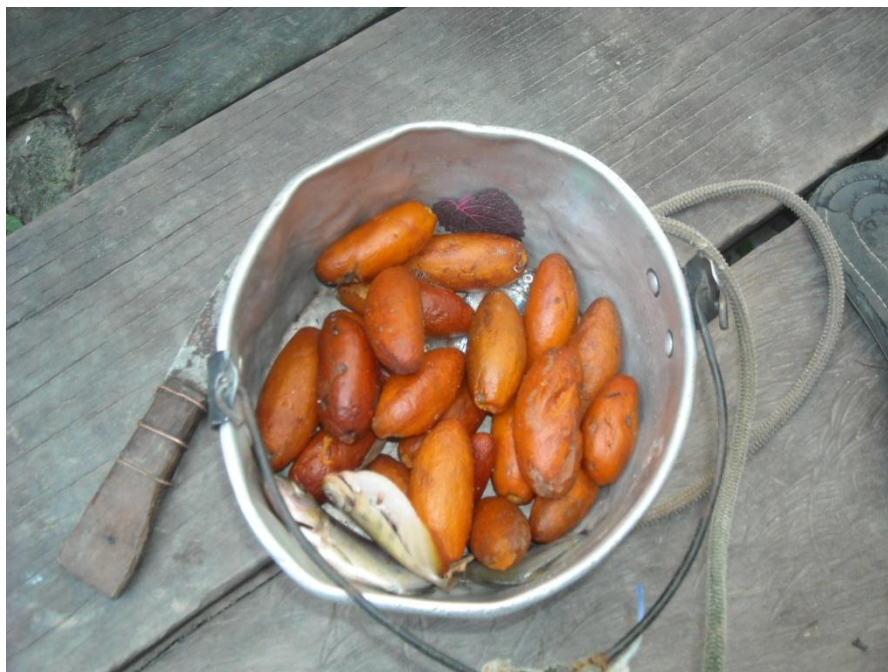


N. and L. said that is more difficult to live in Leticia compared to *San Antonio*, since there they need cash permanently whereas here family is a support and the land for cultivation is available as a last resource.

*Some fishes fetch by B.*



*"Marimamba" fruits from grandmother's backyard*



## 6. FINDINGS II: DIETARY DIVERSITY

This section encompasses the results about the dietary diversity of the 3 households obtained from the food intake recordings, the focus group meeting and the key informant semi-structured interview. Through the first activity, it was possible to have get information about the dietary diversity of each household, understood as the number of different foods or food groups consumed over a given reference period, which in this case was eleven days. The average daily energy availability was also computed as measure of the contribution of diets to energy intake. The recording also contributed to have an insight about food utilization.

### 6.1. Variety and frequency of food consumed

Dietary diversity was calculated by summing the number of unique foods consumed by the household in eleven-day period. Out of a total 85 foods consumed in 11 days, household NR1 showed the lowest diversity, with 14 different food or meals consumed in that period. The total food consumed was higher among HH and NRA households, registering 88 and 108 foods respectively, out of which 26 and 27 were different foods. Overall, dietary diversity is low respect to total number of foods intake.

Figures N° 6, 7 and 8 show the type and frequency of intake foods or meals during the same period among the three households.

Overall, a decrease in consumption of fish and/or meals using it is evidenced among HH and NNR households when compared with NR.

HH and NNR dietary diversity show a combination between cultivated and/or wild growing food and processed food, although the former ones remain in lower frequency. The means of acquisition of not-purchased food differs between them; HH inputs came from its *chagras* whereas NNR had important contributions from gifts. Both households had a higher number of different foods, almost twice, when compared with NR household. Here it must be taking into account that for NNR the food offered by the school was included. Moreover, during two days, the number of meals per day intake in NR was less than in the others, i.e. two instead of three in the whole day. (see Appendix 4). As can be noticed, fish, *fariña* and rice are the staples consumed by the three households, although for NR *fariña* was not placed among the three most consumed foods. Instead of, pasta was the third most consumed food. The consumption of *fariña* food is determined by the availability derived for the self-production in NR1 and HH, whereas the opposite happens in NNR, which have access to it through the purchasing. For this household, eggs were consumed as much as *fariña*.

Figure N° 6 . Dietary diversity of household NR. It shows the frequency of consumption of all food or meal consumed during 11 days at the household.

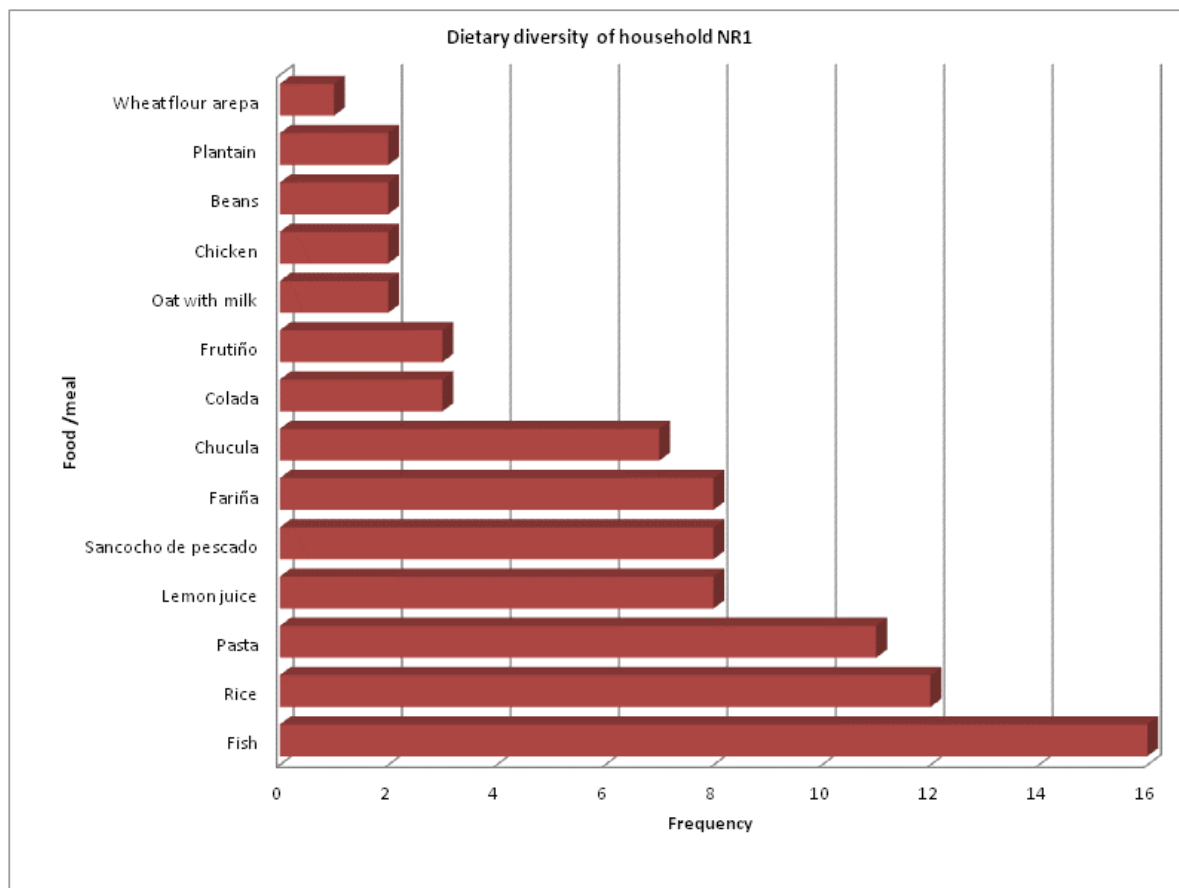


Figure N° 7 . Dietary diversity of household HH. It shows the frequency of consumption of all food or meal consumed during 11 days at the household.

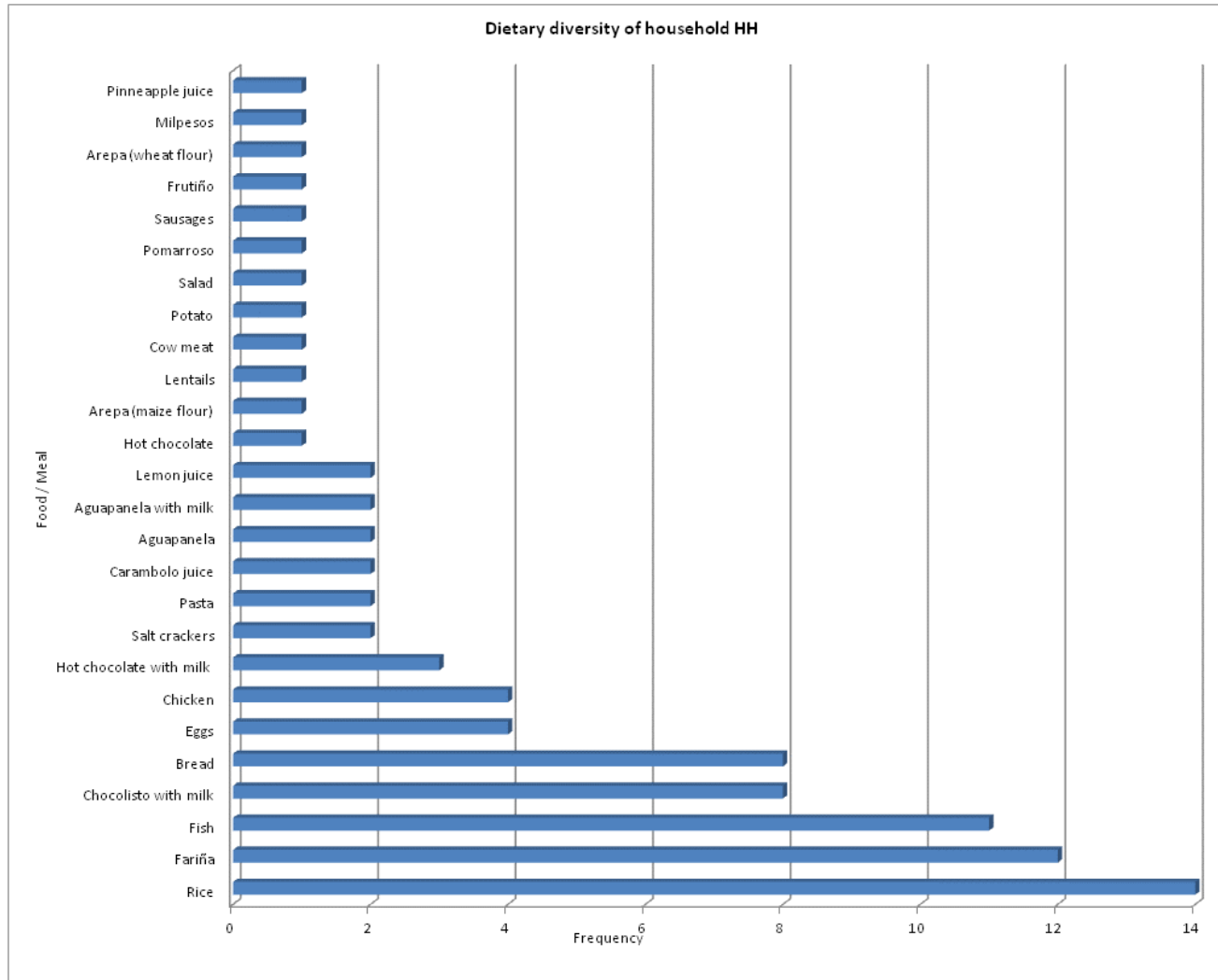
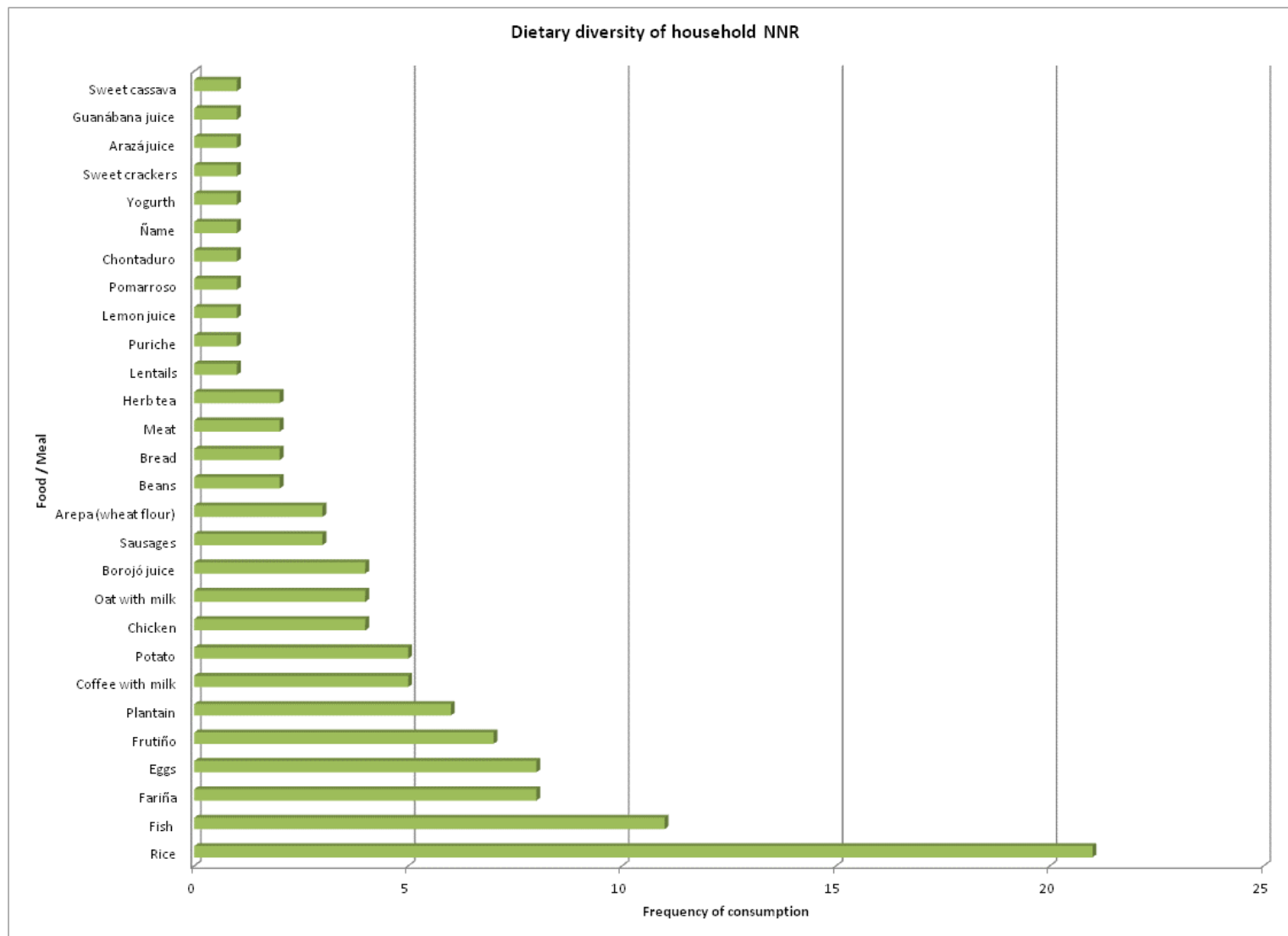


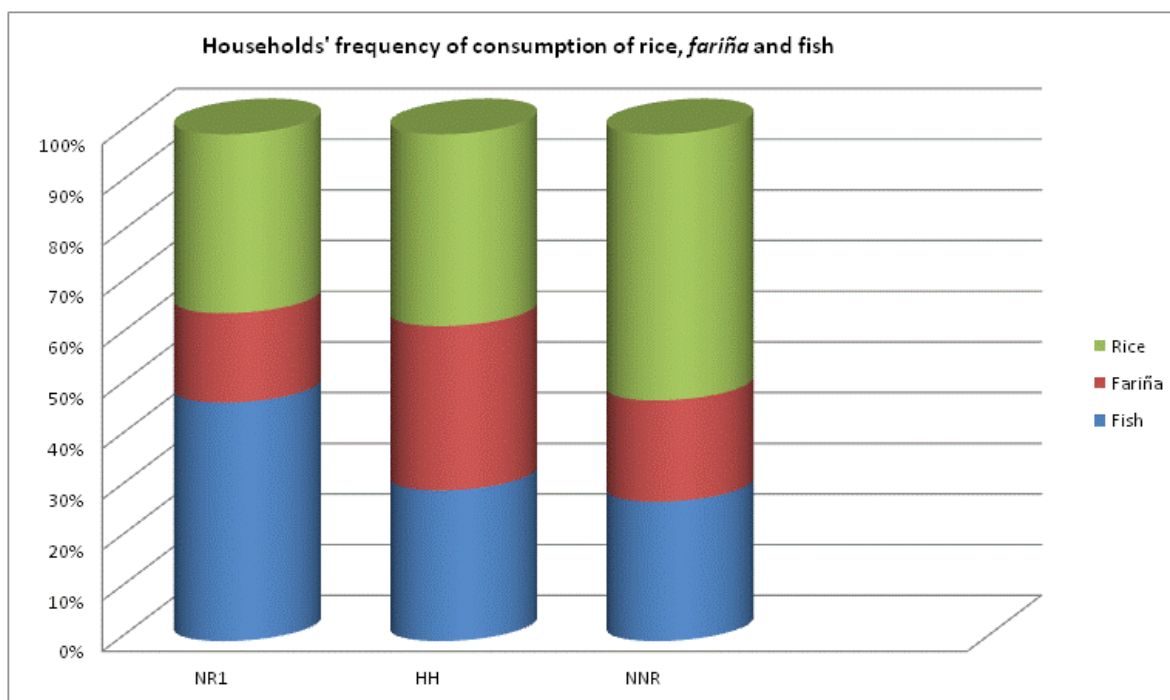
Figure N° 8 . Dietary diversity of household NNR. It shows the frequency of consumption of all food or meal consumed during 11 days at the household. For this household was included the food consumed by children at school.





Number of daily meals was also relevant to the number of total food/meals intake. NR was household showing more often a pattern of two meals /day. Among the most frequent consumed food, fish and/or meals that include it (like *sancocho de pescado*) were the most often food consumed in this household whereas for the other two, the most consumed food was rice. The frequency of consumption of fish varied almost twice, from 27% (NNR) to 47% (NR). For rice, this frequency ranged 35% (NR) to 61% (NNR). Comparison between the frequencies of consumption of these 3 foods is expressed as percentages in Figure N° 9.

Figure N°9. Frequency of household consumption of the most often consumed foods expressed in percentages.



These three products are contributing at least one third (between 37% and 43,5%) to all household food consumption. Out of that percentage high protein content food like fish is contributing less than 50% in all households. Instead, high calories content foods like rice and *fariña* are contributing near 53% to 72% that one third.

Contribution that fish and fariña (as food derived from pursuing NR activities) made to households food consumption during eleven days ranged around 25%. Contribution of rice to household food consumption in same period was around near 15% to almost 20%. Detailed percentages are shown in Table N°2.

Table N°2. Contribution of fish and fariña and rice to total household food consumption during eleven days.

HOUSEHOLD	THREE MORE CONSUMED FOODS (in frequency order)	CONTRIBUTION OF FISH AND FARIÑA TO TOTAL FOOD CONSUMPTION (%)	CONTRIBUTION OF RICE TO TOTAL FOOD CONSUMPTION (%)
NR	Fish, rice, pasta	25,88	14,11
HH	Rice, fariña, fish	26,13	15,9
NNR	Rice, fish, fariña	17,59	19,4

Only household HH consumed vegetables once. The others did not consume it at all. NNR and HH households consumed fruits, either eaten raw or prepared as juice. The fruits consumed were mainly those found locally.

High frequency of fish and pasta consumption suggests reasonable levels of protein intake in household NR. Households HH and NNR showed lower frequency of consumption compared with the former as well as low frequency (< 5 times) of consumption of other sources of animal protein like chicken, cow meat or sausages. However they consumed eggs more often than NR. Among the three households the consumption of pulses (important vegetal sources of protein) was low.

The emergence of certain foods, typically from “*mestizo*” society is evident over all households, although in HH and NNR is more frequent to consume eggs, white bread, coffee and hot chocolate. Basically the only dairy product consumed is powder milk. Food like potato was even more consumed than plantain in household NNR, even though this is not produced locally and must be imported from inward regions of the country, as happens with vegetables. Artificially, quick-made products like “frutiño” and “chocolisto” were consumed in all households as well.

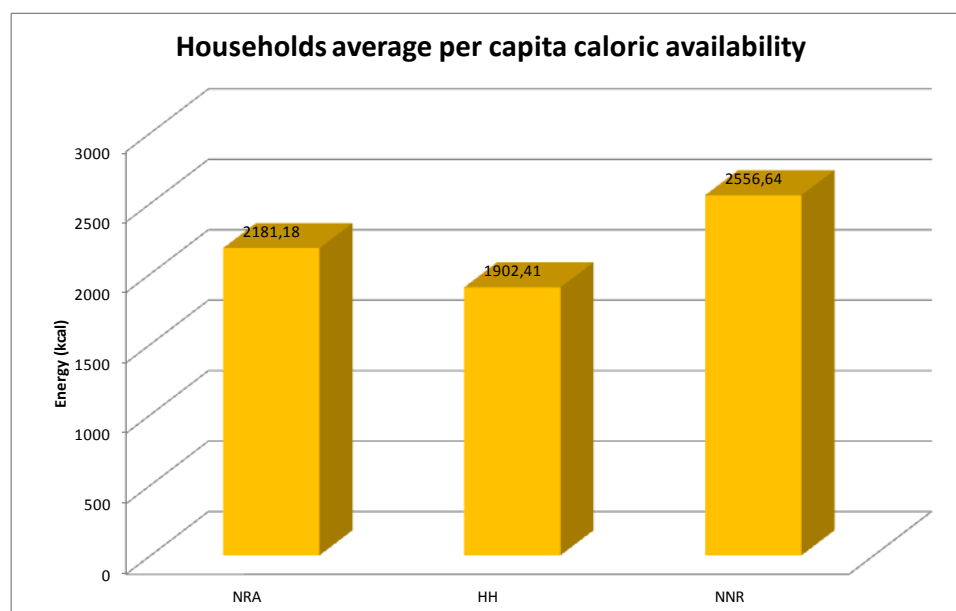
## 6.2. An estimation of caloric availability of households diets

Caloric availability is understood as the amount of food consumed by the household members, expressed in calories. Hoddinott, and Yohanne (2002) found a positive association between dietary diversity and caloric availability in a research carried out with data from ten countries. The magnitude of the association between dietary diversity and caloric availability at the household level increased with the mean level of caloric availability. They concluded that households with low levels of dietary diversity are likely to have low caloric availability.

While the purpose of this research was not to use statistical tools, caloric availability was addressed in order to explore if the minimum energy contribution of the households diets meet the requirements established for Colombian population. An estimation of average caloric availability was carried out based on available data of nutritional composition of Colombian food (ICBF,2005). A compute of the daily energy intake expressed in kilocalories of all foods consumed during 11 days was made. Due to the limitations related

to weighting food and standardisation of measures among households, it was assumed an average of 100 grams of all food consumed, except for the fish, for which was assumed an average value of 200 grams since the sizes of the individuals varied from small, (around 100 grams) to bigger ones (up to 400 grams). Moreover, the intake of sometimes half, one or two pieces also lead to establish a standard measure of 200 grams for all households. Ingredients such salt, sugar and oil were not taken into consideration. The type of preparation, neither. Also it was assumed that in all households, children and adults consumed the same amounts. Summarizing, the resultant data is the minimum average per capita caloric availability if considering 100 grams and 200 grams are rather low amounts of food.

Figure N° 10. Average per capita caloric availability of each household in 11-days period.



Nonetheless the limitations mentioned before, the graph shows the highest caloric availability corresponding with the household with the highest dietary diversity (NNR), however, household HH, with the second higher dietary diversity had a lower caloric availability than household NR.

FAO Food Balance Sheet (2007) of Colombia indicates 2685 kcal per capita per day as food supply measurement. The recommendations of daily energy intake for Colombian population ranges from 2270 to 3000 kcal per day in men of ages between 10 to 50 years, respectively. For women, it ranges from 2000 to 2250 kcal per day in women between 10 to 50 years. Not surprisingly, the estimation made is below any of those values since it was computed based in 100 grams of majority of food. Higher values can be expected from accurate measurement of quantities consumed. However, values of all households are above the minimum dietary energy requirement established by FAO for Colombia (2004-2006): 1790 kcal/person/day (FAO,2002) . Obviously, the main contribution is made by the frequency of consumption of high energy content foods like *fariña*, pasta, rice and oat, so accounts linking low dietary diversity with low caloric availability do not seem to apply for household NR.

When compared with food supply value at national level, it can be inferred that acceptable values among the households suggests also fair level in access to food.

### **6.3. Insights about diet transition**

This section deals with the utilization as a dimension link with the way households get, use and consume food. This was considered an input in order to get evidence of diet transition as an effect of changing of livelihood strategies over the last twenty years.

The focus group discussion and the key informant semi-structured interview focused on changes perceived over preceding twenty years and on trends regarding diets: food habits, sacred/ritual or medicinal food, food avoidances; adaptations, modifications and new food; perceptions regarding food supply and diets. Twelve participants older than fifty were asked to compare the above topics situation with that in the last twenty years.

The semi-structure interview with the school principal was more oriented to identify some of those aspects with emphasis in the feeding approach behind the food supply offered at the school in the last five years.

Additionally, information extracted from daily food intakes registers and direct observations, complemented this section. The findings are summarised in Table N°3.

Integration to non-indigenous society is perceived by informants as an ancient process that nowadays is rather incorporated to their lives. Even though they recognize some changes in food habits and consumption, they did not label them as positive or negative.

Overall, they mentioned an increase in accessibility to foods not available before (i.e vegetables) and acceptance of chicken and cow as relatively new food. However, these aspects were not clearly recognized as evidence about the extent in which some feeding patterns are changing. Elders mentioned still fish, plantain and *fariña* as their favourite foods. Vegetables were not included in food habits in the past but wild fruits did, so in recent times, vegetables are still not common food among their diets. Increase in consumption of carbonated drinks, processed chips and candies, especially among children was not clearly recognized by respondents either, although field observations suggested evidence about it.

From these findings, it can be inferred that changes in traditional indigenous diets has been the logic process linked by the turning into semi-rural society. As fast as urbanization process is running, traditional *Ticuna* ways to obtain and produce food like slash and burn farming, hunting and collecting are less practiced since it requires considerable areas of land. Collective traditional ways of share food like festivities and *mingas* are less practiced. Feeding patterns nowadays are adopting the urban way of having less, quick-made foods. An educative urban-based system is also influencing dietary patterns through the offer of non-traditional food which is consumed out of home and not with family together in the *chagras*, what use to be the costume.

Table N°3. Summary of information regarding changes in food habits and consumption collected from focus group discussion, key informant semi-structured interview and daily food intake registers.

Food transition: changes in food habits and consumption	
Food habits (adaptations, modifications and new food)	<p>Increasing of smaller meals, consisting of bland foods at dinner time in household HH.</p> <p>Children increasingly having lunch at schools. Over there, ICBF does not allow to give them scale fish. Therefore, is replaced by chicken, eggs, beans sometimes meat.</p> <p>The most common ancient method of fish preparation was smoked or roasted by wrapping it in plantain or “vihao” leaves. Increasing incorporation of fried fish since access to oil and electric stoves.</p> <p>Decrease on consumption of old meals/food like “Poroca” (beverage based on mature fermented plantain mixed with cassava); “fish mazamorra” (fish with rasped plantain); sweet cassava masato “(beverage made with fermented sweet cassava); “fariña colada” (fariña boiled with milk) and “tapioca” (white fariña starchy), “yacuba” (refreshment drink made of fariña with water and sugar); “Payawurú” (sweet cassava cooked with its leaves); “maize or chontaduro chicha” (fermented beverages made of this foods).</p> <p>The consumption of “chuchuwasa” a plant known by its properties for relief of menstrual cramps and general pain is nowadays consumed mixed with alcohol.</p> <p>Food collection is not yet much practiced since collective land for growing of wild fruits is becoming scarce. Less consume of local fruits.</p>
Food supply	<p>Decrease on cultivation gastronomic plants like “azafrán”, “achiote” and “guisador”.</p> <p>Decrease in consume of game meat: cocodrile, black iguana, monkey, “danta”, “chigüiro”. Also decrease in insects’ consumption: snails and “palma de aguaje” worm.</p> <p>Increasing distance to hunting areas and prohibition of use of “barbasco” by authorities. Access to shotguns is more difficult.</p>

Ritual-associated, medicinal food, food avoidances, food beliefs	<p>Increase of vegetables supply but low consumption.</p> <p>Recently increase on fruit production and better quality of <i>fariña</i></p> <p>Before only women used to work in the <i>chagra</i>. Nowadays, men and women work equally since children are attending school.</p> <p>The use of fishing nets makes fishing easier compared with the past time.</p> <p>Small stores located in the hamlet offer processed food, generally Brazilian or Peruvian. The most common products are sodas, chips, tuna, white bread, eggs, cigars, beer, candies, rice, oil.</p> <p>Cow meat is expensive. Brazilian chicken is cheaper than Colombian one but has fame to be of lower quality.</p> <p>Even though there is still a supply of Bienestarina, this has decreased to 20 kilos to 1 kilo/month in the last 3 years.</p> <p>Money resources allocated to purchase food for school are scarce. Therefore, it is difficult to diversify diets. Products from harvests complement the menu. Many times daily school menu is the same during a week.</p> <p>Markets offer Brazilian and Peruvian processed food for relatively cheap costs.</p> <p>Colombian vegetables are expensive since they are not produced in the Region; an important part of them as well as fruits found in market in Leticia come from the Peruvian side.</p> <p>“Pelazón festivity” and “abundance festivity” used to be carried out more often before. Roasted game meat and fish is offered as well as other traditional food.</p> <p>Wild fruit and medicinal plants were seen or cultivated more often in the past.</p> <p>Wild fruit “canangucho” contains a lot of fat, so it is not provided to children. It is associated with gay condition.</p> <p>Soup made with local fish called “cucha” has a lot of vitamins. It has attributes regarding</p>
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### Perceptions on food trends

increase of reproductive performance.

Shaman can forbid consumption of several foods for healing purposes. It depends on the type of disease or harm.

Traditional food was healthier.

Nowadays, there is more incidence of illness unknown before, like cancer.

There are more types of food available by the present time.

Indigenous and *mestizo* cultures can be combined.

Indigenous organizations want to promote an adjustment to school feeding according to traditional food habits and costumes.

## 6. RESULTS

Based on the conceptual design, this research selected the NR and NNR activities pursued by the households, the assets they utilize and the factors influencing access to those assets, as the dimensions mediating on their livelihood strategies. Thus, a specific strategy is the sum of the three dimensions interacting in a certain way that lead to a particular dietary diversity. Despite the insights into those strategies derived from the semi-structured interviews, the plenty identification of the strategies required to breakdown the three components mentioned for each household. This output was confronted with the household-specific findings regarding their dietary diversity.

In the analysis that follows it was summarized the activity dimension first, followed by a consideration of the assets and access, as a breakdown into most specifically information for each household.

For the activity dimension, it was compared the contribution to NR and NNR based activities of household subsistence during the period of intake recording among the three households. Only farming and fishing were included as NR activities since hunting, collecting and livestock activities did not contribute either at all or not higher than 1%. It was assumed that the input of NNR activities to household food consumption is basically whereby cash, thus it was expressed as purchased food. School attendance was not taken in consideration since its contribution was not measure in all households. Borrowing/gifts was not considered either since was evidenced in only one household. Table N° 4 shows the percentage of this contribution falling into each activity in the three households.

*Table N° 4. Contribution of NR and NNR based activities to household's food consumption during eleven days.*

HOUSEHOLD	CONTRIBUTION OF ACTIVITIES TO SUBSISTENCE FOOD CONSUMPTION OF 11 DAYS PERIOD (%)			
	NR (in kind)			NNR (purchase)
	<i>Farming</i>	<i>Fishing</i>	<i>Subtotal</i>	<i>Purchase</i>
NR	37	27	64	35
HH	19	12	31	68
NNR	1	4	5	67

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*Source:* the author for this research



- NR: > 50% of total household subsistence consumption of 11 days from NR activities and < 50% from NNR activities.
- HH: > 30% of total household subsistence consumption of 11 days from NR activities and > 50% from NNR activities.
- NNR: < 50% of total household subsistence consumption of 11 days from NR activities and > 50% from NNR activities.

The exercise reveals that out of three, two households based their subsistence consumption in NNR activities, which might indicate that diversification process targets principally non-farm activities. However, here is important to point out that for case of HH household even if the higher contribution is made through purchasing of food, NNR activities still contributes 31% to household subsistence consumption, which might lead this household to try to sustain or increase farming activities as well.

Since food purchases are influenced by the household's income, a classification of total household income whether they obtained from one two or three specific sources is turn out as showed in Table N° 5.

*Table N°5. Household' income. The value of each income stream per month in euros*

Income (€ aprox.per month)					
Household	Sales farming surpluses	Sales fishing surpluses	Sales <i>fariña</i> <sup>1</sup>	Wage earning	Total
NR	190	50*	110	—	350
HH	40*	—	110	200*	350
NNR	—	—	—		334

\*Deduced amount based on existent data or information given by the interviewee.

<sup>1</sup> Although *fariña* is also a farming output, it was separate here in order to highlight its contribution to household subsistence consumption.

Source: the author for this research.

The proportion of household income according to diversity of sources was classified in three categories:

- NR: Three different sources of income; 100% of total household income from sales of farming surpluses
- HH: Three different sources of income; >50% of total household income from wage earnings

- NNR: A single source of income; 100% of total household income from wage earnings

As described by Ellis (2000), a key consideration about diversification is whether it is at individual or household level. Even if different income sources contribute to spreading risks, household NR diversification targets only in selling of farming/fishing surpluses and *fariña*, basically is made individually in a market not quite favorable. Similar case occurs in NNR, which had the lowest level of diversification, having only one source of income dependant on the labour market. However, for this household an advantage is the existence of individual skills-specialization. Unlike them, HH showed a broader level of diversification since is engaged in on-farm, non-farm and off-farm activities, thus this household shows an increased chance to cope with shocks. However, also more than half of its income relies on the labour market.

Regarding the assets, the Table 6 broken down the specific information for each household. Overall all households had the same access to rural infrastructure (roads, rural utilities). Land has an implicit value as the most reliable asset given its attribute to be converted in mean of survival if there are fail on strategy. However, land does not seem to be the starting point for establishing successful livelihoods anymore. In general, access to financial capital is low among all households.

Table N°6. Assets and factors mediating the access found among the three households. A breakdown for each one is presented.

<b><u>Natural capital</u></b>			
<i>Cultivated land area</i>	0,14 Ha	1,2 Ha	0 Ha
<i>Fishing stocks access</i>	High	Medium	Low
<b><u>Physical capital</u></b>			
<i>Housing</i>	wood	wood	wood
<i>Boat</i>	2	1	1
<i>Fridge</i>	No	Yes	Yes
<i>Stove</i>	wood	electric	wood/electric
<i>Piped water</i>	no	no	no
<i>Fariña processing equipment</i>	yes	yes	no
<b><u>Human capital</u></b>			
<i>Household size</i>	9	6	4
<i>Active labour force</i>	3	3	2
<i>Education level of household head</i>	Primary	Secondary	Technical
<b><u>Financial capital</u></b>			
<i>Cash crops diversity</i>	19	14	0
<b><u>Social capital</u></b>			
<i>Kinship ties</i>	?	Medium	High
<b><u>Access</u></b>			
<i>Familias en Acción subsidies</i>	No	Yes	Yes
<i>Reforestation project earnings</i>	No	Yes	No
<i>School feeding</i>	Yes	Yes	Yes

Nutrition and education subsidies represent an advantage for households acceding to it in terms of increase access to cash. However, this measure is apparently having little impact on dietary diversity due to allocation of these resources away from providing food. Feeding school schemes display similar consequences on dietary diversity due to low variety of foods and the reliance of parents in this source as if not the only, an important one for children feeding. The government subsidies and the NGO allowances are evidence on how households are accessing to cash but not to financial capital.

To summarize the findings about dietary diversity, Table N°7 is presented.

Table N° 7. Dietary diversity of the three households during 11 days period.

HOUSEHOLD	TOTAL NUMBER OF FOODS	VARIETY (total number of different foods)	STAPLES (in order according frequency of consumption)	AVERAGE PER CAPITA CALORIC AVAILABILITY (kcal/capita/day)	NUMBER OF FOOD ACCORDING TYPE						
					Animal protein	Starchy	Vegetable s	Fruits	Milk /dairy	Vegetal protein	Others
NR	85	14	Fish, rice, pasta	2182	2	7	0	0	0	1	Artificial soft drink (frutiño)
HH	88	26	Rice, fariña, fish	1902	5	6	1	5	1	1	Chocolate, chocolisto (quick chocolate), aguapanela
NNR	108	27	Rice, fish, fariña	2557	5	8	0	5	2	2	Artificial soft drink (frutiño), coffee

Diet of NR is based mainly on starchy and relies on fish as main source of protein. It was not evidenced the consumption of vegetables, fruits and milk.

Diet of HH is more diverse, with five different sources of animal protein, fruit consumption and milk consumption.

Diet of NNR is the most diverse, with five sources of animal protein, fruit consumption, and higher dairy products consumption.

## **7. EFFECT OF HOUSEHOLDS LIVELIHOOD STRATEGIES ON THEIR DIETARY DIVERSITY: IMPLICATIONS ON LOCAL FOOD SECURITY POLICY**

Identification of livelihood strategies was not an easy task, since the rationale behind households choices to survive were not often easily identify in terms of planned actions at the short, medium and long term but rather than options or alternatives.

The effect of each type of strategy displayed on dietary diversification is analysed with regard to the possible influence that food security policy for strengthening of local marketing system has over them. Suggestions about aspects that must be considered in food security policies according with the type of livelihood strategy are presented.

For the three cases studied in this research, an overall glance over their livelihoods is characterized by having greater natural, human and social capital than financial and physical capital. There is a degree of diversification either in on-farm and non-farm activities being the last one more common. Then considering the differences in activities, assets and access to them, strategies and effects on dietary diversity are presented.

**HOUSEHOLD NR LIVELIHOOD STRATEGY:** Agricultural diversification: principally crops - *fariña* selling- fishing surpluses selling

Seasonality is determinant of diversification in this household. The configuration of the farming system helps to cope with this factor since production of cassava is steady all around the year. This consequently also keeps levels of cassava processing constant throughout the year. Household food subsistence is determined mainly by food available from self-production.

Being the main source of income the sales of crop surpluses, agricultural diversification is the main strategy. Access to financial assets through a credit indicates that strategy pursued by household NR, has presumably to do with investment for intensification. Other households' strategies did not seem to be purposively asset-oriented.

Clearly, dietary diversity of NR is strongly determined most by the availability derived from self-production than by what they can access through purchasing. Although the higher degree of integration in natural resources based activities, this household did not exhibit the highest dietary diversity as was suggested by the first the propositions proposed to be confirmed. Conversely, it was the lowest. By August fish stock is available, but there was not harvest of any type of fruit. Although *Ticuna* conventional farming system let to have several crops at different grow stages and therefore to have production the entire year, it was evidenced that configuration is changing to a more stationary instead of rotation system in farming system of this household. Thus, the cultivated area of crop like sweet cassava is lower compared with bitter cassava and since there was not the harvest time, it was not consumed during the research time. Probably all the production was mainly devoted to marketing as well. Presumably by this time of the year the household has an

acceptable level of protein intake given the relatively high frequency of consumption of fish when compared with the others. Average household caloric availability met the minimum requirements due to frequent consumption of food with high calories content like *fariña*, rice and pasta. However, fluctuations by seasonality coupled with a lack of fruits and vegetables consumption, might entails low dietary quality, which especially may affect milking women and babies belonging to this household.

Contribution of diversification to dietary diversity was not clearly evidenced. The allocation of cash from selling of *fariña* and crops surpluses like sweet cassava in food purchasing, is easily link with consume of products like oat, beans and or chicken. But if there is an improvement just could be noticed through comparison with dietary diversity in previous months and/or before harvests. However, overall lower dietary diversity compared with other households, suggests that either purchasing power is low or money is allocated in different issues than feeding.

As for fishing, during different time of the year the household may create experience shortage regarding animal protein if there is not a comparable input of other type of protein by purchase.

If current department food security policies of increase of local production and marketing are targeting this type of household, base line indicators should consider the degree of dependence of household subsistence food consumption in farming. This is especially relevant for cash crops since the ability of the household of ensure its food security through self consumption might be compromised by the requirements of cash crops. Similarly, initial investment for setting out of new cash crops may entails get into debts that can lead to allocation of cash in to payment instead of contribute to diet improvement. Promotion of vegetables cultivation in backyards and even in the *varzea* can represent a strategy beneficiating the current lacking of consumption of this type of food. Additional factors mediating on the success of further diversification boost by departmental food security policy, is the continuity of eldest members of the household as a labour force given their enrollment in formal educational process and the current phenomenon of land scarcity.

Implementation of policies for strengthening of local markets system must address hindering factors facing by this type of household such as lack of roads, high competition with cheap foreign products, low farm gate prices and low productivity.

**HOUSEHOLD HH livelihood strategy:** Non-farm diversification: Principally wage earning; *fariña* selling; migration

The particularities of this household regarding family composition and previous migration experience make difficult to categorize it as a general typology of household to be found often.

Diversification is broader in this household since it is spreading the risk on both, no-farm and non-farm activities. Thus, even is lower than NNR activities, the contribution of NR activities is still 30% to total household subsistence consumption. This percentage even can rise if the approximation made for income coming from crops surpluses sales is below

than the real one. That would mean that although largest income come from wage earnings, still NR based activities play a significant role in subsistence of this household.

Here, is important consider labour force as a critical factor that probably push the household towards non-farm diversification. Due to the age and health condition of the grandparents, likely this household will quit engagement on farming and *fariña* production in the long term. Same reason may be is also the motivation behind the household head migration purpose as well as the opportunities of the labour market out of the region. Possible reduction in sources of income coming from NNR activities by decrease of the labor force (only grandmother will be active), would have implications in food supply and dietary diversity, which would rely only in non-farm incomes (wage labor and remittances).

Although there is a wish for improve education level, it is seen more like a long term purpose but not as a current assets-strategy for improvement livelihood. Access to school feeding is accomplishing the objective to be a supplement, so the child engage at school receives lunch over there and at home.

Increase of purchasing power is contributing to increase dietary diversity in this household, expressed in a higher number of different foods. Fish and *fariña* maintain its importance in subsistence consumption, however the process of dietary adaptation was evidenced in this household given the reliance in staple like rice (it was the most often food consumed) but an increase of sources of animal protein, hence the slightly decrease of fish intake seemed to be replaced properly. The consumption of fruits coming from collection was significative and would not be underestimated since these are potential sources of micronutrients. This was the only household that consumed vegetables; even the frequency was very low (once).

Food security policy for improvement of local markets systems might not benefit this type of household as net producer, if migration occurs. But, as a net consumer it would benefit of more diverse, local produced, cheap food. Suitable food security policy regarding availability for this kind of household must underpin in improve access to better quality of processed food at affordable prices.

**HOUSEHOLD NNR:** Non-farm diversification: Fully wage earning; searching for full-time job allocation

This household showed the lowest degree of diversification which used to be associated with higher risk. Therefore, there is also a level of proneness to food insecurity if the single source of income disappears.

Labour market and social assets were particularly significant to this household. Withdrawn of farming and fishing practices due to education level attained is a differential factor determining life options. Motivated by possession of specific skills, household labour force considers as better the allocation in a full-time job than the pursuing in farming practices. Thus, the single source of income relies in temporary wage job, which in turn is attached to a regional labor market with two main sectors: marketing of goods and services supply. Within these sectors, the most deployed activities are retailing and fish wholesaling (Peña-Venegas et al. 2009). The household head is specialized in the construction sector, less developed in the Region, so the job offer is not so high. In addition, national significant



levels of unemployment and underemployment (more than 10 million Colombians without employment in the formal sector) reinforce the implicit suggestion of vulnerability of this household due to a loose or unstable labour market. Unlike the other households, the strategy of this one seems motivated by income-generation opportunity more than in a planned improvement of welfare in a long term.

Probably, the confidence into taking of higher risk is also related with reliance in land as permanent asset to resort to in case of need. As well as this factor, certain reliance in social capital determined by support of kinship and school feeding, contribute to decrease possible risks. Both, gifts and school contributed 14% each one, to household subsistence consumption.

Higher purchasing power also meant higher dietary diversity for this household, and similarly that previous one, diet has been influenced by closeness to city. This household displayed the higher total number of foods consumed but the higher amount of starchy foods consumed in the period as well. Overall, the diet is slightly more diverse compared with the others and moderate consumption of new food as potato (not produced in the region) was evidenced. Low purchase of local available products was evidenced since lack of daily cash prevents to buy groceries until salary was not paid. Meanwhile, food storage (i.e. in the fridge) gifts and recreational fishing carried out by children, were measures for food supply until restock. So the rising of purchase power did not guarantee itself regular procurement of food. Thus, engagement on unsteady, informal and underpaid job by active labor force of the household had implications in dietary diversity since payments of debts displaced incomes from food purchasing purposes. In a similar way, government nutritional subsidies were also sources of income not fully destined to improvement of diet.

Reliance in school was also a measure to support household feeding. Lunch procurement at school replaced totally the consumption of this meal at home. Despite of, demands of diversity of food for growing requirements of children might increase under conditions of high physical activity coupled with a tough weather.

Food security policies for this type of household can promote schemes for employment guarantees. Condition as net purchaser also can benefit this household if supply of local products is increased. Home fruits processing for elaboration of juices (*puriche*) has a potential as an income-generation activity. Available local fruits like coconut, pineapple, "canangucha", "chontaduro" and "Amazon grape" also have high nutritional content. Therefore, an intervention for provision of microcredits schemes for this type of business is a suitable alternative to current no productive labour force.

## 8. CONCLUSIONS AND RECOMMENDATIONS

Livelihood strategies of contemporary *Ticuna* households studied, are the outcome of complexity of relationship between assets and activities given by their particular condition as a minority which is merging with a larger, culturally different society. Indigenous people capabilities are crashing with an administrative structure which formerly enclosed them as societies out of the market-consumption system. However, nowadays they are being pushed to integration in the predominant economic model. This generates authority conflicts and results on means of living increasingly alienated of their original culture. Heterogeneity on livelihood strategies resultant of this process requires policies considering depth the transitional status from rural to urban of these populations. Formal employments and income-generation activities in non-farm sector might contribute to deal with growing scarce of land faced by semi-rural settlement like *San Antonio de los Lagos*.

Current livelihoods strategies of *Ticuna* households studied, display slight diversification in both, on-farm and non-farm activities benefit of diversification process in dietary diversity of the studied households is link with the increase of purchasing power. So, households with a higher degree of incorporation in non natural resources activities (non-farm diversification), displayed better diets expressed in a higher consumption of different foods and also increased variety of animal protein sources and dairy products. Contrary to the general consideration that associate indigenous traditional subsistence activities with better diets, the studied household with a higher degree of incorporation in these types of activities presented the lowest dietary diversity, in both, the frequency and variety of food consumed.

The average caloric availability ranged above the minimum requirements for Colombian population, since the consumption of high caloric content starchy was high among all households. However, the use of only two variables (number of foods and caloric availability) does not constitute an assessment of the appropriateness of diets for meeting nutritional requirements and ensure a good health. Thus, besides dietary diversity, dietary quality must be considered as well as indicator for measurement of nutritional status. Such indicator must be created according to information about nutritional requirements given the particularities of the Amazon biophysical conditions. Incorporation of these variables may complement anthropometric data as indicators regarding growing and adequate nutrition. Institutions like the ICBF and the local universities must tackle research on this matter.

Nonetheless households' strategy pursued, consumption of fish, rice and *fariña* as the main staples remains important for their diet. Due to the high frequency of consumption of the former, it was inferred that potential deficiencies in protein intake during this period were prevented. However, in different season it might be possible for them to experience lacking of this nutrient, if there is no adequate replacement with other sources of protein, either animal or vegetal. Among all households, vegetables consumption was minimum given the lack of local production and the high purchasing prices, which make this group of food few affordable. Fish storage and processing is an alternative for guarantee of constant supply of this important staple. Regarding the others, cultivation of vegetables like cabbage, paprika and/or other species tolerant to acid soils in gardens and backyard

can supply households subsistence requirements. Potential for rice cultivation in flooding areas for subsistence purposes must be also explored. Similarly, research on nutritional potential of local wild pulses and fruits is required from the local academic sector in order to generate information to support selection of suitable species.

Since natural resources activities still contributes in different extent to all households' subsistence consumption, the Department local food security policy for improvement of local market system must consider a balance between both, cash and subsistence crops. A decrease in productive capacity of the current farming systems due to intensification promoted by establishment of cash crops might jeopardize food security among all type of households. However, a benefit for net purchasers' households is inferred if the markets become cheaper and more diversify. Net sellers households might also benefit of markets strengthening if hindering factors as poor roads, seasonality and competition with cheap foreign products are overcome. Since a competitive farming productive system requires steadily production, the implications of an increase on production and/or productivity must be deep evaluated by department authorities from the perspective of environmental sustainability of Amazon ecosystems.

Changes in traditional indigenous diets have been the logic process linked by the turning into semi-rural society. As fast as urbanization process is running, traditional *Ticuna* ways to obtain and produce food like slash and burn farming, hunting and collecting are less practiced since it requires considerable areas of land. According with the findings of this research, diet transition was evidenced in steadily adoption of urban feeding patterns like less amount and use of quick-made artificial foods. An educative urban-based system is also influencing these changes through the supply of non-traditional food. Diet adaptation resulted in increased consume of new food although the largest consumption still remains on starchy foods. SINCHI educational interventions, should underpin to increase information and awareness about the benefits of a balanced diet in terms of diversity and quality.

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## APPENDICES

### Appendix 1

Appendix 1.1. Table

HOUSEHOLD N°	NAME	MEMBERS	AGE	SEX	ETHNIC GROUP
NR	Grandes-Huahuari	<i>W</i>	41	M	<i>Ticuna</i>
		<i>M</i>	34	F	<i>Ticuna</i>
		<i>W</i>	20	M	<i>Ticuna</i>
		<i>D</i>	18	F	<i>Ticuna</i>
		<i>A</i>	14	M	<i>Ticuna</i>
		<i>S</i>	9	F	<i>Ticuna</i>
		<i>D</i>	6	F	<i>Ticuna</i>
		<i>G</i>	1	M	<i>Ticuna</i>
		<i>S</i>	5 months	M	<i>Ticuna</i>
HH	Curico- del Aguila- Jordan	<i>M</i>	32	M	<i>Ticuna</i>
		<i>L</i>	36	F	<i>Mestiza</i>
		<i>R</i>	80	M	<i>Ticuna</i>
		<i>H</i>	74	F	<i>Ticuna</i>
		<i>C</i>	7	F	<i>Mestiza</i>
		<i>C</i>	5	M	<i>Mestizo</i>
NNR	Catachunga-Vento Demetrio	<i>L</i>	32	M	<i>Cocama</i>
		<i>N</i>	26	F	<i>Ticuna</i>
		<i>D</i>	6	M	<i>Cocama-Ticuna</i>
		<i>B</i>	9	M	<i>Cocama-Ticuna</i>



## Appendix 2

### Appendix 2.1. Semi-structured interview topic list

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

Interviewee name: \_\_\_\_\_

Position in household: \_\_\_\_\_

#### ACTIVITIES

Availability /food production:

Production system

- Chagras: how many, kind of crops cultivated
- Hunting: kind of animals hunted or trapped, how often, methods
- Fishing: kind of fish caught, how often, methods
- Collecting: kind of animals and plants gathered, how often
- Livestock: kind of animals kept

Barter/exchange/gifts?

Acessibility / Purchasing power

- Kind of food purchased on the market or shops
- How often/ How much
- Markets, distance to main purchase place
- Prices
- Household income
- Job
- Credit

## Appendix 2.2. Activities form

DATE: \_\_\_\_\_

INTERVIEWEE NAME: \_\_\_\_\_ Sex: \_\_\_\_\_ Age: \_\_\_\_\_

TOTAL NUMBER OF HOUSEHOLD MEMBERS: \_\_\_\_\_ Fixed: \_\_\_\_\_ Temporal: \_\_\_\_\_

HOUSEHOLD COMPOSITION: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

ACTIVITIES:

NR BASED ACTIVITIES		NON-NR BASED ACTIVITIES	
Farming (food and no-food cultivation: chagra(s), backyards, gardens,etc)		Sales of handicrafts	
Fishing		Wage employment	
Livestock keeping		Wage unskilled labour	
Hunting		Exchange labour	
Collecting or gathering		Services supplier	
Handicrafts manufacturing		Marketing of other goods, inputs	
Sales of crop/fishing surpluses		Others	

NOTES:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Appendix 2.3. Farming plots inventories form.

HOUSEHOLD NAME: \_\_\_\_\_

DATE : \_\_\_\_\_

SEASON: \_\_\_\_\_

TOTAL NUMBER OF FARMING UNITS: \_\_\_\_\_

UNIDAD N°	TYPE	SIZE	N°	NAME CROP/SPECIE	LOCAL NAME (DIALECT)	COMMON NAME (SPANISH)

## Appendix 3

### Appendix 3.1. Food intake recording form

Fecha: \_\_\_\_\_

Hogar/grupo: \_\_\_\_\_

FECHA	ALIMENTACIÓN DIARIA	PARTICIPANTS	NOMBRE ALIMENTO	CANTIDAD	UNIDAD	MEDIO DE OBTENCIÓN						
						Chagra /huerto	pesca	caza	Ganado /pollo	recolección	compra	otros
	Mañana (4 a.m. - 12 a.m)											
	Tarde (12 a.m – 5 p.m)											

#### Appendix 4. Data on households' daily intake records

HOUSEHOLD N°	DATE	PARTICIPANTS		TIME INTAKE			MEAL/FOOD	VARIETY/TYPE	PREPARATION	AMOUNT (aprox. per person)	MEASURE/SIZE	ORIGIN /ACQUISITION							Household per capita daily caloric intake	Energy (kcal)											
		Adults	Children (>5)	M	N	E						CH	F	H	C	L	P	G													
NRA1 (Grandes-Marfa)	03/08/2011		3	4			Chucula (plantain with milk)		cooked	1	cup	1.00							438.00												
							Plantain		Fried	1	piece	1.00							154.00												
							Sancocho de pescado		cooked	1	plate	1.00	1.00						177.00												
							Lemon juice			1	cup	1.00							41.00												
							Fish		Roasted	1/2	piece	1.00							192.00	2	96.00										
							Fariña			60	grams	1.00							350.00		350.00										
	DAILY CALORIC AVAILABILITY																			1352.00		1256.00									
	04/08/2011		3	4			Fish	Bocachico	Fried	1			1.00						192.00	2	96.00										
							Rice		cooked				1.0						351.00		351.00										
							Colada (rice with milk)		cooked	1	cup		1.0						306.00		306.00										
							Fish	Bocachico	Fried	1									192.00	2	96.00										
							Pasta		Cooked										364.00		364.00										
							Lemon juice			1	glass		1.0						41.00		41.00										
	DAILY CALORIC AVAILABILITY																			1446.00		1254.00									
	05/08/2011		3	4			Fish	Bocachico						1.00					192.00	2	96.00										
							Chucula (plantain with milk)		cooked	1	cup		1.0						438.00		438.00										
							Sancocho de pescado		cooked	1	plate			1.00					177.00		177.00										
							Rice		cooked				1.0						351.00		351.00										
							Pasta		cooked								1.00		364.00		364.00										
							Lemon juice			1	cup		1.0						41.00		41.00										
	DAILY CALORIC AVAILABILITY																			1563.00		1467.00									
	06/08/2011		3	4			Sancocho de pescado	Cucha	cooked	1	plate			1.00					177.00		177.00										
							Lemon juice			1	cup		1.0						41.00		41.00										
							Sancocho de pescado	Cucha	cooked	1	plate			1.00					177.00		177.00										
							Rice		cooked				1.0						351.00		351.00										
						Pasta		cooked								1.00		364.00		364.00											
						Frutifio			1	glass							1.00	5.00		5.00											
						Sancocho de pescado	Chirui	cooked	1	plate			1.00					177.00		177.00											
						Chucula (plantain with milk)		cooked				1.0						438.00		438.00											
						Rice		cooked	1	big spoon							1.00	351.00		351.00											
						Pasta		cooked								1.00		364.00		364.00											
DAILY NUTRITIONAL VALUE																			2445.00		2445.00										
07/08/2011		3	4			Fish	Bocachico				1	piece		1.00				192.00	2	96.00											
						Chucula (plantain with milk)			1	glass								438.00		438.00											
						Fish	Bocachico	roasted	1	piece			1.00					96.00	2	96.00											
						Oat with milk		cooked	1	cup								319.50		319.50											
						Rice		cooked	1	big spoon							1.00	351.00		351.00											
						Pasta		cooked									1.00	364.00		364.00											
						Chicken		Fried								1.00		232.00		232.00											
						Rice			1	big spoon								351.00		351.00											
						Pasta												364.00		364.00											
						Frutifio			1	glass							1.00	5.00		5.00											
DAILY NUTRITIONAL VALUE																			5253.50		3618.50										
08/08/2011		3	4			Fish		Fried	1	piece			1.00					192.00	2	96.00											
						Colada (rice with milk)	powder milk	boiled	1	cup							1.00	306.00		306.00											
						Rice		cooked	1	big spoon		1.0						351.00		351.00											
						Pasta											1.00	364.00		364.00											
						Lemon juice			1	glass		1.0						41.00		41.00											
DAILY NUTRITIONAL VALUE																			1254.00		1158.00										
09/08/2011		3	4			Fish	Bocachico	Fried	1	medium piece			1.00					192.00	2	96.00											
						Fariña						1.0						350.00		350.00											
						Rice			1	big spoon							1.00	351.00		351.00											
						Pasta											1.00	364.00		364.00											
						Lemon juice			1	cup		1.0						41.00		41.00											
						Chicken		Fried	1/2	piece							1.00	232.00		232.00											
						Rice		cooked	1	big spoon								351.00		351.00											
						Beans		cooked									1.00	346.00		346.00											
						Frutifio			1	glass							1.00	5.00		5.00											
						Sancocho de pescado	Chirui	cooked	1	plate			1.00					177.00		177.00											
						Fariña						1.0						350.00		350.00											
						Chucula (plantain with milk)	powder milk	boiled	1	cup		1.0						438.00		438.00											
DAILY NUTRITIONAL VALUE																			3197.00		3101.00										
10/08/2011		3	4			Fish	Bocachico		1/2	piece			1.00					192.00	2	96.00											
						Plantain		Fried	2	piece		1.0						154.00		154.00											
						Fish	Bocachico	Fried	1	piece			1.00					96.00		96.00											
						Colada (rice with milk)	powder milk	boiled	1	cup								306.00		306.00											
						Rice		cooked	1	big spoon							1.00	351.00		351.00											
						Beans											1.00	346.00		346.00											
						Fariña												350.00		350.00											
						Fish	Cucha	roasted	1	piece		1.0	1.00					192.00	2	96.00											
						Fariña			1	glass		1.0						350.00		350.00											
						Lemon juice						1.0						41.00		41.00											
DAILY NUTRITIONAL VALUE																			2378.00		2186.00										
11/08/2011		3	4			Chucula		boiled	1	cup		1.0						438.00		438.00											
						Wheat flour arepa		Fried	1	piece							1.00	358.00		358.00											
						Fish		Fried	1/2	piece			1.00					192.00	2	96.00											
						Rice		cooked	1	big spoon							1.00	351.00		351.00											
						Pasta											1.00	364.00		364.00											
						Plantain (patacón)		Fried				1.0						154.00		154.00											
						Fish	Cucha	roasted	1	piece			1.00					192.00		192.00											
						Lemon juice			1	glass		1.0						41.00		41.00											
DAILY NUTRITIONAL VALUE																			2090.00		1898.00										
12/08/2011		3	4			Oat with powder milk		boiled	1	cup							1.00	319.50		319.50											
						Fish		Fried	1/2	piece			1.00					192.00	2	96.00											
						Sancocho de pescado (with)	Cucha	cooked	1/2	piece			1.00					177.00		177.00											
						Fariña						1.0						350.00		350.00											
						Sancocho de pescado	Chirui	cooked	1	piece			1.00					177.00		177.00											
						Rice		cooked	1	big spoon							1.00	351.00		351.00											
						Pasta											1.00	364.00		364.00											
DAILY NUTRITIONAL VALUE																			1930.50		1834.50										
13/08/2011		4	4			Fish	Bocachico	Roasted	1	piece			1.00					192.00	2	96.00											
						Fariña						1.00						350.00		350.00											
						Fish soup			1	plate			1.00					192.00	2	96.00											
						Fariña						1.00						350.00		350.00											
TOTAL FOOD/MEALS INTAKEN NRA1																			1084.00		85.00										
PERCENTAGE																			38.5	28.2	0.00	0.00	0.00	1.00	25.00	0.00	0.00				



NUMBER OF DAYS REGISTERED: 11																						Per capita																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
HOUSEHOLD #	DATE	PARTICIPANTS	TIME INTAKE	MEAL/FOOD			VARIETY/TYPE	PREPARATION	AMOUNT	MEASURE/UNIT	ORIGIN/ACQUISITION	ORIGIN/ACQUISITION											Per capita daily intake																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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## **Appendix 5**

### **Appendix 5.1. Focus group topics checklist**

1. Food habits/practices
  - Changes on time: adaptations, modifications
  - Traditional food:
    - Kinds of food and drinks traditionally prepared
    - Methods of storage and/or preservation of food
    - Sacred, ritual food
  - Perceptions
  - Current trends

### **Appendix 5.2. Key-informant topics checklist**

1. School feeding
  - Types of food / menus
  - Criteria for selection
  - Bienestarina
  - Changes in school feeding
  - Ethnicity and food



## Appendix 6

Appendix 6.1 Table N° 2. Farming plots inventory of household NR

FARMING SYSTEM				DIVERSITY			AVAILABILITY
Unit N°	Type	Area (m)	Location	Crop (Spanish, local name / English name)	Specie (scientific name)	Variety	
1	Chagra	360 (90 x 40 )	Varzea	Yuca dulce / Sweet cassava	<i>Manihot esculenta</i>	Green	Growing and for re-sowing
						Purple	
				Plátano / Plantain	<i>Musa paradisiaca</i>		No harvested
				Banano / Banana	<i>Musa sp.</i>		
				Amazon lulo /	<i>Solanum sessiliflorum</i>		sowed 3 months ago
				Papaya / Papaya	<i>Dunal</i>		sowed 3 months ago
				Cilantro / Coriander	<i>Carica papaya L.</i>		
				Caña de azúcar / Sugar cane			
				Caimo /	<i>Pouteria caimito</i>		
				Sandía / Watermelon			
2	Chagra	560 (80 x 70)	High	Arroz / Rice	<i>Oryza sativa</i>		Growing
				Caimo /	<i>Pouteria caimito</i>		
				Guamo	<i>Inga spp.</i>		
				Uva caimarona / Amazon grape	<i>Porouma cecropiifolia</i>		Harvest between Sept Oct
				Piña / Pineapple	<i>Ananas comosus</i>		
				Chontaduro	<i>Bactris gasipaes</i>		
				Yuca brava / Bitter cassava	<i>Manihot esculenta</i>	Lopuna	Harvesting
						Arenilla	
3	Chagra	300 (60 x 50)	High			Panguana	
						Asai	
				Yuca brava / Bitter cassava	<i>Manihot esculenta</i>		Ready for sowing
				Piña / Pineapple	<i>Ananas comosus</i>		
				Marañon	<i>Anacardium occidentale L.</i>		
4	Backyard plot	250 (50 x 50)	House	Bacaba			
				Asaí			
4	Backyard plot	250 (50 x 50)	House	Yuca brava / Bitter cassava	<i>Manihot esculenta</i>		Growing
4	Garden	?	House	Guamo	<i>Inga spp.</i>		
				Copoazú	<i>Theobroma grandiflorum</i>		
				Zapote	<i>Matisia cordata</i>		

## Appendix 6.2. Farming plots inventory of household HH

FARMING SYSTEM				DIVERSITY			AVAILABILITY
Unit N°	Type	Area (m)	Location	Crop (Spanish, local name / English name)	Specie (scientific name)	Variety	
1	Chagra	100 (20 x50)		Yuca brava / bitter cassava	<i>Manihot esculenta</i>	Lupuna	harvesting
						Karai	re- sowing
				Plátano / Plantain	<i>Musa paradisiaca</i>		Decayed, so no harvested
				Mango / Mango	<i>Mangifera indica L.</i>		sowed 6 months ago
				Guayaba / Guava			sowed six months ago
				Cacao / Cocoa			
				Chontaduro	<i>Bactris gasipaes</i>		
				Caña de azúcar / Sugar cane			
				Caimo /	<i>Pouteria caimito</i>		
				Guamo /	<i>Inga spp.</i>		
				Arazá	<i>Eugenia stipitata</i>		
2	Chagra	1 Ha (100 x 100)	High	Copoazú	<i>Theobroma grandiflorum</i>		
				Arazá			
				Uva caimarona / Amazon grape	<i>Porouma cecropiifolia</i>		Harvest between Sep- Oct
				Piña / Pineapple	<i>Ananas comosus</i>		
				Chontaduro	<i>Bactris gasipaes</i>		
				Yuca brava / Bitter cassava	<i>Manihot esculenta</i>		Harvesting
				Ñame			
3	Chagra	100 (20 x 50)	High	Yuca brava / Bitter cassava	<i>Manihot esculenta</i>		
				Piña / Pineapple	<i>Ananas comosus</i>		

