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Knowledge of the risks and benefits of fish consumption among the populations of Sibiti

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Abstract

The aim of this work was to gain a comprehensive understanding of the public's awareness, perceptions, and knowledge regarding the potential advantages and disadvantages associated with eating fish in Sibiti. The main source of animal protein in Sibiti is games, but logging societies have led to a shortage of local meat and low fish production. To improve animal protein supply, local fishing can be developed to increase fish production. Fish are rich in essential nutrients and have a reduced risk of diseases. The investigation took place in Sibiti, the capital of the Lékoumou department in the southwest of the Republic of Congo. A total of 100 people were interviewed, with data collected through in-person surveys. The majority of respondents, aged 26-45, considered fish nutritious but overlooked health benefits like reducing heart disease, cancer, and life expectancy. They were unaware of vitamin D and omega-3 fatty acid intake, and potential dangers like PCBs, heavy metals, and parasites. The effects of certain constituents and contaminants were not well understood. The Lékoumou department should be educated on the benefits and risks of fish consumption, as this knowledge promotes safe consumption. However, excessive consumption can pose health risks, and benefits depend on factors like frequency, species, processing methods, education, and income.

Keywords: Knowledge; Fish; Benefits; Nutritional; Risks; Contaminants

1. Introduction

In Sibiti city, games are the main source of animal protein, but recently, logging societies have opened avenues for hunters, leading to a massacre of wild animals. Most of the proceeds from hunting are diverted to urban markets for greater profit. In addition, fish production is low, which leads to a shortage of local meat (1). Frozen products from Pointe-Noire dominate the market but are poorly transported, poorly preserved, and too expensive for rural populations, causing malnutrition in rural areas. Information is lacking, but in 2012, this department already had the highest stunting rate in the country, at around 39% (2).

Among the possible solutions to improving the supply of animal proteins in Lékoumou is the development of local fishing to increase fish production. However, consumption must increase and therefore stimulate supply. This requires consumers to be interested in the potential health and physiological benefits offered by fish meat.

Indeed, fish are rich in high-quality proteins, omega-3 fatty acids, vitamins D and B12, iodine, and minerals. These nutrients are essential for the development and proper functioning of the brain, nervous system, bones, and immune

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system (3–8). Oily fish, such as salmon, mackerel, and tuna, are an important source of omega-3 fatty acids. These fatty acids are beneficial for cardiovascular health because they may reduce the risk of heart disease (9, 10). Omega-3 fatty acids found in fish are essential for cognitive development, especially in unborn and young children (11–13). Regular consumption of fish is associated with a reduced risk of certain diseases, such as cardiovascular disease, high blood pressure, certain types of cancer, and allergies (14–17).

However, some fish can contain high levels of heavy metals such as mercury as well as environmental pollutants like PCBs (polychlorinated biphenyls). These substances can have adverse health effects, particularly in pregnant women and young children (18, 19). Some people may be allergic to fish, which can lead to serious allergic reactions (20). Furthermore, consuming fish infected with parasites poses risks to human health, causing various problems, including gastrointestinal problems and serious infections. Some parasites can infect the human digestive tract, causing nausea, vomiting, diarrhea, and abdominal pain. Anisakiasis is a disease caused by anisakis parasites in certain marine fish (21). Diphyllobothrium, a parasite found in some freshwater fish, can cause fatigue, diarrhea, and weight loss (22). Other parasites, such as protozoa, flatworms, and roundworms, may also be present in some fish.

The aim of this work is to inform individuals, communities, and decision-makers about the positive and negative aspects related to fish consumption. The specific objective is to analyze public perceptions of fish consumption.

2. Material and method

The investigation into the risks and benefits of fish consumption in Sibiti was carried out in accordance with the methodology below.

2.1. Definition of survey objectives

The specific objective for assessing perceptions of risks, benefits, and health-related concerns was set.

2.2. Literature paper

A literature review to understand previous research on the topic, methods used, and key findings was conducted.

2.3. Development of the questionnaire

A structured questionnaire, based on the objectives of the survey and including questions on knowledge of the benefits and risks of fish, was designed. A form of 35 questions plus a section reserved for comment was completed immediately by the investigator in accordance with the responses of each respondent. This form was inspired by that established by (23). The questions focused on the knowledge of the respondents, the benefits and risks linked to the consumption of fish, as well as the main constituents of fish capable of inducing beneficial or harmful effects for consumers.

2.4. Sampling

The investigation took place in the town of Sibiti and surrounding areas. The commune of Sibiti is the capital of the Lékoumou department, located in the southwest of the Republic of Congo. It has approximately 32,296 inhabitants and brings together all the ethnic groups of the department and a few foreigners and nationals from other departments of the country (24). In total, 100 people were interviewed.

2.5. Data collection

The data was collected through in-person surveys. An investigator was trained to ensure consistency in data collection. The respondents were met randomly and interviewed individually. Interviews took place in French or the local dialect.

2.6. Ethical considerations

The survey was carried out in accordance with ethical principles, including informed consent and data confidentiality.

2.7. Statistical analysis

The data were processed by the Chi-square test at the 5% significance level. Differences were considered significant for observed chi-square values (χ^2_{obs}) above the threshold values (χ^2_0) in accordance with the degree of freedom.

3. Results

3.1. Sample characteristics

The sample characteristics are shown in Tables 1 to 3. The results of their analysis all yielded χ^2_{obs}values above the threshold values at the corresponding degree of freedom and at α = 0.05, indicating that not all observed percentages were significantly equal. It appears that the majority of respondents (66%) were adults aged 26 to 45; 54% of households surveyed had 3 to 4 people; and more than 80% declared having a monthly income of less than 50,000 CFA.

Table 1 Ages of respondents

Age	Effective	Percentage (%)	Statistics Values
Less than 25 years old	2	2.0	χ^2_{obs} = 36 dof = 4 α = 0.05 $\chi^2_0 = 9{,}49$
[26 to 35 years old]	14	14.0	
[36 to 45 years old]	36	36.0	
[46 to 45 years old]	30	30.0	
Above 45 years old	18	18.0	
Total	100	100.0	

Table 2 Household sizes

Number of persons per household	Effective	Percentage (%)	Statistics Values
1 to 2	33	33.0	χ^2_{obs} =60.25 dof = 2 α = 0.05 $\chi^2_0 = 5{,}99$
3 to 4	54	54.0	
More than 5	13	13.0	
Total	100	100.0	

Table 3 Monthly income

Income Monthly (FCFA)	Effective	Percentage (%)	Statistics Values
Less than 50000	80	80.0	χ^2_{obs} =80.25 df=2 α = 0.05 $\chi^2_0 = 5{,}99$
[510000-1000000]	17	17.0	
Greater than 1000000	3	3.0	
Total	100	100.0	

3.2. General benefits of fish

The collected data is summarized in Table 4. The results of the analysis of these data gave observed values of χ^2_{obs}, all above the threshold values at 0.05 at the corresponding degree of freedom. This indicates that, for all questions, there were significant differences between the numbers of the different response categories. It emerged that a majority of the 100 respondents said that fish was nutritional (96%), healthy (81%), and safe (65%). Some explained that fish, being in water, was the cleanest and safest food.

Table 4 General benefits on fish

Item	Completely agree	Neither disagree nor agree	Disagree	χ^2_{obs}	dof	χ^2_0
Fish are nutritious	96	4		55.12	1	3.84
Fish are healthy	81	19		32.02	1	3.84
Fish are safe	65	33	2	54.74	2	5.99

3.3. Health benefits

On the other hand, the majority of respondents ignored the benefits linked to the consumption of fish mentioned here and there, such as the reduction in coronary heart disease (90%) and cancer (90%), the extension of life expectancy (68%), stimulating brain development (57%), strengthening intelligence (57%), improving bone development (74%), and improving physical performance (70%) (Table 5).

Table 5 Knowledge of health benefits

Item	Totally agree	Neither disagree nor agree	Disagree	χ^2_{obs}	dof	χ^2_{0l}
Reduces the risk of coronary heart disease	10	90		277.00	1	3.84
Reduces the risk of certain cancers	1	90	8	283.57	2	5.99
Extend people's lives	32	68		121.68	1	3.84
Stimulates brain development	42	57	1	88.75	2	5.99
Makes people smart	42	57	1	88.75	2	5.99
Improves bone development	26	74		157.32	1	3.84
Make people strong	6	70	24	148.21	2	5.99

3.4. Fish content level

Table 6 Fish content level

Item	Totally agree	Neither disagree nor agree	Disagree	χ^2_{obs}	dof	χ^2_0
Vitamin D	34	64	2	113.01	2	5.99
Omega-3 fatty acids	42	57	1	88.75	2	5.99
Dietary fiber	80	18	2	81.75	2	5.99
PCBs		94	6	48.52	1	3.84
Dioxins		25	75	163.75	1	3.84
Residues of pesticides and other chemicals		28	72	144.88	1	3.84
Heavy metals	5	95		321.75	1	3.84
Drug residues	14	83	3	224.11	2	5.99
Dyes	1	95	4	325.41	2	5.99
Microorganisms	59	39	2	54.02	2	5.99
Parasites		80	20	198.00	1	3.84

The results, given in Table 6, show that respondents from Sibiti also claimed to be unaware of the intake of compounds such as vitamin D and omega-3 fatty acids (57%) from fish, except for fibers, 80% of whom said they were aware of their presence in fish. The majority of respondents also declared that they were unaware of the possible presence in fish of potentially dangerous elements such as PCBs (94%), heavy metals (95%), and parasites (80%). But 75% and 95% remained doubtful about the potential presence of dioxins and pesticide residues, respectively, in fish, while 59% of them said yes to possible contamination of fish by microorganisms.

3.5. Effects of fish components

Concerning the effects of certain constituents and possible contaminants in fish, 39 and 80% of respondents answered yes to the positive effects of omega 3, vitamin D, and dietary fiber, respectively (Table 7). Other respondents said they were unaware that PCBs (86%), drug residues (62%), heavy metals (74%), and dyes (80%) constitute health dangers. Among those who spoke out in favor of negative effects were 50% for dioxins, 49% for pesticide residues, 77% for parasites, and 51% for microorganisms.

Table 7 Effects of fish components

Components	Negative	Neutral	Positive	Do not know	χ^2_{obs}	ddl	χ^2_{seuil}
Vitamin D		6	49	45	95.71	2	5.99
Omega-3 fatty acids		14	39	47	65.71	2	5.99
Dietary fiber			86	14	27.72	1	3.84
PCBs		14		86	27.72	1	3.84
Dioxins	50	1		49	68.44	2	5.99
Residues of pesticides and other chemicals	49	4	1	46		3	5.99
Heavy metals		24	2	74	164.61	2	5.99
Drug residues		17	21	72	143.25	2	5.99
Dyes	1	19	80		211.41	2	5.99
Microorganisms	51	6		43	96.91	2	5.99
Parasites	77			23	15.03	1	3.84

4. Discussion

Considering the results obtained, it appears that the majority of respondents in Sibiti were undecided on most of the questions asked. Of course, more than 65% of them affirmed that the consumption of fish was beneficial to their health but were unable to say what the main benefits were. They were unaware, for example, that regular consumption of fish provides vitamin D, which is essential for good bone health and can reduce the risk of cardiovascular disease and ensure brain growth and memory development. The majority of respondents were convinced that fish living in the water were healthy and safe and could not be harmful to their health, unaware of the risks associated with the consumption of certain contaminated or naturally toxic fish.

In view of the above, it would be desirable for the populations of the Lékoumou department to be made aware and educated by existing means on the benefits and risks linked to the consumption of fish. This knowledge is among the factors in promoting safe fish consumption, as suggested by some authors (25, 26). However, it should be noted that excessive consumption of fish nutrients, however beneficial they may be, can present health risks for the consumer (27) The benefits mentioned by many authors also depend on factors such as frequency of consumption, fish species and processing methods, educational level, and income (28, 29) .

5. Conclusion

The study examines public perceptions of fish consumption in Sibiti, the capital of the Lékoumou department in the southwest of the Republic of Congo. While gaming remains the primary source of animal protein, logging activities have contributed to a decline in local meat availability and reduced fish production. A significant number of participants, aged

26-45, acknowledge the nutritional value of fish but tend to underestimate its health benefits, such as lowering the risks of heart disease, cancer, and increasing life expectancy. The research aims to raise awareness among individuals, communities, and policymakers regarding both the advantages and drawbacks of consuming fish in Sibiti.

Compliance with ethical standards

Disclosure of conflict of interest

The authors certify that they have no affiliation with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

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