

Consumers' Choice of Beef Brands and Intention to Switch in Northern Ghana: The Role of Theory of Planned Behavior

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Abstract

Product and consumer-related factors are key determinants of food choices and preferences globally. This study uses decomposed form of the original components of theory of planned behavior (TPB) to evaluate consumers' intentions toward three beef brands in northern Ghana. Through multi-stage sampling, 560 beef consumers were selected and made to choose their favorite beef brands through choice experiment. A pre-tested questionnaire was used to collect cross-sectional data which were analyzed using descriptive statistics and partial least square structural equation modeling (PLS-SEM). NVivo was used as a supporting tool to generate text clouds from the qualitative data collected during focus group discussions. The results show that majority of the respondents prefer locally produced beef sold fresh at butcher shops. Results from focus group discussions revealed that consumers grade beef quality using attributes such as color, freshness, taste, production and sales environment. On intention to switch to enhanced (healthy) beef brands, majority (65%) of consumers of beef brand **A**, 87% of brand **B** and 91% of brand **C** had intention to switch. On factors influencing intention to switch, attitude had 22.5% influence at 3.213 ($p < 0.010$) significance level. Subjective norm had 18.3% influence at 4.144 ($p < 0.001$) significance level with perceived behavioral control having the highest influence of 38.3% at 6.207 ($p < 0.001$) significance level.

Keywords: Consumer Behavior; Theory of Planned Behavior; Northern Ghana; Food Safety; Choice Experiment; Structural Equation Modeling.

Introduction

Healthy eating is key to personal growth and economic development (WHO, 2020). This is why policy makers globally continue to advocate for the consumption of healthy and safe meats. Globally, meats containing less than 10% saturated fats and less than 30% total fat are deemed safest and healthiest sources of dietary proteins, vitamins and minerals (FAO, 2022; WHO, 2020). In Ghana, consumption of different meats has more than doubled, especially beef, which is mostly sold fresh in the open market (Abraham et al., 2023; Amfo and Ali, 2020). In 2020, Ghana's per capita consumption of beef reached an all-time high of 410g per day (Darko et al., 2021). MoFA (2025) attributes such increased consumption to increased availability from enhanced domestic production. Also, consumers' purchasing powers have been improved due to recent economic development resulting from

successive GDP growth of 3.0%, 5.1% and 6.0% for 2023, 2024 and 2025 respectively (World Bank, 2025).

Along these economic changes, the modern-day meat consumer's well-being has improved structurally with drastic nutritional transitions. Coupled with these, factors such as urbanization, concerns over health and attachment to certain socio-cultural beliefs have made consumers even more complex (Abraham et al., 2023; Adom, 2018; Pawlonka and Bereznicka, 2018). These have significantly influenced consumption trends with calls on food safety regulators to trace beef chains and their production methods to safeguard consumers (Asuming-Bediako et al., 2018; Annan-Prah et al., 2012). A 14-year distribution of beef consumed in Ghana between 2011 and 2024 is shown in Table 1.

Table 1: The distribution of beef in Ghana between 2011 and 2024

Year	Total consumed (MT)
2011	35,415
2012	37,925
2013	43,114
2014	34,982
2015	32,868
2016	49,643
2017	55,047
2018	57,156
2019	46,867
2020	66,025
2021	59,802
2022	46,486
2023	49,414
2024	44,446
Average total consumed per year= 47,085	

Source: (SRID-MoFA, 2025)

Statement of the Problem

Despite the increased consumption of beef in Ghana, an apparent economic problem persists. Beef consumers continue to express concerns over the quality and safety standards of the meat. There are reported cases of majority of chain actors not adhering to standard operating procedures enshrined in Food and Drugs Authority (FDA) manuals. For example, poor husbandry practices leading to zoonotic infections in beef have been identified among practitioners (FAO, 2022). Furthermore, Adzitey (2018) found cattle being slaughtered in unhygienic environment with carcasses being washed with dirty water and on dirty slabs. Again, Annan-Prah (2012) reported cases of cattle body parts being singed with flammable car tires. Asuming-Bediako et al. (2018) have also reported traces of microbial and zoonotic food-borne infections like Salmonellosis, bovine tuberculosis and

brucellosis in some beef brands in Ghana. These implicate the quality and safety standards of beef already in the market, deepening consumers fears.

The current study further identifies a research problem emanating from an overly applied attribute-based theories like Lancaster's and Random Utility theories and econometric tools that fail to explore cognitive decision-making processes of consumers (e.g. Glent, 2024; Saija et al., 2023; Ahtiainen et al., 2023; Do Paço et al., 2019). The Lancaster's and Random Utility theories shift consumers' behaviors toward foods in one direction, focusing on product attributes as the basis of choice. However, different schools of thought have identified consumers as psychological and social beings whose choices are directly influenced by the society and other latent factors (e.g. Przymuszala et al., 2024; Lihua, 2022; Shen et al., 2022; Tornikoski and Maalaoui, 2019). Specifically, studies have linked consumers' behaviors toward foods to be influenced by psychological variables such as personal attitude, subjective norm and perceived behavioral control (e.g. Sui et al., 2024; Chilón-Troncos et al., 2024; Mucha, 2024; Quaye et al., 2023; Sajjad et al., 2023; Ajzen, 2015). The current study addresses these economic and research problems by applying the theory of planned behavior (TPB) in its decomposed form to test its influence on beef consumers intentions in a typical Ghanaian context. The application of TPB is particularly suited for Ghana, a developing country where consumption of all foods (meats inclusive) is well integrated in the social, cultural and religious lives of the people.

Research Objective and Questions

Based on the overall objective of the study, evaluating the role of theory of planned behavior on beef choice decisions among Ghanaians, the study sought to address the following specific research questions:

1. Which beef brand is most preferred by consumers?
2. How do consumers rank attributes of beef in the market?
3. Do consumers have intention to switch to enhanced beef brands? If yes, what factors influenced such intentions?

The current study is unique in consumer behavior and meat consumption literature in two distinct ways:

1. It is a complete shift from the overly-applied Lancaster and Random utility theories which are hinged on product attributes as the main predictors of consumers' choices.
2. It combines a multi-attribute valuation technique with TPB in a single study. The authors are not aware of any such study, especially in Sub-Saharan Africa.

Theoretical Overview: The Theory of Planned Behavior (TPB)

Being a member of the theory of reasoned action, the theory of planned behavior provides an extensive socio-psychological framework to behaviors in different domains (Ajzen, 2020). In food purchasing and consumption, the theory goes beyond decisions influenced by product attributes. It proposes that intentions toward a consumption behavior is

dictated by three distinct sources of influence, namely attitude, subjective norm and perceived behavioral control (Mucha, 2024; Shen et al., 2022; Bosnjak et al., 2020; Ajzen, 2020; 1991). First, an individual's intention to perform a consumption behavior is driven by such person's attitude towards the product in question, and this may be positive or negative with certain outcomes (Ajzen, 2015). This means consumers attitude towards enhanced beef brands is determined by their positive or negative belief in beef already in the market. A positive attitude reflects trust in beef already in the market whilst a negative attitude indicates lack of trust in such beef brands and the need for enhanced versions. Attitude has been observed to be a primary predictor of people's response to products under the influence of product knowledge and confidence (Vij and Saxema, 2024; Sui et al., 2024; Sajjad et al., 2023; Shen et al., 2022; Asioli et al., 2017). Vij and Saxema (2024) found attitude to show a direct positive and significant effects ($\beta=0.57$; $p<0.001$) on consumers' purchase intentions. Similarly, Sui et al. (2024) and Asioli et al. (2017) identified a positive and significant effect of attitude on purchase intentions of green foods. Shen et al. (2022) further showed a strong and positive correlation between attitude and purchase intentions. However, Sajjad (2023) found a negative effect of attitude on choice of fast foods among college students.

Subjective norm (SN), on the other hand, evaluates the influence of social groups on behaviors (Ajzen, 2020; Ham et al., 2015; Ajzen, 1991). These sources of influence are external and define the codes of conduct as enshrined in the expectations of significant reference groups (Tornikoski and Maalaoui, 2019). Under such circumstances, people become responsible for protecting important cultural, religious and social norms (Vij and Saxema, 2024). When such external influences become intense, the affected individuals become obliged to follow the suggestions of such significant reference groups to fit into behavioral rules, life expectations and norms of society (Piroth et al., 2020; Tornikoski and Maalaoui, 2019). The theory of planned behavior treats these social influences as features of beliefs where people perceive that some external significant people must approve certain eating trends in order to fit into the society (Farias et al., 2019). When this happens, beef consumers exhibit tendencies to switch to brands with enhanced quality and safety standards based on approval and recommendations of important reference groups in the society. These significant reference groups include spouses, peers, family members, work colleagues, acquaintances and community elders (Mucha, 2024; Piroth et al. 2020; Farias et al., 2019). Studies have found subjective norm to have the greatest influence on consumers' behaviors towards quality and safe foods (e.g. Arya et al., 2024; Saut and Saing, 2021; Li et al., 2020; Rivaroli et al., 2019a; Santisi et al., 2018; Liobiekienė et al., 2016). According to Arya et al. (2024), subjective norm has positive influence on sustainable food consumption. Also, Saut and Saing (2021) and Li et al. (2020) showed how subjective norm positively influenced consumption of environmentally friendly agri-foods. Again, Rivaroli et al (2019a) and Santisi et al. (2018) found subjective norm to correlate positively with craft beer consumption among certain European groups.

Additionally, perceived behavioral control (PBC) expresses one's perceived ability to engage in certain consumption behaviors (Mucha, 2024; Ajzen, 2020). This perceived ability is in two-folds: self-efficacy and resource availability (Ajzen, 2020; 1991). The self-efficacy exemplifies one's ability to make purchasing and consumption decisions based on personal positive or negative beliefs. However, this ability does not operate in vacuum but require the availability of important resources like disposable income, time, purchasing skills, product knowledge and retail outlets (Ajzen, 2015; 1991). According to Ajzen (1991), the inclusion of PBC to the traditional attitude-behavioral model has resulted in considerable modifications in forecasting intentions. Accordingly, Ajzen (2005) associated the influence of perceived behavioral control to how individuals see their behavioral outcomes as a direct result of personal factors rather than external factors. In the context of this study, as consumers become more confident in their pursuit of quality and safe beef brands, the more such consumers follow through to achieve them. Although the beliefs such consumers hold may be unfounded and illogical, attitudes, subjective norms and perceived behavioral control are known to follow instinctively and logically to give rise to behavioral intentions that are consistent with purchasing and consumption decisions. Studies have shown positive and significant influences of PBC on food choice intentions across the globe, as exemplified in Pedrinelli et al. (2024), Chilón-Troncos et al. (2024), Lin et al. (2021) and Nguyen et al. (2019).

A schematic representation of the original TPB with its central dependent variable (intention) and independent variables (attitude, subjective norm and PBC) is shown in Figure 1.

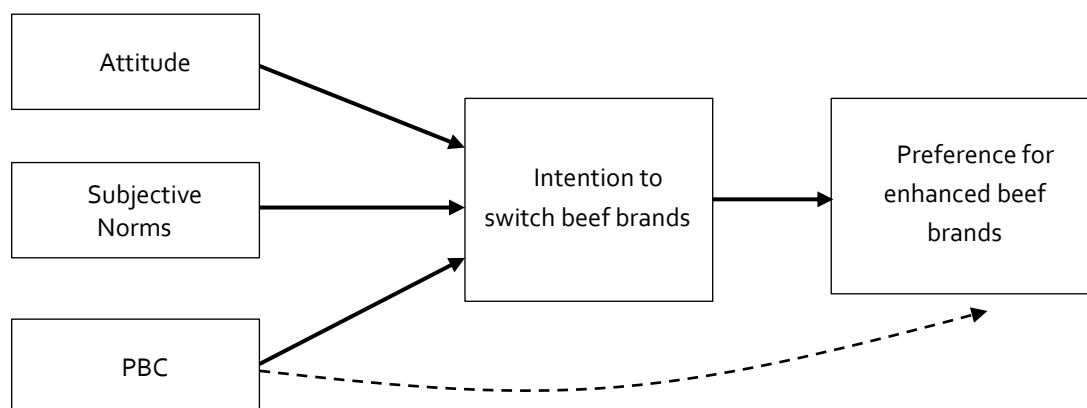


Figure 1: Schematic representation of the original TPB

Source: Authors' own construct

Though not an original component of TPB, the study extended the TPB model to include consumers demographic factors because studies have found such factors to relate positively and significantly with meat choices globally (e.g. Dube et al., 2023; Wanselius et al., 2022; Zhang et al., 2022; Quaye et al., 2023; Bannor et al., 2020; Amfo and Ali, 2020; Adom, 2018). The inclusion of demographic factors was necessary to test the theory's predictive powers on such factors.

Hypothesis

From the ensuing discussions on factors influencing consumers choices and preferences of food products, the study evaluated the role of theory of planned behavior on beef choice decisions among Ghanaians by stating the following hypotheses:

Hypothesis 1:

There is a positive and significant relationship between consumers' demographic factors and willingness (intention) to pay for enhanced meat products in Ghana (Bannor et al., 2020; Amfo and Ali, 2020; Adom, 2018; Annan-Prah et al., 2012).

Hypothesis 2:

There is a positive and significant relationship between consumers' positive attitude towards quality food products and intention to switch to such foods globally (Sui et al., 2024; Vij and Saxema, 2024; Sajjad et al., 2023; Shen et al., 2022, Asioli et al., 2017).

Hypothesis 3:

Subjective norm (social influence) has positive and significant influence on consumers' intention to switch to quality food brands globally (Arya et al., 2024; Saut and Saing, 2021; Li et al., 2020; Rivaroli et al., 2019a; Santisi et al., 2018).

Hypothesis 4:

Consumers perceived behavioral control has positive and significant influence on consumers' intention to choose quality food brands globally (Pedrinelli et al., 2024; Chilón-Troncos et al., 2024; Lin et al., 2021; Nguyen et al., 2019).

Materials and Methods

Study areas

The study was conducted in Tamale, the regional capital of Northern Region of Ghana. Applying multi-stage sampling technique, Tamale Metropolitan Assembly and its two sub-metros (Tamale South and Tamale central) were purposively selected. This is due to the metro's cosmopolitan nature characterized by different economic, social and commercial activities. These have attracted different people with different cultural, religious and educational backgrounds to the metro (GSS, 2021; King and Imoru, 2018). Again, being the capital town of a region described as the livestock hub of Ghana (MoFA, 2025; Abraham et al., 2023), Tamale is dominated by communities whose main occupation involve rearing and sale of different kinds of livestock, especially cattle (MoFA, 2025). Also, the dominance of Muslim communities within Tamale has made beef the most preferred meat among the populace (Mahaboubil-Hag and Adzitey, 2016). These informed the choice of Tamale for the study.

Through stratified sampling, suburbs within the two sub-metros were put into three strata: low-income, middle-income and high-income suburbs. This grouping was based on state of

infrastructure, available services and expenditure patterns of the people. Suburbs selected from each sub-metro are: Tamale South: Lamashegu (high-income), Asawaba (middle-income) and Banvim (low-income). For Tamale Central: Dakpema (high-income), Kalandan (middle-income) and Aboabo (low-income). Through systematic sampling, houses within these suburbs were selected with first houses selected at random after which every k^{th} house (sampling interval) was selected. k was determined by dividing the number of houses in each sub-metro (available from GSS, 2021) by the pre-determined sample size. Finally, households were selected randomly within houses and interviewed.

Sample size determination

Using the household population of TMA 365,510 (GSS, 2021), the sample size for the study was estimated using Yamane (1967) formula at 95% confidence level. According to Yamane (1967),

$$n \text{ (households)} = \frac{N}{1+N(e)^2}$$

where n = the required sample size, N = the population of the unit of analysis and e = the allowable margin of error, determined as 1 - (confidence level chosen).

Therefore,

$$n \text{ (households)} = \frac{N}{1+N(e)^2} = \frac{365,510}{1+365,510(0.05)^2} = 400$$

Since most Social Science research are characterized by low response rate and uncooperative respondents, Salkind (1997) recommends sample sizes be increased between 40%-60% to offset such negative effects. Accordingly, the original sample size was increased by 40% to obtain 560 households. Again, since the two sub-metros had varying household populations, proportional sampling was used to obtain representative households for each sub-metro. According to GSS (2021), Tamale South has a total of 240,087 households whilst Tamale Central has 125,423 households. Consequently, households selected from each sub-metro were estimated as:

$$n \text{ (per sub-metro)} = \frac{\text{number of households in a sub-metro}}{\text{Total number of households in the metro}} \times \text{target sample size}$$

Proportionally, 367 and 193 households were selected from Tamale South and Tamale Central respectively for interview with pre-tested questionnaires.

Application of Choice Experiment

First developed by Lancaster in 1966, choice experiment remains the best policy tool for evaluating the economic importance of market products with multiple attributes (Saija et al., 2023; Hanley and Czajkowski, 2019; Holmes et al., 2017). Specifically, this tool is best under situations where revealed preference data (real market data) is difficult to obtain or is completely non-existent (Edwards et al., 2020). Unlike contingent valuation which restricts respondents to just one attribute with binary responses, choice experiment allows

different attribute levels to be varied simultaneously to express preferences in a comfortable manner (Reynolds, 2025).

Furthermore, choice experiment uses an indirect method and does not explicitly involve asking for monetary valuation, an approach which eliminates biases associated with contingent valuation method (Bateman et al., 2002). On top of these, incorporating a no-choice option in the choice design gives respondents the freedom against any of the options provided. This makes choice situations more practical as respondents had the right to avoid any of the options provided.

In the present study, beef was selected and set at three different attribute levels as pertains in different meat markets in Tamale and Ghana. The choice of beef is due to its readily availability and popularity among households in Northern Ghana (Abraham et al., 2023; Adzitey et al., 2018). In designing the choice experiment for the study, the following steps were followed:

Identification and Selection of Key Beef Attributes

According to literature, attributes of meats are measured in terms of quality and safety standards. While the quality standards measure intrinsic features, the safety standards measure extrinsic features that surround meats and make them wholesome for consumption (ElMasry et al., 2012). Studies have labeled color (appearance), leanness, tenderness and freshness as the four topmost quality attributes considered by consumers (e.g. Amfo and Ali, 2020; Udonkum et al., 2019). On the other hand, certification of production methods, origin (source), mode of retail (market type) and price are topmost safety attributes by consumers (Bannor et al., 2020). Each of these attributes are defined by specific indicators, and their prominence in existing literature encouraged their selection for the current study.

Assigning Different Levels to the Selected Attributes

Product attribute levels define the different forms by which attributes can be presented to respondents in a hypothetical market (Holmes et al., 2017). To present attribute levels that represent the market situations in the study areas, focus group discussions were held with butchers, beef retailers, city authorities and some selected consumers in Tamale. Questions asked related to the types, source and states of beef sold within the metro. Also, consumers perceived color of original beef, available beef markets, sources of beef verifications and prices of a pound of all beef brands were solicited from sellers and consumers in the metro. The responses captured two brands of beef (halal beef and non-halal beef), different perceived colors (bright-red, brown, dark brown etc.). Three market outlets were identified (butcher shop, supermarket/cold store and uncertified vendors), two sources of certification were named (local Malam and Veterinary Services Directorate (VSD) of MoFA. Pricing was based on type of beef and market outlet (Gh¢45 for halal certified beef, Gh¢50 for VSD certified beef and Gh¢40 for uncertified vendors).

Based on this information, the study assigned two levels of color (bright-red; otherwise), two levels of leanness (less fatty; fatty), three levels of freshness (1-7 days; 1-14 days; 1-21 days). For safety attributes, two sources of certification were assigned (certified by local Malam; certified by VSD), one level of origin (locally produced), three levels of retail market (butcher shop; supermarket/cold stores; open local market) and three levels of price (Gh¢40; Gh¢45; Gh¢50). These levels are presented in Table 2

Table 2: Beef attribute levels

Quality attributes:	Attribute levels
Color (Appearance)	Bright red, otherwise
Leanness	Low fat (<5%), Fatty (>5%)
Freshness	1-7 days, 1-14 days, 1-21 days
Safety attributes:	Attribute levels
Certification	Certified by local Malam, certified by VSD, no certification
Origin	Locally produced
Mode of retail	Butcher shops, Supermarket/cold store, Local market
Price/pound	Gh¢40; Gh¢45; Gh¢50

Source: Authors' own construct

Combining Attributes Levels into Alternative Choice Sets

Available designs for combining product attribute levels into alternative choice sets include random draw, orthogonal main effect, minimal D-optimal, full and fractional factorial designs (Dieter and Xiaohua, 2020; Holmes *et al.*, 2017). However, no statistically significant differences have been found among these, and larger designs do not necessarily perform better except increasing sample sizes to control the error term. Not only that, the fractional factorial design is less expensive and provides practically feasible choice sets without overburdening respondents while maintaining orthogonality and attribute balance (Gao *et al.*, 2010)). Accordingly, the study adopted the fractional factorial design to combine the selected subsets of attributes into choice sets. Finally, the choice sets were drafted in a pre-tested questionnaire and presented to respondents. Since beef is a market good, an "opt out" option was included to give respondents the opportunity to choose against any of the alternatives. The three beef choice sets are presented in Table 3.

Table 3: Choice sets for the three beef brands

Attributes	Beef brand A	Beef brand B	Beef brand C
Color	Bright-red	Bright-red	Otherwise
Leanness	Lean (<5% fat)	Lean (<5% fat)	Fatty (>5% fat)
Tenderness	Assured	Assured	Unassured
Freshness	1-14 days	1-7 days	1-21 days
Mode of certification	VSD certified	Local Malam	No certification
Origin	Locally produced	Locally produced	Locally produced
Mode of retail	Supermarket/cold store	Butcher shop	Local market
Price/pound (Gh¢)	50	45	40

Attributes	Beef brand A	Beef brand B	Beef brand C
I prefer			
I do not prefer any			

Source: Authors' own construct

NB: At the time of the study, US\$1= Gh¢11.50

Beef brand A is produced locally with VSD certification, well packaged and sold at supermarkets and cold stores. This brand could stay in freezers up to two weeks (14 days) at the supermarket, making it lose freshness. Beef brand B is a locally produced halal beef that is certified by recognized local malams in the communities. Though fresh, this beef is mostly sold at butcher shops on open vending tables and exposed to flies, dust and airborne contaminants, making it susceptible to infections. Beef brand C is also produced locally but characterized with high fat content, uncharacteristic odor, unhygienic sales environment and no appropriate certification. It is sold on vending tables in open local markets

Decomposing TPB, Data Analysis and Empirical Specifications

Although TPB is well grounded in behavioral research, studies have found it to be uni-dimensional in nature and fails to present details of how intentions are shaped (Taylor and Todd, 1995; Ajzen, 1991). More importantly, the cross-over effects associated with intentions and beliefs have been difficult to explain in existing literature (Hung et al., 2012). To control these weaknesses, the current study decomposed the three core components of the theory into relatable sub-constructs to achieve a state of multi-dimensionality and enhance the interactive and explanatory abilities of the main constructs. In achieving this, attitude was decomposed into constructs measuring consumers' trust in existing beef brands, the need for enhanced beef attributes, and perceived expected utility. Also, the subjective norm was decomposed into constructs measuring influences of family members, spouse, friends, work colleagues and community elders on intention to switch to enhanced beef brands. Finally, perceived behavioral control was decomposed into constructs measuring consumers' knowledge about quality beef (self-efficacy) and availability of resources like time, disposable income, retail outlets and product information that make purchasing intentions possible. These were drafted into a well-designed questionnaire for the study. The decomposed form of TPB as used in the current study is shown in Figure 2, indicating the sub constructs of the three main independent variables of the theory.

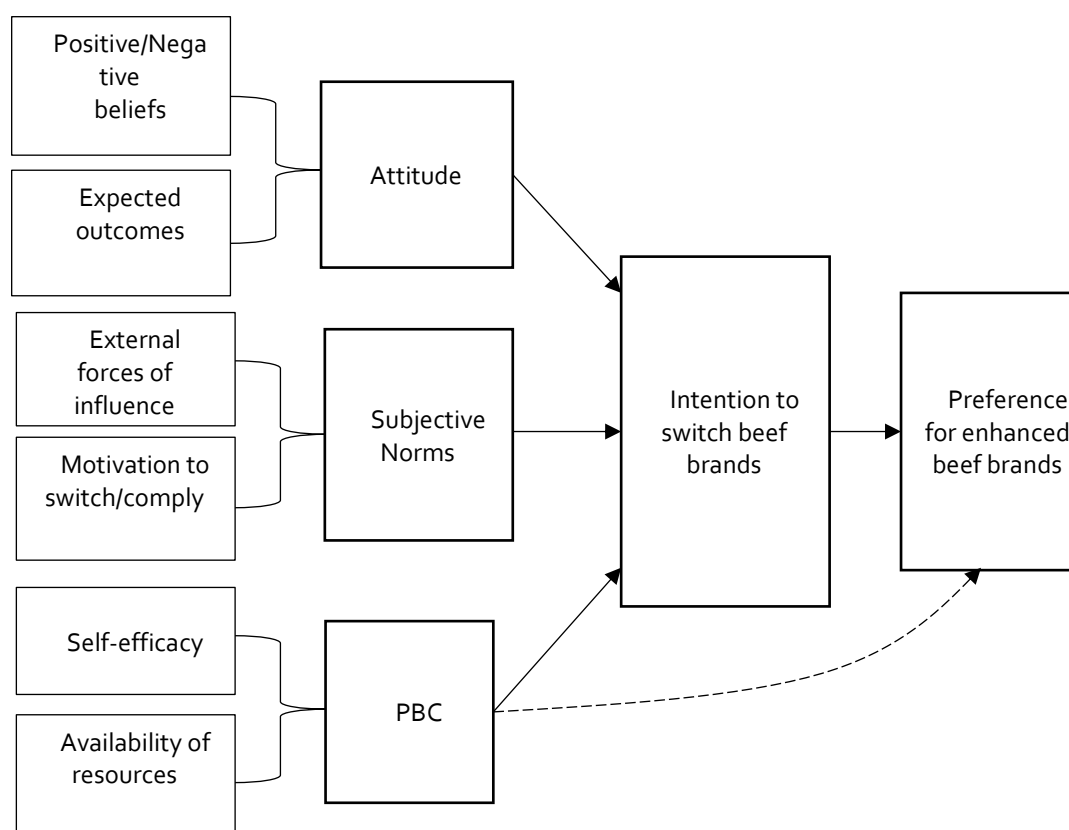


Figure 2: Schematic representation of the decomposed TPB

Source: Authors' own construct

The quantitative field data were analyzed using STATA and PLS-SEM, supplemented by the use of NVivo software for the qualitative data from interviews and focus group discussions. The choice of PLS-SEM over covariance-based structural equation modeling (CB-SEM) methods like LISREL, AMOS and SEPATH is because the data for the study did not follow the multi-variate normal distribution order as shown by the normality tests of Skewness, Kurtosis, Kolmogorov-Smirnov and Shapiro-Wilk (see appendix A. 2). Fortunately, PLS-SEM is less stringent on such data (Cassel et al., 1999). Secondly, unlike CB-SEM, PLS-SEM uses series of ordinary least squares in its iterative algorithm which make identification of recursive models easy with no presumed distributional form of the measured variables (Falk and Miller, 1992). Finally, though PLS-SEM is best for theory confirmation, it is also best for identifying and testing sources of relationships among variables (Hair et al., 2016). Consequently, the two main steps of PLS-SEM, namely, the measurement and structural model analyses, were followed. In the measurement model analysis, multicollinearity tests were conducted for the formative and reflective latent variables. While the formative test used factor loadings to assess validities of variables used in constituting the constructs, the reflective test used reliability, convergent and discriminant validities to determine internal consistencies. For reliability and convergent validity, the Cronbach's alpha coefficients and average variance extracted (AVE) were estimated in addition to composite reliability ratings. Additionally, the significance levels of these tests were determined using bootstrapping t-values based on 5000-subsamples. All item loadings with t-values greater

than 1.96 (two-tail test) were rated significant. Empirically, the Cronbach alpha coefficient was represented as:

$$\alpha = \frac{N \times \bar{C}}{\bar{V} + (N-1) \times \bar{C}} \text{-----} (1)$$

where N is the number of items in a construct, $\bar{C}$ is the mean covariance between items in a construct and $\bar{V}$ is the mean item variance. Conversely, the AVE for construct y_a was constituted as:

$$AVE_{y_a} = \frac{\sum_{k=1}^{k_a} \ell_{ak}^2}{\sum_{k=1}^{k_a} \ell_{ak}^2 + \omega_{ak}} \text{-----} (2)$$

where ℓ_{ak} is the indicator loading and ω_{ak} is the error variance of the k^{th} indicator ($k = 1, \dots, k_a$) of construct y_a . When standardized with mean of 0 and variance of 1, equation 2 becomes:

$$AVE_{y_a} = \frac{1}{K_a} \sum_{k=1}^{k_a} \ell_{ak}^2 \text{-----} (3)$$

As a guide, Cronbach's alpha and composite reliability values exceeding 0.700 and AVE value of 0.5 or more are most acceptable for theoretical studies (Hair et al., 2016; Al-Swidi et al., 2014). These were followed by investigating the constructs' discriminant validity to determine how distinct and correlated they were. The rule of thumb is, variables should relate strongly to their own constructs than to other constructs. For the purposes of this study, the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT) of correlations were used to assess the discriminant validities. Additionally, correlation matrix test was conducted to evaluate the inter-variable correlations between the validated constructs. After these, the final stage of PLS-SEM, the structural model analysis stage, was built to examine the influence of beef consumers' demographic factors, attitude, subjective norm (SN) and perceived behavioral control (PBC) on intention to switch to enhanced beef brands. For the purposes of this study, intention to switch beef brands was based on attributes possessed by each brand. As a result, beef attribute was set as the endogenous (dependent) variable in the structural model analysis as:

$$\eta = \beta\eta + \Gamma\varepsilon + \zeta \text{-----} (4)$$

where η is a vector of the observed endogenous variable (intention based on beef attributes), β and Γ are the matrices of structural parameters to be estimated, ε is the vector of unobserved exogenous variables and ζ is the vector of unobserved errors.

Results and Discussions

Characteristics of Respondents

The descriptive statistics of respondents' characteristics are shown in Table 4.

Table 4: Characteristics of respondents

Variables		N	%
Gender	Male	150	26.8
	Female	410	73.2
Total		560	100
Age group	< 30 years	123	21.9
	31-40 years	207	37.0
	41-50 years	143	25.5
	51-60 years	71	12.7
	> 60 years	16	2.9
Total		560	100
Marital Status	Married	409	73.0
	Unmarried	151	27.0
Total		560	100
Household size	1-5 members	379	67.7
	6-10 members	178	31.8
	11-15 members	3	0.5
Total		560	100
Level of education (Years)	None (0 years)	37	6.6
	Basic School (9 years)	188	33.6
	Senior High School (12 years)	197	35.2
	Tertiary (16 years)	138	24.6
Total		560	100
Occupation	Private workers	470	83.9
	Public workers	90	16.1
Total		560	100
Income Group	< GHC500	5	0.9
	GHC500-GHC999	171	30.5
	GHC1000-GHC1499	112	20.0
	GHC1500-GHC1999	66	11.8
	GHC2000-GHC2499	58	10.4
	>= GHC2500	148	26.4
Total		560	100
Religion	Muslims	393	70.2
	Christians	167	29.8
Total		560	100

Source: Field data analysis

It may be observed from Table 4 that majority (73.2%) of the respondents were females with few (26.8%) males. This exemplifies the significant roles Ghanaian females play in meat purchases and cooking, validating results of Quaye et al. (2023). Also, majority (84.4%) of the respondents were between 30-50 years old, 12.7% were between 51-60 years and few (2.9%) were above 60 years. According to GSS (2021), Ghanaians between 30-50 years are in the working-class group, implying that majority of the respondents were

working class individuals with purchasing powers. This means the respondents were best suited for the study because they could afford the price of beef. Although majority (73%) were married, 67.7% had household size of 1-5 members and 31.8% had 6-10 members. This agrees with the findings of Abraham et al. (2023) and GSS (2021) who found Tamale to be dominated by nuclear families compared to its surrounding rural communities. Table 4 further shows that 33.6% of the respondents had completed nine years of basic education (primary to Junior High school), 35.2% had completed Senior High school and 24.6% had tertiary education. In all, majority (93.4%) had acquired formal education, making them well suited for the study because they could read, understand and process product information to make right decisions about meats. On occupation, 83.9% were employed in the private sector whereas 16.1% worked in the public sector. Within these two categories, 51.4% earned between Gh¢500 - Gh¢1,449 per month, 22.2% earned between Gh¢1,500- Gh¢2,499 per month and 26.4% earned Gh¢2,500 or more. This implies that beef consumption is an attribute of households with disposable income. On religious affiliation, 70.2% were Muslims and 29.8% were Christians. This trend generally agrees with GSS (2021) report that Tamale is dominated by Muslims.

Respondents' Ranking of Quality (Intrinsic) and Safety (Extrinsic) Attributes

Respondents' ranking of quality and safety attributes of beef was assessed through focus group discussions and NVivo thematic analysis.



Figure 3: Respondents ranking of beef attributes in NVivo text clouds

Source: Thematic analysis of field data

Figure 3 shows that majority of the respondents ranked color as the most important quality attribute they look for when purchasing beef from the market. They associate quality beef

with bright-red color, and this explains why color appears bolder in the text cloud in Figure 3. This was followed by freshness and leanness. On safety attributes, the respondents labelled production and sales environment as the topmost safety attribute they consider when purchasing beef. On the other hand, availability, price, tenderness and packaging were given low rankings by the respondents. This exemplifies consumers' knowledge about attributes of beef, thus guiding them in their rankings. Apparently, these results corroborate with Amfo and Ali (2020) who, through Random Utility theory, linked Ghanaian meat consumers' preferences for locally produced meats to enhanced meat colors, freshness and good taste.

Respondents' most Preferred Beef Brands, and Intention to Switch to Enhanced Attributes

It may be observed from Table 5 that 196 (35%) of the total respondents preferred beef brand **A**, 319 (57%) preferred beef brand **B** and 45 (8%) preferred beef brand **C**. Out of the 196 who preferred beef brand **A**, majority (65%) had intention to switch to fresh form of such beef at the supermarket whilst the remaining 35% had no such intention. With beef brand **B**, majority (87%) had intention to switch to butchers and vendors selling such fresh beef in netted structures that prevent access by flies, dust and air-borne contaminants. The remaining 13% were satisfied with how such brand is vended and had no intention to switch. Finally, almost all consumers of beef brand **C** (91%) had intention to switch to enhanced versions due to its overall poor state. The remaining 9% cited lack of disposable income as main reason for buying such low quality brand. From these, it is clear that majority of beef consumers in the study areas prefer locally produced halal beef, and want such beef to be vended in well protected butcher shops. Table 5 provides a summary of respondents' preferences of beef and intention to switch brands.

Table 5: Consumers' choice of beef brands and intention to switch

	Beef Choice A		Beef Choice B		Beef Choice C		Pooled sample	
	<i>Freq</i>	<i>%</i>	<i>Freq</i>	<i>%</i>	<i>Freq</i>	<i>%</i>	<i>Freq</i>	<i>%</i>
<i>Choice of brand</i>	196	35	319	57	45	8	560	100
<i>intention to switch</i>								
Yes	127	65	278	87	41	91		
No	69	35	41	13	4	9		
Pooled sample	196	100	319	100	45	100		

Source: Field data analysis

The Structural Equation Model (SEM) Analysis

SEM is made up of two inter-related steps, the measurement model and the structural model. The measurement model describes the indicator measurement properties, mostly shown by how the latent constructs are deduced from the observed variables. On the other hand, the structural model specifies the causal relationships among the latent variables and

describes the direct and indirect effects with explained and unexplained variance to the dependent constructs.

Step 1: Measurement Model Analysis

The Content Validity Test (Stage 1)

The measurement model analysis began with the content validity test and its results are presented in Table 6. It may be observed from the results that while some items had extremely high cross loadings, others had low loadings in the intended constructs. Using 0.700 as the threshold for statistical significance of item loadings (Hair et al., 2016), consumers' lack of trust in already existing beef brands (att1), guaranteed health benefits (att2) and personal belief in quality and safe beef attributes (att3) loaded significantly in the consumers' attitude construct. Also, consumers' educational level (dm3), cultural (dm5) and religious (dm6) backgrounds loaded significantly in the consumers' demographic construct. Again, consumers' knowledge levels about quality and safe beef (pbc1), availability of disposable income (pbc2), availability of time (pbc3) and sufficient retail outlets (pbc4) loaded significantly in the perceived behavioral control (PBC) construct. Similarly, influences from spouse (sn1), friends/peers (sn2), family members (sn3) and community elders (sn4) also loaded significantly in the subjective norm construct. Finally, beef with original color (bfat1), low fat (bfat2), freshly produced (bfat4), certified by malam/VSD (bfat5) and produced locally (bfat6) loaded significantly in the attribute construct. All items that loaded significantly in their respective constructs (shown in pink) were selected for the next stages of the measurement model analysis.

Table 6: Item Cross loadings

	Preference based on PBC	Preference based on beef attributes	Preference based on attitude	preference based on demographics	Preference based on subjective norm
att 1	0.308	0.250	0.730	0.228	0.248
att 2	0.258	0.451	0.877	0.301	0.383
att 3	0.287	0.323	0.822	0.271	0.338
de m 3	0.375	0.333	0.308	0.838	0.247
de m 5	0.361	0.216	0.273	0.800	0.324

	Preference based on PBC	Preference based on beef attributes	Preference based on attitude	preference based on demographics	Preference based on subjective norm
dem6	0.204	0.171	0.170	0.717	0.299
pb c1	0.762	0.396	0.271	0.290	0.285
pb c2	0.727	0.417	0.156	0.249	0.218
pb c3	0.759	0.452	0.323	0.344	0.382
pb c4	0.765	0.356	0.268	0.366	0.278
sn 1	0.376	0.414	0.384	0.279	0.730
sn 2	0.289	0.293	0.222	0.285	0.772
sn 3	0.243	0.307	0.310	0.227	0.799
sn 4	0.216	0.238	0.271	0.271	0.702
bf at 1	0.421	0.774	0.358	0.262	0.313
bf at 2	0.455	0.809	0.383	0.238	0.335
bf at 4	0.403	0.771	0.321	0.266	0.396
bf at 5	0.332	0.703	0.271	0.233	0.284
bf at 6	0.435	0.739	0.322	0.239	0.315

(NB: att=attitude, dem=demographics, pbc=perceived behavioral control, sn=subjective norm, bfat=beef attributes)

Source: Field data analysis

Reliability and Convergent Validity Tests (Stage 2)

To validate the reliabilities and validities of items that passed the content validity test, Cronbach alpha coefficient, composite reliabilities and average variance extracted (AVE) were conducted. The results are shown in Table 7.

Table 7: Reliability and convergent validity results

Constructs	Cronbach's alpha Coefficient	Composite Reliability (rho-A)	Composite Reliability (rho-C)	Average Variance Extracted (AVE)
PBC	0.747	0.748	0.840	0.568
Beef attributes	0.817	0.822	0.872	0.577
Attitude	0.749	0.813	0.852	0.659
Demographics	0.713	0.774	0.829	0.619
Subjective norm	0.750	0.762	0.838	0.565

Source: Field data analysis

From Table 7, the Cronbach alpha coefficient and composite reliability ratings for all the five constructs were higher than 0.700. Similarly, all the five constructs had average variance extracted (AVE) values greater than 0.500. However, the acceptable Cronbach Alpha value for theoretical studies is 0.700 or higher (Hair et al., 2016). Similarly, the recommended composite reliability and average variance extracted values are 0.700 and 0.500 respectively (Al-Swidi et al., 2014). Owing to these, all the five-constructs are said to show adequate reliability and convergent validity.

Discriminant Validity Test (Stage 3)

To measure how distinctive and uncorrelated the constructs were, a discriminant validity test was conducted using the Fornell-Lacker criterion and the Heterotrait-Monotrait ratio (HTMT). The results of the Fornell-Lacker criterion are shown in Table 8 and that of the Heterotrait-Monotrait ratio in Table 9. It is evident from Table 8 that the square roots of the average variance extracted for all five constructs are bigger than their Pearson correlations. This means the discriminant validity was in accordance with the Fornell-Larcker criterion (Fornell and Larcker, 1981).

Table 8: Fornell-Larcker Criterion results

	PBC	Beef attributes	Attitude	Demographics	Subjective Norm
PBC	0.753				
Beef attributes	0.542	0.760			
Attitude	0.339	0.439	0.812		

	PBC	Beef attributes	Attitude	Demographics	Subjective Norm
Demographics	0.413	0.325	0.332	0.787	
Subjective norm	0.390	0.434	0.408	0.354	0.752

Note: The bold-diagonals have the square root of AVEs.

Source: Field data analysis

Providing additional evidence for the discriminant validity, the Heterotrait-Monotrait (HTMT) ratio results in Table 9 show that all HTMT correlations are smaller than 0.85, a value within which a discriminant validity is said to be achieved (Henseler et al., 2015).

Table 9: Heterotrait-monotrait ratio (HTMT) of correlation results

	PBC	Beef attributes	Attitude	Demography	Subjective Norm
PBC					
Beef attributes	0.684				
Attitude	0.464	0.531			
Demographics	0.540	0.397	0.423		
Subjective norm	0.492	0.528	0.509	0.498	

Source: Field data analysis

Correlation Matrix Test (Stage 4)

Finally, correlation matrix test was conducted to evaluate how the selected items in each construct related internally. It may be observed from Table 10 that correlations are positive and significant for all the five constructs. This implies demographic factors, attitudes, perceived behavioral control and subjective norm were significant in shaping beef consumers intentions to switch beef brands in the Tamale Metropolis.

Table 10: Correlation Matrix

	1	2	3	4	5	
PBC	1.00					
Beef attributes	0.30***	1.00				
Attitude	0.37***	0.41***	1.00			
Demographics	0.38***	0.35***	0.39***	1.00		
Subjective norm	0.29***	0.41***	0.57***	0.39***	1.00	

Source: Field data analysis

NB: ***p<0.001 two tail (significant at 1%)

The Structural Model Analysis

Structurally, the constituted constructs were analyzed to determine the effects of each construct on consumers' intention to switch to enhanced beef brands. Since Partial Least Squares (PLS) do not have reliable model fit indices (Hair et al., 2020), the coefficient of determination, R^2 , was estimated to validate the structural model's fitness. The structural model provides a moderate to substantial level of predictive accuracy as predictors of intention to switch beef brands explained 26.4% of its variance ($R^2 = 0.264$). This R^2 value

surpasses the minimum threshold of 0.19 (19.0%) (for predicting consumer behaviors), indicating acceptable explanatory power. The coefficients and corresponding t-values of the structural paths are shown in Figure 4 and Figure 5 respectively. Specifically, consumers' educational level (dem3), cultural affiliation (dem5) and religious affiliation (dem6) loaded appropriately in the demographic construct with a collective positive coefficient of 0.028. This means holding consumer attitudes, subjective norms and perceived behavioral control constant, the intention of consumers with high levels of education, strong cultural and religious affiliations to switch to enhanced beef brands increased by just 2.8%. Although this relationship was positive, it was not statistically significant based on the corresponding bootstrap t-values ($t=0.755$, $p>0.05$). In other words, high educational levels, strong attachment to certain cultural and religious beliefs do not necessarily influence consumers' intention to switch to enhanced beef brands. This outcome contradicts with results of Amfo and Ali (2020), Adom (2018) and Annan-Prah et al. (2012) who found educational levels, ethnic and religious affiliations to significantly influence meat choice decisions among Ghanaians. Therefore, the current study rejects the null hypothesis that demographic factors relate significantly with consumers' intention to pursue quality food brands (H_1).

Also, respondents' negative attitude towards beef already in the study due to mistrust in such beef (att1), perceived positive health needs (att2) and general belief in quality and safe beef (att3) loaded appropriately in the attitude construct. There was a collective positive coefficient of 0.225 for the attitude construct and its corresponding intention. This means holding demographic, subjective norm and perceived behavioral control factors constant, there was a 22.5% chance that consumers would switch towards enhanced beef brands if they do not trust already existing beef brands, attach good health to beef with enhanced attributes and have general positive belief in quality and safe beef. Not only that, but the relationship between the attitude construct and intention was statistically significant based on the bootstrap t-values ($t=3.213$, $p<0.010$). This means consumers' lack of trust in beef already in the market, perceived positive health needs and a generally positive belief in the quality and safety of beef is a precursor to their intention to seek better versions of beef. This is consistent with studies by Sui et al. (2024), Shen et al. (2022), Aitken et al. (2020) and Asioli et al. (2017). These studies found consumers positive attitudes toward foods of better standards to positively and significantly influence intention to choose such foods. Consequently, the current study fails to reject the hypothesis that consumers' positive attitude relates positively and significantly with intention to pursue enhanced quality food brands globally (H_2).

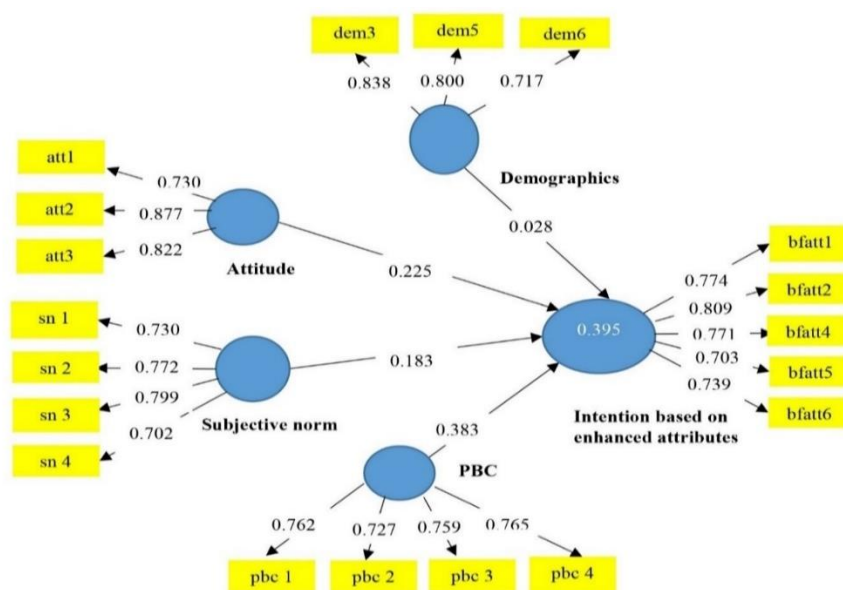


Figure 4: Structural model showing direct and moderating effects (path coefficients)
Source: Field data analysis

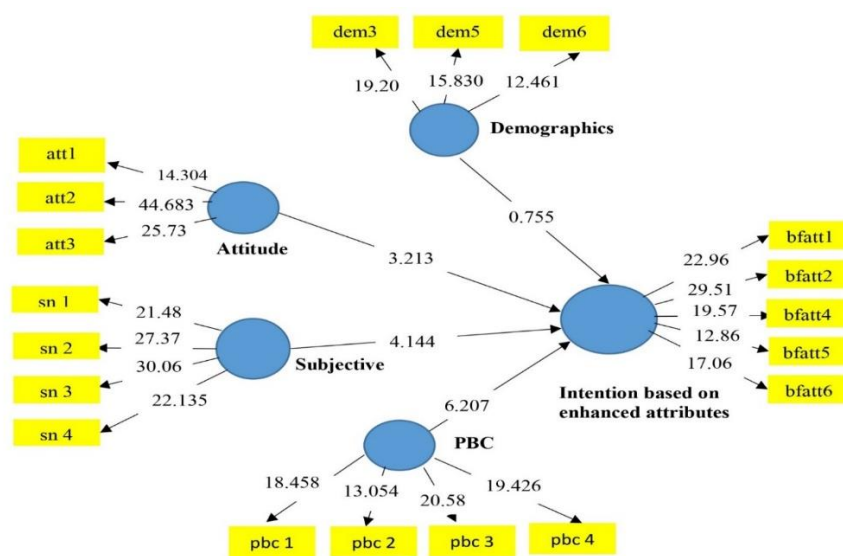


Figure 5: Bootstrap t-values for the structural model with direct and moderating effects.
Source: Field data

Similarly, the influences of spouses (sn1), peers (sn2), family members (sn3) and community elders (sn4) loaded appropriately with a positive coefficient of 0.183 in the subjective norm construct. This suggest that holding demographic, attitude and perceived behavioral control factors constant, there was a 18.3% chance that consumers would switch to enhanced beef brands if they are influenced by spouses, peers, family members and community elders. Besides, the relationship between the subjective norm construct and such intention was statistically significant based on the bootstrap t-values ($t=4.144$, $p<0.001$). This demonstrate the significant roles spouses, peers, family members and community elders play in consumers' choice decisions in typical Ghanaian communities.

This finding corroborates with studies by Arya et al. (2024), Saut and Saing (2021), Li et al. (2020) and Rivaroli et al. (2019a) who found subjective norm to positively and significantly influence consumers' intentions toward safe foods. Owing to these, the study fails to reject the hypothesis that subjective norm relates positively and significantly with consumers' intention to pursue foods with quality attributes globally (H_3).

Finally, consumers' perceived knowledge about quality beef (pbc1), income levels (pbc2), availability of time (pbc3) and retail outlets (pbc4) also loaded positively with a positive coefficient of 0.383 in the PBC construct. Holding demographics, attitude and subjective norm constant, there was a 38.3% chance that beef consumers with high product knowledge, high disposable income, more purchasing time and more retail outlets would switch to beef with better attributes. What is more, the relationship between the PBC construct and its corresponding intention was highly significant ($t=6.207$, $p<0.001$) when compared with the impacts of attitude and subjective norm. This outcome validates studies by Pedrinelli et al. (2024), Lin et al. (2021), Chilón-Troncos et al. (2024) and Nguyen et al. (2019). These studies found perceived behavioral control to positively and significantly influence consumers intentions to indulge in sustainable green foods, healthy eating lifestyles and proper recycling practices. Owing to these, the current study fails to reject the hypothesis that PBC has positive and significant influence on consumers' choice of quality food brands globally (H_4).

It is worth noting that the insignificance of demographic factors as a predictor of intention in the current study strengthens support for the TPB framework in studies that involve psychological variables. This implies that attitude, subjective norm and perceived behavioral control predict behavioral intentions better than demographics, especially in Sub-Saharan Africa.

Conclusions

The study extends the theory of planned behavior to consumers' choice of beef in Ghana along with demographic and beef attribute factors. It highlights Ghanaians preference for locally produced beef, with particular preference for beef certified and sold fresh at butcher shops. Although consumers prefer locally produced beef, their choices are informed by specific quality and safety attributes. These attributes include color (appearance), freshness (number of days beef has been produced) and leanness (fat content). Other key attributes considered by consumers are production and sales environment. The respondents (consumers) ranked these attributes high in their beef choice decisions. The study further emphasizes consumers' intention to switch to beef brands having better attribute standards than those already in the market. It highlights the pivotal roles of personal attitude, subjective norm and perceived behavioral control in shaping such intention. These are key information for the broader meat industry in Ghana, reminding meat marketers and policy makers to give priorities to locally produced beef. While the study informs beef marketers to integrate diverse set of values and social identities into the traditional marketing strategies, it highlights the need for policy makers to strengthen rules and

regulations regarding activities of butchers and meat processors. Understanding this perspective of consumer behavior promotes understanding of why consumers behave the way they do, and how marketers could use that to their competitive advantage. On the other hand, policy makers could craft consistent and pragmatic interventions to control safety of beef in the market to reduce the growing consumer fears.

Recommendations for Marketing and Policy

Based on the findings from the study, the following recommendations are suggested. Practitioners and marketers are recommended to give priorities to consumers who identify themselves among social groups and follow socially accepted norms. They are advised to consistently advertise the social importance of consuming beef with enhanced attributes using social media outlets like Facebook, WhatsApp, Tiktok and Instagram. This would help increase awareness on the benefits of consuming enhanced quality beef brands. In addition, sales outlets specializing in enhanced quality beef brands should be increased in urban centers to enhance accessibility. In all of these, policy makers like the Ministry of Food and Agriculture and food safety regulators like the Food and Drugs Authority are encouraged to conduct regular checks at abattoirs and meat joints to inspect quality standards of beef before being allowed into the market. Furthermore, these bodies should conduct regular training programs to sensitize butchers and meat processors on the appropriate food safety measures to curb the growing public health concerns.

Limitations and Suggestions for Future Research

Like all other research, the current study could not have been conducted without limitations. First, the geographical scope was limited to only one region in Ghana. This may not give a true representation of Ghana. It is suggested that future research should be extended to two or more regions to widen the geographical scope. Second, the study used cross-sectional data which were collected at just one time for the study. This may lead to capturing intended rather than actual behavior of the respondents. It is therefore suggested that future studies employ a longitudinal approach to track actual rather than intended behaviors of meat consumers in Ghana.

Note:

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Data Availability Statement:

The data that support the findings of this research are not publicly available because they contain confidential information about participants. However, constructs used to collect the data are provided in Appendix A. 3.

Ethics And Confidentiality Statement:

Respondents' consents were formally sought, informing them that the study was only for academic purposes and were assured of their confidentialities.

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Appendix

Table A. 1: Acronyms and meanings

Acronym	Definition/Meaning
WHO	World Food Organization
MoFA	Ministry of Food and Agriculture
GDP	Gross Domestic Product
FDA	Food and Drugs Authority

Acronym	Definition/Meaning
FAO	Food and Agriculture Organization
TPB	Theory of Planned Behavior
PBC	Perceived Behavioral Control
SN	Subjective Norm
TMA	Tamale Metropolitan Assembly
GSS	Ghana Statistical Service
VSD	Veterinary Services Directorate of MoFA
PLS-SEM	Partial Least Square Structural Equation Modeling
CB-SEM	Covariance Based Structural Equation Modeling
AVE	Average Variance Extracted
HTMT	Heterotrait-Monotrait

Table A. 2: Descriptive statistics and normality diagnostics of constructs used to test TPB

Variables	Mean	S.D	Skewness	Kurtosis	Kolmogorov-Smirnov	p	Shapiro-Wilk	p
					Alpha		W	
Demography	1.55	1.31	-1.03	0.32	0.19	0.00	0.89	0.00
Attitude	2.11	0.86	-2.24	7.03	0.24	0.00	0.79	0.00
PBC	2.11	0.79	-1.84	5.03	0.20	0.00	0.84	0.00
Subjective Norm	1.13	1.37	-0.70	0.10	0.11	0.00	0.95	0.00
Willingness to Pay	2.43	0.72	-2.76	11.93	0.21	0.00	0.73	0.00

Source: Field data analysis (A 7-Point likert scale, -3=strongly disagree; +3=strongly agree)

Table A. 3: Variables used in constituting constructs to collect data on consumers intentions

DEM	Demographic related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
dem1	My age can influence my intention to choose enhanced beef brands.							
dem2	My Sex can influence my intention to choose enhanced brands							
dem3	My educational level can influence my intention for enhanced beef brands.							
dem4	My income level can							

DEM	Demographic related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
	influence my intention towards enhanced beef brands.							
dem5	My cultural background can influence my intention to choose enhanced beef brands.							
dem6	My religion can influence my intention to choose enhanced beef brands.							
ATT	Attitude related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
att1	My lack of trust in the beef already in the market can influence my intention to choose enhanced beef brands.							
att2	Knowing that my perceived health needs (utility) are guaranteed from quality beef can influence my intention to switch to enhanced beef brands.							
att3	My general belief in high quality and safe meats can influence my intention towards							

DEM	Demographic related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
	enhanced brands.							
SN	Subjective norm related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
sn1	My spouse is part of me. My spouse's choice of beef can influence my intention to switch to enhanced brands.							
sn2	My peers (friends and colleagues) are part of my everyday life. My peers can influence my intention to switch to enhanced beef brands.							
sn3	My family members are important to me. Therefore, my family can influence my intention to switch to enhanced beef brands.							
sn4	My community elders form key part in shaping my societal norms. Therefore, their perceptions can influence my intentions							

DEM	Demographic related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
	for enhanced beef brands.							
PBC	PBC related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
pbc1	My level of knowledge about the quality and safety of existing beef can influence my intentions to switch to enhanced brands.							
pbc2	My disposable income can influence my intention to switch to better beef brands.							
pbc3	The time available to me should influence my intention to access enhanced beef brands.							
pbc4	The availability of sufficient retail outlets can influence my intention to access enhanced beef brands							
BFAT	Beef attributes related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
bfatt1	When beef has the original bright-red color, this can							

DEM	Demographic related constructs	Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
	influence my intention for such beef.							
bfatt2	When beef is low in fat (<5%), it can influence my intention to choose such beef.							
bfatt3	When the tenderness (softness) of beef is assured and guaranteed by the seller, it can influence my intention for such beef.							
bfatt4	When beef is packaged and sold within 7 days, it means the beef is fresh and this can influence my intention towards such beef.							
bfatt5	When beef is produced under hygienic conditions and approved by VSD, it can influence my intention for such beef.							
bfatt6	Beef produced locally are deemed healthier. This can influence my							

DEM	Demographic related constructs	Strongly Disagree	Disagree	Somehow Disagree	Neither	Somehow Agree	Agree	Strongly Agree
	intention for local beef.							
bfatt7	When beef is sold in open butcher shops, I can select the parts I want. This can influence my intention to buy beef from open butcher shops.							

Source: Authors' own construct

Table A. 4: The selected contents of the constructs with their loadings and bootstrap t-values

Code	Selected Contents	Loading	Bootstrap t-values
	Indicators of consumer attitude on intention to choose enhanced beef brands		
att1	My mistrust in the quality and safety standards of beef already in the market can influence my intention to choose enhanced brands.	0.730	14.304
att2	Knowing that my perceived health needs are guaranteed from quality beef brands can influence my intention to choose such brands.	0.877	44.683
att3	My general belief about quality and safe beef can influence my intention to choose enhanced beef brands for perceived benefits.	0.822	25.735
	Indicators of consumer demographic factors on intention to choose enhanced beef brands		
dem3	My educational level can influence my intention to choose enhanced beef brands	0.838	19.209
dem5	My cultural background can influence my intention to choose enhanced beef brands	0.800	15.830
dem6	My religion can influence my intention to choose enhanced beef brands.	0.717	12.461
	Indicators of consumer PBC on intention to choose enhanced beef brands		
pb1	My knowledge about the quality and safety levels of beef already in the market can influence my intention for better brands.	0.762	18.458

Co de	Selected Contents	Loa din g	Bootstr ap t- values
pb c2	My available disposable income can influence my intention to choose beef with better attributes.	0.727	13.054
pb c3	The limited time available to me can influence my intention to choose enhanced beef brands.	0.759	20.587
pb c4	The availability of sufficient retail outlets to purchase enhanced beef brands can influence my intention to go for such beef.	0.765	19.428
	Indicators of consumer SN on intention to choose enhanced beef brands		
sn 1	My spouse is part of me. If my spouse likes enhanced beef brands, it can influence my intention to choose such brands.	0.730	21.488
sn 2	My peers (friends and colleagues) are part of my everyday life. Their preference for enhanced beef can influence my intention.	0.772	27.379
sn 3	My family members are important to me. Therefore, my family can influence my intention to choose enhanced beef brands.	0.799	30.060
sn 4	My community elders form key part in shaping my social norms. Therefore, my community elders can influence my intention to choose enhanced beef brands.	0.702	22.135
	Indicators of beef attributes on intention to choose enhanced brands		
bf att 1	When beef has the original bright-red color, it means it is quality and this can influence my intention to choose such beef	0.774	22.963
bf att 2	When beef is lean (low in fat), it can influence my intention to choose such beef.	0.809	29.514
bf att 4	When beef is packaged and sold within 7days, it is fresh and such state of the beef can influence my intention to go for such beef.	0.771	19.575
bf att 5	When beef is produced under hygienic conditions and approved by VSD, this can influence my intention to choose such beef.	0.703	12.869
bf att 6	Generally, meats produced locally are deemed healthier. So, I have strong intention towards locally produced beef.	0.739	17.061

Source: Field data analysis (Note: att=attitude, dem=demographics, pbc=perceived behavioral control, sn=subjective norm, bfatt=beef attributes)