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A Case Study on the Non-price Factors and Consumer Behaviour for Pangasius (*Pangasianodon hypophthalmus*) (Valenciennes, 1840) Consumption in Pune City, India

P. Mugaonkar[1], N. R. Kumar[1]*, Gauri Shelar[2], J. F. Polanco[3], V. Ramsubramanian[1] and R. S. Biradar[1]

[1]*ICAR-Central Institute of Fisheries Education, Versova, Mumbai - 400 061, India*
[2]*College of Fisheries, Shiragon, Ratnagiri - 415 629, India*
[3]*University of Cantabria, Santander, Spain*

Abstract

The consumption and preferences of Pangasius and the constraints in the same have been investigated among consumers in Pune city, Maharashtra, India. Though 85.83% of respondents were aware about the Pangasius as new catfish available for consumption, only 38.33% of them consumed it. Consumers quoted 'oiliness' (high fat content) of Pangasius as the prime reason for non-consumption. Only 37.5% of consumers were willing to try processed Pangasius. The consumers of "low income" and "high income" group showed significant difference in their expenditure on Pangasius. "Low income" group consumers spent more on Pangasius compared to "High income" group. Consumption of Pangasius can be improved by improving its quality and creating awareness on perceived health hazards. Different cooking methods or use of Pangasius as raw material for other products may solve the problem of 'oiliness' and may become popular among high income group consumers.

Keywords: Pangasius, India, preferences, consumers, constraints

Introduction

India introduced Pangasius (*Pangasionodon hypopthalamus*) (Valenciennes, 1840) during 1995-96 from Thailand through Bangladesh (Rao, 2010). The growth potential and productivity of Pangasius had encouraged Indian government to take this step. The attributes such as fast growth, air breathing nature, tolerance to low dissolved oxygen, and compatibility to polyculture received the attention of policy makers and fish farmers of India. Culture of Pangasius spread very fast in India and its production reached nearly 0.2 million tonnes during 2009 (Lakra & Singh, 2010). Andhra Pradesh is a leading Indian state in Pangasius production with 0.5 million tonnes from about 32 '000 ha of pond area with productivity ranging from 12.5 to 50 tonnes $ha^{-1}year^{-1}$ (Rao, 2010). Like Indian Major Carps (IMC), several other freshwater fishes e.g. magur, silver carp etc. have strong demand in the market as they are liked by consumers (Shodhganga, 2015). Thus, it is quite challenging for a new species like Pangasius to penetrate and sustain in the market. The increasing popularity of Pangasius, especially as Basa fillet, could be seen from the India's import of nearly 4000 tonnes of frozen fillets of Pangasius from Vietnam in 2012 (Globefish, 2013). On the other hand Pangasius farmers in India had a critical time as their produce was not absorbed by the domestic market and fetched low price during 2009 and 2010 (The Hindu, 2011). The prices of catla (₹ 60-100 Kg^{-1}) and rohu (₹ 40-90 Kg^{-1}) were high compared to Pangasius (₹ 20–40 Kg^{-1}) during the year 2011, in the Delhi (Anon, 2011). However, Indian consumers have a liking for catfishes and their price remain high in comparison to other species (Sinha et al., 2013). Under the conditions of preference towards catfishes, the price crash for Pangasius was a concern for all stakeholders in the Pangasius value chain. To sustain Pangasius in the Indian market it was imperative to understand consumers interest in it. Asche et al. (2001) found

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*E-mail: nrkumar@cife.edu.in

that increased aquaculture production, attributes of farmed fish, unique production process, market size and structure influence prices of farmed fish to a greater extent. Hoilenting et al. (2015) mentioned that the Pangasius was preferred among the consumers of Manipur state of India. Mugaonkar et al. (2016) emphasized need for the promotion of the Pangasius consumption in the country. Kunnath et al. (2015) suggested that for better acceptance, low cost Pangasius mince can be converted into value added restructured fish products with better quality attributes. The recent slump in prices for Pangasius may be due to small market size and lack of preference for the species among consumers due to various reasons (Rao, 2010). Knowledge on consumers preference, constraints in Pangasius consumption and segmentation of market for Pangasius. Knowing consumers' expectations from the Pangasius and preference towards it stands basis for Pangasius future in India. Information on these aspects will help private sector and policy makers to take right decisions for the sustainability of Pangasius in India. Knowing preferences, attitudinal and behavioural patterns of consumers towards Pangasius would be of significance in segmenting consumer markets. The segmented markets can be better served, with the fishes of their choice. Therefore, in the absence of information on acceptance of Pangasius among consumers in India and constraints faced by them, the study aimed to provide a better understanding of consumer behavior for Pangasius.

Materials and Methods

Primary data for the study was collected from 120 fish consumers through personal interview with the help of pre-tested specially designed interview schedule. The study was conducted during the year 2012 in Pune district of Maharashtra state in India where bulk of Pangasius produced in Andhra Pradesh is consumed (Mugaonkar, 2015). Two traditional retail markets namely "Ganesh Peth" and "Shivaji Market" and two modern retail outlets of Reliance delight from Pune, Maharashtra were selected for the study (Table 1). From each of the modern retail outlets, 30 consumers willing to participate in the survey on the day of visit were interviewed. Similarly 30 consumers from each of the selected retail markets were interviewed based on their willingness to participate in the survey. In addition to simple statistical mean and percentage analysis, Rank Based Quotient and 't' statistics were used to achieve the objectives of the study. Consumers were post stratified on the basis of their income into three strata' i.e. low income (<₹ 200000), middle income (₹ 200000 to 1000000) and high income group (> ₹ 1000000) (Shukla, 2010).

For the study of socio-demographic characteristic of consumers, and household consumption details amount spent on total food consumption, meat, other fishes and Pangasius, percentage analysis was used. The socio-demographic characteristics studied were age, gender, education, occupation, income, family size and age group.

Pangasius consumers were asked to rank the constraints in its consumption which includes its unavailability, irregular supply, lack of fresh fish, fluctuation in price, health hazards, high price and poor quality. By un-availability it was referred to that the consumer witnesses absence of Pangasius in the market on some days. Irregular supply meant that Pangasius is available in the market but there was fluctuations in quantity available. Lack of fresh fish meant un-availability of freshly harvested fish and the available fish is sourced from distant area and sold in the iced condition. Unstable Price indicates fluctuations in prices, which may affect poor consumers / low income consumers. Health hazards referred to perception of consumers regarding impact of Pangasius consumption on human health. Poor quality meant the consumer perception based on external appearance of fish.

Table 1. Sampling plan (State – Maharashtra, District – Pune) (N =120)

Markets	Sample	Markets	Sample
*Reliance Delight – I	30	*Ganesh Peth*	30
Reliance Delight - II	30	*Shivaji* Market	30

*Reliance Delight - Retail outlet – arm of Reliance Industries offering non-vegetarian food *Non-veg – stands for animal origin food products meat, eggs and fish excluding dairy products. Reliance has discontinued offering non-veg food since 2013.

The major constraints in Pangasius consumption were analysed by estimating Rank Based Quotient, with the formula:

$$RBQ = [fi (n+1-i)] / N n \times 100$$

Where,

fi is the frequency of consumers for the i^{th} rank of constraint;

N is the total number of respondents and

n denote total number of constraints identified.

't' statistics was computed to examine the differences between expenditure on Pangasius for the different levels of income. Levene's test for homogeneity of variance was evaluated for't-test'.

Results and discussion

The socio-economic profile of sample fish consumers are summarised in the Table 2. Majority of the consumers (79.17%) belonged to the age group of 30-45 years. All the respondents of low income and middle income group were male, while only 6% were female in high income group. Numbers of women respondents were very less due to their unwillingness to participate in the survey. Average family size was highest in high income group (5.28) followed by middle (5.01) and low income groups (4.04). Average monthly per capita income of high, middle and low income group consumers were ₹ 19783.9, ₹ 8078.77 and ₹ 3336.42, respectively. Nearly, 45% of fish buyers of high income group were graduates, 44.4% post-graduate and 11.1%

Table 2. Socio-economic characteristics of consumers (Percentages)

Characteristics	Income group			
	Low Income	Middle Income	High Income	Overall
Sample Size	n=27	n=75	n=18	n=120
Age (%)				
<15 years	0	0	0	0
15-30 years	18.52	0	0	4.17
30-45 years	77.78	85.30	61.11	79.17
>45 years	3.70	14.7	38.89	16.67
Gender (%)				
Male	100	100	94	99.37
Female	0	0	6	0.62
Family Size (No.)				
Family Size	4.04	5.01	5.28	4.83
Non-veg eaters	3.69	4.74	5.17	4.53
Fish eaters	3.74	4.87	5.06	4.64
Income (₹ /capita)				
Monthly	3336.42	8078.77	19783.9	8767.51
Annual	40037.04	96945.30	237407.0	105210.17
Education (%)				
High School	22.22	0.0	11.1	6.6
Higher Secondary	25.93	6.7	0	10.0
Graduation	48.15	46.7	44.4	46.67
PG & above	3.70	46.7	44.4	36.67
Occupation (%)				
Government Job	14.81	10.67	16.67	12.50
Employee of Private company	40.74	64.00	72.22	60.00
Business	44.44	25.33	11.11	27.50

were high school pass. In middle income group 46.7% of the fish buyers were post-graduate and 46.7% were graduates. In case of low income group 48.15% of the consumers were graduates followed by high secondary 25.93%, high school 22.22% and post-graduate 3.70%. On the whole 'employee' in corporate sector was the prominent occupational group accounting for about 60% of total respondents whose prominence was highest in high income group (72.22%) followed by middle income group (64%) and low income group (40.74%). Business was the second largest occupational group accounting for about 27.50% of respondents followed by government employees (12.50%).

Household consumption pattern was estimated based on the detailed food expenditure information obtained through survey and are presented in Table 3. Consumers earned a per capita income of ₹ 8767.51 month^{-1} and spend ₹ 1736.95 month^{-1} on food. Out of total expenditure on food, consumers, spend only 28.3% on meat and fish and out of total expenditure on meat and fish items, about 66% was spent on fish consumption. Consumers spent only 6.83% of total fish consumption expenditure on Pangasius consumption.

Fish buyers of low income group spent 25.86% of their income on food, 22.13% of the total food spending on meat and fish and out of this, 74.37% was spent on fish. Middle income group sample consumers spent 22.99% on total food, 29.34% of total amount spent on food, on non-veg 65.55% of the total expenditure for non-veg on fish and 6.08% of the amount spent for fish consumption on Pangasius. High income group consumers, spent 62.59% of amount spent for meat and fish on fish consumption and only 2.39% of the amount on Pangasius consumption. Consumers of low income, middle income and high income groups were found to spend about 21.46, 6.08 and 2.39% respectively of their total fish consumption expenditure on Pangasius. To see whether the expenditure on Pangasius consumption by different income group was significantly different or not, Levene's test and t-test was performed and results of the test was presented in Table 3.

Levene's test for homogeneity of variance was performed before conducting the 't' test. The Levene's test indicates that variances are significantly different from each other. The t- test was conducted to examine the effect of income levels on expenditure on Pangasius across three income levels. The "low income" and "high income" group have shown significant difference in their expenditure on Pangasius with a mean score between the groups is significantly different (t= 2.091. P=0.043, mean difference = 19.74). Though the Levene's statistic for 'Middle income' and 'High income' group expresses the absence of assumed equality of variances, the 't' test does not reflect the significant difference between these groups (t=1.571. p=0.043, mean difference =10.99).

To understand the awareness of consumers about Pangasius and its products, consumers were asked 'Have you heard about Pangasius? – a cat fish available in the market for consumption?'. Based on the responses consumer' attitude towards Pangasius was estimated and is presented in Table 4. Perusal of the table revealed, that 85.83% of total consumers were aware about Pangasius. However, only 38.33% consume Pangasius. Further, consumers were asked

Table 3. Effect of income level/group on expenditure on Pangasius

Group	F	Levene's test for equality of variances Significance	T	df	T-test for equality of means	
					Significance (2 –tailed)	Mean difference
High income* low income	8.849	0.005**	2.091	42.23	0.043	19.24
Low income* Middle income	0.472	0.494	1.004	100	0.318	8.75
Middle income* High income	5.617	0.020	1.571	42.89	0.124	10.99

Notes: ** Significant Levene's statistic indicates unequal variances among income groups for expenditure on Pangasius

about awareness regarding processed Pangasius and their willingness to consume different Pangasius products. Low income fish buyers were not aware about processed Pangasius. The awareness among middle and high income group was 14.66% and 33.3%, respectively. Whereas in total 85.84% of respondents were not aware of processed Pangasius and only 37.5% of them were willing to try these products (Table 4).

Reasons for not eating Pangasius differ among income groups. Across the low income group most of the respondents (92.59%) were aware about Pangasius, while only 85.33 and 77.78% of consumers were aware among middle and high income groups, respectively. The majority of low income group consumers (48.14%) consume Pangasius while only 37.33% of middle income group consumers and 27.77% of high income group consumers consume Pangasius. Consumers of different income groups who do not consume Pangasius have quoted different reasons (Table 5). Among those reasons "Oiliness" (high fat content) of fish tops the list among low income group fish buyers with (50%) and middle income group buyers with (31.91%). "Dislike the taste" of fish tops the list among affluent consumers (30.76%). Major reasons behind not consuming Pangasius, was it being more 'oily' by 31.08% which was followed by 'dislike the taste' (28.37%), unhealthy (24.32%), and soft texture (8.10%).

Pangasius consumers ranked important attributes associated to Pangasius consumption which are presented in the Table 6. "Taste" was the main attribute overall for selecting Pangasius for consumption, followed by being 'boneless'. Consumers from low income group and middle income group quoted "taste" as the top most attribute, whereas high income group consumer claimed "bonelessness" as the main attribute behind Pangasius consumption. For low income and middle income consumer's taste, bonelessness, flavour and appearance of the fish were attributes of preference.

Consumers' perception of 'potential negative impact on health' of Pangasius consumption by 50.22% of consumers was the major constraint in Pangasius consumption followed by irregular supply (46.09%), un-availability (40.87%) and lack of fresh fish (39.57%) (Table 7).

Consumers quoted some health hazards associated with Pangasius like itching of body, body pain and high oil in fish affects health adversely. Across all income groups 'health hazards' from Pangasius was the main constraint marked by the majority of respondents and so ranked first. Fluctuation in price was the prominent constraint (13.04%) among low income group consumers followed by health hazards (11.74%) and irregular supply of Pangasius (11.74%). Whereas, middle income group consumers

Table 4. Consumers' awareness towards Pangasius (% of total)

Details	Income group			
	Low	Middle	High	Overall
Awareness Yes (%)	92.59	85.33	77.78	85.83
Eat Pangasius Yes (%)	48.14	37.33	27.77	38.33
Awareness about processed Pangasius Yes (%)	0	14.66	33.33	14.16
Willingness to try Processed Pangasius Yes (%)	25.96	41.33	38.89	37.5

Table 5. Reasons for not eating Pangasius (n=74 do not eat)

Details	RBQ score of Income group			
	Low	Middle	High	Overall
Unhealthy (%)	35.71 (III)	21.27 (III)	23.07 (II)	24.32 (III)
Oily (%)	50.00 (I)	31.91 (I)	7.69 (III)	31.08 (I)
Dislike taste (%)	42.85 (II)	23.40 (II)	30.76 (I)	28.37 (II)
Itching (%)	21.42 (IV)	6.38 (V)	0.00 (V)	8.10 (V)
Soft texture (%)	7.14 (V)	8.51 (IV)	7.69 (IV)	8.10 (IV)

Table 6. Preference for Pangasius across different income group (n=46)

Preferences	RBQ score of different income group Low	Middle	High	Overall
(A) Affordable price	25.65 (VI)	44.35 (VI)	6.52 (VI)	76.52 (VI)
(B) taste	28.26 (I)	60.43 (I)	10.00 (II)	98.70 (I)
(C) boneless	28.26 (II)	58.70 (II)	10.87 (I)	97.83 (II)
(D) ease in cooking	27.83 (V)	56.96 (IV)	9.13 (V)	93.91 (V)
(E) Variety of products	17.83 (VII)	34.35 (VII)	3.91 (VII)	56.09 (VII)
(F) appearance	27.83 (IV)	56.52 (V)	10.00 (III)	94.35 (IV)
(G) flavour	28.26 (III)	58.26 (III)	9.13 (IV)	95.65 (III)

Note: Figures in parenthesis indicate the rank of particular characteristics for the preference of *Pangasius*.

Table 7. Constraints in Pangasius consumption across different income group (n=46)

Constraints	RBQ score of different income group Low	Middle	High	Overall
A) Unavailability	11.30 (V)	26.09 (III)	3.48 (VI)	40.87 (III)
B) Irregular Supply	11.74 (III)	29.57 (II)	4.78 (II)	46.09 (II)
C) lack of fresh fish	10.43 (VI)	25.65 (IV)	3.48 (VII)	39.57 (IV)
D) Unstable Price	13.04 (I)	20.00 (VII)	3.91 (IV)	36.96 (VII)
E) Health Hazards	11.74 (II)	36.96 (I)	6.52 (I)	55.22 (I)
F) Poor quality	8.70 (VIII)	17.39 (VIII)	2.61 (VIII)	28.70 (VIII)

(36.91%) claimed health hazards due to Pangasius as the major constraint, which was pointed out by 6.52% of the high income consumers too. Further both middle income (29.57%) and high income group (4.78%) consumers quoted 'irregular supply' as the second most important constraint in Pangasius consumption.

Consumer behaviour is often linked with demographic variables (Baker & Burnham, 2001). Batzios et al. (2005) found that the choice of fish as food is subjective to the socio-demographic features of the consumer. Studies of Myrland et al. (2000); Olsen, (2003) and Verbeke & Vackier (2005) have proven that there is a relationship between seafood consumption and socio-demographic aspects.

Awareness, preferences and expenditure on Pangasius consumption was highest among low income group, who were mostly involved in "Business". Nygaard & Owren (2012) found that unmarried low income group consumers were inclined towards Pangasius due to its cheaper price compared to other fish species. Middle and high income consumers have shown comparatively lesser inclination towards Pangasius, in terms of both "Awareness" and "Expenditure" on it. Nygaard & Owren (2012) fond that consumers were not interested to pay higher price for Pangasius. Several prior studies also shown that seafood preferences and willingness to pay was affected by seasonal supply and demand, socio-economic conditions, cultural background and demographic features (Spinks & Bose, 2002; Redkar & Bose, 2004; Quagrainie, 2006, Polanco & Luna, 2012).

The t-statistics indicated that with increase in income, expenditure towards consumption of Pangasius has significantly declined. Significant difference was found across 'low income' and high income group' in their expenditure on Pangasius. Consumers of low income group, middle income group and high income group were spending about (21.46%), (6.08%) and (2.39%) on Pangasius respectively of total spending on fish consumption. With increase in population, urban migration and higher levels of disposable income available to people in India, have shown increase in food consumption

including seafood (Krishnan & Sharma, 1995). Growth of household income, diversification of diet into dairy, meat and fish from starchy food staples. This transition conforms to Bennett's Law (Bennett, 1941), where the food share of starchy staples declines as income increases. In Vietnam, to offset the losses of Pangasius industry promotional programmes were implemented in collaboration government and industry (Tung et al., 2004). Similarly India can also take such steps to boost the domestic consumption. The prices of carps are found to be higher than that of Pangasius. Pangasius being affordable to low income group consumers and having high productivity may provide animal protein at relatively cheaper prices. That will ensure the food security as well as nutritional security, by providing protein at lower price. India ranks 2nd in undernourished population among South Asian countries. The country has all resources and means its needed to stand out as 'No more food insecure nation'. In a broader context this study understands the role of Pangasius in food security as its consumed more by 'low income' population. Consumers' preference for product attributes, sensory characteristics, prices and external features influences the perception of the consumers and differentiate the product (Maryland et al., 2000; Olsen, 2003; Trondsen et al., 2003). Pangasius taste was preferred by all the income groups. High income group consumers prefer it due to its characteristic of "bonelessness". Affordable price is of great concern for the consumers particularly for the lower income-group but surprisingly all the income groups have ranked it as sixth most important attribute while buying Pangasius. This implies that there are potential buyers and a potential market for Pangasius, as consumers are not just buying Pangasius for its low price but because of other specific characteristics. This is a positive sign for effective promotion of Pangasius. A variety of Pangasius products were not of much concern to the consumers, this may be due to the unawareness about the product range available for it (e.g. fillet, skewer, medallion, breaded, steak, mice block etc.).

Prominent constraints in eating were perception of "health hazards" followed by, irregular supply, unavailability and lack of fresh fish. Yellowing of meat in Pangasius has been an issue that has affected its trade. Several reasons were attributed to this like inappropriate feed and unsafe culture practices (The Hindu, 2011). Also, Pangasius sourced from distant destinations in these markets also adversely affect quality. Improved handling practices including icing and cold chain for transportation are important to maintain quality. For steady market supply, stable prices are expected by the intermediaries and this indirectly depends on demand for Pangasius in the market. Poor infrastructure of retailer and wholesaler may not be able to maintain the quality of fish. In case of Pangasius, the application of standards is understood as a way of improving product quality as specific requirements of various standards that are applied at the farm level focus precisely on achieving better quality (Belton et al., 2011). In Vietnam over 60% of farmers who apply standards chose quality improvement as a reason to start applying standards and only 21% of farmers were applying standards to increase the export (Trifkovic, 2014). Pangasius also needs geographical expansion of markets in the country as it was sold in number of distant markets in India at quite high price e.g. Punjab, Haryana etc. (Rao, 2010). Confidence needs to be created among consumers in buying Pangasius by providing information through promotional events that, Pangasius is cultured in a safe environment and is free from any pathogens and bacteria.

'Low income' group found as principal consumer base of Pangasius being affordable and consumption among high and middle income groups can be encouraged through strategic promotion and target marketing. 'Taste' of fish was highly appreciated by the consumer those who prefer to eat, this sustains the demand of fish in the market. Different preparatory/cooking methods or use of Pangasius as raw material for other products may solve the problem of 'Oiliness'. Steady supply, better quality with stable prices may satisfy the Pangasius consumers. Proactive promotional practices are needed to get rid of negative image of Pangasius in consumers mind. Private parties and the Government must collaborate to promote domestic consumption of Pangasius and highlight its healthy culture practices.

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