

## Local Preferences and Perception towards the Consumption of Farmed Fish in the Center Region of Cameroon

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### Abstract

Aquaculture is a sector set up in order to fill the gap left by depleting natural fish stocks. Despite management strategies for develop this sector; consumer's preferences and opinion on farmed fish supplies are little known what may hinder the highlight of products aquaculture. This study aims to determine preferences and perceptions on farmed fish consumption and to identify its determinants in three areas namely Mefou-Et-Afamba, Nyong-Et-So'o and Mfoundi, within the Center Region of Cameroon. Structured and pre-tested questionnaire was used to interview consumers. A total of 307 respondents aged  $31 \pm 10$  years on average were included in the study and were mainly consisted of females (57.0%), attended secondary level (59.9%), worked in formal sector (52.1%) and of the ethnic group "Beti" (76.5%). Our data suggested that mean perception scores were in favor of wild fish because of its better taste and best quality than farmed fish particularly in rural areas ( $P = 0.0004$ ). Most of consumers were not able to distinguish between wild fish and farmed fish. The study area (OR = 0.20;  $P = 0.01$ ), age of participants (OR = 5.47;  $P = 0.01$ ) and awareness on the benefits from fish consumption (OR = 3.56;  $P = 0.03$ ) influenced consumption of farmed fish. These findings provide valuable information for the improvement of the quality of farmed fish in response of consumer's request in order to promote products stem from aquaculture sector.

**Keywords:** Farmed fish; Preferences; Perceptions; Determinants; Cameroon

### Introduction

A healthy diet is now a trend which is receiving more and more important attention worldwide<sup>[1]</sup>. The increasing demand for fish is considerably linked to a permanent research for healthy food by a human population constantly rising. Indeed, several studies have shown that modern consumers are interested in health benefits brought by consumption of fish<sup>[2-4]</sup>. Fish represent an excellent source of proteins, omega-3 fatty acids, vitamins and minerals which are important for growth and development through their implication in biological processes<sup>[4,5-8]</sup>. As a consequence, the demand for fish is increasingly important in human population<sup>[9]</sup>.

The global fish consumption has increased per capita steadily from an average of 9.9 kg in the 1960s to 16.4 kg in the 2000s and rising above 20 kg in 2016<sup>[10]</sup>. However, the maximum potential of capture fisheries has been probably reached and natural fish stock stated fully exploited or overexploited which is translated a shrinking global fisheries and require attention to maintain stability<sup>[11]</sup>.

Farmed fish is an alternative approach for counterbalance the depleting wild

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fish stock and an increasing consumer demand<sup>[12]</sup>. Indeed, as outlined<sup>[13]</sup>, aquaculture and small scale fisheries contribute to improve fish availability, nutrition security, employment and income generating activity in developing countries. Aquaculture is one of the fastest growing food production sector of the world with a global production which has raised from less than 1 million Tons per year in early 1950s to 73.8 million Tons either 49.8 million Tons of fish in 2014<sup>[11,10]</sup>. Its global contribution was estimated to 44.1 percent for the total production against 42.1 percent in 2012 and 31.1 percent in 2004. Africa as a whole contributed 1 694 853 Tons (about 2 percent) of fish for the world<sup>[10]</sup>.

In Cameroon, country of sub-Saharan Africa, the national fish production was estimated in 2015 about 239 000 Tons for an average consumption of 15.4 kg per capita. Introduced in the late 1948s, the annual aquaculture potential is estimated between 2 300 and 20 000 Tons<sup>[14]</sup>. Unfortunately, fish farming is still poorly established and far from realizing its potential, leading the government to import large steadily quantity of fish products each year<sup>[14]</sup>.

In some countries, fish from aquaculture has some disadvantages especially with costs, less positive image and quality when compared with capture fisheries according to consumers<sup>[15,16]</sup>. Moreover, the acceptance or rejection of fish is of multi-factorial nature and has a high influence on consumer preferences and perceptions for wild-caught versus farmed fish<sup>[17]</sup>. According to<sup>[18]</sup> the lack of aquaculture growth is attributed to a combination of negative public perceptions and media depictions, lack of awareness and knowledge of aquaculture practices (production system); environmental impacts and advancements. However, new potential agents need to acquire information about consumer preferences of wild and farmed fish within a country, so as to create a business and strategies that can withstand the difficulties that the sector is facing<sup>[15,19,20]</sup>. Some factors including income distribution and accessibility of fish products were reported to influence fish consumption at both urban and rural levels<sup>[21]</sup>. Besides, there is a paucity of study having addressed this topic in developing countries especially in Cameroon. The present study aimed to determine preferences and perceptions on wild and farmed fish consumption and to identify its determinants in three areas of the Centre Region of Cameroon.

## Material and Methods

### Study area

The study was conducted in three neighboring areas of the Centre region (4°45'0"N/12°0'0"E) of Cameroon consisting of two rural areas and one urban area referred to as Mefou-Et-Afamba (3°57'36"N/11°55'48"E); Nyong-Et-So'o (3°24'0"N/11°30'0"E) and Mfoundi (3°52'0"N/11°31'0"E) respectively (Figure 1). It is the first region in the country where aquaculture was introduced through fish farming since 1948. It has in all 10 main areas called Divisions where we found rural, peri-urban and urban cities with high fish farming possibilities and there are rivers and streams available for fresh water fishing as well as high population densities and local fish markets.



**Figure 1:** Map of the Centre Region of Cameroon presenting the location of study areas.

### Research approach and sampling

A survey was carried out in three areas of the Centre Region of Cameroon, from March to May 2018. This period corresponds to the draining of some ponds according to fish farmers in this region and was just after the post-harvest of wild-captured fish. Data collection was conducted through “face-to-face” interviews, so as to minimize incomplete questionnaires rates. The respondents were randomly selected and individually interviewed at their home for 20–30 minutes in the language (French and local language known as Ewondo) they understood the best. A structured questionnaire established by us, consisting of 21 questions distributed in 3 sections, was used. The first part of the questionnaire was focused on socio-demographic variables on age, gender, education levels, marital status, and number of family members, as recommended by<sup>[22]</sup>, while the second part captured information about fish in general as well as on farmed and wild fish. In the third part, the respondents were interviewed about their habits, preferences and perceptions on fish consumption particularly farmed fish.

### Statistical analysis

Data collected was keyed, verified for consistency and analyzed statistically using the Statistical Package for the Social Sciences (SPSS) for Windows version 20 (IBM-SPSS Inc., Chicago, IL, USA). Descriptive statistics were used where appropriate. Proportions were compared using Pearson’s chi-square ( $\chi^2$ ) and Fisher’s exact tests. Logistic regression analysis was used to identify factors associated with consumption of fish and farmed fish. All results were considered statistically significant at P-value less than 0.05.

## Results

### Socio-demographic characteristics of the respondents included in the study

Table 1 summarizes the socio-demographic characteristics of fish consumers enrolled with regard to the study areas. A total of 307 respondents aged  $31 \pm 10$  years on average were included in the study. They were mainly females (57.0%), attended secondary level education (59.9%), married (56.0%) and belong to the “Beti” ethnic group (76.5%). Besides, the occupation of

the household head was mainly worked in formal sector (52.1%) and they mostly lived in households of less than five members (59.6%). Likewise, these patterns were also observed in all the three study areas (Table 1).

**Table 1:** Socio-demographic characteristics of respondents

Variables	Mefou-Et-Afamba (n = 89)		Mfoundi (n = 185)		Nyong Et So'o (n = 33)		Total (n = 307)	
	n	%	n	%	n	%	n	%
<b>Gender</b>								
Female	44	49.4	110	59.5	21	63.6	175	57
Male	45	50.6	75	40.5	12	36.4	132	43
<b>Age (years)</b>								
≤18	2	2.2	12	6.5	0	0,0	14	4.6
[19 - 30]	43	48.4	107	57.9	14	42.4	164	53.4
[31 - 40]	20	22.5	50	27	12	36.4	82	26.7
[41 - 50]	14	15.7	15	8.1	6	18.2	35	11.4
> 50	10	11.2	1	0.5	1	3	12	3.9
<b>Level of education</b>								
Primary	22	24.7	16	8.6	10	30.3	48	15.7
Secondary	61	68.6	104	56.3	19	57.6	184	59.9
University	6	6.7	65	35.1	4	12.1	75	24.4
<b>Marital status</b>								
Single	26	29.2	92	49.7	10	30.3	128	41.7
Married	57	64	92	49.7	23	69.7	172	56
Widow(er)	3	3.4	1	0.5	0	0	4	1.3
Divorced	3	3.4	0	0	0	0	3	1
<b>Occupation</b>								
Formal sector	46	51.7	89	48.1	25	75.8	160	52.1
Informal sector	39	43.8	74	40	7	21.2	120	39.1
Unemployed	4	4.5	22	11.9	1	3	24	8.8
<b>Ethnic groups</b>								
Bamileke	6	6.7	27	14.5	1	3	34	11.1
Beti	73	82	132	71.4	30	90.9	235	76.5
Other	10	11.3	26	14.1	2	6.1	38	12.4
<b>Family size</b>								
≤ 5	44	49.4	125	67.6	14	42.4	183	59.6
[6 - 10]	35	39.4	54	29.2	11	33.3	100	32.6
> 10	10	11.2	6	3.2	8	24.3	24	7.8

### Preferences of the respondents regarding fish species consumed

Places reported by the respondents for purchase fish included fishmongers, fishing pond, local markets and fishermen (Table 2). Fishmongers were the main place to purchase fish according to respondents, followed by markets and fishermen particularly in the two rural areas, Mefou-Et-Afamba (39.3%) and Nyong-Et- So'o (43.8%) respectively. According to them, they purchase fish from fishpond depending to period or by affinity with fish farmer.

Mackerel and others fish (African spade fish, Croakers, Machoiron banderille, etc) were the most purchased fishes within the households irrespective of the studied area ( $P = 0.02$ ). The consumption pattern was different for the other fish species reported in the study. Various fish species have been reported by interviewees to be consumed in their households as presented in Table 2. Indeed, according to respondents freshwater fish the most preferred were Carp (49.1%,  $P = 0.23$ ) and Catfish (31.6,  $P < 0.0001$ ) followed by Kanga and Tilapia. Snake fish (7.2%,  $P < 0.0001$ ) was the less preferred fish because of different reasons (Unavailability, cost, lack of knowledge).

Respondents specified more preferred wild-caught fish than farmed fish irrespective of the studied areas ( $P = 0.0004$ ). In one of the rural areas (Mefou-Et-Afamba), respondents (22.7%) declared to consume in preference farmed fish in comparison to the both other study areas, particularly during the period of ponds draining.

Among the other forms of fish also sold in this region, some respondents within rural and urban areas declared to purchase

and to consume more smoked and dried fish particularly farmed fish when it is available, because of its good taste. In the three areas, the most preferred transformed freshwater fish is Catfish (48.4%), followed by Carp (28.9%) and then Kanga (17.4%). Whereas smoked/dried Snake fish (14.6%;  $P=0.003$ ), is the most preferred transformed fish in rural households of Mefou-Et-Afamba.

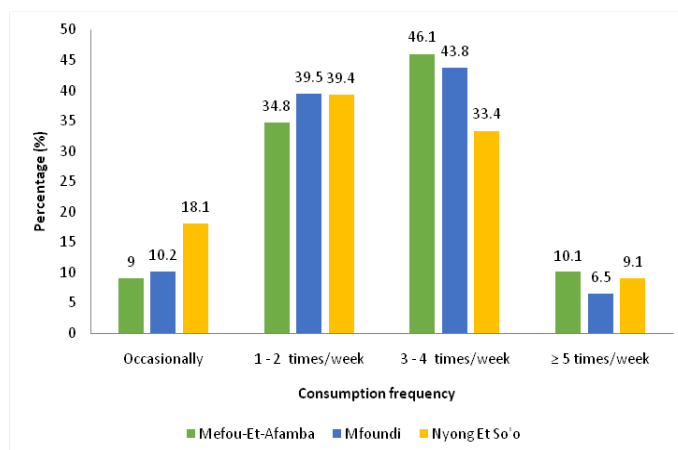
**Table 2:** Preferences of respondents

Variables	Mefou-Et-Afamba (n = 89)		Mfoundi (n = 185)		Nyong Et So'o (n = 33)		Total (n = 307)		P-value
	n	%	n	%	n	%	n	%	
<b>Preferred animal proteins sources</b>									
Meat/Fish	15	16.9	24	13	3	9.1	42	13.7	0.77
Fish	56	62.9	121	65.4	24	72.7	201	65.5	
Meat	18	20.2	40	21.6	6	18.2	64	20.8	
<b>Place of fish purchase</b>									
Fishmonger, yes (n, %)	69	77.5	172	94	29	90.5	270	88.8	0.0003*
Fishing pond, yes (n, %)	25	28.1	20	10.9	7	21.9	52	17.1	0.001*
Markets, yes (n, %)	35	39.3	71	38.8	8	25	114	37.5	0.32
Fishermen, yes (n, %)	28	31.5	21	11.5	14	43.8	63	20.7	< 0.0001*
<b>Preferred fish species for consumption</b>									
Tilapia, yes (n, %)	24	26.9	32	17.5	12	37.5	68	22.4	0.02*
Carp, yes (n, %)	38	42.7	92	50.3	19	59.4	149	49.1	0.23
Catfish, yes (n, %)	45	50.6	38	20.8	13	40.6	96	31.6	< 0.0001*
Kanga, yes (n, %)	31	34.8	24	14.8	10	31.3	68	22.4	0.0004*
Mackerel and others, yes (n, %)	70	78.7	166	90.7	28	87.5	264	86.8	0.02*
Snake fish, yes (n, %)	15	16.9	5	2.7	2	6.3	22	7.2	0.0001*
<b>Preferred fresh fish</b>									
Wild-caught fish	48	54.6	89	48.1	26	78.7	165	53.7	0.0004*
Farmed fish	20	22.7	29	15.7	2	6.1	52	16.9	
The both type of fishes	16	18.2	24	13	3	9.1	42	13.9	
No idea	5	5.6	43	23.2	2	6.1	48	15.6	
<b>Preferred type of transformation</b>									
Smoked, yes (n, %)	75	84.3	150	81.1	26	78.8	251	81.8	0.7303
Dried, yes (n, %)	45	50.6	67	36.2	15	45.5	127	41.4	0.0668
Salted, yes (n, %)	8	9	22	11.9	2	6.1	32	10.4	0.523
Braised, yes (n, %)	3	3.4	38	20.5	5	15.2	46	15	0.0010*
Fermented, yes (n, %)	1	1.1	3	1.6	0	0	4	1.3	0.7393
<b>Preferred transformed species</b>									
Tilapia, yes (n, %)	11	12.4	33	18	8	25	52	17.1	0.23
Carp, yes (n, %)	25	28	60	32.8	3	9.4	88	28.9	0.02*
Catfish, yes (n, %)	50	56.2	76	41.5	21	65.6	147	48.4	0.009*
Kanga, yes (n, %)	17	19.1	27	14.8	9	28.1	53	17.4	0.16
Mackerel and others, yes (n, %)	42	47.2	126	68.9	27	84.4	195	64.1	< 0.0001*
Snake fish, yes (n, %)	13	14.6	7	3.8	1	3.1	21	6.9	0.003*

Data are presented as frequency and percentage; Pearson's chi-square test was used to compare proportions; \*: statistically significant

### Habits of fish consumption

Nearly 40% of all respondents consumed fish 3-4 times/week (Figure 2). The highest rate was reported in those living in the Mefou-et-Afamba rural area (46.1%) compared to their counterparts from Mfoundi (43.8%) and Nyong-Et-So'o (33.4%), urban and rural areas respectively. In one of the rural area (Nyong-Et-So'o), according to respondents, until 18,1% of households consume fish per occasion.



**Figure 2:** Consumption frequency of fish within households of selected areas.

### Perceptions of the respondents

Most of consumers were not able to distinguish between wild-caught fish and farmed fish (Table 3). The highest rate was reported in those living in urban area, Mfoundi (61.7%) compared to their rural counterparts from Mefou-Et-Afamba (43.9%) and Nyong-Et-So'o (50.0%) areas. In addition, the differences were statistically significant ( $P = 0.001$ ). The main reasons used for distinction included taste (50%) and aspect (36.9%) irrespective of the study areas. According to them, fresh farmed fish has a less tasty or bad taste compared with its wild-captured counterpart. Thus, most of the respondents (45.2 %;  $P = 0.001$ ) did not appreciate the taste of farmed fish principally because of prejudice of its fresh form, the others respondents did not really know the origin of smoked fresh-water fish (Farmed or captured) they consume. In some rural and urban areas, respondents stated that the smoking could improve the taste of farmed fish.

**Table 3:** Perception of wild-caught fish versus farmed fish within selected areas

Variables	Mefou-Et-Afamba (n = 89)		Mfoundi (n = 185)		Nyong Et So'o (n = 33)		Total (n = 307)		P-value
	n	%	n	%	n	%	n	%	
Distinction between wild and farmed fish									
No	39	43.9	113	61.7	16	50,0	168	55.3	0.001*
Yes	48	53.9	54	29.5	14	43.8	116	38.2	
Often	2	2.2	16	8.8	2	6.3	20	6.5	
Reasons									
Aspect (length)	13	26.5	30	45.5	5	33.3	48	36.9	0.23
Taste	30	61.2	26	39.4	9	60,0	65	50,0	
Appearance (Colour)	6	12.2	8	12.1	1	6.7	15	11.5	
Freshness	0	0,0	2	3,0	0	0,0	2	1.5	
Perception of smoked farmed fish									
Bad taste	11	26.2	18	24.7	9	64.3	38	45.2	0.001*
Good taste	26	61.9	40	54.8	2	14.3	23	27.4	0.004*
Less tastier	5	11.9	15	20.8	3	21.4	23	27.4	0.001*

Data are presented as frequency and percentage; Pearson's chi-square test was used to compare proportions; \*: statistically significant

### Determinants of the consumption of fish and farmed fish

Two factors namely level of education and family size were found to be associated with fish consumption. Indeed, respondents who attended secondary and university education consumed fish three times (OR = 2.81; 95% CI 1.11 – 7.08;  $P = 0.02$ ) or more (OR = 3.35; 95% CI 1.02 – 11.01;  $P = 0.04$ ) than their counterparts of primary education. Indeed, those having attended university level had better knowledge on health benefits of fish than those of primary (42.7% versus 25.4%,  $P = 0.0004$ ). Those living in households whose family size was more than 10 members consumed fish (OR = 0.26; 95%CI 0.08 – 0.86;  $P = 0.02$ ) less than those living in households having less than 5 members (Table 4).

Besides, farmed fish consumption pattern was significantly influenced by area of study, age of respondents and awareness on the benefits of fish consumption. The occupation of the head of household, particularly for the informal sector, has also an influence on farmed fish consumption. Consumption of farmed fish in the urban area (Mfoundi) were lower (OR = 0.20; 95%CI 0.06



– 0.73; P = 0.01) than in rural area, Mefou-Et-Afamba. Conversely the phenomenon evolved with consumers aged 19-30 years (OR = 5.47; 95%CI 1.54 – 55.04; P = 0.01) and awareness on the benefit of fish consumption (OR = 3.56; 95%CI 1.06 – 11.93; P = 0.03) (Table 4).

**Table 4:** Factors controlling consumption of fish and farmed fish

Factors	Categories	Fish consumption		Farmed fish consumption	
		AOR (95%CI)	P-value	AOR (95%CI)	P-value
Study areas	Mefou-Et-Afamba	1		1	
	Mfoundi	0.97 (0.38 - 2.44)	0.94	0.21 (0.06 - 0.77)	0.01*
	Nyong Et So'o	3.32 (0.71 - 15.46)	0.13	0.17 (0.02 - 1.86)	0.14
Gender	Female	1		1	
	Male	0.70 (0.33 - 1.49)	0.35	1.42 (0.56 - 3.57)	0.46
Age (years)	≤18	1		1	
	[19 - 30]	0.81 (0.09 - 7.47)	0.86	6.25 (1.60 - 64.63)	0.01
	[31 - 40]	1.04 (0.10 - 10.32)	0.96	3.34 (0.30 - 36.83)	0.32
	[41 - 50]	0.52 (0.04 - 6.20)	0.61	2.97 (0.20 - 44.00)	0.43
	> 50	0.77 (0.04 - 15.64)	0.86	3.66 (0.14 - 53.18)	0.97
Educational level	Primary	1		1	
	Secondary	2.94 (1.08 - 7.99)	0.02*	0.85 (0.22 - 3.35)	0.82
	University	3.42 (1.02 - 12.01)	0.04*	0.85 (0.22 - 3.35)	0.83
Marital status	Single	1		1	
	Married	1.79 (0.80 - 3.98)	0.15	1.34 (0.51 - 3.57)	0.55
Occupation	Formal sector	1		1	
	Informal sector	0.92 (0.39 - 2.19)	0.84	2.13 (0.77 - 5.86)	0.14
	Unemployed	0.31 (0.10 - 0.97)	0.04*	0.51 (0.08 - 3.04)	0.46
Ethnic groups	Others	1		1	
	Bamileke	0.68 (0.13 - 3.64)	0.65	0.50 (0.07 - 3.51)	0.59
	Beti	0.45 (0.12 - 1.70)	0.24	0.99 (0.18 - 5.40)	0.86
Family size	≤ 5	1		1	
	[6 - 10]	1.45 (0.53 - 3.96)	0.47	2.34 (0.83 - 6.59)	0.11
	> 10	0.25 (0.07 - 0.86)	0.02*	3.06 (0.49 - 19.32)	0.23
Aware on benefits from fish consumption	No	1		1	
	Yes	1.08 (0.40 - 2.29)	0.86	3.67 (1.05 - 12.80)	0.04*

## Discussion

The decisions to purchase and to consume food are influenced by a series of factors such as cultural, psychological, lifestyles, culinary trends and diet restrictions<sup>[23]</sup>. In our findings, most of respondents preferred fish than meat consumption irrespective of the residential area and livelihood. Their marital status which are mainly married and their family size could influence those cultural and food habits what should participate in the attitude and intention to consume more fish than meat. That it is justified by their frequency of fish consumption for most of respondents which is of 3-4 times per week. Indeed, respondents declared that their main factors influencing to purchase fish depended on cost, availability and habits within households. Furthermore, among respondents, the most represented ethnic group was the Beti whom is traditionally major freshwater fish consumer particularly in rural areas. This tribe is used to many traditional recipes such as ‘Ndomba’, ‘Bongo’, ‘Nam wondo’ and peanut sauce made of freshwater fish as main ingredient. Unfortunately, according to them, those recipes seem to disappear with time due to unavailability or lack of knowledge of farmed fish species available. They stated that freshwater fish was less and less accessible in the markets which made them choose what available, particularly imported frozen fish which are relatively cheap in the market. This could justify why the common place to purchase fish in this Region, particularly in urban area, is fishmonger followed by local open air market where we find also imported frozen fish and some fresh fish.

However, during the high period of fishing, particularly inland ones within this Region, most of respondents declared to consume mainly Carp, followed by Catfish, Kanga, Tilapia and in last Snake fish. Their main reasons were because those fishes have relatively more flesh, good taste and fewer bones compared to tilapia. This was also found by<sup>[24]</sup> in Kenya but was different from that reported by<sup>[25]</sup> in South Africa where Tilapia was the main consumed fish. According to<sup>[26]</sup>, geographical factors affect preferences

and consumption patterns of some products. Our findings concluded that the lack or the scarce of knowledge about some fish species, particularly Snack fish in this study within urban area, doesn't encourage also consumers to purchase it.

In our study, although most of respondents declared to be more focused on wild-caught fish than farmed fish and they were not able to distinguish both counterparts. Those results are partially in contradiction with those obtained in Croatia by<sup>[17]</sup>, where consumers give higher preferences for wild fish and detect differences between the taste of wild and farmed fish. Our study emphasizes that, the main reasons of rural respondents especially, to preferred wild-caught fish were because of their proximity of lake or river and their affinity with fishermen. And unfortunately, the periods of ponds draining by fish farmers are very scarce (one or two times every year), what could not allowed them to get farmed fish regularly, and so, it is difficult to make distinction. The others reasons according to them, are justified by the good taste and better quality of wild fish and the absence of chemical substances like growth promoter, medicines and antibiotics residues compared to farmed fish<sup>[27-29]</sup>. Obiero, K.O., et al.<sup>[24]</sup> concluded that the better taste of wild-caught fish is attributed to the presence of natural elements, thought health-improving, from the bottom mud of lake waters. Studies in some countries have shown that farmed fish species are perceived as of lower quality and less safe than their respective wild equivalents<sup>[23,29]</sup>. Moreover, our study findings reported also that few proportions of respondents indicated to have no option concerning the source (farmed or wild) because of their indifference with the taste and freshness of fish.

In the Centre Region of Cameroon, the main types of processing of fish are smoking and/or drying. Asmah, R.<sup>[30]</sup> highlighted that fish products in sub-Saharan Africa are typically smoked or dried. It's an easy solution in an environment poor in storage and transformation infrastructures. In our study, some respondents declared to consume more smoked and/or dried fish particularly farmed fish, because processing could improve its taste. Among freshwater fish species, most of the respondents prefer smoked or dried Catfish and Carp. This result does not corroborate that of<sup>[24]</sup>, who reported that the least preferred fish product was smoked fish particularly for Catfish and Tilapia.

Some factors such as level of education, household head's occupation and family size revealed to be significantly associated with fish consumption. Most of respondents have fewer difficulties to understand messages from different communication media such as papers, advertising spots and radio or television. Previous studies concluded that high education individuals were more conscious of benefits from fish consumption than those of low educated counterparts<sup>[31,32]</sup>. This finding did not corroborate that of<sup>[27]</sup>. According to<sup>[19]</sup>, the occupation greatly influence ability to purchase and consume fish within households. In our study, unemployed heads of household were less likely to consume fish than their counterparts working in both formal and informal sectors. Besides, this findings point out that the household food insecurity as a consequence of low incomes which increase the risk for purchase low or bad quality fish in order to satisfy the population<sup>[15,24,33]</sup> which are generally large in Africa. It is clear that brain function and heart health, among others, become inaccessible to low-income individuals<sup>[33]</sup>.

However, consumption of farmed fish was significant-

ly associated with area of residence, age and awareness on fish consumption benefits. Thus, its consumption was lower in urban area (Mfoundi) than in rural areas. Influence of area on fish consumption has also been reported by other authors<sup>[1,9,26]</sup>. Furthermore, low level of knowledge on potential of farmed fish may also jeopardize the chances of consuming farmed fish<sup>[34]</sup>. In our study findings old people were more conscious on quality, safety and nutritional values of fish and particularly they stated to prefer fish because of its good and soft flesh for their tooth<sup>[35]</sup>.

## Conclusion

Consumer's image in this Region on farmed fish is disregarded particularly in urban area. Preferences in fish and farmed fish consumption are influenced by factors including study area, age, level of education and awareness on benefits from fish consumption. These findings provide valuable information's for the aquaculture sector especially to plan improving strategies of production and feeding for the promotion of quality of farmed fish.

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