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**Advances in biology through
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environmental sciences**
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Advances in Biology through Agronomy, Aquaculture, Coastal and Environmental Sciences, Volume II, is an e-book that continues the work of the first version (<https://editorapantanal.com.br/ebooks/2023/advances-in-biology-through-agronomy-aquaculture-coastal-and-environmental-sciences/ebook.pdf>), published in 2023 by Leandris Argente-Martínez and Ofelda Peñuelas-Rubio.

Our e-book compiles 25 manuscripts that present scientific results and reviews based on biological aspects. All of them contribute to explaining the responses of living organisms to agricultural, aquaculture, and coastal ecosystems, as well as those facing fragility or threat of climate change. This e-book was edited by Leandris Argente-Martínez, Ofelda Peñuelas-Rubio, and Joe Luis Arias-Moscote, members of the Consolidated Academic Group ITVAYA-CA-3.

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Consumer preferences and value-added opportunities in the commercialization of *Oreochromis niloticus* in Tenosique, Tabasco, México

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ABSTRACT

Tilapia, *Oreochromis niloticus*, is among the most important aquaculture species worldwide because of its high adaptability, rapid growth, and broad market acceptance. In this context, the present study aimed to analyze consumer preferences and value-added opportunities in the commercialization of tilapia in Tenosique, Tabasco, Mexico. A quantitative, descriptive, and cross-sectional study was conducted through the application of 303 surveys to fish consumers. The data were analyzed using descriptive statistics. The results revealed that tilapia is a frequently consumed product, with a predominant preference for fresh (32%) and whole (54%) presentations, as well as fried preparations (38%). The main factors influencing purchasing decisions were taste (28%), place of purchase (28%), and health benefits (23%). Additionally, a high willingness to purchase value-added products (88%) and tilapia from certified production systems (94%) was identified, highlighting opportunities to strengthen commercialization through product differentiation. In conclusion, tilapia consumption preferences in Tenosique are determined by sensory attributes, accessibility, and perceived quality, allowing the identification of strategies aimed at value generation and strengthening the aquaculture value chain. These findings provide relevant evidence for decision-making in the sector and open avenues for future research incorporating inferential approaches to better understand consumer behavior.

Keywords: tilapia; consumer behavior; fish consumption; value-added products; aquaculture marketing.

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INTRODUCTION

Aquaculture has become among the fastest-growing food production sectors worldwide, contributing significantly to food security, nutrition, and economic development. According to the Food and Agriculture Organization (FAO), global fish consumption has steadily increased in recent decades, driven by the recognition of its nutritional benefits and its role in healthy diets (FAO, 2022).

Among aquaculture species, tilapia, *Oreochromis niloticus*, stands out because of its high adaptability to diverse production systems, rapid growth, and wide market acceptance, positioning it as one of the most widely cultivated species globally. Its economic and productive relevance has increased significantly in recent years, driven by the growing demand for affordable protein and the expansion of both local and global markets (El-Sayed, 2019). In this context, consumer preference for fish products, including tilapia, has been shown to be influenced by attributes such as price, product presentation, origin, and production methods, which directly affect purchasing decisions (Andoh-Odoom et al., 2024; Owusu et al., 2025).

In southeastern Mexico, particularly in the state of Tabasco, aquaculture represents a relevant activity with significant potential for economic development, especially in areas with abundant water resources. The municipality of Tenosique, located along the Usumacinta River, is characterized by the presence of aquaculture production units, cooperatives, and commercial farms dedicated to fish production. However, there is limited scientific evidence addressing local consumer preferences for tilapia, which restricts the ability of producers to make informed decisions regarding product diversification and market positioning, as commercialization is predominantly based on fresh products sold directly at the farm level (Rusdian et al., 2023; Rusdian et al., 2024). Therefore, the objective of this study was to analyze consumer preferences for tilapia in Tenosique, Tabasco, to identify the factors influencing consumption, propose more efficient commercialization strategies, and contribute to strengthening the aquaculture value chain.

MATERIALS AND METHODS

Study design

A quantitative, descriptive, and cross-sectional study was conducted to analyze consumer preferences for tilapia and the factors associated with its commercialization in the municipality of Tenosique, Tabasco, Mexico. This type of design is widely used in consumer behavior research, as it allows the characterization of consumption patterns within a specific context without manipulation of variables (Malhotra, 2019).

Study area

The study was carried out in the municipality of Tenosique, Tabasco, Mexico, which is located in the southeastern region of the country. This area is characterized by its proximity to the Usumacinta

River and by the presence of aquaculture production units, including commercial farms and cooperative societies dedicated to tilapia farming, making it a relevant setting for analyzing local consumption patterns.

Population and sample

The target population consisted of fish consumers residing in the municipality of Tenosique. A nonprobabilistic convenience sampling approach was employed, with participants selected on the basis of accessibility and availability. This sampling method is typically used in exploratory and consumer preference studies aimed at obtaining direct information from local markets (Hair et al., 2019). A total of 303 valid surveys were collected, providing a sufficient dataset for analyzing consumer preferences. Participation was voluntary and anonymous, and the confidentiality of the information was guaranteed. The data collected were used exclusively for academic and research purposes.

Instrument design and data collection

Data were collected using a structured questionnaire designed on the basis of approaches commonly used in consumer preference studies for food and fish products (Verbeke et al., 2007; Claret et al., 2012). The instrument included qualitative categorical variables organized into three analytical dimensions: a) sociodemographic characteristics, including variables such as age, sex, and occupation, to characterize the consumer profile; b) consumption habits, including frequency of fish consumption, types of products consumed, and general consumption patterns (Claret et al., 2012); and c) consumption preferences and decision-making criteria, including variables related to product presentation, place of purchase, and selection criteria such as price, quality, freshness, and origin. These attributes have been identified as key determinants in fish product acceptance and purchasing decisions (Verbeke et al., 2007; Honkanen et al., 2005). The questionnaire was administered in person at strategic locations within the municipality, including commercial areas, markets, and high-traffic zones, to capture a diverse range of consumer profiles.

Study limitations

This study employed a nonprobabilistic convenience sampling approach, which has certain limitations in terms of population representativeness. Although this type of sampling is widely used in consumer behavior research because of its operational feasibility, it does not ensure that all individuals in the population have an equal probability of being selected, which may introduce bias into the results (Hair et al., 2019; Malhotra, 2019).

Therefore, the findings reflect the preferences of the surveyed consumers within the specific context of Tenosique, Tabasco, and should be generalized to other regions with caution. Nevertheless,

this sampling approach is appropriate for obtaining preliminary and descriptive insights into consumption patterns in local markets, providing valuable inputs for decision-making in specific contexts (Etikan et al., 2016).

Data analysis

The collected data were organized and analyzed using descriptive statistics. Absolute frequencies and relative frequencies (percentages) were calculated for each variable, allowing the identification of consumption patterns, consumer preferences, and commercialization trends. This type of analysis is widely used in food preference studies for market characterization (Hair et al., 2019).

RESULTS AND DISCUSSION

Sociodemographic distribution of fish consumers

The results indicate that tilapia consumption in Tenosique, Tabasco, is influenced by a combination of sociodemographic factors, consumption habits, and product attributes that directly affect consumer decision-making. A total of 303 valid responses were obtained from fish consumers. The ages of the respondents ranged from 18 to 50 years, with the highest proportion concentrated in the 26–33 age group (Table 1).

Table 1. Sociodemographic distribution of fish consumers (n=303).

Variable	Category	Percentage (%)
Gender	Female	54
	Male	46
Age (years)	18 - 25	19
	26 - 33	28
	34 - 41	27
	42 - 50	26
Occupation	Employer	14
	Employee	48
	Homemaker	38

Source: Own elaboration.

This distribution reflects a diverse sociodemographic profile, which is essential for understanding the consumption patterns of fish and seafood products. Additionally, 54% of the respondents were female, and 46% were male. With respect to occupation, most participants were classified as employees (48%), followed by homemakers (38%) and employers (14%). These findings suggest that tilapia consumption is associated with economically active population groups, which is consistent with the findings of Claret et al. (2012), who reported that age and occupational profile significantly influence fish consumption patterns. The slight predominance of female participants also aligns with previous studies

indicating that food purchasing decisions are often influenced by women, particularly in household contexts.

Consumption habits and product preferences

Table 2 presents the consumption preferences for tilapia. The most relevant findings indicate that respondents reported a weekly consumption frequency (38%), suggesting that tilapia is part of the regular diet in the study area. With respect to purchasing preferences, fresh (32%) and prepared products (31%) tended to have similar preferences, whereas whole fish was the most preferred presentation (54%).

Table 2. Consumer preferences for tilapia fish consumption (n=303).

Variable	Category	Percentage (%)
Consumption frequency	Weekly	38
	Biweekly	32
	Monthly	30
Purchase preference	Frozen	25
	Fresh	32
	Prepared	31
	Canned	13
Product presentation preference	Whole	54
	Fillet	28
	Steak (cut)	18
Preparation preference	Grilled	28
	Fried	38
	Baked	18
	Wrapped	16
	(foil-cooked)	
Purchase quantity preference	0.5 - 1 kg	46
	400 - 450 g	36
	300 - 350 g	18

Source: Own elaboration.

In terms of preparation methods, fried tilapia was the most preferred material (38%), and the most common purchase quantity ranged between 0.5 and 1 kg (46%). These results reinforce the role of tilapia as an accessible source of animal protein, which is consistent with the findings of Andoh-Odoom et al. (2024), who reported that fish consumption in developing countries is strongly influenced by availability, accessibility, and cultural habits. The preference for whole and fresh presentations reflects the importance of freshness as a quality indicator, in agreement with Del Río-Zaragoza et al. (2022), who identified freshness as a key factor in fish selection in Mexico. Additionally, the preference for fried preparation suggests the influence of local culinary traditions.

Factors influencing purchasing decisions

With respect to the factors influencing purchasing decisions, consumers identified taste (28%) and place of purchase (28%) as the most important attributes, followed by health benefits (23%) and price (21%) (Figure 1). The preferred purchasing locations were restaurants or small food establishments (30%), followed by local markets (29%), street vendors (21%), and supermarkets (20%). This distribution highlights the relevance of traditional and short marketing channels in fish commercialization. These findings reinforce the role of local markets in shaping fish consumption behavior in developing regions. These findings are consistent with those of Owusu et al. (2025), who reported that fish consumption decisions are influenced by a combination of intrinsic (such as taste) and extrinsic (such as accessibility and price) factors. From a consumer behavior perspective, these results can be interpreted as part of the product evaluation process prior to purchase (Rusdian et al., 2023).

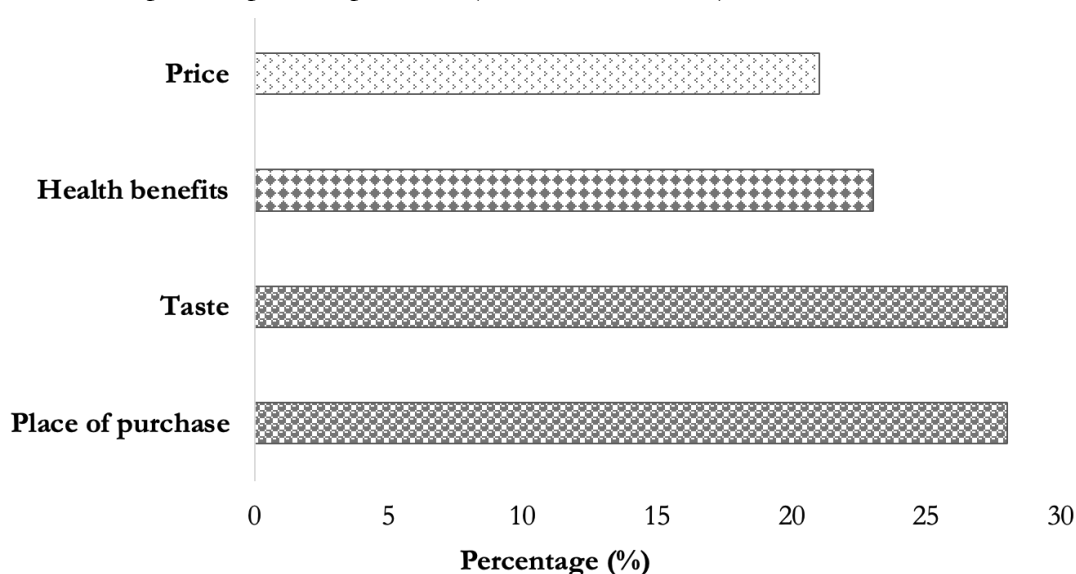


Figure 1. Distribution of the main factors influencing consumer purchasing decisions for tilapia in Tenosique, Tabasco.

Commercialization trends and value-added opportunities

Table 3 shows consumer perceptions regarding commercialization trends. A high willingness to purchase value-added tilapia products was observed (88%), particularly those offering convenience in preparation (57%). Additionally, there was a strong preference for tilapia products from certified farms (94%), indicating a growing interest in quality assurance and production standards. With respect to product presentation, 54% of the consumers preferred vacuum-packed, marinated, and frozen whole tilapia, followed by smoked products (30%) and canned products (16%). Moreover, consumers expressed interest in alternative value-added products such as nuggets (35%) and sausages (32%). These findings reveal significant opportunities for market diversification through the development of value-added products and certification strategies. The preference for traditional purchasing channels further supports

the importance of local distribution systems, as reported by Verbeke et al. (2007). Furthermore, the incorporation of value-added processes has been identified as a key strategy for improving product acceptance and competitiveness in emerging markets (Del Río-Zaragoza et al., 2022).

Table 3. Commercialization trends and value-added opportunities for tilapia consumption (n=303).

Variable	Category	Percentage (%)
Willingness to purchase value-added products	Yes	88
	No	12
Preferred type of value-added product	Easy-to-prepare products	57
	Ready-to-eat products	20
	Lack of knowledge regarding fish preparation	23
Preference for certified production	Yes	94
	No	6
Preferred presentation of value-added products	Vacuum-packed, marinated, frozen whole tilapia	54
	Smoked products	30
	Canned products	16
Interest in alternative products	Sausages	32
	Nuggets	35
	Snacks	13
	Products with souces	20

Source: Own elaboration.

CONCLUSIONS

This study demonstrates that tilapia consumption preferences in Tenosique, Tabasco, are determined by the interaction of sociodemographic factors, consumption habits, and product attributes, with freshness, taste, and place of purchase identified as key drivers of consumer decision-making. Additionally, the high willingness to purchase value-added and certified products highlights strategic opportunities for product differentiation and strengthening the aquaculture value chain, contributing to regional economic development. Overall, these findings provide relevant evidence for designing more efficient commercialization strategies; however, future research should incorporate probabilistic sampling and inferential approaches to enhance generalizability and deepen the understanding of consumer behavior.

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