Scientific Paper

Study of food accessibility in two rural municipalities of Matanzas province, Cuba

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Abstract

A study was conducted in the Colón and Martí municipalities –in Matanzas, Cuba–, in order to determine the level of food accessibility by the population. The analyzed indicators were: availability based on the offer in the sale points in all the people's councils and the total sales of the municipalities. For such purpose a total of 100 persons were interviewed, including farmers and customers, who were represented, proportionally, in 100 % of the people's councils (six in Martí and ten in Colón). A total of 49 sale points were visited in the two municipalities. Regarding the most offered products, vegetables occupied the first place with more than 30 % of the total offer, followed by fruits and roots and tubers, with 21 and 19 %, respectively; then meats appeared with 10 %, and rice with an offer of 5,6 % with regards to the total. Beans were last, with only 3,4 %. It is concluded that the offer of food products accessible for the population of the Martí and Colón municipalities is still poor in quantity, quality and variety. Nevertheless, it is possible to solve this situation in two ways: on the one hand giving priority to the quantity of foodstuffs that satisfy the demands; and on the other hand, increasing the production variety and quality through the installation of irrigation infrastructure, and by utilizing idle or deficiently used land.

Keywords: foodstuffs, human nutrition, food consumption.

Introduction

According to Urquía-Fernández (2014), food security "jumped" to the front page of worldwide political agendas due to events that were triggered after the emergence of the financial, energetic and food crisis of 2008, and vulnerability occurred in the prices of basic foodstuffs, which turned instable and volatile, which was aggravated by the lack of coordination in the response of the large world producers. All this, even, slowed down the advances in the attainment of the first millennium goal, of decreasing by half the percentage of people who suffer hunger.

There are many factors that impact food acquisition: incomes, food prices (which will affect the availability and affordability of healthy foodstuffs), individual preferences and beliefs, cultural traditions; as well as geographic, environmental and socioeconomic factors, which interact in a complex way to configure individual feeding habits (Zárate-Guevara *et al*., 2016). Subsequently, providing a healthy feeding environment, which includes feeding systems that promote a diversified, balanced and healthy diet, requires the participation of different actors and sectors, among them the public and private sectors (OMS, 2015). Nevertheless, in its reports about the world state of agriculture and food (FAO, 2013; 2014; 2015), FAO reminded that the official number of people with hunger in the world is around 870 million, but the number of undernourished people is 2 000 million (FAO, 2013).

The World Food Program (WFP) has elaborated the following definition of food security: «Situation that occurs when no person is at risk of suffering hunger at any time» (WPF, 2009). When food is scarce, hygiene, innocuousness and nutrition are often neglected; the population adopts less nutritious diets and consumes more unhealthy foodstuffs, for which the chemical, microbiological, zoonotic and other dangers cause risks for health (OMS, 2015).

That is why PAHO/WHO[1] consider food security as an essential aspect of human health, understood as the nutritional adaptation resulting from good balance between the food offer and nutritional requirements, because its manifestations are late and almost always irreversible. Alterations in physical growth and mental development; abnormal changes of body weight, with deficiencies and excesses; acute

[1]OPS/OMS. «Seguridad alimentaria en las Américas». Available in http://www.paho.org/hia/home.html Accessed 17/11/2016.

and chronic morbidity; limitations in academic performance and in adults' productivity; as well as mortality in all the age groups are some of the short- and medium-term expressions of food and nutritional insecurity, whose later manifestation is human underdevelopment.

Valencia-Valero and Ortiz-Hernández (2014) report some of the most widely used instruments in Latin America to measure accessibility to food; thus, the food consumption basket or family shopping basket serves to establish global food supply amounts, and constitutes one of the essential components along with income information to establish poverty lines. Another indicator used to measure such accessibility is the so-called consumer price index; it is used to measure the changes, in time, of the general price level of the products and services that a population group uses, acquires or purchases for consumption.

As incomes increase, initially the proportion aimed at food products, which is frequently up to 80 %, remains stable. It is assumed that when the food needs are satisfied, the expenses start decreasing and it can be considered that this is the point at which food security starts. Finally, the food expenses tend to stabilize around 30 % when feeding stops posing problems (FAO, 1990).

The objective of this study was to determine the food accessibility in two rural municipalities of Matanzas province, Cuba, from the offers of the different agricultural products of the market.

Materials and Methods

The work was conducted in the Martí and Colón municipalities[2], of Matanzas province, during August, 2015. The markets in both municipalities were characterized by the absence of refrigeration or air conditioning equipment, and the merchandise was exposed to ambient conditions on wheelbarrows or counters.

The Martí municipality is located in the northeast of Matanzas province; it limits to the North with the Florida Strait, to the South with Perico and Colón municipalities, to the East with Villa Clara province and to the West with Cárdenas municipality. The main economic activity is animal husbandry-forestry, which is concentrated in the Martí Animal Husbandry Enterprise, Martí Food Crops Enterprise and Matanzas Integral Forestry Enterprise; besides having a pig production enterprise.

Colón municipality is geographically located in the central-eastern portion of Matanzas province; it limits to the North with Martí municipality, to the South with Calimete municipality, to the East with Los Arabos municipality and to the West with Perico and Jagüey Grande municipalities.

The total geographical extension of Martí is 101 225,87 ha (1 012,25 km^2); while Colón has 597,46 km^2. Both municipalities have roads that link their most important urban and agricultural areas.

The population of Martí municipality is distributed in 25 settlements, four urban and 21 rural ones. The total population represents 3,9 % of the total in the province. The urbanization degree is 54,1 %. At present it has a population of 22 305 inhabitants, from which 51,5 % are men and 48,4 %, women. From the population 60,3 % lives in urban zones and 39,7 % in rural areas.

The fundamental economic base of the municipality is supported on the agricultural activity, which explains that 54,5 % of all the entities belong to this sector; while 18,2 % belongs to the industry (salt industry and rice mill) and 27,3 % to the local organs of People's Power (commerce and gastronomy, food elaboration, and services for the population).

The population of Colón municipality is distributed in 47 settlements: seven urban and 40 rural ones. The population represents 10,1 % of the total population of the province. The urbanization degree is 82 % and it has a population density of 115,99 inhabitants per square kilometer. At present it has a population of 70 396 inhabitants, from which 49,7 % are men and 50,3 %, women. From the population, 79 % lives in urban zones and 21 % in rural areas, from the latter only 2 % is scattered. The main population nucleus is Colón city, with 63 % of the total population.

The economy of Colón municipality is based on the agricultural and agroindustrial activity. Within the territory industrial treatment is given to sugarcane, fruits and vegetables; to cattle, pig and poultry slaughter and distribution; as well as to milk processing.

Characteristics of the population sample. In each municipality surveys were made to consumers and farmers, and sale points of agricultural products

[2]The data of the municipal characteristics were obtained from CITMA, the municipal museum, and from institutions of the territorial governments.

were visited to know the availability of different products, the appearance frequency in the market and causes of their acquisition or not according to the consumers' and farmers' perception.

To conduct this work, a total of 100 persons were surveyed in each municipality, including farmers and consumers who were represented, proportionally, in 100 % of the people's councils (6 in Martí and 10 in Colón).

Results and Discussion

Table 1 shows the main nutrient sources of some foodstuffs, and from them the most frequent in the market offer of Martí and Colón municipalities.

From the 55 particularly nutritious products indicated by FAO (table 1), 14 were present in the market of the studied municipalities. This could be interpreted as the total absence of an important group of necessary products in Cuban markets; however, it should be considered that the stores that charge in Cuban convertible pesos sell many of these products, but with prices which, in general, are only affordable by a small part of the population. Some products such as oil, sugar and rice are offered in a limited amount to all family units with state subsidies, which, although not satisfying the needs, relieve the families with lower incomes.

Figure 1 shows the most offered products, per item. Vegetables occupied the first place, with more than 30 % of the total offer; followed by fruits and roots and tubers, with 21 and 19 %, respectively; afterwards, with 10 %, were meats, followed by rice with an offer of 5,6 % with regards to the total. Beans occupied the last place, with only 3,4 %.

The highest offer corresponded to vegetables (roots and tubers and vegetables), which had the

Table 1. Foodstuffs rich in different nutrients, offered in the market during August, 2015♦

Energy	Protein	Fat	Vitamin A	Vitamin C	Iron
Corn	Meats	Fat	Spinach	Orange	**Meats**Δ
RiceΔ	Fish	Oils	Chard	Mandarin orange	**Liver**Δ
Wheat	**Beans**Δ	Mayonnaise	Green	Lemon	Kidneys
Barley	Soybean	Butter	leaves	Grapefruit	Legumes
Potato	Milk	Tallow	Squash	**Guava**Δ	Spinach
Sweet potatoΔ	Eggs		Carrot	**Pineapple**Δ	Chard
TaroΔ	Chickpeas		**Tomato**Δ	Tamarind	
CassavaΔ	Yoghurt		**Mango**Δ	Passion fruit	
Green plantainΔ	Cheese		**Papaya**Δ		
Sugar	Amaranth		**Banana**Δ		
Sweets	Quinoa				
Fats	Dry pea				
	Dry fava bean				

♦According to FAO (2001).
Δ Most frequent foodstuffs

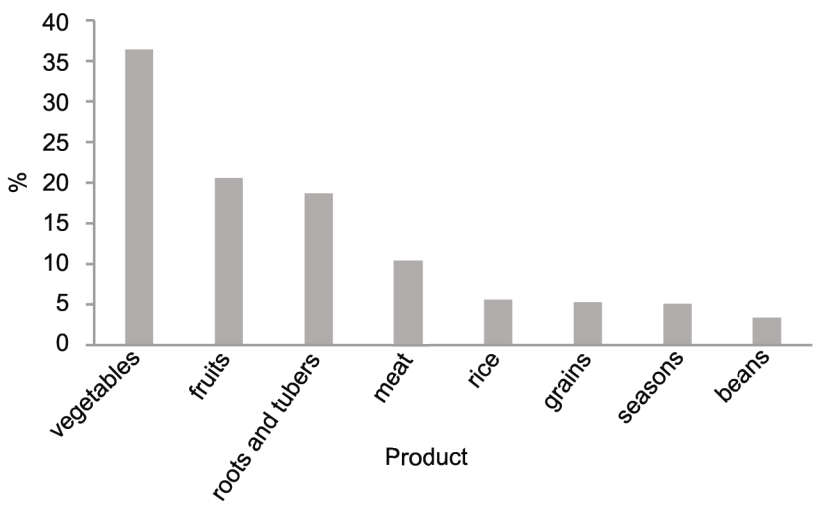

Figure 1. Percentage of the products offered per item.

lowest prices, favoring that they were the most purchased ones, followed by rice and beans in spite of their comparatively high relative prices and lower offer; this reaffirms the food preferences and feeding habits of this population (table 2).

Table 2. Most acquired products in the market (number of people, from the sample of 100, who acquired the products).

Indicator	Colón	Martí	Total
Tubers	45	40	85
Vegetables	48	22	70
Rice	20	48	68
Beans	29	22	51
Fruits	16	13	29
Pork	13	12	25
Taro	12	5	17
Peas	0	4	4

Beans consumption is very important because it can substitute, in some meals, the consumption of animal products, since beans contain an equivalent amount of proteins. If they are consumed (as it is the Cubans' habit), along with rice, the biological value of the protein mix is remarkably increased (MINSAP, 2009).

Porrata-Maury (2009) reported the results of a diet survey applied to the Cuban population considered urban, which comprised the 14 provinces; fruits (20 %), vegetables (38 %) and milk products (45 %) were the least consumed food groups, compared with the recommendations. On the other hand, food fats and meats and their substitutes were the most consumed foodstuffs, which suggests that feeding habits have changed in cities with regards to rural zones.

Nevertheless, it is known that feeding is one of the elements which have experienced deterioration in recent years, mainly due to limitations in the total availability of food goods. This availability meant globally, in 1995, a supply of food energy equivalent to 91 % of the calories established by the nutritional requirements of the basic Cuban food basket. The gap with regards to the recommendations in terms of proteins and fats is also important (Ferriol, 1997), and all this could have influenced changes in food culture. In fact, food security in Cuba is not consolidated, which is shown in the statistics; they indicate that food production in 2013 decreased by 20 % and that the prices of the foodstuffs that the country is forced to import to balance the nutritional scale increased by a similar proportion (Couceiro, 2007), all of which influences the quality of the diet consumed by the population (Crovetto *et al*., 2014). The weight excess affects one fifth of the Cuban population, a trend that seemingly will not be attenuated, at least in the next years; and cancer has replaced cardio-and cerebrovascular diseases as the main cause of morbidity and death in almost the whole country (Santana-Porbén, 2014).

The most acquired products in the market (table 2) showed that the preferences are maintained in the population's consumption culture of these municipalities, although vegetables moved to the first place because of the offer and prices; however, rice and beans with lower offer and higher price are included. The last choice was meat, due to its high prices. The higher acquisition of roots and tubers and vegetables with regards to rice and beans is due to the fact that they are the cheapest products, especially plantain, sweet potato and cassava. Machado-Martínez (2001) developed a participatory diagnosis in Martí, which proved that the salary proportion dedicated by the family to food was 70 %, value that FAO classifies as of food scarcity. Although the mean salary has been increased since then, it is still far from satisfying the family's needs.

At national level, the most sold products (data from 2009), according to the ONEI, were: plantain, 26 %; sweet potato, 21 %; tomato and squash, 10 %; while rice occupies sixth place with 6 % and beans, eleventh place with 2,1 %. Fruits occupied tenth place with 2,3 %, which shows the unbalance that still remains regarding quality, variety and preference in the population's food.

In that sense, figure 2 shows that the offer of products was low (31 products), and it was detected that in most people's councils not all of them were present (table 3). For the population to have access to a balanced diet, the productions should be aimed at that purpose, and preference should be given in prices and other policy instruments to the most necessary products.

With regards to the physical access to foodstuffs, it is difficult to make an accurate characterization of the closeness to «nutritional foodstuffs», because it is influenced by factors such as transport availability, conditions of communication ways and individual travel patterns, that is, the relative location of the home and the workplace (CONEVAL, 2010). After having the availability and price, then one can know how easy it is for a consumer to have physical access to foodstuffs.

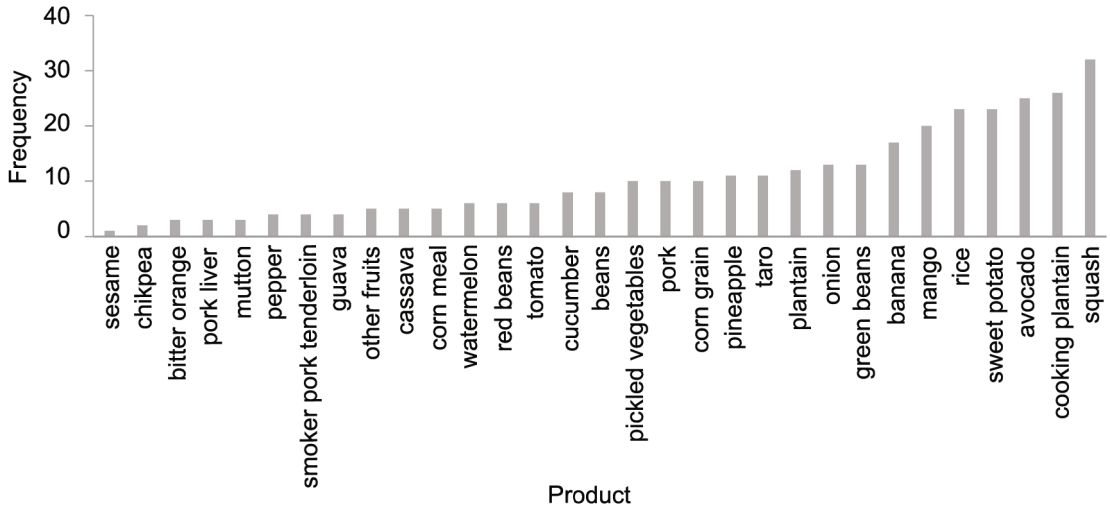

Figure 2. Frequency of the offers of the most common products.

Table 3. Offer per people's council and mean calculated by the number of sale points (N = number of total products offered in the market in each people's council)

People's councils	N	Mean
Martí municipality		
Martí	63	9,65
28-Oct.	13	4,38
Itabo	15	5,4
Esteban Hernández	24	12
Carlos Rodríguez	4	4
Hoyo Colorado	19	6,47
Colón municipality		
René Fraga	16	16
Colón Oeste	25	6,68
Colón Este	141	23,55
Colón Sur	10	5
Zona industrial	39	19
Sergio González	9	9
Guareiras	24	8
Banagüises	11	6,09
Total	413	14,64

The cost of foodstuffs is one of the main factors that determine their election, which is shown not only in the quantity, but in the quality of food, when families try to lower expenses in this regard (Antentas and Vivas, 2014; Ayala-Gaytán and Díaz-Durán-Hernández, 2015). It has been observed that the population groups with low incomes have a higher trend to follow unbalanced feeding, and ingest few fruits and vegetables. Nevertheless, in some studies in European countries it was proven

that the fact of having higher amounts of money is not necessarily translated into higher quality feeding, although the food variety should increase (Lee, 2013).

The accessibility to commercial centers is another important physical factor that influences food election, and depends on such resources as transportation and geographical location. When available in towns and cities, healthy foodstuffs tend to be more expensive than in supermarkets (Dip, 2014).

Herrera-Cuenca (2011), when reviewing seven works related to food sales, found that the closeness of the sale was extremely important for food acquisition, and that food offer was determinant, because one cannot acquire what cannot be found on a sale shelf. Likewise, the sales that offered some kind of educational element promoted more the knowledge about health in the population; and, finally, the inequality factor in the offer among the markets of the most affluent zones with regards to the least economically favored zones was shown, because the difference in quality is important to the detriment of the most unprotected neighborhoods. Similar results were obtained by Pérez *et al*. (2013).

Precisely, one of the aspects stated by consumers in this study was the remoteness of the sale points with regards to households, taking into consideration that there is little density of points and rural transportation is very deficient in both municipalities, which banishes the possibility of product acquisition, even when there is money available or the prices are lowered.

The productive results of the studied municipalities were limited by the severe drought that affected Matanzas province in 2014. According to a report emitted by the Meteorology Institute and published in its website, on Friday, September 4 of that year, the country went through a critical situation with the rainfall cumulative value. Among the provinces with the most significant deficit of those classified with extreme and severe drought was Matanzas. The semester November, 2014-April, 2015, was reported among those with higher affectation, situation that was stressed in the trimester May-July, 2015, in which from the 10 municipalities classified as the ones with higher deficit in the country (from 124 in that category), 7 were from Matanzas and one of them was precisely Colón.

Nevertheless, it can be stated that the response capacity to this risk factor was high, if it is taken into consideration that Matanzas has the highest richness of underground waters of the country, for which the problem is of irrigation infrastructure. Soil agroproductivity is very good in Colón and acceptable in Martí; however, the soil surface dedicated to non-food crops is critical. In this sense, from 40 cooperatives between the two municipalities 25 are dedicated to sugarcane cultivation, from them 20 in Colon, which explains the lower production capacity of this municipality with regards to Martí; this, according to PMA (2001), would constitute a high risk factor for food vulnerability. The need to find alternatives for the increase of food crops would prevail. Nevertheless, the agricultural sector in Cuba has problems such as: low productivity, unutilized land resource, imperfections of the food markets, and insufficient dynamics in its productions, among others (García-Álvarez and Anaya-Cruz, 2015), which increase food vulnerability.

Another negative aspect with regards to food security is the food outputs of the municipality (figs. 3 and 4), which in many cases exceed 50 % of the total volume of their sales. There is a large volume of beans going out of the municipality, which affects the inhabitants' accessibility. This situation also occurs because of the absence of an entity that organizes and stabilizes the productive chain, due to the lack of realization of ownership in the agricultural sector, lack of complementarity relation between the market and planning, and the lack of systemic character in the reorganization measures of agricultural production, as stated by Nova (2014; 2016) and Suárez-Castellá *et al*. (2016) in different forums and published works.

Esqueda and Paolini (2014) stated that there is a strong link of welfare perception with foodstuffs and the possibility of finding them. This leaves room for later studies that allow to determine how the absence of preferred foodstuffs can negatively impact the welfare perception. The authors report that the relevance of feeding and the importance acquired by the understanding of the concept of welfare, associated to the consumption of goods or products, require higher research efforts about the relation that could exist between both of them. The results of this approach show that feeding, particularly the presence of certain foodstuffs in the diet, has direct incidence on the perception of need satisfaction, happiness and, definitely, welfare.

It can be concluded that the offer of food products accessible for the population of Martí and Colón is still poor in quantity, quality and variety. Nevertheless, production in these municipalities can be solved by two ways: on the one hand, giving

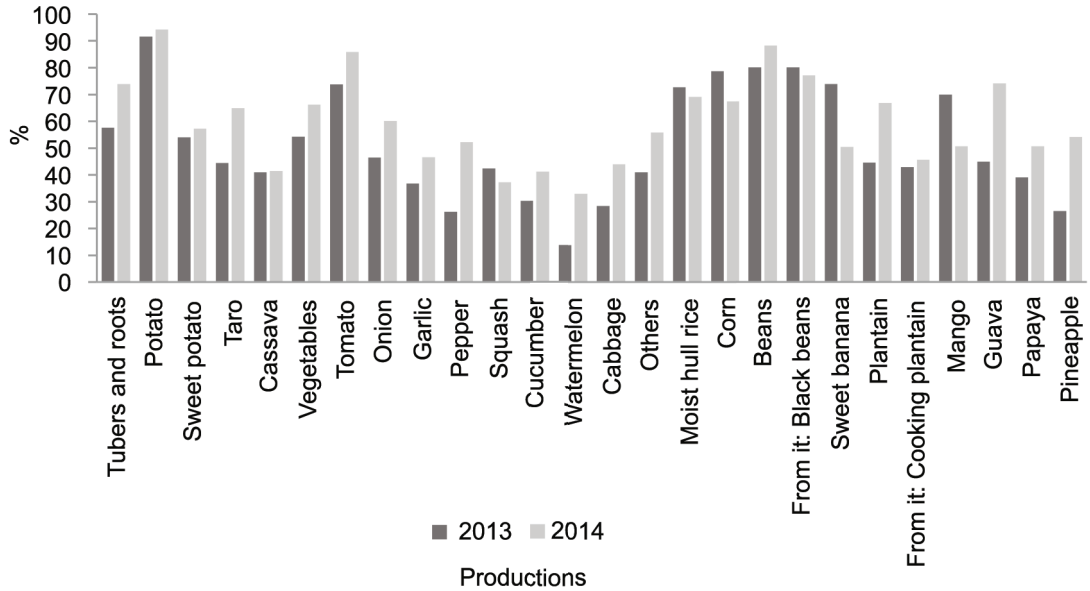

Figure 3. Percentage of productions going out of the municipality with regards to the total sales.

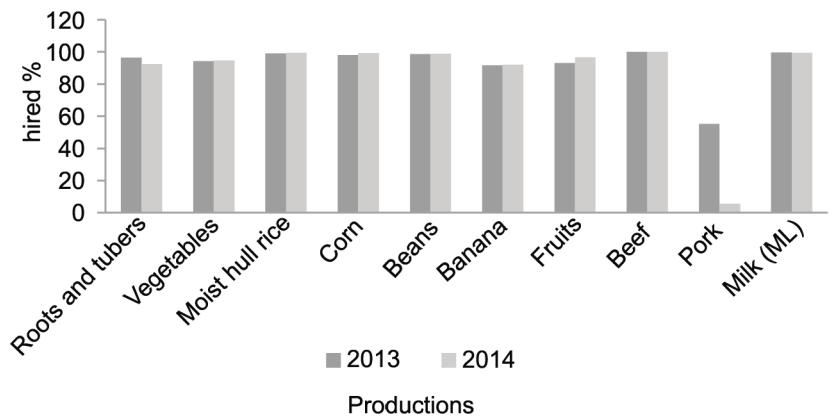

Figure 4. Hired productions in the Martí municipality

priority to the quantity of foodstuffs that satisfies the demands; and, on the other hand, increasing production, accompanied by variety and quality through the installation of irrigation infrastructure and utilizing idle or weakly used lands, as well as by means of the reorganization and stabilization of the chain. There is response capacity to the food vulnerability risks in both municipalities.

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