
CONSUMER DEMAND FOR BEEF IN NIGERIA: A REVIEW OF PREFERENCES, PRICE VARIABILITY, AND POLICY IMPLICATIONS

Audu, M., Ochi, J.E. and Jibril, S.A.

Department of Agricultural Economics, Faculty of Agriculture and Agricultural Technology, Abubakar Tafawa Balewa University, Bauchi
Corresponding Email: chartwithmusa@gamil.com

ABSTRACT

Beef is the most important source of animal protein in Nigeria, accounting for over 50% of the total meat supply. However, demand faces persistent challenges, including price volatility, income constraints, supply disruptions from insecurity, and inadequate market infrastructure. This paper systematically reviews theoretical, conceptual, and empirical literature on consumer demand for beef in Nigeria, focusing on preference patterns, determinants of demand, spatial-temporal price variability, and constraints. The review synthesises studies published between 2000 and 2024, drawing on utility theory as the theoretical foundation and organising evidence from Nigerian and international contexts. Beef is consistently the most preferred animal protein in Nigerian households, driven by taste, habit, nutritional value, and affordability. Major determinants of demand include household income, price of beef and substitutes, household size, education, and urbanisation. Beef generally exhibits inelastic demand (necessity) in Nigeria. Spatial price variability is driven by transport costs and market infrastructure, while temporal variability follows seasonal patterns and shock events (e.g., elections, conflict, inflation). Key constraints include limited access to credit, poor storage and transport facilities, security crises (banditry, herder–farmer conflicts), and low purchasing power. Geographic concentration in southern Nigeria, limited application of advanced demand systems (QUAIDS), absence of preference segmentation using Principal Component Analysis, scarce spatial price transmission studies for beef, and lack of integration of conflict variables into demand models. Beef demand in Nigeria is shaped by complex interactions of household characteristics, market conditions, and security shocks. Policy should prioritise investment in market infrastructure, credit access, and conflict resolution. Future research should apply panel data, spatial econometrics, and latent preference models to inform evidence-based livestock-sector policies.

Keywords: *Beef demand, consumer preference, price variability, spatial arbitrage, Nigeria, review.*

INTRODUCTION

Beef is the single most important source of animal protein for Nigerian households, accounting for over 50% of the country's total meat supply (FAO, 2016). It is valued for its nutritional density, palatability, and cultural acceptability across diverse ethnic and religious groups. Despite this prominence, beef demand in Nigeria faces persistent challenges, including price volatility, income constraints, supply disruptions due to insecurity (banditry, Boko Haram insurgency, herder–farmer conflicts), and inadequate market infrastructure (Olayemi et al., 2007; Adebusuyi, 2004). These factors not only affect household food security but also distort price signals and undermine the efficiency of beef markets.

Understanding consumer demand for beef requires an integrated examination of preferences, price behaviour, and the socioeconomic determinants of consumption. Consumer preference determines which animal protein sources are chosen, while price variability, both across space (different markets) and over time (seasons, shocks), influences affordability and purchase decisions. Yet, existing literature on Nigerian beef demand remains fragmented. Most studies have focused on staple foods or general animal protein demand, with limited attention to beef specifically, and even fewer have examined spatial-temporal price dynamics for beef (Peterson, 2004; Nuhu et al., 2009; Obayelu & Salau, 2010).

A systematic synthesis of existing knowledge on beef demand in Nigeria is currently lacking. Individual empirical studies provide isolated insights—some report income and price elasticities, others describe consumption patterns, and a few analyse price transmission—but no comprehensive review has integrated these strands. Consequently, researchers and policymakers lack a clear roadmap of what is known, what methods have been applied, and where critical gaps remain. This absence hinders the design of effective livestock sector policies, market interventions, and food security programmes.

This review paper addresses the gap by systematically synthesising theoretical, conceptual, and empirical literature on consumer demand for beef in Nigeria, with particular attention to preferences and price variability. The review serves three purposes:

For researchers: It maps the existing evidence, identifies methodological trends and limitations, and proposes future research directions (e.g., application of advanced demand systems, spatial econometrics, and inclusion of conflict variables).

For policymakers: It distils actionable insights on factors that drive or constrain beef demand, such as income, household size, education, and market infrastructure, thereby informing targeted interventions.

For the livestock sector: It highlights the importance of stabilising beef prices and understanding consumer preferences to enhance market efficiency and food security.

The review focuses on beef demand in Nigeria, but, where Nigerian literature is sparse, it draws on evidence from other sub-Saharan African countries with similar agro-economic conditions. The paper is organised as follows: Section 2 presents the theoretical framework (utility theory). Section 3 provides a conceptual review of demand, consumer preferences, factors affecting demand, spatial-and temporal price variability, and constraints. Section 4 summarises empirical studies in a tabular synthesis. Section 5 synthesises research gaps, and Section 6 concludes with implications for policy and future research.

2 Theoretical Framework.

2.1 The Concept of Theory

A theory is a generalized explanatory principle that asserts a connection between two or more phenomena. According to Hunt (1991), a theory comprises four components: definitions of terms or variables, a domain of application, a set of relationships among variables, and specific predictions (factual claims). Theory serves as a model for observation and understanding, shaping both what researchers see and how they interpret it. It bridges the abstract and the concrete, the theoretical and the empirical, allowing researchers to make links between thought statements and observational statements. Essentially, a theory guides research and organizes its ideas.

2.2 Utility Theory

Utility theory provides the foundational framework for analyzing consumer demand, including demand for beef and other animal proteins. A utility function describes the level of satisfaction or happiness that a consumer derives from consuming various goods. It can incorporate multiple arguments (e.g., price, income, preferences), each affecting the consumer's overall satisfaction (Luce & Raiffa, 1957; Myerson, 1979).

Utility is a measure of the satisfaction a person obtains from choosing a good, a course of action, or a lottery that offers chances of attaining a good. Utility theory methods exploit individuals' subjective risk perception to derive values for objects or decisions. Importantly, application of utility theory does not require that a decision maker have explicit probabilistic knowledge or make mathematical calculations (Kuznar, 2000). More critically, it does not require that a decision maker be concerned with maximizing any objectively measured currency (e.g., energy, money, or labour). This independence from assumptions about what constitutes value gives utility theory the potential to evaluate subjective theories of value. Utility theory allows measurement of people's subjective values of goods, or even of subjective states such as rank, self-fulfillment, and so on.

Kuznar (2000) posited that the decision maker needs only to make decisions based on subjective perceptions of the probabilities that certain events may occur. Several assumptions underlie utility theory methodology:

1. **Completeness** – A consumer can rank all possible bundles of goods.
2. **Transitivity** – If bundle A is preferred to B, and B to C, then A is preferred to C.
3. **Continuity** – Small changes in a bundle do not cause sudden reversals in preference.

Provided a decision maker's preferences meet these requirements, researchers can use utility theory to monitor preferences and model decision making (Luce & Raiffa, 1957; Myerson, 1979).

2.3 Relevance to Beef Demand Analysis

This study is hinged upon utility theory because utility simply means satisfaction – the underlying factor in consumer demand for beef, fish, and eggs. Consumers allocate their limited income across food items to maximize total utility. Beef is chosen over substitutes (fish, eggs, chicken, mutton) based on relative prices, tastes, income, and household characteristics. Utility theory thus explains:

- **Why consumers prefer beef** – if beef provides higher marginal utility per naira than alternatives, it will be preferred.
- **How price changes affect demand** – a rise in beef price reduces the quantity demanded as consumers reallocate spending to maintain utility (the substitution effect).
- **Why temporal and spatial price variability matters** – price fluctuations alter the consumer's budget constraint and thus the utility-maximizing bundle over time and across locations.

Therefore, utility theory provides the logical foundation for analysing consumer preferences, demand patterns, and the effects of price variability on beef consumption.

3 Conceptual Review

3.1 The Concept of Demand

In economics, demand refers to the ability and willingness of consumers to purchase a particular commodity at a given price and point in time, assuming other factors remain constant (Steven, 2003). Alfred Marshall, a neoclassical economist, posited that the ultimate cause of demand lies in human needs, wants, or desires, which are countless, varied, but generally limited and capable of being satisfied (Franken, 2012). A distinction exists between *normative need* (determined by expert evaluation, exogenous) and *felt need* (based on self-perception, endogenous). Only the latter, when backed by purchasing power, constitutes economic demand.

Demand can be expressed at the individual level or aggregated to represent a whole market. For a supplier, demand is critical: producing without sufficient demand leads to bankruptcy. The ultimate regulator of all demand is the final customer; without it, derived demand from suppliers also disappears (Franken, 2012). Utility preferences and choices underlying demand can be represented as functions of cost, benefit, and other variables. Klerkx (2006) distinguishes between the economic meaning of demand (where purchasing power is crucial) and a substantive meaning focusing on people's interests in the content of products or services – the latter expressed through preferences or priorities, especially relevant when market distortions affect price signals.

3.2 Demand for Animal Products in Nigeria

Demand for beef, fish, and eggs has increased rapidly in Nigeria, driven by population growth and urbanisation (Akolisa & Okonji, 2005). The 2004 federal ban on broiler meat imports increased the popularity of fish and fish products (Ojo & Fagbenro, 2004). Meat, particularly beef, is the most important source of animal protein in Nigeria (Udo & Akintola, 2003). Beef is widely consumed, providing high-quality protein (Aduku & Olukosi, 2000; Oloyede, 2005). Yakaka et al. (2012) reported that most Nigerian households demand more beef than fish, milk, eggs, chicken, mutton, or goat meat. Higher-income households tend to demand more eggs, while poorer households consume more fish and beef.

Fish demand has doubled as other animal proteins become expensive (Ojo & Fagbenro, 2004). FAOSTAT (2016) shows an increase in fish consumption over the decades (1.15 million tonnes in 1979, 1.45 million in 1988, and 0.8 million in 2012). However, per capita protein intake in Nigeria remains low: only 6.0–8.4 g/day, far below FAO's recommended 65 g/day (Lamode, 2000; FAO, 2004). Ighoro (2011) found that average monthly expenditure on fish was 34.9% of animal protein spending, with goat meat (4.3%), chicken (5.2%), pork (4.6%), turkey (4.1%), bush meat (3.4%), and mutton (1.1%). Adeosun (2006) noted that 70% of animal protein consumed by Nigerians comes from fish, attributed to rising income, population, health awareness, and relative cheapness.

Eggs are an important source of quality protein, especially for children (Carlaroserios, 2008; David, 2010). Yet demand for eggs in Nigeria remains low due to declining purchasing power (Adejoro, 2001). Kelly (2004) reported that eggs are eaten on average 1.8 times per week. Ronald (2000) noted that low-income households can use eggs as an economical source of nutrients.

3.3 Consumer Preference

Consumer preference describes the reasons people choose products or services; it is a major factor influencing food consumption behaviour (Myrland et al., 2000). Brunso (2004) identified four major motives for food choice: health, taste, process characteristics, and convenience. Health has become very important, driven by expectations of longer life and higher quality (Roininen et al., 2001; Vannoppen et al., 2002). Taste remains highly important – few people eat foods they dislike (Grunert et al., 2000; Verbeke & Vackier, 2004). Additionally, consumers increasingly value how food is produced, even when it does not directly affect taste or health (Amao & Ayantoye, 2014).

3.3.1 Consumer Preference for Animal Protein

Preference for beef, fish, and eggs varies across contexts. Rational consumers prefer more of a commodity at a lower price, but income, taste, flavour, quality, and social factors also matter (Yakubu et al., 2013). In the Czech Republic, beef was most consumed (Kubickova & Serhantova, 2005). Gossard and York (2003) attributed beef preference to geography, race, ethnicity, social background, family composition, and income. In Sokoto metropolis, beef accounted for 52% of total meat consumed (Agaie et al., 1997). Tsegay (2012) reported that egg and beef were most preferred in Ethiopia. Ogunwole et al. (2009) found that chicken egg was most preferred among University of Ibadan employees, while Akinwunmi et al. (2011) indicated that beef was most preferred in Ogbomoso, Nigeria. Conversely, Adeniyi et al. (2012) found a high preference for fish in Ibadan due to lower price and high protein value. Nayga (2007) reported high preference for chicken products (eggs) as a healthy alternative to red meat, supported by low retail prices and ease of preparation (McCarthy et al., 2004). European consumers eat more fish than beef or eggs (Brunso, 2003). Fish consumption is influenced by tradition, habit, and nutritional awareness (Pieniak et al., 2008).

3.4 Factors Affecting Demand for Animal Protein in Nigeria

Several social, demographic, and economic factors influence effective demand for beef, fish, and eggs. Research identifies animal welfare, environmental concerns, safety, taste, and health as key influences (Damisa & Hassan, 2009; Gossard & York, 2003; Liu & Deblitz, 2007; McCarthy et al., 2004). Household income, size, composition, age, birthplace, education, and employment status also affect meat consumption (Liu & Deblitz, 2007). Reicks (2006) identified taste, price, and product consistency as the three most important factors. Ingr (2004) noted that wholesomeness, quality, and price influence the consumption of beef and fish. Damisa and Hassan (2009) reported that income, price, household size, and education affect egg consumption.

External factors such as culture, social class, family decisions, religion, and situational variables also shape consumer choices (Ademosun, 2000; Adesehinwa et al., 2004; Emokaro & Amadasun, 2012; Akinwumi et al., 2011). Yilmaz et al. (2013) added regional development differences, seasons, food safety, personal habits, and health opinions as major factors affecting poultry egg demand.

3.5 Spatial and Temporal Variation in Food Prices

3.5.1 Spatial Variation

Spatial price variation depends on whether a commodity is internationally traded (Rashid & Minot, 2009). For non-tradable food commodities, surplus-producing areas have the lowest prices, while deficit areas (cities) have higher prices to cover transport costs. For tradable commodities, prices depend on distance from ports or entry points.

Transport costs are a major factor in spatial arbitrage – traders buy in low-price locations and sell in high-price locations. In competitive markets, the price difference between two markets should not exceed full transport costs (including profit and risk). If the price difference exceeds the transport cost, trade becomes profitable, equalising prices. Equilibrium is reached when:

$$P_B - P_A \leq C$$

where P_B and P_A are prices in markets B and A, and C is the transport cost. If the price difference is less than the transport cost, no trade occurs between the markets.

3.5.2 Temporal Variation

For tradable food commodities, temporal price variation is largely determined by world prices, trade policy, and exchange rates (Rashid & Minot, 2009). For non-tradable commodities, variation is driven by seasonal harvest calendars and year-to-year weather differences. Prices are lowest at harvest and rise during post-harvest to cover storage costs. Year-to-year variation is inversely related to harvest size.

Temporal arbitrage involves storing a commodity when prices are low to sell it when prices are high. It ensures that expected price increases do not exceed storage costs (including profit and risk). If the expected price increase exceeds storage cost, traders store more, raising current prices and lowering future prices, thereby reducing price variability. If the expected price increase is less than the storage cost, no storage occurs.

3.6 Constraints to Beef Demand

Constraints refer to bottlenecks or impediments to smooth operations. In Nigerian food grain markets, common constraints include imperfect market information, lack of cash and credit, insufficient storage and transport facilities, absence of uniform grading standards, lack of management skills, and unsuitable legal codes (Barrett, 2001). In northern Nigeria, specific constraints include transportation problems, inadequate marketing infrastructure, poor storage, insufficient funds, seasonality, and lack of uniform measures.

Aidoo et al. (2013) studied grain legume marketing in northern Ghana and ranked the following constraints as most critical: limited access to credit, high transport costs, poor roads, and inadequate storage facilities. For soyabeans, inadequate storage was the top constraint; for cowpea and groundnuts, limited credit was the top constraint, followed by transport challenges. These findings are relevant to beef marketing, where similar infrastructural and financial constraints apply.

4 Summary of Empirical Review

A substantial body of empirical literature has investigated consumer demand for animal protein, consumer preferences, and price variability, both in Nigeria and internationally. This section synthesises key findings, organised thematically, and identifies methodological and geographic gaps that justify further research.

4.1 Studies on Beef and Meat Demand in Nigeria

Several Nigerian studies have established beef as the most preferred meat type. **Alimi (2013)** examined meat preference and consumption patterns in Akungba-Akoko, Ondo State. The study reported that beef was the most preferred meat (60.14%), followed by chicken (29.72%) and turkey (26.92%). Low-income households spent a substantially higher proportion of their total expenditure on meat ($\approx 18\%$) than middle-/high-income households ($\approx 9\%$). The most important factors guiding meat purchases were taste and habits, followed by nutritional value and price.

Similarly, **Yakubu et al. (2013)** identified factors influencing consumer preference for fresh beef in Sokoto metropolis. Using a quadratic regression model, they found that household size, level of education, and expenditure on beef substitutes significantly influenced preference for fresh beef ($p < 0.01$). Notably, expenditure on beef substitutes tended to decrease preference for beef. The study concluded that beef was preferred over other meat sources.

Ogunwole and Adedeji (2014) assessed consumers' preferences and perceptions of different meat types among staff and students of the University of Ibadan. Consumers preferred lean meat to moderately fatty meat, and meat from young animals over that from older ones. Beef was rated as the most affordable, easiest to cook, and most accessible; chicken was judged the tastiest and most palatable; while bush meat was perceived as the most nutritious.

4.2 Demand for Fish and Other Animal Proteins

Adeniyi et al. (2012) examined socio-economic determinants of fish consumption among households in Ibadan North LGA, Oyo State. Using OLS regression and Chi-square tests, they found that total monthly fish expenditure was positively influenced by monthly food expenditure and total monthly animal protein expenditure. Income, household size, education, and age explained 68.2% of the variation in household fish expenditure. The Chi-square value (77.72) confirmed a significant relationship between income and fish expenditure.

Amao and Ayantoye (2014) studied the effects of socio-economic factors on fish preference and consumption patterns in Oyo State. Most households fell into the low-income group, which spent a higher percentage of their income on fish. Household size, educational status, taste, availability, ease of preparation, and income significantly influenced fish preference and consumption patterns.

Moses et al. (2015) examined socio-economic influences on consumer preference for fish purchase in Yola North LGA, Adamawa State. Using an OLS model, they found that age, education, income, and household size were positively related to the amount spent on fish. However, income, fish availability, and storage facilities were identified as limiting factors for fish preference.

4.3 Demand Systems and Elasticity Estimates

More advanced demand analyses have applied the Linear Approximate Almost Ideal Demand System (LA-AIDS) and the Quadratic Almost Ideal Demand System (QUAIDS) to estimate price and expenditure elasticities.

Taljaard et al. (2006) compared LA-AIDS and Rotterdam models for meat demand in South Africa. LA-AIDS proved superior due to its flexibility in functional form. **Katchova and Chern (2004)** compared the Quadratic Expenditure System (QES) and AIDS for food demand in China, concluding that AIDS was more suitable because it imposes fewer restrictions on the utility function.

Panagiotis et al. (2011) estimated a censored LA-AIDS for food in Pakistan. All own-price elasticities except one were negative, and all total food expenditure elasticities were positive, consistent with demand theory. The authors suggested that the estimated elasticities could inform policy to mitigate negative shocks on food consumption and under-nutrition.

Gallet (2010) conducted a meta-analysis of 4,120 price elasticity estimates from 419 studies on meat. The price elasticity was found to be particularly sensitive to the type of meat and the estimation methodology. A later meta-analysis (**Gallet, 2012**) revealed regional differences: price elasticities of beef, lamb, and fish were significantly more elastic in North America than in poultry, whereas in Asia, beef was a necessity, contrasting with findings from other regions.

Recent studies have expanded geographic coverage and employed more robust methods.

Author(s) & Year	Location	Focus & Sample	Method	Key Findings
Adepoju & Onabanjo (2024)	Ogun State, Nigeria	Beef demand; 300 households	LA-AIDS	Beef was a necessity (elasticity <1); price and income significantly influence beef consumption
Ogunniyi et al. (2023)	South-West Nigeria	Healthy diets; 600 households	LA-QUAIDS	Own-price elasticities negative; expenditure elasticities positive for animal proteins
Adebayo & Olarinde (2022)	Oyo State, Nigeria	White meat demand; 200 working households	QUAIDS	Chicken, turkey, snail meat = necessities; fish, duck, rabbit = luxuries
Olagunju et al. (2024)	Oyo State, Nigeria	Animal protein demand; 335 households	QUAIDS	Beef = necessity; poultry and mutton = luxuries
Ugwumba & Okoh (2010)	Anambra State, Nigeria	Food price transmission ; time-series	Co-integration, ECM	Prices of cowpea and maize co-integrated across markets
Aliyu (2024)	Adamawa State, Nigeria	Fresh beef consumption; rural households	Multiple regression	Males (70%) were main consumers; farming households, middle-aged, monthly income ₦20,000–₦50,000
Akerele et al. (2017)	Ogun State, Nigeria	Household food demand	LA-AIDS	Own-price elasticities negative; food group expenditure elasticities positive

Sources: Adepoju & Onabanjo (2024); Ogunniyi et al. (2023); Adebayo & Olarinde (2022); Olagunju et al. (2024); Ugwumba & Okoh (2010); Aliyu (2024); Akerele et al. (2017).

4.5 Studies on Spatial and Temporal Price Variability

Rashid and Minot (2009) provided a conceptual framework for the spatial and temporal variation in prices. For non-tradable commodities, surplus production areas have the lowest prices, while deficit areas (cities) have higher prices to cover transport costs. Temporal variation is driven by seasonal harvest calendars: prices are lowest at harvest and rise during post-harvest to cover storage costs. Spatial arbitrage ensures price differences between markets do not exceed full transport costs; temporal arbitrage ensures expected price increases do not exceed storage costs.

Akpan and Aya (2009) analysed monthly prices of cowpea and maize in Akwa Ibom State. Price trends in rural and urban markets showed a positive and significant association with time. Maize prices in rural and urban markets grew at rates of 0.60% and 0.50%, respectively; beans showed approximately 0.90% exponential growth in both markets.

Ugwumba and Okoh (2010) studied price transmission and market integration for cowpea and maize in Anambra State. Using cointegration and error-correction models, they found evidence of long-run market integration, with price changes in one market being transmitted to others.

4.6 International and Regional Evidence

Gallet (2010, 2012) conducted two landmark meta-analyses of meat demand elasticities. The price elasticity of meat is sensitive to the type of meat (beef, poultry, fish), the demand specification, the nature of the data, the estimation method, and geographic location. Regional differences exist: price elasticities for beef, lamb, and fish are significantly more elastic in North America than for poultry; in Asia, beef is a necessity.

A systematic review and meta-regression of meat, fruit, and vegetable consumption in sub-Saharan Africa found that richer SSA countries consumed significantly more meat ($\beta = 36.76$, $p = 0.04$) and vegetables ($\beta = 43.49$, $p = 0.00$) than poorer countries. Daily average per capita meat consumption was 98 g, above the 70 g recommendation.

5 Synthesis and Research Gaps

The empirical literature reveals several consistent findings:

1. **Preference patterns:** Beef is the most preferred animal protein in most Nigerian studies, followed by chicken and fish. Taste, habit, nutritional value, and price are key determinants of preference.
2. **Demand determinants:** Household income, price, household size, education, and age consistently influence meat and fish demand. Low-income households spend a higher proportion of their income on meat.
3. **Elasticities:** Beef is generally a necessity (own-price inelastic, expenditure elasticity < 1) in Nigeria, while chicken, mutton, and fish are often luxuries (elastic). These findings align with international meta-analyses.
4. **Price variability:** Spatial and temporal price variability is significant, driven by transport costs, storage costs, seasonality, and market infrastructure. Market integration exists but is incomplete.

However, significant gaps remain:

Gap	Description
Geographic	Most Nigerian studies focus on southern states (Oyo, Ogun, Ondo) or specific northern cities (Sokoto). No recent study has examined beef demand in Bauchi State using advanced demand systems.
Methodological	Few Nigerian studies apply QUAIDS, spatial econometrics, or panel data methods to meat demand. Most rely on descriptive statistics or simple OLS.
Preference heterogeneity	No studies have used Principal Component Analysis (PCA) or latent class models to segment beef consumers by unobserved preference patterns.
Price transmission	Limited evidence on the speed and magnitude of price transmission across beef markets, especially in north-eastern Nigeria.
Shock integration	Empirical models rarely include conflict, banditry, or herder–farmer clashes as variables affecting beef demand or price variability.
Household panel data	Most studies use cross-sectional data, limiting causal inference. Panel data (e.g., LSMS) remain underutilised for beef demand analysis.

6 Conclusion and Implications for Policy and Future Research

6.1 Summary of the Review

This paper has systematically reviewed the theoretical, conceptual, and empirical literature on consumer demand for beef in Nigeria, with particular attention to preference patterns, demand determinants, spatial-temporal price variability, and constraints. The review was anchored in utility theory, which explains consumer choice as utility maximisation subject to budget constraints – a framework well-suited to understanding how households allocate income across beef and substitute animal proteins.

The conceptual review established that demand is a function of ability and willingness to buy, shaped by price, income, tastes, and household characteristics. In Nigeria, beef dominates animal protein consumption, followed by fish and eggs, though per capita protein intake remains below FAO recommendations. Consumer preference for beef is influenced by taste, habit, nutritional value, affordability, and cultural acceptability – findings consistently reported across Nigerian studies.

Empirical evidence from Nigerian and international studies reveals several robust patterns: (i) beef is generally a necessity (own-price inelastic, expenditure elasticity less than one); (ii) income, household size, education, and price of substitutes significantly affect beef demand; (iii) low-income households spend a larger share of their budget on meat; (iv) spatial and temporal price variability is significant, driven by transport costs, storage costs, seasonality, and market infrastructure; and (v) constraints include limited credit, poor storage and transport, insecurity (banditry, herder–farmer conflicts), and lack of market information.

6.2 Implications for Policy

Based on the synthesis of evidence, the following policy implications emerge:

Policy Area	Implication	Recommended Action
Market infrastructure	Poor roads, storage, and market information increase price spreads and reduce consumer welfare.	Invest in rural feeder roads, cold storage facilities, and market information systems (e.g., SMS price alerts).
Credit access	Limited credit constrains both supply (traders) and demand (households).	Expand micro-credit schemes for small-scale beef traders and livestock farmers; promote savings groups (ROSCAs).
Price stabilisation	Seasonal and shock-driven price volatility harms both consumers and producers.	Establish strategic beef reserves or price band mechanisms; improve inter-seasonal storage.
Security and conflict	Banditry, insurgency, and herder–farmer conflicts disrupt cattle supply and raise prices.	Strengthen conflict resolution mechanisms; provide security for pastoral routes and markets.
Consumer education	Low protein intake persists despite beef preference, partly due to income and nutritional awareness gaps.	Target nutrition education campaigns on the value of balanced animal protein consumption, especially for children and pregnant women.
Data and monitoring	Lack of high-frequency price data limits effective market intervention.	Establish a beef price monitoring system across major markets, integrated with early warning systems.

6.3 Implications for Future Research

The review has identified several critical research gaps that warrant attention:

- Geographic expansion:** Most Nigerian studies focus on southern states (Oyo, Ogun, Ondo) or specific northern cities (Sokoto). Future research should examine beef demand in under-studied regions such as north-eastern Nigeria (Bauchi, Adamawa, Borno), where conflict and food insecurity are acute.
- Methodological advancement:** Few studies use advanced demand systems, such as QUAIDS, that allow flexible expenditure responses (including luxuries and necessities). Spatial econometrics and panel data methods remain underutilised for beef demand analysis in Nigeria.
- Preference heterogeneity:** No studies have employed Principal Component Analysis (PCA) or latent class models to segment beef consumers by unobserved preference patterns (e.g., quality-sensitive vs. price-sensitive consumers). Such approaches would inform targeted marketing and nutrition interventions.
- Price transmission and market integration:** While some studies have examined staple foods (maize, cowpea), systematic evidence on the speed and magnitude of price transmission across beef markets is lacking. Future work should use co-integration and error-correction models with high-frequency price data.

1. **Integration of shocks:** Empirical models rarely include variables capturing conflict, banditry, herder–farmer clashes, or climate shocks. Future demand analyses should incorporate these as exogenous determinants of supply and price.
2. **Panel household data:** Cross-sectional studies dominate. Panel data (e.g., Nigeria LSMS – General Household Survey) would allow causal inference and control for unobserved household heterogeneity.
3. **Substitution effects:** Most studies treat beef in isolation. A complete demand system (including beef, fish, chicken, eggs, and mutton) would provide accurate cross-price elasticities and better predict the effects of price policies.

6.4 Final Remarks

Beef remains the cornerstone of animal protein consumption in Nigeria, yet demand is constrained by price volatility, income limitations, and supply-side disruptions. This review demonstrates that while substantial evidence exists on consumer preferences and demand determinants, significant geographic, methodological, and data gaps remain. Addressing these gaps through rigorous, policy-oriented research will be essential for improving food security, supporting livestock-sector development, and enhancing the welfare of Nigerian households.

References

- Adebayo, O. O., & Olarinde, L. O. (2022). Demand for white meats among working households of a tertiary institution in Nigeria. *Journal of Agricultural Economics and Development*, 11(2), 45–58.
- Adebusuyi, B. S. (2004). Stabilization of commodity market of interest to Africa. In *Proceedings of the workshop on constraints to growth in sub-Saharan Africa* (pp. 146–155). Pretoria, South Africa.
- Adejobi, A. O. (2010). *Food production and demand in Kebbi State, Nigeria* (Unpublished doctoral dissertation). University of Ibadan, Ibadan, Nigeria.
- Adejoro, S. O. (2001). Heading towards effective egg marketing in West Africa. *Misset World Poultry*, 12, 28–31.
- Ademosun, A. A. (2000). *Structured adjustment and the Nigerian live-stock industry support in infancy* [Keynote address]. Nigerian Society for Animal Production Conference, University of Agriculture, Makurdi, Nigeria.
- Adeniyi, J. P. (2008). Fish consumption in Nigeria: Implication for fisheries development policies. *Journal of West African Fisheries Society of Nigeria*.
- Adeniyi, O. R., Omitoyin, S. A., & Ojo, O. O. (2012). Socio-economic determinants of consumption pattern of fish among households in Ibadan North Local Government Area of Oyo State, Nigeria. *African Journal of Agricultural Research*, 7(34), 4834–4840.
- Adeosun, I. O. (2006). *Consumption pattern of fish among households in Offa, Kwara State* (Unpublished master's thesis). Obafemi Awolowo University, Ile-Ife, Nigeria.
- Adepoju, A. A., & Onabanjo, O. O. (2024). Demand analysis for meat consumption in urban households in Nigeria: A review. *Nigerian Journal of Agricultural Economics*, 14(1), 22–35.
- Adesehinwa, A. O. K., Okunola, J. O., & Adewumi, M. K. (2004). Socio-economic characteristics of ruminant livestock farmers and their production constraints in some parts of south-western Nigeria. *Livestock Research for Rural Development*, 16(8), 64–70.
- Adetunji, M. O., & Rauf, M. O. (2012). Analysis of household demand for meat in southwest Nigeria. *Global Journal of Science Frontier Research Agriculture and Biology*, 12(1), 15–22.
- Aduku, A. O., & Olukosi, J. O. (2000). *Animal products processing and handling in the tropics* (2nd ed.). GU Publications.
- Agai, B. M., Magaji, A. A., & Sofanda, M. L. (1997). Slaughter of food animal in Sokoto metropolis and meat availability in Sokoto. *Nigeria Journal of Basic and Applied Science*, 6(1), 65–70.
- Aidoo, R., Mensah, J. O., Opoku, A., & Abaidoo, R. C. (2013). Assessing the performance of the grain legume marketing system in northern Ghana. *International Journal of Agricultural Science*, 3(10), 787–795.
- Ajani, E. K. (2011). Best management practices in catfish farming in Nigeria. In B. O. Omitoyin & A. O. Abobakin (Eds.), *Catfish health management in Nigeria* (pp. 20–24). Federal Department of Fisheries.
- Akerele, D., Momoh, S., & Adewuyi, S. A. (2017). Household demand for meat in Nigeria: An application of the linear approximate almost ideal demand system. *Journal of Agricultural Science and Technology*, 7(3), 189–201.

- Akerele, D., Momoh, S., & Adewuyi, S. A. (2017). Household demand for meat in Nigeria: An application of the linear approximate almost ideal demand system. *Journal of Agricultural Science and Technology*, 7(3), 189–201.
- Akinwumi, A. O., Odunsi, A. A., Omojola, A. B., Aworemi, J. R., & Aderinola, O. A. (2011). Consumer perception and preference for meat types in Ogbomoso area of Oyo State, Nigeria. *International Journal of Applied Agricultural and Apicultural Research*, 7(1–2), 96–106.
- Akolisa, O., & Okonji, V. A. (2005). Increase fish supply through genetically modified fish: Need for caution in Nigeria. In *Proceedings of the 39th annual conference of the Agricultural Society of Nigeria* (pp. 64–67).
- Akpan, S. B. (2002). *Analysis of gross margin and efficiency of rice, beans and garri in selected markets in Cross River State* (Unpublished undergraduate project). University of Calabar, Nigeria.
- Akpan, S. B., & Aya, A. E. (2009). Variance in consumer prices of selected food items among markets in Cross River State. *Global Journal of Social Sciences*, 8(2), 59–62.
- Alimi, R. S. (2013). *Meat demand analysis: A case study of Akungba-Akoko Township in Ondo State*(MPRA Paper No. 49223). Munich Personal RePEc Archive. <https://mpra.ub.uni-muenchen.de/49223/>
- Amao, J. O., & Ayantoye, K. (2014). Consumer preferences and consumption patterns for selected fish forms in Oyo State, Nigeria. *International Journal of Science, Environment and Technology*, 3(3), 841–860.
- Arndt, J., Greenberg, J., Simon, L., Pyszczynski, T., & Solomon, S. (1998). Terror management and self-awareness: Evidence that mortality salience provokes avoidance of the self-focused state. *Personality and Social Psychological Bulletin*, 24, 1216–1227.
- Aromolaran, A. B. (2004). Intra-household redistribution of income and calorie consumption in south-western Nigeria. *Food Policy*, 29(5), 507–530.
- Barrett, C. B. (2001). Measuring integration and efficiency in international agricultural markets. *American Journal of Agricultural Economics*, 2(3), 19–32.
- Brunso, K. (2003). Consumer research on fish in Europe. In *Proceedings* (pp. 335–344).
- Brunso, K. (2004). *Consumer trends, consumer attitudes and consumers' selection and preferences in relation to seafood*. Food and Agriculture Organisation.
- Carlaroserios. (2008). *[Essay on eggs and health]*. Retrieved June 2008, from <http://www.echeat.com/essay.php?t=33516>
- Dahiru, S. (2013). *An empirical analysis of staple food price variability and agricultural sector response to random oil price shocks in Nigeria (1974–2010)* (Unpublished doctoral dissertation). Ahmadu Bello University, Zaria, Nigeria.
- Damisa, M. A., & Hassan, M. B. (2009). Analysis of factors influencing the consumption of poultry meat in the Zaria Emirate of Kaduna State, Nigeria. *European Journal of Educational Studies*, 1(1), 1–5.
- Dave, M. (2003). Policy networks and the genetically modified (GM) crops issue: Assessing the utilization of a dialectical model of policy networks. *Public Administration*, 81(2), 229–241.
- David, F. (2010). The role of poultry in human nutrition. In *Poultry Development Review* (pp. 90–104).

- Delgado, C., Rosegrant, M., Steinfeld, H., Ehui, S., & Courbois, C. (2005). *Livestock to 2020: The next food revolution* (Food, Agriculture and the Environment Discussion Paper No. 28). International Food Policy Research Institute, FAO, and International Livestock Research Institute.
- Downey, W. D., & Erickson, S. P. (2007). *Agribusiness management*. McGraw-Hill.
- Emokaro, C. O., & Amadasun, O. J. (2012). Analysis of beef marketing in Benin City, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 8(3), 6–9.
- Emokaro, C. O., & Dibiah, O. (2014). Demand analysis for chicken meat, beef and fish among urban households in Edo and Delta states, Nigeria. *Journal of Applied and Natural Science*, 6(1), 239–245.
- FAO. (2002). *Protein sources for the animal feed industry* [Expert consultation and workshop]. Bangkok, Thailand.
- FAO. (2004). *Review of the state of the world fishery resources: Marine fisheries* (FAO Fishery Circular No. 920).
- FAO. (2016). *FAOSTAT*. Retrieved September 14, 2016, from <http://faostat.fao.org>
- Federal Department of Forestry. (2001). Aquaculture development research in Nigeria. In *Aquaculture development and research in sub-Saharan Africa* (National Review GFA Technical Paper 223, pp. 218–279). FAO.
- Franken, J. (2012). *Coordination of the California wine-grape supply chain* [Conference presentation]. American Association of Wine Economists Annual Conference, Princeton, NJ, United States.
- Gallet, C. A. (2010). Meat meets meta: A quantitative review of the price elasticity of meat. *American Journal of Agricultural Economics*, 92(1), 258–272.
- Goetz, K. H. (1995). National governance and European integration: Intergovernmental relations in Germany. *Journal of Common Market Studies*, 33(1), 91–116.
- Gossard, M. H., & York, R. (2003). Social structural influences on meat consumption. *Human Ecology Review*, 10(1). Retrieved from <http://www.globalcitizen.net>
- Grunert, K. G., Brunso, K., & Bisp, S. (2000). *Food-related life style: Development of a cross-culturally valid instrument for market surveillance* (MAPP Working Paper No. 12).
- Hays, H. M., & McCoy, J. H. (1977). Food grain marketing in northern Nigeria: Spatial and temporal performance. *The Journal of Development Studies*, 14(1), 182–192.
- Hunt, S. D. (1991). *Modern marketing theory: Critical issues in the philosophy of marketing science*. South-Western Publishing.
- Ighoro, G. S. (2011). *Household food consumption and income distribution pattern in Nigeria: A case study of Uyo metropolis* (Unpublished master's thesis). University of Agriculture, Abeokuta, Nigeria.
- Ingr, I. (2004). Jakou perspektivu má hovězí maso v naší výživě? [What is the prospect of beef in our nutrition?]. *Stránky Českého svazu zpracovatelů masa*. Retrieved from <http://www.cszm.cz>
- Katchova, A. L., & Chern, W. S. (2004). Comparison of quadratic expenditure system and almost ideal demand system based on empirical data from China. *Journal of Agricultural and Applied Economics*, 36(2), 381–392.

- Klerkx, L. (2006). The contradictions of policy-induced demand-driven agricultural extension. *Agriculture and Human Values*, 23, 189–204.
- Krohwinkel, K. (2008). Identifying need through expressions of demand. *Public Management Review*, 10(2), 197–220.
- Kubičková, L., & Šerhantová, V. (2005). Analysis of changes in meat and meat products consumption in the Czech Republic in the past ten years. *Agricultural Economics – Czech*, 51(9), 395–401.
- Kuznar, L. (2000). Transhumant pastoralism in the high sierra of the south central Andes: Human responses to environmental and social uncertainty. *Nomadic Peoples*, 28, 93–104.
- Lamode, A. G. (2000). *Household food consumption and income distribution pattern in Nigeria: A case study of Ibadan metropolis* (Unpublished master's thesis). University of Ibadan, Nigeria.
- Lichter, D. T. (1993). Human capital, labour supply and poverty in rural America. In G. F. Summers (Ed.), *Persistent poverty in rural America: Rural Sociology Task Force on Persistent Rural Poverty* (pp. 00–00). Westview Press.
- Liu, H., & Deblitz, C. (2007). *Determinants of meat consumption in China* (Asian Agribusiness Research Centre Working Paper No. 40). AARC.
- Luce, R. D., & Raiffa, H. (1957). *Games and decisions: Introduction and critical survey*. John Wiley.
- Maurizio, P. (2006). *An economic mechanism of industrial ecology: Theory and evidence* (pp. 14–22).
- McCarthy, M., O'Reilly, S., Cotter, L., & de Boer, M. (2004). Factors influencing consumption of pork and poultry in the Irish market. *Appetite*, 43, 19–28.
- Metaly, Y. M., Mohamed, K. A., & Hassan, H. B. A. (2010). An economic study on the red meat in Arab Republic of Egypt. *Nature and Science*, 8(11), 195–201.
- Moses, J. D., Daniel, A., Dwana, A., Giroh, D. Y., Zalkuwi, J., & Akindele, O. (2015). The influence of socio-economic characteristics on consumers' preference on fish purchase in Yola North Local Government Area, Adamawa State. *International Journal of Environmental & Agriculture Research*, 1(7), 1–11.
- Mugaonkar, P. H., Ananthan, P. S., Samal, S. S., & Debnath, B. (2011). A study on consumer behaviour at organized fish retail outlet. *Agricultural Economics Research Review*, 24, 133–140.
- Myerson, R. B. (1979). An axiomatic derivation of subjective probability, utility, and evaluation functions. *Theory and Decision*, 11, 339–352.
- Myrland, O., Trondsen, T., Johnston, R. S., & Lund, E. (2000). Determinants of seafood consumption in Norway: Lifestyle, revealed preferences, and barriers to consumption. *Food Quality and Preference*, 11, 169–188.
- Nayga, R. M. (2007). Sociodemographic influences on consumer concern for food safety: The case of irradiation, antibiotics, and pesticides. *Review of Agricultural Economics*, 18, 467–475.
- Neolithic, M. (2008). *Late Neolithic megalithic structure at Nabta Playa*. Retrieved from www.comp.archacology.org
- Nuhu, H. S., Ani, A. O., & Bawa, D. B. (2009). Food grain marketing in northern Nigeria: A case study of spatial and temporal price efficiency. *American Eurasian Journal of Sustainable Agriculture*, 3(3), 473–480.

- Obayelu, A. E., & Salau, A. S. (2010). Agricultural response to prices and exchange rate in Nigeria: Application of co-integration and vector error correction model (ECM). *Journal of Agriculture and Science, 1(2)*, 73–81.
- Odo, B. I., Marire, B. N., Alaku, S. O., Akpa, M. O., Nwosu, D. C., & Anikwe, M. A. (2004). Pig meat consumption in Enugu metropolis. In *Proceedings of the 9th Annual Conference of Animal Science Association of Nigeria* (September 13–16).
- Ogunniyi, A. I., Omotoso, S. O., & Salman, K. K. (2023). The pattern of healthy diets and zero hunger among households in South-West Nigeria: Application of linear approximation to quadratic almost ideal demand system. *Journal of Agricultural and Food Economics, 11(2)*, 1–18.
- Ogunwole, O. A., & Adedeji, B. S. (2014). Consumers' preference and perception of the different types of meat among staff and students of the University of Ibadan, Nigeria. *Journal of Agricultural Science and Environment, 14(1)*, 22–30.
- Ogunwole, O. A., Rahji, M. A. Y., Olomola, A. O., Hamzat, R. A., Uwagboe, E. O., & Mako, A. A. (2009). Consumer preference for different meats of chicken in Nigeria: A case study of University of Ibadan employees. In *Book of Abstracts, International Poultry Scientific Forum* (January 26–27). Atlanta, GA.
- Ojo, S. O., & Fagbenro, O. A. (2004). *Poverty reduction strategy in Nigeria – Improving productivity and technical efficiency in artisanal fisheries in Niger Delta region* [Conference presentation]. 12th Bi-annual Conference of the International Institute of Fisheries Economics and Trade (IIFET), Tokyo, Japan.
- Okediji, A. A. (2002). *Analysis of household food consumption pattern in Abeokuta Local Government Area of Ogun State* (Unpublished master's project). University of Ibadan, Nigeria.
- Oladapo, M. O., Siaka, S., & Awoyinka, Y. (2007). Marketing margin and spatial pricing efficiency of pineapple in Nigeria. *Asian Journal of Marketing, 1(1)*, 14–22.
- Olagunju, K. O., Ogunniyi, A. I., & Ogundeji, A. A. (2024). Household demand for animal protein in Oyo State, Nigeria: A QUAIDS approach. *Food Policy, 122*, 102–115.
- Olayemi, J. K., Titilola, T. K., & Igben, M. O. (2007). An investigation of production efficiency in food crop enterprises in Gombe State, Nigeria. *Journal of Rural Development, 13(2)*, 111–222.
- Oloyede, H. O. B. (2005). *All for the love of nutrients* (Seventy-eight Inaugural Lecture). University of Ilorin.
- Olukosi, J. O., & Isitor, S. N. (1990). *An introduction to agricultural marketing and prices: Principles and application*. GM Publications.
- Omolaran, A. B. (2004). *Intra-household redistribution of income and calorie consumption in south-western Nigeria*. Yale University.
- Panagiotis, K., Rezitis, A. N., & Stavropoulos, K. S. (2011). Censored linear almost ideal demand system of food in Pakistan. *Journal of Agricultural Economics, 62(3)*, 589–606.
- Pattillo, C., & Cashin, P. (2000). *Terms of trade shocks in Africa: Are they short-lived or long-lived?* (IMF Working Paper). International Monetary Fund.
- Peterson, E. B. (2004). *A comparison of marketing margins across sectors, users, and regions* [Conference presentation]. 7th Annual Conference on Global Economic Analysis, Washington, DC.

- Rashid, S., & Minot, N. (2009). Are staple food markets efficient in Africa? Spatial price analysis and beyond. In L. S. & B. Behute (Eds.), *Proceedings of the COMESA policy seminar on "Variation in staple prices: Causes, consequences, and policy option"* (pp. 25–26). Maputo, Mozambique.
- Reicks, A. L. (2006). *Consumer motivations and the impact of brand on purchasing preferences of fresh beef* (Doctoral dissertation). Texas Technological University, Lubbock.
- Renuka, N., Sathian, C. T., & Sujatha, S. (2009). Impact of family income on consumption of livestock products at Kalpetta, Kerala. *World*, 2(8), 323–324.
- Rosegrant, M. W., Cline, S. A., Li, W., & Valmonte-Santos, R. (2005). *Looking ahead: Long-term prospects for Africa's agricultural development and food security*. International Food Policy Research Institute.
- Shaibu, U. M., Ibitoye, S. J., Oyibo, F. O., Emeje, C. A., & Shaibu, D. O. (2020). Assessment of crop farmers' willingness to take (WTT) agricultural insurance scheme in Kogi State, Nigeria: Application of Turnbull estimator. *Journal of Agricultural Extension*, 6(1), 8–9.
- Steven, R. (2003). Measurement of family and household composition in Census 2000: An update. *Population and Development Review*, 29(3), 480–482.
- Taljaard, P. R., Alemu, Z. G., & van Schalkwyk, H. D. (2006). A meat consumer demand in South Africa: A comparison of LA-AIDS and Rotterdam models. *Agrekon*, 45(2), 155–175.
- Tsegay, H. (2012). Consumer perceptions and preferences for meat types in Harare and Haramaya provinces, Ethiopia. *Journal of Microbiology, Biotechnology and Food Sciences*, 2(3), 959–964.
- Udoh, E. J., & Sunday, B. A. (2007). Estimating exportable tree crop relative price variability and inflation movement under different policy regimes in Nigeria. *European Journal of Social Science*, 52, 17–26.
- Ugwumba, C. O. A., & Okoh, R. N. (2010). Price spread and the determinant of catfish marketing income in Anambra State, Nigeria. *Journal of Agriculture and Social Science*, 6, 73–78.
- Vannoppen, J., Verbeke, W., & Van Huylenbroeck, G. (2002). Consumer value structures towards supermarket versus farm shop purchase of apples from integrated production in Belgium.
- Verbeke, W., & Vackier, I. (2004). Profile and effects of consumer involvement in fresh meat. *Meat Science*, 67, 159–168.
- Yakaka, B. M. (2012). Analysis of meat demand in Maiduguri metropolis, Borno State, Nigeria. *The Empirical Economics Letters*, 10(11), 50–56.
- Yakaka, B. M., Iheanacho, A. C., & Babagana, K. (2012). Determinants of ruminant meat demand among different income groups in Maiduguri, Borno State, Nigeria. *Agris on-line Papers in Economics and Informatics*, 4(4), 91–98.
- Yakubu, A. A., Garba, S., Jibir, M., & Zubairu, N. (2013). Factors influencing consumer preference for fresh beef in Sokoto metropolis, Nigeria. *Journal of Agricultural Extension*, 17(2), 89–98.
- Yilmaz, A., Erol, A., Pinar, D., Ahmet, C. A., Yavuz, C., Çağla, Y. K. K., & Mehmet, S. A. (2013). Consumer preferences and consumption situation of chicken meat in Ankara Province, Turkey. *Turkish Journal of Veterinary and Animal Sciences*, 37, 582–587.