

ANALYSING THE DETERMINANTS OF FRESH BEEF CONSUMPTION AND ITS MARKETING EFFICIENCY IN NIGERIA: A RURAL PERSPECTIVE

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Abstract. This survey determined the factors influencing fresh beef consumption and its marketing efficiency among consumers and sellers, respectively, in rural communities of Maiha Local Government Area (LGA), Adamawa State, Nigeria. Combined purposive and random sampling methods were employed in the selection of respondents for the study. A structured questionnaire, group discussion and an interview schedule were used to source the data. Descriptive statistics, multiple regression analysis and marketing efficiency were the measures adopted in analysing the data. The findings show that males (69.96%), who were mostly married and educated, were the major consumers of beef in rural areas. A large proportion were farmers with a monthly income between ₦20,000 and ₦50,000, and the majority were middle-aged persons with a household size of 1–5 individuals. Major significant ($p < 0.05$) socioeconomic determinants of fresh beef consumption in the domain were income, household size, monthly expenditure on beef, frequency of consumption and age. A value of 156% for marketing efficiency reveals a highly efficient market system for fresh beef. The challenges most commonly experienced by fresh beef consumers were the incomes of household heads (70.76%) and the price of fresh beef (49.87%). In conclusion, middle-aged, educated males constituted the bulk of beef consumers in the area surveyed, with income, household size and monthly expenditure on fresh beef the main determinants of consumption. Concerned institutions should therefore advance policies that would lower the cost of beef in order to increase the consumption rate in rural communities.

Keywords: beef, consumers, consumption, efficiency, marketing, Nigeria

INTRODUCTION

Beef, which is rich in vitamin B₁₂, zinc, iron, vitamin B₆, thiamin, potassium and magnesium (CCHS, 2021), is the major source of animal protein available to mankind (Odoemena et al., 2020). Globally, there has been a remarkable growth in the number of consumers of beef over the past five decades, with around 430 million tons produced yearly (Barrow et al. 2017). Henchion

et al. (2021), who reported consumption of animal-sourced proteins in five regions of the world based on the World Health Organisation (WHO) classification, documented that the European countries consistently account for a higher consumption rate than Southeast Asia and Africa. Specifically, in 2017 values of 0.29 and 1.08 were reported as ratios of animal- to plant-sourced protein for Africa and Europe, respectively. This scenario depicts a low consumption rate, especially for the

Accepted: 19.07.2024

Published: 30.09.2024

Cite as: Abubakar, A., Ja'afar-Furo, M. R., Abdullahi, A. (2024). Analysing the determinants of fresh beef consumption and its marketing efficiency in Nigeria: A rural perspective. *J. Agribus. Rural Dev.*, 3(73), 282–293. <http://dx.doi.org/10.17306/J.JARD.2024.01803>



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black continent. However, with the slight improvement in the income level across Europe and the United States of America (USA), an appreciable level of consumption has been noticed recently among the citizenry of these regions. FAO (2019) noted that in spite of the rapidly growing demand for beef around the globe due to a sharp increase in population and technological advancement, there exists a huge shortfall in supply.

In the African context, in which Nigeria is situated, numerous studies abound (Chauvin et al., 2012; Vougat et al., 2016; Bisschoff and Liebenberg, 2017; Enahoro et al. 2021; Vasko et al., 2022; Erdaw, 2023) investigating beef consumption in relation to the livelihoods of the population, especially taking into account rural dwellers' development. For instance, Chauvin et al. (2012) conducted a survey in 19 African countries investigating the nexus between poverty, agriculture as a tool for the transformation of individuals and the general wellbeing of the population through better access to nutrients. Their discoveries show that although gross food production in sub-Saharan Africa (SSA) has been rising at a slow pace of less than 1.00% per annum, the demand for beef has been rising geometrically. This disparity has to be addressed if the eradication of hunger on the continent by the year 2030 is to be achieved. This result was further corroborated by Vougat et al. (2016), who found that of the 202 households involved in a survey in Maroua of the Republic of Cameroon, 98.00% of them included consumption of beef in their household expenditure. In a similar vein, Bisschoff and Liebenberg (2017) reported a significant increase in the consumption of beef in South African townships among the 299 participating households studied, linking the trend to the presentation and quality of the commodity (beef). In line with these reports, while Enahoro et al. (2021) emphasise the growing demand for fresh beef in West Africa, there has not been a commensurate increase in supply, leading to a significant shortfall. Similarly, Erdaw (2023), who comprehensively reviewed works of prominent scholars on the prospects and consumption of livestock products in SSA, concluded that the demand for these products and the level of production do not match. In other words, the overall production of livestock products falls short of the total demand. Addressing this problem requires more studies on both the urban and rural communities in order to understand its intricacies.

In Nigeria, beef is said to account for over 71.00% of the tonnage of meat consumption (Bobola et al., 2015).

An estimated quantity of 360,000 tons is consumed by Nigerians yearly, which forms half of West Africa's consumption. As the most populous black nation on earth, World Bank (2021) estimated the population at 218.5 million persons in 2021, with about 47.25% found in rural areas where the production of cattle is part of people's livelihoods. Oluwatusin et al. (2019) maintained that the consumption of animal protein in this country has been at a minimum, attributing this scenario to the upsurge in beef prices and the low incomes of most consumers. Although the Food and Agriculture Organisation (FAO) recommends the consumption of 200 g of animal protein per person per day, Oluwatusin et al. (2019) reported that an adult's requirement for protein per day in Nigeria is between 65 g and 85 g, of which 35 g should come from beef. While Yakubu et al. (2013) have stated that preferences for beef consumption are significantly influenced by factors including ethnicity, geographical location, race, social position and household income, scholars like Oluwatusin et al. (2019) have advanced three main factors. The good tastes or flavour consumers derive from the consumption of beef was cited as the most important factor. The second factor was largely connected with the social status associated with the consumption of beef, especially during special occasions or festivities, and the third was the nutritional or health benefits connected with the commodity.

The fact remains that despite the sharp increase in population in the Federal Republic of Nigeria (FGN), there has not been a commensurate rise in the production of beef to reduce the deficit in supply (Odoemena et al., 2020). Although several studies (Uzunoz and Karakas, 2010; Ngore et al., 2011; Vinholes et al., 2012; Nse-Nelson et al., 2017; Makweya and Oluwatayo, 2019; Newton and Blaustein-Rejto, 2021) have documented how the demographic and economic variables of consumers influence the consumption patterns of beef in any prevailing circumstances, Bhanot (2018) emphasises the role of effective rural and urban marketing through promotional strategies as substantially enhancing beef purchases in any given economy. These socio-economic factors are the level of education of the consumers, the extent of expenditure on beef by households, the cost of cattle, the household size of buyers and the cost of storing beef. Now, with the availability of mass advertisements in urban settlements, which are beginning to exhibit a saturated marketing scenario, marketers have started to turn their searchlight on rural settings, where

the bulk of consumers have slower income growth but there is more potential to raise awareness of the product. Understanding marketing needs in these rural environments calls for careful investigation in the localities to reveal reliable information for appropriate planning.

This survey, which focused on the socio-economic variables of consumers of beef in a typical rural setting in Nigeria, was an attempt to determine the factors that influence consumption of the commodity in these areas. Efforts were also made to assess the demographic characteristics of rural buyers, determine the marketing efficiency of the beef market system and describe the challenges faced by consumers and marketers in relevant policymaking.

METHODOLOGY

The study area

The area under survey, Maiha Local Government Area (LGA), is located in Adamawa State, Nigeria. The LGA is one of 21 in the State. Adebayo et al. (2020) reported that the LGA lies between latitudes of $9^{\circ}31'$ and $10^{\circ}09'$ North and between longitudes of $13^{\circ}02'$ and $13^{\circ}17'$ East of the equator. It has a landmass of 1,385 km². The LGA shares boundaries with Mubi-North LGA to the north, and Mubi-South to the northeast. Hong and Song LGAs are found to the northwest and west, respectively. Fufore LGA is to the southeast of the study area, with the Republic of Cameroon to the east. In terms of population, the area has a total of 156,033 inhabitants, with the Nzanyi as the major tribe. Other languages spoken include Fulani, Kilba, Higgi and Margi, among others.

The area of study has terrain that is marked by mountains and hills rising to 1,200–1,500 m above sea level in the eastern part, and a height of 400–800 m in the southern part. The nature of the terrain is such that streams and river valleys traverse the area, with two distinct wet and dry seasons. The wet season lasts from April until October every year and the dry season from November until March. Maiha LGA has minimum and maximum temperatures of 19.0°C and 32.3°C, respectively. On average, the level of humidity was estimated at 24.0%, while 11 km/h was the average estimate of wind speed in the LGA. Annual rainfall in the area is between 1,000 and 1,050 mm (Adebayo et al., 2020).

As the area has been mainly agrarian in nature, human activities in relation to farming, the gathering of

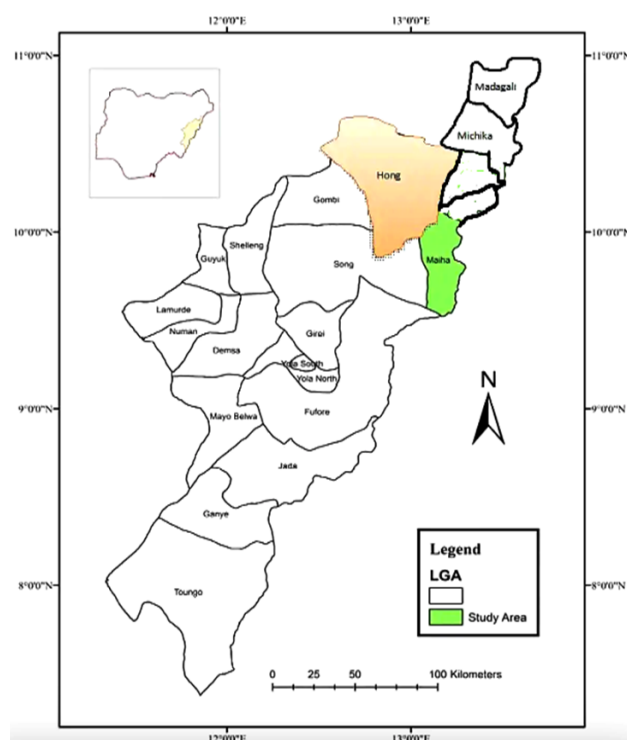


Fig. 1. Map of Adamawa State, Nigeria, showing the study area
Source: Adebayo et al., 2020.

wood for fuel, adjustment with connection to settlements, economic shuttles way for considerable vegetative changes in the LGA (Adebayo et al., 2020). Further, agricultural production has been identified as the main livelihood of the people of the area. In particular, favourable crops grown are rice, maize, sorghum, cow-pea, and cassava. The most dominant livestock raised in the area include cattle, sheep and goats, poultry, and fish. The cattle feedlot system has been the most practiced among farmers due to its economic potential. Virtually all cattle that enter Nigeria via the international border with the Republic of Cameroon pass through the LGA, thereby allowing the feedlot business to flourish. Therefore, middlemen, retailers and butchers in the cattle business are numerous in the area.

The Maiha LGA therefore presents an appropriate location for the consumption of beef and its by-products, which warrants its study as a typical rural community which can be taken to represent other parts of the country with similar characteristics.

Methods of data sampling and collection

The study area, Maiha LGA, is composed of 10 wards, namely Belel, Humbutudi, Konkol, Pakka, Mayo-Nguli, Manjekin, Maiha-Gari, Sorau-A, Sorau-B and Tambajam. Purposive and simple random sampling methods were employed in the selection of wards and respondents, respectively. Ward headquarters were purposively chosen for their high concentration of beef consumers and sellers. However, while the selection of beef sellers was carried out through a snowball method, the beef consumers were recruited through the identification of buyers at selling points over a period of two weeks.

Data collection for the study was carried out by a thoroughly briefed set of veterinary attendants in charge of the respective wards (10 veterinary attendants), who engaged both beef sellers and consumers in answering the questionnaire. Respondents who could not read or properly write were assisted by interview sessions, group discussion and, in some instances, interpreters. Data were sought on the demographics of the beef consumers and sellers. Similarly, the general expenditure on beef by consumers was obtained. Also, the marketing costs of the beef sellers were sought and documented. A total of 186 beef sellers were generated

as a sample frame, of whom 141 sellers formed the sample. Further, 1,488 beef consumers were obtained from the 10 wards, of whom 1,115 formed the sample for the study. The ward headquarters, beef sellers, beef consumers and sampling frames are shown in Table 1.

The methods of data analysis

The data were analysed using both descriptive and inferential statistics. Specifically, the demographic aspects of the respondents and challenges to fresh beef consumption were determined by the application of descriptive statistics, including frequency distributions, percentages and means. The influence of the socio-economic characteristics of the consumers on fresh beef consumption was determined by the use of regression analysis. The function is explicitly specified as follows:

$$Y = f(X_1; X_2; X_3; X_4; X_5; X_6; X_7; X_8; X_9; X_{10}; U) \quad (1)$$

Where:

- Y – fresh beef consumption in kg,
- X_1 – age of fresh beef consumer in yrs,
- X_2 – gender of fresh beef consumer: 1 for male, otherwise 0,
- X_3 – level of education of fresh beef consumer in years,
- X_4 – marital status of fresh beef consumer: 1 for married, otherwise 0,
- X_5 – household size for fresh beef consumer as a number,
- X_6 – income of fresh beef consumer in ₦,
- X_7 – taste of the fresh beef consumer: 1 for yes, otherwise 0,
- X_8 – monthly expenditure on fresh beef by consumer in ₦,
- X_9 – monthly expenditure on fresh beef substitute in ₦,
- X_{10} – frequency of fresh beef consumption as a number,
- U – error term.

The above equation was subjected to four functional forms, namely linear, exponential, semi-log and double-log. However, the double-log function was discovered to have the best fit in terms of the R^2 value, the number of significant variables in the model and the F -value. It was therefore selected as the lead equation, explicitly specified as follows:

Table 1. Sample frame and size of both fresh beef consumers and marketers

Wards	Beef*	Sellers (75% of n)**	Beef*	Consumers (75 of n)**
Belel	22	17	171	128
Humbutudi	21	16	201	150
Konkol	18	14	157	118
Mayo-Nguli	17	13	095	071
Manjekin	19	14	187	140
Maiha-Gari	25	19	256	192
Sorau-A	17	13	089	067
Sorau-B	16	12	191	143
Tambajam	15	11	069	052
Pakka	16	12	072	054
Total	186	141	1488	1115

*Sample frame.

**Sample size.

Source: generated from field data, 2023.

$$\text{Log } Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + \dots + b_{10} X_{10} - U \quad (2)$$

Where:

Y – as stated in equation 1,

X_1 – X_{10} – as described in equation 1,

a – the constant or intercept,

b_1 – b_{10} – the coefficients,

U – as defined in equation 1.

The efficiency of the marketing of fresh beef in the study area was realised by the use of a marketing efficiency tool. The components of this model include gross marketing receipts and marketing expenses. It is specified as follows:

$$\text{ME (\%)} = (\text{GMR}/\text{Me}) \times 100 \quad (3)$$

Where:

ME – marketing efficiency,

GMR – gross marketing receipts,

Me – marketing expenses.

RESULTS AND DISCUSSION

The first segment of this research deals with the demographic characteristics of both fresh beef consumers and marketers in the study area. The variables considered include age, gender, educational background, experience, household size, income, marital status and expenditure on the consumption of fresh beef. The summary statistics are given in Tables 6 and 7. In these tables, four variables – namely the age, level of education, household size and monthly income of the fresh beef consumers and marketers – were selected and reported because of their relevance to the livelihoods of rural community dwellers. Particularly, Bhandari (2013) in Nepal, whose study gave an insight into the significant role played by these factors in the transformation of rural community livelihoods, posited their immense economic relevance in the consideration of rural economic development. Similarly, the FAO (2015) advanced the prominence of these variables in influencing the patterns of rural community activities.

Socio-economic characteristics of fresh beef consumers in the study area

The findings in tables 2–5 depict the socio-economic characteristics of both fresh beef consumers and marketers. The results show that the majority (63.68%) of the

Table 2. Distribution of socio-economic characteristics of fresh beef consumers based on age, gender, marital status and household size

S/No.	Variables	Frequency	Percentage
1.	Age		
	20–30	27	2.42
	31–40	33	2.96
	41–50	710	63.68
	Above 50	345	30.94
	Total	1 115	100.00
2.	Gender		
	Male	780	69.96
	Female	335	30.04
	Total	1 115	100.00
3.	Marital status		
	Single	362	32.47
	Married	605	54.26
	Divorcee	89	7.98
	Widower	59	5.29
	Total	1 115	100.00
4.	Household size		
	< 5	535	47.98
	6–10	252	22.60
	11–15	84	7.53
	16–20	143	12.83
	Above 20	101	9.06

Source: computed from field survey data, 2023.

consumers fell within the age bracket of 31–40 years. The age bracket of 41–50 accounted for 30.94% of fresh beef consumers. This was followed by the age range of 20–30 years, which constituted 2.96% of fresh beef consumers. The smallest group was those above 50 years of age, which only made up 2.42% of consumers. This is in accordance with the findings of Anyiro et al. (2013) in Abia State, Nigeria, who opined that individuals aged 20–40 years form the majority of beef consumers. Again, Christopher et al. (2015) stated that as consumers grow older, their total consumption of beef begins to

decline. Male-headed households provided the majority (69.96%) of consumers. Females constituted 30.04% of the beef consumers in the study area. Male dominance is attributed to the fact that the majority were involved in buying foodstuffs/groceries, among other things. This contradicts the findings of Oluwatusin et al. (2019), who attested that the majority of the households in Ekiti State, Nigeria were headed by females. Married households accounted for the majority (54.26%), single fresh beef consumers for 32.46%, and divorcees and widowers for 7.98% and 5.29% of fresh beef consumers, respectively. This implies that since the majority of the fresh beef consumers in the area of Maiha (LGA) were married, there would be a greater demand for beef at the household level. Therefore, married consumers should be the focus of marketers. This supports the findings of Oluwatusin et al. (2019), which affirmed that households headed by married persons would demand more beef than those headed by unmarried persons. Those in households of fewer than 5 persons constituted the largest proportion (47.98%). Households with 6–10 individuals accounted for 22.60%. Households with 16–20 members contributed 12.83% of the total, while households with 11–15 persons represented 7.53% and households with more than 20 individuals made up 2.04%.

The educational level of the fresh beef consumers showed that individuals with a secondary education formed the majority (56.95%). Fresh beef consumers with a tertiary education made up 25.02% of the total, while those with a primary school or non-formal education constituted 11.56% and 6.45%, respectively. These results are shown in table 3. The study further revealed that the largest proportion (43.05%) of fresh beef consumers were middle-income earners, with a monthly income of between ₦21,000 and ₦50,000. A total of 30.13% were low-income fresh beef consumers, earning less than ₦20,000 monthly. Fresh beef consumers who earned above ₦50,000 made up 26.82% of the total. The demand for beef was sensitive to changes in the fresh beef consumers' income levels. This implies that rural dwellers with a greater disposable income exhibit greater demand for fresh beef. Household heads with better paid jobs generate a higher income, which allows them to afford more fresh beef for their family members. A total of 37.40% of fresh beef consumers were farmers. Civil servants accounted for 29.24% of fresh beef consumers. Businessmen and women constituted a proportion of 19.19%, whilst consumers involved in other

occupations/artisan constituted 14.17%. Nevertheless, consumers' monthly expenditure on fresh beef indicates that majority (65.46%) of fresh beef consumers spend less than ₦5,000 monthly on the product, while 23.90% spend between ₦5,000 and ₦10,000. About 4.39% of fresh beef consumers purchased beef with a value of between ₦11,000 and ₦15,000 monthly. Finally, 8.07% consumers spend more than ₦15,000 on fresh beef monthly.

Table 3. Distribution of socio-economic variables of fresh beef consumers based on income, occupation, monthly expenditure on fresh beef and education level

	Variable	Frequency	Percentage
1.	Education level		
	Non-formal	72	6.46
	Primary	129	11.57
	Secondary	635	56.95
	Tertiary	279	25.02
	Total	1 115	100.00
2.	Monthly income		
	N20,000	336	30.13
	N21,000–N50,000	480	43.05
	Above N50,000	299	26.82
	Total	1 115	100.00
3.	Occupation		
	Civil servant	326	29.24
	Farmer	214	19.19
	Business	417	37.40
	Artisan	158	14.17
	Total	1 115	100.00
4.	Monthly expend on beef		
	< N5,000	716	64.22
	N5,000–N10,000	260	23.32
	N11,000–N15,000	90	8.07
	Above N15,000	49	4.39
	Total	1 115	100.00

US\$1 = ₦1,200 (as at the time of data collection).
Source: computed from field survey data, 2023.

Socio-economic characteristics of fresh beef marketers in the study area

Tables 4–5 depict the socio-economic attributes of fresh beef marketers in the study area. The results reveal that the largest proportion (38.30%) of fresh beef marketers fell within the age range of 41–50 years. About 30.50% fell within the group aged 31–40 years. A total of 17.02% were aged 20–30 years, and 14.18% were aged above 50 years. However, in terms of gender, the findings show that all the fresh beef marketers in the

surveyed area (100%) were men. The majority (55.32%) of fresh beef marketers were married. Single individuals made up a proportion of 20.57%, divorcees accounted for 13.48%, and widowers represented 10.63%. Further, households of less than 5 persons accounted for 32.62%, and those from households with between 6 and 10 individuals represented 25.53%. This was followed by those from households with 16–20 persons, who accounted for 13.48% of the total, and those from households of 11–15 persons, who formed 16.31%. Finally, those from

Table 4. Distribution of socio-economic characteristics of fresh beef marketers based on age, gender, marital status and household size

S/No.	Variable	Frequency	Percentage
1.	Age		
	20–30	24	17.02
	31–40	43	30.50
	41–50	54	38.30
	Above 50	20	14.18
	Total	141	100.00
2.	Gender		
	Male	141	100
	Female	-	-
	Total	141	100.00
3.	Marital status		
	Single	29	20.57
	Married	78	55.32
	Divorcee	19	13.48
	Widower	15	10.63
	Total	141	100.00
4.	Household size		
	<5	46	32.62
	6–10	36	25.53
	11–15	23	16.31
	16–20	19	13.48
	Above 20	17	12.06
	Total	141	100.00

Source: computed from field survey data, 2023.

Table 5. Distribution of socio-economic characteristics of fresh beef marketers based on income, educational level, years of experience and membership of an association

S/No.	Variable	Frequency	Percentage
1.	Education level		
	Non-Formal	25	17.73
	Primary	38	26.95
	Secondary	55	39.01
	Tertiary	23	16.31
	Total	141	100.00
2.	Monthly income		
	₦20,000	32	22.70
	₦21,000–₦50,000	35	24.82
	Above ₦50,000	74	52.48
	Total	141	100.00
3.	Years of experience		
	< 5	20	14.20
	6–10	45	31.91
	11–15	58	41.13
	16–20	10	7.09
	Above 20	08	5.67
	Total	141	100.00
4.	Membership		
	Yes	110	78.01
	No	31	21.99
	Total	141	100.00

Source: computed from field survey data, 2023.

households with more than 20 individuals constituted 12.06%.

Data on the educational attainment of the fresh beef marketers (shown in table 5) indicate that 39.01% attended secondary school. This was followed by those with only a primary-level education, who constituted 26.95%. Fresh beef consumers with a non-formal education formed 17.73% of the total, while those with a tertiary education accounted for 16.31%. Fresh beef marketers earning above ₦50,000 monthly were the majority (52.48%). About 24.82% earned between ₦20,000 and ₦50,000 monthly. Those with a monthly income of less than ₦20,000 formed 22.70%. However, a larger proportion (41.31%) of beef marketers had 11–15 years of experience. About 31.91% had 6–10 years of experience, while 14.20% had been in beef marketing for less than 5 years. A negligible segment (5.67%) had more than 20 years' experience. Furthermore, the majority (78.01%) of the fresh beef marketers were registered members of an association, while 21.99% were not registered members of an association.

Summary statistics of the demographics of the fresh beef consumers in the study area

Table 6 shows that the minimum and maximum ages of fresh beef consumers were 29 and 75 respectively, with a mean age of 33, indicating that most of the individuals were middle-aged persons. They had a minimum of 6 years and maximum of 16 years of education, with a mean of 11.94 years. Respondents had a maximum household size of 25 persons and a minimum of 1 person. The mean household size was 7 individuals in the surveyed area. The mean monthly income of the respondents was ₦36,353.68, with minimum and maximum incomes of ₦20,000 and ₦100,000, respectively.

Table 6. Summary of demographic statistics of fresh beef consumers in Maiha LGA

Variable	Minimum	Maximum	Mean	Standard dev.
Age	29.00	75.00	33.32	9.25
Education level	6.00	16.00	11.94	4.06
Household size	1.00	25.00	7.00	5.00
Monthly income (₦)	20,000	100,000	36,353.68	21,570.86

US\$1 = ₦1,200 (as at the time of data collection).
Source: computed from field survey data, 2022.

Summary statistics of the demographics of fresh beef marketers in the study area

Table 7 reveals that the minimum age of fresh beef marketers was 27 and the maximum age was 69, with a mean age of 31. They had a minimum of 6 years of education, a maximum of 12 years and a mean of 9 years. The maximum household size was 30 persons and the minimum was 1 person, with a mean household size of 8 persons. The minimum monthly income was ₦20,000, in contrast to a maximum of ₦300,000. The mean monthly income was ₦37,353.70.

Table 7. Summary of demographic statistics of fresh beef marketers in Maiha LGA

Variable	Minimum	Maximum	Mean	Standard dev.
Age	27.00	69.00	31.60	7,701.00
Education level	6.00	12.00	9.50	3,296.00
Household size	1.00	30.00	8.00	1,771.00
Monthly income (₦)	20,000	456,000	37,353.70	9,114,300.00

Source: computed from field survey data, 2022.

Socio-economic determinants of fresh beef consumption among consumers in the study area

The influence of the socio-economic attributes of consumers on fresh beef consumption is presented in table 8. Four functional forms of regression were fitted to the data collected – namely, linear, exponential, semi-log and double-log. The double-log was chosen as the lead equation. Ten (10) variables were regressed on beef consumption – namely, age, gender, educational level, marital status, household size, monthly income, taste, monthly expenditure on beef, monthly expenditure on beef substitute and frequency of consumption. Of these variables, educational level, household size, monthly income, taste, monthly expenditure on beef, monthly expenditure on beef substitute and frequency of consumption were positively related to beef consumption, while age, gender and marital status were negatively related to beef consumption. However, age is an important determinant of beef consumption. As a consumer ages, their total consumption begins to decline. The study revealed a negative coefficient, as age was negatively

Table 8. Socio-economic attributes of consumers influencing fresh beef consumption (double-log output)

Parameter	Coefficient	Standard error	t-value	Level of sig.
Constant	–2.1820	1.2010	–1.81	0.071*
Age (X_1)	–0.0487	0.0209	–2.28	0.024*
Gender (X_2)	–0.1407	0.3482	–0.40	0.686 ^{ns}
Edu level (X_3)	0.0718	0.0489	1.46	0.143 ^{ns}
M/status (X_4)	–0.1393	0.3547	–0.39	0.695 ^{ns}
H/H size (X_5)	0.1096	0.0351	3.11	0.002**
Income (X_6)	0.0016	0.0008	2.09	0.037*
Occupation (X_7)	0.6363	0.3997	1.59	0.113 ^{ns}
Taste (X_8)	0.0027	0.0018	15.06	0.000***
M/E/B (X_9)	0.0011	0.0021	5.41	0.000***
M/E/S (X_{10})	0.5070	0.1222	4.14	0.000***
F/C/B (X_{11})	–2.1820	1.2010	–1.81	0.071*
R ²	0.865 (86.5%)			
R ² adjusted	0.858 (85.8%)			
F-ratio	134.744***			

Significant at: * $p < 0.01$, ** $p < 0.05$, *** $p < 0.001$; ns – not significant.

Source: extracted from statistical packet for social science (SPSS, 2023).

related to beef consumption, but the relationship was significant at $p < 0.01$. This implies that increase in age of 1% would lead to a 4% decrease in fresh beef consumption. It shows that older consumers only consume small quantities of beef in the area under consideration. This supports the finding of Moreno et al. (2012) that beef consumption declines with age. Whether male or female, the head of a household is responsible for feeding the family members. In this study, there was a negative relationship between gender and beef consumption, but it was not significant. In spite of this, a 1% increase in the number of households headed by females would lead to a 14% decrease in fresh beef consumption. This suggests that males consume more fresh beef than females. It is at odds with the findings of Oluwatusin et al. (2019) in Ekiti State, Nigeria, who reported that females consume more beef than their male counterparts. Educational attainment affects living conditions directly

or indirectly. Developed economies are saturated with high educational attainment, which is one facet of their prosperity. In this study, a positive relationship between educational attainment and beef consumption was documented but was not significant. An increase in educational attainment of 1% would result in a 7% increase in the consumption of fresh beef. This implies that educated household heads consumed more beef at the household level. This is in agreement with the studies of Yakubu et al. (2013) in Sokoto State, Nigeria, which attest that education guides households to find proper dietary sources of protein that support healthy development. Marital status was negatively related to fresh beef consumption, and the relationship was not significant. A 1% increase in the number of unmarried households would lead to a 13% decrease in the consumption of fresh beef. This contradicts the findings of Oluwatusin et al. (2019), who affirmed a positive effect of marital status in an area of southern Nigeria. Larger populations demand and consume more groceries than smaller ones, particularly at the household level. In line with this, household size had a positive relationship with beef consumption, which was significant at $p < 0.05$. This suggested that households with family members consume more beef. Specifically, a 1% increase in household size would result in a 10% increase in beef consumption. This implies that households with many members will demand and consume more beef. Moreover, monthly income was significant at $p < 0.01$ and also positively related to the consumption of fresh beef. An increase in monthly income level of 1% would result in a 0.2% increase in fresh beef consumption. This supports the findings of Oluwatusin et al. (2019) in southern Nigeria. Similarly, it is in line with the results of Uzunoz and Karakas (2014) in Turkey. Taste had a positive relationship with fresh beef consumption, which was significant at $p < 0.001$. This suggests that the consumers in the area surveyed had a relative preference for the taste of fresh beef. The coefficient of taste was recorded as the highest of all the variables. Overall, an increase in the taste parameter of 1%, holding other factors constant, would lead to a 63% boost in fresh beef consumption. Monthly expenditure on beef and beef substitute were positively related to beef consumption. Both variables were significant at $p < 0.001$. A 1% increase in monthly expenditure on fresh beef or beef substitute, holding other factors constant, would lead to a 0.27% or 0.11% increase in the consumption of fresh beef, respectively. Similarly, the

frequency of consumption was positively related to beef consumption, and the relationship was significant at $p < 0.001$. Therefore, a 1% increase in the frequency of consumption would result in a 50% rise in total fresh beef consumption. This implies that people who consume beef more frequently consume greater quantities of beef.

Marketing efficiency of fresh beef in Maiha LGA

Aspects of the marketing efficiency of fresh beef were determined and are presented in table 9. The Total Gross Receipts (TGR) of fresh beef marketing were recorded at ₦68,074,000. The items contributing to Gross Receipts (GR) included fresh beef, skin, ingester and horn/bone. Of these items, fresh beef formed the larger part (89.02%) of TGR. This was followed by ingester, which accounted for 7.57%. About 2.97% was skin and 0.44% horn/bone. Nonetheless, Total Cost or Total Marketing Expenses (TME) were ₦40,915,100. Components of TME included the cost of slaughtering, flaying, beef purchased, loading/off-loading, transportation, packaging, storage, and miscellaneous. Further, the estimated Total Variable Cost (TVC) was recorded at ₦43,391,370.75. The revenue accrued from the enterprise was ₦24,682,629.25. The marketing efficiency was therefore 1.56 (156%). This implies that the market was highly efficient. It is worth mentioning that for every ₦1 spent, a net return of ₦1.56 Kobo was realised on the investment. This is similar to the findings of Nse-Nelson et al. (2017) in Akwa North Local Government Area (LGA), Anambra State, Nigeria, on the economic analysis of beef marketing. Their findings showed that the enterprise in the area incurred a total variable cost of ₦11,099.93 and accrued a total revenue of ₦1,601.93 per kilo of beef. They reported a marketing efficiency of 1.45 (145%).

Major challenges associated with the marketing of fresh beef in the study area

The challenges to fresh beef consumption are described as well as presented in table 10. The income of the household head is the foremost challenge faced by fresh beef consumers in the surveyed area, affecting 70.76% of respondents. The price of beef, which is ranked 2nd, was a challenge for a proportion of 49.87%. This suggests that beef demand is sensitive to price fluctuation. It agrees with the findings of Uzunoz and Karakas (2014) in Turkey, who affirmed that low-income

Table 9. Marketing efficiency of fresh beef in Maiha LGA, Adamawa State, Nigeria

Item	Unit	Unit cost (₦)	Quantity	Total cost (₦)	Percentage (%)
Gross receipt (GR)					
Fresh beef	kg	2,000	30,300	60,600,000	89.02
Skin	kg	800	2,525	2,020,000	2.97
Ingester	kg	1,700	3,030	5,151,000	7.57
Horn/bone	kg	30	10,100	303,000	0.44
Total gross receipts (TGR)				68,074,000	100.00
Marketing expenses					
Cost of slaughtering	per cow	1,000		101,000	0.24
Cost of flaying	per cow	1,500		151,500	0.37
Cost of beef purchased	kg	1,300	30,805	40,046,500	97.87
Cost of loading/offloading	per cow	500		50,500	0.12
Transportation cost	per cow	600		60,600	0.14
Cost of packaging	kg	10		303,000	0.74
Cost of storage		200		20,200	0.04
Cost of tax		800		80,800	0.19
Miscellaneous		1,000		101,000	0.20
Total marketing expenses (TME)				40,915,100	100.00
Depreciation on fixed cost					
Wheel barrow				1,049,340.23	42.38
Knife				191,480.43	7.73
Table				1,235,450.09	49.89
Total depreciation on fixed cost				2,476,270.75	100.00
Total marketing cost (TVC)				43,391,370.75	
Gross margin (GM) = TR – TVC				24,682,629.25	
Marketing efficiency (ME) = GR/Me × 100				1.56 (156%)	

Note: US\$1 = ₦1200 (as at the time of data collection).
Source: Computed from field survey data, 2023.

Table 10. Challenges to fresh beef consumption on the basis of ranking ($n = 1,115$)

Challenge	Frequency	Percentage	Ranking
Income of HH	789	70.76	1 th
Price of beef	556	49.87	2 nd
Market availability	467	41.88	3 rd
Health problem	302	27.09	4 th
Taste	223	20.00	5 th
Household size	201	18.03	6 th
Age	190	17.04	7 th

Multiple responses were observed. HH – household head.
Source: computed from field survey data, 2023.

households consumed more beef when beef prices were lower. This implies that when the price of beef is high, the total consumption of low-income groups will be affected. Marketing availability and health problems were ranked 3rd and 4th, affecting proportions of 41.88% and 27.09%, respectively. Taste was a factor for 20.00% of respondents. Age of household members was a significant factor for 17.04%. This implies that as a consumer grows older, his/her consumption eventually declines.

CONCLUSION

In conclusion, middle-aged males form the majority of fresh beef consumers in the rural area of the study, and most of them are married individuals. The bulk of the consumers were fairly well educated. While the significant determinants of beef consumption were income of household head, size of household, monthly expenditure on beef, age, and frequency of beef consumption, the fresh beef marketers made their sales mainly by disposing of beef and ingester. Overall, fresh beef marketing in the rural communities of Maiha LGA was discovered to be highly profitable. The major challenges associated with the marketing of fresh beef in the surveyed rural communities were the income of the household head and the price of fresh beef.

Taking cognisance of the major challenges revealed by the findings of this study, all institutions, both private and governmental, intending to promote the consumption of fresh beef in their rural communities should work toward subsidising the price of the commodity. This task could easily be achieved by encouraging fresh beef marketers

to form associations for ease of access to soft loans with long repayment periods. Similarly, marketers could be encouraged by the provision of extension services by government agents on issues pertaining to the fattening of cattle generally and the establishment of marketing points at strategic locations for wider publicity and access.

ACKNOWLEDGEMENTS

The authors would like to sincerely extend their profound thanks to all those who worked tirelessly in the collection of data for the study. The numerous fresh beef consumers also deserve commendation for their patience in providing the data collectors with answers to the questionnaire.

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