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# Investigating the motivations driving meat analogue purchase among middle-income consumers in Mbombela, South Africa

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## ABSTRACT

Meat analogues are becoming widely accepted in high-income countries as substitutes for meat. As consumer acceptance of faux meat is beginning to follow a similar trend in South Africa, this study investigated the aspects of the product's positioning that could be used to further grow the product's market. Using data collected from 130 middle-income consumers in Mbombela, the study determined consumer perceptions of meat analogues. These were measured using composite indices extracted using principal component analysis, and these indices were regressed against the consumers' purchase probability of meat alternatives. The study's results showed that meat alternatives were perceived as a pricey symbol of class and status. This was found to have a two-sided effect on consumer behaviour. On one hand, the products' position encouraged purchase among the survey respondents and encouraged them to recommend the products to their peers and on the other, it discouraged consumption with their families. As this finding shows that meat analogues remain niche products in the study area, the study offers recommendations on ways to improve product performance in the niche market. It also suggests changes in the products' marketing that could assist in launching them into the mainstream food market of South Africa.

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## 1. Introduction

Meat analogues (food products that approximate the aesthetic qualities and/or chemical characteristics of certain types of meat) have been put forward as a healthier source of protein than conventional meat (Kumar et al., 2017). Faux meat has also been found to assist in addressing the mounting concerns of lack of climate change adaptation and the violation of animal rights that are associated with animal protein production (Lee et al. 2020). Despite these strong ethical motivations for purchase, processed meat alternatives have struggled to find a permanent place in the global mainstream food market (Fiorentini et al., 2020). A major challenge in the transition to diets with more meat alternatives is the distinct position of meat in society. Meat's association with various prominent social norms and values makes it difficult for consumers to voluntarily reduce its consumption (Sparkman et al. 2021). Beverland (2014) likens the challenge to meat reduction to the classic agency-structure tension, where conflicts play out between consumers' values for human health, environmental sustainability, morality, identity, and other numerous institutional factors. Therefore, an increase in meat analogue consumption will require much research to be done on consumer

perceptions as this can provide insights into the type of value propositions that should be offered to consumers to facilitate a higher acceptance and wider adoption of sustainable diets.

According to The Vegan Society (2019), the number of individuals who committed themselves to a vegan or vegetarian lifestyle increased significantly in the late 2010s. While one body of knowledge advocates for the increase of this segment, another suggests that a general reduction in meat consumption across all segments in the market would be more practical and achievable (Lang 2019). Due to the profound shared benefits that plant-based diets provide to society, a significant amount of research has been done to find ways of assisting consumers to adopt these sustainable diets. Most studies have employed various aspects of the MINDSPACE Nudge Theory (Dolan et al. 2010) to determine the most effective non-verbal cues that could motivate the consumption of less meat or more meat analogues. Some studies have investigated how “nudges” can be tailored to consumers’ personal convictions, egos and values (Noguerol et al. 2021; Dakin et al. 2021). Other studies have shown how these nudges can be utilised to develop marketing campaigns that can be utilised in developing business outreach exercises or public sector incentives (Bryant and Sanctorum 2021; Siegrist and Hartmann 2019; Becker and Lawrence 2021; Rozin, Haidt, and Clark 2000).

This study aims to investigate the effect of consumers’ perceptions on their purchase of meat analogues. Similar to past studies, it takes this focus because such an inquiry provides insights of consumers’ values, which are some of the most stable motivators of human behaviour. It is envisaged that positioning the products according to these life-long guides would produce the sought-after lasting changes in consumer behaviour. The study also makes a contribution to the literature on the meat analogue market, which has been dominated by studies on high-income countries, as reported by Arora, Brent, and Jaenicke (2020). A probe into the market from this angle brings helpful insights that could expedite the adoption of a solution to the global sustainable consumption challenge. It is envisaged that this study will assist in potentially bringing the next wave of growth in the market, as studies have shown a slowing down in growth in western countries (Dagevos 2021), the inability of consumers to further increase their current consumption (Collier et al. 2021) and a reversion back to former high meat consumption habits (De Visser et al. 2021).

The remainder of this paper is structured as follows. The following section reviews the findings from similar studies. Section 3 discusses the conceptual and theoretical framework that underpins the study. This is followed by Section 4, which details the analytical methods applied in this research, while Section 5 presents and discusses the results. The paper is concluded in Section 6.

## 2. Review of previous studies

Numerous studies have been conducted in the past decade to investigate ways of increasing the consumption of meat analogues or reducing meat consumption. Given the shortcomings of utilising forceful directives in stimulating sustained behavioural change, these studies have explored how the use of “nudges” (subtle persuasions or provocations) can be used to guide consumers into adopting diets with less meat. As a result, these studies have tested the applicability and effectiveness of various elements of the Nudge Theory’s MINDSPACE Framework (Dolan et al. 2010). As detailed in the Framework, the studies have found that the most effective means of provoking a reduction in meat consumption is done by using the right messengers (people/medium who/which delivers the message), incentives (the benefits/cost of a change in consumption choice), norms (actions of reference groups), defaults (pre-set options), and inciting a certain salience (perceptions of novelty and relevance), providing a conducive environment (priming), and presenting appeals to consumers’ emotions, commitment and egos.

A significant number of studies have shown that the identity of the person (or people) who was (were) relaying the meat reduction message had differentiated effects on consumption behaviour. A literature review conducted by Sparkman et al. (2021) showed that, in some instances, consumers were responsive to messages from large institutions, such as grocery stores and university dining

services, while in other circumstances, behavioural change was only observed after repeated contact with scientists or subject specialists. Other studies show that the choice of the medium used to relay the meat reduction message had a similar varying effect on consumers. For example, The Humane League (2015) found that the use of flyers had a high response rate, but behavioural change was often short-lived. Other studies found that presenting the messages using common media formats was more effective in nudging consumers. These studies include the likes of those carried out by De Visser et al. (2021) and Pohjolainen and Jokinen (2020), who found that public internet campaigns (i.e., the Meat Free Monday campaign and the Meatless October campaign) were more effective in reducing meat consumption for a longer time than other traditional media of messaging. A study by Noguerol et al. (2021), which was carried out in Spain, showed that other contemporary means of consumer education, such as the use of a food label, was similarly effective on vegans, vegetarians, flexitarians and omnivores, alike. Clark and Bogdan (2019) recommended the use of online messaging and food labels, as these were found to be the most trusted sources of food information for consumers surveyed in Canada.

Most studies agree that a general change in diet is often made in response to the benefits that the food products provide. In the case of meat analogues, these incentives are often aligned to a strong desire to avoid loss of good health and preserve animal welfare and the environment. As a result, interventions for reducing meat consumption tend to focus on the products' ability to curb concerns in these three areas (Dakin et al. 2021; Circus and Robison, 2019). Recent studies have ventured to determine which of these incentives has a stronger effect on consumers. For example, a study by The Humane League (2015) compared the effect of a message with an animal cruelty appeal, a clean eating appeal, and one with an environmental appeal. The study found that the animal cruelty message was more effective than the latter messages at persuading change of diets in survey respondents. In a study conducted in the United Kingdom, Apostolidis and McLeay (2016) found that a large proportion of the interviewed individuals were motivated by all three factors mentioned above; however, an almost equal proportion of people were open to persuasion by the taste and the price of the products. These studies' findings indicate that consumers also consider the time horizon associated with receiving the benefits of their consumption choices. In the study conducted by Apostolidis and McLeay (2016), the immediate and egoistic benefits were found to equally serve as a motivation of consumption as the long-term and ethical benefits. The study recommended the use of a mix of these incentives in future marketing campaigns.

Investigations on the effect of norms or social influence on meat and faux meat consumption have provided mixed findings. Studies such as those by Banovic and Sveinsdóttir (2021) and Siegrist and Hartmann (2019) found that demographic groups, such as youths, educated and elite individuals, were more likely to be influenced by their peers to eat meat analogues. Female consumers were also found to have a higher proclivity to reduce meat consumption. Bryant and Sanctorem (2021) attribute this, in part, to the relatively higher health conscientiousness of females, and their higher dietary diversity and higher consumption of plant proteins. The findings from a study conducted by Hoek et al. (2013) showed that reference groups also had an effect on consumption behaviour in other population demographic groups (men and individuals in low-income classes) that did not have characteristics that are known to favour high meat consumption. On the contrary, a review of empirical evidence gathered in high-income countries, which was conducted by Dagevos (2021), indicated that there remained a segment in society that was completely unpersuaded to reduce their meat eating habits, regardless of their peers' decisions or any other factor.

Other studies have shown that salient features or subconscious cues often cause attraction or repulsion to meat. As these influencing factors are not easily identifiable, people often interpret them as positive and negative feelings toward this type of food. An example of such a study was carried out in Sweden by Collier et al. (2021). The study found that the psychological barriers towards meat consumption congregated around uncertainty, scepticism, health, and identity themes. Other studies, such as one carried out by Becker and Lawrence (2021) in the United Kingdom, examined "meat disgust" and its role in vegetarianism and meat intake reduction in a

cross-sectional and longitudinal online study. This study built on the findings from past studies, such as Rozin, Haidt, and Clark (2000), that had identified the source of the negative feelings as being conjured by messages from the society (socio-moral disgust) or meat images (animal-reminder disgust).

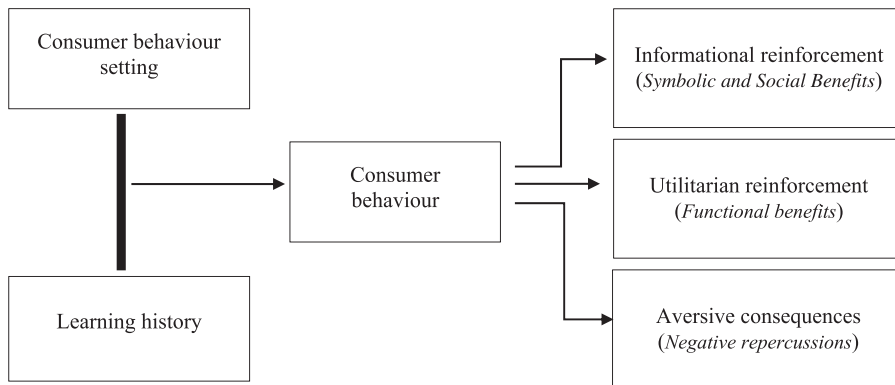
A study by Dagevos (2021) explored the influence of commitment on meat analogue consumption. In this study, four different meat reduction diets were prescribed to omnivorous participants for a seven-day adherence period. The study's findings showed that the diet assignments had a positive impact on reducing meat consumption, and improved participants' attitudes towards meat analogues. These effects outlived the prescribed adherence period. However, Sparkman et al. (2021) warn of the level of sacrifice that people can endure, in the long term. This study showed that people were more likely to make long-term commitments when they were asked to reduce their meat consumption, rather than if they were asked to stop eating meat completely. A study conducted in the United Kingdom by Neville et al. (2017) further showed that a commitment to eating hybrid analogues (products with both meat and vegetable materials) yielded a long-term meat substitution, rather than a commitment to eating purely plant-based meat alternatives.

The majority of the studies in processed meat analogue consumption patterns have been carried out in developed countries. Very few studies have documented trends and motivations for faux meat adoption in Africa, Latin America and Asia. One study by Arora, Brent, and Jaenicke (2020) tested consumers' willingness to pay for meat analogues in India. Their study found that the survey respondents demanded specific product features (good quality, low price) in meat analogues in order for them to accept faux meat into their diets. Another study was carried out by Eze et al. (2018) in Nigeria. This study specially investigated the acceptability of tofu among high-school students. The study indicated that the movement to introduce the meat alternative was actually driven by the need to increase dietary diversity (more dairy) in students' diets, as opposed to the moral and ethical drivers that have been reported in the developed countries. Such a finding indicates that there are subtle differences in the way people in the developing world think about the product. This points to the need for more research to be done into understanding these consumer perceptions in order to facilitate the creation of suitable value propositions that could facilitate an increase in the products' consumption.

### 3. The theoretical and conceptual framework

This study adopts the Behavioural Perspective Model (BPM) to explain how different factors interact to result in an increase in the consumption of meat analogues. This conceptual framework was developed by Foxall (1990, 2007) and it postulates that consumer behaviour is a function of the individual's learning history on a given type of consumption, the behaviour setting, and the consequences of past consumption behaviour. The behaviour setting is defined as the social and physical environments that provide stimuli in a choice situation. It includes various socio-economic factors, such as the location (urban city supermarkets and/or restaurants with meat analogues), cultural norms about meat/vegetable consumption, age and gender. The learning history refers to the knowledge gained from similar or related consumption decisions. In the case of this study, this could be knowledge of the negative effects of meat consumption on health, the environment or animal welfare. Alternatively, it could be recollection of an experience (taste or feeling) induced by consumption.

The BPM predicts that the behaviour setting, learning history and consequences of past behaviour can converge to form a perception of the effects of future consumption, which can lead the consumer along a path of behavioural shift. As indicated in Figure 1 below, these perceptions are summarised as expectations of utilitarian reinforcement, informational reinforcement, and adverse consequences of consumption. Utilitarian reinforcement refers to the direct and functional benefits of the purchase and/or consumption of a product. The benefits of utilitarian reinforcement are mediated by the product and include the feeling of satisfaction attributable to practising sustainable consumption. Informational reinforcement describes the more indirect and symbolic



**Figure 1.** Behavioural Perspective Model. Source: Foxall (2007).

consequences of behaviour, such as social consequences (e.g., social status and self-esteem). These are rewards mediated by other people and function as feedback to the consumer. The third type of consequence is adverse in nature and includes the costs to the consumer in monetary and nonmonetary outcomes (e.g., unsatisfactory taste).

The rate of behavioural change and, consequently, the probability of purchase and consumption ultimately depend on two factors. The first, according to Foxall (2007), comprises the social and physical environment, which is measured on a continuum representing varying levels of freedom of choice made available to the consumers. The second, as noted by Alhadeff (1982), is the relative weight of the positive reinforcements and aversive consequences that are perceived and/or received by the consumer. Hence, this study focuses on investigating how consumer perceptions and their socio-economic circumstances have an effect on their purchase probability of processed meat alternatives.

## 4. Methodology

### 4.1 Data

This study was conducted in the city of Mbombela, which is located in the province of Mpumalanga in South Africa. It made use of primary data, which was collected using interviews of respondents, who were randomly selected by using a convenience sampling survey technique, from three of Mbombela's largest shopping malls, located in the city's urban areas. A preselection quiz was carried out in order to ascertain whether the consumers were familiar with processed meat analogues. A sample of 130 individuals was then determined, which was relatively small because of the significantly low number of consumers who were aware of the meat alternatives at the time of the study. Data from other respondents that did not fall in the middle-income class was also not included in the study. Data for the study were collected using a structured questionnaire that was divided into three sections. Section A captured the socio-economic profiles of the individuals. The interview questions in this section enquired about the respondent's age, gender, race, income, education level, health, general eating habits, lifestyle and general purchase behaviour. These were measured using a mix of dummy, scale and categorical variables. Another question also enquired about the probability of buying a meat alternative in the following month. This variable was measured using a Juster Scale of 0–10 (see Brennan and Esslemont 1994), which was calibrated in a manner shown below in Table 1.

Section B of the questionnaire set out statements that drew out the level of influence that various perceptions of utilitarian and information reinforcements had on respondents' purchase behaviour. Section C was populated with statements that enquired about the perceived fears, repulsive factors

and reservations that were associated with the consumption of the meat analogues. The collection of this information in Sections B and C was done by using a five-point Likert scale, ranging from 0 (“strongly disagree”) to 4 (“strongly agree”). A five-point Likert scale was used because it gives reasonably robust correlation coefficients by limiting distortions in data scaling caused by ordinal data (Conradie and Piesse 2016).

#### 4.2 Method of analysis

The interaction of consumers’ different perceptions of meat analogues was analysed using the Principal Component Analysis (PCA). This methodological technique lessens the width of a set of data that is comprised of a large number of interrelated variables, while retaining the distinction existing in the data (Mabuza, Ortmann, and Wale 2015). This is accomplished by changing the data set into new variables, known as the principal components (PCs), which are not correlated, while ensuring that a few PCs retain most of the distinctions existing among all the original variables (Conradie and Piesse 2016). PCA has been used extensively to construct different indexes by other researchers (e.g., Sinyolo and Mudhara 2018).

As illustrated in Equations (1)–(3) below, for an initial set of  $n$  correlated variables, PCA creates uncorrelated components. These are called Principal Components (PCs), which are linear and are weighted combinations of the initial variables.

$$PC_1 = a_{11}X_1 + a_{12}X_2 + \dots + a_{1n}X_n \quad (1)$$

$$PC_2 = a_{21}X_1 + a_{22}X_2 + \dots + a_{2n}X_n \quad (2)$$

$$PC_m = a_{m1}X_1 + a_{m2}X_2 + \dots + a_{mn}X_n \quad (3)$$

where  $a_{mn}$  represents the weight for the  $m^{\text{th}}$  principal component ( $PC_m$ ) and the  $n$ th variable.

The weights for each principal component are given by the eigenvectors of the covariance or correlation matrix. The components are ordered so that the first principal component (PC1) explains the largest possible amount of variation in the original data, subject to the constraint that:

$$a_{11}^2 + a_{12}^2 + \dots + a_{1n}^2 = 1 \quad (4)$$

The second component (PC2) explains additional but less variation than the first component, and is uncorrelated with the first component (PC1), subject to the same constraint. Subsequent components are uncorrelated with previous components, while explaining smaller and smaller proportions of the variation of the original variables. The higher the degree of correlation among the original variables in the data, the fewer the components required to capture common information.

The Kaiser criterion of retaining PCs with eigenvalues larger than one was used in this study. Factor loadings greater than 0.5 were also used in the study. As robustness checks, the Kaiser-Meyer-Olkin and Bartlett’s tests were carried out in order to ensure there was sufficient correlation between the perception indicators to justify the factor reduction procedure. The Cronbach’s alpha analysis was used to test the level of internal consistency between the indicators included in measuring the perception variable. The Kaiser criterion was applied for retaining PCs. The number of indicators showing sufficient association between the original scores and the PCs was determined by using the Koutsoyiannis method.

The indices generated in the PCA were extracted and plugged into a regression model, along with a number of socio-economic variables. The impact of the different factors on meat analogue purchase was measured by using a logit model. The logit regression model had the form shown in Equation (5) below.

$$P_k = E(Z = 1|X_k) = \frac{e^{(-\beta_0 + \beta_1 X_1 + \dots + \beta_j X_j)}}{1 + e^{(-\beta_0 + \beta_1 X_1 + \dots + \beta_j X_j)}} \quad (5)$$

**Table 1.** Juster Scale for purchase probability measurement.

Scale calibration	Responses	Interpretation
0	No chance at all	0 out of 10
1	Very slight possibility	1 out of 10
2	Slight possibility	2 out of 10
3	Some possibility	3 out of 10
4	Fair possibility	4 out of 10
5	Fairly good possibility	5 out of 10
6	Good possibility	6 out of 10
7	Probable	7 out of 10
8	Very probable	8 out of 10
9	Almost sure	9 out of 10
10	Certain, practically certain	10 out of 10

Source: Brennan and Esslemont (1994).

where  $P_k$  is the purchase probability of meat alternatives;  $\beta_j$  where ( $j = 0, 1, 2, 3 \dots, k$ ) are the coefficients calculated, and  $X_k$  denotes the set of explanatory variables that were divided into respondents' socio-economic factors, utilitarian product attributes, and the aversive consequences to meat analogue consumption.

## 5. Results

### 5.1 Descriptive statistics

The results showed that the majority of survey respondents (55%) were between the ages of 30 and 49 and female (69.70%). The majority (41.67%) of the respondents were white, 35% were black, 13% were coloured (mixed race), and 10% were Indian. Almost all the survey respondents had received a formal education. The majority (78%) had obtained tertiary education, 19% had ended their formal education at secondary school, while 1% had ended at the primary school level. About half of the sample of individuals was married. The mean household size was 3.94, with a standard deviation of 2.56. The majority of the individuals in the survey (70.77%) had health insurance, indicating that there was a high awareness of the importance of health. The majority of the respondents (43%) earned an income falling between R11,000 and R20,000, while 36% of the sample earned between R21,000 and R30,000, and 21% of the survey's respondents earned between R31,000 and R40,000. The sample was not representative of the national demographic distribution, as there is an over-representation of the white race, people with a tertiary education, and married people (see StatsSA 2015).

Table 2 below shows the average scores for the opinion statements presented to the respondents. These were classified according to the three categories stated in the Behavioural Purchase Model. As shown by the ANOVA test's p-value of 0.019, there was a statistically significant difference between the survey respondents' perceptions of the benefits and the negative repercussions of purchasing and consuming meat alternatives. As shown in Table 2 below, consumers were more motivated to purchase faux meat because of the perceived social benefits (status symbolism) than the perceived functional benefits provided by the products. This was despite having negative expectations regarding the meat analogues' taste, price, and family's negative judgement, as well as some elements of neophobia.

These perceptions of the social benefits were mildly positive, as the averages shown in Table 2 ranged between 2.03 and 2.37. The informational reinforcement statements that had the highest average scores of 2.37 and 2.25 were "I order veggie burgers and meat alternatives when I eat out with friends" and "Advertisements on meat alternatives motivate me to buy them", respectively. This result shows that the prevailing perception of meat alternatives was similar to what Johnston, Szabo, and Alexandra (2011) found, where consumers in the middle and upper classes they sampled perceived the alternatives as a symbol of high class and prestige. These statements indicate that the

**Table 2.** Average scores on respondents' opinion statements .

	Average score
<b>Informational reinforcements</b>	
I would purchase meat alternatives for consumption at home with my family	2.032
I order veggie burgers and meat alternatives when I eat out with friends	2.369
Advertisements on meat alternatives motivate me to buy them	2.246
I could recommend meat analogues to my friends and family	2.047
<b>Utilitarian reinforcements</b>	
I am aware of the meat alternatives health benefits	1.102
I am aware of meat alternatives environmental benefits	1.838
Meat alternative helps do away with worries about animal rights violations	1.507
Meat alternatives because they create employment	1.554
<b>Aversive consequences</b>	
The price of meat alternatives is too high	2.692
I am worried that eating meat analogues may cause health problems	2.523
I am afraid meat alternatives taste bad	2.654
I am not willing to try something I am not accustomed to	2.123
I am afraid my family will judge me for consuming meat alternatives	2.838
ANOVA Variance between groups = 0.012.	
Variance within groups. = 0.034.	
P-value = 0.019.	

Note: 0 = strongly disagree; 1 = disagree; 2 = indecisive; 3 = agree; 4 = strongly agree.

Source: Field Survey (2019).

respondents received stronger informational reinforcement outside the family unit. This result contradicts past studies, such as one carried out by Elzerman, van Boekel, and Luning (2013), which showed that the family provided more persuasion for consumers to eat meat alternatives. A similar study by Hoek et al. (2013) found that positive attitudes toward meat alternatives by house-mates/partners had a more profound effect on consumer acceptance than any other socio-demographic factor. However, a more recent study by Circus and Robison (2019) has explained that advances in technology have resulted in consumers more readily responding to cues from outside the family than their immediate environment. The improvement in communication technology has increased consumers' ability to form stronger social ties with reference groups that may not be in their immediate environment.

Respondents indicated having negative perceptions towards the utilitarian reinforcement opinion statements. As the statements particularly enquired about the knowledge of the different functional benefits provided by the meat analogues, this finding tells of the lack of awareness of the products' different valuable attributes. The statement, "I am aware of the meat alternatives health benefits", has the highest average in this category, indicating that consumers were slightly more aware of the environmental benefits of faux meats, as compared to the health, animal welfare and community benefits provided. This finding shows the need for consumer education, as perceptions or knowledge of these moral and ethical product values are normally the main motivators of faux meat purchase (Lang 2019; Clark and Bogdan 2019). The finding is not unusual, as Hoek et al. (2013) found that knowledge of the moral and ethical benefits of meat alternatives was actually a purchase motivation for individuals who committed to plant-based diets, like vegans and vegetarians.

Consumers had a greater awareness of the different social, sensory quality, and economic costs that were associated with faux meat's purchase and consumption. This evident by the three statements, "I am afraid my family will judge me for consuming meat alternatives", "I am afraid meat alternatives taste bad" and "The price of meat alternatives is too high", which had the highest score averages of 2.84, 2.65 and 2.69, respectively, in this perception indicator category. The results from this category reiterate the need for consumer education, as consumers confessed to having fears of negative health consequences resulting from consuming the products. This is not surprising, as people tend to fear food that has undergone high levels of transformation and processing. They also showed signs of neophobia. The results reported here are very similar to those

ascertained by Hoek et al. (2013), who found that the key barriers for the majority of surveyed UK and Netherlands consumers were the unfamiliarity with meat substitutes and the lower sensory attractiveness, as compared with meat.

## 5.2 Principal component analysis results

Table 3 below shows the results acquired from the PCA.

Two PCs were extracted from the analysis, as they had eigenvalues above 1 and they captured most of the variation in the data. The loadings are presented in bold in Table 3. The first PC's original indicators accounted for 44.9% of the total variation in the variables. The results for PC1 indicate that one value position, which can be used to motivate purchase of meat alternatives, should highlight the products' benefits to human health, the environment, animal welfare, job creation and societal standing. Therefore, this PC represented product utilitarian value provision and external informational reinforcements. These results are similar to those found by The Humane League (2015), who found that of the three main utilitarian motivations, consumers were moved by the concerns for animal welfare.

PC2, on the other hand, accounted for 15% of the variation in the data. It reiterated the possible gainful use of moral and ethical product value propositions to encourage purchase, but highlighted that the price of the products would remain a significant deterrent to purchase. This hindrance to market growth by product prices was also mentioned by Elzerman, van Boekel, and Luning (2013), who noted that meat alternatives were often priced well above the price of conventional meat.

## 5.3 Robustness analysis results

The p-value of 0.000 that was acquired for the Bartlett's test and the 0.801 p-value acquired for the Kaiser-Meyer-Olkin test show that a sufficient measure of sampling adequacy and correlation was found in the matrix of perception indicators. These findings justify the use of a data reduction procedure using factor analysis for the study's data. A Cronbach's alpha value of 0.883 was also acquired

**Table 3.** Principal component matrix.

	PC1 Utilitarian and Informational reinforcements	PC2 Utilitarian reinforcements and adverse consequences
Purchase motivations		
I recommend meat alternatives to my friends and family	<b>.838</b>	.060
I am concerned about animal rights	<b>.734</b>	.373
Advertisements on meat alternatives products motivate me to buy them	<b>.721</b>	-.243
I order veggie burgers and meat alternatives when I eat out with friends	<b>.685</b>	.174
I buy meat alternatives because they create employment	<b>.649</b>	.118
I am aware of meat alternatives environmental benefits	<b>.611</b>	<b>.584</b>
I am aware of the meat alternatives health benefits	<b>.575</b>	<b>.566</b>
The price of meat alternatives is too high	.125	<b>.533</b>
I am afraid meat alternatives will cause health defects	.160	.155
I am afraid my reference group will judge me for consuming meat alternatives	.134	.099
I am not willing to try something I am not accustomed to	.482	.202
Eigenvalues	4.041	1.360
The proportion of variance captured	44.905	15.113
Cumulative proportion of variance	44.905	60.017

Note: Scores of adverse consequence indicators were reversed before PCA was carried out in order to allow correct analysis. Source: Field survey (2019).

**Table 4.** Results of the logit regression model.

	Coefficients	Standard Error	Standardised Coefficients	T-test	P values
(Constant)	.489	.091	.105	5.372	<b>0.000***</b>
Age of respondent	-.003	.006	-.055	-.414	.680
Gender of respondents	-.189	.113	-.176	-1.675	<b>.097*</b>
Education	.235	.085	.202	2.781	<b>.006***</b>
Household size	-.051	.009	-.371	-5.424	<b>.000***</b>
Income	.118	.050	.189	2.381	<b>.019**</b>
Utilitarian and informational reinforcements	.038	.020	.124	1.883	<b>.062*</b>

Source: Field survey (2019).

$R^2 = 0.62$ .

Variables significant at 10% (\* $p < 0.1$ ); Variables significant at 5% (\*\* $p < 0.05$ ); Variables significant at 1% (\*\*\*) $p < 0.01$ ).

in the study and this confirmed the high correlation between purchase motivation factors. A sample determinant of 0.738 was acquired from the factor analysis, signifying an adequate extraction of variation per variable.

### 5.4 Regression analysis results

Table 4 below shows the results of the logit regression analysis. The results of this analysis are discussed below.

The results in Table 4 show that women were more likely to have a higher probability of purchasing meat analogues. This finding is in agreement with past studies (Banovic and Sveinsdóttir 2021; Siegrist and Hartmann 2019) that showed that female consumers had a stronger preference for plant-based proteins. The results also show that high educational level attainments ( $p$ -value = 0.006) had a significant and positive influence on the purchase probability of meat alternatives. This result concurs with that of Sparkman et al. (2021), who found that meat analogues appealed to more-educated consumers. This is an expected result, as educated individuals tend to be more liberal and are willing to consume new products that embody moral and ethical values.

The results shown in Table 4 indicate that individuals who earned higher incomes ( $p$ -value = 0.019) were more likely to purchase meat analogues. This finding concurs with the results found by Sparkman et al. (2021) and Johnston, Szabo, and Alexandra (2011), who showed that, for middle- and upper-class individuals, meat analogues were perceived as a symbol of high class and prestige. Elzerman, van Boekel, and Luning (2013) also noted that meat alternatives were often priced well above the price of conventional meat, and often appeal to individuals who were well off. The high prices also deterred purchases in this study, as the results showed that a larger household size, which is associated with the impacts of high costs of food, was found to have negatively associated with meat alternative purchase. According to StatsSA (2015), larger households in South Africa generally experience more budget pressure; therefore, they would opt for lower-priced food.

The index measuring utilitarian and informational reinforcements had a significant and positive influence ( $p$ -value = 0.062) on the purchase probability of meat alternatives. This indicates that the use of a product value proposition that centres on utilitarian and informational reinforcements is associated with a high purchase probability. The results provide evidence that marketing campaigns that highlight these product values would result in an increase in purchases. Several past studies, such as those carried out by Dakin et al. (2021) and Dagevos (2021), have reported similar findings. According to Boukid (2021), appealing to consumers' values in such a manner provides compelling reasons for them to change their eating habits.

## 6. Conclusion and recommendations

This study sought to measure consumers' perceptions of meat alternatives and to determine how these influence the purchase probability of meat analogues. This investigation was done by carrying

out principal component analysis on a number of perception indicators and regressing the derived perception indices on consumers' purchase probability of faux meat. The investigation was carried out to ascertain the value propositions that could be posed to consumers that could result in an increase in the purchase of the products.

The results of the principal component analysis showed that the survey respondents had positive perceptions of the social benefits associated with the consumption of meat alternatives, and responded positively to advertisements of the products. It found that there was a limited awareness of the moral and ethical values that are associated with meat alternatives. The feelings of concern for the possible negative repercussions of purchasing and consuming faux meat were found to be stronger than the perceptions that motivated purchase. These negative concerns were about the high product price, possible health implications, bad taste and disapproval from family. The regression analysis results showed that value propositions centred on the provision of the functional benefits (improvement of health, the environment, animal welfare, and job creation) and social benefits (indications of higher social status) can be used to motivate an increase in the purchase of faux meat. The findings also highlighted the need to address the products' pricing concerns, as factors, such as household size, that are linked with the high product price are deterrents to purchase.

Given these findings, we recommend that a two-pronged approach be used in the marketing of meat analogues. The first would highlight the functional benefits of the products, particularly the implied improvements in human health, the environment, animal welfare, job creation and societal standing, which might result from faux meat purchase and consumption. This could be implemented in the short term and target the niche market in which the products currently sell. The marketing approach would include an increase in advertisements of meat analogues, as the study's results indicate that consumers responded positively to advertisements. The second approach would be longer-term in nature, as it would be aimed at addressing the problem of transitioning the product to the mainstream food market. These efforts should be directed towards marketing the product as a household good. Educational campaigns and product tasting could be utilised to assist consumers in overcoming neophobia. Investments in technologies that could assist in reducing the cost of the products would be instrumental in making sure that the products are within the reach of consumers with lower disposable incomes and larger households. This would address the deterrents to purchase identified in the study.

This study was not without limitations. The study was carried out in the city of Mbombela, and because of the low number of consumers who were aware of these new products at the time of the study, the study collected data from a sample of only 130 individuals. We recommend that future studies be conducted with larger samples, as the consumption of faux meat is becoming more popular, and a nationally representative sample could allow for a determination of results that could be applied nationwide. In addition, the perceptions and purchase motivations of consumers are likely to change, with time. Studies could also be carried out in the economic hubs of the country, where the products are likely to find a larger market due to the higher disposable incomes of the consumers in these locations. Other investigations of the threshold income and family size that could be targeted for marketing campaigns could also be gainful to the industry. A study of other developing countries is also recommended, as these represent a market that is yet to be explored.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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