International Journal of Innovation and Scientific Research
ISSN 2351-8014 Vol. 15 No. 1 May 2015, pp. 88-94

http://www.ijisr.issr-journals.org/

MARKET GARDEN PRODUCE CONSUMPTION IN LUBUMBASHI: A COMPARISON BETWEEN TWO TYPES OF CABBAGE

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ABSTRACT: The food value and the socio-economic importance of vegetables explain their increasing importance in urban agriculture at Lubumbashi. This research is preliminary study on the consumption of vegetables. Its objective is to compare the consumption of two types of cabbage, namely Chinese cabbage and head cabbage. To attain that goal, a survey was conducted between June and July 2014 among households of Congo district in the Rwashi *commune* (municipality), and in Kabecha district and Bel-air II in the Kampemba *commune*. The results reveal that for the majority (50%) of households surveyed, household size varies between 5 and 7 persons. For 60% of households, their monthly income varies between 100 and 200 US$. As for consumption, 73.5% of households consumed vegetables frequently (2 to 5 times per week). 73% of households had chosen Chinese cabbage because is cheaper than head cabbage and always available on market, whereas 27 % affirmed that head cabbage is the best for their consumption because is good for their health and smells good. However, 80% of households affirmed to prefer head cabbage to Chinese cabbage for its taste. These results constitute an incentive message to local farmers to orientate their production according to the preferences, needs and the appreciation of consumers. One limit of this study is that the sampling has not been wide so that its generalization can be inferred for all of Lubumbashi. Secondly, neither the quantity of cabbage consumed nor the parts of income allocated to purchase it have not been determined.

KEYWORDS: Track farming, consumption, Chinese cabbage, Head cabbage, income, households.

1 INTRODUCTION

The problems of hunger and malnutrition in urban areas force the population to exploit all food resources available [1]**.** In Africa, vegetables form an important part of the diet in just about every household[2] The food values, therapeutic and socio-economic value of vegetables explain the increasing importance that their cultivation takes in current agricultural economics, particularly in cities.[3].Their positive impact on the poor people is noted through the consumption of market garden produce[4] and their contribution to food security and balanced diets[5],[6],[7]. In the Democratic Republic of Congo (DRC), truck farming has become widespread in the towns like Kinshasa and Lubumbashi and proves to be an effective means to reinforce food security in urban areas. According to the [8], each year 150,000 tons of vegetables are grown in and around towns to supply fresh, nutritious produce, particularly rich in essential vitamins and minerals, to 11.5 million urban residents. However, vegetable consumption is still below FAO/WHO minimum recommended intake of 400 g per head per day, whereas vegetable consumption decreases factors of cardiovascular disease and some forms of cancer, the two leading causes of death in the world today[9].

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Table 1. Nutritious Values of some vegetables

Vegetables	Nutritive values %				
	Protein	Water	Lipid	Carbohydrates	Calories(kg)
Onion	1.93	87.05	0,17	21.58	95
Tomato	0.6	94.1	0.11	3.35	176
Cabbage	1.73	91.07	0.2	3.82	288
Cucumber	0.46	96.01	0.11	0.81	63

Source: M. Kakonde and E. Tollens ,2001], quoted by [10]

These nutrition values play an important role in health maintenance due to their protective properties. In Lubumbashi town, there are various leaf vegetables grown and available on markets: kale, Sweet potato leaves, head cabbage, Chinese cabbage, amaranth, marrow leaves, cassava leaves, and sorrel... As elsewhere in world, cabbage is a widely consumed leafy vegetable, used mainly in salads, as a fresh food item, but also boiled in soups or cooked with other foods. It is suitable for processing into products such as sauerkraut[11],[12],[13] It is most often used in various soups/sauces eaten as accompaniments with starchy staples like maize mush, cassava mush, yams and rice [14],[15][5]. Several studies led in Lubumbashi by [8] and[16] highlighted the importance of vegetables in food safety but few of them paid attention to preferences and the choice of cabbages for consumption in households. This study is the third part of research carried out on cabbage channels. The first focused on production, the second on marketing, and this last aims to compare the consumption of two types of cabbages in Lubumbashi. More specifically, it is a question of showing the characteristics of consuming households, by providing explanations as to which type of cabbage is more consumed and appreciated by households in the town of Lubumbashi.

2 MATERIELS AND METHODS

2.1 STUDY AREA

Lubumbashi, the administrative capital of Katanga province, is located in the southeast of the Democratic Republic of the Congo, at an altitude ranging from 1220 to 1240 meters and covers an area of some 747 km². Named Elisabethville in homage to Queen Elisabeth, the city received its official recognition in Order n°20 of 16 November 1910 according to Dibwe dia Mwembu quoted by [17] The local climate corresponds to the Cw category in the Köppen classification and is characterized by a wet season from November to April and a dry season for the rest of the year [Malaisse, quoted by [18]]. The city of Lubumbashi celebrated its centenary year in 2010. It is one of the cities created under the colonial regime as a site of administrative and economic interest, whose dynamism led to its growth both in demographic and spatial terms. Indeed, Lubumbashi's demographic growth is not a result of the natural demographic growth of households but a phenomenon brought about by internal and international migration.[17]. This demographic growth coupled with poverty led people to food insecurity. To face this situation, the development of urban agriculture has been a strategy of low-income people through the whole city to get money and assume routine responsibilities such as education and feeding. Already In 2008, one could count 31 market-gardening sites disseminated in and the around the *communes* of Lubumbashi town occupying approximately 460 ha [19]

2.2 MATERIALS AND METHODS

This research is the preliminary study on the consumption of vegetables in Lubumbashi. The methodology used in this study took inspiration from two major studies on leafy vegetables carried out by[20]and[21]. A survey was conducted between June and July 2014, proceeded by two surveys on production and marketing of market garden produce in Lubumbashi. A random sampling of 90 households consumers of vegetables were interviewed to learn their opinions on cabbage consumption, with three sites selected: Congo district in the *commune* of Rwashi, Kabecha District and Bel-air II in the Kampemba *commune*. The choice of study sites was on the basis that these households have cultivated, commercialized, and consumed the vegetables especially cabbage. The materials used were questionnaire and pen. The information was relative to household size, income, frequency of cabbage consumption, opinions on cabbage consumption, and general appreciation. Data collected were subjected to analysis by simple percentage presented on graphs. Limitations of this study

include that it has not been easy to determine precisely the incomes of households surveyed, nor the part allocated to purchase vegetables, in particular cabbage, neither the actual quantities. In the current context of the city of Lubumbashi, the majorities of heads of households met are not employed officially but rather work in the informal sector where they have multiplied various sources of income which require further research. As said above, this is a preliminary study on vegetable consumption. The present sampling may not reflect the reality of the entire city of Lubumbashi.

3 RESULTS AND DISCUSSION

What the African communities eat can be viewed in the context of the diverse socio-cultural and economic environments [7]. The results discussed here are related to the size households, income, frequency, appreciation and preference consumption of cabbage in Lubumbashi.

3.1 SIZE OF HOUSEHOLDS CONSUMERS OF CABBAGES IN LUBUMBASHI

The demand for food products depends on the number of people in the household. According to[22], four elements are to take into account for household structure: the size of the households, the number of children in the family, the sub-households, as well as the number of people supported within the households. In 2009, [23] found households averaging of 5,2 persons in Katanga. The results of [24] revealed that households of large size in D R.Congo were increasingly poor.

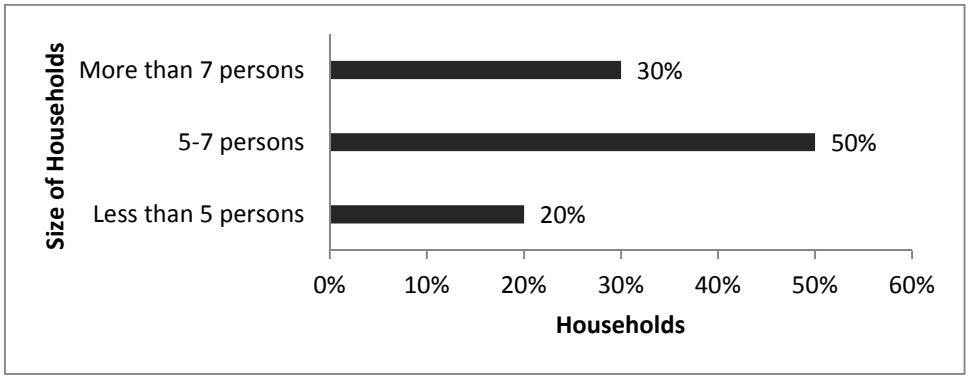

Fig.1. size household's consumers of cabbages

The above graph shows that for 50% of households surveyed, their size varies between 5 and 7 persons, 30% have more than 7 persons and 20% less than 5 persons. This result reveals households are relatively large. Similar trends of household size have been observed in many zones of Africa. In Imo state (Nigeria) [25] found that the mean household size of the farmers was approximately 6 persons with 63.30% and 28.30% of the farmers having household sizes of 1-4 persons and 5-8 persons respectively. The perception and apprehension of the household size seems to be different in town and in rural areas. In rural areas for example, when the household is large this implies significantly the availability of family labour[25],[26] whereas in town it means principally high food expenditures if everyone can not contribute to household income.

3.2 INCOMES OF CONSUMERS OF CABBAGE

Even if this study does not focus on income as a determinant of Household demand for vegetables as established by [27], we nevertheless present the ranges of incomes of households surveyed in order to perceive if it can enable them to access food of good quality, more especially as it is known that the demand for food products depends on their purchase from household income[28]). A lack of adequate income has been an established cause of inadequate food intake in New Zealand [29]. In Zimbabwe, there is inability to acquire food from the market because of inadequate household incomes and/or unreliable markets that deliver food at a very high price [30**]**. Consumer preferences are influenced also to an extent by income available to the household [2]

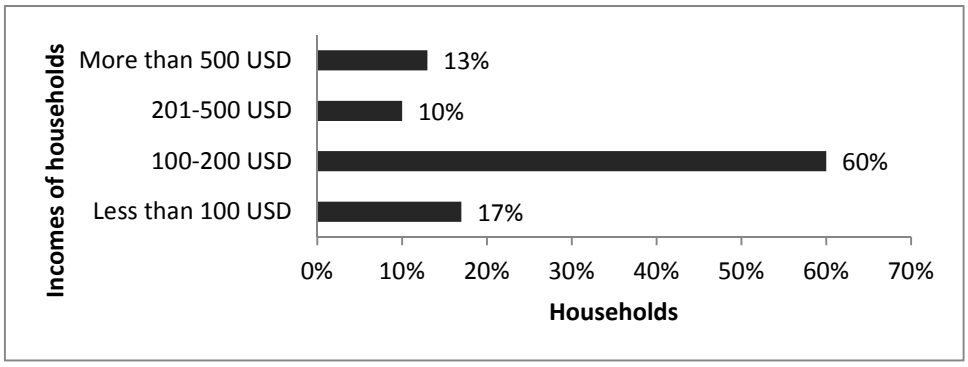

Fig 2. Incomes of households

The **fig.2.** shows that most households surveyed (60%) have income between US$ 100 and 200. For 17% of households, income is less than US$ 100, whereas few households (10%) obtain income between US$ 201 and 500 and only 13% more than US$ 500. Similar results have been reported in Lubumbashi in a study on risk of death and economic accessibility to dialysis therapy for the renal insufficient patients in Lubumbashi [31] which indicated that patients' declared monthly income was US$ 205 for 52.8% of patients, US$ 525 for 34% patients and US$ 750 for 13.2% of patients. The DR Congo belongs to the category of low-income countries where vegetables (46%) are among of the foods for which the main source is household production [32]. Although growth has been positive since 2002, per capita income, estimated at US$ 180 in 2011, is below that of the late 1980s'. 71,3% of the population continue to live below the poverty line [33]. Given that households have to make different expenditures related to food, health, schooling and house rent, these incomes reported on **fig 2** are less than household needs as reported by 75.4% of households surveyed. A study led by [34] on the characteristics of urban food insecurity in three *communes* of Kinshasa, showed that money spent on vegetables was important. The monthly cost of vegetable accompaniments is around US$ 50 in Limete, US$ 34 in Ndjili and US$ 25 in Makala.

3.3 VEGETABLE CONSUMPTION

AT WHAT FREQUENCY ARE VEGETABLES CONSUMED?

Vegetables are important in the diet because they provide vitamins, including vitamins A, C and folate plus minerals including, iron and magnesium; proteins; they are also good sources of fiber [7]. There are various leafy vegetables consumed by households in Lubumbashi., but mainly cabbage, amaranth, sweet potato leaves and cassava leaves. The results of this study indicate that 73.5% households surveyed consumed vegetables frequently (2 to 5 times) and 26.5% consumed them 1 to 2 times per week. Quantity varies according to the size of the household, the price and of the nature of the vegetable. Similar results have been reported in Yaoundé where on average the population consumed vegetables 2 to 4 times per week [20]. Head cabbage was consumed once a week for 82% households. In general, vegetable consumption, especially cabbage, is less in bachelor households. This situation may be explained by the fact that urbanization has greatly influenced Africans' feeding habits, especially among the young. In urban areas, food habits consist of high consumption of processed foods and snacks [7]; also vegetables take long to prepare. For example, cassava leaves must be pound before being cooked. Cabbage must be cut in small or large parts before being cooked or eaten raw.

WHICH TYPE OF CABBAGE IS MORE CONSUMED IN LUBUMBASHI?

Several reasons make that Chinese cabbage is more consumed in Lubumbashi. First, Chinese cabbage is a popular vegetable with many benefits. For growers it is the short cultivation period, and for consumers its high nutritional quality[35]. In the same way,[36] noted that the possibility of producing Chinese cabbage three or four times per year from a field determines its availability on the market all the time. whereas headed cabbage is produced twice per year and it is thus more expensive than Chinese cabbage. Most households surveyed made a choice between the two types of cabbages (**fig3**) conditioned by reasons suh as cost, taste, and availability. In urban areas of East Africa, head cabbage is likely to be encountered more often in households with above average disposable incomes[2]. In Nigeria, the secondary factors that influenced vegetable consumption were availability and price for 43.8% of households.[7]

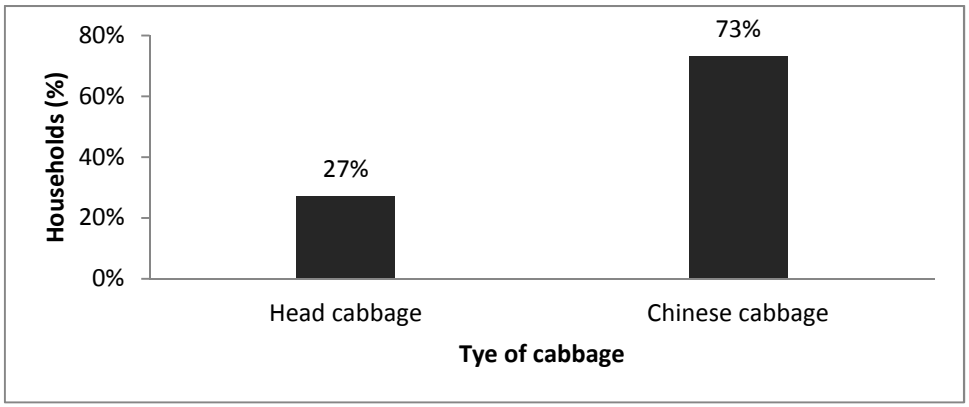

Fig 3. Household's opinion on consumption of cabbage

Chinese cabbage is the more consumed in the area of this study. 73% of household surveyed chose it because is cheaper than head cabbage and always available on the market whereas 27% affirmed that head cabbage is the best for their consumption because is good for their health and smells good. The other reason is that some urban producers of Chinese cabbage are also consumers in Lubumbashi. In Kenya, in her research on African leafy vegetable, [21] noted that farmers were at the same time growers, sellers and consumers of vegetables. According to [27], being a farmer could increase likelihood of consumption of fresh fruits and vegetables. There is a great disparity in the quantities consumed in various types of vegetables, but the food practices and the appreciation of the consumer are determining too.[37]

3.4 WHICH TYPE OF CABBAGE IS MORE APPRECIATED?

Consumer preferences are influenced to an extent by culture, traditions and income available to the household.[2]. In USA, fresh head cabbage accounts for 35% and its Consumption has increased since from 1970 to 200[38] because it may be preferred and appreciated by consumers. The Diversification of diet which is good for health, the preference of family members, smell after cooking were and taste were the main reasons for consuming vegetables and factors that increased satisfaction [20].

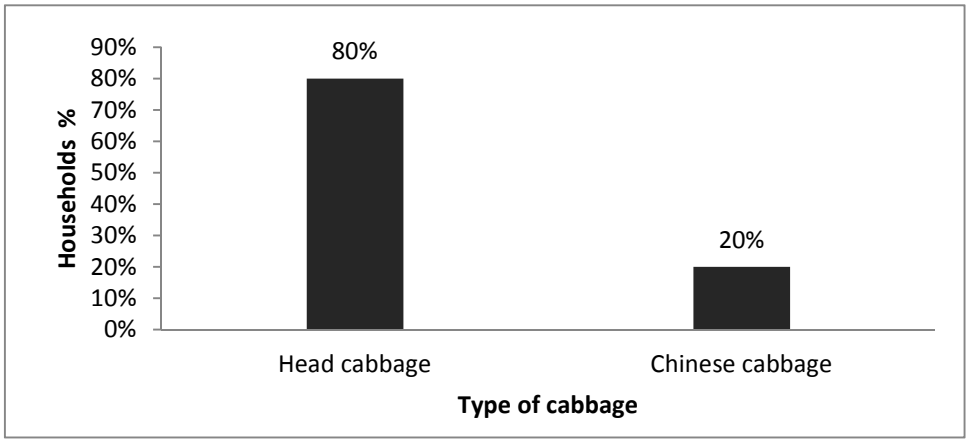

Fig 4. Household opinion on cabbage preference

The **fig.4** above shows that the majority (80%) of households surveyed prefer head cabbage to Chinese cabbage (20%). This is mainly due to head cabbage tasting good and can be utilized in various forms. A woman surveyed at Hewa Bora in Lubumbashi was more eloquent: "We use head cabbage for salad, it smells very good and does not hide insect inside and thusis liked by my children. Unfortunately it is not available all the time." Other researchers have found that the cost of food items and the seasonal availability of some vegetables to be the two main deterrent barriers limiting adequate consumption [39]. Recently, [36] noted that in addition to the consumption of head cabbage by people, the old leaves are served to domestic animals such as rabbits. However, in spite of the relatively high consumption of vegetables at Lubumbashi, there are reasons to worry about the quality of vegetables produced and sold in Lubumbashi at this period of development and the growth of mining activities. On this subject, recent research by [40] indicates that vegetables and fruits present in their

tissues high levels of trace metals which can lead to public health problems. In consideration of this, it is required to clean vegetables properly with abundant water two or three times before cooking or eating.

4 CONCLUSION AND SUGGESTIONS

Availability, price, preference and taste determine market garden produce consumption in Lubumbashi. The results of this study reveal that households consume more Chinese cabbage than head cabbage. This has been explained by the fact that the Chinese cabbage is always available and remains less expensive. If head cabbage would always be available and with a reasonable price, it would be more valued for reasons of taste. The promotion of home vegetable production, especially of the two types of cabbage, could be a potential strategy to increase consumption in low income households. However, given that the risks of trace metal contamination were evaluated in certain vegetables produced locally at Lubumbashi, producers and consumers must take appropriate recommended measures in food hygiene to remain healthy.

ACKNOWLEDGEMENT

The authors thank Professor Jeff Hoover of UNILU for having corrected and made the paper clear and Birindwa patient for having taken part on surveys.

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