# DEMAND ANALYSIS OF BUSHMEAT IN EDO-SOUTH AGRO-ECOLOGICAL ZONE, EDO STATE, NIGERIA

**BY**

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**BENIN CITY.**

**JANUARY, 2023**

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL ECONOMICS, AND EXTENSION SERVICES, FACULTY OF AGRICULTURE, UNIVERSITY OF BENIN, BENIN CITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF AGRICULTURE OPTION: AGRICULTURAL ECONOMICS AND EXTENSION SERVICES**

**JANUARY, 2023**

## CERTIFICATION

This is to certify that this project research work on the demand analysis of bushmeat in Edo-south agro-ecological zone, Edo state, Nigeria was carried out by **EWERE MIRACLE AIMUAMWOSA** with matriculation number **AGR1600042** in the Department of Agricultural Economics and Extension Services, Faculty of Agriculture, University of Benin, Benin City, Edo State, Nigeria.

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| **DATE** | **DATE** |

## DEDICATION

This project is dedicated to God Almighty, my parents, siblings and my friends.

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## ABSTRACT

Millions of tropical forest inhabitants rely on wild meat (or bushmeat) as an essential source of protein and income, which in turn result to unsustainable harvest of these animals, thus putting both human food security and ecosystem functioning at risk. This study was carried out to analyse the demand for bushmeat in Edo-south agro-ecological zone, Edo state, Nigeria; with specific objectives to ascertain the socio- economic characteristics of bushmeat consumers in the study area, the level and frequency of their demand for bushmeat, identify factors influencing household demand for bushmeat, determine the effect of these factors on household demand for bushmeat, estimate the price and income elasticity of demand, estimate the household expenditure for bushmeat in the study area, as well as identifying the closest substitute for bushmeat in the study area.

A two-stage sampling procedure was used to obtain 88 respondents (bushmeat consumers) for the study. Data was collected through the use of well-structured questionnaire and interview schedule, and analysed using descriptive statistics such as frequency counts, percentages, mean and standard deviation, and inferential statistics such multiple regession.

The result revealed that 86.36% of the respondents were male, 62.50% were married with mean age of 36 years. Larger percentage (59.09%) had tertiary education and had small family size of 1-5 members (90.91%). Also, Majority of the respondents (75%) do business with mean monthly income of ₦262267, and mean monthly household income of ₦349733. Most of the respondent consumes bushmeat week in, week out (55.68%), preferred it smoked (93.18%) and consume it majorly because of its unique taste (79.55%). The the major factors influencing household demand for bushmeat were taste (94.3%) which was significant at 5% with a positive coefficient (312.56), price of bush meat (79.6%),

income of consumer (77.3%) which was significant at 1% with a positive coefficient (4049.60) and availability of bush meat (76.1%), was significant at 10% with a positive coefficient (1398.60). The positive coefficient of the factors indicated that increase in those factors will lead to increase in the demand for bushmeat. 65% of the variation in the demand for bush meat was explained by the factors in the regression model ($R^2$ = 0.65, F-value = 4.64). The result also showed bushmeat was inelastic to its price (-0.44), but tending to elastic for income elasticity (0.58), which was significant at 1%. The mean result showed that the respondents spends ₦71795.45 on food items monthly, accounting 20.5% of the household mean monthly income (₦349733), and having mean household budget share of bushmeat as 0.27. Chicken was the closest substitute to bushmeat with a cumulative preference frequency of 44.45% (very high-23.86%, high-20.45%), in the study area, followed by frozen fish (44.32%).

There is urgent need for wild species domestication in the study area to meet the increasing market demand for bushmeat, as well as development and enforcement of policy interventions geared towards sustainable harvest of wild animals.

# CHAPTER ONE

## 1.0 INTRODUCTION

## 1.1 BACKGROUND INFORMATION

Bushmeat is an African term referring to the meat of wild animals. Thousands of wild animal species obtained from the forest in the tropical ecosystems are sources of livelihood to human societies. The meat serves as an essential source of protein and cash-earning commodity for millions of tropical forest inhabitants

(Coad, Fa, Abernethy, VanVliet, Santamaria, Wilkie, ElBizri, Ingram, Cawthorn and Nasi, 2019).

Bushmeat as a protein source (which is an important aspect of balanced diet in human nutrition) is said to provide an equivalent and in some cases greater quality food than domestic meat of high protein and low fat (Hoffman, 2008). The recommended daily protein intake for an adult is 0.75g of protein per kilogramme of body weight per day (World Health Organization -WHO, 2002) which equates to approximately 46g per day for adult women and 56g per day for adult men; and 35g of this minimum requirement should be obtained from animal products (Omotosho, 2004).

Bushmeat is also rich in energy, and provides various important micronutrients (vitamins and minerals), that have greater bioavailability than vegetable sources and are vital for health and developmental functions (Neumann, Bwibo, Murphy, Sigman, Whaley, Allen, Guthrie, Weiss, and Demment, 2003; Sirén and Machoa, 2008).

Being a crucial source of protein and livelihood for rural people, as well as consumed by urban inhabitants (Fa, Peres and Meeuwig, 2002; Fa, Seymour, Dupain, Amin, Albrechtsen, and Macdonald, 2006; Brashares, Golden, Weinbaum, Barrett, and Okello, 2011), the overall volume of bushmeat can be large, thus having consequences for the targeted wildlife populations (van Vliet, Nasi and Taber, 2011). This problem is compounded with the reality of our

world's ever-increasing population, even Nigeria, currently having 2.55% increase rate of her population (United Nation, 2019). This coupled with increasing urbanisation, which is likely to be accompanied by increasing wealth, thus the impact on demand for animal protein is expected to be dramatic (Seto, Güneralp and Hutyra, 2012). According to data from the FAO, while the developed world is projected to experience growth in demand for animal protein of approximately 15% between 2016 and 2050, demand in Africa may grow by as much as 170% (Alexandratos, 2012; FAOSTAT, 2017). Hence, the bush meat trade is perceived as a major threat to wild animal population in the tropics (Oduntan, Soaga, Shotuyo, Akintunde and Olarewaju, 2016).

Demand is defined as the quantity of commodity a consumer is willing and able to purchase at a given time, and at a given market price (Boyes, 2011). Demand for a commodity could be influenced by several factors such as price, taste or preference, it's substitute, etc. The price of a given good and its close substitute influences the demand for the good. Derived from economic knowledge, for most goods, demand for the goods falls as its price (own-price) rises and /or the prices of substitutes fall. A good is described as 'inelastic' when the change in demand is small relative to the change in price. Example include primary necessity good, like water and salt, which will still be purchased, even if it gets more expensive. Also goods that are sought-after, and can hardly/not be substituted have inelastic demand, such as a Rolls Royce car.

The wealth or income of a consumer will also influence demand for a good, and goods can be defined by the way they respond to changes in wealth/income, with the demand for inferior goods decreasing as wealth increases, and the demand for normal and luxury goods increasing.

Economic theory also suggests that providing consumers with access to acceptable and affordable substitutes may help reduce the demand for a commodity, in this case, reduce unsustainable hunting and enhance wildlife conservation.

The factors/drivers for the demand and consumption of bushmeat differs from one region to another, and they are yet to be fully ascertained, especially for African countries, where it's demand is high (Wilkie, Malcolm, Abernethy, Nstame, Telfer and Godoy, 2005). For some regions, bushmeat is a deeply rooted cultural preference, noted for its important role in ceremonies and as a way for urban families to connect with the village life they left behind (Trefon and de Maret 1999; Rose, 2002; Wilkie, *et al.* 2005), for others, it's the taste, while other regions have different reasons why they demand and consume bushmeat.

## 1.2 Problem Statement

The population increase in our world places greater demands on natural resources, especially food (Luiselli, Hema, Segniagbeto, Ouattara, Eniang, Parfait, Akani, Djidama, Barineme, Daniele and Fa, 2020), of which wild animals serves as one-

a major source of protein, and cash-earning commodity for millions of tropical forest inhabitants (Coad *et al.,* 2019). The volume of the bushmeat trade in West and Central Africa was estimated to be between one and five million tonnes per year at the turn of the 21st century (Davies, 2002), and tends to increase as the years goes by. This in turn, poses bushmeat trade as a major threat to biodiversity, particularly in the tropics (Oduntan, *et. al.* 2016; Milner-Gulland, *et al.,* 2003). For many large-bodied and slow-growing species, commercial hunting of bushmeat already exceeds the replacement rate (Barnes 2002; Bennett *et al*. 2002; Fa *et al*. 2003). They've been case studies of locations where once vibrant wildlife communities are harvested to a state of defaunation (Robinson and Bennett, 2000*).*

Thus, there lies a general agreement among researchers that unsustainable harvest of wild animals can have catastrophic consequences for ecosystems and the services and livelihoods that they provide (Robinson, *et al.,* 1999, Robinson and Bennett, 2000, Milner-Gulland, Bennett and the SCB 2002 Annual Meeting Wild Meat Group*.,* 2003). However, despite this, we have only a vague understanding of the economic, social, geographic, or other factors that determine the scale of human reliance on wildlife (Brashares, *et al.,* 2011). The magnitude of exploitation and consumption also varies from one place to the other, thus a need for thorough understand of the drivers/factors of its demand, quantifying the

demand and its elasticities is of priority in the development of effective conservation policy and measures (Guy, Samantha and Rowcliffe, 2004).

Quantifying demand elasticities is important information for policy makers (McNamara, John and YaaNtiamoa-Baidu, 2019). In addition to assessing how sensitive demand for a commodity is to its own price and that of alternatives, the shape of the demand curve also defines how producers' revenues change with price (McNamara *et al.*, 2019). Where demand is elastic (that is, relatively small change in price can lead to large changes in demand), revenues are maximised at high trade volumes even where this suppresses market prices. Where demand is inelastic (that is, relatively large increases in price lead to comparably small changes in demand), demand is much less sensitive to price. Under this scenario revenues are maximized at high prices even though trade volumes will be lower (Dilts, 2004). This has vital implications for the management of the bush meat trade. A policy that successfully reduces consumption by raising prices by, for example, restricting the flow of bushmeat into urban markets through enforcement measures, might be effective where demand is elastic(McNamara *et al.*, 2019). In this case, higher prices would lead to a relatively large fall in consumption and revenue. If, however, the same policy was applied where demand was inelastic, the opposite might be true. High prices would reduce consumption only marginally, while revenues could potentially increase despite the fall in consumption. This could exacerbate the challenges of reducing long-

term reliance on hunting, by encouraging an increase in black market trading behaviour as hunters sought to benefit from higher prices while avoiding trade restrictions. Ultimately such market behaviour would likely increase supplies, supressing prices, restoring demand and undermine the effectiveness of the original policy.

Thus a thorough understanding and analysing the elasticities in the context of both demand and revenue over a study area is vital when considering which policy interventions are likely to be most appropriate over such regions.

In light of the above, this study focus on demand analysis for Bushmeat in Edo-south Agro-ecological zone, Edo state, Nigeria, and is designed to provide answers to the following research questions:

1. What are the socio-economic characteristics of bushmeat consumers in the study area?
2. Is bushmeat demand in Edo South Agro- ecological zone elastic or inelastic?
3. What are the primary substitute goods for bushmeat in the study area?
4. What is the household's budget share for bushmeat compared to other food commodites?
5. How does growing consumer's wealth impact demand for bushmeat?

6. Aside price and consumers wealth, what other factor affects the demand for bushmeat in the study area?

## 1.3 Objectives of the study

The main objective of the study is to analyse the demand for bushmeat in Edo south Agro-ecological zone, Edo state, Nigeria. To achieve this objective, the specific objectives will be to:

1. describe the socio- economic characteristics of bushmeat consumers in Edo-south Agro-ecological zone, Edo state;
2. determine the level and frequency of demand for bushmeat in the study area;
3. identify factors influencing household demand for bushmeat and to determine the effect of these factors on household demand for bushmeat;
4. estimate price and income elasticity of demand, as well as the household expenditure for bushmeat in the study area; and
5. identify the closest substitute for bushmeat in the study area.

## 1.4 Justification of the study

Over the years, numerous studies has been done on bushmeat, ranging from its role in food security and source of rural livelihoods (Fa, Currie and Meeuwig, 2003, de Merode, Homewood and Cowlishaw, 2004; Crookes, Humphreys, Masroh, Tarchie and Milner-Gulland, 2007), Economic contribution of wildlife to

bushmeat markets (Oduntan *et. al.* 2016), bio-economic analysis of bushmeat hunting (Damania, Milner-Gulland and Crookes, 2005*),* bushmeat marketing, even in Nigeria (Kalu and Aiyeloja, 2002), the role of bushmeat hunting in West Africa's agricultural landscape (Alexander, McNamara, Rowcliffe, Oppong and Milner-Gulland, 2015), bushmeat harvesting, conservation and policy development (Bennett, Blencowe, Brandon, Brown, Burn, Cowlishaw, Davies, Dublin, Fa, Milner-Gulland, Robinson, Rowcliffe, Underwood and Wilkie, 2007), as well as the drivers for bushmeat demand and consumption (McNamara *et al.,* 2019; Luiselli *et al.,* 2020; Unah, 2021).

Most previous work on bushmeat and its trade had focused more on the biological and environmental effect on the tropical forest regions considering its trade as a threat to biodiversity (Cowlishaw, Mendelson and Rowcliffe, 2005), rather than the underlying drivers on demand causing the ever-decreasing/over-exploitation of wildlife populations**.** Yes, there have been studies on Demand Analysis for other commodities such as chicken (UKEssays. 2018**),** chevron**,** mutton, beef, and pork **(**Adetunji and Rauf, 2012) etc., but a few on bushmeat**.** Those done were conducted in areas such as Eastern Madagascar **(**Richard, Aidan, Andrinajoro, Rakotomboavonjy, Felicien, Randrianandrianina, Julie, Ralaiarimalala and Jones, 2011**),** Ghana (McNamara *et al*., 2019), Pointe Noire, Republic of Congo (Chausson, Rowcliffe, Escouflaire,Wieland, Wright, 2019), Central Africa – Gabon (Wilkie *et al*, 2005) and Nigeria (Unah, 2021).

The study on the demand analysis of bustmeat in Nigeria by Unah (2021) was conducted only for four major cities in Nigeria (Lagos, Abuja, Port Harcourt, and Calabar). Whereas, this research will be for Edo state, specifically Edo-south Agro-Ecological zone, of which there is yet to be a published work from this end. Edo state is one of the states under the forest tropical zones in Nigeria, of which exploitation of its forest reserve could be a problem. Thus, a need for analysing the demand for bushmeat in the study area of Edo state. Nigeria.

The result of this study will provide necessary information for stakeholders in the agricultural and wildlife sector, policy makers in policy formulation and other stakeholders in the state, while expanding the existing literature on the subject of bushmeat and its demand, providing a good reference for future studies on the topic.

# CHAPTER TWO

## 2.0. LITERATURE REVIEW

## 2.1 CONCEPTUAL FRAMEWORK

### 2.1.1 Bushmeat

The first published paper highlighting the term “bushmeat” originated within a journal in 1843 when the author Captain W. Allen accounted for his visit along the rivers of Cameroon in Western Africa (Simon Dawson, 2018). Allen (1843, p5) wrote, “The natives, who set fire to the grass in the dry season for the purpose of catching wild animals, which they call ‘bushmeat’.” Since then, the term bushmeat accounts for all “wild animals hunted for food, especially in Africa; the meat from these animals” (Oxford English Dictionary 2015). Wild ungulates and

other animals are generally acknowledged as valuable sources of meat and other commodities in many tropical societies, and are widely consumed in many West African countries, as they contribute between an estimated 20% and 100% of the animal protein consumed (Jayeoba, okonkwo, Omonona, Oladele, Suleman, Ojo and Olumuyiwa, 2013). Most wildlife animals consumed by the populace are locally termed "Bushmeat" and are consumed by both rural and urban dwellers with variation in magnitude of its exploitation and consumption (Bifarin, Ajibola and Fadiyimu, 2008). In Nigeria, while native inhabitants kill, eat or sell wild animals, the rich and affluent customers patronize the grasscutters, porcupine, snails and antelopes where they are hosted along roadsides or in expensive hotels and restaurants as a demonstration of preference for bushmeat. However, due to unprecedented population growth in Central and Western Africa, consumption and sale has risen to an unsustainable level that will result in the extinction of many species unless significant changes occur (Chaber, Allebone-Webb, Lignereux, Cunningham, Rowcliffe 2010). The black rhinoceros (Diceros bicornis), western gorilla (Gorilla gorilla), and African wild ass (Equus africanus) are examples of mammals that are now critically endangered due to illegal and indiscriminate poaching (Red List 2015a; Red List 2015b; Red List 2015c). A report published by UNICEF (2014) highlights that over the next 35 years, Africa will double in population with over 1.8 billion new baby births, indicating this problem is only going to get worse, particularly with improving life expectancy.

There are many concerns regarding bushmeat consumption including eradication of species (John *et al.* 2002), poor hygiene (Federal Department of Home Affairs, 2014), inhumane slaughtering (Humane Society International 2015), and spread of tropical diseases (FDHA 2014 and Subramanian 2012). Bushmeat is predominantly obtained from areas of extreme poverty including Africa, parts of South America, and Asia. Data provided by the World Bank (2015) shows that in 2013, of the top 20 poorest countries in the world, 18 of these are in Africa. Within these countries, moral principles governing the activities of a person and their behavior are lost in the need for survival. As a comparison, 12 of the richest countries in the world are in Europe (World Bank 2015).

### 2.1.2 Bushmeat Hunting Methods

Snares are the most common method used by bushmeat hunters. Snares typically comprise a noose, usually attached to trees along trails. Animals are caught when they put their head (or a leg) into the snare and pull it tight. Snares can be made from natural fibre, nylon or wire. Increasingly wire for snares is widely available from telephone and electricity lines, fencing, bicycle brakes and burnt tyres (Lindsey *et al.,* 2011a; Becker *et al.,* 2013). Snares are difficult to detect by the animals and can cause rapid declines in wildlife populations (Lindsey *et al.,* 2011a). They can catch species ranging from rodents to elephants (Loxodonta africana) depending on the snare size and material. Snares are unselective and frequently kill non-target animals (Lindsey *et al.,* 2011a; *Becker et al.,* 2013).

Because of the low value of snares, hunters often check them infrequently, causing wastage (Noss, 1998). For example, in Zimbabwe's Savé Valley Conservancy, at least 1410 animals rotted in snares during 2001–2009 (Lindsey *et al*, 2011a). Dogs are often used by hunters to bay wildlife (Grey-Ross *et al.,* 2010). In some areas firearms are used, though automatic weapons are rarely used (Brown, 2007). In Mozambique, bushmeat hunters commonly use gin traps manufactured from vehicle leaf-springs to kill animals as large as buffalo Syncerus caffer and elephant (Lindsey and Bento, 2012). Fire is used by hunters to flush wildlife, clear undergrowth and increase visibility, stimulate green-growth which concentrates wildlife, and cover tracks (Lindsey *et al*., 2012).

### 2.1.3 Classification of Bushmeat

In meeting this important nutritional need of households in Africa, several species of bushmeat are preferred among different people in Africa for different reasons. For example, Hema *et al*. (2019) revealed that in Burkina Faso, both urban and rural people preferred antelopes (Antilocapra Americana), guinea fowl (Numididae sp.), hares (Lepus sp.), crocodiles (Crocodylinae sp.), grasscutters (*Thryonomys swinderianus*), monkeys (Cercopithecidae sp.) and fruit bats (Pteropodidae sp.) in descending order. However, some families in rural communities do not eat certain animals, e.g., crocodiles (Crocodylinae sp.), pythons (Pythonidae sp.) and other snakes (Serpentes sp.), as to do so is considered a taboo in animistic cults (Hema *et al.,* 2019).

In the Delta State of Nigeria, the predominant bush meat consumed were cane rat (Thryonomys sp.) and the African giant snails (*Achatina fulica*) (Ebewore *et al.,* 2015). Grasscutters (*Thryonomys swinderianus*), rat royal antelope (Neotragus pygmaeus), Maxwell duiker (*Philantomba monticola*) and brush-tailed porcupine (Atherurus sp.) are reported to be consumed mostly in Ghana; with a kilo as high as 108% more expensive than a kilo of beef and 67% more expensive than chevon of the similar weight (Alexander *et al.,* 2015; Cowlishaw *et al.,* 2005; McNamara *et al.,* 2019; Swensson, 2005). In general, rural and urban household consumers of bushmeat prefer variant types of mammals, antelopes (*Antilocapra americana*) and large rodents (Luiselli *et al.,* 2019).

### 2.1.4 Food (Bushmeat) Safety

According to Igene, Ebabhamiegbebho, and Evivie, (2013), Field observations showed that there is a large variation in the level of knowledge among the respective stakeholders in food safety and hygiene management systems. There is therefore a high proportion of ignorance of these aspects among game meat processors and hunters. In Edo State, bush meat is principally derived through hunting of game species by professional hunters and goes through an informal and uncontrolled process (such as improper disposal of visceral at the point of dressing the carcass, packaging of meat in dirty bags and placing the game meat on dirty floors to be priced by prospective buyers) without any form of inspection

by veterinary officials in contrast with domesticated meat trade. This results in the sales of unsafe meat which may be a source of public health challenge. In other developing countries of the world, game meat goes through more standard and hygienic processes in which women have been reported to play active roles (Vieiva-Pinto *et al.,* 2012). Traditionally, the meat obtained from hunted animals is usually processed in the bush meat markets or processing spots except for larger ones such as the bush hog which is partially eviscerated in the bush. The method of hunting adopted depends on the exigency and appropriateness of the situation. The instruments used for hunting comprise of locally made guns to traps made of wire and wooden boxes. This practice appears to be same with those observed in Oban hill communities of Cross Rivers State, Nigeria (Obioha *et al.,* 2012).

The meat are usually processed smoked which help reduce microbial load, increase shelf life and impact desired sensory qualities (distinctive flavor/aroma).

### 2.2.1 Concept of Demand

While demand refers to willingness to buy, Effective demand refers to the desire to buy, the willingness to pay, and the ability to pay for goods and services (Boyes, 2011). There is a direct relationship between the price and demand of the goods and services, which means the prices of goods impacts its demand. Customer always wants goods and services for a reasonable and low price from

the producer. If the prices of goods and services are low, customers shows interest to purchase more goods and services, otherwise the customer purchases less goods and services if the prices are high.

Therefore, analysis of demand or law of demand proves that demand of the goods and services and price of the goods and services are inversely related to each other. Demand depends on prices of goods, price of substitutes/complements, consumer income, price expectation, as well as consumer tastes and preferences (Boyes, 2011).

This can be stated mathematically as:

Qd = f(P, Ps, Y, T, Pe)----------(2.1)

where:

Qd = quantity of goods demanded,

f = functional form of the model,

P = price of the good,

Ps = price of substitutes/complements,

Y = income of consumers,

T = tastes or preferences, and

Pe = price expectations

Demand could also be affected by several other variables such as government policies, advertising, quality, peer influence, age, weather, credit availability and mode of purchase (Umoinyang, 2014).

According to the law of demand, as the price of a good or service increases, quantity demanded will be decreased; conversely, as the price of a good or service decrease, quantity demanded will increase (Nicholson, Walter, Synder and Christopher, 2012). The success of any business largely depends on sales, and sales depend on market demand behaviour. Market demand analysis is one of the crucial requirements for the existence of any business enterprise. Analysis of market demand for the product is necessary for the management in order to take

decisions regarding production, cost allocation, product pricing, advertising, inventory holdings, etc. How much the firm must endeavour to produce depends mainly upon the demand for its product. If demand falls short of production, the two must be balanced by creating a new demand through more and better advertisements. If there is no demand for the product, its production is unwarranted. If the future demand for the product is likely to be more, the more the inventories that the firm should hold. If the demand for the product is large, a higher price can be charged, with other things remaining the same. Market demand analysis helps the manager to make decisions regarding: (a) sales forecasting with a sound basis and greater accuracy: (b) guidelines for demand manipulation through advertising and sales promotion programmes; (c) production planning and product improvement: (d) pricing policy; (e) determination of sales quotas and performance appraisal of personnel in the sales department; and (f) size of market for a given product and corresponding market share. Managerial economics influences decision-making, which is usually aimed at achieving better assessment of required capital, market needs, technological inputs, pricing strategies and marketing of products (Harris, 2010).

### 2.2.2 Factors Affecting Demand

1. Price: The higher the price of any commodity, the lower the quantity that will be demanded and vice versa.
2. The price of other commodities: This applies to commodities that have close substitutes. If the price of such a commodity is high, the consumer may demand for the close substitute.
3. Income of the consumer: The higher the income of a consumer, the higher the quantity of commodities that he/she will demand and vice versa.
4. Changes in taste of consumer: If consumes change their taste for a particular commodity, the demand for that commodity will also change.
5. Population: increase in population in an area will lead to high demand for commodities and vice versa.
6. Periods of taxation: It is well known that people demand for more of specific commodities during certain festivals.
7. Advertisement: A good advertisement for a commodity can lead to an increase in demand for it and vice versa.

### 2.2.3 Theory of Supply

Supply is also an important factor in the marketing process. The urge to sell goods and services is often described as supply. It refers to the quantities of goods and services that producers are willing to sell at given prices. Supply could be

physical or economical. Physical supply refers to the availability of goods and services, while economic supply refers to the value (market price) of physical supply. In other words, goods can be physically available, but economically unavailable. It is economically unavailable when the prices of the physical supply are beyond the effective demand of the consumers. Supply like demand is affected by lots of factors. These factors are price of the goods and services, cost of production, productive capacity and available technology. The supply function can then be expressed as follows:

$Qs = f(P, C, Pc, W, Tc)$ ----------(2.2)

Where:

Qs = quantity supplied,

f = functional form,

P = price of the good or service,

C = cost of production, and

Tc = available technology.

In a perfectly competitive market, for instance, the interactions of demand and supply functions help in the determination of prices of goods and services. When the price of a commodity rises, it will be an incentive for producers to produce more of the products, to take advantage of the high prices (Umoinyang, 2014). But on the other side, the high price will be a disincentive for consumers, and as such the quantities demanded of the goods will fall. This fall in demand will force

producers to adjust (reduce) the quantities of goods they produce, until the quantity demanded will be equal the quantity supplied. As a corollary, a fall in prices of goods and services will act as an incentive to consumers to buy more, while producers will produce less (Umoinyang, 2014). This will result in excess of demand over supply and thereby force prices up. Producers will in response raise their production, and the process continues until equilibrium is attained in the market where quantity demanded is equal to quantity supplied.

### 2.2.4 Consumer Behaviour Theory

Consumer decision making is concerned with the decisions of individual consumers (in some cases assumed to be representative of the wider population). The outcome of consumer decisions is the quantity of goods and services consumed at given prices and income levels. In a conceptual sense, consumers act to maximize utility (their satisfaction level) subject to a budget constraint. One complexity of consumer theory is that it implies that every individual's actual preferences for unlimited goods can be known. In fact that is an impossible task so theorists assumed only that consumers are able to rank their preferences (ordinal utility) or recognize that a particular bundle of goods and services is preferred to another bundle with different combinations of goods and services. Assuming that consumers are rational and that they can rank goods and services in order of preferences then the consumer choice problem can be expressed as:

Maximize U = U ($q_1$, $q_2$.,…. $q_n$)----------

(2.3)

Subject to: Y = $p_1$ $q_1$ + $p_2$ $q_2$ +$p_3$ $q_3$ +... $p_n q_n$ , ----------

(2.4)

where U represents consumer utility, q1, q1…qn represent quantities of goods and services consumed, p1,p2 … pn represent prices of goods and services. In agricultural economics, this theory is used to explain consumer purchases of unprocessed and processed foods (bushmeat), locally and imported, fibers, renewable energy and other agricultural outputs.

### 2.2.5 Price Elasticity of Demand

Price elasticity of demand is a measurement of the change in the consumption of a product in relation to a change in its price.

Expressed mathematically, it is:

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in Quantity demanded}}{\text{Percentage change in price}}$$

$$Ep = \frac{\Delta q/q}{\Delta p/p}$$

$$= \Delta q/\Delta p \times q/p$$

Where:

Ep = price elasticity of demand, Δ= change, p= price, q= quantity.

According to Alfred Marshall: "Elasticity of demand may be defined as the percentage change in quantity demanded to the percentage change in price." According to Cairncross: "The elasticity of demand for a commodity is the rate at which quantity bought changes as the price changes." Economists use price elasticity to understand how supply and demand for a product change when its price changes Price elasticity of demand is a measurement of the change in consumption of a product in relation to a change in its price. If price elasticity is greater than 1, the good is elastic; if less than 1, it is inelastic. If a good's price elasticity is 0 (no amount of price change produces a change in demand), it is perfectly inelastic. If price elasticity is exactly 1 (price change leads to an equal percentage change in demand), it is known as unitary elasticity. The availability of a substitute for a product affects its elasticity. If there are no good substitutes and the product is necessary, demand won't change when the price goes up, making it inelastic. The law of demand says that consumers will respond to decrease or increase in prices of goods and services. (other things remaining constant), but law of demand explains only the concept of change in prices of goods and services effects its demand, but does not explain to what extent demand changes if prices of goods increase or decrease. The degree of responsiveness or sensitivity of consumers to a change in price is measured by the concept of price elasticity of demand If a small change in price is accompanied by a large change in quantity demanded, the product is said to be elastic (or responsive to price

changes). The opposite also applies; a product is inelastic if a large change in price is accompanied by a small amount of change in demand.

### 2.2.6 Elasticity Concept

As developed by Alfred Marshall, the concept of elasticity was applied to elasticity of price. But later on, the concept was made broader. Elasticity of demand is a concept of showing the responsiveness of demand. As we well-known earlier, changes in demand can be caused by several factors which determine demand for a good or commodity. Obviously, demand is responsive to each of these factors i.e. But all the factors are not equally important from the point of view of either theoretical analysis or practical means. For example, take tastes or preference of the consumers, is an exogenous factor and there is no point in measuring the responsiveness of demand to this factor, though in practice this factor is important. Efforts, therefore are made to measure the responsiveness of demand to changes in certain important factors like price, income, prices of related products, sales promotion etc.

### 2.2.7 Types of Price Elasticity of Demand

1. Perfectly elastic demand.
2. Perfectly inelastic demand.
3. Relatively elastic demand.
4. Relatively inelastic demand.

5. Unitary inelastic demand.

1. **Perfectly elastic demand**: means when the percentage of change in quantity demanded is infinite even if the percentage of change in price is zero, the demand is said to be perfectly elastic. Increasing of demand at given price.

2. **Perfectly inelastic demand**: is the situation where there no change in quantity demanded even there is change in price of the goods, the the demand is said to be perfectly inelastic. Simply mean no change in demand for change in price. An example of perfectly inelastic demand would be a lifesaving drug that people will pay any price to obtain. Even if the price of the drug would increase dramatically, the quantity demanded would remain unchanged.

3. **Relatively elastic demand:** When the percentage change in quantity demanded is greater than the percentage change in price, the demand is said to be elastic Or In other words, relatively small changes in price cause relatively large changes in quantity.

4. **Relatively inelastic demand:** More change in the price of the goods but less change in demand for the goods. For instance - if we observe the prices of petrol and comparing its demand change with the change in its price levels (even though the price changes to great extent, there will not be much change in demand for the petrol in the present environment conditions).

5. **Unitary elastic demand:** In case of unitary elastic demand, the proportion of change in demand for goods and services is equal to proportion of change in its price. Which means the change in the ratio of the price of the goods and services is equal to the change in demand of the goods and services.

### 2.2.8 Income Elasticity of Demand

Income elasticity of demand refers to the sensitivity of the quantity demanded for a certain good to a change in the real income of consumers who buy this good. (Adam Hayes, 2022).

The formula for calculating income elasticity of demand is:

$$\text{Income Elasticity of demand} = \frac{\text{Percentage change in Quantity demanded}}{\text{Percentage change in income of consumer}}$$

$$EI = \frac{\Delta q/q}{\Delta y/y}$$

$$= \Delta q/\Delta y \times q/y$$

Where:

EI = Income elasticity of demand, Δ= change, y= income, q= quantity.

The coefficient EI may be positive, negative or zero.

EI is positive (EI +ve) if an increase in income leads to an increase demand for a commodity (that is, Normal good). If EI > 1, it is a luxury good or a superior good. If EI < 1, it is a necessity good.

EI is negative (EI -ve) if an increase in income leads to a fall in the demand for a commodity (that is, Inferior good).

EI is zero (EI = 0) if the quantity of a commodity purchased remains unchanged regardless of the change in income.

## 2.3 Livelihood Importance of Bushmeat

Humans have hunted wild animals for consumption and to protect their crops for millennia (Davies *et al.,* 2007), and it remains an important source of food and income security among rural communities today (Brashares *et al.,* 2011).

Bushmeat is an important source of animal protein in many West and Central African countries, with up to 90 % of total animal protein consumption coming from wild animals (Fa *et al.*, 2003). Overall, the contribution of bushmeat to protein and food security is generally lower in urban than rural areas and is highest among remote rural communities (Brashares *et al.,* 2011). For example, the relative importance of bushmeat in the diet of rural Gabonese households ranged from 13 % of total household consumption value in a village near a town to 25 % in a remote community (Starkey 2004). Similarly, for rural Equatorial

Guinea, Allebone-Webb (2008) showed that bushmeat consumption contributed 43 % to total protein consumption in a village with poor transport links, but only 18 % in a village with good connections. In remote Cameroonian communities with very few opportunities for purchasing alternative protein sources, bushmeat comprised 80–98 % of animal protein consumption.

In rural communities with relatively good market access and low levels of bushmeat consumption, the importance of bushmeat for food has been shown to increase seasonally during the agricultural lean season (e.g. the planting season between harvests) when farming households receive little income (Schulte-Herbrüggen *et al.* 2013b) and during the dry season when fish is not available (Poulsen *et al*. 2009).

Bushmeat is also an important source of nutrients, especially among children. Evidence from rural Madagascar shows that removing bushmeat consumption would result in a 29 % increase in the number of children suffering from anemia and triple the cases of anemia among children in the poorest households (Golden *et al.* 2011).

Most hunters sell at least part of their harvest making it an important source of income, especially where alternative income-generating activities are lacking. The importance of bushmeat in household economies varies across sites and individual hunting households, ranging from 38 % to more than 90 % of the total cash

income earned (reviewed in Schulte-Herbrüggen 2011). In rural Gabon, hunting accounts for up to 72 % of household incomes, with the proportion rising in poorer, more remote communities (Starkey 2004). Hunters are also more likely to sell large animals and keep small animals for their own consumption, because the latter fetch a lower price per animal and may be less marketable (van Vliet and Nasi 2008).

Finally, households facing income shortages during the agricultural lean season and requiring cash income to pay for urgent expenditures, such as hospital bills, are more likely to sell bushmeat than keep it for own consumption (de Merode *et al.* 2004). Overall, income from bushmeat sales can be lucrative and compare favorably with alternative work in many rural places. Vega *et al*. (2013) found that commercial hunters in two villages on Bioko Island Equatorial Guinea generated a mean of US$2000 per year from bushmeat sales.

## 2.4 Demand of Bushmeat

Bushmeat is by far the most expensive meat in many countries. Often the demand for bushmeat and the consequent prices are increasing much more than domestic meat. In many part of Africa the high demand for and the cost of bushmeat compared to other form of protein has created a situation where the hunter finds it more profitable to sell his catch rather than eat it. The income derived from hunting is often spent on cheaper protein with savings used to meet other

expenses. Key drivers of illegal hunting and bushmeat trade include increase demand of bushmeat in rural and urban areas due to population increase, encroachment into wildlife areas, lack of enforcement, lack of alternative livelihood, lack of alternative food source, lack of clear rights over wildlife or land, and/or inadequate benefits from wildlife, Political instability, corruption and poor governance and demand for wildlife body parts for traditional medicine and ceremonies (Lindsey *et.al.,* 2012).

Demand for meat is ever increasing with increase in the population and awareness about its nutritional value (Raghavendra, 2007). Economic theory suggests that change in the price of bushmeat can affect bushmeat consumption in two different ways: (i) increased bushmeat price reduce bushmeat demand and vice versa (the law of demand), and (ii) increased bushmeat price increase bushmeat demand and vice versa (Giffen goods hypothesis) (Varian, 2010). The latter is more hypothetical but could occur because bushmeat remains cheaper (relative to other meat types) even if its price increases and people consume more bushmeat at the expense of more expensive substitutes to compensate for lost income due to the increased price of bushmeat (i.e., the income effect outweighs the substitution effect). The relationship between bushmeat demand and its price is measured by own-price elasticity indicating the responsiveness of bushmeat demand to change in its price. In addition, change in the price of substitute protein sources can affect bushmeat demand in two ways: (i) increased substitute price increase bushmeat

demand and vice versa (substitute good hypothesis) and (ii) increased substitute price reduce bushmeat demand and vice versa (complementary goods hypothesis) (Varian, 2010).The latter would occur if the substitute meat types were consumed together with bushmeat, e.g., for cultural or culinary reasons which is not the case here. The relationship between bushmeat demand and the price of its substitutes (or complements) are measured through the cross-price elasticity of bushmeat demand indicating the responsiveness of bushmeat demand to changes in prices of other (meat) products.

The growing demand for bushmeat can be attributed to the high demand from the urban centres and more generally the increasing population who consume it in restaurants and homes, often far from the forest. These products are increasingly being drawn from forested areas into towns and cities as a result of its preference, inexpensive (Nasi *et al.,* 2008), higher protein content and the fact that bush-meat contain less fat than domestic meat with potentials to supply iron, Vitamins A and B.

## 2.5 Empirical Review on Demand for Bushmeat

McNamara, Julia, Yaa (2019) researched on understanding drivers of urban bushmeat demand in Ghanian market. The own-price and cross-price elasticity of demand of grasscutter meat relatively to commonly consumed alternative meats (goat, beef, poultry and fish) in the Atwemonom market in Kumasi city, Ghana

were determined. The result showed that: Own price elasticity of demand was mildly elastic, (-1.38) suggesting that a 1% increase in bushmeat price will lead to a 1.38% drop in consumption. Income elasticity of demand was strongly elastic (18.2). This implies that for every percentage growth in Gross National Income per capita bushmeat consumption increased by 18%. This relationship firmly places bushmeat in the category of a luxury good, defined in the economics literature. The result also showed that beef has elastic cross-price elasticity. The elastic nature of the market suggests that price control policies e.g. “wild meat” tax, could reduce demand. Given that beef is the best substitute in the study area, suggestion was that investment in Ghana’s underdeveloped cattle industry may reduce wildlife demand while also supporting herding economies.

Solomon, Martin, Jette,(2019) researched on Price elasticity of bushmeat demand in the Greater Serengeti ecosystem. They conducted stated preference surveys, complemented by a socio-economic survey using the Poverty Environment Network protocol in 452 households in 21 villages in the Greater Serengeti Ecosystem in Tanzania. Using random intercept Poisson regression models, the result showed significant and elastic negative own-price elasticities of bushmeat demand and significant positive cross-price elasticities except for goat and fish. The significant (all at the 0.01 level) own-price elasticities ranges from -1.099 when bushmeat is paired with beef to -0.718 when bushmeat is paired with fish while the significant cross-price elasticities ranges from 0.128 when bushmeat is

paired with beef to 0.590 when bushmeat is paired with lamb suggesting that most cross-price relations were highly inelastic. Variation between districts was considerable and depended on substitutes included in the model. Estimated elasticities were modified by socio-economic covariates including ethnicity, household size, household income, household Tropical Livestock Units ownership, household land ownership and distance to nearest protected area boundary, Lake Victoria and nearest road.

David *et al.* (2005) researched on the Role of prices and wealth in consumer demand for bushmeat in Gabon, Central Africa. Data was drawn from a survey of 1208 rural and urban households in Gabon, Africa, in 2002–2003 to estimate the effect of wealth and prices on the consumption of wildlife and other sources of animal protein. Result showed that Consumption of bushmeat, fish, chicken, and livestock increased with increasing household wealth, and as the price of these commodities rose, consumption declined. Although the prices of substitutes for bushmeat did not significantly, in statistical terms, influence bushmeat consumption, as the price of wildlife increased and its consumption fell, the consumption of fish rose, indicating that fish and bushmeat were dietary substitutes. The results suggest that policy makers can use economic levers such as taxation or supply reduction through better law enforcement to change demand for wildlife.

David *et al*. (2001) conducted standardized surveys of household consumption, income, wealth, and education level among Amerindian societies in Central and South America. Results suggest 1) demand for bushmeat may follow an inverted ∪ pattern with income, 2) consumers, particularly the most well-off, reduce their consumption of bushmeat as the price increases; and 3) a small decrease in the price of meat from domesticated animals is likely to lead to a large decrease in the consumption of fish but not of bushmeat. Recommendations included: Policy makers may be able to reduce demand for bushmeat by raising the price of bushmeat, by increasing the direct and opportunity costs of hunting, and by raising household income.

Linh, Etogekwe, Camille, Tatyana (2021) use semi-structured interviews to investigate consumer preferences and bushmeat consumption habits and perceptions of 597 participants in Bertoua and Ebolowa, Cameroon. Bushmeat, in general, was positively perceived as a tasty, healthy, and luxurious item that meets cultural needs, while domestic meat was negatively perceived as an unhealthy and intensively processed product. The biggest barriers to bushmeat consumption were its illegality and high price. Pangolin was among the most desired types of bushmeat. Nearly half of pangolin consumers were willing to pay more for a pangolin meal. Despite being fully protected by national laws, pangolins were consistently found in local bushmeat markets and restaurants,

suggesting the ineffectiveness in law enforcement and/or communication with the public about the legal protection and current status of pangolins. The findings provide an understanding of sociocultural consumer behavior and drivers that can help guide bushmeat demand reduction interventions in urban centers of Cameroon.

## 2.6 Significant Demand Research in Bushmeat in Nigeria

A study on economic analysis of bushmeat trade in Abeokuta, Ogun state (Soaga, Shotuyo, Oduntan and Fatoki, 2014) reported that 51% of the respondents recorded 'profit' as the highest benefit of bushmeat. Therefore majority of the respondents were involved in the trade for profit making with considerable interest on livelihoods. This indicates that bushmeat is a cash earning commodity in the study area. It was reported that 'Protein consumption' recorded the next benefit and this is line with the findings of Jayeoba *et al.,* (2013) that noted bushmeat in the local diets of rural populace for centuries. It was also reported that the cost and return showed the profitability of the bushmeat trade. The analysis indicated that a net profit of N455, 004.00 was made annually per respondent. This therefore indicates that the trade is profitable with profitability rate of 31% which suggests that for every naira invested in the trade, a return of 31kobo will be ensured. This may however be a pointer to the fact that the bushmeat niche is gradually becoming an established market specifically for

bushmeat trade. This is in line with the findings of Lameed and Alade (2013) that noted the existence of well-developed bushmeat market in West Africa in both rural and urban areas.

Unah, (2021) researched on understanding urban consumption of bushmeat in Nigeria. 2,000 respondents were sampled from September to October 2020 across four major cities in Nigeria -Lagos, Abuja, Port Harcourt, and Calabar, using a questionnaire that was sent to mobile phones via their telecommunications carrier. Results found that over 70% of urban Nigerians have consumed bushmeat at some point in their lives, and 45% consumed it 2020. Taste and flavor were significant factors influencing urban bushmeat consumption, with about 51% of bushmeat consumers indicating that it is one of the primary reasons for their choice. Grasscutter (cane rat or Thryonomys swinderianus) and antelopes (such as bushbuck, red-flanked duiker, bay duiker, Maxwell's duiker, black duiker, Ogilby's duiker, yellow-backed duiker, and dwarf antelope) were reported as the most commonly eaten species and were also the most desirable animals, even without taking price into account. More than half of consumers surveyed believe that there is less bushmeat available now as compared to five years ago. The Endangered Species (Control of International Trade and Traffic) (Amendment) Act, 2016 and several other federal and state laws that impose penalties on hunting and trading of species like pangolins, rock pythons, elephants, and some antelope species, were found to be poor deterrents on consumer behavior, as 54%

of consumers believe that all bushmeat is legal to buy, and 88% believe that some or all bushmeat should be legal to buy. Around 98% of urban bushmeat consumers indicated that there are suitable alternatives to bushmeat, with one-third of consumers citing fish as the most appropriate substitute, followed by chicken. Despite the COVID-19 pandemic and the links between the bushmeat trade and the spread of zoonotic diseases, 75% of the respondents intend to eat bushmeat in the future. Generally, those sampled believe that lack of hygiene (51%) is the primary cause of COVID-19 and other zoonotic diseases such as Lassa Fever, HIV, and Ebola, followed by contact with wild animals (44%) and lab experiments/research (43%). Urban consumers demonstrate a sense of worry about the impact of their choices on wildlife populations. Thirty-eight percent of consumers indicated concern about animals going extinct in the wild as one of the top reasons why they would consider avoiding bushmeat consumption. By extension, almost 80% feel that it is the responsibility of the federal or state governments to protect Nigeria's wildlife, while 69% of urban bushmeat consumers sampled believe iconic species like lions and elephants should be protected, and 59% believe that these animals are an important part of Nigerian heritage.

Alarapa, Ijose, Ayodele (2017) examined bushmeat consumption pattern in Owo, Ondo State. Nigeia. Forty-three (43) bushmeat consumers were selected from four restaurants in Owo. Data were collected through a semi-structured questionnaire

while analysis was through descriptive statistics and chi-square. Results revealed that 88.4% of the respondents were male, 62.8% were married while majority (69.9%) were within 20-50 years of age. In addition, larger percentage (41.9%) had tertiary education. Also, 27.9% of them were civil servants, 69.8% had an average household size of 2-5 individuals. The result indicated the relatively moderate household size may reduce the cost spent on consuming bushmeat compared to larger household size. The study further showed that 34.9% and 32.6% of the respondents consumed bushmeat on weekly and daily basis respectively. Grasscutter (58.1%) was the preferred bushmeat while 46.5% consumed it because of its unique taste. The perceptions of the respondents clearly indicated that they were not willing to stop the consumption of bushmeat, despite the obvious disappearance of bushmeat in the wild. This goes a long way to inform conservation stakeholders that the respondents were less concerned conservation. There was significant relationship between educational status ($p<0.0$) of consumers and their patterns of consumption. The implication of this was that bushmeat was more consumed by respondents with high literacy level which could be to their knowledge on the value and importance of bushmeat to human's health against that of conventional meats and serves as contributory factor to why respondents consumed bushmeat.

The perceptions of the respondents clearly indicated that they were not willing to stop the consumption of bushmeat, despite the obvious disappearance of

bushmeat in the wild. This goes a long way to inform conservation stakeholders that the respondents were less concerned conservation.

A study on determinants of bushmeat traders' income in Itu, Akwa Ibom state, Nigeria (Daniel, Eteakamba, Ubong and Imaoong, 2018) reported that Grasscutter was the most demanded (40.85%) bushmeat species, and then followed by antelope (19.01%) and porcupine (14.71%) respectively. Deer, duiker and giant rat all had a demand that were less than 10% respectively. The high demand for grasscutter in the study area is in contrast with (Udo, E. S., 1999) reports that wild meat demands tends on a large extent to be focused on large game species such as antelopes and deer. It also reported that the high demand and supply of grasscutter over other bushmeat species in the area indicates the high preference for the bushmeat due to its availability as a result of its high reproductive rate, with a very short gestation period and a litter size of 2-6 (Happold, D. C. D., 1987), restriction to secondary forests grassland/cassava farms, their sociality and restricted home range increase their susceptibility to being hunted since they are more conspicuous and have a limited ranging area which makes their movements more predictable (Kuchikura, Y., 1988) than porcupine (Friant, S.; Paige, S.B.; Goldberg, T.L., 2015). It also reported that the most common problem or challenge of majority (21.12%) of the respondents the study area was the seasonal nature of wildlife product and supply respectively; and suggested that the inadequate supply and seasonality of wildlife to meet the demand of the trade

could be as a consequent of unsustainable exploitation of wildlife resources, wildlife habitat destruction through deforestation (Jacob, D. E.; Nelson, I. U. A., 2015) and the far distance to needed by the hunter to hunt.

# CHAPTER THREE

## 3.0 RESEARCH METHODOLOGY

## 3.1 AREA AND SCOPE OF THE STUDY

The study was carried out in Edo-south Agro-ecological zones of Edo state, Nigeria. Edo state is one of the 36 states of Nigeria, located in the southern region of the country, having its capital as Benin City. The state covers a land mass of about 17,802 $km^2$ (6,873 sq mi) with a population of 3,233,366 people (National Population Commission, NPC Census, 2006). It lies within latitude $05^0$ 44'N and $07^0$ 34'N, and Longitude $05^0$ 04'E and $06^0$ 43'E.

Edo state has eighteen (18) local governments shared among three (3) Agro-ecological zones, namely: Edo south, Edo North and Edo central. Seven (7) Local Government Areas makes up Edo- South Agro-ecological zone, namely: Oredo, Orhionmwon, Ikpoba-Okha, Egor, Ovia North East, Ovia South West, Uhunmwode local government areas (L.G.A). Oredo is the headquarters of Edo south.

Edo south is covered by mangrove and fresh water swamps, with rainfall ranging between 800-1,600mm annually. Its humid tropical ecosystem encourages the natural establishment of forest reserves and wildlife.

## 3.2 SAMPLING PROCEDURE AND DATA COLLECTION

A Two stage sampling procedure was adopted for this study. The first stage involved a purposive sampling of two Local government areas (Uhunmwode and Ikpoba-okha Local Government Areas), due to the prevalence of bushmeat consumption and presence of natural vegetative area/forest which is habitat for wildlife.

The second stage involved a simple random selection 50 correspondents each from the selected Local Government Areas.

Primary data for the study were collected through the use of well-structured questionnaire and interview schedule conducted among bushmeat consumers in the study area. The questionnaire contains both closed and open-ended questions.

## 3.3 MEASUREMENT OF VARIABLES

All measurements were taken in their local forms. Scale and ranges used are described below;

**Age:** age was measured in years.

**Sex:** sex of the respondents was measured as either male (1) or female (0)

**Marital Status**: was measured on single, married, separated, divorced and widowed basis.

**Educational status**: was measured as; no formal education, primary, secondary and tertiary education.

**Household size:** A household was regarded as all persons feeding from the same cooking pot. This was categorized into: Small (1-5); Medium (6-10); Large (above 10)

**The price:** The price of bushmeat and its other substitute were measured in Naira (₦)

**Income:** income was on monthly basis and measured in Naira (₦).

**Level of preference:** was measured using a 5-point Likert scale with very high preference =5, high preference = 4, moderately preference =3, little preference = 2, no preference =1.

### 3.4.1 ANALYTICAL TECHNIQUE

**Objective 1:** Simple descriptive statistics such as frequency count, mean, percentages and standard deviation were employed to describe the socio-economic characteristics of bushmeat consumers in Edo-south Agro-ecological zone, Edo state.

**Objective 2:** Simple descriptive statistics such as frequency count, mean, percentages and standard deviation were employed to determine the level and frequency of demand for bushmeat in the study area.

**Objective** 3: Descriptive statistics such as frequency count, mean, percentages and standard deviation; and inferential statistics such multiple regression were employed in identifying the factors influencing household demand for bushmeat, as well as determining the effect of these factors on household demand for bushmeat**.**

**Multiple regression**

Multiple regression is used to estimate the relationships among variables (dependent and independent variables), in order to determine the factors on demand for bushmeat. The model is implicitly presented as:

$$Qd = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, \mu)$$

Where:

Qd = Quantity demanded of bushmeat monthly (dependent variable)

$X_1$= price of bushmeat

$X_2$= household size

$X_3$= consumer's income

$X_4$= income of other employed household members

$X_5$ = price of beef

$X_6$= price of chicken

$X_7$ = price of pork

$X_8$ = price of mutton

$X_9$ = price of fish

$X_{10}$ =price of chevon

$X_{11}$ = price of turkey

$X_{12}$ = price of pork

$\mu =$ Error term.

The explicit Functional Form is given as:

$$Qd = b_o + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + b_{10}x_{10} + b_{11}x_{11} + b_{12}x_{12} + \mu$$

Where:

Qd = Quantity demand of bushmeat

$b_o$ = Constant

$X_1 \ldots . X_{12}$= independent variables as defined above

$b_1 \ldots\ldots b_{12}$= slope coefficient of $X_1 \ldots . X_{12}$

$\mu =$ Error term

**Objective 4:** price and income elasticity of demand, as well as the household expenditure for bushmeat in the study area were determined using demand elasticity function, Simple descriptive statistics such as frequency count, mean, percentages e.t.c. and budget share.

**Price elasticity**

Price elasticity of demand is a measurement of the change in the consumption of a product (bushmeat in this case) in relation to a change in its price. It is measured as the ratio of the percentage change in quantity demanded to the percentage change in price of the commodity. Price elasticity will be estimated as follow:

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in Quantity demanded}}{\text{Percentage change in price}}$$

$$Ep = \frac{\Delta q/q}{\Delta p/p}$$

$$= \Delta q/\Delta p \times q/p$$

Where:

Ep = price elasticity of demand, Δ= change, p= price, q= quantity.

Decision rule:

If Ep > 1, demand is elastic

If Ep < 1, demand is inelastic

If Ep = 1, demand is unitary.

**Income Elasticity of demand**

Income elasticity of demand is the responsiveness of the quantity demanded for a good (bushmeat in this case) to a change in consumer income. It is measured as the ratio of the percentage change in quantity demanded to the percentage change in income.

For Income Elasticity of demand = $\frac{\text{Percentage change in Quantity demanded}}{\text{Percentage change in income of consumer}}$

$E_I = \frac{\Delta q/q}{\Delta y/y}$

$= \Delta q/\Delta y \times q/y$

Where:

$E_I$ = Income elasticity of demand, $\Delta$= change, y= income, q= quantity.

**Decision rule:**

The coefficient $E_I$ may be positive, negative or zero.

$E_I$ is positive ($E_I$ +ve) if an increase in income leads to an increase demand for a commodity (that is, Normal good). If $E_I > 1$, it is a luxury good or a superior good. If $E_I < 1$, it is a necessity good.

$E_I$ is negative ($E_I$ -ve) if an increase in income leads to a fall in the demand for a commodity (that is, Inferior good).

$E_I$ is zero ($E_I = 0$) if the quantity of a commodity purchased remains unchanged regardless of the change in income.

However, the coefficient of multiple regression was used in determine the price and income elasticity of bushmeat in the study area:

$$\text{Log } q_1 = \beta_0 + \beta_1 InP_1 + \beta_2 In_2 + \beta_3 InP_3 + \beta_4 InP_4 + \beta_5 InP_5 + \beta_6 InP_6 + \beta_7 InP_7 + \beta_8 InP_8 + \beta_9 InP_9 + \beta_{10} InP_{10} + \beta_{11} InP_{11} + \beta_{11} InP_{12} + \mu$$

Where:

Log $q_1$ = Log of quantity demand of bushmeat

$\beta_0$ = Constant

$InP_1 \ldots InP_{12}$= log price of independent variables as defined above

$\beta_1$ ……. $\beta_{12}$ = slope coefficient of $InP_1 \ldots InP_{12}$ , which also represented the elasticities.

$\mu =$ Error term

**For the household expenditure for bushmeat,**

This was estimated by the budget share of bushmeat in respect to other expenditures by household. Computed as:

$$S_i = \frac{p_i q_i}{y_i}$$

where

$S_i$ = budget share,

$p_i$ = unit price of $i^{th}$ commodity

$q_i$ = quantity consumed of $i^{th}$ commodity

$y_i$ = total expenditure on all commodities by the $i^{th}$ household

Then descriptive statistics was used to describe the budget share.

**Objective 5:** descriptive statistics such as frequency count, mean, percentages were used to identify the closest substitute for bushmeat in the study area.

# CHAPTER FOUR

## 4.0 RESUILTS AND DISCUSSION

One hundred (100) questionnaires were administered to bushmeat consumers in the study area. However, only eighty-eight (88) copies were valid for data analysis for the study.

## 4.1 Socio-economic Characteristics of Bush meat Consumers in the Study Area

The socio- economic characteristics of the respondents are presented in table 4.1

### 4.1.1 Sex

The result presented in table 4.1a among others, shows the sex distribution of the respondents (bushmeat consumers) in the study area. The result shows that 13.64% were females, while 86.36% were males. This implies that males consume bushmeat more than females in the study area. This claim was in line with a study carried out in Vietnam where Drury (2011) affirmed that bushmeat is primarily consumed by successful, high income earners (men) who wish to communicate their high status in society, and this demand is only projected to increase in line with economic growth. It also agrees with Chukwudi, Leonard, Bameyi and Nnamdi (2018) which reveals that majority of the bushmeat consumers in Edo South, Edo State where males (66%) while 34% were females.

### 4.1.2 Age

As shown in table 4.1a, 61.36% of respondents in the study area were between the age bracket of 31-40 years, followed by 18.18% who were between the age bracket of 41-50 years, 15.91% who were between the age bracket of 20-30years, and 4.55% who were between the age brackets of 51-60 years. The mean age of the distribution was 36years (table 4.1b).

This result somewhat disagrees with the result of Bifarin, Ajibola and Fadiyimu (2008) on their study in Abeokuta, Ogun State, with 52% of the respondents being in the age bracket of 21 - 30 years

The above result implies that the middle-age people between the age bracket of 31-40years (Active-age) demands bushmeat more than other age brackets in the study area.

### 4.1.3 Marital status

Table 4:1a shows that 31.82% of the respondents were single, 62.50% were married, 4.55% separated and 1.44% widowed. This implies that bushmeat is consumed more by the married in the study area.

The result agrees with the result of Bifarin, Ajibola and Fadiyimu (2008), stating that majority (96%) of the respondents were married.

### 4.1.4 Education level

The result in table 4.1a also indicated that out of the bushmeat consumers reached within the study area, 59.09% of the respondents had tertiary education, 38.64% of the respondents had secondary education, 1.14% of the respondents had primary education, while 1.14% of the respondents had no formal education. High educational level as observed in this study implies that respondents were well informed about the nutritional benefits of bushmeat not found in conventional meats. This result somewhat agrees with the findings of Alarape, Ijose and Ayodele (2017) which indicated 41.9% and 44.2% of the respondent who had tertiary and secondary education respectively. Quite different from the findings of Bifarin, Ajibola and Fadiyimu (2008), which indicated that most (47%) of the respondents had primary education a situation indicating low literacy level coupled with zero percent tertiary education.

### 4.1.5 Household size

The result presented in table 4.1a shows that 90.91% of respondent in the study area had a household size of 1-5 persons per household (small size), while 9.09% had 6-10 persons per household (large size), with a mean of 3 persons per household (table 4.1b). this result indicate that majority of the bushmeat consumers have small family size, which could be crucial to the availability of income to purchase bushmeat. This result somewhat agrees with the findings of

Alarape, Ijose and Ayodele (2017) where 69.8% of the correspondents were of household size of 2-5 members.

### 4.1.6 Major occupation

The result in table 4.1a shows that 3.41% of the respondents of the study area are farmers, 75% of the respondents are into business, 18.18% of the respondents are professionals in their various vocations, while 3.41% of the respondents are civil servants. The majority been business men/women indicate they have relatively reliable source of income which may encourage high patronage of restaurants where bushmeat are sold. This result conforms with the findings of Lindsey *et al* (2011) and also that of Lindsey and Bento (2012), which they indicated that, where bushmeat is purchased, buyers tends to be those with cash incomes, such as business people or civil servants, or even government officials.

The result disagrees with the results of Ogoanah and Oboh (2017) which shows that majority of bushmeat consumers were petty traders (94.7%) and private business (3.2%) as a primary occupation.

### 4.1.7 Monthly income

Result in table 4.1a shows that a high proportion (62.50%) of respondents had a monthly income of ₦101000-₦300000 while 22.73% of the respondents had a monthly income of ₦301000-₦500000, 10.23% of the respondents had a monthly income of ₦1-₦100000, 1.14% of the respondents had a monthly income of

₦701000-₦900000 and 1.14% of the respondents had a monthly income of ₦901000-₦1000000 . Mean monthly income of the respondent was ₦262267 (table 4.1b). High monthly income as indicated by the respondents could be accounted for by the generally high literacy level among them which provides the opportunity for a good paying job/business and correspondingly high purchasing power. Hence, the respondents are at advantage to consume highly expensive bushmeat without necessarily compromising their family basic needs. This result is in line with the study of Barnett (2002) who stated that, where bushmeat is purchased in urban areas, buyers are likely to be relatively wealthier than those in rural areas due to the higher prices of bushmeat.

**Table 4.1a: Socio-Economic Characteristics Distribution of Bushmeat Consumers**

| Variables | Freq. | (%) |
|---|---|---|
| **Sex** | | |
| Female | 12 | 13.64 |
| Male | 76 | 86.36 |
| **Age** | | |
| 20-30 | 14 | 15.91 |
| 31-40 | 54 | 61.36 |
| 41-50 | 16 | 18.18 |
| 51-60 | 4 | 4.55 |
| **Marital status** | | |
| Single | 28 | 31.82 |
| Married | 55 | 62.50 |
| Separated | 4 | 4.55 |
| Widowed | 1 | 1.44 |
| **Education level** | | |
| Non-formal | 1 | 1.14 |
| Primary | 1 | 1.14 |
| Secondary | 34 | 38.64 |
| Tertiary | 52 | 59.09 |
| **Household size** | | |
| Small(1-5) | 80 | 90.91 |
| Medium(6-10) | 8 | 9.09 |
| **Major occupation** | | |
| Farmer | 3 | 3.41 |
| Business | 66 | 75.00 |
| Professional | 16 | 18.18 |
| Civil servant | 3 | 3.41 |
| **Monthly income** | | |
| 1000-100000 | 9 | 10.23 |
| 101000-300000 | 55 | 62.50 |
| 301000-500000 | 20 | 22.73 |
| 501000-700000 | 2 | 2.27 |
| 701000-900000 | 1 | 1.14 |
| 901,000-1000000 | 1 | 1.14 |

Field survey, 2022

**Tables 4.1b: Mean of the Socio-Economic Characteristics of correspondents**

| Variable | Mean | Std. Dev. |
|---|---|---|
| Age | 36.41 | 6.98 |
| Household size | 2.98 | 1.70 |
| Income | 262267 | 155760.1 |

Field survey, 2022

## 4.2 Level and Frequency of Demand for Bushmeat

From the result presented in table 4.2, most respondents (79.55%) preferred bushmeat due to it delicious taste, and this is corroborated by the findings of Alarape *et al.* (2017) and Michelle, Effa, Starkey, Wilkie, Abernathy *et al.* (2006) who opined that bushmeat trade is driven by cultural proclivity and that Africans favour wild meat over domestic meat because of it taste and other several reasons and on one hand, bushmeat is traditional African cuisine, and familiarity effectuates preference.

From the results in table 4.2, 19.32% of the respondent indicated their consumption of bushmeat due to health reasons. They indicated that bushmeat is rich in various nutrients that helps the body growth, this claim is also supported by the findings of Dresden (2004) who reported that Africans also find in bushmeat certain properties that are not found in domesticated animals.

The result also shows respondents who consume bushmeat on a weekly (55.68%) and daily (7.95%) basis. 33.23% of the respondents consumes bushmeat occasionally, while 1.14% of the respondent consumes bushmeat seldomly. This result is somewhat related to the findings of Alarape *et al.* (2017) having 34.9% and 32.6% of the correspondent who consume bushmeat on weekly and daily basis respectively. These acts are seriously posing severe threat to the already threatened species of wildlife available by providing suitable justification for hunters to intensify their level of hunting more species frequently so as to be able

to meet the increasing demand of bushmeat consumers in the study area on a constant basis (Alarape *et al.*, 2017). These statements were supported with the fact that constant demands for bushmeat as a commodity has resulted in hunting efforts that go far beyond household needs alone (Bowen-Jones *et al.,* 2002).

Also from the result presented in table 4.2, 6.82% of the respondent preferred their bushmeat boiled, while a much greater percentage, 93.18% preferred their bushmeat smoked.

**Tables 4.2: Frequency distribution of demand for Bushmeat**

| Consumption pattern | Frequency | Percentage (%) |
|---|---|---|
| Daily | 7 | 7.95 |
| Weekly | 49 | 55.68 |
| Occasionally | 31 | 35.23 |
| Seldomly | 1 | 1.14 |
| **Reason for consumption?** | | |
| Health reasons | 17 | 19.32 |
| Taste | 70 | 79.55 |
| Availability | 1 | 1.14 |
| **Preferred bushmeat?** | | |
| Boiled | 6 | 6.82 |
| Smoked | 82 | 93.18 |

Field survey, 2022

## 4.3 Factors Influencing Household Demand for Bushmeat

Result from table 4.3a shows that the major factors influencing household demand for bushmeat were taste (94.3%), price of bush meat (79.6%), income (77.3%) and availability of bush meat (76.1%). The result with R-squared value of 0.65 indicated that 65% variation in the demand for bush meat is explained by the factors in the model. The result has a F-value of 4.64 which shows that the factor is significantly different from zero indicating that the factors highly influenced the demand for bush meat.

Result from table 4.3b shows that taste of the bush meat is significant at 5% with a positive coefficient (312.56) indicating that as that taste of bush meat improves the demand for bush meat also increases. The result also shows that income of the consumer is significant at 1% with a positive coefficient (4049.60) indicating that as income of the consumer increases so also the demand for bush meat. It also shows that availability of bush meat is significant at 10% with a positive coefficient (1398.60) indicating that the higher the availability of the bush meat the higher the demand of the bush meat. This somewhat agrees with factors that actually affect demand of any product which has price of the commodity, substitute good, taste, technology etc.

The result also shows that price was not significant because there was a high preference for bush meat in the study area.

**Table 4.3a: Factor influencing household demand for bushmeat in the study area**

| Factors | No (freq.) | No (%) | Yes (freq.) | Yes (%) |
|---|---|---|---|---|
| Consumer's age | 70 | 79.55 | 18 | 20.45 |
| Taste of bushmeat | 5 | 5.68 | 83 | 94.32 |
| Income | 20 | 22.73 | 68 | 77.27 |
| Culture and tradition | 67 | 76.14 | 21 | 23.86 |
| Price of bushmeat | 18 | 20.45 | 70 | 79.55 |
| Price of other meat | 54 | 61.36 | 34 | 38.64 |
| Availability of bushmeat | 21 | 23.86 | 67 | 76.14 |
| Availability of substitute | 47 | 53.41 | 41 | 46.59 |
| Relation to zoonotic disease | 72 | 81.82 | 16 | 18.18 |

Field survey, 2022

**Table 4.3b: Effect of the above factors on household demand for bushmeat**

| Factors | Coefficient | Std. Err. | t vale | P>\|t\| |
|---|---|---|---|---|
| Consumer's age | -113.17 | 844.44 | -0.13 | 0.90 |
| Taste of bushmeat | 312.56 | 1465.86 | 2.01 | 0.83 |
| Income | 4049.60 | 1313.21 | 3.08 | 0.003 |
| Culture and tradition | -94.10 | 772.62 | -0.12 | 0.90 |
| Price of bushmeat | -597.25 | 1343.01 | -0.44 | -0.66 |
| Price of other meat | -950.68 | 800.32 | -1.19 | 0.24 |
| Availability of bushmeat | 1398.60 | 795.97 | 1.76 | 0.08 |
| Availability of substitute | -450.52 | 753.48 | -0.60 | 0.55 |
| Relation to zoonotic disease | -1710.59 | 856.84 | -2.00 | 0.05 |
| Constant | 13689.81 | 3313.37 | 4.13 | 0.00 |

Field survey, 2022

**Table 4.3c: Result from multiple regression on the factors affecting demand of bushmeat**

| | |
|---|---|
| $R^2$ | 0.65 |
| Adjusted $R^2$ | 0.58 |
| Root MSE | 2933 |
| F(9, 35) | 4.64 |

Field survey, 2022

## 4.4 Price and Income Elasticity of Demand for Bushmeat

The result in table 4.4 indicated the magnitude of the regression coefficient of which also indicate the price elasticity of bushmeat in the study area. The magnitude of price elasticity for bushmeat was -0.44. It is less than 1, thus bushmeat consumption is inelastic in the study area. It demonstrates that 1% change in price of bushmeat will only result to 0.44% change in quantity consumed of bushmeat in the study area. This can be attribute to the taste and preference factor earlier stated, which is a major reason why people consume bushmeat. However, this disagrees with work of James, Julia, and Yaa (2008) on bushmeat demand analysis in Ghana. For their, bushmeat demand was elastic to its own price.

The result also shows that p-value of its own price elasticity was not significant because there was a high preference for bush meat due to taste in the study area.

Also, from the result in table 4.4, the coefficient for income elasticity was 0.58, although inelastic, but tending towards elastic as compared to price elasticity discussed earlier. It connotes that 1% change in the income of the consumer will result to 0.58% change in quantity consumed of bushmeat in the study area. The result also shows that income elasticity of bushmeat in the study area is significant at 1% with a positive coefficient (0.58) indicating that as income of the consumer increases so also the demand for bush meat. This agrees with the

findings of Tamsyn, Noelle, Milner-Gulland, Marcus (2005) indicating that increasing wealth of a growing urban population will greatly increase future demand for bushmeat.

**Table 4.4: price and income elasticity of bushmeat**

| Variables | Coef. | Std. Err. | t value | P>\|t\| |
|---|---|---|---|---|
| lnpBushmeat | -0.44 | 0.33 | 1.34 | 0.18 |
| lnpbeef | -0.02 | 0.02 | -0.90 | 0.37 |
| lnpChicken | 0.01 | 0.02 | 0.73 | 0.47 |
| lnpPork | 0.002 | 0.03 | 0.07 | 0.94 |
| lnpChevon | 0.01 | 0.03 | 0.46 | 0.65 |
| lnpFrozen fish | -0.01 | 0.02 | -0.43 | 0.67 |
| lnpCatfish | 0.07 | 0.02 | 3.28 | 0.002 |
| lnplogturkey | 0.04 | 0.02 | 2.29 | 0.03 |
| lnpIncome | 0.58 | 0.17 | 3.40 | 0.002 |
| Constant | -4.53 | 2.44 | -1.86 | 0.07 |

Field survey, 2022

## 4.5 Household Expenditure Distribution, Budget Share for Bushmeat

Table 4.5a revealed the distribution of household average monthly income and expenditures. The result shows household mean monthly income as ₦349733. The mean result showed that the respondents spent ₦71795.45 on food items monthly, ₦21517.05 on monthly transportation, ₦6433.71 on monthly clothing, ₦15845.59 on monthly rent, 19659.09 on education monthly, 10636.36 on power supply (BEDC, fuel) monthly and ₦139204.5 was saved monthly for the household. The result also showed that other household expenditures amounted ₦36424.24 monthly. From the result, it can be deduced that household mean monthly food expenditure (₦71795.45) account for 20.53% of the household mean monthly income (₦349733), of which bushmeat consumption is part of.

Table 4.5b revealed the mean budget share of bushmeat as 0.27. This implies that for every ₦1 available for food by the household, 27kobo goes for bushmeat, while the remaining 73kobo goes for other food stuff including other protein sources if needed. This reflect high preference for bushmeat as protein source in the study area.

**Table 4.5a: Distribution of household average monthly income and expenditures**

| Expenditure | Mean | % | Std. Dev |
|---|---|---|---|
| Monthly household income | ₦349733 | | 205333.4 |
| Amount on food items monthly | ₦71795.45 | 20.53 | 33404.58 |
| Monthly savings | ₦139204.5 | 39.80 | 95838.36 |
| Monthly spending on transportation | ₦21517.05 | 6.15 | 15375.28 |
| Spending on clothing monthly | ₦6433.71 | 1.84 | 48860.85 |
| Spending on rent monthly | ₦15845.59 | 4.453 | 149209.3 |
| Spending on education monthly | ₦19659.09 | 5.62 | 73190.82 |
| Spending on power (BEDC, fuel) monthly | ₦10636.36 | 3.04 | 6496.563 |
| Other household expenditures | ₦36424.24 | 10.41 | 68553.19 |

Source: Field Survey, 2022.

**Table 4.5b: Budget share for bushmeat**

| Variable | Mean | Std. Dev. |
|---|---|---|
| Bushmeat | 0.27 | 0.03 |

Source: Field Survey, 2022.

## 4.6 Closest Substitute for Bushmeat in the Study Area

**Table 4.5: Distribution of level of preference for the following commodities**

| | Very high | | High | | Moderate | | Little | | No preference | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| **Commodities** | | | | | | | | | | |
| Bushmeat | 32 | 36.36 | 38 | 43.18 | 17 | 19.32 | 1 | 1.14 | - | - |
| Beef | 9 | 10.23 | 29 | 32.95 | 30 | 34.09 | 18 | 20.45 | 2. | 27 |
| Chicken | 21 | 23.86 | 18 | 20.45 | 31 | 35.23 | 16 | 18.18 | 1 | 1.14 |
| Pork | 2 | 2.27 | 8 | 9.09 | 12 | 13.64 | 24 | 27.27 | 42 | 47.73 |
| Chevon | 1 | 1.14 | 11 | 12.50 | 35 | 39.77 | 28 | 31.82 | 13 | 14.77 |
| Frozen fish | 8 | 9.09 | 31 | 35.23 | 32 | 36.36 | 15 | 17.05 | 2 | 2.27 |
| Catfish | 13 | 14.77 | 17 | 19.32 | 27 | 30.68 | 21 | 23.86 | 10 | 11.36 |
| Turkey | 12 | 13.64 | 20 | 22.73 | -40 | 45.45 | 8 | 9.09 | 8 | 9.09 |
| Mutton | - | - | 2 | 2.27 | 14 | 15.91 | 39 | 44.32 | 33 | 37.50 |

Field survey, 2022

The result from table 4.6 above shows that bushmeat had outstanding preference by the correspondents in the study area. It had a cumulative 79.54% of very high (36.39%) and high (43.18%) preference. Next to it, although with a large gap, was chicken, with a cumulative preference frequency of 44.45% (very high-23.86%, high-20.45%). Closely followed by frozen fish, having cumulative frequency of 44.32% (very high-9.09%, high-35.23%).

Thus, in the study area with such high preference for bushmeat, the closest substitute to it will be chicken, closely followed by frozen fish. This result is similar to the work of Brashares *et al* (2004), having frozen fish as closest substitute to bushmeat in Ghana, different from the research work of McNamara *et al*. (2019) on bushmeat demand analysis in Ghana. For theirs, beef was the closest substitute.

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATION

## 5.1 SUMMARY

This empirical study was carried out to analyse the demand for bushmeat in Edo-South Agro-ecological zone, Edo state, Nigeria. To achieve the main objective, specific objectives were ploughed out, which included: to ascertain the socio-economic characteristics of bushmeat consumers in the study area, determine the level and frequency of their demand for bushmeat, identify factors influencing household demand for bushmeat, determine the effect of these factors on household demand for bushmeat, estimate the price and income elasticity of demand, estimate the household expenditure for bushmeat in the study area, as well as identifying the closest substitute for bushmeat in the study area.

A two-stage sampling procedure was used for the study. The first stage involved a purposive sampling of two Local government areas, due to the prevalence of bushmeat consumption and presence of natural vegetative area/forest which is habitat for wildlife. Second stage was simple random sampling of correspondents from each local government.

Primary data for the study were collected through the use of well-structured questionnaire and interview schedule conducted among bushmeat consumers in the study area. Data collected were analysed using simple descriptive statistics such as frequency counts, percentages, mean and standard deviation. Also price

and income elasticity of demand for bushmeat in the study area were considered. Multiple regression was used to determine the effect of the identified factors on household demand for bushmeat. Budget share was used to estimate the household expenditure for bushmeat.

The study indicated that 86.36% of the respondents were males while 13.64% accounted to be females. The mean age of bushmeat consumers in the study area was 36years, indicating the middle-age people demanded bushmeat more in the study area. Majority of the respondents (62.50%) were married, having small family size (1-5 members) as majority. The result also showed that majority of the respondent (59.09%) had tertiary education, followed by those who had secondary education (38.64%). Majority of the respondents (75%) do business with mean monthly income of ₦262267, and mean monthly household income of ₦349733.

The result also showed that majority of the correspondents consumed bushmeat weekly (55.68%) preferred it smoked (93.18%) and they consume it majorly because of the taste (79.55%).

The major factors influencing household demand for bushmeat were taste (94.3%), price of bush meat (79.6%), income (77.3%) and availability of bush meat (76.1%).

The R-squared value for the factors of demand was 0.65 indicating that 65% variation in the demand for bush meat was explained by the factors in the

regression model. The result has a F-value of 4.64 which shows that the factor was significantly different from zero indicating that the factors highly influenced the demand for bush meat.

The Result also indicated that taste of the bush meat was significant at 5% with a positive coefficient (312.56) indicating that as that taste of bush meat improves, the demand for bush meat also increases; while income of the consumer was significant at 1% with a positive coefficient (4049.60) indicating that as income of the consumer increases so also the demand for bush meat. The availability of bush meat factor was significant at 10% with a positive coefficient (1398.60) indicating that the higher the availability of the bush meat the higher the demand of the bush meat. The factor, price of bushmeat was not significant because there was a high preference for bush meat in the study area.

The price elasticity for bushmeat was inelastic with regression coefficient of -0.44.The income elasticity was 0.58, although inelastic, but tending towards elastic as compared to price elasticity. The income elasticity was significant at 1% with a positive coefficient (0.58) indicating that as income of the consumer increases so also the demand for bush meat.

The mean result showed that the respondents spent ₦71795.45 on food items monthly, ₦21517.05 on monthly transportation, ₦6433.71 on monthly clothing, ₦15845.59 on monthly rent, 19659.09 on education monthly, 10636.36 on power

supply (BEDC, fuel) monthly, ₦139204.5 was saved monthly for the household, while ₦36424.24 for other household expenditures. From the result, it can be deduced that household mean monthly food expenditure (₦71795.45) account for 20.5% of the household mean monthly income (₦349733), of which bushmeat consumption is part of. The result also showed that the household mean budget share of bushmeat as 0.27. This implies that for every ₦1 available for food by the household, 27kobo goes for bushmeat, while the remaining 73kobo goes for other food stuff including other protein sources if needed. This reflect high preference for bushmeat as protein source in the study area.

Among meat options, bushmeat had outstanding preference by the correspondents in the study area, a cumulative 79.54% of very high (36.39%) and high (43.18%) preference. Next to it was chicken, with a cumulative preference frequency of 44.45% (very high-23.86%, high-20.45%), Closely followed by frozen fish, having cumulative frequency of 44.32% (very high-9.09%, high-35.23%).

## 5.2 CONCLUSION

The study indicated that bushmeat consumers in Edo-south agro-ecological zone were highly literate and had jobs/businesses that provided a steady source of income to patronize bushmeat frequently. Also, the bushmeat consumers in the

study area were of small household size which could be crucial to the availability of income to purchase bushmeat.

The major factors influencing household demand for bushmeat were taste, price of bush meat, income and availability of the bush meat. The preference for bushmeat in the study area was greatly because of taste.

Since price elasticity of demand for bushmeat in the study was inelastic, increase in price will give a less than proportionate decrease in demand, which in-turn gives hunters/traders incentives to intensify their level of hunting/increase prices more frequently, posing severe threat to the already threatened species of wildlife available.

The income elasticity was although inelastic, but tending towards elastic as compared to price elasticity with a positive coefficient (0.58) indicating that as income of the consumer increases so also the demand for bush meat.

## 5.3 RECOMMENDATION

Based on the result, the following recommendations are proffered:

I. In order to meet the increasing demand for bushmeat and to halt the unsustainable exploitation of wild animals for bushmeat, wild species domestication (e.g. grasscutter production) should be encouraged in the study area. This can be done through interventions/programmes of extension/change agents geared towards educating the farmers in the study area about the prospect and viability of wildlife/bushmeat production (e.g. grasscutter production). Government/NGOs interventions will also be of tremendous help in terms of giving low-interest loans/grants to interested farmers, provision of/access to starter breeds, etc.

II. Given that chicken is the closest substitute in the study area, poultry farmer in the study area can be oriented of this prospect (through extension agents) and encouraged to increase production and availability. This encouragement could be in forms of provision of low-interest loans/grants to the farmers by the government/NGOs, change agents programmes geared towards educating the farmers on better production methods/techniques etc.

III. Since availability was a major factor affecting the demand of bushmeat in the study area, efforts should be made to restrict/minimize its availability, thereby driving consumers attention to other substitutes. This will help in reducing the unsustainable exploitation of wild animals. Enforcement of efforts to reduce illegal poaching, e.g –anti poaching patrols carried out under the authority of protected area managers will be of great recommendation.

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**RESEARCH QUESTIONNAIRE**

**DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION SERVICES**
**FACULTY OF AGRICULTURE**
**UNIVERSITY OF BENIN**
**BENIN CITY, EDO STATE, NIGERIA.**

Dear Sir/Ma,

I am a 500-level student of the above-named institution carrying out a research on the topic: "**Demand Analysis of Bushmeat in Edo-South Agro-Ecological Zone, Edo State, Nigeria."**

I kindly solicit your help in carrying out this project by providing sincere answers to the following questions, and ticking where appropriate. The information you provide are to be used strictly for academic purposes, thus will be treated with utmost confidentiality.

Thanks, your keen cooperation is held of great esteem.

Yours Sincerely,

Aimuamwosa Miracle EWERE

**INSTRUCTION: Please tick (√) in the boxes provided below, and write where applicable.**

**SECTION A: SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENT**

Name of Local Government Area: _____

Name of the community: _____

1. Sex of respondent: (a) Male [ ] (b) Female [ ].
2. Age of respondent: _____
3. Marital status: (a) Single [ ] (b) Married [ ] (c) Separated [ ] (d) Divorced [ ]

(e) Widowed [ ].

4. Level of Education completed: (a) Non-formal education [ ] (b) Primary [ ] (c) Secondary [ ] (d) Tertiary [ ] (e) others (specify)
5. What is your major occupation:_____
6. Monthly income:_____
7. What is your Household size: _____
8. Occupation of spouse: _____
9. Monthly income of spouse: _____
10. Monthly income of household head: _____
11. Please specify the monthly income of other employed members of the household (in naira):

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| | | | | | |

**SECTION B: HOUSEHOLD EXPENDITURE**

1. What is the total monthly income of the household?: _____
2. What is the household's monthly expenditure on food?: _____
3. What is the household's monthly savings?_____
4. What is the household's yearly clothing expenditure?_____
5. What is the household's yearly housing expenditure? _____
6. What is the household's expenditure on education (every 3 months)? _____
7. Other household's expenditure:_____

**SECTION C: DEMAND FOR BUSHMEAT**

1. Do you eat bushmeat? (a) Yes [ ] (b) No [ ]
2. How often do you eat bushmeat? (a) daily [ ] (b) weekly [ ] (c) occasionally [ ] (d) seldomly [ ]
3. How do you prefer your bushmeat? (a) smoked [ ] (b) boiled [ ] (c) fried [ ] (d) others (specify)_____
4. Why do you eat bushmeat? (a) Health reasons [ ] (b) taste [ ] (c) price [ ] (d) others (specify)_____
5. Consumption pattern

| Commodity (Bushmeat and its substitutes) | Quantity or unit purchased per week | Unit price of commodity (₦) | Weekly expenditure on commodity (₦) |
|---|---|---|---|
| Bushmeat | | | |
| Beef | | | |
| Chicken | | | |

| | | | |
|---|---|---|---|
| Pork | | | |
| Chevon (Goat Meat) | | | |
| Frozen Fish | | | |
| Catfish | | | |
| Turkey | | | |
| Mutton (Ram meat) | | | |
| Others (specify) | | | |
| | | | |

**SECTION D: FACTORS THAT AFFECT YOUR DEMAND AND CONSUMPTION OF BUSHMEAT**

**Do the following factors affect your demand for bushmeat?**

| **Factors** | **Yes** | **No** |
|---|---|---|
| Your Age | | |
| Taste of bushmeat | | |
| Income | | |
| Culture and tradition | | |
| Price of bushmeat | | |
| Price of other meat | | |
| It's availability | | |
| Availability of substitute | | |
| Relation to zoonotic disease | | |
| Others (specify) | | |
| | | |
| | | |

**SECTION E: LEVEL OF PREFERENCE FOR THE FOLLOWING COMMODITIES**

| **Commodity** | **Very high preference** | **High preference** | **Moderate preference** | **Little preference** | **No preference** |
|---|---|---|---|---|---|
| Bushmeat | | | | | |
| Beef | | | | | |
| Chicken | | | | | |
| Pork | | | | | |
| Chevon (Goat Meat) | | | | | |
| Frozen Fish | | | | | |
| Catfish | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Turkey | | | | | |
| Mutton (Ram meat) | | | | | |
| Others (specify) | | | | | |

APPENDIX

**Fig 1: Freshly-hunted wild animals**

**Fig 2: Smoked Bushmeat**