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EVALUATION OF CONSUMER PURCHASING BEHAVIOUR, PERCEPTIONS AND REQUIREMENTS OF AQUACULTURE PRODUCTS TO IMPROVE GROWTH OF SHARPTOOOTH CATFISH SMALL BUSINESSES IN PHETWANE AND KAAPMUIDEN VILLAGES, SOUTH AFRICA

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Abstract. Aquaculture is becoming increasingly responsible for supplying fish for human consumption and has rapidly turned into one of the significant food production sectors globally. The aim of this study was to evaluate consumer perceptions of aquaculture products in order to improve growth of small businesses in Phetwane and Kaapmuiden communities, South Africa. Primary data were collected through face to face interviews using a semi-structured questionnaire. Descriptive statistics and Binary Logistic Regression (BLR) model on the Statistical Package for the Social Sciences (SPSS) version 25 was used to test significance of purchasing behaviour. The results showed that education level positively and significantly influenced the respondent's decision to buy catfish. Quality, red meat, poultry and fish negatively and significantly influenced the respondents' decision to purchase catfish. The Hosmer and Lemeshow test had a p-value less than 0.004, and it was statistically significant. This means that the model was appropriate from data, and goodness of fit measures may produce the same results constantly. Information gathered from this study was useful for guiding policy makers, economists and retailers to enhance aquaculture and develop sustainable small businesses.

Keywords: consumer perception, aquaculture, improve, growth, small businesses

INTRODUCTION

People around the world continue to rely on aquatic products as sources of protein even though oceans are currently over-fished (Hanson et al., 1994), due to an increase in world population (FAO, 2018; Atalah and Sanchez-Jerez, 2020). Aquaculture has been responsible for addressing this gap and has turned into one of the fastest growing food production sectors globally (FAO, 2018). Fish production worldwide has achieved new levels of 179 million tonnes in 2018, causing aquaculture to be the most rapidly growing food sector since the 1980s (FAO, 2020). Africa contributed only 7% of global fish production in 2018, and 0.00003% of global production was from South Africa (Laboratory Report, 2014).

Egypt is by far the largest producer of aquaculture products in Africa, specialising in tilapia production (Macfadyen et al., 2012). In South Africa, aquaculture is still a young sector, contributing less than one percent to global production (Laboratory Report, 2014), and its strength lies in marine culture, where it grows species such as abalone (DAFF, 2014). The reasons for low production numbers are that producers in freshwater

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aquaculture are not obligated to report annual returns by permitting systems; hence, reliable production and employment data is not collected (Britz, 2014). However, given the highlighted red flags, aquaculture is prioritised by the national government to be an instrument to address hunger, unemployment and inequalities. As the lead agency, the South African Department of Agriculture, Forestry and Fisheries (DAFF) embarked on a number of interventions to grow the industry including:

- The development and endorsement of a National Aquaculture Strategic Framework (NASF) that provides a road map for DAFF and key role players to stimulate the growth of the aquaculture industry in South Africa (DAFF, 2013).
- The Aquaculture Development and Enhancement Programme (ADEP), launched through DAFF and the Department of Trade and Industry (DTI), to promote and encourage investment opportunities in the aquaculture sector (DAFF, 2014).
- The launch of Operations Phakisa Delivery Unit by the President, Mr. Jacob Zuma, in 2014 to unlock the economic potential of South Africa's ocean (Laboratory Report, 2014).
- The drafting of an aquaculture bill to address the issues aquaculture hampering development in SA through the creation of a national aquaculture policy (Aquaculture Development Bill, 2018).

The netting of pilchard in South African oceans was lowered to less than 80% with strict net-mesh size specification. This placed the canning companies under duress to search for alternative fish that would replace the famous pilchard. Sharptooth catfish was found to be the best fish candidate to replenish this gap (Mathews, 2016). According to Rouhani (2010), catfish possess characteristics such as faster growth in high densities, toleration of a wide range of water conditions, breathing air and consuming any type of food. Farming with catfish is a ‘no brainer’, as it reached market size within six months. One commercial catfish project took advantage of this opportunity, and it is producing 26 tonnes supplying local and international markets (Mathews, 2016).

According to the World Bank (2013), aquaculture and fisheries in developing countries mainly consist of smallholder farmers relying on fish for household income generation and nutrient supply. South Africans do not consume much fish, with an estimated consumption per capita consumption of 64–6.7 kg per year (Yakob

et al., 2006; Britz, 2014). The average household expends a much larger share of its food budget on meat (30%) than fish (4%) (Britz, 2014). Information on determinants of consumer preference between farmed and wild caught fish is limited (Marina et al., 2017), and an understanding of the drivers of demand and supply of fish is critical (World Bank, 2013). Alexander et al. (2016) highlighted that consumption practices may be affected by the preferences of consumers and in return hinder development of the sector. The best method to communicate the nutritional benefits of fish and break down strongly held beliefs is through an improved understanding of consumer perception (Reig et al., 2019). Human health benefits of fish consumption have prompted the Peru government to increase awareness of the benefits of fish consumption through a campaign programme such as “A corner pescado” (let’s eat fish) (Morales and Higuchi, 2018). Product acceptance by retailers influences the supply chain, which in turn affects the manner in which farmers produce food. For example, some supermarkets contract and source their fresh produce directly from farmers and ensure consistency and high quality, thereby lessening income poverty and improving skills development (Ogutu et al., 2020).

Ocean fish are depleted and are failing to meet the global demand of fish, and aquaculture was identified as a potential to address this gap. However, farmed fish are not as popular as wild caught products (López-Mas et al., 2021). Consumer acceptance is critical for the success of the aquaculture market (Vanhonacker et al., 2013). Economics and marketing are not given enough attention, yet they are critical for improving profitability and business planning (Van Olst and Carlberg, 1990). Food preference by consumers becomes increasingly complex timeously (Wang et al., 2013). Freshwater aquaculture production is stagnant for a long time due to policy issues (Britz, 2014). Consumers in South Africa lack awareness of aquaculture and the associated product characteristics (Britz et al., 2009). Small aquaculture businesses are of the view that community support is limited in their local areas in terms of purchasing farmed products. The growth of the aquaculture sector can be realised if, amongst others, promotion of aquaculture education, training and skills development and promotion of aquaculture products were recommended (Britz et al., 2009). Other authors reported a gap in research that focus on consumer perception on the sales of various aquatic species and information on their

consumption is vital for utilization and marketability (Gaviglio et al., 2014). For aquaculture products to be accepted, insights of consumer perception have to be known to influence the buying power (Reig et al., 2019; Cantillo et al., 2021). To ensure that aquaculture policy in South Africa addresses the needs of poor, a better understanding of their consumption preference is critical. It is important for factors influencing consumer preference to be determined (Carlucci et al., 2015). Hence, the present study aims to gain insights into the consumer purchasing behaviour, perceptions and needs of aquaculture products.

LITERATURE REVIEW

Globally, fish was identified as an essential source of proteins and nutrients for humans, and studies on fish consumption factors have ignited interest in research for a decade now (Gaviglio et al., 2014). According to the literature, the types of fish products consumers prefer are determined by rate of consumption and the choices of consumers. The rate of consumption studies focus on preference and willingness of consumers to buy while the choices of consumers focus more deeply on attitudes that prompt consumers to repeat their purchase action (Cantillo et al., 2021). Consumer decision making is influenced by the type of information they possess, which influences the type of the products they buy (Alba and Marmosten, 1987 cite Pieniak et al., 2013).

In South Korea, a study that determined factors affecting consumption of live fish was conducted, and the results showed that consumers who indicated that safety was a more critical factor were likely to frequently consume live fish. Although wild caught fish was preferred, its consumption rate was low (Lee and Nam, 2019). Thong and Solgaard (2017), when studying the effect of psychology on fish consumption, also found that elderly people and females with a high income living with children were more likely to consume seafood in France for the purposes of weight loss. In Turkey, consumers earning a high income with a high number of children consumed aquaculture products more frequently in the study where rate of consumption was compared with demographics and attitude (Terrin, 2019).

A few studies conducted that compared the rate of consumption at home rather than outside of the home determined a number of other factors that affected home consumption (Ameida et al., 2015). Other factors, such

as occupation, have affected rate or frequency of consumption, amongst others (Lee and Nam, 2019). Simpler and easier product information provisions increase the frequency of information (Cantillo et al., 2021; Kumar, 2018). Studies conducted on farmed fish versus wild fish focused solely on physiochemical parameters (Rincón et al., 2016; Saavedra et al., 2017; Marina et al., 2017; López-Mas et al., 2021); others worked on the sensory characteristic—amongst other possible factors—that impacts on the consumer's image of fish (Rincón et al., 2016; Saavedra et al., 2017). Other authors reported a significant difference in consumers' preference of farmed and wild fish (Rickertsen et al., 2016; Marina et al., 2017); country of origin (Claret et al., 2012).

Consumers preferred wild fish over farmed fish even in the informed conditions, and this information had significant concord with the recommendation of improving the image of farmed fish (Claret et al., 2016). Socioeconomic demographics such as gender, age, income level, education and place of residence have increased influence on consumer preferences of wild fish and farmed fish (Marina et al., 2017).

Vanhonacker et al. (2013) evaluated the consumer preference of wild and farmed seabass and seabream in Europe. The results showed that consumers had a positive image of fish products in terms of its health benefits, and wild fish were more preferred than farmed fish. Market and quality of products were factors that positively affected consumer preferences, while lack of information concerning aquaculture was one of the negatives in Barcelona (Reig et al., 2019).

(Bronnmann and Asche, 2017) reported that issues related to the environment were found to be more pertinent to consumers in differentiating between farmed and wild species. Consumers' decision to buy was limited by socioeconomic attributes.

(Akuffo et al., 2020) when analysing determinants of fish consumption in the households of Ghanaian people, the authors found that although price was a critical factor, taste, diversity, health and nutrition were also essential for non-traditional consumers. Difference in taste between wild and farmed fish was detected among female and older women in Cortia (Marina et al., 2017).

In another study, focus group discussions conducted in small catfish businesses based in the two villages revealed that market access variable was a significant profit driver to improve profitability (Moroasui et al.,

2022). The identified action or intervention was to conduct a retail and supermarkets survey, which scored a low influence (i.e. personal influence over whether the opportunity will be successfully implemented), and a local community market survey, which scored a higher influence. This led to this study, where a market questionnaire was designed in collaboration with participants and administered face to face in the two communities since little is known or reported regarding their purchasing behaviour and perceptions. In this study, consumer purchasing behaviour and perceptions of aquaculture products were evaluated through administration of local market questionnaires, and the derived information would be of benefit to policy makers and aquaculture decision makers to support and improve the growth of small businesses in rural communities of Limpopo and Mpumalanga Provinces. The study hypothesised that the more positive the perception of consumers towards aquaculture products, the more likely they are to consume them.

METHODS AND MATERIALS

Sampling

The study was conducted in two villages namely Phetwane village, Limpopo Province, and Kaapmuiden village, Mpumalanga Province. The unit of analysis was rural community members within the radius of the Sharptooth catfish aquaculture businesses since little was known about the preferences of aquaculture products in order to learn more about consumer preferences so that small businesses can raise products in line with consumer preferences in terms of species, product form, etc. and then in theory increase sales to improve/grow their business. The total population size of Phetwane (Limpopo) is 912 and 270 in Kaapmuiden (Mpumalanga) (StatsSA, 2016). Sample size was determined from the recommendations made by Saunders et al. (2016) that a population of 1000 requires a sample size (n) of 278 and a population of 300 requires a sample size of 168 to achieve a lower margin error of 5%. However, in this study, Phetwane village had a population of 912 and Kaapmuiden village had a population of 270, and the combined total population was 1,182, which was closer to 1000, and the recommended minimum sample size was 278. Sample size from the two villages was calculated with the following formula adopted from Saunders et al. (2016):

$$\hat{n} = \frac{n}{1 + \left(\frac{n}{N}\right)}$$

Where \hat{n} is the adjusted minimum sample size, n is the minimum sample size, N is the total population. The application of the formula was as follows:

Phetwane:	$\hat{n} = \frac{n}{1 + \left(\frac{n}{N}\right)} = 278/1 + 278/912 = 212$	
Kaapmuiden:	$\hat{n} = \frac{n}{1 + \left(\frac{n}{N}\right)} = 168/1 + 168/270 = 104$	
Total		316

Data gathering

About 316 questionnaires were administered through face to face interviews and given to the participants to complete. However, only 308 survey questionnaires were correctly and fully completed for capturing and analysis. Table 1 shows distribution of study population, target sample size and achieved sample size. The consumer questionnaire was designed and ethical approval was obtained from the University of South Africa (UNISA). The survey consisted of similar parts of questions asked in the 2009 Aquaculture Institute of South Africa (AISA) benchmark survey South Africa (Britz et al., 2009).

Table 1. Sample size for Phetwane and Kaapmuiden target populations

Villages	Total population	Target population (n)	Achieved sample (n)
Phetwane	912	212	99
Kaapmuiden	270	104	209
Total	1,182	312	308

Source: StatsSA, 2016.

A quantitative research approach was applied using a survey design. Random or convenience sampling method was applied as a method of collecting quantitative data. Random or convenience sampling is defined as ‘selecting cases randomly only because they are easily available (or most convenient) to obtain for the sample such as a person interviewed at random in a shopping centre for a television programme (Saunders et al., 2016; 2019)’. The benefits of convenience sampling

were that it was easy to administer and relatively less expensive. The questionnaire was pre-tested with 10 participants and necessary modifications were made before being administered face to face on paper. The paper questionnaire was completed by participants who could read or write and face-to-face interviews were conducted in instances where participants couldn't read or write. Self-administration of the questionnaire was applied to reduce bias when compared to a telephone survey, which could be prone to inaccuracy due to a low response rate (Yeager et al., 2011; Pieniak et al., 2013). The participants were willing and free to enhance reliability of the study and could withdraw at any time.

The data collected were coded and recorded on a Microsoft excel 2010 spreadsheet. The data were transferred and analysed on the Statistical Package for the Social Sciences (SPSS) version 25 and Binary Logistic Regression (BLR) model was used to test significance of purchasing behaviour.

The variable called 'heard the word aquaculture' referred to self-assessment of respondents if they had heard the word aquaculture before. The variables freshness; nutritional value; appearance; quality; price; eco-friendliness; preparation time and low in saturated fats referred to the self-assessment of respondents on their importance in deciding to buy fish products. The variables meat, poultry and fish referred to the self-assessment of respondents on how important meat, poultry and fish are to them. The 'Are you familiar with catfish?' variable referred to the self-assessment of respondents if they were familiar with catfish.

Descriptive statistics were used to present results in the form of frequency tables including percentages, mean and standard deviations. The factors that influenced decisions to purchase fish were calculated as follows:

$$Y = \text{Do you buy catfish (1 = Yes; 0 = No)}$$

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \\ + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \dots \mu$$

X_1 G – gender; X_2 HE – highest education; X_3 RGS – responsible for grocery shopping; X_4 HWA – heard word aquaculture; X_5 F – freshness; X_6 NV – nutritional value; X_7 A – appearance; X_8 Q – quality; X_9 P – price; X_{10} EC – Eco-friendliness; X_{11} PT – preparation time;

X_{12} LSF – low in saturated fats; X_{13} M – meat; X_{14} P – poultry; X_{15} F – fish; X_{16} FWC – familiar with catfish.

RESULTS AND DISCUSSION

Demographic information

Demographic information in this study showed that the majority of the respondents were males (52%), and females were (48%) (Table 2). This may be attributed to males being responsible for fishing and were more likely to consume fish when eating outside of their homes than females (Wenaty et al., 2018). Additionally, Morales and Higuchi (2018) reported that older females in Peru were not willing to purchase fish more than meat.

The majority of the respondents in the study were young; between 28–32 (23%) and 33–38 (28%) of age respectively. According to the Aquaculture Institute of South Africa (AISA) benchmarking survey, respondents ranged from a young to old age between 25 and 54 years (Britz et al., 2009) and as a result, the age category found in this current study was not surprising. In contrast, older people over 65 years of age dominated a USA census with lowest per capita fish consumption (von Stackelberf et al., 2017).

The results of the current study revealed that 59% of respondents were single and 34% were married, respectively. In contrast, Britz et al. (2009) reported that 58% of the respondents in their survey were married and only 25% were single, which is a lower percentage compared to what this study has found.

The majority of respondents (45%) had secondary education, followed by matric/high school (26%); primary (16%) and tertiary/diploma/degree (13%), respectively, in this study. 54% of consumers had completed matric (high school), 16% had undergraduate degree, and 11% had a postgraduate in consumer survey of South Africa (Britz et al., 2009). Therefore, educational attainment is notably lower in these villages than nationwide.

The majority of the respondents were black (98%) and Christians (84%) in this study. The highest number of respondents (82%) reported that religion did not have any influence over their choice in purchasing fish. In 2009, a survey in South Africa reported that 3% of consumers were influenced by religion to purchase certain fish species (Britz et al., 2009).

Around 72% of respondents in this study were responsible for buying groceries for their household. Britz

Table 2. Demographic statistics information of a survey carried out in Phetwane and Kaapmuiden (N = 308)

Variable	Frequency	Percent
Gender		
Male	159	51.6
Female	149	48.4
Age		
16–21	22	7.1
22–27	38	12.3
28–32	71	23.1
33–38	88	28.6
39–44	37	12.0
54–50	23	7.5
51–56	10	3.2
57–60	8	2.6
>60	11	3.6
Marital status		
Single	182	59.1
Married	105	34.1
Divorced	10	3.2
Widowed	11	3.6
Highest education		
Primary	49	15.9
Secondary	139	45.1
Matric/high school certificate	79	25.6
Tertiary/diploma/degree	41	13.3
Race		
Black	303	98.4
Coloured	5	1.6
Indian	—	—
White	—	—
Religion		
Christianity	258	83.8
Islam	17	5.5
None	33	10.7
Does religion influence your purchasing of fish	Yes = 56 No = 252	18.2 81.8
Responsible for grocery shopping	Yes = 223 No = 85	72.4 27.6

et al. (2009) also reported that 87% of consumers interviewed were responsible for household shopping. Similarly, 87% of interviewed consumers were responsible for buying groceries in households (Pieniak et al., 2013).

Table 3 shows that the minimum and maximum importance of poultry, meat and fish in the diet of respondents was (1) and (3), respectively, with a mean of 2. The variation in the importance of poultry in the diet of respondents was slightly higher than for fish and meat as shown by standard deviation of 0.880; 0.851; 0.576 respectively. The minimum and maximum responses of whether respondents heard the word aquaculture was (1) and (2), respectively, with average of 2. The variation of whether respondents heard the word aquaculture was low, as shown by standard deviation of 0.436.

Table 3. Importance of poultry, meat and fish in the diet of respondents

	N	Minim-	Maxi-	Mean	Std. deviation
Poultry	308	1	3	2.28	.880
Meat	308	1	3	2.03	.576
Fish	308	1	3	1.69	.851
Have you heard the word aquaculture	308	1	2	1.75	.436

Factors that influence respondent's decision to buy catfish

The results showed that education level positively and significantly influenced the respondents' decision to buy catfish. It means that people with a higher level of education purchased catfish with all other factors held constant; as education level increases, then people were more willing to purchase catfish. This may be because highly educated people are informed about the nutritional benefits of fish compared to other types of meat. Hanson et al. (1994) also reported that regression revealed that aquaculturists targeted unique characteristics of consumers such as income level, family size, seasonality and other demographic factors in the USA. Consumers with less than high school education consumed more fish according to the USA census (von Stackelberf et al., 2017). People with higher education qualifications and better access to fish information were

more likely to make better informed fish choices (Claret et al., 2014). In Peru, education level increased willingness of consumers to purchase fish over terrestrial meat (Morales and Higuchi, 2018).

The results showed that quality of fish product negatively and significantly influenced the respondents' decision to purchase catfish. It means that consumers' decision to buy catfish was influenced by quality of fish products, and the influence was negative if other factors were held constant: as quality increased, then people were less willing to purchase the product.

It is assumed that respondents may not be well informed about the quality level of catfish because it is not popular in the study areas. Lack of information regarding aquaculture and quality was prevalent amongst stakeholders to influence aquaculture toward sustainability (Reig et al., 2019). Even countries such as Spain reported that consumers purchased fish based on quality (Claret et al., 2012). Additionally, consumers in Europe used quality as an information signal to make the decision to buy fish (Pieniak et al., 2013).

The results showed that red meat affordability had negative and significant influence on a consumers' decision to purchase catfish. It means that affordability of red meat had an influence on the respondents' decision to buy catfish, and the influence was negative with other factors held constant: as red meat became more affordable, people were less willing to purchase catfish. This may be because people in inland provinces where the study was conducted were more exposed to red meat than catfish. Yakob et al. (2006) reported that South Africans by tradition spent 30% of their budget on red meat rather than fish, which is estimated to be 4%.

The results showed that poultry affordability had a negative and significant influence over respondents' decision to purchase catfish. It means that poultry affordability had an influence on the respondents' decision to purchase catfish and the influence was negative, with their variables held constant: as poultry became more affordable, people were less willing to purchase catfish. This may be because people were more familiar with poultry than catfish as an aquatic product. This maybe because people in inland provinces where the study was conducted were more exposed to poultry than catfish. South Africans are also high consumers of poultry when eating out in restaurants and only use fish as a substitute (Britz, 2014).

The results showed that fish affordability had a negative and significant influence over respondents' decision

to purchase catfish. It means that fish affordability had an influence on the respondents' decision to purchase catfish and the influence was negative, with other variables held constant: as fish in general became more affordable, people were less willing to purchase catfish. This may be because people were more familiar with other types of fish than catfish. Price, origin and sustainability of trout were more significant to German consumers than sustainability certification (Risius et al., 2017). Similarly, Germans concerned with sustainability issues opted out of consuming Pangasius and Tilapia due to being unfamiliar with them (Hinkes and Schulze-Ehlers, 2018). In Tanzania, consumers were of the view that fish was healthier than meat and pork, and it was expensive (Wenaty et al., 2018). South African acceptance and fish consumption of seafood is highly driven by innovation of menu presentation by highly competitive seafood restaurants (Britz, 2014).

Highest education increases the logit estimated log of odds to purchase catfish by 1.190 units, and the odds of ration was 3.29, meaning that those with higher education are nearly 4 times as likely to purchase catfish than those with lower education. This may be because highly educated people are informed about the nutritional benefits of catfish compared to those who held lower education. We are testing the null hypothesis that there is no difference in the logarithm of odds regarding those intending to purchase catfish compared to those not intending to. The results showed that p-value is very low ($p < 0.05$); we reject the null hypothesis that when controlling for all the other variables in our model, there is a relationship between highest education and likelihood to purchase catfish.

The estimates of the coefficient on the logit scale are very close to zero for quality and affordability of meat, poultry and fish, which translates into an odds ratio very close to one. Therefore, controlling for all other variables in the model, there is a significant relationship between quality, affordability of meat, poultry and fish (non-catfish) and likelihood to purchase catfish. Meaning that as quality increases and meat, poultry and fish (non-catfish) becomes more affordable, people were less likely to purchase the catfish product.

Controlling for all the other variables in the model, there isn't any significant relationship between responsibility for grocery shopping; hearing the word aquaculture; nutritional value; appearance; eco-friendliness; low level of saturated fats and being familiar with catfish,

Table 4. Combined parameter estimate of Binary Logistic Regression (BLR) model n = 308

	Estimate	Std.E.	Wald	Df	Sig.	Exp(B)
Gender	-.770	.631	1.490	1	.222	.463
Highest education	1.190	.395	9.089	1	.003	3.288
Do you think religion influence your purchasing of fish	-.397	.692	.330	1	.566	.672
Are you responsible for doing most of the grocery shopping for your household	.340	.707	.232	1	.630	1.405
Have you heard the word “aquaculture”	.661	.795	.691	1	.406	1.936
Freshness	-.234	.311	.566	1	.452	.792
Nutritional value	.161	.276	.339	1	.560	1.174
Appearance	.361	.257	1.971	1	.160	1.435
Quality	-.614	.292	4.412	1	.036	.541
Price	-.274	.216	1.613	1	.204	.761
Eco-Friendliness	.216	.267	.654	1	.419	1.241
Availability	-.378	.264	2.051	1	.152	.685
Preparation time	-.454	.267	2.892	1	.089	.635
Low in saturated fats	.105	.256	.168	1	.682	1.110
Meat	-1.901	.867	4.806	1	.028	.149
Poultry	-2.157	.688	9.822	1	.002	.116
Fish (non-catfish)	-2.269	.713	10.143	1	.001	.103
Are you familiar with catfish	-.651	.667	.951	1	.329	.522
Constant	12.085	4.597	6.913	1	.009	177255.829

and likelihood to purchase catfish. Nor is there a significant relationship between gender, religion, freshness, price, availability and preparation time, and likelihood to purchase catfish (see Table 4).

Individuals that were found to buy catfish were 289, and 19 individuals were found not to buy catfish in this study. Therefore, in terms of predictions, it was concluded that, of those individuals that were found to buy catfish, 287 were predicted to do so by the model. Dividing 287 by 289, we get percentage correct of 99.3%. We take 5 predictor of not buying and by dividing 5 by 19, we get 26.3% accuracy rate. The overall accuracy rate for this study was 94.8%, meaning that using this model 94.8% of the time to make these predictions, we would be correct (Table 5).

Table 5. Classification table

		Predicted		Percentage Correct	
		Do you buy catfish			
		Observed	Yes	No	
Step 1	Do you buy catfish	Yes	287	2	99.3
		No	14	5	26.3
	Overall percentage				94.8

The cut value is 500.

The results presented in Table 6 show the pseudo R-squares values, and these were treated as loose analogies

of least square R-squares. Their magnitude in relation to R-square values determined how small, medium or large R-squares values might be in the context of least squares and make a judgement of the relationship between predictors and outcomes. Nagelkerke R square is between 0–1. There is no equivalence of binary logistic regression to the R-squared values and their analysis are of less importance.

Table 6. Pseudo R-Square (N-308)

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
92.671 ^a	.150	.404

The Hosmer and Lemeshow test had p-value 0.004 in the significant value column and it was statistically significant ($p < 0.05$), meaning that the model was appropriate from the data, and goodness of fit measures also produced the same results constantly (see Table 7).

Table 7. Goodness of fit for Hosmer and Lemeshow test (n-308)

Chi-square	Df	Sig.
22.404	8	.004

CONCLUSION AND RECOMMENDATIONS

The objective of this study was to evaluate consumer purchasing behaviour, perceptions and requirements of aquaculture products in order to improve the growth of small businesses in two communities. The results showed that the majority of participants were males, young and single from both communities. The results were not alarming since unemployment in South Africa is high amongst young people. The majority of participants had a secondary education and were Christians. However, religion did not have any influence over their choice in purchasing fish. Participants were also responsible for doing household groceries. This may be due to the child grants that young people receive which caused them to be responsible for purchasing household groceries.

Education positively and significantly influenced a respondent's decision to buy catfish when all other

factors were held constant. As education level increased, people were more willing to purchase catfish. People with high education may be well informed about nutritional benefits of fish. A consumer's decision to purchase catfish was not influenced by quality, indicating that respondents were not well informed or fish may not be popular in the study area. Red meat affordability, chicken and (non-catfish) fish did not influence a respondent's decision to purchase catfish due to increased exposure of red meat and poultry than fish in the study area. Fish affordability had a negative and significant influence on a respondent's decision to purchase catfish. People may be exposed to other types of fish species than catfish in the study area.

The study recommends that since young people are mainly responsible for household groceries, attention should be paid to their low education level to improve willingness to purchase fish products, and further studies focusing on this aspect are encouraged. Programmes such as aquaculture awareness and education campaigns are recommended in this study area to increase knowledge concerning various fish benefits in order to win communities away from high preference of red meat and poultry over fish. These campaigns should also focus more on empowering young women to improve their awareness of aquaculture products since the majority of respondents in this study were males and this also raised a question for further investigations. The cost of catfish production should be low in order to keep its market price even lower than other types of fish to improve willingness of consumers to purchase it in the study areas. The information gathered from this study was useful for guiding policy makers, economists and retailers to enhance aquaculture and develop sustainable small businesses. Future studies that further explore more factors that affect consumer purchasing behaviour and perceptions to improve promotion of aquaculture products are recommended.

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