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Characterizing demand for domestic versus imported chicken in developing countries: the case of Haiti and Cameroon

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Characterizing demand for domestic versus imported chicken in developing countries: the case of Haiti and Cameroon

Abstract

Since the beginning of 2000s, imports of frozen pieces of chicken from the European Union or Brazil have considerably increased in several African and Caribbean developing countries, competing with local chicken meat. Obviously, imported chicken has replaced domestic one in households' consumption. The level of substitution between imported chicken and the several domestic chicken types is not specifically known. In order to focus on this point, investigations have been done in 2005 in Yaoundé (Cameroon) and in 2006 in Port-au-Prince (Haiti). Because of a lack of available statistical data, we surveyed 180 urban households in each country, showing that imported frozen pieces of chicken have widely substituted for the local chicken which has already quite disappeared in Port-au-Prince, but is still appreciated by Yaoundé consumers. This article aims to assess the impacts, on such an evolution of i) socio-economic features of consumers and ii) of chicken consumption habits of households. Without data on income, and to deal with a large number of qualitative variables, we implemented multiple correspondence analyses to build asset indexes usable in our econometric regressions.

Keywords: Chicken, urban consumption, developing countries, household's characteristics, Cameroon, Haiti

JEL classifications: Q18, Q17, D12

Déterminants de la demande de poulet domestique versus importé dans les pays en développement : le cas d'Haïti et du Cameroun

Résumé

Depuis le début des années 2000, les importations de volaille congelée en provenance d'Europe et d'Amérique se sont considérablement développées dans plusieurs pays en développement d'Afrique et des Caraïbes, concurrençant les productions locales de poulet. En revanche, le degré de substitution, dans la consommation des ménages, entre le poulet importé et les différents types de poulet produits localement, est mal connu. De façon à préciser cet aspect, et du fait du manque de données statistiques à ce niveau de précision, des enquêtes ont été menées, en 2005 à Yaoundé (Cameroun) puis en 2006 à Port au Prince (Haïti), auprès de 180 ménages urbains dans chaque pays. Les résultats montrent que les découpes importées de poulet congelé se sont effectivement largement substituées au poulet local : ce dernier a presque disparu à Port-au-Prince, mais reste apprécié des consommateurs à Yaoundé. Cet article approfondit la question des déterminants de cette évolution en évaluant le rôle joué d'une part par la situation socio-économique des ménages urbains, et d'autre part par les modes de consommation de poulet des ménages. De façon à prendre en compte les très nombreuses variables qualitatives, les régressions économétriques utilisent des variables synthétiques continues construites sur la base d'analyse des correspondances multiples.

Mots-clefs : Poulet, Consommation urbaine, PED, Ménages, Cameroon, Haiti

Classifications JEL : Q18, Q17, D12

Characterizing demand for domestic versus imported chicken in developing countries: the case of Haiti and Cameroon

1. Introduction

During spring 2008, several developing countries have known riots related to food prices increase on international markets –rice and other cereals, but also sugar and meat (FAO, 2008a, 2008b, 2008c). Food riots left forty dead in February 2008 in Cameroon (Yaoundé, Douala) and killed at least five people in Haiti (Port au Prince) in April 2008. Violent urban protests and demonstrations occurred in many countries in Africa, Asia and Latin America. That crisis reminds us that food security is not achieved everywhere, and reopens the debate about food dependence of developing countries on imports. That issue is not new. Cheyns and Bricas (2003) show that, to insure cities' food security, the urbanization speeding-up in poor countries is accompanied by the growth of food imports from international markets. Food imports actually compete with local production and may have repercussions on local eating patterns.

Since the beginning of 2000s, in order to let poor people accede to meat consumption, several African and Caribbean countries have opened their domestic chicken market to foreign imports, by reducing import tariffs. Thus imported frozen pieces of chicken from the European Union or Brazil compete with local chicken meat, causing the collapse of many poultry husbandry and the loss of many jobs in the local chicken food chain. But, the level of substitution between imported chicken and the several domestic chicken types is not specifically known. The aim of this paper is to analyze the competition between domestic and imported poultry meat in developing countries from the demand point of view, especially in urban areas. Because of a lack of reliable statistical data about households' chicken consumption in developing countries, we choose to survey urban households in two different towns: Yaoundé in Cameroon and Port-au-Prince in Haiti. Indeed, Cameroon and Haiti are both developing countries confronted with recent high increase of chicken imports, but differ by their geographical situation and level of development. In particular, their populations present significant differences in terms of poverty and undernourishment levels.

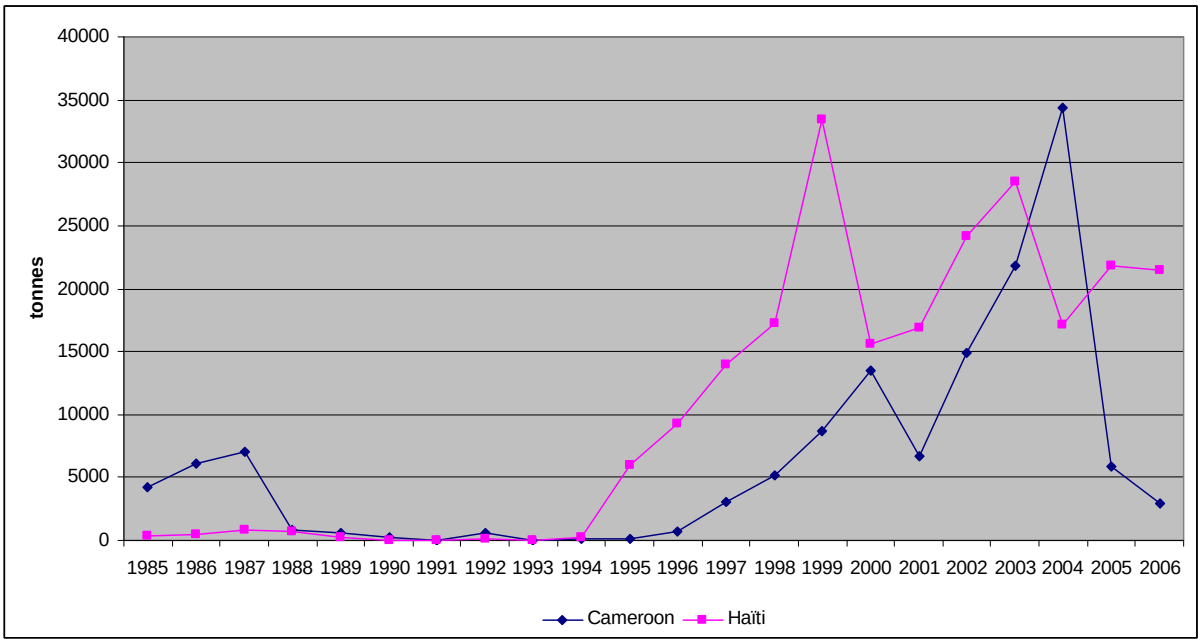
Before 1995, Cameroon *ad valorem* tariff on chicken imports was 20%[1]. Since the 1990s, in order to open the market and to allow poor people to afford meat consumption, Cameroon,

[1] which value added and phytosanitary taxes add to (17,5% and 3% respectively)

like other African countries, has classified poultry as essential foodstuffs. Hence, from 1995 to 2005, corresponding import tariff has been reduced to 5%, other taxes being unchanged[2]. During the same period, a large liberalization of trade exchanges has occurred in Haiti, in the frame of the implementation of Structural Adjustment Programs. In 1995, the last tariff reform instituted a simplified system with only six levels of tariffs: 0, 3, 5, 10, 15 and 57.8% (the last being only applied to gasoline). As a result, import tariffs on agricultural commodities, like poultry meat, decreased from 40-50% to 15% or less. Note that the actual Haitian tariff on poultry meat imports (15%) is lower than the WTO bound tariff (20%) (WTO, 2003; WTO, 2006).

Available FAOSTAT data from 1985 to 2006 about poultry meat Haitian and Cameroonian imports show that in both countries the liberalization of chicken import tariff coincides with a large increase of corresponding imported quantities.

Graph 1: Cameroon and Haiti imports of poultry meat, 1985-2006



Source: FAOSTAT

Concerning poultry meat production, because of a lack of consistent national statistics, FAOSTAT only provide estimated and regular figures for Cameroon and Haiti. Those data are in contradiction with NGO's and producer's associations' statements which denounce the

[2] Chambre de commerce, d'industrie, des mines et de l'artisanat (Ccima), 2005. Expansion du commerce intra- et inter-régional entre les pays de la CEMAC et de l'UEMOA. Cameroun : Etude de l'offre et de la demande sur les produits alimentaire. Yaoundé, Cameroun, rapport du CCIMA, Centre du commercial international CNUCED/OMC, 159 p.

competition between domestic and imported chicken (mainly from the European Union or Brazil and the resulting collapse of many poultry husbandry and the loss of jobs[3] in the local chicken food chain[4]). They notably recommend going back to the previous situation by reinstituting high level of border tariff protection against imports of chicken pieces. This position is reinforced by the frequent use of export subsidies on Brazil or European chicken supply, which are considered as unfair practices. On the other hand, during the same period, chicken consumption has increased in Haitian and Cameroon populations, leading to move near the recommended level by the World Health Organization en terms of animal protein intakes (Teleu-Ngandeu and Ngatchou, 2006).

Cameroon and Haiti differ by their geographical situation and level of development[5]. Cameroon is an African developing country, member of African-Caribbean-Pacific group. Haiti is located in the Caribbean-American area and is classified as one of the least developed countries in the world. Table 1 gives some economic reference data for Cameroon and Haiti. Those differences may impact on consumers' adaptation to the development of frozen chicken cuts imports.

[3] ACDIC (Association citoyenne de défense des intérêts collectifs) claims that 110,000 rural jobs have been lost in the Cameroon poultry industry, due to import surges (see L'importation massive de poulet congelé au Cameroun : état des lieux, enjeux et alternatives. Rapport d'études, 168 p., 2005). This figure has been also used by FAO (2006).

[4] see for example :

- Association civile de défense des intérêts des consommateurs, 2005 L'importation massive de poulet congelé au Cameroun : état des lieux, enjeux et alternatives. Rapport d'études, 168 p.
- Association citoyenne pour la défense des intérêts des consommateurs (Acdic), 2004, Poulets congelés, comprendre le phénomène au Cameroun.
- Chambre de commerce, d'industrie, des mines et de l'artisanat (Ccima), 2005. Expansion du commerce intra- et inter-régional entre les pays de la CEMAC et de l'UEMOA. Cameroun : Etude de l'offre et de la demande sur les produits alimentaire. Yaoundé, Cameroun, rapport du CCIMA, Centre du commercial international CNUCED/OMC, 159 p.
- FAO, 2006.
- Christian Aid, (2006) Libéralisation agricole en Haïti, Claire McGuigan, 59p.

[5] Besides, both countries have not been concerned by the avian pest during the period of study.

Table 1: Economic reference data about Cameroon and Haiti

	Cameroon	Haiti
Average population, (2003-2005)	17.408 millions	9.150 millions
Capital of the country and population	Yaoundé 1.2 million	Port-au-Prince 3.8 millions
Urban population share in 2007	56%	40%
Average annual growth rate of urban population (1990–2007)	+ 4.6%	+3.8%
GNI per capita (2007)	862 $	560 $
Population share under the poverty line (1.25$ per day) (2007)	33%	55%
Number of persons in a condition of undernourishment (2003-2005)	4.0 millions	5.3 millions
Population share in a condition of undernourishment (2003-2005)	23%	58%
Intensity of food deprivation [(a)]	230 kcal	430 kcal [(b)]
Meat supply in 2005 [(c)] among which : Bovine meat Chicken meat	13.46 kg/capita/yr 5.30 2.07	14.06 kg/capita/yr 4.73 3.27

[(a)] "The intensity of food deprivation indicates how much food-deprived people fall short of minimum food needs in terms of dietary energy. It is measured as the difference between the minimum dietary energy and the average dietary energy intake of the undernourished population (food-deprived). The intensity of food deprivation is low when it is less than 200 kilocalories per person per day and high when it is higher than 300 kilocalories per person per day. The greater the food deficit, the greater the susceptibility for health risks related to under nutrition" (FAO calculations).

[(b)] That is the highest score in the world

[(c)] FAO calculations [production + imports – (exports + other uses that human food)] in 2005 (i.e., the most recent available data)

Sources: FAO website[6]; CNUCED, 2008; World Bank website; UNICEF Website[7]

It is noteworthy that global meat supplies are quite identical in Cameroon and Haiti, whereas the levels of poverty and undernourishment are significantly higher in Haiti than in Cameroon. That suggests there is a real difference in terms of effective accessibility of poultry meat for households, according to their socio-economic features. In that sense, the comparison between Cameroon and Haiti is interesting. In that paper, we focus our study on urban households.

In both Cameroon and Haiti, a rapid observation of food markets shows that there are actually three types of chicken supplied to urban consumers (Awono Bessa, 2008):

- Rustic chicken, which is called "Villageois" in Cameroon and "Creole" in Haiti, is produced at family home, in only precarious shelter. In Cameroon, rustic chicken is most

[6] FAO website, http//www.fao.org/es/ess/faostat/foodsecurity

[7] UNICEF website : http://www.unicef.org/infobycountry/

often bred in rural areas, and it is sold alive directly to the consumer or via peri-urban markets after being collected at the village. In Haiti, one can find Creole chicken in urban market places. That chicken is especially used for religious (Cameroon) or voodoo (Haiti) ceremonies.

- Local flesh chicken, sometimes called “White chicken” in Haiti, is produced in semi-industrialized farms. Production chain, feeding, sanitary and veterinary follow-up are rationalized, and animals live in permanent structures. It is sold alive at traditional urban markets. That type of chicken has been, for few years, actually very hard to find in Haiti, whereas it still exists in Cameroon.

Rustic and local flesh chickens are essentially sold whole and alive. Consumers have to slaughter and clean it out themselves or pay a supplement for that. In some rare supermarkets in Yaoundé, one can find whole local rationalized flesh chicken sold ready to cook.

- Imported chickens are usually sold frozen and by pieces at traditional urban markets, supermarkets or fish shops which have freezer. One can also find few whole frozen chickens.

The survey aims to assess the respective role, on the evolution of urban households’ imported vs. domestic chicken consumption, of i) socio-economic households’ features and ii) chicken consumption habits. In particular, we aim to know to what extent imported chicken is considered as substitute to local chicken, or if this new available commodity has actually replaced local chicken in urban households’ demand. Do substitutions between domestic and imported commodities implemented by urban consumers differ in Haiti and Cameroon? Answers to those questions would help to assess the likely future trends in chicken consumption and suggest potential differentiated policy responses for each country.

In order to examine the determinants of food consumption, standard models of household consumption decisions, proposed by Samuelson (1956), or the implementation of Almost Ideal Demand System (AIDS) models are usually used because they are perfectly suited for making projections in terms of changes in households consumption expenditures. The standard household and AIDS models have been applied partially to Sub-Saharan countries by Strauss (1982), Tsegai and Kormawa (2002), Kone (2002), Simister and Piesse (2002) and Ruel et al. (2005). But they require complete data, dealing with price, consumption and supply quantities, and household budget, collected annually on the basis of consumption budget investigations. If such approaches are possible in developed countries, where consumption budget surveys are done every year, one can state that, except in South Africa

(Simister and Piesse, 2002) and maybe other rare countries, there is a wide scarcity of reliable information about food consumption in Africa and the Caribbean, because of a total lack of statistical opinion polls. Those that exist are often outdated: for example the last corresponding data have been collected in 1999 in Haiti (IHSI, 2008) and in 2001 in Cameroon (NIS, 2008)[8], and results have been available only four to five years later, rendering ineffective decision-making and projections obtained in most developing countries.

Recent studies in developing countries have implemented small and *ad hoc* surveys, taking into account the dynamic development of demand such as recent evolution of eating habits. For example Dury et al. (2002) or East et al. (2005) use temporal data collected on households and market and restaurant customers to understand factors influencing urban consumption. The main study about meat consumption was done by East and al. (2005) to understand the determinants of urban bush meat consumption in Rio Muni (Equatorial Guinea). East and al (2005) use interviews with 100 consumers in households and 37 restaurants customers. They show that Guinean consumers have a strong preference for fresh meat and fish over frozen products, but for price considerations they most often eat frozen foods. The degree to which meat consumers are able to satisfy their preferences is significantly related to their income. Frozen produce is considered as an inferior good, with negative income elasticity, while fresh produce, including bush meat, is a normal good. Our study follows the same logic as that of East et al. (2005).

Two similar investigations of eight weeks have been done successively in Yaoundé (Cameroon) and Port-au-Prince (Haiti). Representative sample of urban households have been polled about their chicken consumption: essentially qualitative data about preferences, habits relative to chicken meat, but also socio-economic households' features have been collected. Without data on income, and to deal with a large number of qualitative variables, we implemented multiple correspondence analyses to build asset indexes usable in our econometric regressions.

The second section of the paper presents the survey and its preliminary descriptive statistical analysis. The third section presents the method used to implement regressions and their main results. The last section concludes, focusing on the perspectives, for local chicken, to restore their previous urban consumption share, respectively in Cameroon and in Haiti.

2. The household survey

[8] National Institute of Statistic (NIS), (2008). Web site: http://www.statistics-cameroon.org/

2.1. Survey description[9]

In order to identify the relevant determinants of chicken consumption for consumers, a specific survey was conducted during May-July 2005 in Yaoundé, and during June-August 2006 in Port-au-Prince. After a first examination of urban chicken meat trade (types of chicken and associated markets), a formal questionnaire related to the evolution of urban consumption was implemented to a sample of 180 urban households in each country. The Port-au-Prince survey has been lightly modified compared to the Yaoundé's one in order to take into account failings that had been identified during the work in Cameroon.

To ensure a representative sample, the quota method has been applied (like Dury et al., 2002): the allocation of several control variables (or criteria) is similar in the sample to the distribution in the global population. Control criteria apparently have no particular relationship with chicken consumption; their use aims at minimizing the risk of ignoring some parts of populations in our sample (cf. example in appendix 1). For household pool, control variables were household size and types of housing (equipment and infrastructures available). Available statistics about their distribution in the global population have been taken from IHSI (2003), ECAM (2000) and INS (1994). In the same logic, to minimize distortion in collected data, the localization of each inquiry had been decided beforehand on a map, with respect to demographic weight of the sites of investigations and/or places of consumption. The survey questionnaires are available from the authors upon request. Appendix 1 and 2 briefly present Yaoundé and Port-au-Prince.

2.2. Preliminary survey results

A preliminary analysis of survey results highlights several interesting issues which would motivate developing a more precise econometrical analysis in sections 3.

a- There is a gap between preferences and effective consumption.

Table 2 presents consumers' preferences relative to types of chicken, out of price matter, and the types of chicken actually bought by households from Port-au-Prince and Yaoundé.

[9] Data used in this article have been collected in the frame of a PhD study (Awono Bessa C, 2008).

Table 2: Preferences *versus* actually chicken bought

		Port-au-Prince - Haiti				Yaoundé - Cameroon			
		Rustic	Local Flesh	Imported frozen cuts	Total	Rustic	Local Flesh	Imported frozen cuts	Total
Preferred chicken out of price consideration (only one answer)	nb of answers	159	11	10	180	55	118	4	180
	% of answers	*83.0*	*6.1*	*5.6*	*100*	*30.6*	*65.6*	*2.2*	*100*
Chicken actually bought for familial meal (several answers accepted)	nb of answers	56	71	140	267	18	147	89	254
	% of households(1)	*31.1*	*39.4*	*76.1*		*10.0*	*81.7*	*49.4*	
Chicken actually bought for ceremonies (several answers accepted)	nb of answers	56	71	140	267	0	120	121	241
	% of households(1)	*31.1*	*39.4*	*76.1*		*0*	*66.7*	*67.2*	

Familial meals correspond to usual meals reserved to household's members. Ceremonies design traditional or religious festive meals which bring together several households. (1) = Nb of answers / 180

Source: Household survey, 180 households.

Table 2 shows the large difference between declared preferences, out of price matter, and the reality of household's consumption. While in both countries, imported frozen cuts are, out of price matter, the less appreciated type of chicken, 49% of Cameroon households say they usually consume them for familial meals and 67% for ceremonies meals. Haitian households do not make a difference between familial or ceremonial chicken consumption, and 76% of households declare they usually consume imported frozen cuts. 82% of households in Yaoundé and 40% in Port-au-Prince usually consume local flesh chicken; those results are, in each case, bigger than respective scores of local flesh chicken preference (6% and 66% respectively). Whereas rustic chicken is the preferred chicken for 88% of Haitian households, it is only consumed by 31% of Haitian households. Only 10% of households usually consume rustic chicken in Cameroon, and especially for familial meals, not for ceremonies; the number of households who prefer rustic chicken is threefold higher (31%). All those results let us think the arrival of imported frozen chicken cuts actually introduced a substitution between types of chicken.

In Port-au-Prince, out of price consideration, the quasi totality (88%) of household does prefer rustic chicken[10]. However the gap between households' preferences and effective

[10] We tried to analyse socio-economic determinants of chicken preferences of households. It has not been possible to highlight any significant results, maybe because rustic chicken is widely preferred.

consumption is particularly huge, as if imported frozen cuts and local flesh chicken did constitute a second best choice when rustic chicken is not available, and remaining rustic chicken effective consumption seems to have little substitutability.

In Yaoundé, households also clearly prefer domestic chicken to imported one (97% at all) out of price matter, but there is a difference between rustic one and local one (respectively preferred by 31% and 66% of households).

In Yaoundé there is a marked difference between usual and ceremonies uses of chicken. While the three types of chicken are consumed for familial meals (with an advantage for local flesh chicken), consumption of imported frozen cuts increases for ceremonies meals to the detriment of both rustic and local flesh chicken: when a large quantity of chicken has to be cooked (like for ceremonies meals), imported frozen cuts are advantageously chosen. On the contrary, for household's meals, domestic chicken (rustic or flesh) continues to be used. It seems that imported frozen cuts constitute an imperfect (but largely used) substitute to local chicken, even if local flesh chicken continues to be largely consumed and appreciated by consumers. For households who prefer rustic chicken, local flesh chicken constitutes an acceptable substitute.

Table 3 represents the distribution of answers to the question about households' criteria of choosing one type of chicken over another. Answers to this survey question was free, but we have regrouped all the answers in four headings according to the answer being relative to commodity price, taste, availability, or the fact it was sold by pieces or not. Figure 3 only takes into account the criterion declared in first position to that question (one answer by household).

Table 3: First criteria of chicken choice declared

	Port-au-Prince – Haiti nb of answers (% of answers)	Yaoundé – Cameroon nb of answers (% of answers)
Price	145 (81%)	154 (86%)
Availability	2 (1%)	0 (0%)
Taste	23 (13%)	15 (8%)
Sale by pieces	9 (5%)	11 (6%)

Source: Household survey (180 households)

We can see on the figure that declarations are very similar in Port-au-Prince and Yaoundé: the price is the first criterion of choice, with more than 80% of answers, before the taste and the sale by pieces. Note that in Yaoundé, the criterion relative to "taste" seems to be related to

"buy local" attitude: a lot of households have declared "*I would prefer the local chicken because it is locally produced, anyway it is better*". Issue of availability is very rarely questioned in the survey, and only in Yaoundé.

Furthermore several households polled in Yaoundé mentioned a traditional chicken sharing out, coming from forest people, which certainly participates to maintain the entire local flesh chicken on tables at family meals in Cameroon. Gizzard, heart, wishbone and foots are given to the householder: it would be particularly very bad felt to offer a chicken without wishbone to a householder. Wings are for young ladies: they have to prepare themselves to fly away getting married later. Chicken legs are due to young boys. At last neck and rump are for housewife who has cooked the meal. Imported chicken, sold by pieces, is inappropriate to that traditional allocation.

Such a tradition has not been met in Haiti where, since 1991, the crisis of local chicken industry has introduced a deficit of supplying urban markets in local flesh chicken (Chancy, 2005). But at the same time, rustic Creole chicken is still common in Haiti, and is the only chicken appropriate for voodoo ceremonies.

Lots of Haitian polled consumers have declared that buying imported chicken by cuts was a way to eat chicken at low costs, by choosing only the interesting wanted piece. Moreover, common familial meals seem to decrease via the development of a new form of individual home outside fast food for lunch but also for dinner[11].

b- Recent evolution of chicken consumption

Several consumers polled in Yaoundé, and a lot of consumers in Port-au-Prince, have declared that chicken was one of the most appreciated foods. Most people have insisted to explain that supplying cooked chicken pieces to hosts is very important to give good impression. Furthermore, for polled households in Port-au-Prince, cheap imported frozen cuts actually give the possibility to households to supply meat to the entire family.

Chicken is considered as an accessible substitute commodity to other expensive meat. A look at meat prices in Haitian markets, and Chancy (2005) confirm that chicken meat is the cheapest one. However we don't know of any precise study which would give elements to measure to what extent the increasing of chicken consumption may affect other meat

[11] Home out chicken consumption will be the core of further research.

consumption, or makes global meat consumption growing by giving the possibility to poor household to buy meat.

Tables 4 and 5 present the evolution of chicken consumption habits households have declared in Yaoundé (table 4) and Port-au-Prince (table 5).

Table 4: Evolution of chicken consumption in the last five years in Yaoundé

During the last 5years, household's chicken consumption has known	an increase	a substitution of one type for another	a decrease
nb of answers *(% of 180 answers)*	**59** *(32.8%)*	**46** *(25.6%)*	**75** *(41.7)*
- due to chicken supply change *(% of column)*	43 *(72.9%)*	43 *(93.5)*	0 *(0%)*
- due to household revenue change *(% of column)*	16 *(27.1%)*	3*(6.5)*	75 *(100%)*

Source: Household survey (180 households)

In Yaoundé, chicken consumption has globally increased for one third of households, decreased for 42% ; the remaining 25% declared they just have changed the type of chicken they used to buy for the last five years. Recent (negative) evolution of household revenue is the reason presented in case of decreasing chicken consumption while in case of increasing consumption, (positive) evolution of household revenue explains only 27% of answers, the 73% left being justified by the evolution of chicken supply and in particular the arrival of imported cuts cheaper and / or sold by pieces. The substitution of one type of chicken for another is mainly explained by arrival of imported cuts; only 7% of households put forward a revenue argument.

Answers are more detailed for Port-au-Prince because the Haitian survey had been completed after the experiment of Cameroon survey in order to get more precise information especially about substitution among chicken types at least at Port-au-Prince.

In Port-au-Prince 47% of households declared they had not changed their chicken consumption habits for the last five years. They were 45% to declare they have increased their chicken consumption (with or without substitution) and only 8% to say they just have substituted one type of chicken to another. Supplementary questions to Haitian survey give precisions relative to the nature of chicken substitution that occurred in Port-au-Prince. Households were questioned about the type of chicken they did consume five years ago that has been replaced by another type of chicken. One can see the corresponding answers on figure 5b: rustic and local flesh chicken have massively been replaced by imported chicken cuts. There has been little substitution between rustic and local flesh chicken.

Table 5: Evolution of chicken consumption in the last five years in Port-au-Prince

5a) Type of evolution

During the last 5 years, household's chicken consumption has known	decrease	no evolution	substitution only	increase and substitution
nb of answers	0	85	14	81

5b) Nature of substitution in case of substitution of one type to another, with or without increase of consumption

			Newly adopted chicken type		
		Number of answers	Rustic	Local flesh	Imported cuts
	Number of answers	Reason for adopting	9	7	77
		- Sanitary quality	9	1	0
		- Evolution of household's revenue	0	5	3
		- Cheaper and more available	0	1	74
Type of chicken consumed 5 years ago	Rustic	39	/	3	36
	Reason for giving up…				
	- Sanitary quality	0			
	- Evolution of household's revenue	3			
	- Arrival on the market of cheaper and more available competing commodities	36			
	Local flesh	46	5	/	41
	Reason for giving up…				
	- Sanitary quality	5			
	- Evolution of household's revenue	2			
	- Arrival on the market of cheaper and more available competing commodities	39			
	Imported cuts	8	4	4	/
	Reason for giving up…				
	- Sanitary quality	5			
	- Evolution of household's revenue	3			
	- Arrival on the market of cheaper and more available competing commodities	0			

Source: Household survey (180 households, 95 declaring effective substitution)

Reasons for giving up *versus* adopting each type of chicken have been systematically answered through Port-au-Prince survey, and results have been reported on figure 5b. As expected, rustic and local flesh chicken have been given up for imported cuts essentially because domestic chicken production could not compete with newly imported frozen cuts which are cheaper and widely available, household's revenue evolution accounts very

marginally. Imported frozen chicken is sold by cuts; it gives to households the possibility to purchase only one piece of chicken instead of the whole chicken, improving then the animal protein availability to the poorest households. However 6% of households declared they recently have given up local flesh chicken or imported chicken cuts and replaced those commodities by rustic and/or local flesh because of doubts about sanitary quality of the initial commodity. A focus on those atypical answers shows they all belong to households living in Petion-ville, which is the richest 'commune' of Port-au-Prince.

c- Reserve prices differs among chicken types

Reserve prices have been measured via the answers to following question: "What is the price above which you think the chicken is too expensive?" Table 6 compares average households consumers reserve prices for each type of chicken. In coherence with common use, prices for imported frozen cuts are given in kilograms, and those for rustic and flesh chicken are given for a whole chicken (we therefore don't know exactly their weight). Prices are given in local currencies: *Franc CFA* in Yaoundé, *Gourdes* in Port-au-Prince, and converted in US $, 2005.

Table 6: **Reserve prices for each type of chicken as presented on urban markets**

Types of chicken	Average reserve prices	
	Haiti	Cameroon
Rustic (alive and whole)	**348** gourdes (109) – [118] 9,41 US$	**3 532** FCFA (905) – [47] 6,82 US$
Local flesh (alive and whole)	**248** gourdes (94) – [99] 6,70 US$	**3 363** FCFA (964) – [155] 6,49 US$
Imported frozen cuts (one kg)	**69** gourdes (36) – [158] 1,86 US$	**1 369** FCFA (111) – [142] 2,64 US$

In brackets: standard deviation; in square brackets: number of answers. In 2005, 1 US$=37 Gourdes=518 F CFA.

Source: Average of household survey results.

Prices order are quite similar in Cameroon and Haiti: one kilogram of imported frozen cuts is far cheaper than any domestic chicken, and rustic chicken is slightly more expensive than local flesh chicken. But while in Port-au-Prince, willingness to pay for local flesh chicken is clearly lower than for rustic chicken; in Yaoundé the difference between both prices is very small. Such results are consistent with the idea that local flesh chicken constitutes in Yaoundé a relative good substitute for rustic chicken, whereas it is not exactly adapted to the same use as rustic chicken in Port-au-Prince[12].

[12] In the next sections we don't use reserve price data in our regressions, because it seems there is too little variability in households' answers, especially in Yaoundé, probably related to a default in the survey implementation with that question.

The arrival of frozen imported chicken seems to have widely modified consumers' habits. This type of chicken meat is clearly cheaper than domestic (local or rustic) chicken. Preliminary analysis of survey results seems to show socio-economic household's feature have effect on recent evolution of chicken consumption. But frozen imported chicken is also sold by cuts. Cuts are easy to use, and may be particularly well adapted to urban ways of cooking the chicken. At the opposite, the use of locally produced chicken seems to stay in Yaoundé in links with traditional practices of sharing the different chicken parts during familial meals, or with regards to a preference for local chicken. It seems also that some rare particular mode of cooking (fumed, roasted) most often use whole chicken. In Port-au-Prince, whole rustic chicken is required for voodoo practices. The question is: to what extent the recent evolution of chicken consumption is related to households' level of life or linked to household's forms of consuming the chicken? The following section aims to assess the impact of urban households' socio-economic and forms of consuming features on their effective choice between imported, local or rustic chicken.

3. The determinants of chicken consumption features

3.1. The statistical use of qualitative variables

Variables we try to explain are presented in table 7. Tables 8, 9 and 10 present explanatory variables available for each household.

Table 7: **Explained variables from households' surveys**

Preference regards to chicken type		
Pref	**1** : Rustic; **2**: Local flesh; **3**: Imported frozen cuts	1, 2 or 3
Actual consumption		
Consomen	Type of chicken usually consumed, first enounced (one answer only)	1, 2 or 3
Consofet	Type of chicken bought for festive meals (one answer only -Yaoundé only)	1, 2 or 3
	1 : Rustic; **2**: Local flesh; **3**: Imported frozen cuts	
Loc	All usual chicken types (several answers possible) – Local flesh	0/1
Rus	All usual chicken types (several answers possible) – Rustic	0/1
Imp	All usual chicken types (several answers possible) – Imported frozen cuts	0/1
Consumption evolution :		**Inc, Dec, Subst, NoChg**
Inc	Chicken consumption has increased during the previous 5 years (with or without substitution)	
Dec	Chicken consumption has decreased during the previous 5 years	
Subst	During the previous 5 years, there has been a substitution of one type for another	
NoChg	No particular change in the recent chicken consumption	

Explanatory variables about households and consumers level of life or consumption habits are numerous and essentially qualitative; that leads to problems of multi-collinearity in econometric regressions. Moreover, the size of our sample does not allow for too many

explanatory variables. As explained in World Bank (2003), the most direct measures of living standards are income and consumption, but corresponding data are both expensive and difficult to collect, and many otherwise useful data sources lack direct measures of living standards. However they are needed to test hypotheses relating to the impact of living standards on economic behaviour. That is why researchers use alternative measures of welfare or living standards; several methods exist. One consists in using multiple correspondence analyses (MCA) and establishes a set of uncorrelated linear combination of the original variables where each consecutive linear combination is derived so as to explain as much as possible of the variation in the original data, while being uncorrelated with other linear combination. The asset index is typically assumed to be the first linear combination. This method presents the advantage not to assign arbitrary weight to each original variable in building the index. A similar method has been for example used in Booysen and *al*. (2008) in order to assess trends in poverty in seven sub-Saharan African countries. In this article, we build such asset index and use them as explanatory variables in our regressions[13].

We have implemented MCA to three disjointed groups of qualitative variables: a first group dealing with conditions of life of households (table 8), a second group dealing with socio-economic status of households (table 9), a third one dealing with households' chicken consumption habits (table 10), in order to build three corresponding synthesis variables. Table 11 presents other available variables used in further regressions.

[13] Note that comparable method is used in other application fields, see for example Ducos et *al*. (2009) in the case of identifying the determinants of adopting agro-environmental practices by European farmers.

Table 8: **Available explicative variables relative to households' conditions of life**

House equipment		
wat	Water equipment in the house	0/1
elec	Electricity equipment in the house	0/1
Quarter where household is located		
Quarter	**Del** (Delmas), **Pap** (Port-au-Prince), **PV** (Pétion-ville), **Car** Carrefour - **Y1** :Yaoundé 1, …**Y3** :Yaoundé 6	Port-au-Prince: Del, Pap, PV, Carr Yaoundé: Y1, …, Y6

Table 9: **Available explicative variables relative to households' socio-economic status**

Education level of people answering		
Stud	**No:** No scolar education, **Prim:** Primary education, **Sec:** Secondary education, **Univ:** Higher education	No, Prim, Sec, Univ
Major professional activity of people answering		
Prof	**Unemp:** unemployed, **Inf:** Activities relative to informal sector, **Com:** Tradesman, **SF:** Employee or civil servant	Unemp, Inf, Com, SF

Table 10: **Available explicative variables relative to households' features of chicken consumption**

Type of cooking (for Yaoundé : only for festive meals) – Several answers possible		
Sau	Chicken sauce (casserole or called "braisé" at Yaoundé)	0/1
Fum	Fumed (called "boucané" at Port-au-Prince)	0/1
Fri	Fried	0/1
Roa	Roast (in a cooker or roaster) (for Yaoundé only)	0/1
Gri	Grilled (barbecue) (for Yaoundé only)	0/1
Cut or not cut before cooked? (for Port-au-Prince only)		
C	Cooked after being cut (associated to Sau, Fum or Fri)	0/1
W	Cooked as a whole (associated to Sau, Fum or Fri)	0/1
I	Indifferent (associated to Sau, Fum or Fri)	0/1

Table 11: **Other available variables relative to households**

HH	Household size : number of people composing the household	value
Age	Age of people answering	value
Type of household (relative to the sex of the head of family *versus* single)		
	MC: Male centred, **FC:** Female centred, **N:** Nuclear	MC, FC, N
Usual chicken buying place		
Mk	Traditional urban market	0/1
Road	Seller on the road	0/1
Smk	Supermarket	0/1
Farm	Farm (for Yaoundé only)	0/1
Pmk	Peri urban market (for Yaoundé only)	0/1

3.2. Construction of the asset indexes

We create three composite indicators from a selection of variables. The construction of the asset index was based either on binary variables or categorical indicators. Tables 12, 13 and 14 list these variables with the associated categories. They also give the absolute positions and the partial contribution of categories of each variable.

Therefore, MCA implemented to available variables relative to Yaoundé and Port-au-Prince households' condition of life identify the first dimension as an asset index called « Levlife ». It explains 17.81% and 30.33% of inertia, respectively in Yaoundé and Port-au-Prince. Table 12 reports the weights for each index component. Components that reflect higher level of life contribute positively to the asset index whereas components that reflect lower level of life contribute negatively to this asset index.

Table 12: Variable included in « Levlife » asset index, weights obtained from MCA and partial contributions to inertia, in Yaoundé and Port-au-Prince

Variables	Categories Yaoundé / Port-au-Prince	Yaoundé Weights	Yaoundé Partial contribution to inertia	Port-au-Prince Weights	Port-au-Prince Partial contribution to inertia
Quarters	Lives in Y1 / Carrefour	-1.321	24.11%	0.365	1.3%
	Lives in Y2 / Delmas	-0.135	0.2%	-0.525	4.8%
	Lives in Y3 / Port-au-Prince	0.930	11.2%	-0.013	0%
	Lives in Y4 / Pétion Ville	0.053	0%	2.075	12.6%
	Lives in Y5	0.641	5.6%		
	Lives in Y6	-0.125	0.2%		
House equipment	Owns electricity	0.743	2.6%	0.341	6.3%
	Does not own electricity	-0.462	28.4%	-1.639	30.5%
	Owns water	0.187	17%	0.938	24.1%
	Does not own water	-2.062	10.5%	-0.717	19.2%

In the same way, the first dimension of the MCA implemented to Yaoundé and Port-au-Prince households' socio-economic variables, explaining respectively 23.54 and 34.81% of inertia, defines the « Status » composite indicator. Components that reflect higher socio-economic status contribute positively to this asset index and inversely (table 13).

Table 13: **Variable included in « Status » asset index, weights obtained from MCA and partial contributions to inertia, in Yaoundé and Port-au-Prince**

Variables	Categories	Yaoundé		Port-au-Prince	
		Weights	Partial contribution to inertia	Weights	Partial contribution to inertia
Education level	No scholar education	-1.122	2.5	-1.089	7.1%
	Primary education	-1.306	17.4	-1.197	23.5%
	Secondary education	-0.172	1.2	0.387	4.7%
	Higher education	1.277	28.9	1.045	14.7%
Professional activity	Unemployed	0.229	0.8	0.750	6.1%
	Informal sector	-0.574	9.5	-0.379	2.1%
	Tradesman	-0.823	7.7	-1.053	23.2%
	Employee/Civil servant	1.427	32	0.952	18.6%

Finally, the first dimension of the MCA implemented to Yaoundé and Port-au-Prince households' chicken consumption features, *i.e.* the level of elaboration of cooked chicken, explaining 32.88 and 28.90% of inertia, respectively in Yaoundé and Port-au-Prince, defines the « Consfeat » asset index. Components that reflect higher level of elaboration of cooked chicken contribute positively to this asset index and inversely (table 14).

Table 14: **Variable included in « Consfeat » asset index, weights obtained from MCA and partial contributions to inertia, in Yaoundé and Port-au-Prince**

		Yaoundé		Port-au-Prince	
Variables	Categories	Weights	Partial contribution to inertia	Weights	Partial contribution to inertia
Type of cooking	Chicken sauce	-0.287	1.6%	0.859	10.7%
	No chicken sauce	0.129	0.7%	-0.359	4.5%
	Fumed chicken	4.872	24.1%	1.743	2.3%
	No fumed chicken	-0.082	0.4%	-0.230	17.5%
	Fried chicken	-0.206	2.4%	-0.059	0.2%
	No fried chicken	2.263	26%	1.727	5%
	Roast chicken	0.920	19%		
	No roast chicken	-0.533	11%		
	Grilled chicken	2.172	14.3%		
	No grilled chicken	-0.114	0.9%		
Cut or not cut before cooked (Port-au-Prince only)	Chicken sauce ***and*** cooked as a whole			1.293	10.6%
	Chicken sauce ***and*** indifferent to cook it as a whole or not			-0.189	1.6%
	Fumed ***and*** cooked as a whole			2.273	21.3%
	Fumed ***and*** indifferent to cook it as a whole or not			-0.206	1.9%
	Fried ***and*** cooked after being cut			-0.584	9%
	Fried ***and*** indifferent to cook it cut or not			0.668	10.3%
	Fried ***and*** cooked as a whole			0.848	4.5%
	Fried ***and*** indifferent to cook it as a whole or not			-0.124	0.7%

3.3. Regression model

If the consumer i makes the choice j (among J) in particular, we assume that the observed choice provides the greater utilities (U_{ij} is the maximum among the J utilities). Hence the statistical model is driven by the probability that choice j is made, which is $\Pr(Y_i=j)=P(U_{ij}>U_{ik})\ \ k \neq j$. We model the difference between these utilities as an unobserved variable $y_i^* = \beta' x_i + \varepsilon_i$, where x_i is a set of factors explaining the decision of i to consume j. We assume that the error terms has a standard logistic distribution. Then a Logit model has been implemented to explain preferences and effective consumption using LevLife, Status, Consfeat and other available variables designed in table 11. Note that variables relative to usual buying places are correlated to choice of chicken type, that's why they have not been taken into account. The built synthetic variables LevLife and Consfeat are not correlated at all. We have systematically tried to use crossed synthetic variables (LevLive*Consfeat, Status*Consfeat and LevLife*Status) but results were not significant and we have not hold them. In the following estimation we used the type of the household to explain chicken consumption and man centred households as the reference.

a- Preferences and effective consumption

Logit model does not give any significant result for Preferences, which is consistent with the observation that almost all consumers actually do prefer local chicken in Yaoundé, and rustic chicken in Port-au-Prince (cf. figure 2). Table 15 presents results of estimation for the probability to consume rustic or local or imported chicken with a Logit model. Coefficient have been estimated with those associated to the local one normalized to zero. Table 16 presents results of the Logit model estimation for chicken consumption at festive meals.

Table 15: Yaoundé – Determinants of effective household's consumption (first choice)

Variable	Rustic chicken (compared to local one) Parameter estimate (t-statistics)	Imported chicken (compared to local one) Parameter stimate (t-statistics)
C	- 3.13*** (-4.17)	-1.07* (-1.73)
HH	+ 0.16 ** (+ 2.14)	-0.07 (- 0.93)
LevLife	- 0.27 (- 0.93)	- 0.55*** (- 2.47)
Status	- 0.25 (- 0.90)	+ 0.09 (+ 0.39)
Consfeat	- 0.37 (- 1.05)	- 0.43 (- 1.47)
FC	- 1.09 (- 0.76)	-0.62 (- 1.16)
N	+ 0.73 (+ 0.61)	- 1.77 (- 1.53)

Number of observations=180 (Number of observations of choice 1 =138, choice 2 =18,choice 3 =24); $\rho^2_{MacFadden}$ *= 0.121 ; LR (zero slopes) = 22.25[0.035]*

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

Table 16: Yaoundé – Determinants of effective household's consumption at festive meals (first choice) of imported chicken (compared to local flesh one)[14]

Variable	Parameter estimate (t-statistics)
C	+ 0.32 (+ 0.72)
HH	- 0.09* (- 1.66)
LevLife	- 0.22 (- 1.30)
Status	- 0.14 (- 0.84)
Consfeat	- 0.40 ** (- 2.07)
FC	- 0.52 (- 1.44)
N	- 1.16 * (- 1.80)

Number of observations=180 (Number of observations of imported chicken=67) ; $\rho^2_{MacFadden}$ *= 0.062; LR (zero slopes)= 11.44 [0.076]; Correct prediction= 67,22%*

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

Regression results are quite similar for usual (table 15) and festive meals (table 16): LevLife and Consfeat have negative impact on choosing imported chicken. But note that LevLife is significant for usual meals and Consfeat only for festive meals. The type of household defined by nuclear seems to be significant with a negative effect on imported chicken consumption

[14] No household has declared using rustic chicken for festive meals.

(especially at festive meals) compared to men centred households. The LR tests show that estimated coefficients are jointly significant both for usual and festive consumption. However, the $\rho^2_{MacFadden}$ for the festive and usual consumption models, as a measure of goodness of fit of the regression are rather low. This may be due to omitted variables such as revenue and prices (unobservable) that are important determinants for consumption choices.

Table 17: Yaoundé – Determinants of household's consumption of imported chicken (as first, second or third choice)

Variable	Parameter estimate (t-statistics)
C	0.55 (1.30)
HH	- 0.08 (- 1.53)
LevLife	- 0.27* (- 1.67)
Status	- 0.09 (- 0.61)
Consfeat	- 0.30* (- 1.79)
FC	+ 0.01 (+ 0.02)
N	- 0.88 (- 1.46)

Number of observations=180 (Number of observations of imported chicken=88) ; $\rho^2_{MacFadden}$ = 0.048 ; LR (zero slopes)= 9.03 [0.172]; Correct prediction=55.56%

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

It seems that for festive meals, the way of cooking the chicken actually plays a major role in the choice of chicken type. The more elaborated (fumed, grilled, and roasted) the cooking, the more households choose local chicken. Imported chicken is adapted for less elaborated cooking ways: fried and sauce chicken. Consfeat plays a role in the same direction as LevLife, as if fried and sauce were more popular ways of cooking chicken than roasted, grilled and fumed chicken.

In Port-au-Prince, pooled households don't make any difference between usual and festive chicken consumption. Table 18 presents results of estimation for the probability to consume rustic or imported chicken as compared to local chicken with a Logit model.

Table 18: Port-au-Prince – Determinants of effective household's consumption

Variable	Rustic chicken (compared to local one) Parameter estimate (t-statistics)	Imported chicken (compared to local one) Parameter stimate (t-statistics)
C	+ 1.32 (+ 1.16)	+ 1.60 (+ 1.51)
Age	- 0.48** (- 2.15)	- 0.02 (- 1.31)
HH	+ 0.08 (+ 0.73)	+ 0.02 (+ 0.15)
LevLife	+ 0.34 (+ 1.45)	- 0.38* (- 1.77)
Status	- 0.42* (- 1.71)	- 0.48** (- 2.08)
Consfeat	- 0.04 (- 1.05)	- 0.53** (- 2.44)
FC	+ 0.47 (+ 1.00)	- 0.05 (- 0.13)
N	+ 1.08 (+ 1.37)	- 0.25 (- 0.31)

Number of observations=180 (Number of observations of choice 1 =54, choice 2 =43, choice 3 =83); $\rho^2_{MacFadden}$ *= 0.177 ; LR (zero slopes)= 33.62 [0.002]*

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

Table 19: Port-au-Prince – Determinants of household's consumption of imported chicken (as first, second or third choice)

Variable	Parameter estimate (t-statistics)
C	+ 2.64** (+ 2.53)
Age	- 0.03* (- 1.68)
HH	+ 0.04 (+ 0.36)
LevLife	- 0.45** (- 2.12)
Status	- 0.48** (- 2.11)
Consfeat	- 0.69*** (- 3.45)
FC	- 0.37 (- 0.87)
N	+ 0.05 (+ 0.71)

Number of observations=180 (Number of observations of imported chicken=137); $\rho^2_{MacFadden}$ *= 0.170 ; LR (zero slopes)= 30.91 [0.000]; Correct prediction =80.0%*

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

Results for Port-au-Prince show that LevLife, Status and Consfeat have significant effects on consumption of imported chicken. As expected, they all three have negative impact on imported chicken consumption. It is consistent with the hypothesis that imported chicken constitutes an imperfect substitute to domestic (rustic or local) chicken for well-off consumers even if it enables poor households to access to poultry meat consumption. Note that the way the chicken is cooked (variable Consfeat) has significant impact on households' chicken type choice. Like in Yaoundé, fumed or sauce chicken seems to be correlated to domestic chicken use, and usually requires whole chicken, contrary to fried chicken, for which frozen chicken cuts are particularly well adapted. The LR tests show that estimated coefficients are jointly

significant. But, the $\rho^2_{MacFadden}$ for the two regression model, as a measure of goodness of fit of the regression are not very high.

b- Recent evolution of chicken consumption

In Yaoundé no household has declared not having changed anything to their chicken consumption during the previous five years; they all have i) decreased or ii) increased (with or without substitution of one type for another), or iii) only substituted one type of chicken to another without modifying their consumed quantity. Logit regression of consumption decrease doesn't provide any significant result.

Table 20: Yaoundé – Recent evolution of chicken consumption

20a) Increase of chicken consumption during the previous five years (with or without substitution)

Variable	Parameter estimate (t-statistics)
C	- 0.39 (- 0.52)
Age	- 0.01 (- 0.49)
HH	+ 0.02 (+ 0.43)
LevLife	+ 0.12 (+ 0.68)
Status	+ 0.41** (+ 2.41)
Consfeat	+ 0.18 (+ 1.16)
FC	- 0.30 (- 0.83)
N	- 0.87 (- 1.20)

Number of observations=180 (Number of observations on increase consumption=59);
$\rho^2_{MacFadden}$ *= 0.070 ; LR (zero slopes)= 12.85 [0.076]; Correct prediction = 68.9%*

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

20b) Substitution of imported chicken for other type during the previous five years (without quantitative change)

Variable	Parameter estimate (t-statistics)
C	- 3.41*** (- 3.89)
Age	+ 0.57*** (+ 2.72)
HH	+ 0.01 (+ 0.45)
LevLife	- 0.02 (- 0.12)
Status	- 0.33* (- 1.72)
Consfeat	- 0.20 (-1.00)
FC	- 0.16 (- 0.39)
N	+ 0.35 (+ 0.49)

Number of observations=180 (Number of observations on substitution=46); $\rho^2_{MacFadden}$ *= 0.092 ;*
LR (zero slopes)= 16.56 [0.020]; Correct prediction = 75.6%

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

In Port-au-Prince no household has declared having reduced its chicken consumption (cf. table 5a). They all have declared having i) increased and / or operated substitution, ii) only substituted one type of chicken to another, or iii) not changed anything in their chicken consumption.

Table 21: Port-au-Prince – Recent evolution of chicken consumption

21a) Increase of consumption and / or substitution of imported chicken for other previously consumed type during the previous five years (without quantitative change)

Variable	Parameter estimate (t-statistics)
C	- 0.87 (- 1.07)
Age	+ 0.02 (+ 1.41)
HH	+ 0.04 (+ 0.45)
LevLife	- 0.11 (- 0.70)
Status	+ 0.44** (+ 2.47)
Consfeat	- 0.05 (- 0.29)
FC	- 0.18 (- 0.54)
N	- 0.30 (- 0.52)

Number of observations: 180 (Number of observations on increase and / or substitution of consumption =95) ;
$\rho^2_{MacFadden}$ *= 0.041 ; LR (zero slopes)= 7.50 [0.378]; Correct prediction = 62.22%*

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

21b) Substitution of imported chicken for other type during the previous five years (without quantitative change)

Variable	Parameter estimate (t-statistics)
C	- 6.81*** (- 3.60)
Age	+ 0.08** (+ 2.46)
HH	+ 0.09 (+ 0.50)
LevLife	+ 0.19 (+ 0.57)
Status	+ 0.94** (+ 2.37)
Consfeat	+ 0.38 (+ 1.52)
FC	+ 0.22 (+ 0.32)
N	+ 0.76 (+0.76)

Number of observations=180 (Number of observations on substitution=14);
$\rho^2_{MacFadden}$ *= 0.111 ; LR (zero slopes)= [19.09]; Correct prediction= 92.22%*

*, **, *** indicate statistical significance respectively at 10%, 5%, 1% level

It is noteworthy that status is always significant, playing in favour of increasing the chicken consumption in Yaoundé and in Port-au-Prince, but having a significant impact respectively negative in Yaoundé and positive in Port-au-Prince on the simple substitution of imported chicken for domestic one. Those results confirm the idea that the consumption of imported chicken is considered as a second-best behaviour in Yaoundé: imported frozen chicken cuts constitute an imperfect substitute to the domestic chicken and they are consumed only if domestic chicken is neither available nor accessible to the household. The result in Port-au-Prince (where there are only 14 positive observations) may signify that in case of reduced accessibility or availability of domestic chicken, substitution of imported chicken for domestic one has been easier to operate by the highest status households.

Most regression models predict around 70% of the observation correctly, though the likelihood ratio is rather weak. Few explanatory variables are significant except the three asset index, in particular Levlife, but also Status and Consfeat. And their signs are always consistent with those expected. However, their marginal effects and pseudo-elasticities, especially in Yaoundé, are low, because Levlife, Status and Consfeat are built only on a part of explanatory variables to be taken into account to assess levels of life, personal status and level of consumption features. In other those three asset index may be used as correct indicators but do not reflect these three dimensions in their totality.

4. Conclusion

Chicken cheap imports have been denounced by several non governmental organisations and associations, as causing the collapse of many poultry husbandry and the loss of jobs in the local food chain. They notably recommend reinstituting high level of border tariff protection against imports of chicken pieces. Those organizations often argue that the liberalisation of chicken market is an emblematic example of the negative effects of trade liberalisation for developing countries due to international trade agreements.

Two similar surveys in Port-au-Prince (Haiti) and Yaoundé (Cameroon), aimed to identify the determinants of recent evolution of chicken consumption in urban area of two different developing countries. Starting from preliminary descriptive results of surveys, the paper tried to put the light on the differentiated effects of opening poultry domestic market to world imports on segments of urban population and households' ways of consuming the chicken.

As expected, and in conformity with associations studies[15] which describe the crisis of domestic chicken industry which has occurred since the opening to frozen chicken imports, the surveys we have carried out in both countries confirm that the relative lower cost of imported chicken has introduced a substitution of imports for domestic chicken and a large part of households declare they have increased their consumption of chicken.

Using asset index in economic regressions, results of our estimations show that if level of life actually has an impact on the type of chicken households actually consume, and seems to play in favour domestic chicken compared to imported one, the way the chicken has been cooked also has an effect. Imported chicken seems for example, not perfectly adapted to roasted, grilled or fumed chicken, which require whole chicken, contrary to fried and sauce modes of cooking which are more popular. Furthermore, and especially in Yaoundé, it seems that the way of cooking the chicken is particularly significant in case of festive meals, while level of life's effects are higher for usual chicken consumption. It suggests there would be a place for whole local chicken industry targeted on particular uses, and raises the question of the opportunity (and possibility) to develop a domestic industry of cut chicken able to compete with imported frozen cuts. Import duties would certainly play in favour of local chicken industry, but would have of course negative effects on consumers' welfare.

Port-au-Prince households don't make any difference between usual *versus* festive chicken consumption. Results dealing with recent evolution and substitution of chicken type consumption confirm imported chicken constitutes a second best commodity compared to domestic one, especially in Yaoundé, but the arrival of imported chicken cuts has significantly increased the global chicken consumption of almost all pooled households especially in Port-au-Prince where consumption of domestic chicken, rustic or local, seems to be reserved to specific uses or well-off households and it is not sure that the remaining demand is high enough do encourage the re-development of a local chicken industry; hence it seems there is no sense at this stage in suggesting raising duties on chicken cuts imports.

It would be interesting to extend the analysis to out-of-home consumption available data (at restaurants), in order to see if trends are similar as for home chicken (domestic *versus* imported) consumption in Cameroon and Haiti.

[15] Agir Ici, (2004) Exportations de poulets : l'Europe plume l'Afrique. Paris, France, Campagne d'ici n° 68, 4 p.; ACDIC, 2005.

From a larger point of view, note that survey data present some limits and don't give information about other relevant variables such as households' incomes or more precise willingness to pay for chicken, but also data about households' consumption of potential substitutes of chicken (other meats, even vegetables). Taking those missing data into account would certainly improve interpretations of regression results.

Haiti is classified as a less developed country, where the share of poor and undernourished people is very high. Cameroon is a developing country where poverty and undernourishment constitute real problems, but not with the same importance than in Haiti. Without dealing with the theme of supply organisation of a local poultry industry and its efficiency, our analysis of chicken consumption in urban areas gives new elements to highlight the question of the opportunity of boosting the local poultry industry to satisfy chicken consumers' demand and reduce imports by growing import duties. In particular, it seems that import duties, that lead to an higher domestic price, may be relevant to boost a domestic production only if there is a potential demand i) able to bear a more expensive product, and ii) consistent with specific attributes of domestic products, considering that imported *versus* domestic products may present differentiated attributes more or less adapted to consumers' style of life. If such conditions may be filled in Cameroon, it is clearly not the case for Haitian chicken industry. The case of chicken could be compared to other agricultural production to see if such a conclusion may be generalized at the scale of all least developed countries and other agricultural products, or if it is specific to the Haitian poultry industry.

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Appendix 1: Yaoundé (Cameroon)

Yaoundé, also called "the city of seven hills", has been the administrative and political capital of Cameroon since 1922. After Douala, which is considered as the economical capital, Yaoundé constitutes the second biggest city of Cameroon, and is the county town of Mfoundi Department and of Centre Province. Historically, Yaoundé is composed by four districts.

Yaoundé 1st, 490 000 inhabitants in 2001, is in the north of Yaoundé. That is the headquarters of the Presidency of the Republic and of the province. It is composed by both popular areas (Etoudi, Nlongkak, Mvog-Ada, Essos) in the north and residential area (Bastos) in the South.

Yaoundé 2nd , 500 000 inhabitants in 2001, is located at the West part of Yaoundé. In the North, Tsinga and Mont-Fébé are residential areas, but the main part of population live in very popular areas (Mokolo, Briqueterie, Melen, Nkomkana).

Yaoundé 3rd, 172 000 inhabitants in 2001, is actually the "old Yaoundé". Located in the centre and South-West of the city, it was the headquarters of German and French authorities. It now houses all public administrations and concentrates major part of shops. Downtown is mainly constituted by buildings and residential areas, whereas the South-West concentrates a large part of population in popular areas (Mvolyé, Efoulan).

Yaoundé 4th, 344 000 inhabitants in 2001, is located in the Eastern and South-Eastern part of the capital. There are there several popular areas (Nsam, Mvog-Mbi, Nkoldongo, Kodengui), the airport and several agro-industry head offices.

Since 2007, Yaoundé is cut into seven districts. Yaoundé 5th, 6th and 7th respectively come from the reorganisation of Youndé 2nd, 4th and 1st.

Source : Awono Bessa (2008), using INS (2005)16

Appendix 2: Port-au-Prince (Haiti)

Port-au-Prince, more than 1.2 millions of inhabitants, is the political, administrative, and economic capital of Haiti. It is also the capital of the West Region and one of the 130 districts of the island. Port-au-Prince district has been cut into four administrative "communes" : *Delmas, Pétion-ville*, *Carrefour, Port-au-Prince commune*.

[16] National Institute of Statistic (NIS), (2008). Web site: http://www.statistics-cameroon.org/

Commune of *Port-au-Prince* is the headquarters of public institutions (Presidency, Ministries and other republican services), universities, cultural centres and museums; that is the "old town". All other communes of Port-au-Prince district actually are suburb areas growing with demographic pressure. The town has been built on many hills and there is like a "positive gradient of richness with the altitude of accommodation".

Port-au-Prince commune is located under little mountains: the Mornes. Except administrative offices, the commune is bordered by several very large shanty towns where there is high level insecurity (*Martissan*, *Carrefour-Feuille, Cité l'Eternel*).

Pétion ville is at the South suburb of Port-au-Prince, at the top of a hill. This area has been a place of holidays for a long time. It is composed by luxurious villas and constitutes the rich part of the city.

Delmas takes place in the northern part of Port-au-Prince. That is the real industrial heart of the town with the port, the airport, the industrial area and the head offices of many societies and firms. Near to the airport, there are huge shanty towns: *Cité-Soleil* at the West, which actually constitutes a no-rights area, with very high insecurity, and *Maïs-Gâté* in the South.

Carrefour is the more southern commune of Port-au-Prince district. Although it is bordered by shanty towns (*Brochette, Mon Repos*), this part of town is very quiet, and houses many beaches and touristy sites.

Source : Awono Bessa (2008) using AIDH (2008)[17]

[17] Association des Industriels d'Haïti, carte de Port-au-Prince,2008

Appendix 3 – Control variables and implementation of quota method[18]

Distribution of households in global population and quota for establishing samples

Yaoundé Quarters	Population	%	Nb. of pooled households
Yaoundé 1 (+7)	53 187	29	52
Yaoundé 2 (+5)	39 263	21	38
Yaoundé 3	51 133	28	50
Yaoundé 4 (+6)	40 176	22	40
Total	183 759	100	180

Port-au-Prince Communes	Population	%	Nb. of pooled households
Port au Prince	736 618	36	66
Delmas	604 211	30	54
Carrefour	392 986	20	35
Pétion-Ville	280 214	14	25
Total	2 014 029	100	180

Allocation of pooled household following the same method for Yaoundé quarters, example of Yaoundé 1, using ECAM, 2000.

Household's size	Hut	House with several households	Modern villa	Buildings with several flats	Concessions
1	2	7	1	1	1
2 to 5	3	14	1	1	1
6 to 9	3	11	1	1	1
> 9	1	1	1	0	0
Total = 52	9	33	4	3	3

[18] Note that Haitian survey has been made in a very difficult context of urban violence and high level of insecurity: the respects of statistic quotas of polled people actually constituted a real challenge.

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